African Journal of Social and Behavioural Sciences (AJSBS)
Volume 15, Number 10 (2025) ISSN: 2141-209X

AWARENESS, MOTIVATIONS AND USAGE CHALLENGES OF MOBILE HEALTH APPLICATIONS AMONG CIVIL SERVANTS IN ANAMBRA STATE

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ABSTRACT: Globally, digital technologies are increasingly becoming key enablers of new forms of service delivery in every sector of society, including the healthcare industry. Anchored on diffusion of innovations theory, this study investigates awareness, motivations and usage challenges of mobile health applications among civil servants in Anambra State, Nigeria. A convergent parallel design, a mixed-methods approach encompassing surveys and in-depth interviews, was adopted. A sample size of 378 civil servants from 37 ministries, departments, and agencies was determined using Cochran's formula, but only 370 responses were returned and analysed. Quantitative data were obtained using a structured questionnaire, while qualitative data were collected from (n=10) purposively selected participants, using in-depth interviews. Quantitative data analyses adopted descriptive statistics, while qualitative data were analysed thematically. Survey findings showed that civil servants in Anambra State are fairly aware of m-health apps and motivated to use them for healthcare services, based on their perceived usefulness and ease in meeting users' healthcare needs. In-depth interviews revealed a higher degree of awareness and additional motivations, such as the ability of m-health apps to help users keep health records. Limited technical skills and knowledge of m-health app procedures, poor internet connectivity, rising data subscription costs, and concerns about data privacy were identified as barriers. We conclude that civil servants in Anambra State recognise the potential of m-health apps for improving healthcare access and recommend supportive health policies, targeted marketing campaigns, the development of secure apps, and enhanced digital skills to increase awareness and motivation.

Keywords: Mobile health applications, m-health, healthcare services, civil servants, awareness, motivations, challenges, Anambra state, Nigeria

INTRODUCTION

Nowadays, the growth and penetration of digital technologies, encompassing: the Internet, social media, smartphones, computers, electronic wearable devices, Artificial Intelligence (AI), and mobile health applications (m-health apps), influence significant growth in the health sector, particularly, in developing countries (Hoque et al., 2017, as cited in Gu et al., 2021); by promoting public health (Kreps, 2017), providing efficient, cost-effective and high-quality healthcare services (Blumenthal & Glaser, 2007, as cited in Gu et al., 2021); and offering greater choices and control to users, regarding information-seeking, unlike the traditional media (Dunu et al., 2015).

Consequently, McQuail (2010) designates the Internet and digital media as "technologies of freedom" that boost seamless connectivity and creation of shared communication, including health communication.

Specifically, Rouse (2018) defines m-health apps as 'software' programs and digital assets that provide health-related services, comprising: patients monitoring, health tracking and remote consultations with medical experts, when downloaded, on-demand, and installed on computers, smartphones, and electronic wearable devices. Despite evolving usage challenges: limited technical skills, infrastructural issues, and operational barriers, Banjoko and Banjoko (2008) argued that many Nigerians are already engaging with e-health, seeking health information, interacting with healthcare providers online, via social media, and participating in online health communities. Hence, a robust network of e-health solutions exists in Nigeria's social media spaces: Facebook, X/Twitter, WhatsApp, LinkedIn, Instagram, Telegram, and YouTube. These platforms offer health-related services to subscribers and enhance health communication within healthcare organisations and between medical experts and patients (Shah, 2025), including civil servants, who can now access healthcare conveniently from their homes or offices, using digital health devices; thereby, reducing the stress of long queues at medical facilities.

Civil servants are employees who perform managerial, administrative, and professional services in government organisations, ministries, departments and agencies. They are indeed central to the administration and economic development of every nation and state; thus, Akinyemi et al. (2021) advocate the provision of easy access to quality, affordable, and accessible healthcare for them, for better, more effective, and more efficient delivery of civil services. Significantly, numerous studies have examined e-health awareness and utilisation of m-health technologies among different populations and across cultures (e.g. Kayyali et al., 2017; Adum & Ejiofor, 2020; Nzekwe & Abaneme, 2021; Ezema, 2021); but, the awareness, motivations and usage challenges of m-health apps among civil servants in Anambra State, Nigeria are, arguably, underexplored, hence, this study.

Research Problem

Digital health technologies, comprising m-health apps, are creating a paradigm shift in how health consumers and medical experts exchange health-related information, from traditional models (paper-based records and face-to-face consultations) to a digital healthcare model, regardless of geographical constraints (Rauv, 2017). Smith (2019) describes this shift as "a passage from industrial-age medicine to information-age healthcare".

Electronic health (e-health), health informatics, mobile health (m-health) or telemedicine devices (Ukwueze & Osuala, 2020; Uzochukwu & Izunwanne, 2021), can improve access to personalised health monitoring and help health consumers (e.g. civil servants) connect and consult with healthcare providers more effectively, via video conferencing, online discussions, and real-time meeting capabilities (Obayi et al., 2021; Herrick et al., 2024).

However, health consumers may be apprehensive about using m-health apps due to potential challenges, including high internet subscription costs, limited technical knowledge of digital

technologies, privacy concerns, misinformation, fear of incorrect prescriptions, inadequate emotional engagement with care providers on the apps, and frequent network failures. In Nigeria, the lack of accessible, affordable healthcare, coupled with limited government initiatives to bring healthcare closer to citizens, may have contributed to some of the country's poorest health indicators. One viable solution to improve healthcare access, particularly for civil servants, is the integration and adoption of digital health technologies, specifically m-health apps, into healthcare delivery (European Union Report, 2018). To address this problem, this study employs a convergent parallel design, combining quantitative and qualitative methods concurrently, to investigate awareness, motivations, and usage challenges of m-health applications among civil servants in Anambra State.

Objectives of the Study

This study aims to interrogate awareness, motivations and challenges of using m-health apps for healthcare services among civil servants in Anambra State. The specific objectives are:

1. To examine the level of awareness of m-health applications among civil servants in Anambra State,
2. To identify the factors that motivate civil servants in Anambra State to use m-health applications for healthcare services, and
3. To explore the challenges of using m-health apps for healthcare services among civil servants in Anambra State.

CONCEPTUAL LITERATURE REVIEW

Understanding Users' Awareness of E-Health, M-Health, and M-Health Apps

Generally, e-health technologies, including m-health apps, have gained significant popularity; they can improve access to quality healthcare services, particularly for individuals living in remote areas, those with limited mobility, and those with chronic health conditions that require continuous care (Umeike et al., 2023). With the ubiquity of smartphones and digital devices, e-health, specifically, m-health apps are now parts of healthcare delivery (Eikey & Poole, 2014); implying that health consumers, in developed and developing nations, have access to e-health; and perhaps, they have now realized what they can do with e-health technologies, regarding their health, as ownership of smartphones and other ICT devices is also rising, mainly, in developed nations (Singh & Landman, 2017).

Compared with developed countries, the strategic value of e-health is more relevant in developing countries, where access to essential healthcare services is invariably limited by weak government policies and inadequate technology infrastructure (Omary et al., 2010). In these regions, studies have shown that awareness and adoption rates of e-health technologies are relatively low, usually as a result of a lack of motivation to use the apps consistently, unlike in developed economies with advancement in technologies and healthcare infrastructure (Woldaregay et al., 2018). Quantitatively, adoption of m-health technologies in high-income countries exceeds 60%, compared to 20% in middle and low-income countries, a disparity largely attributed to better

awareness and understanding of m-health systems in high-income nations (Feroz et al., 2018). Thus, Uzochukwu and Izunwanne (2021, p. 17) emphasise that media literacy, particularly knowledge of ICTs and their use in healthcare, is essential for mainstreaming m-health applications.

Commonly, in developing nations, a high rate of illiteracy among both health workers and patients poses a major barrier to m-health adoption (Uzochukwu & Izunwanne, 2021); and lack of knowledge of digital technologies and absence of ICT education contribute to low awareness and adoption of m-health technologies (Asemahagn, 2015, as cited in Uzochukwu & Izunwanne, 2021). Particularly, in Nigeria, literature indicates that e-health, including m-health apps, is a relatively new concept (Egbuna, 2016). Consequently, Adum and Ejiofor (2020) reported low awareness and poor utilisation of mobile health applications among staff at Nnamdi Azikiwe University, Awka, Anambra State, due to high internet costs, limited awareness campaigns, limited technical know-how, and a preference for face-to-face consultations.

Identifying the Motivations for Using M-Health Apps

Eikey et al. (2014) identified five primary motivational factors for mobile health app use. They are: functionality (ease of use and quick information entry), social connection (ability to seek support, compete, or interact with others), consumption consciousness (capacity to track health activities such as caloric intake or water consumption), surveillance (tools for monitoring health metrics, e.g. sleep hours), and exercise consciousness (integration with physical activity tracking and fitness goals). Similarly, Woldaregay et al. (2018) maintain that user perspectives and apps' design elements influence motivations, stressing that apps must address privacy and trust concerns, meet individuals' needs, and provide reliable and structured information; as well as save time, have an intuitive design, personalised instructions, and data-sharing capabilities (Mendiola et al., 2015).

According to Xie and Or (2023), key motivational factors for m-health app acceptance include: app cost, security and privacy assurances, ease of use and usefulness, low data and storage requirements, and endorsements by healthcare professionals. Marvel et al. (2022) underscored factors, such as operability, privacy, security, and content quality in app design. However, Scheibe et al. (2015), as cited in Woldaregay et al. (2018), identified lack of additional benefits, lack of individually tailored features, and inability of m-health apps to guarantee ease of use as crucial deterrent effects; while Xie and Or (2023) further noted that many health apps are abandoned due to mismatched consumer preferences.

The Usage Challenges of M-Health Applications

Despite the merits of digital health technologies, there are risks of inaccurate information and ethical issues regarding privacy and data security concerns (Aungst et al., 2022); poor media literacy and technical skill, cultural and language barriers, and high costs of data subscription (Latif et al., 2017). Giebel et al. (2023) categorise barriers into ten: validity, usability, technology, use and adherence, data privacy and security, patient-physician relationship, knowledge and skills, individuality, implementation, and costs.

Other risks are: misinterpreted data, wrong advice, and interference with treatment (AI and the LinkedIn Community Report, 2024). Generally, technological innovations, such as cloud computing, can enhance effectiveness, but challenges, such as inconsistent power supply, weak ICT infrastructure, and interoperability issues, persist in developing countries (Istepanian, 2022). Similarly, Ezema (2021) highlights that users of mobile phones in southeast Nigeria are often unaware of telemedicine services, due to insufficient media campaigns. These challenges clearly reflect a broader reluctance in developing countries to embrace new technologies, compounded by limited and unwilling governments' investments in technologies and, indeed, healthcare (Dunu et al., 2017).

In Nigeria, while small-scale telemedicine projects have been implemented, most of the initiatives, mainly driven by the private sectors, have failed, because of scarce funding, lack of skilled personnel, and poor national strategy; resulting to Nigeria's poor health indicators, with a life expectancy of approximately 52 years, maternal mortality of 576 per 100,000 live births, and under-five mortality of 128 per 1,000 live births (European Union Report, 2018).

Review of Empirical Studies

Adum and Ejiofor (2020) explored awareness and utilisation of mobile health applications among teaching and non-teaching staff at Nnamdi Azikiwe University, Awka. Anchored on the health belief model and diffusion of innovation theory, the study adopted a survey method, using a questionnaire to collect data from 360 respondents. Findings indicated low awareness and utilisation of m-health apps, and respondents expressed both positive and negative attitudes towards the apps. Barriers identified included: high internet costs, limited knowledge of m-health applications, lack of practical know-how, and a preference for face-to-face medical consultations. The study recommended that government policies should support m-health adoption. The study is similar to the current study on awareness and setting, but it varies in population and purpose. The current study investigates awareness, motivations, and usage challenges of m-health apps among civil servants in Anambra State.

Aljedaani et al. (2021) assessed end-user security awareness regarding m-health apps in Saudi Arabia, using data from 101 users. Findings revealed that although users had the requisite knowledge, they often failed to adopt appropriate security behaviours; thus, putting their health data at risk. The study emphasised that m-health providers should promote multi-step authentication measures and organise security training for best practice. Unlike the current study, which probes awareness, motivations, and challenges of m-health apps, the study concentrated heavily on security awareness and behaviour among end-users of m-health apps.

Jembai et al. (2022) evaluated awareness, attitudes, practices, and motivational factors for m-health apps usage among 739 medical students at Universiti Malaysia Sarawak. Using a validated questionnaire in a cross-sectional design, the researchers found that attitudes towards m-health apps were generally favourable, with higher usage for COVID-19 management apps, compared to medical education and fitness apps, and usage was significantly associated with awareness and attitudes. However, the current research emphasises a broader task, by interrogating awareness, motivations and usage challenges of m-health apps among civil servants in Anambra State, Nigeria.

Assaye et al. (2022) assessed knowledge and awareness of telemedicine services among 423 health professionals in Northwest Ethiopia. The study used an institution-based cross-sectional design with descriptive statistics and logistic regression to analyse data. Findings revealed that factors such as IT support, internet availability, training, and computer access significantly influenced awareness, and over half of the participants demonstrated high awareness. The current study, though, is similar in evaluating awareness of e-health technologies, but it has a different setting and focuses on health consumers' experiences with m-health apps, rather than healthcare providers.

Shekoni et al. (2024) investigated healthcare workers' perceptions of mobile health technologies in Lagos, Nigeria, using a qualitative design, with six focus group discussions involving 26 healthcare professionals. The study identified usage barriers, as follows: routine disruption, information overload, network failures, scepticism, lack of trust, and concerns over diagnostic accuracy. Differently, the current study examines awareness, motivations, and usage challenges of m-health apps among civil servants in Anambra State, Nigeria, using a mixed-method design.

Alipour et al. (2025) examined awareness, attitudes, and obstacles to using m-health apps among 267 nurses in south-eastern Iran. Employing a descriptive-analytical cross-sectional design with a researcher-made questionnaire, the study found that most nurses owned smartphones and recognised the usefulness of m-health, yet 70.8% did not use the apps for patient care. Awareness was positively correlated with attitude, while attitude was negatively correlated with obstacles. While the study centred on healthcare providers using the survey method, the current study focuses on health consumers, using a survey and in-depth interview methods.

Based on extant conceptual and empirical facts, awareness, motivations, and usage challenges of m-health apps vary contextually and across populations. In developing nations, particularly in Nigeria, m-health apps are relatively new concepts. In these climes, health consumers are gradually aware of medical apps, given the rise in internet diffusion and smartphone ownership, but their awareness has remained low. Even as users could be motivated to embrace these apps for healthcare services, there are challenges. To address the existing gaps, this paper interrogates the extent of awareness of m-health apps, specifically, among civil servants in Anambra State, Nigeria, the factors that actually influenced usage of the apps, and the key usage challenges that users encounter.

Theoretical Framework

Diffusion of Innovation Theory (DIT)

The Diffusion of Innovation Theory (DIT) explains the gradual process by which people in society, such as civil servants in Anambra State, become aware of new products, ideas, or technologies, including m-health apps. It describes how awareness and adoption of innovations spread across different layers of society, from those who are aware and proficient, to those who are unaware or resistant; it emphasises how innovations gain momentum and spread within a social system, rather than the direct influence of technology on individuals (Dunu et al., 2017; Dearing & Cox, 2018).

Developed by E. M. Rogers in 1962, DIT is also referred to as information-flow theory, which examines how information moves from media to audiences, achieving specific effects, while

innovation diffusion theory focuses on how innovations are introduced and adopted by communities (Baran & Davis, 2006); these innovations go through a series of stages before being widely adopted. Initially, most people become aware of the innovation through mass media. Early adopters and innovators experiment with the innovations, followed by opinion leaders who influence their peers. Eventually, the majority adopts the innovation, and laggards, who are highly resistant to change, adopt it last. Rogers (1962) further categorises adopters into: innovators, early adopters, early majority, late majority, and laggards. Innovators are risk-takers and first movers, while early adopters serve as opinion leaders who encourage others to follow. The early majority requires evidence of effectiveness before adoption; the late majority is sceptical and adopts only after the majority has tried the innovations; and laggards are highly resistant to change, invariably clinging to traditional practices.

Rogers (2003), as cited in Uzochukwu and Izunwanne (2021) also describes the individual adoption process, termed the innovation-decision process, in five stages: knowledge, persuasion, decision, implementation, and confirmation. The knowledge stage involves initial exposure; the persuasion stage involves active information-seeking; the decision stage is when individuals weigh gains and demerits, as well as, available motivational factors, to determine whether or not, to adopt the innovation; the implementation stage is the practical use and assessment of the innovation, and confirmation stage is when the individual affirms the decision to continue using an innovation.

Tersely, diffusion of innovation theory illustrates and describes how m-health applications are communicated to and gradually adopted by civil servants in Anambra State (the laggards), over time, through social influence of those who are aware (the innovators), social marketing, media campaigns and information dissemination, role plays, education programs, and other available and accessible communication channels, while emphasising certain motivational elements. In a nutshell, DIT affords a *'sociological approach'* into how m-health apps, being new innovations and concepts, can become publicly recognised and accepted among civil servants in Anambra State, for healthcare services.

METHODOLOGY

This study adopted a 'mixed-method' research design- a concurrent combination of quantitative and qualitative research designs, basically, to compare research outcomes. For quantitative research design, the survey method was adopted to achieve randomisation and generalise findings, while the qualitative design espoused an in-depth interview method, using an in-depth interview guide, to gain a detailed understanding of the research problem. The setting is Anambra State, Nigeria, one of the five states in the south-east geopolitical zone, selected for Nigeria's fibre optic Internet broadband plan, an opportunity that could allow a significant rate of Internet penetration in the state (Agboje et al., 2017); and increase the propensity for access to healthcare, via m-health apps. The population studied comprised all civil servants at the Anambra State Government Secretariat, Awka, estimated at 12,063, as obtained from the Office of the Head of Service of Anambra State, based on the Active Staff Verification Exercise (ASVE). To determine sample size, for the required level of precision and confidence level, the Cochran's (1963) formula, as cited in Ezema (2021), was adopted. The formula is suitable for a large population that is certain (see Nanjundeswaraswamy & Divakar, 2021), as represented thus:

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

Wherein:

n = Sample size;

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 follows:

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

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

Given that the target population is large and includes ministries, agencies, and departments, sample units were selected from the subgroups. Hence, to select sample units and ensure that all units had an equal chance of being selected for the study, a simple random sampling technique was adopted.

The procedure involved a Balloting System Without Replacement (BSWOR); thereafter, ten (10) ministries and departments were selected, as shown below.

Table 1: 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*

A proportionate-to-size sampling approach was adopted to allocate samples and distribute questionnaires across the selected units. A sample was drawn from each subgroup, within the aggregate population, in an appropriate proportion or percentage, to represent each sub-population. The percentage or proportion was calculated thus:

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

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 the study.

To select sample size for In-Depth Interview (IDI), a non-probability sampling technique was adopted; and (n=10) civil servants were purposively selected and interviewed, based on defined characteristics (see LeCompte & Preissle, 1993); 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 by physical administration of 378 copies of questionnaires to the respondents, for survey, but 370 responses validly returned and analysed; and second, in-depth interviews, which involved herculean processes of booking appointments, timed data recording and immediate transcription of recorded data, to avoid loss. Data analyses comprised quantitative and qualitative methods. Quantitative data (survey) were analysed using descriptive statistics, such as simple percentages, and presented using statistical frequency tables and pie charts. Qualitative data generated via IDI were presented, using a narrative presentation style and thematically analysed.

RESULTS

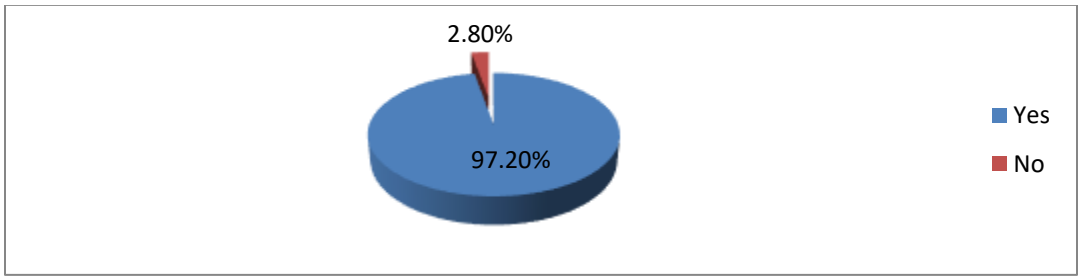

Figure 1: Respondents' Awareness of Mobile Health Applications

Source: Field survey, 2025

In Figure 1, a total of 360 respondents, representing 97.2% of 370 respondents (number of returned questionnaire), indicated *Yes*, that they were aware of mobile health applications, while only 10 or 2.8% of the respondents, indicated *No*, that they were not aware. This result shows that the majority of civil servants in Anambra State, are aware of m-health apps.

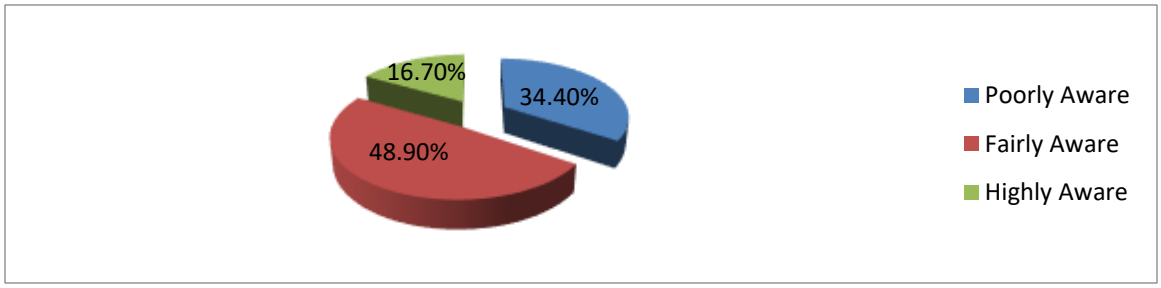

Figure 2: Respondents' Level of Awareness of Mobile Health Applications

Source: Field survey, 2025

In Figure 2, further analysis of the 360 respondents who were aware of m-health apps, revealed that 176 (48.9%) reported being fairly aware of m-health apps, 124 (34.4%) indicated poor awareness, while only 60 (16.7%) stated, highly aware. This suggests that although there is cognisance of m-health applications, the level of awareness remains moderate- neither low nor high. However, IDI responses are presented, as recorded and transcribed. See extracts below:

From interviewee 1,

> I am aware of mobile health apps, and there are lots of them, but I am very much aware of only one. It is called *Ovulation Calculator*, or Menstruation Calculator, either of those…

From interviewee 2,

> I would say, I knew about m-health apps 'a long time ago', when my mum was alive, but that wasn't on phone apps. There is this tiny stuff that you can carry around and wear, and the rest is being where you can calculate it with colours, and what it stands for. She handed it over to me, and it was easy for me to monitor, and calculate at any point in time, especially, as a young growing girl in Nigeria. Now; that we have the apps on our phones. Since I got to know about that, they have been helpful….

From interviewee 3,

> ….I have always known about mobile health apps, as far back as 2020, since I started using Android phones efficiently. Any good Samsung user knows about *Samsung health*, used for tracking heart rate, steps, cholesterol and help check weight, monitor health status, blood pressure and vital signs. Another app I am conversant with is Period Tracker, for checking female menstruation; it helps a woman keep track of her period, when the time is drawing near, and it acts as a 'reminder' for a woman…. I am much aware because I understand how to use smartphones, especially my first Samsung phone, which exposed me to health tips.

From interviewee 4,

> …I am aware of mobile health apps. That period people were told to stay indoors and most hospitals and clinics were almost deserted because a pandemic, COVID-19 time, in 2020. I was browsing the Internet, my Facebook, and I read about the health talks and how to manage one's health using apps. I got health apps on Google Play Store, and downloaded one. I had also watched a health programme on Channels TV, where one Dr Richard Okoye of Save-A-Life Foundation was talking about m-health apps. I was moved by his endorsement. I have been aware for about five years now. I have *DrSavealife* mobile health app. There are other apps, like Omomi, usually for pregnant women and childcare, and Mypaddi app, used for sexual health management. My awareness of health apps is okay….

From interviewee 5,

> I am aware of m-health applications, but quite limited. I have come across a few health apps through social media ads. I cannot really say, for how long. I have heard about MyFitnessPal and Google Fit. I know they are meant to help people track their health or consult with medical professionals online, but that is about as far as my knowledge goes. My limited awareness might be because I have not had a major health issue that require me to look for digital alternatives. Also, there is not much promotion or guidance about these apps in my environment…

From interviewee 6,

> I am well aware of m-health apps, over five years. I understand their functions, such as: Health line, MyFitnessPal, Ada, Babylon Health, Samsung Health, and Medscape. My awareness is good. The reason for my high awareness is largely due my access to smartphones, growing digital literacy, and the visibility of these apps through app stores, also health-focused advertising. The COVID-19 pandemic era prompted me more, to explore these apps. Some of the apps were even recommended during routine medical check-ups or by peers in online forums. Social media has played a huge role too in raising awareness through health influencers…. Low awareness may stem from digital illiteracy, lack of internet access, or trust issues with digital health platforms.

From interviewee 7,

> I am aware of mobile health apps, about four years ago, when I started looking for ways to manage stress. I am aware of different m-health apps, including: DoctorCare, Fitbit, Calm, 1mg (India-based), Teladoc, and Doxy.me.
>
> These apps help for remote doctor consultations, mental health support, medication tracking, and even chronic disease management. My awareness is fair. I know how these apps function, the kind of data they collect, and the healthcare solutions they offer. I believe the rising smartphone penetration, and the gradual shift towards digital healthcare models have contributed to high awareness among urban and educated users, like me. Low awareness in could be due to digital divide issues, lack of smartphones, technical skills or literacy, or scepticism about using virtual healthcare tools.

From interviewee 8,

> I am not totally aware of mobile health applications. I have heard of them, but I have not explored them in-depth. My awareness began about one to two years ago, mostly through my friends. Occasionally, I see social media advertisements about m-health apps. I am aware of: MyFitnessPal, Health line, and Samsung Health, but I am not too familiar with how they function or the services they offer. Limited awareness like mine could be due to a lack of adequate exposure, or insufficient health education about digital health…

From interviewee 9,

> I am aware of mobile health applications. I first learned about them through YouTube health channels. In fact, I have been aware of them for a long time, about five to six years now. I am familiar with a variety of these apps, including: Medscape, Ada Health, Pill Reminder, Fit-On, and even online Pharmacy apps, like Health-Plus. I know what they do, how to use them, and which ones are better suited

> for specific health needs, like consultations, fitness tracking, or medication scheduling. I actively follow updates, explore new apps, and read reviews. I am digitally active, health-conscious, or have had health needs that require remote support. The low awareness some people face could be due to limited digital access or a lack of trust in technology.

From interviewee 10,

> Honestly, I am not very aware of mobile health applications. I have never really heard much about them in detail, and I have not come across anyone in my immediate environment, actively using such apps for healthcare. However, I have seen and accessed health-related ads online, but I did not realize they were part of something called 'm-health apps'.... so, I have poor awareness, due to limited exposure to digital health awareness.

Findings from in-depth interviews provide richer insights into respondents' awareness of m-health applications. The interviewees generally demonstrated higher level of awareness, compared to the survey results. Most participants were familiar with a range of m-health applications, particularly those related to reproductive health, fitness tracking, chronic disease management, symptom checking, and consultations, but frequently mentioned apps were: Ovulation Calculator, My Calendar, Flow, Period Tracker, Samsung Health, MyFitnessPal, Ada Health, Medscape, Fitbit, Calm, and DrSavealife. The majority of the interviewees traced their awareness to increased smartphone use, exposure through apps' stores, social media, health campaigns, and, notably, the COVID-19 pandemic, which intensified interest in digital healthcare.

Conversely, a few interviewees (e.g. 8 & 10) admitted limited awareness, attributed to: a lack of exposure, scanty promotion and poor digital health education, etc. Generally, while survey results found average awareness, the qualitative findings indicated a more informed, experiential awareness among participants. This difference may be attributed to the open-ended nature of the qualitative interview, which allowed participants to elaborate their personal experiences.

Table 2: Factors Responsible for Inadequate Awareness of M-Health Applications

Variable	Frequency	Percent
Absence of ICT literacy education	23	6.2
Lack of technological skills	46	12.4
Poor government policy on e-health and telemedicine	106	28.6
Lack of a serious media campaign about m-health use	95	25.7
All of the above	100	27.0
Total	**370**	**100**

Source: Field survey, 2025

In Table 2, about 106 or 28.6% of the respondents indicated that poor government policy on e-health and telemedicine is a major factor responsible for inadequate awareness of m-health apps.

However, with about 100 or 27.7% indicating *all of the above*; it implies that other factors, such as: lack of serious media campaign about m-health apps' use for healthcare management and health information-seeking, lack of technological skills, and absence of ICT literacy education, contribute to health consumers' inadequately awareness of m-health apps

Table 3: Motivations for Using M-health Apps to Access Healthcare Services

Variable	Frequency	Percent
Healthcare experts have endorsed m-health apps,	23	8.4
Perceived usefulness of m-health apps, simplicity or ease of use to consult with different healthcare experts,	78	28.5
Perceived cost-effectiveness of m-health apps in accessing healthcare services,	23	8.4
Perceived access to quality healthcare tips on general health issues via m-health apps,	39	14.2
Security and privacy protection of m-health apps in healthcare management,	54	19.7
Convenience, trustworthiness and timeliness of m-health apps in reporting health emergencies,	37	13.5
Ability of m-health apps to consume less mobile data and use up less of a smartphone's storage space, while offering healthcare services.	19	6.9
Total	**273**	**100**

Source: Field survey, 2025

Among the 273 respondents who reported that they used m-health applications for healthcare services, the majority of them (28.5%) indicated they were more motivated by their perceived usefulness and ease of use of m-health apps to consult with different healthcare experts; followed by security and privacy protection in healthcare management (19.7%).These findings suggest that health consumers, primarily, prefer m-health apps that are prolific, very easy to use, and apps that are secure, and capable of delivering reliable healthcare services, while safeguarding personal health information.

The responses from in-depth interviews, regarding motivations are presented, thus:

Interviewee 1**:** I could not 'keep records' on my own… So that particular app actually helped me to keep records properly… But, if anyone should be discouraged, it will be because that particular app was not given what was needed or was 'not accurate'.

Interviewee 2**:** … it is easy to reach, more timely and prompt. Mobile health apps give very convenient access to healthcare… The fear-factor here is that it could be misleading, if care is not taken, that is it.

Interviewee 3: The exposure I have to this app helped to motivate me. As a lawyer, I intend to know more than the average person; so the quest to know my health status and the difficulties in going to the clinics have motivated me to start using these mobile

health apps. Social media has helped me too; adverts pop up and help you find them interesting and motivate you to use them. With the apps, you do not necessarily pay to use them to manage health concerns, unlike in the hospitals, where you have to queue and pay for consultations before you can see a doctor. I do not have any fear. I use my apps.

Interviewee 4: The facts that I can conveniently, at home, office, anywhere and at any time, access healthcare services, connect with a medical expert, and review the symptoms I have, whenever I feel unwell, are key. 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. Using the app saves my time too. My major fear is that I do not really see or know who receives my medical data. At times, I am afraid that my personal health information could leak online and become public knowledge.

Interviewee 5: If I were to use mobile health apps again, I think what would attract me is convenience. Being able to check symptoms, talk to a doctor, or set reminders for medications, without leaving my house, this sounds useful, especially for minor health issues. Also, if the apps could provide accurate and clear information without being too complicated, I would be more motivated to try them. I would probably feel more confident using them, if they came recommended by a doctor or a trusted health organization… I sometimes worry that the information on these apps may not be right, or could cause unnecessary anxiety if I misinterpret it.

Interviewee 6: The apps are convenient and cost-effective, allowing access to healthcare services at any time of the day; they give me a sense of control over my health. I can get reminders, and make consultations from the comfort of my home. They provide well-sourced information, and many include disclaimers, encouraging users to consult a physician, if symptoms persist, which I find responsible and reassuring….

Interviewee 7: I am motivated by accessibility and privacy they offer. I can consult with a doctor, without physical presence, which is helpful in avoiding long queues experienced during hospital visits. M-health apps give me the freedom to monitor and manage my health at any time of the day, which is vital at a busy schedule. I find m-health apps to be very cost-effective. Most apps offer essential features for free, and even the premium plans are cheaper than frequent hospital visits; they are backed by AI algorithms. However, some people may be discouraged by concerns about receiving incorrect results, privacy breaches, or over-reliance on self-diagnosis…

Interviewee 8: I usually prefer visiting a clinic or asking a pharmacist when I need help… A lack of trust and preference for face-to-face consultation are key reasons why I have not incorporated m-health apps into my healthcare routine. If I were to consider using m-health apps, as regularly as possible, I think convenience and time-saving features would be my main motivations. Being able to access health supports from home, especially, when clinics are far or crowded, is appealing… However, I am uncertain about the reliability of these apps, especially, regarding diagnoses and privacy

assurances. There is also a fear that I might misunderstand the information or depend too much on self-medication, which could negatively affect professional help.

Interviewee 9: What motivates me most is the *independence I have* to manage my health. I do not always have the time or resources to go to a hospital for minor issues, so being able to access healthcare from my phone is incredibly helpful. Another factor is the *cost-effectiveness*; they are *highly convenient*; I can check symptoms or schedule a blood test right from my bedroom without waiting in line. I trust these platforms because many are backed by certified medical professionals or institutions. I rarely feel discouraged using them, if anything, *they complement my in-person visits* by helping me prepare better questions…

Interviewee 10: Because I am not too familiar with mobile health apps, I have not been motivated to try them. I did not even know they were available to the general public. If someone explained how they worked or if my doctor recommended one, I might be open to it. From what I now understand, if these apps truly offer convenience, cost-saving features, and remote access to healthcare, then those would be strong motivating factors…

From the data above, in-depth interviews revealed these motivations: usefulness of m-health apps, especially, in keeping health records, time-saving, prompt feedback, accessibility and cost-effectiveness, past experience and quest to know one's health status, exposure to promotional messages on social media, sense of independence, self-confidence, free service features, and approvals by healthcare experts. No doubt, these themes are similar with the findings of survey, which identified: simplicity and ease of using m-health apps to consult with different healthcare experts, as key motivations. However, survey revealed, high cost of acquiring smartphones or high-end ICT devices that support m-health apps, as the major barrier against using m-health apps for healthcare services, while in-depth interview discovered these factors as barriers: fear of obtaining misleading health information, lack of trust in the apps, concern about health data privacy, exposure to self-medication, fear of misusing health information on the apps, lack of technical know-how or media literacy, and a preference for face-to-face consultation.

Table 4: Challenges of Using M-Health Apps for Healthcare Services

Variable	Frequency	Percent
Poor internet/network connection	37	13.6
High cost of Internet data subscription,	25	9.2
Heavy data consumption while connected to the Internet,	63	23.1
Presence of too many unsolicited adverts in m-health apps,	15	5.5
Poor technical know-how/inability to understand m-health apps' design and operational mechanisms,	89	32.6
Availability of incomplete health information	44	16.1
Total	**273**	**100**

Source: Field survey, 2025

Data in Table 4 reveal that among the respondents who actually used m-health apps for healthcare services, the majority of the respondents, 89 or 32.6% had the challenge of *poor technical know-how or inability to understand m-health apps' design and operational mechanisms*. The implication of this finding is that a greater number of civil servants in Anambra State, who use m-health apps for healthcare services, do not have a proper understanding or technical knowledge of m-health apps and how the apps function. Certainly, this challenge may affect satisfactory usage.

Meanwhile, with in-depth interviews, the participants clearly emphasised that these challenges occur in two ways, namely: while downloading and installing m-health apps, and during the actual use of m-health apps for healthcare services. Some of the challenges that arise while downloading and installing m-health apps include: poor internet connectivity, network failures, low memory or storage capacity of the ICT device in use, confusion in knowing ideal m-health apps, due to too many similar health apps in apps' stores, draining of device battery life, high data consumptions and error downloading or installing, etc. The challenges that occur during the actual use of m-health, include: poor internet connectivity, network failures, data error, frequent pop-up of unsolicited adverts, draining of device battery life, poor understanding of medical terms, diagnosis, and how medical apps operate, sudden freezing of apps as a result of technical bug, high data consumptions, frequent request to update apps, and privacy concerns, etc.

Table 5: Fear-factors Responsible for Poor Attitude towards M-Health Apps

Variable	Frequency	Percent
Low level of awareness of m-health apps, fear of privacy intrusion, revealing personal health data to unknown persons, or cyber insecurity,	21	7.7
Rising cost of smartphone/high-end ICT devices that support m-health apps,	78	28.6
Lack of need for health apps, lack of time, fear of exposure to self-medication,	40	14.7
Lack of trust in m-health apps, due to too many m-health apps on app stores,	51	18.7
Absence of empathy and personal touch with healthcare providers,	43	15.8
Fear of wrong, incomplete, harmful, or inaccurate health advice that can lead to negative health outcomes,	21	7.7
Tenacious preference for conventional face-to-face medical consultation.	19	7.0
Total	**273**	**100**

Source: Field survey, 2025

Table 5 shows that, out of the 273 respondents who used m-health apps for healthcare services, 78 or 28.6% indicated rising cost of smartphone or m-health-enabled high-end ICT devices, as the greatest fear-factor. This result supposes that economic constraints, possibly, induced by poor salaries, could discourage civil servants from procuring m-health-support ICTs/smartphones; thereby, pushing them to develop poor attitude towards using m-health apps, for healthcare services. However, most of the interviewees, except interviewee 10, expressed less fear in their use of m-health apps for healthcare services; they displayed consistency in their usage, while largely, describing m-health apps as 'complementary' to conventional healthcare-seeking culture.

DISCUSSION

The purpose of this study is to probe awareness, motivations and usage challenges of m-health apps among civil servants in Anambra State. Quantitative and qualitative designs, comprising survey and in-depth interviews, were adopted.

On awareness, the survey discovered that the majority of the respondents (97.2%) were aware of m-health applications; nonetheless, their level of awareness was moderate. Interestingly, in-depth interviews found a higher degree of awareness; thereby, upholding the finding of Assaye et al. (2022) that over half of health professionals in Northwest Ethiopia demonstrated high awareness of telemedicine services. Succinctly, these results imply a moderate level of awareness of m-health apps among civil servants in Anambra State; and while some civil servants have moderate awareness of m-health apps, a good number of them, probably, like health professionals in Northwest Ethiopia, have strong predilection for digital healthcare services. They are likely in the digital natives' category, and invariably, seek alternative ways to learn about m-heath apps and stay informed (see interviewees 4, 6 and 8). Besides, survey underlined the factors contributing to inadequate awareness of m-health apps, as: poor government policy on e-health and telemedicine, lack of serious media campaigns, limited technological skills, and absence of ICT literacy education, similar with the findings of Adum and Ejiofor (2020).

The discovery with in-depth interviews that participants became aware of m-health apps, mainly, through social media advertisements (Facebook, YouTube, Instagram, TikTok), health campaigns, recommendations from health experts, word-of-mouth from other users, and personal concern for alternative healthcare solutions, especially, during COVID-19 lockdown, supports Banjoko and Banjoko's (2008) claim that many Nigerians, including civil servants in Anambra State, are now actively engaged in e-health communications and health information-seeking about their health, via online discussions and social media (Mansour, 2021). Particularly, the finding of in-depth interviews, with respect to higher degree of awareness of m-health apps, vary significantly, from the outcomes of Adum and Ejiofor (2020), which explicitly discovered low awareness of m-health apps among the teaching and non-teaching staff of Nnamdi Azikiwe University, Awka.

It also varies from the result of Kayyali et al. (2017), which found low awareness of m-health apps among patients and pharmacists. Arguably, the variation from the past studies could be attributed to the recent steady rise in the use of smartphones, social media, as well as, the internet ubiquity across south-east Nigeria (Agboje et al., 2017). In other words, mobile health apps incline to be more popular now, and many civil servants in Anambra State are gradually aware of the apps; thereby upholding the assumption of diffusion of innovation theory (see Rogers, 1962). However, generally, in the adopter categories, civil servants in Anambra State, could be among the *late majority*, characterized by scepticism towards adoption of innovations; they only become fully convinced to adopt innovations (e. g. m-health apps), after the innovations have been widely tried by many. The likely strategies to encourage them to embrace change, include: demonstrating widespread use and ensuring sustained experts' endorsements (Baran, 2009; Morah & Okunna, 2020).

About motivations for using m-health apps, survey data revealed key motivations as, perceived usefulness of m-health apps and ease of consulting with different healthcare experts (28.5%), followed by security and privacy protection (19.7%); implying that civil servants in Anambra State prioritize apps that are both practical and protective of their confidentiality. However, in-depth interviews revealed additional motivations for using m-health apps, as follows: m-health apps' ability to help users maintain medical records, m-health apps save time, ensure promptness in providing health information, are accessible, convenient, cost-effective, facilitate personal health monitoring, sense of independence and self-confidence, have free features, recommendations by healthcare experts, and participants' exposure to promotional messages online. Categorically, these findings align with the assumption of Health Belief Model (HBM), which posits that health behaviours and adoption of a health product, such as m-health apps, by health consumers, including civil servants in Anambra State, are influenced, basically, by perceptions of benefits, susceptibility, severity, barriers, cues to action, and self-efficacy (Morah & Okunna, 2020).

Regarding the fear factors that are responsible for a poor attitude towards using m-health apps for healthcare services, the survey identified the *rising cost of smartphones and high-end ICT devices* (28.6%). This outcome, simply, reflects economic constraints that may hinder sustained adoption. Other fear-factors, as validated through in-depth interviews, were: preference for conventional methods of medical consultations, lack of trust, privacy concerns, inaccurate information, illiteracy and limited technical skills. This suggests that, despite technological advancement in the health sector, there are, yet, fears. Indeed, the indication of *preference for conventional or traditional face-to-face means of medical consultations* among the anxieties, upholds the proposition by Udeh et al. (2024) that "what is old remains valuable and irreplaceable for some users, and the old does not easily give way to the new".

Concerning the usage challenges of m-health apps, survey revealed poor technical knowledge (32.6%), as the primary challenge for using m-health apps among civil servants in Anambra State. But, in-depth interviews discovered other challenges, namely: poor network connectivity, low device storage, difficulty selecting appropriate apps, unsolicited advertisements, complex medical terms, and privacy concerns. These findings support the findings in prior studies (e.g. Adum & Ejiofor, 2020; Adeniji et al., 2022; Giebel et al., 2023), which highlight that lack of skills and knowledge negatively affect digital health adoption; and the perspective of Latif et al. (2017) that, poor health and media literacy is among the factors militating against adequate implementation of m-health and adoption of m-health apps for healthcare services, in developing nations.

It means that while awareness of m-health apps is high, adoption and sustained use could be constrained by economic, technical, and behavioural factors. The findings also agree with the postulation of Aungst et al. (2022) that the consumption of digital health solutions allows for possible exploitation or confusion; and the statement of Isaruk and Sahab (2020) that mobile health apps create a privacy issue, because personal health information is disclosed and available on some m-health apps, in which unauthorized persons can use for their selfish gains. Hence, for users to effectively appropriate m-health apps for healthcare services, they must, first, have the expertise to use the apps, and understand the technicality and operational mechanisms of m-health apps.

Conclusion

Civil servants in Anambra State are substantially aware of m-health apps, but adoption is potentially limited by weak government policies, inadequate advocacy, lack of ICT literacy, and insufficient technological skills. They recognise the value of m-health apps in healthcare access, and are primarily motivated to use m-health apps, based on the beliefs that the apps are beneficial, time-saving, convenient, cost-effective, and provide a sense of independence, to users. Despite the merits of m-health apps in healthcare delivery, users encounter certain challenges, such as: poor technical knowledge, inadequate digital literacy, network issues, high data consumption, unsolicited advertisements, and privacy concerns. Moreover, economic constraints, fear of inaccurate information, and preference for face-to-face consultations, discourage positive engagement with m-health apps; but, endorsements by healthcare experts boost awareness.

Recommendations

Based on the findings, the following are recommended:

i. To boost awareness, government, investors, app developers, and healthcare professionals should collaborate on marketing communications or advocacy campaigns, on social media and traditional media, across communities, as well as, organise workplace-based training about m-health applications, using role models, role plays and health promoters,
ii. Anambra State government should increase awareness and motivations for using m-health apps, by enacting supportive e-health policies and legal frameworks that expand telemedicine, and advance digital infrastructures for m-health,
iii. Civil servants and health consumers 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, and
iv. Regulatory agencies and apps' developers should collaborate to ensure that only m-health apps that are user-friendly, accurate, secure, and meet healthcare needs of users, with clear instructions, simplified interfaces, and official endorsements, are manufactured and pushed on the apps stores, so as to build user trust and encourage adoption.

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