International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Determination of Factors Influencing the Retention in HIV Care of Adolescents During the Covid-19 Pandemic in Lusaka Zambia

Jane Kalenga Nkatya[1], Alice Hazemba[2]

[1,2]Department of Community and Family Medicine, School of Public Health, University of Zambia, P.O. Box 51110, Lusaka, Zambia.

Abstract

Background: Adolescents (ages 18-24) living with HIV are prone to disengagement from care, risking health deterioration and viral transmission. Identifying key barriers to adolescent retention is crucial for intervention development. This study aims to explore barriers and facilitators to adolescent HIV care retention. In Zambia, where 32% of 15–17-year-olds and 60% of 18–19-year-olds are sexually active, with low condom use rates, the risk of HIV and STIs is high. Despite Ministry of Health strategies, many HIV-positive adolescents in Zambia struggle with adherence. This study sought to investigate how various factors interact to influence HIV retention among adolescents in Lusaka, Zambia, employing an adapted Andersen framework. Its objectives include understanding factors impacting HIV retention, analysing predisposing factors, and examining health system influences on adolescent HIV care retention in Lusaka, Zambia.

Methods: The study was conducted at University Teaching Hospital (UTH), Chilenje Hospital, and Chawama, Mtendere, and Kalingalinga) clinics in Lusaka, Zambia. Non-probability sampling, specifically purposive sampling, was employed. Semi-structured questionnaires were used for data collection and the quantitative data was analyzed using STATA 16.0. Findings will be disseminated through healthcare community, policy circles, among stakeholders and shared with UNZA's library. Ethical approval was obtained from The University of Zambia Biomedical Research Ethics Committee (UNZABREC) and permission from the Zambia National Health Research Authority (ZNHRA). Informed consent was obtained from participants, emphasizing voluntariness and the right to withdraw. Anonymity, confidentiality, and privacy was strictly upheld throughout the study.

Results: The results highlight the nuanced nature of factors influencing adolescent retention in HIV care, emphasizing the importance of predictors such as education level, alcohol intake, belief in HIV cure through prayers, and perception of HIV as a significant life problem. The findings align with prior studies, warranting further exploration of support networks and experiences of non-engaged adolescents.

Conclusion: In summary, this study makes a significant contribution to public health research by delving into the intricate factors impacting adolescent retention in HIV care in Lusaka, Zambia. The findings, aligned with research inquiries and existing literature, shed light on education, substance use, and psychosocial aspects. These insights lay the groundwork for tailored interventions, highlighting the significance of patient-centered strategies. Moreover, the study emphasizes the necessity for continued exploration of support networks, disclosure challenges, and broader societal dynamics affecting healthcare engagement. This insight informs future research endeavors aimed at enhancing the well-being of

adolescents living with HIV. Recommendations include improve medication access through mobile services, provide financial aid integrated with counseling, personalize adherence plans, involve social networks, respect religious beliefs, address geographic disparities, monitor long-term health, and pilot targeted interventions. Policies should establish guidelines for medication access and financial assistance.

Keywords: HIV care, Adolescents, Retention, Covid-19

Introduction

Retention in HIV care is vital for the continuous engagement of patients in prevention, treatment, and support services, as defined by the World Health Organization (WHO, 2011). It significantly contributes to antiretroviral therapy (ART) adherence, thus improving treatment outcomes and preventing drug resistance. However, among youths, including adolescents living with HIV (ALHIV), challenges such as loss to follow-up, poor ART adherence, treatment failure risks, and high mortality rates persist (Vithalani, 2018). HIV, a virus targeting the human immune system, has evolved into a global pandemic, with significant socio-economic and psychological impacts (Ubesie, 2012). The UNAIDS Fast Track targets aim for 90% of people living with HIV to be aware of their status, receiving ART, and achieving viral suppression by 2020 (UNAIDS, 2017). However, studies reveal concerning statistics: a review of patient cohorts across Africa showed that only 60% remained in ART programs after two years (M. Fox, 2010), and Zambia reported low viral load suppression rates, indicative of similarly low retention-in-care rates (ZAMPHIA, 2016).The global perspective on HIV retention in adolescents underscores significant challenges faced by this demographic, particularly in regions like sub-Saharan Africa, where HIV prevalence among adolescents is notably high. South Africa and Zambia, among other countries in the region, struggle to maintain optimal retention rates among adolescents in HIV care programs despite extensive efforts to expand antiretroviral therapy (ART) coverage. Studies highlight the persistent gaps in the HIV care cascade, with adolescents often experiencing poorer health outcomes even when on treatment. Efforts to achieve global targets, such as the 90–90–90 goal set by organizations like PEPFAR, are hindered by suboptimal retention rates among adolescents, indicating a critical need for targeted interventions to improve retention and ensure better health outcomes for this vulnerable population.

Materials and Methods

Study Design

Research design is defined as a detailed outline of how the research will be carried out to address the research problem (Yin, 2013). A Cross-sectional study was be used in this study.

To meet the first objective, the study may use a combination of methods such as surveys, interviews, and focus groups with HIV-positive adolescents in Lusaka, Zambia to gather information about their experiences and perceptions of retention in HIV care during the Covid-19 pandemic. Additionally, data from healthcare providers and community leaders may be collected to gather information about the healthcare system and community-level factors that may be influencing retention in HIV care. The collected data will be analyzed to identify any predisposing and multilevel factors that may be impacting retention in HIV care during the pandemic.

To meet the first objective, the study will use interviews with HIV-positive adolescents in Lusaka, Zambia to gather information about their experiences and perceptions of retention in HIV care during the Covid-19 pandemic. Additionally, data from healthcare providers will be collected to gather information about

the healthcare system and community-level factors that may be influencing retention in HIV care. The collected data will be analyzed to identify any predisposing and multilevel factors that may be impacting retention in HIV care during the pandemic.

To meet the second objective, the study will also use interviews with HIV-positive adolescents in Lusaka, Zambia to gather information about their personal health practices and experiences with the healthcare system during the Covid-19 pandemic. Additionally, data from healthcare providers and community leaders will be collected to gather information about the healthcare system and its impact on retention in HIV care during the pandemic. The collected data will be analyzed to identify any connections between personal health practices, healthcare system and retention in HIV care during the pandemic.

Study site and Study Population

The study will be conducted at The University teaching Hospital (UTH), and Chilenje Hospital and the following clinics Chawama, Mtendere and Kalingalinga in Lusaka Zambia. HIV positive adolescents (18-24 years) living within Lusaka Zambia. The accessible population should have been receiving HIV care at (UTH), and Chilenje Hospital and the following clinics Chawama, Mtendere and Kalingalinga in Lusaka and have not shown retention in HIV care between 2020 and present.

Sample Size and Sampling Technique

A sample size of 105 HIV-positive adolescents was determined using Yamane's formula (1967) to estimate the proportion of this population who have not shown retention in HIV care from 2020 to present with a 5% margin of error. This calculation assumes (i) the proportion of the target population not retained in care is known (143/X, where X is the total population size), (ii) a sample size of 105 achieves the desired precision, (iii) simple random sampling will be employed, (iv) the sample is independent and representative, (v) the sample size allows for normal approximation of the binomial distribution, (vi) the proportion not retained in care is constant over time, and (vii) no participant loss will occur during the study. A systematic sampling method was used to select participants for the study because it has advantages of eliminating the phenomenon of clustered selection and a low probability of contaminating data. In this study, a random starting point and the sampling interval will be determined after looking at the sampling frame.

Recruitment Criteria

Recruitment for the study primarily involved partnering with healthcare facilities offering HIV care services in Lusaka, Zambia, leveraging their resources to efficiently reach potential participants. These facilities assisted in participant recruitment and disseminated study information. Adequate safety measures, including the provision of personal protective equipment and adherence to COVID-19 protocols such as social distancing and sanitation, were ensured to safeguard both researchers and potential participants during interactions. Existing databases of HIV-positive individuals currently in care or previously dropped out of care were instrumental in identifying and reaching potential participants. Incentives like gift vouchers or transportation reimbursement were offered to enhance participants' willingness to engage in the study. In terms of inclusion criteria, HIV-positive adolescents aged 18 to 24 receiving care at specific healthcare facilities in Lusaka were considered. The age range of 18 to 24 was chosen to avoid the need for assent for individuals under 18 while adhering to consent requirements for those above 18. Exclusion criteria involved excluding HIV-positive adolescents on care for less than six

months before the study. Independent variables such as age, sex, marital status, education level, occupation, and area of residence were examined. Age was measured as a continuous variable, while sex, marital status, education level, and occupation were assessed as categorical variables. The dependent variable was retention in HIV care, defined as not coming to get medication for a period of more than three months. These variables were assessed using various scales of measurement, including binary, categorical, and ordinal scales, to capture comprehensive data for analysis.

Data Collection and Analysis

Institutional tailored observational checklists from ART departments of the selected health facilities will be used and from the information collected, the researcher will make follow ups with patients using semi-structured questionnaires to achieve the study objectives. Data from the answered questionnaire will be entered into excel then exported into STATA (version 16). Data cleaning will be done by checking for errors and correcting them. Descriptive statistics for continuous variables like age will be reported as mean and standard deviation for normally distributed data, otherwise the median and interquartile range will be reported. For categorical variables such as sex, frequencies and percentages will be reported. Histogram with a normal superimposed, and further the statistical test such as the Sharpiro-wilk test will be used to check the normality of continuous variables. To test whether there are differences in the averages of the continuous variables for the different categories of the outcome variable, a two-sample t-test will be used if the distribution of the continuous variable is normal, otherwise, the Mann-Whitney U test will be used. To assess the association between the outcome variable and each of the categorical explanatory variables such as sex, a Chi-squared test will be used if the expected frequencies in all the cells of the contingency table will be more than 5, otherwise, the Fisher's exact test will be used. To determine factors associated with retention to HIV treatment, logistic regression will be used since the outcome variable is binary (retained or did not retain). Data analysis will be done using STATA version 16.0.

Ethical Consideration

The study adhered to ethical guidelines set forth by the University of Zambia Research and Ethics Committee (UNZABREC). Ethical clearance was sought from UNZABREC, and authorization to conduct the study was obtained from the Zambia National Health Research Authority (ZNHRA). Participation in the study was voluntary, and participants were required to provide informed consent by signing a consent form, indicating their willingness to take part. They were also informed of their right to withdraw from the study at any point if they felt uncomfortable or simply wished to do so. Throughout the study, measures were implemented to ensure anonymity, confidentiality, and privacy of the participants' information.

Results

The study included a total of 196 patients, with 57.14% (112/196) being females and 42.82% (84/196) males. Out of these patients, 71.43% (140/196) had retention in HIV care, while 28.57% (56/196) had no retention in HIV care. The mean age of the patients was 20.65 years, with a standard deviation of 2.09 years. The mean duration on ART treatment was 12.15 years, with a standard deviation of 6.04 years. The minimum duration on ART was one year, and the maximum was 27 years. In terms of healthcare facility attendance, 34.18% (67/196) of patients were attended to at the University Teaching Hospital (UTH), followed by 18.37% (36/196) at Kalingalinga clinic, 17.86% (35/196) at Mtendere clinic, 16.33% (32/196) at Chawama level 1 clinic, and 13.27% (26/196) at Chilenje level 1 hospital.

The study conducted an in-depth analysis of factors influencing retention in HIV care, involving a dataset of 196 patients, among which 140 individuals (71.43%) had retention in HIV care, while 56 (28.57%) did not. Key demographic and behavioral factors were scrutinized, including age, duration on antiretroviral therapy (ART), sex, marital status, health facility, employment status, education level, alcohol intake, disclosure of HIV status, belief in HIV cure through prayers, perception of HIV as a significant life problem, and type of transport used. Statistical tests revealed that alcohol intake status, HIV status disclosure, belief in HIV cure through prayers, and perception of HIV as a significant life problem were statistically significant factors influencing retention in HIV care. However, variables such as age, duration on ART, marital status, employment status, health facility attended, and type of transport used did not exhibit statistical significance in impacting retention.

Further analysis through logistic regression highlighted the independent roles of significant variables, indicating their impact on health outcomes. Education level, alcohol intake status, belief in HIV cure through prayers, and perception of HIV as a significant life problem emerged as influential factors affecting retention in HIV care. Specifically, individuals with secondary education and above had 1.510 times increased odds of retention compared to those with primary education or below. Additionally, those who did not consume alcohol had higher odds of retention, while individuals who perceived HIV as a significant life problem or believed in HIV cure through prayers had reduced odds of retention in HIV care.

Table 1 Baseline characteristics of patients stratified by retention in HIV care (retention in care or no retention in care

Predictor	**Retention in HIV care (N=140)**	**No retention in HIV care (N=56)**	**P - value**
Age Mean(SD)	20.70(2.13)	20.63(2.08)	0.8376[T]
Duration on ART Mean(SD)	12.01(6.10)	12.50(5.90)	0.6068[T]
Sex			
Female	80(71.43%)	32(28.57%)	1.000[C]
Male	60(71.43%)	24(28.57%)	
Marital status			
Unmarried	3(100.00%)	0(0.00%)	0.559[F]
Married	137(70.98%)	56(29.02%)	
Health facility			
UTH	53(79.10%)	14(20.90%)	0.338[C]
Chawama level 1	21(65.63%)	11(34.38%)	
Kalingalinga clinic	22(61.11%)	14(38.89%)	
Mtendere clinic	26(74.29%)	9(25.71%)	
Chilenje level 1	18(69.23%)	8(30.77%)	
Employment status			
Unemployed	107(72.79%)	40(27.21%)	0.465[C]
Employed	33(67.35%)	16(32.65%)	
Education level			

Up to primary level	22(55.00%)	18(45.00%)	0.010[C]
Secondary and above	118(75.64%)	38(24.36%)	
Take alcohol			
No	114(85.07%)	20(14.93%)	<0.0001[C]
Yes	26(41.94%)	36(58.06%)	
Disclosed HIV status			
No	23(54.76%)	19(45.24%)	0.007[C]
Yes	117(75.97%)	37(24.03%)	
HIV cured by prayers			
No	102(81.60%)	23(18.40%)	<0.0001[C]
Yes	38(53.52%)	33(46.48%)	
HIV big problem in my life			
No	102(84.30%)	19(15.70%)	<0.0001[C]
Yes	38(50.67%)	37(49.33%)	
Type of transport used			
Public transport	90(68.70%)	41(31.30%)	0.236[C]
Other	50(76.92%)	15(23.08%)	

[T] means p-value obtained from the two sample test, [C] means p-value obtained from chi squared test and [F] means p-value obtained from the Fisher's exact test

The study conducted an in-depth analysis of factors influencing retention in HIV care, employing statistical tests to ascertain the significance of various predictors. The dataset, comprising 140 individuals with retention in HIV care and 56 without retention, provided insights into demographic and behavioural factors impacting care continuity. Variables including age, duration on antiretroviral therapy (ART), sex, marital status, health facility, employment status, education level, alcohol intake, disclosure of HIV status, belief in HIV cure through prayers, perception of HIV as a significant life problem, and type of transport used were scrutinized. The results revealed that alcohol intake status, HIV status disclosure, belief in HIV cure through prayers, and perception of HIV as a significant life problem were statistically significant, indicating differences in retention proportions based on these factors.

Contrarily, age, duration on ART, marital status, employment status, health facility attended, and type of transport used did not exhibit statistical significance in influencing retention. For continuous variables (age and duration on ART), the two-sample t-test was applied, while the Chi-squared test was utilized for categorical explanatory variables. Notably, the Fisher's exact test was employed for marital status due to expected values in some cells being less than 5. These findings enhance our understanding of the nuanced dynamics affecting retention in HIV care. While certain factors emerge as crucial determinants, others may not exert a significant impact. This nuanced understanding is essential for tailoring interventions to specific subpopulations and ensuring targeted strategies for improved retention in HIV care.

Table 2 Results from simple logistic regression (Unadjusted estimates)

Predictor	Odds Ratio	P – value	95% CI
Age	0.984	0.837	(0.848, 1.142)
Duration on ART	0.986	0.605	(0.937, 1.039)
Sex			
Female	1(Ref)	NA	NA
Male	1	1.000	(0.535, 1.871)
Health facility			
UTH	1(Ref)	NA	NA
Chawama level 1	0.504	0.152	(0.197, 1.288)
Kalingalinga clinic	0.415	0.053	(0.170, 1.013)
Mtendere clinic	0.763	0.581	(0.292, 1.993)
Chilenje level 1	0.594	0.317	(0.214, 1.648)
Employment status			
Unemployed	1(Ref)	NA	NA
Employed	0.771	0.466	(0.383, 1.551)
Education level			
Up to primary level	1(Ref)	NA	NA
Secondary and above	1.365	0.011	(1.073, 1.736)
Take alcohol			
No	1(Ref)	NA	NA
Yes	0.127	<0.0001	(0.063, 0.253)
Disclosed HIV status			
No	1(Ref)	NA	NA
Yes	2.612	0.008	(1.283, 5.320)
HIV cured by prayers			
No	1(Ref)	NA	NA
Yes	0.260	<0.0001	(0.136, 0.497)
HIV big problem in my life			
No	1(Ref)	NA	NA
Yes	0.191	<0.0001	(0.098, 0.373)
Type of transport used			
Public transport	1(Ref)	NA	NA
Other	1.519	0.232	(0.765, 3.013)

Table 3 Factors of retention in HIV care from a multiple logistic regression model

Predictor	**Unadjusted estimates**			**Adjusted estimates**		
	OR	**P - value**	**95% CI**	**OR**	**P - value**	**95% CI**
Education level						
Up to primary level	1(Ref)	NA	NA	1(Ref)	NA	NA
Secondary and above	1.365	0.011	(1.073, 1.736)	1.510	0.007	(1.118, 2.039)
Take alcohol						
No	1(Ref)	NA	NA	1(Ref)	NA	NA
Yes	0.127	<0.0001	(0.063, 0.253)	0.130	<0.0001	(0.059, 0.286)
HIV cured by prayers						
No	1(Ref)	NA	NA	1(Ref)	NA	NA
Yes	0.260	<0.0001	(0.136, 0.497)	0.371	0.013	(0.169, 0.811)
HIV big problem in my life						
No	1(Ref)	NA	NA	1(Ref)	NA	NA
Yes	0.191	<0.0001	(0.098, 0.373)	0.202	<0.0001	(0.091, 0.446)

From table 3 above, the variables that influenced retention in HIV care were, education level, whether someone took alcohol or not, whether someone believed that HIV could be cured by prayers or not, and whether someone perceived HIV as a big problem in their life or not. The following are the interpretations of the variables that influenced retention in HIV care.

Taking account of alcohol intake status, belief that prayers can cure HIV and perceiving HIV to be a big problem in one's life, those who had attained secondary education and above had 1.510 increased odds of retention in HIV care compared to those who had gone up to primary education and 95% CI (1.118, 2.039). These findings are statistically significant (p – value=0.007).

Taking account of education level, belief that prayers can cure HIV and perceiving HIV to be a big problem in one's life, those who took alcohol had 0.130 reduced odds of retention in HIV care compared to those who did not take alcohol and 95% CI(0.059, 0.286). These findings are statistically significant (p – value<0.0001). Taking account of education level, alcohol intake status and belief that prayers can cure those who perceived HIV to be a big problem in their life had 0.202 reduced odds of retention in HIV care compared to those who did not perceive HIV to be a big problem in their life and 95% CI(0.091, 0.446). These findings are statistically significant (p – value<0.0001).

Taking account of education level, alcohol intake status and perceiving HIV to be a big problem in one's life, those who believed that prayers can cure HIV had 0.371 reduced odds of retention in HIV care

compared to those who did not believe that HIV can be cured by prayers and 95% CI (0.169, 0.811). These findings are statistically significant (p – value=0.013).

Discussion

The aim of this study was to examine the multilevel factors that influence retention in HIV care of adolescents in Lusaka Zambia during the covid 19 pandemic. The main findings of the study revealed that alcohol intake status, HIV status disclosure, belief in HIV cure through prayers, and perception of HIV as a significant life problem were statistically significant and these factors influenced retention in HIV care of adolescents in Lusaka Zambia during the covid 19 pandemic. Moreover, the research identified predisposing factors that emerged as barriers to non-medication adherence across different age groups. These encompassed shortage of medication, financial constraints, changes in location, personal reasons, transportation impediments and religious beliefs. These findings illuminate the complex interplay of various socio-economic, cultural, and individual factors shaping the retention in HIV care among adolescents in Lusaka, Zambia, underscoring the need for tailored interventions and support mechanisms. This chapter further emphasizes both the implications and limitations of the study, while also elucidating their significance in interpreting the obtained results. The conclusions and recommendations drawn are exclusively drawn from the insights gleaned from this investigation. Baseline characteristics and logistic regression analysis revealed key factors impacting retention. Adolescents with secondary and higher education levels exhibited notably higher retention rates (75.64%) compared to those with lower educational attainment (24.36%). Additionally, non-drinkers demonstrated significantly higher retention rates (85.07%) compared to drinkers (14.93%). Those who disclosed their HIV status experienced higher retention rates (75.97%) compared to non-disclosers (24.03%), while individuals not relying on prayers for HIV cure showed higher retention rates (81.60%) compared to those relying on prayers (18.40%). These findings underscore the significance of education, alcohol consumption, HIV status disclosure, and reliance on prayers for HIV cure as pivotal factors influencing adolescent retention in HIV care. Logistic regression further emphasized the significance of these factors, with secondary and above education levels, non-drinking behavior, and HIV status disclosure showing significantly higher odds ratios for retention. However, employment status, education level, and mode of transportation were identified as non-significant factors, aligning with previous studies. Health system-related factors, including health facility choice and type of transport used, were also found to have no statistically significant role in influencing retention. These nuanced insights contribute to our understanding of the complex dynamics shaping adolescent retention in HIV care in the region, emphasizing the need for tailored interventions. Personal health practices, such as alcohol consumption, HIV status disclosure, and reliance on prayers for HIV cure, significantly impact retention rates, aligning with previous literature. Our study underscores the importance of fostering supportive environments and holistic care to enhance retention among adolescents living with HIV in Lusaka, Zambia. Comparisons with existing literature, such as Muwanguzi et al.'s study in rural southwestern Uganda, provide valuable insights into regional disparities and underscore the importance of context-specific approaches to improving retention in HIV care among adolescents and young adults.

Limitations of the Study

The study acknowledges limitations, including the sample size and potential biases, which may have influenced the results presented in Chapter Four. Expanding the scope of the study to encompass additional

hospitals and clinics in Lusaka, Zambia, was considered. However, this was not feasible within the constraints of the limited timeframe allotted for the study. These limitations should be considered when interpreting the findings.

Recommendations

The study provides comprehensive recommendations for both practice and policy to address the challenges identified in adolescent retention in HIV care. From a practice standpoint, it is recommended to focus on ensuring consistent access to HIV medication through the introduction of Mobile Antiretroviral Therapy (ART) services tailored for adolescents aged 18 to 24. Additionally, establishing a framework offering financial assistance integrated with counseling services can help address economic and psychosocial barriers hindering treatment adherence. Clinicians are advised to conduct thorough assessments of patients' socio-economic backgrounds, mental health, and disclosure dynamics to develop personalized adherence plans. Engaging patients' social support networks, respecting their religious practices and beliefs, and addressing transportation challenges are also crucial aspects highlighted in the recommendations. Long-term follow-ups to assess health outcomes and lifestyle modifications are suggested, along with piloting targeted intervention strategies in collaboration with researchers. On a policy level, the study suggests developing a structured framework to ensure uninterrupted access to HIV medication and Mobile ART services, specifically tailored for adolescents aged 18 to 24. Similarly, policy guidelines should be established to provide financial assistance integrated with counseling services, thus addressing both economic and psychosocial barriers comprehensively. These recommendations aim to create a standardized approach to enhance medication accessibility and support services, ultimately improving retention rates among adolescents living with HIV.

Conclusion

This study serves as a pivotal cornerstone in understanding the multifaceted dynamics of adolescent HIV care, paving the way for targeted interventions. The identified factors, ranging from education and substance use to psychosocial elements, provide a foundation for the development of patient-centered, effective, and tailored interventions. Moreover, our findings align with previous research, emphasizing the need for further exploration into support networks, disclosure issues, and broader social and community influences on healthcare engagement. As we move forward, the collective understanding gained from this study will undoubtedly inform and shape future research endeavors aimed at improving the well-being of adolescents living with HIV.

References

1. Vithalani, J., & Villanueva, H. M. (2018). HIV epidemiology in Uganda: survey based on age, gender, number of sexual partners and frequency of testing. Afr Health Sci.
2. Ubesie, A. C. (2012). Pediatric HIV/AIDS in Sub-Saharan Africa: Emerging Issues and Way Forward. African Health Sciences, 12(3), 297–304.
3. UNAIDS. (2017). Global AIDS Update 2017. UNAIDS. AIDSinfo website. Retrieved from http://aidsinfo.unaids.org/.
4. Fox, M. P., & Rosen, S. (2010). Patient retention in antiretroviral therapy programs up to three years on treatment in sub-Saharan Africa, 2007-2009: Systematic review. Tropical Medicine & International Health, 15(1), 1–15.

5. Zamphia. (2016). Zambia Population-Based HIV Impact Assessment, 2016. Retrieved from http://phia.icap.columbia.edu/wp-content/uploads/2016/09/ZAMBIAFact sheet.FIN_.pdf.
6. Country progress report Zambia. (2020). Global AIDS Monitoring. Retrieved from https://www.unaids.org/en/regioscountries/countries/zambia.
7. Singh, T. (2018). Identifying the Multilevel Factors Influencing Retention in HIV Care in western Kenya.
8. Villela, V., et al. (2022). Factors predicting 12-month retention in care for minority women living with HIV. Ther Adv Infectious Dis, 9, 1–10.
9. David, C., et al. (2019). Retention in care and adherence to HIV and AIDS treatment in Anambra State Nigeria. BMC Infectious Diseases. Retrieved from https://doi.org/10.1186/s12879-019-4293-8.
10. Mesic, A., Halim, N., MacLeod, W., Haker, C., Mwansa, M., & Biemba, G. (2019). Facilitators and barriers to adherence to antiretroviral therapy and retention in care among adolescents living with HIV/AIDS in Zambia: a mixed methods study. AIDS and Behavior, 23(9), 2618–2628.
11. Audi, C., Jahanpour, O., Antelman, G., et al. (2021). Facilitators and barriers to antiretroviral therapy adherence among HIV-positive adolescents living in Tanzania. BMC Public Health, 21, 2274. Retrieved from https://doi.org/10.1186/s12889-021-12323-1.
12. Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-revisiting Andersen's behavioural model of health services use: A systematic review of studies from 1998–2011. GMS Psycho-Social-Medicine, 9, 1–15.
13. Ministry of Health Zambia. (2017). Zambia National Health Strategic Plan 2017-2021. Ministry of Health.