Low Viral Suppression in HIV Positive Children and Adolescents on Art in Bweengwa Community of Monze District Southern Province, Zambia

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ABSTRACT

HIV / Aids low viral suppression also known as viral non-suppression is a major health problem in the world especially in children and adolescents. According to the WHO people on ART for more than 6 months should acquire viral suppression but that does not seem to be the case. The study aimed to investigate factors contributing to low viral suppression in children on ART in Bweengwa community. A cross-sectional non-interventional pre-experimental descriptive study type was used to determine factors for contributing to low viral suppression among HIV children and adolescents in Bweengwa community. Purposive sampling method was used to select 80 participants in Bweengwa community through their parents or/and caregivers. The criteria used was parents and caregivers with children and adolescents with viral non suppression and/or on second line of ART treatment who come at Bweengwa RHC between February and August ,2023. A questionnaire with closed ended questions was used to obtain data from the 80 participants. The study used SPSS 27.0.0 to analyze data which was displayed in graphs and tables. The study revealed that parents/caregivers lack knowledge on children's and adolescents' HIV viral suppression, influence viral suppression of the child and have low social economic status. The study also revealed that children and adolescents with HIV lack of compliance to medication contributed to the low viral suppression. The study recommended that for long-term ART success, implementing a close monitoring of adherence and risks of viral rebound would be highly relevant, especially for orphans of both parents.

Keywords: ART, HIV / Aids ,viral non-suppression, Children

INTRODUCTION

HIV / Aids viral non-suppression is a major health problem in the world especially in children and adolescents. According to the WHO people on ART for more than 6 months should acquire viral suppression but that does not seem to be the case. Acquired immune deficiency syndrome (AIDS) is a viral disease caused by human immunodeficiency virus (HIV) that weakens the immune system and makes the body susceptible to opportunistic infections. According to Bain, Nkoke, & Noubiap, 2017 the Human Immunodeficiency Virus (HIV) pandemic affects many parts of the world population. In 2018, approximately37.9 million people were living with HIV worldwide and around 1.8 million were children aged15 years and below. In East and Southern Africa out of the 1,400,000 HIV-positive children, only 51% are on antiretroviral therapy (ART). Although the overall suppression rate is estimated to be 47%, the suppression rate among children is not documented. HIV prevention and treatment efforts primarily aim at reducing morbidity and mortality among people living with HIV, but also to reduce the risk of transmission, hence the need to ensure virological suppression to undetectable levels among children on ART. It is recommended that children with initial positive virological test results are initiated on ART immediately and routine viral load monitoring be carried out at 6 and 12 months, then every 12 months if the patient's viral load becomes stable. (Munthali, Hachizovu, & Washington, 2020).

In low- and middle-income countries, a viral load (VL) <1000 copies/ml defines treatment success (suppression), a measure of Anti Retro Treatment efficacy, which also indicates treatment adherence and reduced risk of HIV transmission. Several factors like; low adherence rate, WHO clinical stage 4 and TB co-

infection have been highlighted to be associated with virological non-suppression among adults. Likewise, viral load suppression rates among children on ART have been shown to be low and considerably poorer. (Shiferaw, M. B., Et al 2019).

In Zambia, regular VL monitoring is done at the Central Public Health Laboratory through the district laboratories and in case of virological non-suppression, that is; two consecutive viral loads above 1000 copies/ml done at least 3–6 months apart, 3 sessions of intensive adherence counseling (IAC) are offered. IAC is offered to the caregiver or to both the child and the caregiver at one-month intervals by mainly counselors although at times by nurses, clinicians and peer-educators. (Yiltok, E. S., et al ,2020).

In Zambia, there is an increasing low rate of viral load suppression among children especially in the rural areas. Therefore, this study was set out to determine the factors that affect low viral load suppression among HIV children receiving ART in Bweengwa of Zambia to help HIV managers to design and modify age specific strategies and polices to improve HIV viral suppression.

Virological monitoring through plasma viral load (PVL) quantification is an essential part of clinical monitoring of HIV patients undergoing antiretroviral treatment therapy (ART), and for detecting treatment failure (Zvanaka Sithole, et 2017.) An estimated 1.2 million children (aged 0-14 years) are living with HIV in Eastern and Southern Africa. Viral load suppression (VLS) is essential to reducing child morbidity and mortality yet several Eastern and Southern Africa countries have shown alarmingly low rates of VLS among children, especially as compared to adults. Children are lagging behind adults in viral load suppression in Malawi: Children at 42% Uganda: Children at 39% Zimbabwe Children at 47%. (UNAIDS 2020). ART and medication adherence can lead to a significant reduction in viral load in the body with the ultimate goal of reaching undetectable levels viral suppression. ART and viral suppression also play critical roles in the prevention of HIV transmissions. (CQII Literature Review on Social Determinants of Health - October 15, 2020) In a study done in Zambia, 94 000 children (under 16 years) living with HIV, with about 52% in HIV care, and only 34.1% of them are virally suppressed. (Munthali T, ET 2020). Bweengwa community of southern province has relatively a low viral suppression among patients on ART especially children and adolescents. There are, however, relatively a few investigators who have examined the factors contributing to the increase in high vial load among children; hence the interest as to why this research was undertaken.

(Horacio A. Duarte et al, 2015) conducted a study on the Relationship between viral load and behavioral measures of adherence to antiretroviral therapy in children living with human immunodeficiency virus in Latin America .Standardized behavioral measures were applied to a large cohort of human immunodeficiency virus-infected children in Brazil, Mexico, and Peru to assess adherence to prescribed antiretroviral therapy doses during the three days prior to study visits, assess timing of last missed dose, and evaluate the ability of the adherence measures to predict viral suppression. Associations of adherence with human immunodeficiency virus viral load were examined using linear regression. The proportion with undetectable viral load was higher among those who never missed a dose at enrollment and the 12-month visit, but not at the 6-month visit. While antiretroviral therapy adherence measures utilized in this study showed some association with viral load for these Latin American children, they may not be adequate for reliably identifying non-adherence and consequently children at risk for viral resistance. Other strategies are needed to improve the evaluation of adherence in this population.

(Kolab Chhim, et al 2018) investigated the Factors associated with viral non-suppression among adolescents living with HIV in Cambodia in which a cross-sectional study was done. A cross-sectional study was conducted among 328 adolescents living with HIV aged 15–17 years who were randomly selected from 11 ART clinics in the capital city of Phnom Penh and 10 other provinces. Clinical and immunological data, including CD4 count and viral load, were obtained from medical records at ART clinics. Adolescents were categorized as having achieved viral suppression if their latest viral load count was < 1000 ribonucleic acid (RNA) copies/mL. Multivariate logistic regression analysis was performed to identify factors independently associated with viral non-suppression. After adjustment for other covariates, the likelihood of having viral non-suppression remained significantly lower among adolescents. The proportion of adolescents living with HIV with viral suppression in this study was relatively high at 76.8%, but falls short of the global target of 90%. Programs targeting younger adolescents and adolescents in transition from pediatric to adult care with a range

of interventions including psychosocial support and treatment literacy could further improve viral suppression outcomes.

(Nneka Egbonrelu et al 2021) investigated the Factors Associated with Poor Viral Suppression among Children and Adolescents Accessing Antiretroviral Therapy in Selected Health Facilities in Lagos, Nigeria. A descriptive retrospective study of children and adolescents living with HIV accessing care and support in 7Global Fund supported ART treatment facilities in Lagos between January 2013 and June 2020. Data extraction was done between July 2020 and August 2020. The socio demographic, clinical and laboratory data were extracted from patients' folders. Binary logistic regression model was done to identify the determinants of viral non-suppression among children and adolescents age groups. The study population consisted of 363 children (age 0-9 years) and 275 adolescents (age 10-19 years). The mean age of children was 5.8±2.2 years and that of adolescent was 13.21±2.8years. About 256(70 %) of children were virally unsuppressed and 118(43 %) had non-suppressed viral load status among adolescents. The findings highlight the need for a renewed focus on developing and strengthening HIV programmers in rural areas where children and adolescents living with HIV are more likely to be virally unsuppressed. More emphasis and resources should be channeled to Public health intervention such as health education, social support group programmers to improve drug pick up and adherence in adolescents living with HIV.

(BeleteGelaw et al 2021) studied on the Prevalence and Associated Factors of Treatment Failure among Children on ART in Ethiopia in a Systematic Review and Meta-analysis. The study searched international databases (i.e., Pub Med, Google Scholar, Web of Science, Ethiopian Universities 'online repository library, Scopus, and the Cochrane Library) during the period of February 30 to April 7, 2021. All identified observational studies reporting the proportion of treatment failure among HIV positive children in Ethiopia were included. A random-effects meta-analysis model was performed to estimate the pooled prevalence of treatment failure. The results showed an estimated pooled prevalence of treatment failure among children in Ethiopia was 12.34.Sub group analysis of this review showed that the highest prevalence was observed in Addis Ababa (15.92%), followed byOromia region (14.47%). Poor ART adherence advanced WHO clinical staging and opportunistic infections were found to be significantly associated factors with childhood treatment failure. This study revealed that treatment failure among children on ART was high in Ethiopia which resulted in low viral suppression. Poor ART adherence, advanced WHO clinical staging, opportunistic infections, and low level of CD4 cell counts increased the risk of treatment failure.

(Bain, L. E., Nkoke, C., & Noubiap, J. J. N. 2017) conducted a study on Understanding and Improving Viral Load Suppression in Children with HIV in Eastern and Southern Africa. This was a cross-sectional mixed-methods study that entailed a comprehensive literature review, secondary analysis of laboratory information management systems (LIMS) data from Malawi, Uganda and Zimbabwe, patient records review from selected facilities in Malawi, and in-depth interviews with health workers and caregivers at selected health facilities in Malawi. Findings from this study highlight that, during 2016-2018, one out of 3 children who had a viral load test were not virally suppressed in Malawi, Uganda and Zimbabwe. A number of factors contributed to whether children achieved viral suppression. Children are more likely to achieve VLS when they and their caregivers have support from families, communities and health workers Supportive networks for caregivers. Concerns over stigma were likely to restrain disclosing that a child is on ART, a situation that often-impacted adherence and, subsequently, VLS. Drug regimens and formulation is another factor continues to challenge VLS. Several drug-related issues were associated with unsuppressed viral load. Some issues were related to the drug itself, as children on first-line EFV had higher VLS than those on first-line NVP. Other issues included high pill burdens, frequent daily intake of drugs, and complexities in administering LPV/r pellets and their bitter taste. The quality, efficiency, and accessibility of health services have a direct impact on adherence and VLS. Viral load testing at the time of ART initiation provided critical information for predicting VLS and the subsequent clinical management of children with HIV. Clinic schedules, staff shortages, waiting times, inadequate space for confidential counseling, and unfriendly attitudes by service providers contributed to whether children received timely, comprehensive and supportive care.

(Nakalega et al, 2021) invested the linkage to intensive adherence counseling among HIV-positive persons on ART with detectable viral load in Gomba district, rural Uganda Rita. A retrospective cohort study was conducted of HIV-positive persons who received ART between January and December 2017 at 8 HIV clinics

in Gomba district, rural Uganda. Gomba has a population of 160,075 of which 92% is rural and 49% are female it was found that three hundred and thirty-one participants (81%) with non-suppressed viraemia were linked to the Intensive Adherence Counseling intervention within three months of receipt of viral load test results. Sixteen percent (65/411) had not been linked to Intensive Adherence Counseling by the time of the study, and three percent (15/411) had been linked to Intensive Adherence Counseling after more than three months. Nearly all widowed participants (96%) were linked to Intensive Adherence Counseling. In conclusion, linkage to Intensive Adherence Counseling was high among persons with detectable viral load in rural Uganda.

(Julian Natukunda et al, 2019) conducted a research on Virologic failure in HIV-positive adolescents with perfect adherence in Uganda. This study aimed to identify the factors associated with viral load suppression among HIV-positive adolescents (10–19 years) receiving antiretroviral therapy (ART) in Uganda. A cross-sectional study among school-going, HIV-positive adolescents on ART from August to September 2016. Data was collected using patients' demographics and treatment- and clinic-related factors using existing medical records and questionnaire-guided face-to-face interviews. For outcome variables, we defined viral suppression as < 1000 copies/mL. We used multivariate logistic regression to determine factors associated with viral suppression. The study analyzed the data of 200 adolescents meeting the inclusion criteria. In which more than 70% of adolescents who experienced virologic failure were sufficiently adherent and adolescents who had unsuppressed viral loads in their initial viral load were more likely to experience virologic failure upon a repeat viral load regardless of their adherence level or change of regimen. The study also showed that strong religious beliefs exist among adolescents. Healthcare provider training in psychological counseling, regular and strict monitoring of adolescent outcomes should be prioritized to facilitate early identification and management of drug resistance through timely switching of treatment regimens to more robust combinations.

(Sarah Nabukeera et al, 2021) conducted a study on Factors associated with virological non-suppression among HIV-positive children receiving antiretroviral therapy at the Joint Clinical Research Centre in Lubowa, Kampala Uganda. A retrospective cohort study conducted at the pediatric HIV/AIDS clinic at the Joint Clinical Research Centre (JCRC) in Kampala, Uganda. Three hundred (300) HIV-positive children (0-14 years) were randomly selected from existing medical records and data on children's socio-demographic and clinical characteristics (age at ART initiation, WHO clinical staging, and ART-induced side effects) were abstracted using a data abstraction form. Nearly a quarter of HIV-positive children on ART had a non-suppressed viral load after six months of treatment. Being at WHO clinical stage 4 at ART initiation and ART-induced side effects were significantly associated with virological non-suppression while older age at ART initiation was protective. Our findings suggest a need for age-specific interventions, particularly those targeting children below five years of age, to improve virological suppression among HIV-positive children receiving ART in this setting.

(Lilian Bulage et al, 2017) invested the Factors Associated with Virological Non-suppression among HIV-Positive Patients on Antiretroviral Therapy in Uganda, August 2014-July 2015. A descriptive cross-sectional study was conducted using routinely collected program data from viral load (VL) samples collected across the country for testing at the Central Public Health Laboratories (CPHL) in Uganda. Data were generated between August 2014 and July 2015. We defined virological non-suppression as having ≥1000 copies of viral RNA/ml of blood for plasma or ≥5000 copies of viral RNA/ml of blood for dry blood spots. We used logistic regression to identify factors associated with virological non-suppression. The study was composed of 100,678 patients; of these, 94,766(94%) were for routine monitoring, 3492(4%) were suspected treatment failures while 1436(1%) were repeat testers after suspected failure. Young age, poor adherence and having active TB increased the odds of virological non-suppression while second/third line ART regimens were protective against non-suppression. Close follow up was recommended and intensified targeted adherence support for repeat testers after suspected failure, children and adolescents.

Factors associated with virological failure and suppression after enhanced adherence counselling, in children, adolescents and adults on antiretroviral therapy for HIV in Swaziland (Kiran Jobanputra et al, 2015). This study explored factors associated with virological detectability, and viral re-suppression after enhanced adherence counselling, in adults and children on antiretroviral therapy (ART) in Swaziland. A descriptive study used laboratory data from 7/5/2012 to 30/9/2013, which were linked with the national ART database to provide information on time on ART and CD4 count; information on enhanced adherence counselling was

obtained from file review in health facilities. Multivariable logistic regression was used to explore the relationship between viral load, gender, age, time on ART, CD4 count and receiving (or not receiving) enhanced adherence counselling. Children, adolescents and those with advanced disease were most likely to have high viral loads and least likely to achieve viral suppression at retesting; receiving adherence counselling was not associated with higher likelihood of viral suppression. Although the level of viral resistance was not quantified, the study suggests the need for ART treatment support that addresses the adherence problems of younger people and to define the elements of optimal enhanced adherence support for patients of all ages with detectable viral loads.

(John M Humphrey et al, 2019) conducted a study on viral suppression among children and their caregivers living with HIV in western Kenya. The study conducted a retrospective analysis of children living with HIV <15 years of age and their caregivers living with HIV attending HIV clinics affiliated with the Academic Model Providing Access to Healthcare (AMPATH) in Kenya between 2015 and 2017. To be included in the analysis, children and caregivers must have had ≥1 viral load (VL) during the study period while receiving antiretroviral therapy (ART) for ≥6 months, and the date of the caregiver's VL must have occurred ±90 days from the date of the child's VL. Of 7667 children who received care at AMPATH during the study period, 1698 were linked to a caregiver living with HIV and included as caregiver–child dyads. For caregivers, 94% were mothers and 23% were not virally suppressed. For children, 52% were female on ART of which 38% were not virally suppressed. In the multivariable model, children were found more likely to not be virally suppressed if their caregivers were not suppressed compared to children with suppressed caregivers. Other characteristics associated with child viral non-suppression included caregiver ART regimen change prior to the VL, caregiver receipt of a non-NNRTI-based regimen at the time of the VL, younger child age at ART initiation and child tuberculosis treatment at the time of the VL.Children were at higher risk of viral non-suppression if their caregivers were not virally suppressed compared to children with suppressed caregivers. A child's viral suppression status should be closely monitored if his or her caregiver is not suppressed.

(Niyonziza Bitwale et al, 2021) This study was conducted to determine the prevalence and factors associated with virological treatment failure among children and adolescents with HIV/AIDS on antiretroviral therapy (ART) attending HIV/AIDS care clinics in Dodoma, Central Tanzania. A cross-sectional study of children aged 1–19 years attending 3 HIV/AIDS care clinics in Dodoma (central Tanzania) from November 2018 to February 2019. Sociodemographic and clinical factors were documented, HIV viral load and CD4+ T lymphocytes were evaluated for children on ART for ≥6 months. The primary outcomes were the prevalence and factors associated with virologic treatment failure. The study was conducted on 300 children enrolled, 102 (34%) had virological treatment failure. Poor adherence to ART, nevirapine regimen, not using cotrimoxazole prophylaxis and nondisclosure of HIV status to others were independently associated with virological treatment failure. The current prevalence of virological treatment failure among children and adolescents living with HIV on ART remain high. Therefore, all these factors should be addressed to achieve sustained virological suppression.

(Njom Nlend et al, 2017) conducted a study on the Predictors of Virologic Failure on First-line Antiretroviral Therapy Among Children in a Referral Pediatric Center in Cameroon. An observational cohort study was conducted in 375 children living with HIV initiating a first-line ART and treated for ≥6 months at the National Social Insurance Fund Hospital in Yaoundé-Cameroon from 2009 to 2013. Overall, 64/375 children living with HIV experienced viral load failure on first-line art after a median time of 28 months. After viral load failure, median time to switching from first- to second-line ART was 20 months. In multivariate analysis, viral load Failure was associated with male gender, motherless children and treatment with stavudine-containing compared with zidovudine-containing regimens. Overall, male gender, orphanhood (motherless) and treatment with stavudine-containing regimens predicted viral load failure at a rate of 70%. Viral load Failure on first-line pediatric ART is common, and switching children failing first-line to second-line ART is considerably delayed. These results suggest performance of pediatric ART program can be improved by targeting orphans, adapting counseling for male children, complete phasing-out of stavudine and ensuring timely switch to second-line regimens.

In a study done by Elon Warnow Isaacet al.2020 in Nigeria on HIV Viral Suppression in Children in a Subnational Antiretroviral Treatment Programme in Nigeria, it was found that about half of children on HAART had viral load > 1000 c/ml after more than 1 - 5 years on HAART. Longer duration of ART and use of AZT/3TC/NVP are associated with viral load > 1000 c/ml. The Key considerations were poor adherence and/or viral drug resistance. The study usedadescriptive cross-sectionalmethod on 663 CLHIV aged 0 - 18 years on HAART from several health facilities including primary, secondary and tertiary health institutions in 4 states in the North of Nigeria between 2017 and 2019.Blood samples for HIV viral load estimation were collected from the 663 children living with HIV, the Samples were analyzed at a Polymerase Chain Reaction laboratory of the Federal Teaching Hospital, Gombe. Optimizing ART adherence and resistance monitoring remain key strategies for ART.

(Adwoa K. A. Afrane et al, 2021) conducted a study on HIV virological non-suppression and its associated factors in children on antiretroviral therapy at a major treatment center in Southern Ghana.A cross-sectional study of 250 children aged 8 months to 15 years who had been on ART for at least 6 months attending the Pediatric HIV clinic at Korle Bu Teaching hospital in Ghana was performed. Socio-demographic, clinical, laboratory and ART Adherence related data were collected using questionnaires as well as medical records review. Blood samples were obtained for viral load and CD4+ count determination. Viral load levels > 1000 copies/ml on ART was considered virological non-suppression. It was found that out of the 250 children 99 had viral non suppression, which means the prevalence of virological non-suppression was high. Virological non-suppression was associated with a previous history of TB treatment, female gender, severe CD4 immune suppression status at study recruitment and being on a nevirapine based regimen. Early initiation of ART and phasing out Nevirapine-based regimen might improve viral load suppression in children. In addition, children with a history of TB may need focused measures to maximize virological suppression.

(Joel Maena et al 2021) conducted a study on Determinants of viral load non-suppression among adolescents in Mbale District, Eastern Rural Uganda. A retrospective review of routinely collected HIV programme records was conducted. Data such as age, education, ART Regimen, ART duration, WHO Clinical stage, comorbidities, etc., were extracted from medical records for the period January 2018 to December 2018. Descriptive analysis was done for continuous variables using means and frequencies to describe study sample characteristics, and to determine the prevalence of outcome variables. We used logistic regression to assess factors associated with VL non-suppression among adolescents. The analysis included 567 HIV-infected adolescents and the VL non-suppression rate was 31.4%. VL non-suppression was associated with being male, age 16-19 years, low education level, duration on ART therapy, WHO Clinical Staging II, second-line ART regimen, and presence of comorbidities. Adolescent-friendly strategies to improve VL suppression for example peer involvement, VL focal persons to identify and actively follow-up non-suppressed adolescents, patient education on VL suppression and demand creation for ART are needed, especially for newly-initiated adolescents and adolescents on ART for protracted periods, to foster attainment of the UNAIDS 95-95-95 targets.

(Esther S Yiltok et al 2020) conducted a study on Clinical profile and viral load suppression among HIV positive adolescents attending a tertiary hospital in North Central Nigeria. A descriptive cross-sectional study of adolescents on routine regular follows up at the pediatric and adult HIV clinic who are on antiretroviral therapy. Consenting adolescents aged 10–19 years attending the pediatric and adult antiretroviral therapy (ART) program of Jos University Teaching Hospital (JUTH) were enrolled into the study. A semi-structured interviewer administered questionnaire was used to collect the necessary information like the biodata, educational background, orphan and vulnerable children (OVC) status, and ART use. Self-reported adherence and viral load results were retrieved and data was analyzed using SPSS version 23. A total of 143 were recruited into the study with 87 females and 56 males. Adherence to medication, where adolescents lived, if felt like stopping medication or ever stopped medication were significantly associated with viral load suppression. In conclusion, virologic suppression was mainly related to adherence, being double orphan, and whom the child lives with. Therefore, additional interventions should be instituted to address adolescent-specific services to enhance virologic suppression among them.

(Melashu Balew Shiferaw; et al 2019) conducted a study on Viral suppression rate among children tested for HIV viral load at the Amhara Public Health Institute, Bahir Dar, Ethiopia. An Institutional based cross-

sectional study design was conducted from July 01, 2017 to June 30, 2018, in children under the age of 15 years. Socio-demographic, clinical and HIV1RNA viral load data were collected from the excel database. The data were analyzed in SPSS 20.0 statistical software.1567 children, age ranged from one to 14 years, were tested for HIV viral load. Children were either treated using nevirapine-based, efavirenz-based or protease inhibitor-based anti-retroviral drugs. Children on nevirapine-based treatment had about two times more non-suppressed viral load compared to those who had efavirenz-based treatment. There was a high rate of non-suppressed HIV a load among children tested at Amhara Public Health Institute, Bahir Dar, Ethiopia. Specifically, the odds of having a non-suppressed viral load were higher in Nevirapine based treatment users. Hence, comprehensive management and follow up of children on ART, and testing for resistance as well as viral load could help to reduce the problem in advance.

(Zvanaka Sithole et al 2017) invested Virological failure among adolescents on ART in Harare City. A Case-control study was conducted on a one to one unmatched among 102 randomly recruited cases. A case was any adolescent who presented with VL more than 1000copies/ml after at least 12 months on ART. In which Poor adherence, alcohol consumption and non-disclosure increased the odds of virological failure. Based on these findings support should focus on behavior change and strengthening of peer-to-peer projects to help address issues related to disclosure and adherence.

In a study conducted on Factors associated with virological non suppression among HIV-positive children receiving antiretroviral therapy at the Joint Clinical Research Centre in Lubowa, Kampala Uganda by Sarah Nabukeera (2021). A retrospective cohort study was conducted at the pediatric HIV/AIDS clinic at the Joint Clinical Research Centre (JCRC) in Kampala, Uganda. Three hundred (300) HIV-positive children (0–14 years) were randomly selected from existing medical records and data on children's socio-demographic and clinical characteristics. The sample size for determining the proportion of children living with HIV who had a non-suppressed viral load after six months of receiving. The study showed that 23% of the children did not obtain viral load suppression and where mostly because of ART-related side effects significantly associated with biological non-suppression, while being five years or older at initiation was protective. HIV-program managers therefore need to design targeted age-specific treatment and care policies, programs and interventions or to modify the existing ones, in order to improve suppression among HIV-positive children receiving ART.

(Zvanaka Sitholeet al,2017) conducted a study on Virological failure among adolescents on ART in Harare City, Zimbabwe. This study was focusing on the factors associated with virological failure among adolescents (age 10–19 years) on antiretroviral therapy (ART) in Harare city. The study was conducted on a one-to-one unmatched case control study among 102 randomly recruited case. Control pairs at the two main infectious disease hospitals in Harare. A case was any adolescent who presented with VL > 1000c/ml after at least 12 months on ART. A control was any adolescent who presented with VL < 1000c/ml after at least 12 months on ART. Interviewer administered questionnaires were used to collect data. Poor adherence, alcohol consumption and non-disclosure increased the odds of virological failure. Based on these findings support should focus on behavior change and strengthening of peer-to-peer projects to help address issues related to disclosure and adherence. Further operational research should aim to define other components of effective adherence support for adolescents with virological failure.

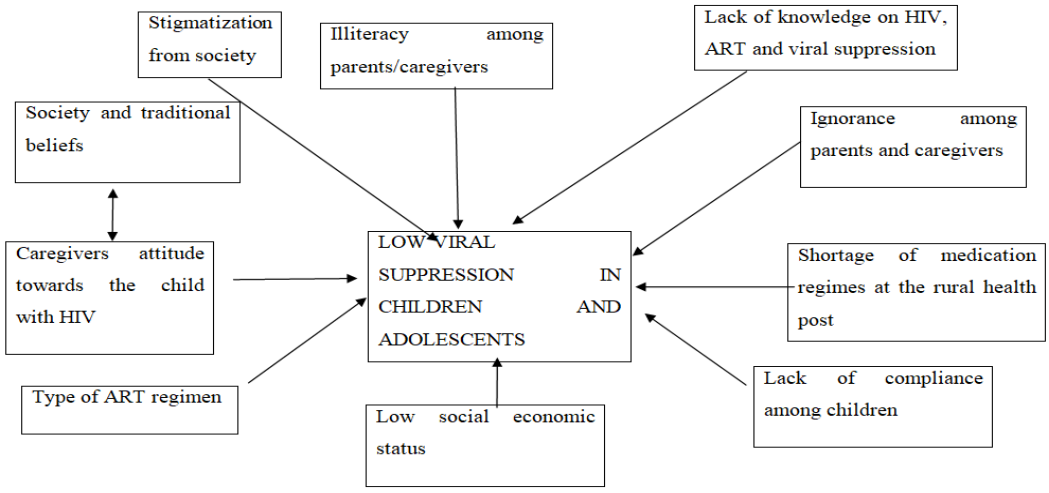
(Emeka F Okonji et al 2021) conducted a study on Determinants of viral suppression among adolescents on antiretroviral treatment in Ehlanzeni district, South Africa. A cross-sectional analysis was conducted with 9386 Adolescents Living with HIV, aged 10 to 19 years, who were enrolled in 136 ART clinics in the Ehlanzeni district. Clinical and immunological data were obtained from electronic medical records. Adolescents living with HIV were categorized as having achieved viral suppression if their latest viral load count was < 1000 ribonucleic acid (RNA) copies/mL. Using a backward stepwise approach, a multivariate logistic regression analysis was performed to identify factors independently associated with viral suppression. Viral suppression amongst adolescents living with HIV was at 74% which is considerably lower than the WHO target of 95%. Of particular concern for intervention is the lower rates of viral suppression amongst male adolescents living with HIV. Greater emphasis should be placed to early enrolment of adolescents living with HIV on ART and keeping them engaged in care (beyond 6 months). Furthermore, improved and regular viral load monitoring

will help to adequately identify and manage adolescents living with HIV with unsuppressed viral load and subsequently switching to second line treatment.

A study was conducted on the association between adherence and viral suppression in Zambia (Munthali T, Hachizovu S, Washington M, 2020). Even though it was done on adults older than 16 years, it revealed that individuals with suboptimal adherence had 30% increased risk of virological failure compared to individuals with optimal adherence. Children and adolescents have the lowest adherence levels compared to adults. There are a number of factors affecting childhood adherence and viral suppression: depending on caregivers to administer medication, anticipating community level stigma, fearing disclosure, forgetting doses, changing ones routine, being too busy, and the child refusing medication coupled with poor edibility of clinic opening hours are some of the factors affecting adherence and in turn viral suppression among children in which a qualitative study was done. In conclusion, Community-based differentiated service delivery strategies were identified as important strategies for improving ART adherence and viral suppression where the project has yielded adherence and viral suppression levels above 90%. Although these findings are among adults, a call to action to implement a similar intervention among children is needed in order to reach 90% viral suppression by 2020, among Zambian HIV infected children.

Problem Analysis

Low viral suppression in HIV positive children and adolescents on ART in Bweengwa community of Monze district, Southern province, Zambia.



Purpose of the study

The primary objective of this study is to investigate factors contributing to viral non-suppression in children on ART in Bweengwa community.

RESEARCH METHODOLOGY

The study employed quantitative research methodology grounded in a cross sectional non-interventional pre-experimental descriptive study to investigate factors contributing to viral non suppression in children on ART in Bweengwa community.The study population where parents or care givers of children and adolescents aged 0 to 19 with viral non suppression or on second line of ART treatment.

Inclusion Criteria

- All HIV/ AIDS parents and caregivers with children and adolescents with viral non suppression and/or on second line of ART treatment who come at Bweengwa RHC between February and August ,2023.
- Children below the age of 15 were represented by their caregivers.

- All children/adolescents or caregivers who consented to participate and meet all the requirements under inclusion.

Exclusion Criteria

- All children and adolescents on ART that have achieved viral suppression.
- All children and adolescents on ART who have never had a high viral load after initiation of ART.

The study used a purposive sampling method to collect data from participants who were available and willing to participate.

The sample size was determined by applying the Slovin's formula as shown below. n =Sample Size

Sample size was computed using **Slovin's formula n = N/1 + Ne^2**

Where:

n = Sample size

N = Total population study of 100 children and adolescents on viral non suppression or on second line of ART treatment

e = Margin of error (0.05)

1= Constant

n =100/1 + 100 $(0.05)^2$

n =100/1+100(0.0025)

n =100/1.25

n= 80

This means the total sample size will be 80 children and adolescents on viral non suppression or on second line of ART treatment

To gather relevant information pertinent to the assessment of factors contributing to viral non suppression in Bweengwa Community, a designed structured questionnaire was used. The questionnaire contained series of closed ended questions in English language, formed with simple words that require fixed answers to be selected.

During data processing, the data was checked for completeness and any incomplete or misfiled questions was excluded. Data was double entered and analyzed using SPSS-27 statistical software.

Descriptive statistics were used to give a clear picture of background variables like age, sex and other variables in well-structured questionnaire. The analyzed data was presented in frequency tables, pie charts, percentage analyzed with Statistical Package for Social Sciences (SPSS) software 27.0 for windows.

Throughout the study, confidentiality of the data collected and the anonymity of the respondents and participants was assured. The data collection was not associated with any identifier other than numbers that did not bear any name. Access to the questionnaires was restricted to those taking part in the research project throughout the period of study. Data was collected only through the informed consent of the respondents.

Researchers must obtain voluntary, informed consent from participants before involving them in the study. Participants should be made aware of the study's purpose, procedures, risks, and benefits in a language they

understand. All participants will provide informed consent before data collection. Informed consent is the cornerstone of ethical research with human subjects" (Creswell & Creswell, 2018). All data collected should be treated confidentially. Participants' identities must not be revealed, and personal information should be anonymized. Data was anonymized to protect participants' identities. Confidentiality and anonymity are essential to protect participants and encourage honest responses" (Babbie, 2021). Participation must be entirely voluntary, without any coercion. Participants should be free to withdraw at any point without facing any penalties. Ethical research requires that subjects participate voluntarily, with full knowledge of relevant risks and benefits" (Bryman, 2016). Researchers must ensure that no physical, psychological, or emotional harm comes to the participants as a result of the study. Researchers are obliged to minimize potential harm and maximize benefits to participants" (Israel & Hay, 2006). The study should aim to benefit participants or the broader community. The principle of beneficence stresses the importance of maximizing possible benefits while minimizing possible harms" (Beauchamp & Childress, 2019). Researchers must obtain ethical approval from a recognized Institutional Review Board (IRB) or Ethics Committee before conducting research. The study will obtain ethical clearance from relevant educational and governmental authorities in Zambia. No research should proceed without ethical clearance from an appropriate board" (Resnik, 2018). Participants will have the right to withdraw at any stage without any consequences.

Data Presentation, Analysis and Interpretation

Data preparation

The questions were entered in the statistical package for social sciences (SPSS) version 27 data base. The SPSS was used for data entry and analysis of data collected. Before data analysis, the researcher checked for missing values and no values were missed during data entry.

Demographic Data

The study found it important to establish the demographic information of the respondents, this information comprised of age category (years) of both the child and the caregiver, gender of both the child and the caregiver, child academic level, relationship with the caregiver, occupation of the caregiver.

Table 1 depicts the age of the respondents, these were grouped into 2, below 15 years and between 15-17. Majority were children below 15 years who were 59 (74%) and children between 15-17 were 21 (26%).

AGE					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 15	59	73.8	73.8	73.8
	15-17	21	26.3	26.3	100.0
	Total	80	100.0	100.0	

Table 2 Depicts the gender of the children. These were male and female of which the majority of the of the respondents were female 52 (65%) and males were 28 (35%).

GENDER					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	28	35.0	35.0	35.0
	Female	52	65.0	65.0	100.0
	Total	80	100.0	100.0	

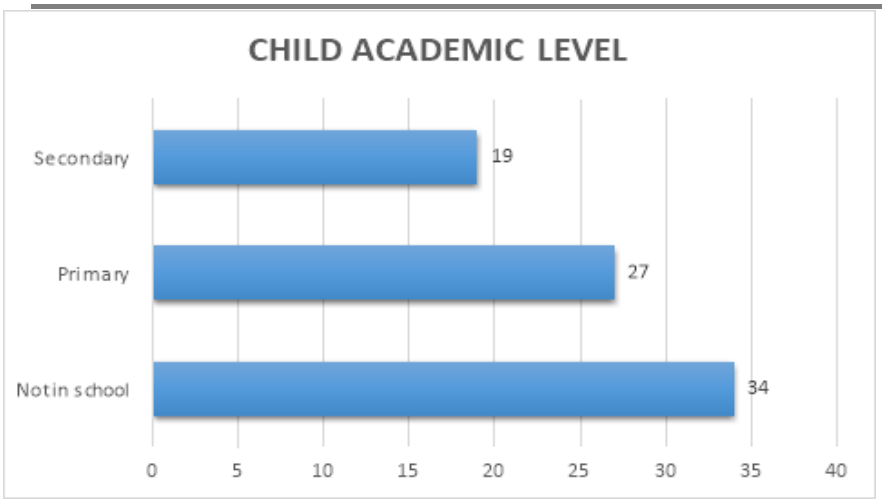


Figure 1. shows the child's academic level of which majority of the children were not yet enrolled in school were 34 followed by those in primary school who were 27 and 19 were in secondary school.

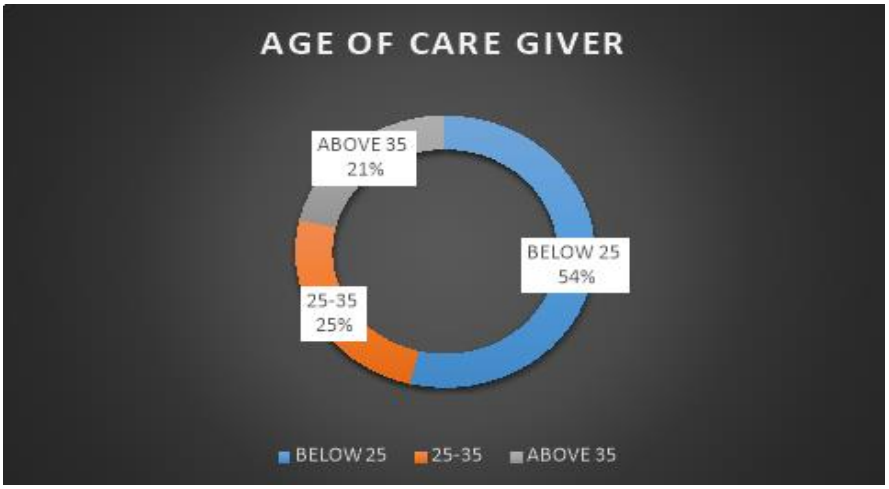


Figure 2. shows the age of the caregivers who were grouped into 3. Below 25, between 25- 35 and above 35 years of age. Majority of the caregivers were found to be below 25 and they made up 54%, followed by those between 25 – 35 that made up 25% and lastly those above 35 which made up 21%.

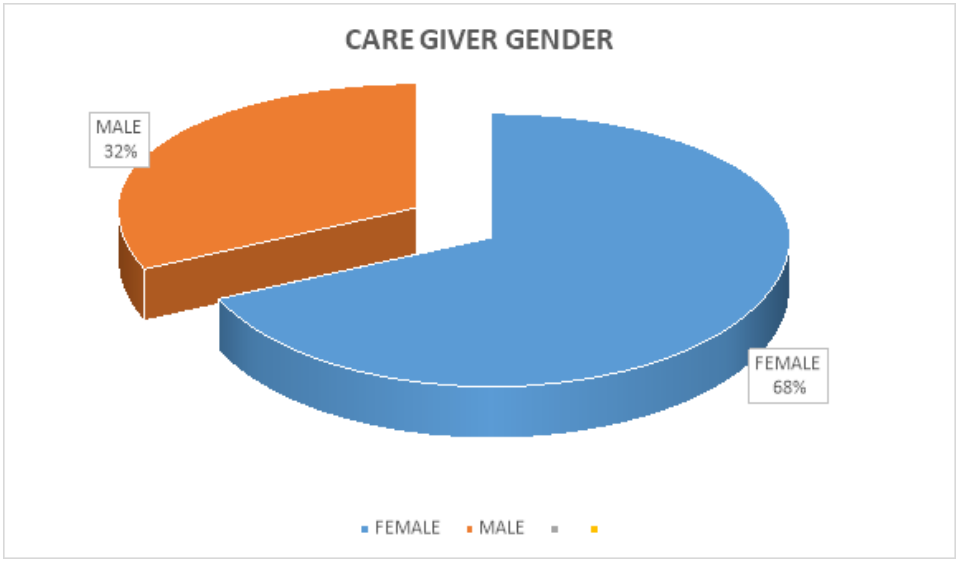


Figure 3. shows the Gender of the caregivers grouped in male and female of which majority were female caregivers who were 43 and male caregivers were 20.

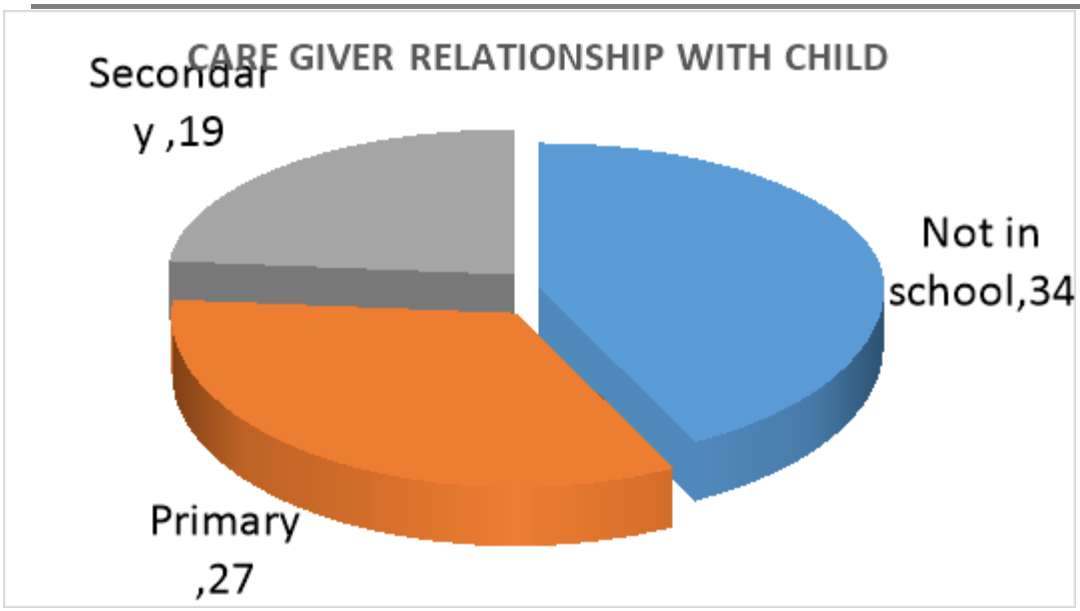


Figure 4. shows caregiver relationship with the child grouped into parents, relatives and guardians. Majority of the caregivers were relatives who were 34 (42%) followed by guardians who were 27(34%) and parents who were 19 making (24%)

Figure 5. shows the occupation of caregivers of which majority are farmers 69%, followed by caregivers who were unemployed 12% , 10% of caregivers were business men and women and 9% of care givers were civil servants.

Knowledge On Hiv Viral Suppression

Table 3 shows that the majority of respondents that said HIV/AIDS was not curable had knowledge on HIV and were 72 (90%) and 8 respondents said HIV is curable were 8 (10%)

IS HIV/AIDS CURABLE					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	10.0	10.0	10.0
	No	72	90.0	90.0	100.0
	Total	80	100.0	100.0	

Table 4 shows majority of respondents had knowledge on ARVs as 58 (73%) said you should not stop taking ARVs and 22 (28%) said you can stop taking ARVs

SHOULD YOU STOP TAKING THE ARVS					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	27.5	27.5	27.5
	No	58	72.5	72.5	100.0
	Total	80	100.0	100.0	

Table 5 shows the knowledge of respondents on viral load suppression and majority who were 36 (45%) said I don't know, followed by 22 (28%) of respondents said to cure HIV and the other 22(28%) said to provide good health to the child living with HIV.

IMPORTANCE OF VIRAL SUPPRESSION					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	To provide good health to the child living with HIV	22	27.5	27.5	27.5
	To cure HIV	22	27.5	27.5	55.0
	I don't know	36	45.0	45.0	100.0
	Total	80	100.0	100.0	

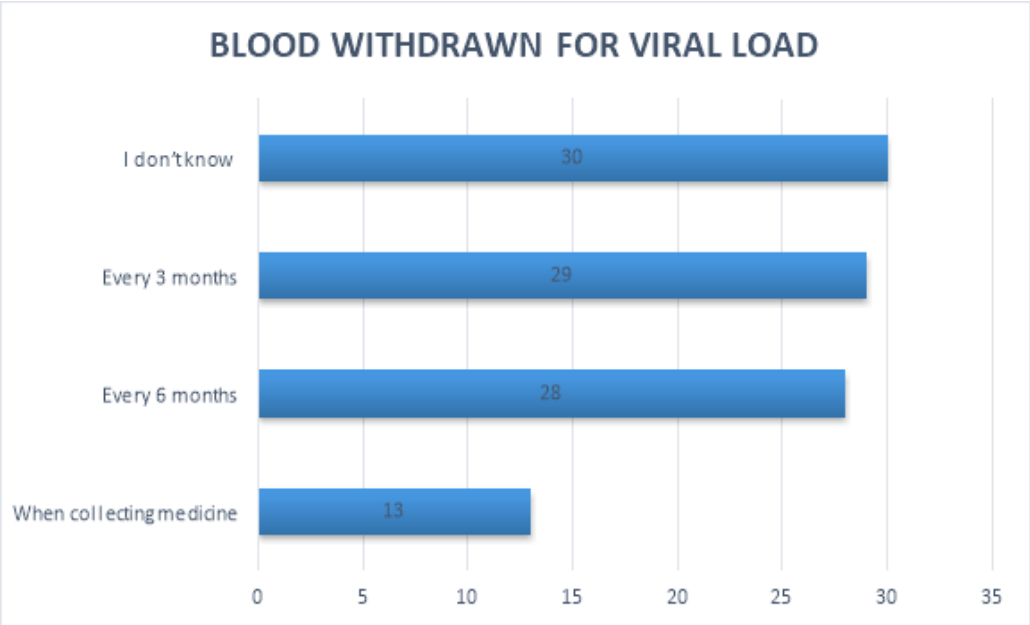


Figure 6. shows how often your blood should be withdrawn for viral load. Majority of the respondents said I don't know, 29 respondents said every 3 months, 28 respondents said every 6 months and 13 respondents said when collecting medicine

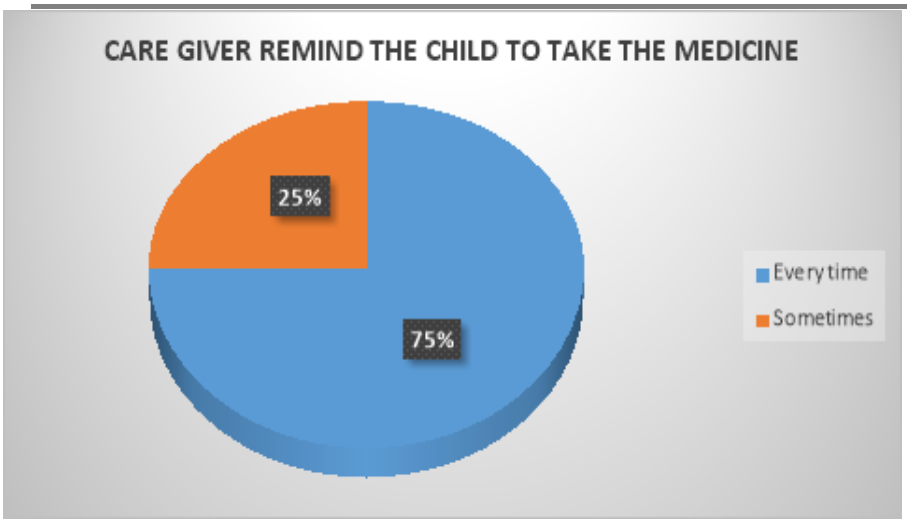


Figure 7. shows the percentage the caregiver reminds the child to take the medicine every time is 75% and sometimes is 25%.

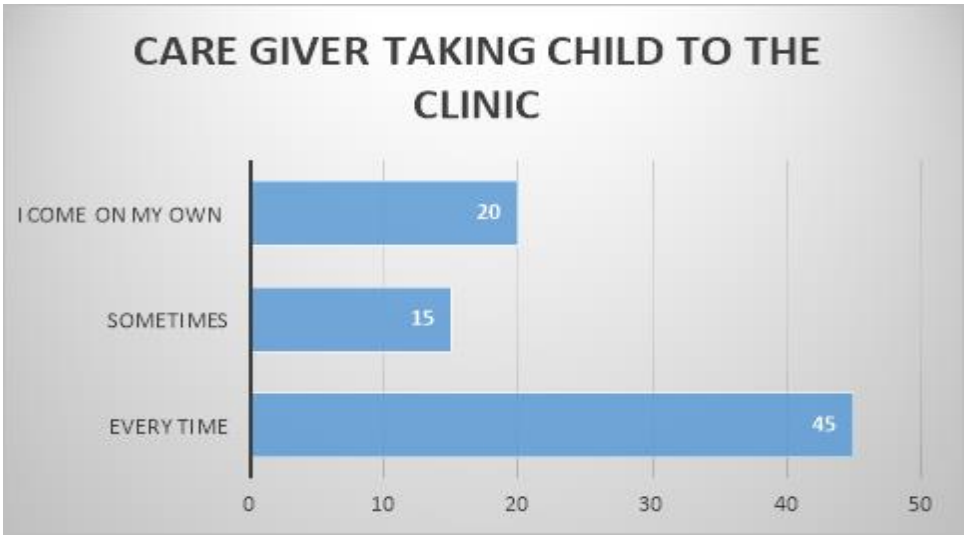


Figure 8. shows caregiver taking the child to the clinic, majority who responded every time were 45 followed by 20 respondents who said they come on their own and 15 responded sometimes.

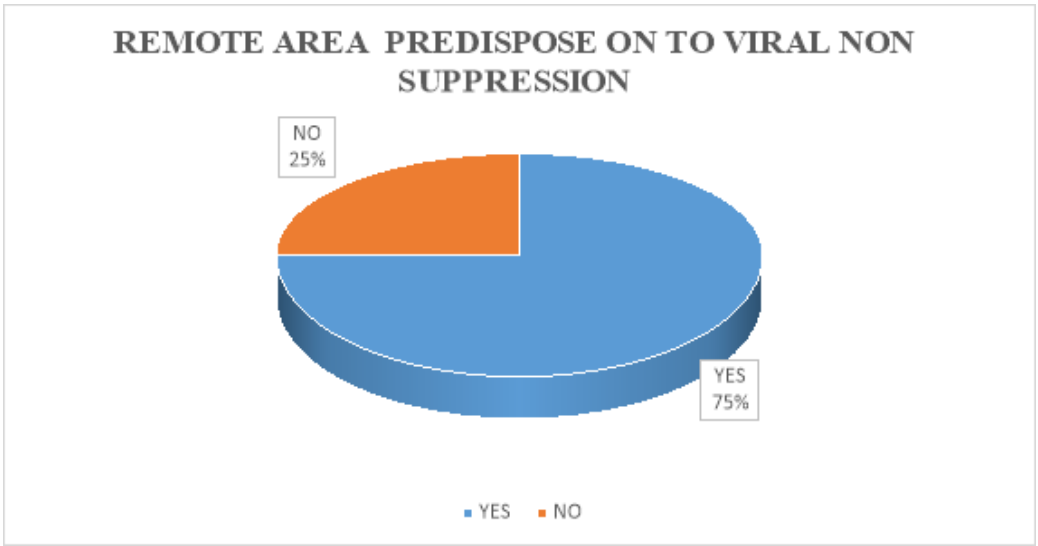


Figure 9. shows that majority of respondents who said remote area predispose to viral non suppression was 75% and 25% of respondents said remote area does not predispose to viral non suppression.

Table 6 shows the number of people who said remote area predispose to viral non suppression and there reasons why. 28 (35%) gave there reasons as because we don't have proper infrastructure, 27 (33%) said because we don't have the necessary income to have our need met and 25 (31) said I don't know.

IF YES, HOW					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Because we don't have the necessary income to have our needs met	27	33.8	33.8	33.8
	Because we don't have proper infrastructure	28	35.0	35.0	68.8
	I don't know	25	31.3	31.3	100.0
	Total	80	100.0	100.0	

Stigmatization

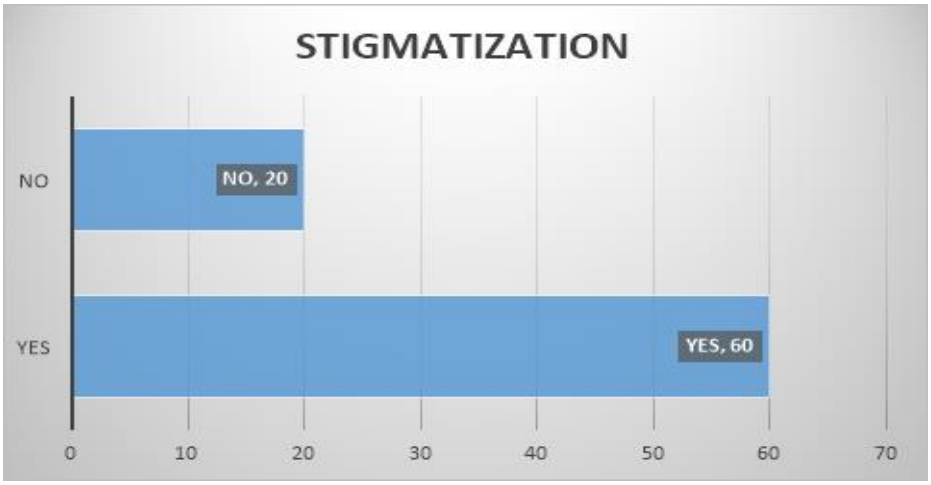


Figure 10. shows if social stigma affects the individual living with HIV thereby affecting viral load suppression. Majority of respondent who said yes were 60 and 20 respondents said NO

Medication

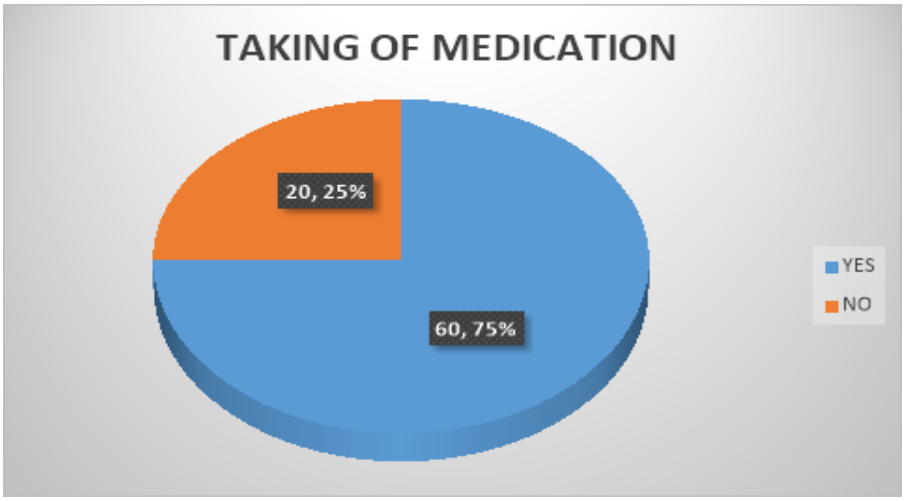


Figure 11. shows compliance of medication. 60 respondents said they take their medication everyday making 75% and 20 respondents said they don't take their medication every day and made up 25%.

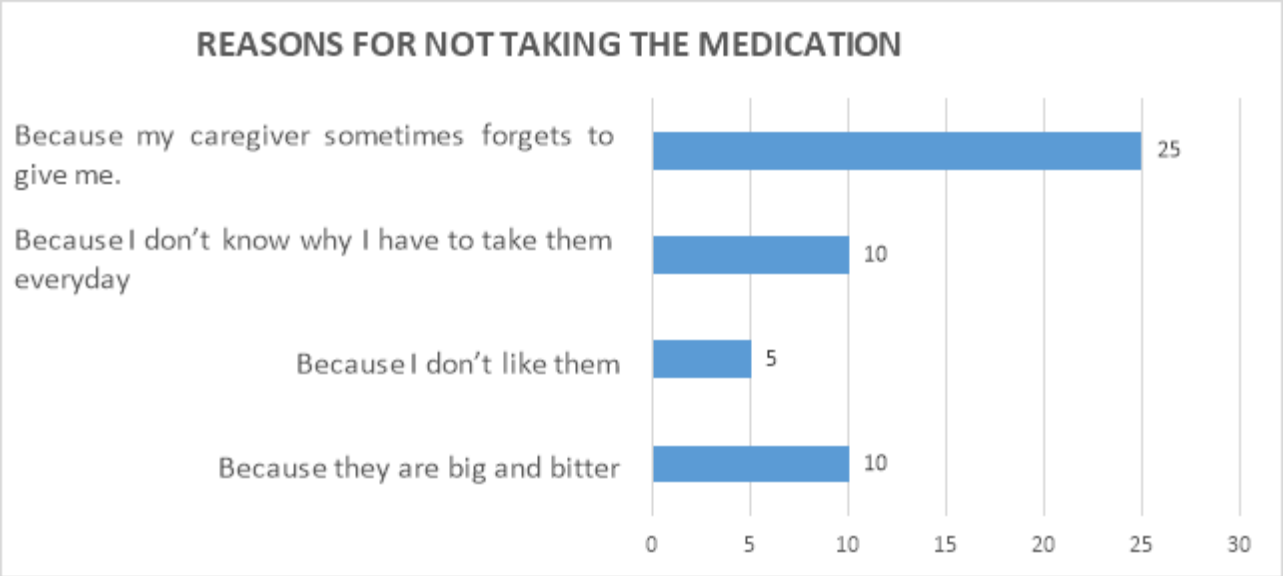


Figure 12. shows reasons some respondents gave for not taking their medication every day. 25 respondents said because my caregiver sometimes forgets to give me, 10 respondents said because I don't know why I have to take them every day, 10 other respondents said because they are big and bitter and 5 respondents said because I don't like them.

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Demographic Data

From the analysis of Table 4.3.1 the age of the respondents was grouped into 2, below 15 years and between 15-17. Majority were children below 15 years who were 59 (74%) and children between 15-17 were 21 (26%). The gender of the children which are male and female of which the majority of the of the respondents were female 52 (65%) and males were 28 (35%). From the analysis of the children academic level, the majority of the children were not yet enrolled in school who were 34 followed by those in primary school who were 27 and 19 were in secondary school. This clearly shows that most children are not in school and that affects the attitude towards ART.

From the analysis of Figure 2 the Majority of the caregivers were found to be below 25 and they made up 54%, followed by those between 25 – 35 that made up 25% and lastly those above 35 which made up 21%. The majority gender were female caregivers who were 43 and male caregivers were 20. Majority of the caregivers were relatives to the child who were 34 (42%) followed by guardians who were 27(34%) and parents who were 19 making (24%). The majority of caregivers worked as of which was at 69%, followed by caregivers who were unemployed 12%, 10% of caregivers were business men and women and 9% of care givers were civil servants. The data from the research shows that most caregiver were younger than 25 years and this shows that age of the care giver is a factor in viral suppression of the child. Not only the age but also the relationship between the caregiver than the child also affects the child it was discovered that most caregivers were just relatives to the child.

Knowledge On Viral Load

From the research findings shows the majority of the respondents said HIV/AIDS was not curable and had knowledge on HIV and were 72 (90%) and 8 respondents said HIV is curable were 8 (10%). 58 (73%) said you should not stop taking ARVs and 22 (28%) said you can stop taking ARVs. The research findings on the knowledge of respondents on viral load suppression and majority who were 36 (45%) said they do not know, followed by 22 (28%) of respondents said to cure HIV and the other 22(28%) said to provide good health to the child living with HIV. Figure 6. showed how often the blood should be withdrawn for viral load. Majority of the respondents said I don't know, 29 respondents said every 3 months, 28 respondents said every 6 months and 13 respondents said when collecting medicine. The research showed that most respondents did not have

much knowledge on viral suppression. Increased sensitization and education of the ART client can massively help them have more knowledge on the matter.

Care Giver Influence On Viral Suppression

The research analyzed the influence that the care giver has on the child's viral suppression of which the research revealed that 75% of caregivers remaindered the children to take the medicine every time is 75% and only 25% of the care giver remaindered the children sometimes but not always. The research also revealed that majority of the care givers 45 took the child every time for ART services, 20 respondents who said they come on their own and 15 responded sometimes. This clearly shows the massive impact that caregivers have on the child's viral suppression.

Low Social Economic Status

The study revealed that 75% of the respondents said remote area predisposes them to viral non suppression and only 25% of respondents said remote area does not predispose to viral non suppression. The study also reviewed the number of people who said remote area predispose to viral non suppression and there reasons why. 28 (35%) gave their reasons as because we do not have proper infrastructure, 27 (33%) said because we don't have the necessary income to have our need met and 25 (31) said I don't know. The evidence in the study shows clearly that low social economic status affects the viral suppression of the children and adolescents.

Stigmatization

The research showed that 60 out of 80 respondents were stigmatized and treated unfairly by the community and only 20 respondents said that they do not suffer from any negative treatment from the community. Stigma towards people living with HIV is largely practiced in society and the study clearly shows the impact of stigma on viral suppression.

Lack Of Compliance

Figure 11. showed compliance of medication. 75% respondents said they took their medication everyday making and 25% respondents said they do not take their medication every day. The research also assessed the reasons some respondents gave for not taking the medication every day. 25 respondents said because my caregiver sometimes forgets to give me, 10 respondents said because I don't know why I have to take them every day, 10 other respondents said because they are big and bitter and 5 respondents said because I don't like them. This clearly shows that most children and adolescents are not taking their medication every day and this is due to the many factors associated to it.

Conclusion

The study sought to determine factors that contribute to the low viral load suppression among children and adolescents in Bweengwa community. The research revealed that there is lack of knowledge among children and adolescents about HIV viral suppression, influence and impact that the caregivers have on viral suppression of the child, low social economic status has a huge bearing on the suppression of the virus among Children and adolescents and lastly it showed that most of the respondents were not taking their medication every day.

Recommendations

For long-term ART success, implementing a close monitoring of adherence and risks of viral rebound would be highly relevant, especially for orphans of both parents.

Focusing particularly on younger adolescents and adolescents in transition to adult clinic with a range of counseling and social support could improve their treatment outcomes.

Similarly, enhancing counseling and treatment literacy to improve adolescents' understanding of the importance of ART and the currently incurable nature of HIV could improve adherence to the treatment and viral suppression.

For younger adolescents, the education and information could be reinforced with their main caregivers and themselves during routine patient support group sessions.

The identification of the factors that are most positively associated with poor viral suppression in children and adolescent patients living with HIV highlights the need for a renewed focus on developing and strengthening HIV programmes in rural areas where children and adolescents living with HIV are more likely to be virally unsuppressed.

Health education, psychosocial and sociocultural policies which focus on adherence challenges associated with this age groups should be incorporated into HIV programmes.

Timely identification and monitoring of nutritional problems should be necessary to enhance the effectiveness of ART treatment and to prevent further related complications.

Early detection of treatment failure, adherence counselling and appropriate switching to second-line therapy are key strengths of a viral load monitored model.

Strategies to optimize IAC linkage at lower-level health facilities for persons with suboptimal ART adherence are needed.

HIV-program managers therefore need to design targeted age-specific treatment and care policies, programs and interventions or to modify the existing ones, in order to improve suppression among HIV-positive children receiving ART, to achieve the 90-90-90 UNAIDS targets by 2030

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