



OPEN Experiences of people living with HIV/AIDS in selected hospitals in Imo state, Nigeria, regarding the usability and satisfaction of reminders using M-health features: a qualitative study

Chinelo Judith Ezelote^{1✉}, Eunice Anyalewechi Nwoke¹, Sally Nkechinyere Ibe¹, Blessed Okwuchi Nworuh¹, Chimezie Christian Iwuala¹, Obinna Godwin Udujih¹, Christopher Chike Anunonwu Okereke¹, Joy Nkechi Osuji¹, Eleanor Asuzu¹, Oghenekowhoro Stephen Eyarefe², Ugochukwu Emmanuel Felix² & Alexis Ebikonbowei Okaba³

HIV presents an ongoing, serious issue within the global public health domain, with prevalence across all nations. Mobile health (m-Health) is the use of mobile and wireless devices to improve health outcomes, health care services, and health research has been shown to have the capacity to improve medication adherence. Good adherence to ART is beneficial to patients and the public. This study aimed to assess the reported usability and satisfaction of m-Health among people living with HIV/AIDS (PLWHA). The study included PLWHA under care at the Federal University Teaching Hospital (FUTH) Owerri who were previously enrolled in m-Health intervention programme. A total of 50 participants were purposefully selected for this study. This descriptive-qualitative study lasted for 3 months. In-depth interviews were conducted with 50 participants who had completed at least 7 weeks since enrolling in the trial. Data results were grouped into five main themes: varying usefulness of the intervention, the need for confidentiality, concerns about delivery modes, reasons for non-compliance, and barriers to attending appointments. Majority of the participants expressed satisfaction with the intervention they received, while some discontinued before the end due to reasons such as faith healing, use of herbal drugs, and fear of disclosure. The study emphasizes the need to integrate m-Health into standard care for PLWHA to enhance adherence to antiretroviral therapy (ART) refill schedules, medication dosage, and timing of intake. Due to the ongoing demand for more diverse and advanced technology, using mobile health to assist PLWHA in adhering to their medication is very feasible. Text messaging, phone calls, and WhatsApp audio notes have been recognized as valuable tools for promoting medication adherence and facilitating timely drug refills. The findings underscored the factors affecting patients' readiness, acceptance, and the barriers to effectively utilizing mobile health solutions for managing adherence challenges. The majority of study participants expressed satisfaction with the ease of use of this m-Health intervention. They reported that it helped them with the timely intake of their medication at the correct dosage, prompt refills, and keeping appointments with healthcare personnel. It is important to integrate m-Health into standard hospital procedures. Future studies should focus on developing an app that automatically tracks medication intake for PLWHA.

¹Public Health Department, Federal University of Technology Owerri, Owerri, Imo State, Nigeria. ²Dental Technology Department, Federal University of Technology Owerri, Owerri, Imo State, Nigeria. ³Department of Biological Sciences, University of Africa, Toru-Orua, Bayelsa State, Nigeria. ✉email: ezelotejudith@gmail.com

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Mobile Health, often referred to as m-Health or mhealth, is a term that describes the practice of medicine and public health supported by mobile devices¹. Access to and use of mobile telephony in sub-Saharan Africa has increased dramatically over the past decade². Across urban–rural and rich–poor divides, mobile phones connect individuals to individuals, information, markets, and services². A study conducted in 2011 showed that smartphones can enhance patients’ adherence to antiretroviral treatment for people living with HIV/AIDS³. HIV stands for human immunodeficiency virus, which is the virus that causes HIV infection and if untreated, it may cause acquired immunodeficiency syndrome (AIDS), the most advanced stage of HIV infection⁴. The main risk factors affecting HIV/AIDS disability adjusted life years (DALYs) rates included behavioral risks, drug use, partner violence, and unsafe sex⁵. In Nigeria, 80% of new HIV infections are caused by unprotected heterosexual intercourse, with most remaining HIV infections happening in key populations such as sex workers, men who have sex with men, people who inject drugs and transgender people^{6,7}.

HIV treatment involves taking medicine known as antiretroviral therapy or ART as prescribed by a health care provider⁸. Antiretroviral therapy (ART) aims to improve the prognosis and quality of life for patients living with HIV⁹ by reducing the rate of disease occurrence, progression, mortality¹⁰, and morbidity¹¹. According to WHO guidelines, a high level of adherence (> 95%) is required for antiretroviral therapy to be effective¹². Adherence is defined as a patient’s ability to follow a treatment plan, take medications at prescribed times and frequencies, and follow restrictions regarding food and other medications¹³. Medication adherence was also defined as taking all medications at the appropriate time with the appropriate dosage as prescribed by the health care provider¹⁴. Similar studies have been conducted with positive outcome such as the study conducted on usability testing of a mHealth app to support self-management of HIV-associated non-AIDS related symptoms¹⁵ where the Informatics experts and end-users evaluated the VIP-HANA application as highly usable. End-users reported ease of navigation through its sessions and provided positive feedback on its layout and system functions. Study on the usability and acceptability of an adolescent mHealth HIV/STI and drug abuse preventive intervention in primary care in Southeast Michigan reported high acceptability of the content, process, and format of the programme¹⁶. Also the findings of the study conducted on the evaluating mobile health interventions for HIV patients in Nigeria reveals substantial improvements in system efficiency, a reduction in the number of visits required, enhanced health outcomes, economic benefits for stable patients, and an increase in overall capacity¹⁷. The results of these previously reviewed studies, along with the successful outcomes of the main trial of this research¹⁸, highlighted the need to assess the level of satisfaction among the participants regarding the usability and overall satisfaction of the trial. Thus, this study aims to explore the experiences of people living with HIV/AIDS (PLWHA) who have participated in a mobile health (m-Health) intervention on medication adherence and timely refill of ART regarding its usability and satisfaction.

Method

We conducted a descriptive qualitative study on individuals living with HIV/AIDS who were receiving treatment at the Federal University Teaching Hospital (FUTH) in Owerri. The study participants were purposely selected from those who took part in a previous study examining the effect of mobile health intervention on medication time adherence among people living with HIV/AIDS in Imo State, Nigeria¹⁸. Permission was obtained from the copyright holder of the initial study to include these participants in this current research. This qualitative study was carried out from May 2024 to July 2024. The intervention comprised the use of SMS, voice calls and WhatsApp voice notes to remind them to take the correct dosage of their drugs at the right time, and to remind them of their drug refill and their doctor’s appointments. Among the 223 participants included in the previous study, 50 participants were purposely included in this study. All the participants received SMS, voice calls and WhatsApp messages from the principal researcher during the previous study trial.

Inclusion criteria

- PLWHA who have been receiving care at Heart to Heart Centre at FUTH Owerri for at least twelve months prior to the commencement of the study.
- Those aged 20 and above as at their last birthday.
- Those who consented to the study.

Exclusion criteria

- Participants on admission since drug adherence would be ensured via provider administered treatment.
- Participants who also had other chronic diseases (co-morbidities) that necessitated daily medication e.g., tuberculosis, hypertension. This was because of the increased pill burden from co-morbidities that could introduce undesirable effects into the study.
- Those who refused to give consent to the study.

Sample size determination and sampling techniques

50 participants who were among the people previously enrolled in the 6 months mobile health intervention program were purposefully selected for this study. 25 participants were purposefully selected from those who were adherent to their medication at the end of the trial, and another 25 participants were selected from those who were non-adherent to their medication. 5% of the participants were drawn from each age group to ensure equal representation. They were further purposely selected based on their ethnic, gender, educational, occupational, and rural/urban backgrounds aimed to capture a diverse range of perspectives.

Message content

The message sent to the participants included several sections, each with its own title. Although the same message was sent to all the participants, it was customized to avoid being overly formal. This was achieved by using simple, easy-to-understand English. The messages were designed to be compelling, featuring encouraging words and reassurances. They were concise and easy to remember, fostering interpersonal relationships between the participants and the principal researcher. Additionally, the messages were developed to be suitable for all age groups. The goal of the message was to help them feel at home and relaxed during the intervention in order to achieve the best results from them. The title “Encourager” aimed to motivate participants and assure them of their ability to adhere to their medication dosage and timing. Another section titled “Adhering to Required Drug Dosage and Time Adherence” provided information on the importance of taking the correct medication dosage at the right time and encouraged participants to follow these guidelines. The section titled “Clinic Appointment Reminder” served to remind participants of the exact date of their upcoming clinic appointment and urged them to attend as scheduled. On the message titled “Reminder to Refill Medication”, recipients were encouraged to refill their prescriptions before they ran out and reminded of the importance of not running out of their medication. The last message was titled “Maintenance.” Recipients were congratulated for reaching the final day of the study and were provided with uplifting and motivational messages. They were encouraged to remember that medication adherence is a routine that must be maintained. Participants were advised to continue practicing the healthy habits they developed during the study, such as taking their medication regularly, eating nutritious food, and getting enough rest. Finally, they were reminded that they could contact the researcher if they had any questions or faced any challenges. The participants were guaranteed confidentiality and anonymity by ensuring that the customized messages did not include their names, references to the Immunology Center, HIV status, or medications.

Intervention

The intervention as already discussed in details in the previous trial¹⁸, involved the test group receiving M-Health messages via SMS, phone calls, and WhatsApp voice notes. Participants received customized reminders three times a week to help them take their ART medication as scheduled and its timely refill ART. Messages were primarily in English, with further options for Igbo or Nigerian Pidgin English for WhatsApp voice notes for those with no formal education. All the participants received the same text messages, while WhatsApp audio voice notes were developed in English, Igbo, and Nigerian Pidgin English for all the participants. The principal researcher, CJE, created and sent the voice notes in each participant's preferred languages.

She also contacted participants weekly by phone to monitor their progress and provided guidance on responding via WhatsApp. Participants received medication message reminders three times a week followed by an adherence assessment using a checklist on the seventh day to reduce recall bias. SMS reminders continued post-assessment. The overall adherence was evaluated with the AIDS Clinical Trials Group (ACTG) questionnaire adapted from a study by Reynolds et al.¹⁹, and personal calendars after four months and during a two-month follow-up. An additional two-month follow-up without intervention assessed post-intervention adherence levels. Generally, the study lasted for six months which included four months of intervention and two months of follow up without intervention. Participants responded objectively to the researcher and were expected to reply within 24 h on weekdays and 48 h on weekends. Positive reinforcement was used to encourage adherence, with reminders to take medication to prevent relapse.

Data collection procedure

In-depth interviews were conducted with a total of 50 participants who had completed a minimum of seven weeks since their enrollment in the trial. The interview guide utilized for the collection of qualitative data was meticulously developed, and its reliability was confirmed through the test–retest method prior to the commencement of data collection. The interview guide consisted of 15 open-ended questions and one structured question that covered topics such as the usefulness of m-Health, the need for confidentiality, concerns about delivery modes, reasons for non-compliance, and barriers to attending appointments/drug refills. Participants were interviewed utilizing an in-person methodology, and the subsequent discussions were transcribed. When in-person meetings were not feasible, interviews were conducted using telephone or Zoom video conferencing. All telephone interviews were conducted in quiet environments, including the clinic and mutually convenient off-site private locations, such as public libraries or workplaces. With the consent of the participants, the interviews were audio-recorded. The interviews were carried out in English and had duration of approximately 30 min. Data saturation was reached after the twelfth interview, at which point the researchers determined that further interviews would not yield additional insights.

Participants received a compensation of 4000 naira for completing the interview. For those who were not literate, the interview was translated into their native language by a local language expert who was also fluent in English. Four health workers from the heart-to-heart centers served as research assistants. They were all university graduates between the ages of 20 and 30. These assistants received training from the principal researcher twice a week for two weeks.

Validity of the Instrument

The interview guide that was developed by the researcher was given to four experts in the field for their input for face, criterion, construct and content validity. Corrections made were used to modify the final copy of the instruments.

Demographic information	n (50)	n (%)
Gender		
Female	27	54
Male	23	46
Age (Years)		
20–29	10	20
30–39	11	22
40–49	13	26
50–59	8	16
60–69	6	12
70 +	2	4
Education level		
Post-graduate	10	20
BSc	21	42
SSCE	9	18
Primary School Certificate	6	12
None	4	8
Occupation		
Private Firm	14	28
Civil Servant	11	22
Unemployed	7	14
Trader	14	28
Farmer	4	8
Marital status		
Married	14	28
Single	18	36
Cohabiting	2	4
Widowed	4	8
Separated	8	16
Divorced	4	8

Table 1. Demographic information.

Reliability of instruments

The instrument's reliability was established by pre-testing and employing the Cronbach Alpha co-efficient reliability test for internal consistency. It involved 20 people living with HIV/AIDS at Imo State University Teaching Hospital Orlu. The questionnaire was administered to them twice, with an interval of two weeks between each administration. The p-value was 0.75 showing high reliability.

Data management and analysis

All interviews were transcribed verbatim, and field notes were utilized to complement the audio recordings. A proficient language expert, fluent in both the local language and English, transcribed and translated the voice notes into English. The research team ensured the accuracy of the transcriptions by cross-referencing them with the recordings and subsequently reviewed and de-identified the transcripts. The lead author then conducted selective verifications to ensure consistency with the original recordings. The transcribed notes were subjected to validation by three researchers, who are co-authors of this study and possess extensive expertise in Epidemiology and Biostatistics. The data were subsequently classified into five distinct groups. Any paraphrased text that didn't fit into a category was thoroughly discussed by all authors. Subsequently, paraphrased texts from experts were employed to synthesize the interview results. The audio files were uploaded to a secure server for data protection, with access limited to interviewers for data management. Once paraphrasing was completed, the recording files were deleted to ensure anonymity by removing identifying data. Data were analyzed using descriptive statistics of frequency and percentages.

Results

Table 1 below presents the socio-demographic characteristics of the participants. The majority (54%) were female, with the highest number of participants aged 40–49. Most participants (42%) held a Bachelor of Science (BSc) as their highest level of education, and the largest group (36%) identified as single.

Patient-reported usability and satisfaction of m-Health intervention

The participants' verbal and voice note responses in the test group were categorized into five main themes: varying usefulness of the intervention, the need for confidentiality, concerns about delivery modes, reasons for non-compliance, and barriers to attending appointments.

Varying usefulness of the intervention

The majority of the participants found that mobile phone reminders helped them establish a routine for taking their medication, while others did not. Many of the participants noted that the intervention was a helpful reminder during the day and week, and they preferred that it occurred twice a week. They mentioned that it helped reduce forgetfulness, particularly when they were busy with work or away from home.

One of the PLWHA provided this response: *"I'm always rushing out to work and getting busy throughout the day. I am a busy person. You know I have job to do and family to cater for. All these makes me forget to take my medication. This reminder is so timely and has helped me develop the habit of taking my medication at the right time."* (43 years old female).

A 21 years old female said: The study helped the participants to develop the skill of taking the right dosage of their drugs. One of the participants responded: *"The message reminders have helped me to inculcate the habit of not just taking my medications. Now it is not just taking the drugs anyhow.... but also taking the right dosage. I now know the importance of taking the complete dosage of my medications"* (21 years old female).

The participants have also developed the skill of taking their medications at the right time for effective functioning of their medications. One of the PLWHA expressed her satisfaction:

"I never knew that I needed to take my drugs at a particular time. Like, I thought that I could take them anytime I remembered. No matter the time. The messages, calls, and reminders had helped me develop a specific schedule for taking my medications." (18 years old female).

Another participant mentioned: *"It's a fantastic idea and it works really well. I receive an SMS at 7 am on Sunday and Thursday. I don't even have to check; I already know. It's a great innovation"* (47 years old female).

One of the participants responded: *"In the first two weeks of the study, I was not following. I was still non-adherent. I had no interest in the medication and the SMS. Then the motivational messages encouraged me. You know, I realized that I had to do it for myself. Now failing each day makes me feel guilty. The constant messages and motivational messages boosted my spirits"* (20 years old male).

One of the participants said, *"I believe the reminders helped me establish a routine for taking my medication. I won't overlook them. I am capable of managing it on my own now, but without the reminders, I might just decide to go to bed without taking my meds. When I receive the text, I pause to check who messaged me. Then I realize it's the reminder, so I take my meds right away"* (32 years old male).

Another participant emphasized the importance of receiving message and call reminders. The reminders helped them to refill their medications on time and keep their doctor's appointments. The participant explained, *"I often forget to refill my medications. I only realize that I've run out when I open the pack. Sometimes it takes me days to go to the hospital to refill, which makes me non-adherent for days. Sometimes even weeks. I go just dey. But these reminders helped me to refill my medication before it ran out, so I didn't miss any doses"* (59 years old female).

Another participant reiterated the importance of the intervention in keeping doctor's appointment. She said: *"I didn't miss any doctor's appointments. I received a reminder a week before the appointment, which helped me to keep the day free. I will continue to follow this routine"* (24 years old male).

An elderly participant said, *"The reminder helped me to refill my medication ahead of time without running out. I normally sent my son to refill it for me. When I saw the reminder I called him immediately. It made him to refill it ahead of time"* (76 years old female).

The need for confidentiality

The emphasis on maintaining the confidentiality and privacy of the SMS intervention was crucial. Many participants expressed their concerns about privacy and highly valued the confidential nature of the messages throughout the study. A 39 female participant said:

I appreciate how the text messages remind me to take my medication without disclosing any details about my condition.

A 23 year old female participant responded: *"If somebody sees my message, they don't know what it's for. My condition was not contained in the message. Sometimes... you know... I will just say oh it is from my network provider"*.

A 47 years old male responded *"Initially I didn't want to enroll. I was worried about my condition getting revealed. I am well known in the state and country. People don't know that I am HIV positive. I was highly assured of confidentiality and anonymity. When I saw samples of the messages I was convinced. It didn't reveal anything. I relaxed"*.

A 20 years old female worried about her class mates said: *"I stay in school hostel there is no privacy there. I mean... like someone can just read your message without your consent. Someone might even peep when you are reading message. Though I was assured that the message won't reveal my status but I had to protect myself more. I put a screen lock on my phone. And again I don't read the message when I am with anyone. I just have to be extra careful. People talk"*.

A 72 years old male participant explained that he was not worried about the confidentiality of the message. He said: *"I was not worried about my family members seeing my message. They are the ones that refill the drugs for me and take me to doctor's appointment"*.

Overall, the participants appreciated that the messages, if seen by others, would not reveal anything about their status. They were grateful for receiving medication reminders that didn't disclose any information about their health condition.

Concerns about delivery modes

The third theme that emerged was related to logistical issues of the texting itself. Many participants found the texts helpful in reminding them to take their medications. They were also grateful for the bi-directional mode of messaging, feeling more in control of the messages. Some participants appreciated the capability to change the time of the text alert, which the researcher agreed with.

A participant expressed, *"It feels good to be able to respond and express my concern about the intervention. I am happy that the researcher granted my request for my message delivery time to be 7 pm. I knew it was not convenient for her, but she had to agree. I felt more involved"* (36 years old female).

Some participants, especially those who were not literate, appreciated the voice note messages more. A 51 years business man responded: *"I like that I could use voice notes. I dey always dey too busy to type, so I often communicate back to her using voice notes. Voice message dey too simple and easy for me. I listen to it when I dey alone. Make no one know wetin dey happen to me"*.

An 71 elderly woman explained, *"I don't know how to read or write. My children taught me how to use voice notes, so I asked the researcher to send me voice notes in Igbo, which she obliged. I responded in the same manner using voice notes, and it made it so easy for me."*

An 18 years old female expressed her happiness with the bi-directional message. She said: *"I enjoyed the mode of message delivery. I was happy that I could respond. Ask questions. Get clarity on things. It feels good to have someone to call. And I appreciated the free airtime. I was able to call freely and reply my messages. I wanted it to continue like this"*.

Reasons for non-compliance

Some participants provided reasons for not adhering to their medications despite receiving SMS and phone calls from the researcher.

One of the participants mentioned that ART conflicted with her religious beliefs: *"I stopped taking ART because it goes against my faith in healing. I believe I have been healed and no longer need ART"* (41 years old female).

Another individual on mentioned that it conflicted with her fasting schedule. She said, *"I had to discontinue ART during my fasting period. While fasting, I abstain from taking any medications. I resumed taking my medications after I finished fasting"* (54 years old female).

One of the participants mentioned that he prefers herbal drugs over ART drugs. He mentioned that: *"I combine ART and herbal drugs by alternating the intake. For example, if I take ART drugs one day, I take an herbal drug the next day. This is my personal belief and practice"* (49 years old male).

One participant mentioned that he only takes herbal medication and decided to withdraw from the study during the first week. He stated, *"I will not continue with this study. I only use herbal drugs, which I believe will heal me. We have highly medicinal plants in Igbo land that our ancestors relied on for survival. I will rely on them for my health"* (51 years old male).

Barriers to attending clinical appointments/drug refill

Some participants said they missed their clinical appointments because they were recognized by someone from the hospital. Others mentioned issues with transportation costs, staff attitudes, and difficulty leaving work. When asked why she didn't go to her doctor's appointment, one participant living with HIV/AIDS said, *"I am considering changing hospitals because someone recognized me the last time I was there. I will not be going back there again"* (34 years old female).

A 48 years old male replied, *"My workplace is always very busy. They hardly allow us to go out during work hours. By the time I finish work, the clinic has already closed. I work from Monday to Friday. It's difficult for me to refill my medications and attend doctor's appointments. They should consider opening during weekend. Even for just half day. And I can't disclose my status at work in order to get free time to refill drug and attend doctor's appointments. I will not do that, I will rather be non-adherent"*.

A 39 years old woman expressed frustration with the staff. She said: *"Some of the staff members are rude. I really don't like interacting with them."*

21 years old participants complained about her study schedules occurring same time with doctor's appointment. She said: *"it is not easy. I am in SS3. We are preparing to write SSCE exam. We barely have time for ourselves in school now. We are always having classes. I keep taking excuses to go to hospital. It is becoming embarrassing. One day I went take excuse to go to clinic. Yet again. I was asked if I have a terminal ailment for always frequenting the hospital. I cried"*.

A 22 years old male expressed his frustration with his clinic appointment coinciding with his academics. He said: *"I just got admission to university. There is a lot going on with me now. I regret having this disease. I hate it. I just want to live a normal life. You get? It is just too much. I rush to school, rush for lectures, rush to finish my clearance. In all I must make out time to take my meds. Refill them, attend doctor's appointment. It is not like you will go there and they will attend to you immediately. Young people should be prioritized. It is just too much for us"*.

Some participants complained that they lost their phones, which disrupted their ability to follow up on the intervention. One trader said, *"I lost my phone three month into the study. That phone contains everything about me. I am happy though that the messages didn't reveal my status. You pick the phone, read the message, but won't understand anything. I felt bad because I was not getting messages again. I bought a new phone after two weeks later. I didn't get the message for the hospital appointment, though I later attended."* (47 years old trader).

Discussion

Participants' reported usefulness of m-Health

The participants reported varying usefulness of the m-Health intervention which included increase in medication time and dosage adherence, prompt refill of their medication and keeping of their clinical appointment. The usefulness of the mobile health reminder as expressed by the participants is consistent with previous studies such as the study conducted on the participants' level of satisfaction on m-Health Adherence Support Intervention for Patients With HIV in Philippines which recorded high participant satisfaction and acceptability, especially among those who received high dose of the intervention²⁰. A study on the effects of an m-Health voice message service, known as mMitra, examined its impact on the maternal health knowledge and practices of low-income women in India²¹. The findings indicate that in low-resource settings, mobile voice messaging that provides tailored and timely information about pregnancy can significantly improve maternal healthcare practices, thereby enhancing maternal health outcomes. Study on the interactive voice response (IVR) software to improve the quality of life of people living with HIV in Uganda revealed a high uptake and acceptability of the IVR tool among the participants²². Those who used the tool more frequently showed greater improvements in quality of life, viral suppression, and adherence to appointments. A study on the acceptability of mobile phone technology for medication adherence interventions among HIV-positive patients at an Urban Clinic showed that majority of patients at an urban HIV clinic possess mobile phones and expressed a willingness to utilize them to improve adherence to HIV medication²³. Furthermore, the study demonstrated that the use of smartphones is becoming increasingly prevalent among this population, which may pave the way for innovative technology-based interventions. The study on a mobile health app (WYZ) developed for engagement in care and antiretroviral therapy adherence among youth and young adults living with HIV showed significant willingness to utilize a hypothetical app-based HIV prevention program among the participants²⁴. The study findings emphasized the importance of privacy, confidentiality, and the associated risks and benefits of participating in such a program. It also indicates that concerns about privacy and confidentiality when using an app for HIV prevention are genuine and crucial for fostering public trust and encouraging widespread adoption. The study conducted among HIV patients at risk of disengaging from care found that a mobile health intervention can effectively support adherence to HIV treatment and retention in care. These findings highlight the value of using a clinic-based, bi-directional mHealth intervention for patients who are at risk of dropping out of medical care²⁵. This is significant given the high prevalence of cell phone use, text messaging, and the intervention's acceptability among participants. Many were at increased risk of loss to follow-up due to being newly diagnosed, returning to care, or having a history of non-adherence to treatment. Similarly, the findings of the study conducted on the acceptability of a mobile health intervention to enhance HIV care coordination for patients with substance use disorders shows that combining patient navigation with mHealth app is feasible and acceptable for patients with substance use disorders who struggle to stay engaged in HIV care²⁶. The research further indicates that individuals living with HIV in urban areas with high poverty and substance abuse find both components of the intervention responsive to their barriers in accessing care.

The need for confidentiality

At the start of the study, the participants raised concerns about their confidentiality to safeguard their privacy. They felt more at ease and confident after being assured that their identities would remain anonymous and that the information wouldn't reveal their status or the hospital they were associated with. These findings were similar to the findings in the study conducted in Malaysia where nearly one-fourth indicated that they would not feel comfortable using an app to get HIV prevention medications, and more than half (53.8%) were concerned that other people might find out about their participation in the study²⁴. Also the participants in the study on feasibility and acceptability of a mobile health application conducted among adolescents and young adults living with HIV in Cameroon expressed concerns regarding the confidentiality of their information²⁷. The researchers found that, compared to adolescent girls and young women (AGYW) aged 21 to 25 years, those aged 18–20 were less likely to accept mobile apps for HIV testing, prevention, and treatment. This reluctance may stem from privacy concerns, especially in home environments. Although these younger AGYW have phones, they often share them with family members or are subject to parental controls, which can lead to coercive disclosure of their access to HIV-related services. In another similar study, researchers assessed the feasibility and acceptability of mobile health interventions among HIV-infected cocaine users and their healthcare providers. Although participants found the mobile phone interventions useful, they wanted assurance that the technology was secure, as they already took great pains to keep their HIV status confidential²⁸. In another study with similar finding conducted on mobile health treatment support intervention for HIV and tuberculosis in Mozambique, patients were also concerned about the confidentiality of the mobile phone text messages²⁹. Participants expressed concerns about unauthorized access to text messages, particularly when mobile phones are shared for reminders. Some patients use relatives' devices, raising fears that accidental disclosure of HIV status could lead to treatment discontinuation. Medical practitioners highlighted the risks of patients losing or having their phones stolen, which could expose sensitive information. Pharmacy and clerical technicians also noted that regular messages might create mistrust between partners if one is unaware of the other's HIV status, potentially leading to misunderstandings.

Reasons for non-compliance

Despite the majority of participants reporting the usefulness of the m-Health intervention, some did not comply for various reasons, including their beliefs, faith, and preference for herbal drugs. These findings are consistent with a study conducted among people living with HIV and AIDS in Gweru, Zimbabwe³⁰. The study found that people living with HIV often stop taking their medication because they believe in faith healing, alternative medicines, and see spirituality as the main cause of HIV and AIDS. Additionally, their commitment to church

values also plays a role in their non-adherence to medication. Similarly, a study in Uganda found that participants who had stopped taking their antiretroviral medication cited teachings and prophecies from religious leaders, support from Biblical scriptures, and the belief that God and their faith, rather than medication, would help them³¹. Testimonies from peers who claimed to have been healed after stopping their medication also influenced their decision to discontinue treatment. Some participants who had stopped taking their antiretroviral therapy (ART) cited a strong belief in God and a conviction that they could be cured without medication. A study in Uganda assessing the experiences of individuals with poor viral suppression found that some HIV patients had discontinued their ART due to religious beliefs³². Additionally, some participants turned to alternative medicine, such as herbal remedies, influenced by radio advertisements promoting alternative treatments as safer than Western medication. Three female Pentecostal Christians claimed to have been healed by God and no longer saw the need to continue ART. Another study in Ghana found that religious beliefs hindered treatment adherence among HIV/AIDS patients receiving ART³³. A study conducted on medication adherence among HIV/AIDS patients in Benue State, Nigeria revealed that belief in the potency of spiritual healing affected adherence to medication among the patients³⁴. The study found that HIV/AIDS patients who believed in spiritual healing were less likely to adhere to therapy and instead spent much of their time praying, performing religious rituals, and seeking cure from prayer houses and herbalists. In a study conducted at ZNNP + Gweru urban, it was found that within the first year of starting the ART program, participants tended to turn to Christian faith for comfort after learning about their sero-status³⁵. However, the teachings and attitudes within the church often discouraged them from adhering to the ART program.

Barriers to attending clinic appointments

Some barriers prevented participants from attending their clinic appointments despite being on the m-Health intervention programme. Reported barriers included being recognized at the hospital, transportation costs, staff attitudes, and difficulty leaving work. Study conducted on barriers and facilitators to patient retention in HIV care revealed similar findings³⁶. Some of the participants reported competing life activities, difficult relationships with clinic staff including providers and negative experiences with clinic spaces & processes as some of the barriers to retention in care for people living with HIV. Stigma was also noted as a barrier in the high tertile for patients not retained in care and a barrier in the medium tertile for those retained in care. They expressed fear of being recognized in by their family, friends, and acquaintances while in waiting room, laboratory, and pharmacy.

A study conducted in Zambia among young people living with HIV further showed similar findings³⁷. Some of the barriers to accessing care included stigma, fear of being recognized, and the attitude of healthcare providers (HCPs). Participants noted that when they encountered neighbors or friends at healthcare facilities, they felt compelled to withdraw from care. Some participants felt that HCPs did not understand their needs and spoke to them inappropriately or scolded them. As a result, some individuals wanted to leave and not return after being spoken to in a disrespectful manner. Some reported that they left healthcare facilities and returned to school without collecting their medication after being shouted at.

Conclusion

M-Health interventions are valuable for supporting medication adherence. m-Health interventions have a significant impact on ART adherence in HIV-infected patients. The in-depth interviews conducted showed that the majority of participants were satisfied with the m-Health intervention. However, some chose not to continue with it due to their faith, beliefs, and preference for herbal drugs.

Recommendations

There is a need for public education on the importance of antiretroviral therapy (ART) for people living with HIV/AIDS, emphasizing that herbal remedies cannot replace it. Religious leaders should be sufficiently informed about the necessity of allowing their members to access ART. Some patients struggle to refill their medications due to busy work schedules. Therefore, Heart-to-Heart centers in hospitals should consider opening on Saturdays and operating for half the day. Additionally, there needs to be adequate public awareness to combat the stigma against people living with HIV/AIDS (PLWHA). This will help individuals disclose their status in a timely manner, ensuring they receive appropriate care without feeling stigmatized.

Limitation of the study

Individuals with co-morbidities were excluded from the study thereby excluding those that might have benefited from it. They were excluded because the presence of additional health conditions can complicate the management of HIV, necessitating specialized treatment approaches that may not align with the standard protocols of this intervention. Moreover, these individuals often have unique healthcare needs and priorities that may not be adequately addressed by this mobile health intervention. There are also concerns about the feasibility of monitoring and responding to the interactions between HIV and other conditions. Excluding this group helps to maintain the integrity of this research findings by minimizing variables that could influence the outcomes of the intervention.

Future research should specifically focus on those with comorbidities to effectively address their poly-pharmacy challenges. This should involve the integration of m-Health technologies with electronic health records to identify potential drug interactions. Additionally, it is essential to promote patient education and foster shared decision-making, as well as to coordinate care among various healthcare providers to ensure optimal management of medications.

Data availability

All data generated or analyzed during this study are included in this published article. The primary data were the original data collected by the researchers and were well presented in the results section. The secondary data that were made reference to were all cited in the manuscript and the reference links provided in the reference list.

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Author contributions

CJE conceptualized the study and assisted in the methodology, validation, interview, data curation, writing of manuscript, project administration, and Audio recording. EAN assisted in conceptualization and supervision. SNI assisted in conceptualization and supervision. BON assisted in conceptualization and supervision. CCI assisted in the prescription of the voice note. OGU assisted in the prescription of the voice note. CCAO assisted in the prescription of the voice note. JNO assisted in the validation, interview, audio recording, project administration, and manuscript writing. EA assisted in validation, project administration, and audio recording. OSE assisted in the manuscript writing and project administration. UEF assisted in methodology and project administration. AEO assisted in conducting the interview, data curation, and project administration.

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Declarations

Competing interests

The authors declare no competing interests.

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Health Research Ethics Committee of Federal Medical Centre (FMC), Owerri Imo State, Nigeria (Under the Chairmanship of Dr. I.I. Ike, MBBS, FMCPAED) dated February 25th May 2022 under the Chairmanship of Dr. I.I. Ike (FMC/OW/HREC/ Vol.11/048). This study ensured the principle of anonymity and confidentiality. Informed consent was obtained from all the respondents involved in the study.

Additional information

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1038/s41598-025-93964-9>.

Correspondence and requests for materials should be addressed to C.J.E.

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