International Journal of Design & Nature and Ecodynamics
Vol. 19, No. 1, February, 2024, pp. 311-320
Journal homepage: http://iieta.org/journals/ijdne

Factors Influencing Non-Adherence to Antiretroviral Therapy Among HIV/AIDS Patients in Western Sumatra: Implications for Practice in the Post-COVID-19 Era

Adriani Suwito[1,7*], Ikhwana Elfitri[2], Afriwardi[3], Arina Widya[4], Afrizal[5], Hardisman[3], Achmad Syafruddin[6], Amel Yanis[3], Evi Hasnita[7]

[1] Public Health Andalas University, Padang 25127, Indonesia
[2] Faculty of Engineering, Andalas University, Padang 25163, Indonesia
[3] Faculty of Medicine, Andalas University, Padang 25127, Indonesia
[4] Andalas Hospital, Padang 25163, Indonesia
[5] Faculty of Social and Political Sciences, Andalas University, Padang 25163, Indonesia
[6] Faculty of Information Technology, Andalas University, Padang 25163, Indonesia
[7] Fort De Kock University, Bukittinggi 26129, Indonesia

Corresponding Author Email: adrianisuwito@fdk.ac.id

https://doi.org/10.18280/ijdne.190134

Received: 26 December 2023
Revised: 15 January 2024
Accepted: 24 January 2024
Available online: 29 February 2024

Keywords:
HIV/AIDS, non-adherence, antiretroviral, post-COVID-19, qualitative study, Indonesia

ABSTRACT

This study seeks to elucidate the factors contributing to non-adherence to antiretroviral therapy (ART) among HIV/AIDS patients in Western Sumatra, with a view to informing practice in the post-COVID-19 era. Utilizing a mixed-methods approach that combines qualitative analyses and survey techniques, in-depth interviews were conducted with 26 patients at M. Djamil Hospital, serving a diverse patient population across Western Sumatra, Indonesia. Non-adherence was frequently attributed to factors such as medication-related boredom, forgetfulness, busyness, geographic inaccessibility to healthcare facilities, stigma, economic constraints, insurance challenges, and concerns related to COVID-19. Additionally, adverse effects of the medication, including dizziness, nausea, vomiting, sleepiness, irregular heartbeat, rash, and diarrhea were reported. Furthermore, the critical role of non-governmental organizations (NGOs) in patient support through education, medication delivery, and home visits was identified. The findings underscore a complex interplay of behavioral, socio-economic, and systemic factors underpinning non-adherence. It is posited that healthcare providers, by recognizing these determinants, can develop targeted interventions to enhance adherence, such as personalized communication strategies, including phone calls and home visits, in alignment with the UNAIDS program's long-term objectives. This study contributes to the existing literature by highlighting the multifaceted reasons behind ART non-adherence in a post-pandemic context, suggesting a need for comprehensive strategies that address both individual and structural barriers to optimize treatment outcomes for HIV/AIDS patients.

1. INTRODUCTION

Non-adherence with ART or loss of follow-up (LTFU) are the most common causes of HIV/AIDS patient mortality. If you do not cooperate, drug resistance will rise, endurance will decline, and mortality will occur [1], whereas the purpose of ART therapy is to reduce the viral load to undetectable levels [2]. Immunosuppression exacerbates the risk, and HIV infection contributes to COVID-19-related mortality [3]. According to the WHO, 1.2 million individuals will get infected with HIV by 2025, with one person dying from HIV/AIDS every second [4]. Meanwhile, the LTFU rate in West Sumatra, Indonesia, was measured at the M. Djamil Hospital by the end of 2021, which was fairly high at 30%. While the typical LTFU rate is less than 20% [5], in the post-Covid era, the LTFU rate remains high, but it should begin to fall. HIV/AIDS spreads by sexual contact, drug injection, mother-to-child transmission, and blood transfusions [6]. To reduce morbidity and death rates, optimal adherence to antiretroviral treatment is required, lowering the risk of HIV/AIDS transmission [7]. If the patient is obedient, he will reach the maximum age after being disciplined to use medication, which is 21 years [8, 9]. Boredom, nausea and vomiting, and feeling healthy if medication is not taken are all reasons for noncompliance. There are also huge distances between where you reside and the place of service [10], no transportation charges, sadness, forgetfulness, busyness, and side effects [11]. The non-adherent behavior of people with HIV/AIDS causes failure of long-term ART therapy [12].

According to the head of the VCT polyclinic that provides services to HIV/AIDS patients, it was discovered that following COVID-19, HIV/AIDS patients who were not disciplined in taking medication were generally due to the impact of the declining economy; they were unable to pay for

treatment tickets and were even unable to afford insurance. This has an impact on their health, which is why researchers seek to understand what drives HIV/AIDS patients to fail to take antiretroviral medicine. Following the COVID-19 pandemic, studies on this topic were never carried out, and it is hoped that the results would be valuable for the effectiveness of services for HIV/AIDS patients in order to attain the UNAIDS objective of 95-95-95, which indicates that 95% of people know their HIV status. 95% of HIV-positive people receive treatment that can suppress viral load, and 95% of HIV-positive people know their status [13, 14].

2. LITERATURE REVIEW

Individuals infected with HIV/AIDS have severe immunological deficiencies, resulting in reduced CD4 (Cluster of Differentiation 4). The body's immune system is unable to avoid opportunistic infections. So it is important to provide therapy to prevent opportunistic diseases. The success of antiretroviral therapy is measured by the absence of an increase in CD4 [15]. Before therapy is given, counseling must be given with the aim of increasing awareness about the prevention and treatment of HIV/AIDS, which must be taken in a disciplined manner and consumed throughout life [16]. If stopping therapy will hasten the death of people with HIV/AIDS [17], then adherence to antiretroviral treatment is important [18]. There is no single cause that causes non-adherence, while if patients comply, it will reduce HIV/AIDS transmission [19]. Health workers should pay attention to non-compliance; less than 80% is a predictor of therapy failure [20]. Communication barriers such as distrust, fear, shame, low level of education, not believing in the effectiveness of antiretrovirals, forgetting, being busy, falling asleep, feeling cured; side effects of medications; Influence of family and social support: lack of social support, stress, financial problems, and the role of staff also influence patient non-compliance with taking medication; transportation constraints due to distance, complex treatment regimens, and side effects of medication also influence patient non-compliance with taking medication [21-23].

The COVID-19 condition has an impact on people living with HIV/AIDS (PLWHA), both in terms of health services and treatment, and on social, political, and economic conditions [24]. During the COVID-19 period, the supply of antiretroviral drugs was disrupted for about six months in 50% of the HIV population, resulting in a 1.63-fold increase in deaths in Sub-Saharan Africa [25]. Even though post-COVID-19 medical costs are not a problem because all services have returned to normal, patients still find it difficult to come to the clinic to collect medicine [26]. M. Djamil Padang Hospital anticipates this drug problem by helping send drugs to HIV/AIDS patients, with the approval of doctors and nurses. Supported by Indonesian government policies and legal regulations issued by the Indonesian government (HK.02.02/II/753/2020) [27]. By knowing the causes of patient non-compliance with antiretroviral treatment, the treatment process reduces the impact of antiretroviral treatment [28]. If the treatment is successful, the global UNAIDS program's target for HIV/AIDS patients, 95-95-95, will be met. This indicates that 95% of patients comprehend the meaning of being HIV positive and receive therapy; 95% of HIV positive patients get treatment; and 95% of HIV/AIDS patients are aware of their status [14].

3. METHODS

This research uses qualitative research methods to provide an in-depth description and analysis of this phenomenon [29]. An important aspect of qualitative research focuses on understanding respondents to better understand their own experiences, meanings, and perspectives. In this study, in-depth interviews were conducted to identify factors causing patient non-compliance with taking medication, even though there should no longer be any obstacles to taking medication after COVID-19. This research was carried out in hospitals, even cafes, where HIV/AIDS patients were comfortable, and individual confidentiality was well maintained.

We collected data through semi-structured interviews lasting 30 – 60 minutes and used thematic analysis with the analysis tool N Vivo 12 [30, 31]. Interviews were conducted face-to-face with 26 participants, with a duration of 20-60 minutes, depending on the participant group. The participants include one doctor who specializes in HIV/AIDS, one head of the HIV outpatient room, two pharmacists, 22 NGOs, and HIV patients. Table 1 presents a list of participants based on purposive sampling. Convenience sampling is the first step that involves selecting potential participants. This is a fast and efficient way of collecting data because it allows for easy-to-reach participant selection. This is useful when the population is difficult to access or when the sample size is small [32]. Next, purposive sampling was used to select cooperative HIV/AIDS patients without serious disease complications.

Table 1. The participants demographic characteristics

Informants	Gender	Position	Years
Inf-1	M	Doctor VCT	35
Inf-2	F	Head of nursing VCT	56
Inf-3	F	Staff of Pharmacy	27
Inf-4	F	Procurement person	40
Inf-5	M	NGO 1 (Mk)/HIV	32
Inf-6	M	NGO 2 (Nnk)/HIV	31
Inf-7	M	NGO 3 (Pdr)/HIV	27
Inf-8	M	NGO 4(A)/HIV	32
Inf-9	M	NGO 5 (Hdyt)/HIV	29
Inf 10-26	15M, 2F	PLWHA	23-46
Total	26		

M = Male, F = Female, PLWHA= People living with HIV AIDS.

The thematic analysis process is carried out by coding first. Then, by grouping important items in the transcript, themes will emerge from the interview transcript, thus allowing us to communicate the participant's perspective in language that is easily transferred into research categories. HIV/AIDS patients selected as informants had the following inclusion criteria: had received ART for at least three months, were cooperative patients, and did not have advanced stages of HIV.

We collected data for approximately 3 months (January-March 2022) after obtaining permission from the hospital. Purposive sampling was used in this research to take samples from a population of HIV/AIDS-positive people. Table 2 provides a list of the demographics of the participants involved in this study. Patients were asked to discuss their experiences and the reasons why they did not continue treatment, even though there were no obstacles to doing so given that COVID-19 had passed. Patient adherence while undergoing antiretroviral therapy and patient understanding of the importance of antiretroviral treatment, barriers to drug use, drug adherence programs, patient understanding of HIV/AIDS

conditions, and patient support systems are some of the topics discussed in the interview guide.

Table 2. The participants demographic N (26)

Characteristics	f	%
Age		
20-29 years	10	**39**
30-39 years	10	**39**
40-49 years	5	19
50-59 years	1	3
Gender		
- Male	21	81
-Female	5	19
Profession		
-Health worker	4	15
-NGOs	5	19
-Self Employed	7	27
-Trade	4	15
-goverment	1	4
-Housewife	1	4
-Company	2	8
-College student	2	8
Education		
-Junior HS	3	12
-Senior HS	8	31
-University	2	8
-Baccalaureate	9	35
-College	4	16
Total	**26**	100%

All selected patients were provided with the opportunity to participate as respondents after signing informed consent forms. This research received ethical approval from Dr. M. Djamil Padang Hospital's Ethics Committee, as indicated by letter no. 363/KEPK/2021. Informed consent was obtained from all participating patients prior to the study's initiation. To protect the patient's or informant's privacy as an informant, the location of the interview is also guarded so that it is not bogus, even safe for informants, where the location of the interview is at the patient's or informant's request. All of the interviews were audio-recorded, and the transcripts were carefully prepared and compared to the state of the original voice recording to ensure accuracy [30]. The data obtained is entered into the software N Vivo 12, code, and category to build thematic frames [33-35].

We classified the "causes of non-adherence" to antiretroviral medications in HIV/AIDS patients as a topic for further discussion. We used a thematic approach to examine the categorized data [36]. This entails going over each category established when grouping data depending on the coding that was designed. We identified four potential categories and compared them to the emerging data to determine that they were relevant to the cause of patient non-adherence to the medicine. As a result of our research, we determined three themes of causes of non-adherence in taking medication, including: the first is "causes of non-adherence," the second is "side effects of drugs that influence non-adherence," and the third is the "role" of LGO in helping patients comply with medication. Our theme revolves around these three elements.

4. RESULT

In this study, all interviews were audio-recorded, and transcripts of the recordings were carefully written. The collected data were analyzed individually and compared to evaluate the experiences of people living with HIV/AIDS (PLWHA) who faced difficulties taking medication. To ensure the privacy of the informants, all personal information was removed. The interview data was transcribed and compared with the original voice recordings [30] for accuracy. The collected data from 26 participants was managed using the NVivo 12 software package. The codes and categories were created using a thematic framework [33-35].

The most common age groups were 20-39 years old, which accounted for 78% of the total. The majority of the informants were male (81%), self-employed (27%) in terms of occupation, and had completed senior high school education (31%). The research results were visually represented using Nvivo 12, and the themes included:

Theme 1: Causes of non-adherence factors

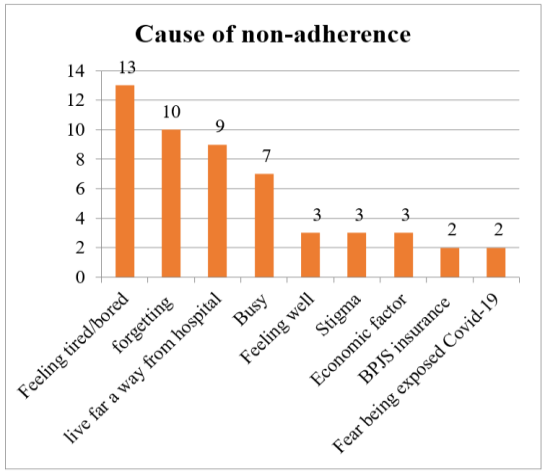

Figure 1. The causes of non-adherence

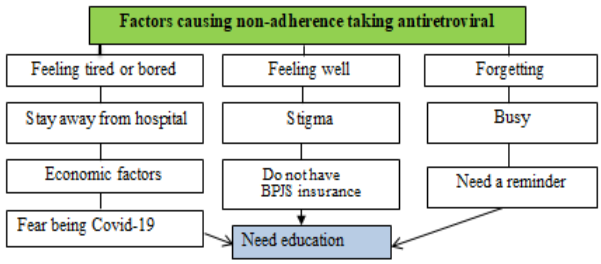

Figure 2. Scheme and solution to the problem of non-adherence with taking antiretroviral therapy

Most patients expressed feeling tired of taking medication. They mentioned experiencing side effects that persisted even after taking medication for 4-5 years. Some reported symptoms such as dizziness, excessive sleepiness, and a lack of energy. Despite explanations about the purpose of taking medication, patients sometimes fail to adhere to the prescribed regimen due to these side effects. The primary reasons and solution for non-adherence (Figures 1 and 2) are patients who emphasize two or more answers. The patients mentioned feeling bored, and they said:

I am already healthy; why should I continue taking medication? (*Inf 5,6*). *I have side effects such as dizziness, excessive sleepiness, and a lack of energy; I feel bored due to our perceived healthiness; and I feel bored due to prolonged medication* (*Inf 7, 8, 9, 25, 26*).

Forgetting and being busy means living far away from the

hospital. The patient reported experiencing forgetfulness and being busy. They shared their concerns as follows:

I often forget, which is attributed to early habits, and it is the most common cause for quitting medication due to boredom and busyness (*Inf 6, 7, 10, 15*). *I am away from home. Oversleeping is a frequent reason for forgetting to take medication* (*Inf 15, 17, 20, 26*). *Feeling overwhelmed and saturated with our daily routines* (*Inf 22, 25*).

Patients expressed the obstacle of living far away from the hospital and their experiences:

I live far away from hospitals, and transportation costs or economic factors help us collect our medication due to living far away and saving costs (*Inf 6, 7, 9, 16, 19, 21, 24*).

Some patients are reluctant to take their medication in their local areas because of stigma. The head of the clinic, HIV, expressed their concerns as follows:

I prefer to take my medication at M. Djamil Hospital instead of a local area due to a fear of our HIV status becoming known by others." Sometimes I am not ready to accept the stigma associated with HIV (*Inf 2, 15*).

Economic factors and the absence of BPJS insurance, COVID-19. Another factor that contributes to non-adherence is economic constraints. This is expressed by the following patient:

This is closely related to the prevalence of unpaid BPJS (*Social Security Agency on Health*), *because we are required to pay Rp. 100,000 for registration, which can be a significant financial burden for us* (*Inf 2, 5, 6*). *We are afraid of the impact of COVID-19, although we have our own protection, such as wearing masks* (*Inf 12, 13*).

The solution to medication non-adherence is to educate patients and advise them to set up reminders if they frequently forget to take their medications.

Theme 2: Side effects of antiretroviral therapy

Antiretroviral medicine side effects are commonly reported by patients to nurses. This may cause patients to temporarily stop taking the medication and solution (Figures 3 and 4). The following are some of the most common negative effects:

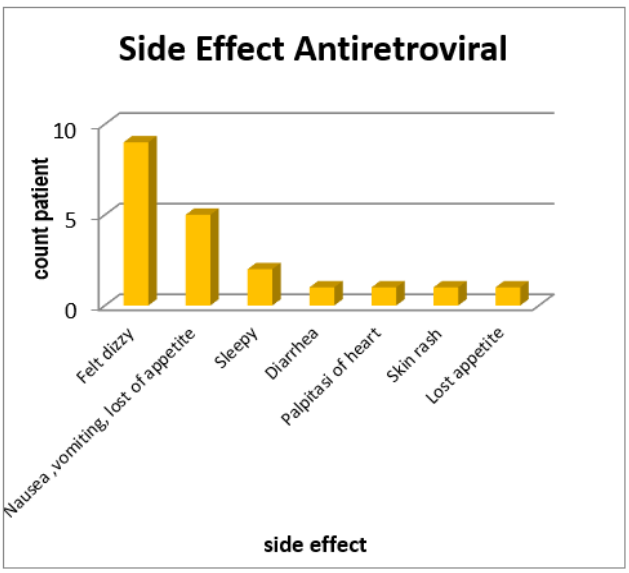

Figure 3. Overview of side effects of antiretroviral

The side effects are not the same among us, such as dizziness and sometimes nausea (*Inf 1, 2, and 5*). *Impact efavirens: nausea and vomiting, duviral, neviral: makes anemia, lamivudine symptoms: can be herpes, the atripla content can make nausea, and darkening of the skin* (*Inf 8, 11, 12, 15, 17*). *Loss of appetite* (*Inf 16*) *and slightly increased heart rate as a side effect* (*Inf 22*).

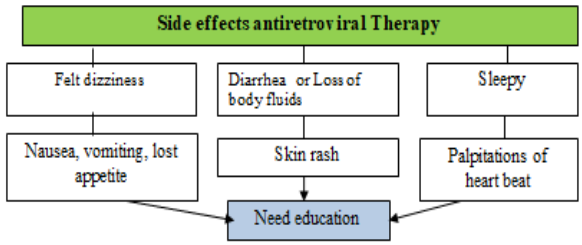

Figure 4. Schemes and solutions for side effects of antiretroviral therapy

They said the most common side effects were dizziness, nausea, and vomiting. This in-depth study of side effects is deliberately studied further to find out which drugs cause the most symptoms. Patients generally ask the doctor to change their therapy; not all patients reveal the side effects of the antiretroviral.

Education is a solution for patients so that they understand the importance of taking medication and the side effects, and it is hoped that patients will adjust to these conditions.

Theme 3: The role of NGOs in helping PLWHA patients

The head of nursing said that "the role of NGOs in assisting PLWHA patients is quite important, as long as it is in the COVID-19 era, in order to monitor PLWHA. The role of NGOs is to fetch medicine, act as a motivator, and provide information and education to PLWHA. Patient statements about the role of NGOs:

The role of NGOs helps us explain adherence and share information about the impact of ART (*Inf 10, 12*). *They ask a friend to help us get the medication and give us motivation and education* (*Inf 16, 19, 20, 22*).

The role of non-governmental organizations for HIV patients is vital to motivating patients to take medication.

In Figure 5, the scheme and recommended problem solving are outlined:

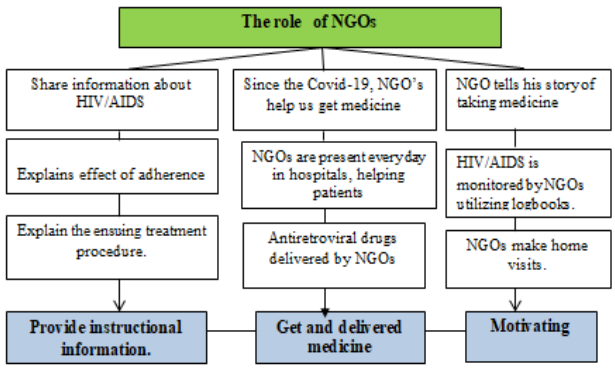

Figure 5. Schemes and solutions to the role of NGOs

The role of NGOs is to educate, provide information, get medicine, and send it to the homes of patients who tend to be LTFU. Providing motivation is very important for patients so that they remain obedient when taking medicine.

5. DISCUSION

The first theme derived from the factors causing HIV/AIDS patients non-adherence to antiretroviral treatment is boredom or boredom/tiredness of taking medication because HIV/AIDS patients must take medication for life, according to research in India, which states that taking oral medication for a long time can cause boredom [37]. Boredom can be linked to the patient's lack of understanding about the need for taking medication [38]. We need good education and incentives from doctors and personnel to prevent pill ennui and improve non-adherence [39]. The HIV policlinic's head of nursing and NGO officials must help patients realize the necessity of taking antiretroviral therapy and the consequences of not taking medicine. The other factors are forgetfulness and being overly busy. This is consistent with the findings of an American study, which indicated that the most prevalent reason for a PLWHA not taking ART medication is forgetfulness [40].

According to the interview data, the cause of forgetfulness was bustle throughout daily tasks. According to an African study, forgetting to take medication is caused by being busy [41], and then feeling bored while taking medication is linked to patients' lack of understanding about the importance of pharmaceutical advantages for viral suppression and their clinical state [38]. Patients frequently express boredom with antiretroviral drugs because they perceive themselves to be healthy while experiencing side effects such as excessive sleepiness, feeling heavy-headed, and a sense of helplessness, particularly with drugs such as Atripla or TLE (Tenofovir, Lamivudin, and Efavirenz), even after taking medication for 4-5 years. As a result, it is critical to provide education and always remind patients to use medication reminder devices. Improve patients' understanding of the benefits of medication in sustaining health [25, 42].

The distance from the hospital makes it difficult to pick up medicine. Sometimes patients ask NGOs for help to get their medicine; this is in accordance with research [43]. Patients attending came from various areas across the West Sumatra province, including distant locations such as Darmasraya, Pesisir Selatan (approximately 5 hours away), and West Pasaman (approximately 4 hours away). Some patients even traveled from the border areas of Jambi, Bengkulu, and Mentawai (approximately 12 hours away) (distance estimation). The supportive role of nursing services and doctors in monitoring and ensuring patient adherence to medication plays a vital role. NGOs are requested to assist in delivering medication to patients' homes through expeditions, with patients required to return for health check-ups after the third month.

This is one of the Ministry of Health's policies during the COVID-19 condition: patients are allowed to take medicine once every three months [44, 45]. Stigma makes the patients not want to take antiretroviral therapy in their area because they are afraid of being stigmatized, embarrassed, and afraid their status will be known if they take drugs in their area of residence. Even if they are far away, 5-8 hours from their home, research in British Columbia says that distance to health services plays an important role in determining access to patient care and health [46]. So, they want to take medicine away from where they live on the grounds that they are afraid of being stigmatized. A study in South Africa said one in four participants forgot that they were taking ART in their social environment to avoid stigmatization, behaviors associated with a younger age, experiencing greater stigma, and lower ART adherence. Worse [47], lack of knowledge about HIV and sex and a poor perception of the risk of stigma [48]. Stigma due to HIV infection undermines patient adherence to antiretroviral therapy (ART) [47]. Collaboration between health service providers, social workers, and families can increase information about HIV. PLWHA can increase their self-esteem, not isolate themselves due to stigma, and actively visit health care facilities such as Puskesmas [49]. While research in India says that fighting stigma is a key priority in controlling the HIV epidemic and providing quality care to PLWHA [50].

Patients choose to go to RSUP Dr. M. Jamil Padang, despite the distance from their residences, because they feel embarrassed to be recognized by others. They often wear glasses, masks, and sometimes hats to conceal their identities. The role of nursing and doctors is crucial in encouraging patients to seek regular treatment without experiencing stigma. Creating a comfortable environment for patients is emphasized. The nurse often called him "my son," indicating their satisfaction with seeking treatment for outpatient HIV/AIDS [51]. In order to overcome the stigma of PLWHA patients, it is necessary to think about how to overcome it by visiting patients' homes and providing community-based nursing services [52]. This has also been done at the M. Djamil Hospital Padang, including visiting and making telephone contact with patients who do not come more than once and are at risk of being lost to follow-up.

Patients with HIV/AIDS often feel well, so they ignore their long-term health, but they will come to the hospital if their illness is severe or opportunistic infections have arisen. This is in line with research in South Africa, which found that 3.2% of patients feel fine, so for various reasons they do not take treatment [53]. Sometimes they also don't know and they just feel healthy [54]. The feeling of being fine often leads patients to overlook or underestimate the symptoms of opportunistic infections (IO) and delay seeking appropriate medical help. This lack of understanding of the consequences of not taking medication is a significant factor [55].

One of the significant factors contributing to the high number of patients lost to follow-up (LTFU) is the economic conditions faced by individuals during the COVID-19 pandemic, which can be a significant financial burden for them. Socio-economic factors, lack of insurance, and the conditions of existence of COVID-19 [56] are closely related to each other, especially due to the conditions of COVID-19 in the past, where the impact is being felt by patients at this time, including many who have been laid off. From where they work, they cannot afford to pay insurance premiums. This is felt in China, where the COVID-19 pandemic has amplified health inequalities among men who have sex with men (MSM) [57]. Meanwhile, the direct influence of the past COVID-19 pandemic on the level of adherence was not felt by patients [58]. Compared with older MSM, those aged 15-24 years are more likely to report economic and service impacts. If a patient cannot afford to buy a service ticket at the hospital, then the solution taken by the head of the VCT Poly is that the head of the room took the initiative to make a return referral to the HIV service health center closest to the PLWHA patient's residence.

During COVID-19, the use of cellphones really supports transparency by guaranteeing patient privacy and helping to fight the spread of COVID-19. The last period of the COVID-19 pandemic affected the lesbian, gay, bisexual, transgender, and queer (LGBTQ+) population. The effects on: physical health, mental health, financial stabilization, fulfillment of

basic needs, and social interaction contacts [59, 60]. In line with research in Atlanta, the influence of the conditions during the COVID pandemic had an effect on HIV patients, namely disrupting HIV care, hindering access to food and medicine, and causing long-term effects [26]. In a study in Uganda, it was found that adherence to ART was caused by economic insecurity, adherence to HIV treatment regimens, and saving money so they have the finances they need to manage HIV/AIDS [61].

Non-adherence of HIV/AIDS patients with antiretroviral therapy can lead to drug resistance, and non-adherence in question is if there is at least one ART dose missed within 28 days [42]. Education is considered important for HIV/AIDS patients, related to economic and sociodemographic factors in peers, effectively avoiding non-adherence to taking ART [42, 60].

One of the causes of non-adherence in HIV/AIDS patients taking medication is due to drug side effects, which patients experience the most are dizziness, nausea and vomiting, and drowsiness, generally due to the drug efavirens, duviral neviral. This is in accordance with the results of a study in South Africa that said that non-adherence to taking antiretroviral drugs is one of the reasons for side effects [62]. In Nigeria, one of the most common causes of patient non-compliance is the presence of drug side effects (66.7%), no transportation costs to the hospital, traveling, forgetting, and avoiding being seen by other people [63, 64].

This is different from studies in Tanzania, Uganda, and Zambia, which found that 29% of patients had missed taking medication, and stavudine drugs caused more symptoms felt by patients [65]. The cause of non-adherence due to side effects of this drug also occurred in a study conducted in Nigeria, namely 66.7% [66]. People who are drug-resistant HIV have frequently had few tolerable treatment options available, and new medications are badly needed for this population [67]. This must be the concern of nurses and doctors who provide therapy.

The role of NGOs in helping patients during the treatment process for HIV/AIDS patients is to provide information, education, and motivation. The NGO is present every day at the daily VCT service at Dr. M. Djamil Hospital Padang. NGO staff share their own experiences about the side effects of taking medication they have experienced. Patients who are not compliant can be properly traced via WA, contacted via telephone, or even to the point of making home visits to patients. The NGO is under the coordination of the Medan Plus foundation, with a work contract no. SK 060/SPK-1/MPS/2022, and is paid a salary with the support of the Global Fund through the distribution of the Indonesia Spiritia HIV foundation. In the COVID-19 condition, NGOs can help get medicine in accordance with the doctor's approval and permission from the head of the VCT outpatient [68]. During the COVID-19 condition, patients are allowed to take medicine for 3 months [69]. This is in line with research in Ghana that the COVID-19 pandemic provided a solution to reduce social distance, so the role of community pharmacist pharmacy practice outlets for HIV patients can maintain essential services during a pandemic in order to prevent the burden of non-COVID diseases on the health care system, especially in areas with low and middle income [70]. NGO also helps patients control the activity of patients taking daily medication, according to research [71]. This is also in line with research in America in 2020 that the role of social workers during the COVID-19 pandemic is very important [71], and there was the use of digital assistance in reducing patient exposure to health workers in dealing with the COVID-19 condition at that time. The role of NGOs is very important and very helpful in motivating patients to seek treatment and always motivating patients to recover.

Practical implications for health-care personnel following COVID-19: It is critical to pay attention to patient complaints because they are often the source of patient non-adherence. It is critical to maintain communication with patients via phone calls. economic factors post-COVID-19 considerations must be addressed by officers by relocating the patient's treatment location near their home if the patient agrees. If all parties have played a role in reducing LTFU patients, then ART treatment will be optimal, and then the 95%-95%-95% program on UNAIDS will be achieved.

Recommendations for policymakers, particularly hospitals and health centers that provide services to HIV/AIDS patients, to closely monitor patient attendance and provide incentives for human resources who monitor this, especially for patients who are noncompliant, must also be able to contact the closest family contact number, apart from the patient, and then empower NGOs to monitor the patient's discipline more closely.

6. CONCLUSIONS

The causes of non-adherence to HIV/AIDS antiretroviral therapy are very diverse. To effectively treat patient noncompliance, healthcare providers must first identify the underlying cause. Boredom, forgetfulness, busyness, distance to treatment facilities, stigma, feeling unwell, economic problems, insurance, worries about COVID-19, and the bad effects of drugs are some of the causes. The most common side effects are dizziness, nausea and vomiting, drowsiness, heart palpitations, skin rashes, and diarrhea. Non-governmental organizations (NGOs) have an important role in the post-COVID-19 era, including in terms of education, delivery of medicines to patients' homes, and home visits. This has quite good implications for staff services for post-Covid-19 HIV/AIDS patients, which must be maintained or improved. Recommendations for policymakers to closely monitor patient attendance and provide incentives for human resources on duty, especially for patients who are not compliant, must be able to contact their closest family contacts. Apart from the patients themselves, empower NGOs to monitor patient discipline so that the UNAIDS program is achieved.

ACKNOWLEDGMENT

The authors would like to express their gratitude to the individuals who participated in this study and the team at the outpatient and VCT of M. Djamil Hospital Padang, West Sumatra, Indonesia. They also acknowledge the data collection and coding team, including Raveinal MD, Bude, Miko, and Dayat.

REFERENCES

[1] Dillingham, R., Ingersoll, K., Flickinger, T.E., Waldman, A.L., Grabowski, M., Laurence, C., Wispelwey, E., Reynolds, G., Conaway, M., Cohn, W.F. (2018).

PositiveLinks: A mobile health intervention for retention in HIV care and clinical outcomes with 12-month follow-up. AIDS Patient Care and STDs, 32(6): 241-250. https://doi.org/10.1089/apc.2017.0303

[2] Soares, R.D., Brito, A.M., Lima, K., Lapa, T.M. (2020). Adherence to antiretroviral therapy among people living with HIV/AIDS in northeastern Brazil: A cross-sectional study. Sao Paulo Medical Journal, 137(6): 479-485. https://doi.org/10.1590/1516-3180.2019.0212170919

[3] Brady, D.K., Gurijala. A.R., Huang, L., Hussain, A.A., Lingan, A.L., Pembridge, O.G., Ratangee, B.A., Sealy, T.T., Vallone, K.T., Clements, T.P. (2022). A guide to COVID-19 antiviral therapeutics: A summary and perspective of the antiviral weapons against SARS‐CoV-2 infection. The FEBS Journal. https://doi.org/10.1111/febs.16662

[4] Joint United Nations Programme on HIV/AIDS (UNAIDS). (2022). UNAIDS Global AIDS Update.

[5] Kemenkes. Laporan kinerja. Tahun 2020. https://p2p.kemkes.go.id/laporan-kinerja-ditjen-p2p-tahun-2020/, accessed on Feb. 10, 2024.

[6] Panel on antiretroviral guidelines for adults and adolescents. Guidelines for the use of antiretroviral agents in adults and adolescents with HIV. https://clinicalinfo.hiv.gov/en/guidelines/adult-and-adolescent-arv, accessed on Jan. 26, 2024.

[7] Closson, K., Palmer, A., Salters, K., Puskas, C., Parashar, S., Tiamiyu, L., Zhang, W., Barrios, R., Kaida, A., Hogg, R.S. (2019). Lower optimal treatment adherence among youth living with HIV in a universal health care setting where ART is available at no cost. Journal of Adolescent Health, 64(4): 509-515. https://doi.org/10.1016/j.jadohealth.2018.10.001

[8] MacCarthy, S., Mendoza-Graf, A., Huang, H., Mukasa, B., Linnemayr, S. (2019). Supporting adolescents to adhere (SATA): Lessons learned from an intervention to achieve medication adherence targets among youth living with HIV in Uganda. Children and Youth Services Review, 102: 56-62. https://doi.org/10.1016/j.childyouth.2019.04.007

[9] Alfian, A., Ibrahim, K., Rafiyah, I. (2019). The effect of the E-Patuh application on HIV/AIDS patients' adherence in consuming antiretroviral. Jurnal Keperawatan Padjadjaran, 7(1): 49-57.

[10] Adeoti, A.O., Dada, M., Elebiyo, T., Fadare, J., Ojo, O. (2019). Survey of antiretroviral therapy adherence and predictors of poor adherence among HIV patients in a tertiary institution in Nigeria. The Pan African Medical Journal, 33: 277. https://doi.org/10.11604%2Fpamj.2019.33.277.18711

[11] Kalichman, S.C., Kalichman, M.O., Banas, E., Hill, M., Katner, H. (2021). Drug use and life chaos as potential factors contributing to HIV viral load among people with lower health literacy. Substance Use & Misuse, 56(5): 606-614. https://doi.org/10.1080/10826084.2021.1884722

[12] Lee, E.H., Ganesan, K., Khamadi, S.A., Meribe, S.C., Njeru, D., Adamu, Y., Magala, F., Crowell, T.A., Akom, E., Agaba, P., Desai, P. (2021). Attaining 95-95-95 through implementation science: 15 years of insights and best practices from the walter reed army institute of research's implementation of the US president's emergency plan for AIDS relief. The American Journal of Tropical Medicine and Hygiene, 104(1): 12-25. https://doi.org/10.4269/ajtmh.20-0541

[13] UNAIDS data 2022. https://www.unaids.org/en/resources/documents/2023/2022_unaids_data, accessed on Feb. 10, 2024.

[14] Robert Harrison, H. (1983). Acquired immune deficiency syndrome. Infectious Diseases Newsletter, 2(2): 10-11. https://doi.org/10.1016/S0278-2316(83)80073-5

[15] Formularium nasional 2019. https://www.slideshare.net/ulfahhanum1/formularium-nasional-2019, accessed on Feb. 10, 2024.

[16] Renju, J., Moshabela, M., McLean, E., Ddaaki, W., Skovdal, M., Odongo, F., Bukenya, D., Wamoyi, J., Bonnington, O., Seeley, J., Zaba, B. (2017). 'Side effects' are 'central effects' that challenge retention in HIV treatment programmes in six sub-Saharan African countries: A multicountry qualitative study. Sexually Transmitted Infections, 93(Suppl 3): e052971. https://doi.org/10.1136%2Fsextrans-2016-052971

[17] Fogel, J.M., Hudelson, S.E., Ou, S.S., Hart, S., Wallis, C., Morgado, M.G., Saravanan, S., Tripathy, S., Hovind, L., Piwowar-Manning, E., Sabin, D. (2016). Brief report: HIV drug resistance in adults failing early antiretroviral treatment: results from the HIV prevention trials network 052 trial. JAIDS Journal of Acquired Immune Deficiency Syndromes, 72(3): 304-309. https://doi.org/10.1097/QAI.0000000000000951

[18] Dawson-Rose, C., Gutin, S.A., Cummings, B., Jaiantilal, P., Johnson, K., Mbofana, F. (2016). ART adherence as a key component of prevention with persons living with HIV in Mozambique. Journal of the Association of Nurses in AIDS Care, 27(1): 44–56. https://doi.org/10.1016/j.jana.2015.10.001

[19] Karyadi, T.H. (2017). Keberhasilan Pengobatan Antiretroviral (ARV). Jurnal Penyakit Dalam Indonesia, 4(1).

[20] McMahon, J.M., Braksmajer, A., Zhang, C., Leblanc, N., Chen, M., Aidala, A., Simmons, J. (2019). Syndemic factors associated with adherence to antiretroviral therapy among HIV-positive adult heterosexual men. AIDS Research and Therapy, 16(1): 32. https://doi.org/10.1186/s12981-019-0248-9

[21] Guidelines for the management of adult HIV infection with antiretroviral therapy. https://infeksiemerging.kemkes.go.id/document/se-dirjen-p2p-no-hk-02-02-ii-891-2022-tentang-percepatan-pemeriksaan-covid-19/view, accessed on Feb. 20, 2024.

[22] Permenkes RI No 74 Tahun 2014 tentang Pedoman Pelaksanaan Konseling dan Tes HIV. https://www.kebijakanaidsindonesia.net/id/dokumen-kebijakan/download/17-peraturan-pusat-national-regulation/607-permenkes-ri-no-74-tahun-2014-tentang-pedoman-pelaksanaan-konseling-dan-tes-hiv, accessed on Feb. 10, 2024.

[23] Chenneville, T., Gabbidon, K., Hanson, P., Holyfield, C. (2020). The impact of COVID-19 on HIV treatment and research: A call to action. International Journal of Environmental Research and Public Health, 17(12): 4548.

[24] Jewell, B.L., Mudimu, E., Stover, J., et al. (2020). Potential effects of disruption to HIV programmes in sub-Saharan Africa caused by COVID-19: Results from multiple mathematical models. Lancet HIV, 7(9): e629-640. https://doi.org/10.1016/S2352-3018(20)30211-3

[25] Kalichman, S.C., Eaton, L.A., Berman, M., et al. Intersecting pandemics: Impact of SARS-CoV-2 (COVID-19) protective behaviors on people living with HIV, Atlanta, Georgia. JAIDS Journal of Acquired Immune Deficiency Syndromes, 85(1): 66-72. https://doi.org/10.1097%2FQAI.0000000000002414
[26] Kemenkes, R.I. (2020). Pedoman pencegahan dan pengendalian coronavirus disease (Covid-19). Novel Corona Virus, 1-3.
[27] Nachega, J.B., Kapata, N., Sam-Agudu, N.A., Decloedt, E.H., Katoto, P.D., Nagu, T., Mwaba, P., Yeboah-Manu, D., Chanda-Kapata, P., Ntoumi, F., Geng, E.H. (2021). Minimizing the impact of the triple burden of COVID-19, tuberculosis and HIV on health services in sub-Saharan Africa. International Journal of Infectious Diseases, 113: S16-21.
[28] Creswell, J.W., Creswell, J.D. (2018). Research Defign: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications.
[29] Shubayr, M.A., Kruger, E., Tennant, M. (2023). Oral health providers' views of oral health promotion in Jazan, Saudi Arabia: A qualitative study. BMC Health Services Research, 23(1): 214. https://doi.org/10.1186/s12913-023-09170-8
[30] Luiz, M.E., Marinho, A. (2021). Leisure spaces and equipment: reflections on school recreation time. Journal of Physical Education, 32(1). https://doi.org/10.4025/jphyseduc.v32i1.3225
[31] Obilor, E.I. (2023). Convenience and purposive sampling techniques: Are they the same? International Journal of Innovative Social & Science Education Research, 11(1): 1-7.
[32] Company-Morales, M., Casadó, L., Zafra Aparici, E., Rubio Jiménez, M.F., Fontalba-Navas, A. (2022). The sound of silence: Unspoken meaning in the discourse of pregnant and breastfeeding women on environmental risks and food safety in Spain. Nutrients, 14(3): 593. https://doi.org/10.3390/nu14030593
[33] Rao, A., Patil, S., Kulkarni, P.P., Devi, A.S., Borade, S.S., Ujagare, D.D., Adhikary, R., Panda, S. (2021). Acceptability of HIV oral self-test among truck drivers and youths: A qualitative investigation from Pune, Maharashtra. BMC Public Health, 21: 1931. https://doi.org/10.1186/s12889-021-11963-7
[34] Aslan, S., Ozkara, A., Kasım, I., Aksoy, H. (2023). Why Turkish parents refuse childhood vaccination? A qualitative study. Archives of Iranian Medicine, 26(5): 267-274. https://doi.org/10.34172/aim.2023.41
[35] Braun, V., Clarke, V. (2019). Reflecting on reflexive thematic analysis. Qualitative Research in Sport, Exercise and Health, 11(4): 589-597. https://doi.org/10.1080/2159676X.2019.1628806
[36] Sahay, S., Verma, A., Shewale, S., Bangar, S., Bijeshkumar, A., Angolkar, M., Subramanian, T., Chandhiok, N. (2021). Understanding issues around use of oral pre exposure prophylaxis among female sex workers in India. BMC Infectious Diseases, 21(1): 1-15. https://doi.org/10.1186/s12879-021-06612-8
[37] Byrd, K.K., Hou, J.G., Hazen, R., Kirkham, H., Suzuki, S., Clay, P.G., Bush, T., Camp, N.M., Weidle, P.J., Delpino, A. (2019). Antiretroviral adherence level necessary for HIV viral suppression using real-world data. Journal of Acquired Immune Deficiency Syndromes, 82(3): 245. https://doi.org/10.1097%2FQAI.0000000000002142
[38] Ahmed, S.I., Farooqui, M., Syed Sulaiman, S.A., Hassali, M.A., Lee, C.K. (2019). Facilitators and barriers affecting adherence among people living with HIV/AIDS: A qualitative perspective. Journal of Patient Experience, 6(1): 33-40. https://doi.org/10.1177/2374373518770805
[39] Freeman, R., Gwadz, M., Francis, K., Hoffeld, E. (2021). Forgetting to take HIV antiretroviral therapy: a qualitative exploration of medication adherence in the third decade of the HIV epidemic in the United States. SAHARA-J: Journal of Social Aspects of HIV/AIDS, 18(1): 113-130.
[40] Magidson, J.F., Joska, J.A., Regenauer, K.S., Satinsky, E., Andersen, L.S., Seitz-Brown, C.J., Borba, C.P., Safren, S.A., Myers, B. (2019). "Someone who is in this thing that I am suffering from": The role of peers and other facilitators for task sharing substance use treatment in South African HIV care. International Journal of Drug Policy, 70: 61-69. https://doi.org/10.1016/j.drugpo.2018.11.004
[41] Hussein, M., Dibaba, B., Wondu, Y. (2020). Factors influencing effectiveness of peer education against nonadherence to antiretroviral therapy among adult people living with HIV/AIDS: A pre-post intervention study in Arsi zone, Ethiopia. HIV/AIDS - Res Palliat Care, 12: 1-7. https://doi.org/10.2147/HIV.S228330
[42] Kalichman, S.C., Katner, H., Banas, E., Hill, M., Kalichman, M.O. (2020). HIV-related stigma and non-adherence to antiretroviral medications among people living with HIV in a rural setting. Social Science & Medicine, 258: 113092. https://doi.org/10.1016/j.socscimed.2020.113092
[43] SE Dirjen P2P No. HK.02.02-II-891-2022 Tentang Percepatan Pemeriksaan COVID-19. https://infeksiemerging.kemkes.go.id/document/se-dirjen-p2p-no-hk-02-02-ii-891-2022-tentang-percepatan-pemeriksaan-covid-19/view, accessed on Jan. 20, 2024.
[44] Peraturan Menteri Kesehatan Nomor 23 Tahun 2022 tentang Penanggulangan Human Immunodeficiency Virus, Acquired Immuno-Deficiency Syndrome, dan Inkubasi Menular Seksual. https://peraturan.bpk.go.id/Details/245543/permenkes-no-23-tahun-2022, accessed on Jan. 20, 2024.
[45] Amram, O., Shoveller, J., Hogg, R., Wang, L., Sereda, P., Barrios, R., Montaner, J., Lima, V. (2018). Distance to HIV care and treatment adherence: Adjusting for socio-demographic and geographical heterogeneity. Spatial and Spatio-Temporal Epidemiology, 27: 29-35. https://doi.org/10.1016/j.sste.2018.08.001
[46] Kalichman, S.C., Mathews, C., Banas, E., Kalichman, M.O. (2019). Treatment adherence in HIV stigmatized environments in South Africa: Stigma avoidance and medication management. International Journal of STD & AIDS, 30(4): 362-370. https://doi.org/10.1177/0956462418813047
[47] Pratt, M.C., Isehunwa, O.O., Bassett, I.V., Kempf, M.C., Gordon, B., Matthews, L.T. (2023). Rapid qualitative analysis approach to stakeholder and client interviews to inform mobile-based HIV testing in the U.S. Deep South. Arch Public Heal, 81(1): 1-15. https://doi.org/10.1186/s13690-023-01039-w
[48] Sianturi, E.I., Perwitasari, D.A., Islam, M.A., Taxis, K. (2019). The association between ethnicity, stigma,

beliefs about medicines and adherence in people living with HIV in a rural area in Indonesia. BMC Public Health, 19(1): 1-8. https://doi.org/10.1186/s12889-019-6392-2

[49] Machowska, A., Bamboria, B.L., Bercan, C., Sharma, M. (2020). Impact of 'HIV-related stigma-reduction workshops' on knowledge and attitude of healthcare providers and students in Central India: a pre-test and post-test intervention study. BMJ Open, 10(4): e033612.

[50] Rouleau, G., Richard, L., Côté, J., Gagnon, M.P., Pelletier, J. (2019). Nursing practice to support people living with HIV with antiretroviral therapy adherence: A qualitative study. Journal of the Association of Nurses in AIDS Care, 30(4): e20-e37. https://doi.org/10.1097%2FJNC.0000000000000103

[51] Adelekan, B., Andrew, N., Nta, I., Gomwalk, A., Ndembi, N., Mensah, C., Dakum, P., Aliyu, A. (2019). Social barriers in accessing care by clients who returned to HIV care after transient loss to follow-up. AIDS Research and Therapy, 16(1): 1-7. https://doi.org/10.1186/s12981-019-0231-5

[52] Mabunda, K., Ngamasana, E.L., Babalola, J.O., Zunza, M., Nyasulu, P. (2019). Determinants of poor adherence to antiretroviral treatment using a combined effect of age and education among human immunodeficiency virus infected young adults attending care at letaba hospital hiv clinic, Limpopo Province, South Africa. Pan African Medical Journal, 32: 1-14.

[53] Sambah, F., Baatiema, L., Appiah, F., Ameyaw, E.K., Budu, E., Ahinkorah, B.O., Oduro, J.K., Seidu, A.A. (2020). Educational attainment and HIV testing and counselling service utilisation during antenatal care in Ghana: Analysis of demographic and health surveys. PLoS One, 15(1): e0227576. https://doi.org/10.1371/journal.pone.0227576

[54] Khawcharoenporn, T., Srirach, C., Chunloy, K. (2020). Educational interventions improved knowledge, attitude, and practice to prevent HIV infection among HIV-negative heterosexual partners of HIV-infected persons. Journal of the International Association of Providers of AIDS Care, 19: 1-15. https://doi.org/10.1177/2325958219899532

[55] Ahmed, A., Dujaili, J.A., Jabeen, M., Umair, M.M., Chuah, L.H., Hashmi, F.K., Awaisu, A., Chaiyakunapruk, N. (2022). Barriers and enablers for adherence to antiretroviral therapy among people living with HIV/AIDS in the era of COVID-19: A qualitative study from Pakistan. Frontiers in Pharmacology, 12: 807446. https://doi.org/10.3389/fphar.2021.807446

[56] Sanchez, T.H., Zlotorzynska, M., Rai, M., Baral, S.D. (2020). Characterizing the impact of COVID-19 on men who have sex with men across the United States in April, 2020. AIDS and Behavior, 24(7): 2024-2032. https://doi.org/10.1007/s10461-020-02894-2

[57] Carbonero-Lechuga, P., Castrodeza-Sanz, J., Sanz-Muñoz, I., Marqués-Sánchez, P., Eiros, J.M., Dueñas-Gutiérrez, C., Prada-García, C. (2023). Impact of COVID-19 on adherence to treatment in patients with HIV. Healthcare, 11(9): 1299. https://doi.org/10.3390/healthcare11091299

[58] Nowaskie, D.Z., Roesler, A.C. (2022). The impact of COVID-19 on the LGBTQ+ community: Comparisons between cisgender, heterosexual people, cisgender sexual minority people, and gender minority people. Psychiatry Research, 309: 114391. https://doi.org/10.1016/j.psychres.2022.114391

[59] Ssewamala, F.M., Byansi, W., Bahar, O.S., Nabunya, P., Neilands, T.B., Mellins, C., McKay, M., Namuwonge, F., Mukasa, M., Makumbi, F.E., Nakigozi, G. (2019). Suubi+ adherence study protocol: A family economic empowerment intervention addressing HIV treatment adherence for perinatally infected adolescents. Contemporary Clinical Trials Communications, 16: 100463. https://doi.org/10.1016/j.conctc.2019.100463

[60] Eyassu, M.A., Mothiba, T.M., Mbambo-Kekana, N.P. (2016). Adherence to antiretroviral therapy among HIV and AIDS patients at the Kwa-Thema clinic in Gauteng Province, South Africa. African Journal of Primary Health Care and Family Medicine, 8(2): 1-7.

[61] Anyaike, C., Atoyebi, O.A., Musa, O.I., Bolarinwa, O.A., Durowade, K.A., Ogundiran, A., Babatunde, O.A. (2019). Adherence to combined Antiretroviral therapy (cART) among people living with HIV/AIDS in a Tertiary Hospital in Ilorin, Nigeria. Pan African Medical Journal, 32(1).

[62] Legesse, T.A., Reta, M.A. (2019). Adherence to antiretroviral therapy and associated factors among people living with HIV/AIDS in Hara Town and its surroundings, North-Eastern Ethiopia: A Cross-Sectional Study. Ethiopian Journal of Health Sciences, 29(3): 299-308.

[63] Koole, O., Denison, J.A., Menten, J., Tsui, S., Wabwire-Mangen, F., Kwesigabo, G., Mulenga, M., Auld, A., Agolory, S., Mukadi, Y.D., Van Praag, E. (2016). Reasons for missing antiretroviral therapy: Results from a multi-country study in Tanzania, Uganda, and Zambia. PloS One, 11(1): e0147309. https://doi.org/10.1371/journal.pone.0147309

[64] Sivamuni, K., Mantri, V. (2018). HIV smART monitor-A health care system that monitors pediatric Antiretroviral Therapy (ART) drug dosages. In 2018 3rd International Conference for Convergence in Technology (I2CT), Pune, India, pp. 1-5. https://doi.org/10.1109/I2CT.2018.8529324

[65] Frey, E., Johnston, C.D., Siegler, E.L. (2023). Treatment regimens and care models for older patients living with HIV: Are we doing enough? HIV/AIDS - Research and Palliative Care, 15(2023): 191-208. https://doi.org/10.2147/HIV.S311613

[66] Iradukunda, P.G., Pierre, G., Muhozi, V., Denhere, K., Dzinamarira, T. (2021). Knowledge, Attitude, and Practice Towards COVID-19 Among People Living with HIV/AIDS in Kigali, Rwanda. Journal of Community Health, 46(2): 245-250. https://doi.org/10.1007/s10900-020-00938-1

[67] Kretchy, I.A., Asiedu-Danso, M., Kretchy, J.P. (2021). Medication management and adherence during the COVID-19 pandemic: Perspectives and experiences from low-and middle-income countries. Research in Social and Administrative Pharmacy, 17(1): 2023-2026. https://doi.org/10.1016/j.sapharm.2020.04.007

[68] de Mattos Costa, J., Torres, T.S., Coelho, L.E., Luz, P.M. (2018). Adherence to antiretroviral therapy for HIV/AIDS in Latin America and the Caribbean: systematic review and meta-analysis. African Journal of Reproduction and Gynaecological Endoscopy, 21(1).

[69] Bogart, L.M., Ojikutu, B.O., Tyagi, K., Klein, D.J., Mutchler, M.G., Dong, L., Lawrence, S.J., Thomas, D.R., Kellman, S. (2021). COVID-19 related medical mistrust,

health impacts, and potential vaccine hesitancy among Black Americans living with HIV. Journal of Acquired Immune Deficiency Syndromes, 86(2): 200-207. https://doi.org/10.1097%2FQAI.0000000000002570

[70] Smith, C., van Velthoven, M.H. (2020). Best practices in digital health to improve antiretroviral treatment adherence. BMJ Health & Care Informatics, 27(3): e100215. https://doi.org/10.1136/bmjhci-2020-100215

[71] Mottiar, S., Lodge, T. (2018). The role of community health workers in supporting South Africa's HIV/AIDS treatment programme. African Journal of AIDS Research, 17(1): 54-61. https://doi.org/10.2989/16085906.2017.1402793