



College of Health Sciences

Department of Public Health

**Prevalence of Delayed Antiretroviral Therapy Initiation and Its
Associated Factors Among HIV-Infected Children at Dessie and
Kombolcha Town Selected Public Health Facilities, South Wollo Zone,
Amhara Region, Ethiopia**

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Study period	August 15-October 30, 2024
Study settings	Public Health Facilities, South Wollo Zone
Study Area	Dessie and Kombolcha public health facility, south wollo

DECLARATION

Research Title: Prevalence of delayed anti-retro-viral therapy initiation and its associated factors among HIV-infected children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

I, the undersigned student declare that I have submitted my original work which has not been submitted in whole or in part, in any previous application for a degree or any professional qualification except were stated otherwise by reference or acknowledgment, the work presented is entirely my own.

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ABBRIVATIONS AND ACRONOMYS

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal care
AOR	Adjusted Odds Ratio
ART	Antiretroviral therapy
CLHIV	Children Living with HIV
COR	Crude Odds Ratio
DCSH	Dessie Comprehensive Specialized Hospital
HAART	Highly Active Antiretroviral Therapy
HCW	Health Care worker
Hgb	Hemoglobin
HIV	Human Immunodeficiency Virus
MCH	Maternal and Child Health
MTCT	Mother-To-Child Transmission
NGO	Nongovernmental Organization
OIs	Opportunistic Infections
PLHIV	People Living with HIV
TB	Tuberculosis
UNAIDS	United Nations Program on HIV/AIDS
UTT	Universal Test and Threat
WHO	World Health Organization
IDUS	Injecting drug users

ABSTRACT

Introduction: Antiretroviral therapy has dramatically reduced human immunodeficiency virus related morbidity and mortality among HIV-infected individuals. One of the major HIV related challenges around the world is the significant percentage of people living with HIV start therapy at delayed stage despite of the availability of ART, which has negative impacts on the quality of life and more transmission of HIV infection.

Objective: Assessing the prevalence of delayed ART initiation and associated factors among HIV-infected children at Dessie and Kombolcha selected public health facilities Ethiopia, 2025.

Method: A facility-based Cross-sectional study design was conducted from August 15 to October 30 2024 at Dessie and Kombolcha town-selected public health facilities. The sample size for this study was 422. Data was collected through an interviewer-administered pre-tested questionnaire and the collected data was entered into EPI-data 4.7.0 and analyzed using STATA 15 statistical software. Variables that had a p-value of ≤ 0.25 in bi-variable analysis were considered as candidates for multi-variable regression analysis. Adjusted Odds ratio along with 95% confidence interval was estimated to measure the strength of association between dependent and predictor variables.

Results: The overall proportion of delayed ART initiation among children less than 15 was 44.2% (95% CI: 39.47 - 49.04%). The finding of the study indicated that the variables of rural residences [AOR = 2.44; 95% CI: (1.12, 5.32)], base line CD4+ ≥ 350 cells/mm³ [AOR = 20.09, 95% CI: (8.76, 46.04)], hemoglobin level at base line ≥ 10 mg/dl [AOR = 18.42; 95% CI: (6.99, 48.56)], taking medication prior to ART initiation [AOR = 2.67; 95% CI: (1.19, 6.00)], and children with past OI [AOR = 2.36; 95% CI: (1.04, 5.36)] had increased the log odds of delayed ART initiation of HIV-infected children. However, the other variables such as baseline viral load ≥ 1000 [AOR = 0.06; 95% CI: (0.02, 0.13)], child has primary caregiver [AOR = 0.35; 95% CI: (0.14, 0.87)], and household residence locate near to hospital [AOR = 0.33; 95% CI: (0.14, 0.74)] had decrease the log odds of delayed ART initiation of HIV-infected children.

Conclusion and Recommendations: Nearly half of the children were delayed ART initiation among children on ART follow up at Dessie and Kombolcha town public health facilities. The factor variables such as residence, child has primary caregiver, baseline CD4 count, hemoglobin level, baseline viral load, taking any medication before ART initiation, child have past OI at ART enrollment, and households residing locate near to hospital were predictors of delayed ART

initiation of HIV-infected children. Health care workers better to focus on early HIV testing mechanisms and timely linkage to HIV care by advocating “Test-and-Treat” should be strengthened. The government better to encourage service availability of rural residence.

The health facility ART clinic staffs to have strict monitoring and early initiation of ART on CLHIV.

Keywords: Delayed ART Initiation, HIV-Positive Children, Dessie-Kombolcha

1. INTRODUCTION

1.1. Background

Acquired immunodeficiency syndrome (AIDS) is a viral infection caused by the Human Immunodeficiency Virus (HIV) that weakens the immune system and makes the body susceptible with HIV infections [1]. Antiretroviral therapy (ART) has dramatically reduced HIV-related morbidity and mortality among HIV-positive individuals [2]. Globally, According to the latest report from the World Health Organization (WHO), 38.4 million people living with HIV (PLHIV) and children comprise 1.7 million cases, among those PLHIV only 73% have access to antiretroviral drugs [3].

Delayed ART initiation is defined as those who started ART after 7 days of enrollment into HIV care. One of the major HIV-related challenges around the world is the high rate of delay in the initiation of antiretroviral therapy (ART), which has negative impacts on the quality of life and more transmission of HIV infection [4]. The most recent global estimates from UNAIDS suggest coverage of ART in children living with HIV (CLHIV) < 15 years is only 54%, compared to 74% in adults, and Ethiopia's estimated pediatric ART coverage (40%) is even lower [5].

Despite efforts made towards increasing ART among CLHIV, a large number of children continue to die from HIV annually. They accounted for 13% of the deaths attributable to HIV recent data showed that the incidence of HIV-related mortality in children tripled that of adults [6]. Many high HIV-burden countries continue to face challenges concerning identifying and initiating treatment for CLHIV within the recommended period [7].

This delay in the initiation of ART for those children left many challenges such as adherence problems, drug resistance, reproductive health complications, transition to adult medical care, and the potential for long-term complications from HIV and its treatments [8]. As far as to my knowledge and experience, there is no previous research done in south Wollo zone that showed the magnitude and associated factors of ART delay, despite the high burden and related challenges demonstrated in routine clinical practice among CLHIV in which this study aims to assess it.

1.2. Statement of the Problem

Globally, 1.7 million children are living with HIV, with the majority of them residing in sub-Saharan Africa [9]. In addition, a wide disparity exists between delay initiation of ART in developed and developing countries among CLHIV [6]. In Africa, a study showed that 46% of HIV-positive children were initiated into ART after seven days of confirmation of diagnosis [10]. In this region, there varies in magnitude of delay in ART initiation which ranges as high as in South Africa (59.9%) [11] and as low as low in Zimbabwe (35% [12]. Even in high-income countries like Canada (48%) and Iran (65.5%), the prevalence of delayed ART initiation was high. Similarly, Cameroon (35.5%) and Uganda (37.7%) [13] had high rates of delayed ART initiation, suggesting that the burden of delayed ART initiation is still exist in Africa [14].

Ethiopia is also one of the countries with a high prevalence of delayed ART initiation.

Studies conducted in some parts of Ethiopia showed that the prevalence of delayed ART initiation among children less than 15 years living with HIV enrolled on ART is high for example, in North West, Ethiopia 53.2% [4], in Addis Ababa 52.3% [4].

Multiple studies supported that children who received early treatment were less likely to progress to AIDS or death, and they also had improved growth and lower morbidity compared with those who started treatment later [15]. Antiretroviral Treatment (ART has substantially improved outcomes for PLHIV, including suppressing viral loads to an undetectable level, restoring CD4+ T-cell counts, and decreasing AIDS-related morbidity and mortality [16]. Additionally, early ART initiation is associated with a higher probability of good prognosis, serving as the main predictor of virological suppression, and can substantially decline the HIV transmission rate by 96% in couples with one HIV-infected partner, compared to late ART initiation [10]. Conversely, late or delayed ART initiation is linked to weakened immune function, clinical progression, increased risk of opportunistic infections, and higher AIDS and non-AIDS-related morbidity and mortality among PLHIV, as well as higher pressure on healthcare systems [17].

The HIV epidemic is staying long times as considered one of the important public health issues for several decades. To control this problem, early diagnosis of the disease, early onset of treatment, and adherence to the treatment to keep the viral load suppressed in CLHIV [18]. Early linkage to ART initiation among children is critical to achieving UNAIDS 95–95- 95 goals by 2030 (95% of people living with HIV are diagnosed, 95% of those diagnosed are on ART, and 95% of those on ART are virally suppressed) [19].

All people living with HIV are eligible to start ART regardless of age, CD4 cell count, and clinical stage. For all clients without contra-indications, ART should be initiated within 7 days, and on the same day if possible. Pregnant women, infants children, and clients with advanced HIV disease should be prioritized for rapid initiation [11]. However, delay in starting antiretroviral therapy is associated with increased opportunistic infections, high treatment resistance reduced quality of life, the emergence of new strained infections, and increased morbidity and mortality from HIV/AIDs [20].

However, the gap is previous studies used specific study area in West Amhara about prevalence of delay in initiation of ART among children. In addition to this, the previous study's geographical area is different from this study area. Therefore, this study aims to include multicenter selected public health facilities and to investigate the prevalence of delayed antiretroviral therapy initiation and its associated factors among HIV-infected children at Dessie and Kombolcha selected public health facilities of south Wollo zone, Amhara region, Ethiopia.

1.3. Significance of the study

Most importantly early initiated ART should benefit the child's future life improvement in which ART timely initiated prevent advanced complications, drug resistance, and at higher stage. ART helps the child from death. In addition, quality of life in early initiation of ART is gained if the children start ART as early as their HIV status is confirmed. Therefore, this research is important for hospitals and health centers to know the status of delayed ART initiation among HIV-infected children in this study area.

Furthermore, the study will help to determine the factors that delay initiation of ART and to plan intervention programs and methods how to implement to fill the existing gaps to ensure initiation of ART as soon as possible in eligible children that helps children lower mortality and morbidity. Timely initiation of ART will help to improve better linkage to HIV services and ART initiation among newly diagnosed CLHIV. The current HIV-positive children would be the future adult HIV people since studying delayed and its factor helps to set long and short-term goals. It also helps to prepare guidelines, policies, and strategies for the treatment modality in those children at this time and for the future.

The findings of the study will provide ground information and encourage researchers to conduct further researches concerning delayed ART initiation among HIV patients. The finding of this study will serve as input for program planners and policymakers working in the area of

HIV/AIDS to assess and update the current practices to decrease the burden of delayed ART initiation among HIV-positive children.

2. LITERATURE REVIEW

2.1. Prevalence of Delayed ART Initiation in HIV-Positive Children

The highest HIV burden in countries here in the Eastern and Southern African regions, multiple studies showed that ART initiation within the intended period had given less attention [10]. Iran's HIV/AIDS surveillance data (2024) showed that ART in recent calendar years had lower odds of late ART initiation than previous studies which was evidenced by delayed ART initiation from 77.14% in 2009 to 39.1% in 2019 [17].

Delayed ART initiation in children was also studied in several African countries and the magnitude showed that different reports. Several years' experience of ART initiation in Nigeria showed that 50.6% of CLHIV delayed ART initiation [6]. Similarly, a study done in South Africa indicated that delay in ART initiation was 56.4%, and a consistent study done in Ethiopia showed that two-thirds of children received delayed ART initiation [19]. ART [21]. A study conducted in Taiwan showed that 31.7% of the newly diagnosed HIV-positive was delayed in initiating.

Different study showed that high prevalence of delayed ART initiation in Uganda 54.4% [22], Kenya 53% [23], Mozambique 48% [24], South Africa 68.2% [25], Rural Zambia 60% and 72.4% [26], and Addis Ababa, Ethiopia 58.3% [27]. Similarly, a study conducted at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia showed that the overall prevalence of late antiretroviral therapy initiation among children on antiretroviral therapy was 53.2%, which is high prevalence [4].

2.2. Associated Factors for delayed ART Initiation in children

2.2.1. Socio-demographic characteristics

A study in Cameroon found that the odds of being late ART initiated among rural children were two times more likely as compared to urban residents [28]. This association was consistent with a study in Ethiopia where a rural resident was associated with delayed ART initiation in children [4]. In another study, male HIV-positive individuals had higher odds of being delayed for ART initiation than female children. Considering age, the study showed that an increase in maternal age resulted in a significant decrease in initiating ART on time [29]. A consistent study found in Taiwan stated that the older age of mothers was significantly associated with a decreased risk of delayed ART initiation [21].

Another study conducted in South Africa [30] and Ethiopia [4] showed that a child's age was another significant factor for delay in initiation of ART in which the older the child's age the higher being delay for treatment which the odds of being delay initiated for ART among children less than 5 years were 2 times more likely as compared to those children more than 5 years of age [31].

A study conducted in Gondar; Ethiopia found that being single was significantly associated with an increased odds of late ART initiation [4]. A study in Uganda showed that married couples start ART initiation earlier [13]. In another study, single PLHIV reported a 1.88 times longer delay in starting ART than married couples [7].

The study found in Southeast Nigeria showed that the occupation of HIV-positive children's mothers or caregivers was not associated with delay in ART initiation [6]. Similarly, the study found in the South African cohort showed that the occupation of mothers or caregivers was not related to delay in ART initiation in HIV-positive children [30]. This was also supported in Ethiopia where occupation wasn't significantly associated with delay in ART [4].

A study conducted in Iran revealed strong associations between low education levels and delayed HIV diagnosis and late ART initiation [17]. This finding was supported by a study conducted in South Africa which showed that mothers' age and educational status were found barriers to ART initiation among children [30].

The study done in Kigali, Rwanda [48] showed that child caregiver was a significant factor of delayed ART initiation. However, the other studies [49, 50] showed that age of caregiver, sex of caregiver, caregiver HIV status, and caregiver on ART was not significantly affect delayed ART intention of children.

2.2.2. Clinical and Treatment-Related Characteristics of Children

HIV-infected children who were diagnosed via provider-initiated testing were lower than children who were diagnosed via voluntary counseling to delay ART initiation when considering diagnosis and time of treatment for HIV in Ethiopia [29]. In addition, the advanced stage of WHO were at higher risk of delayed ART as compared to their lower stage counterparts. This finding is in agreement with other previous studies conducted in Africa [32].

Immunization was an important component of the HIV care package in many international guidelines, and people living with HIV should be assessed for eligibility for vaccination at all stages of care. HIV-exposed children should receive all vaccines under routine vaccination according to recommended national immunization schedules [33]. However, a case-control study

conducted Swaziland in showed that children who had received their immunizations were 3 times more likely to have initiated ART earlier as compared to children who had not received their immunizations [8].

Besides, in Ethiopia, the odds of being late for ART initiated among children who took medication before ART initiation was 2 times more likely as compared to those who had not taken it [19]. This finding was consistent with a study conducted in Iran where a cohort study showed that individuals who had a medication history had a strong association with delayed ART initiation [18].

The CD4 count was strongly associated with delayed ART initiation especially in the previous studies because CD4 count was considered to initiate ART in the former guidelines [18]. People with higher CD4 counts were at risk for late treatment of HIV, and also a Higher risk of complication and mortality [34]. This was consistent with previous studies in Ethiopia [8].

TB disease was more common among persons with advanced HIV-related immunosuppressant, both the disease itself and TB therapy were risk factors for late ART initiation in children [35]. In addition, there were supporting evidence considering lower CD4 count and TB co-infection were another challenge for initiation of ART on time [35]. Bed-ridden functional status at ART initiation, lower CD4 count, and advanced stage WHO clinical stages were found associated factors to delay ART initiation among HIV cases in another study [16].

A study conducted in Amhara, Ethiopia showed that the odds of late ART initiation among children who experienced opportunistic infection were 2.5 times more likely to delay for ART initiation than children who hadn't opportunistic infection [4]. It is supported by a study from South Africa where opportunistic infection was related to delayed initiation of ART in children [35].

A study conducted Iran [28] showed that 57% of IDUs had received care services and initiated ART, with only 15% reaching a viral load of less than 1000 copies/ml. Therefore, fewer amounts of viral load causes delayed ART intention. The other findings suggest that initiating ART soon after an infant acquires HIV can limit the size of the HIV viral reservoir, and smaller reservoirs may provide some level of protection against viral rebound in the setting of treatment no adherence. Therefore, delayed ART initiation related with low levels of viral load and visceral [34, 35].

The study done in Iran [17] on factors associated with late initiation of antiretroviral therapy in Iran's HIV/AIDS surveillance data showed that medication causes fear of pill burden and

advanced disease. Similarly, the study done in Kenyatta National Hospital, Kenya [53] showed that the increased level of hemoglobin level causes delayed ART initiation and missing treatments.

2.2.3. Health facility-related characteristics

Among determinant factors for delay in ART facility, related factors were identified in multiple studies. One of the significant factors for delay in most countries showed that initiating children on ART is closely related to long-distance travel initiate get health facilities in children. There was also a related determinant factor for this in most institutions that caused irregular attendance at health care facilities rather than the barriers being related to services availability in the health institution [36].

Studies in developing countries showed that a client's relationship with a healthcare worker may have many implications for client satisfaction and retention, especially when a patient is HIV-positive and pregnant. A healthcare facility should be cognizant of a patient's rights charter, the importance of customer care, and the difference between being firm and being disrespectful. Due to different stakeholders interventions, promotions, and campaigns could modify risks and motivate parents/guardians to seek treatment and reduce delays for ART. This improved HIV service delivery strategies with efficient pediatrics ART enrolment and provision to determine whether ART was delayed or not. However, comprehensive integrated ART provision mitigated stigma and discrimination and was associated with lower delay in ART initiation [8].

The presence of service availability and its effects on bringing a shorter time and distance to get ART initiation also resulted in a higher uptake of ART as compared to their counterparts [37]. Increasing service availability and accessibility which provide sufficient information and awareness of staff and patients of the ART services, to offer ART more quickly following HIV diagnosis was negatively associated with delayed ART [19, 37].

2.3. Conceptual Framework

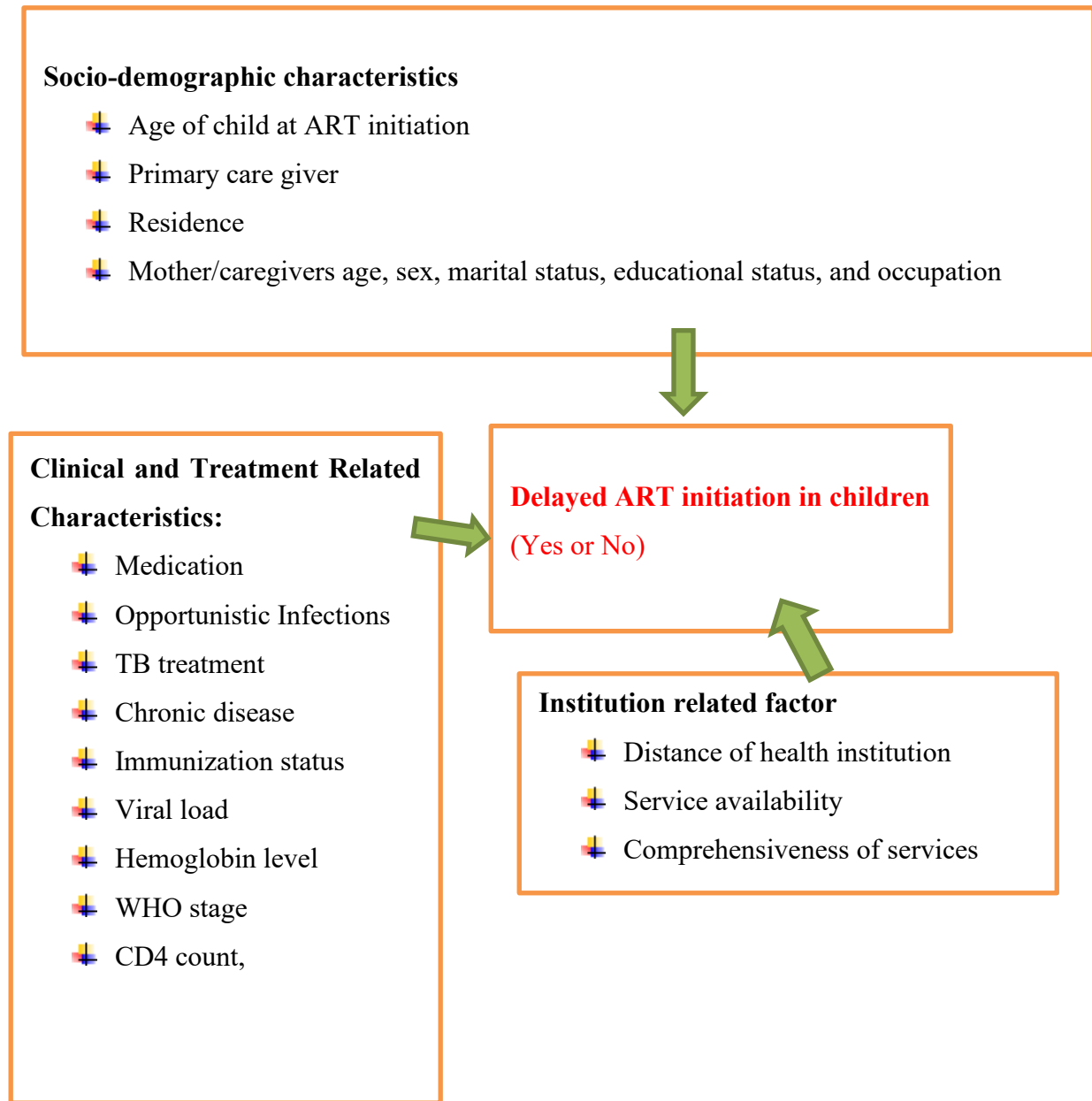


Figure 1: Conceptual framework for assessing prevalence of delayed ART initiation and its associated factors among HIV positive children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

3. OBJECTIVES

3.1 General objective

- To assess the prevalence of delayed ART initiation and its associated factors among HIV-infected children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

3.2 Specific objective

- To determine the prevalence of delayed ART initiation among HIV positive children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.
- To identify associated factors of delayed ART initiation among HIV positive children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

4. METHODS AND MATERIALS

4.1 Study area

The study was conducted at Dessie and Kombolcha town health facilities. Dessie town located in Dessie, South Wollo Zone of Amhara Regional State which is located 401 km to the north of the capital, Addis Ababa 471 Km from Bahir Dar (capital city of Amhara).

Generally, the town has one comprehensive specialized hospital and eight health centers. DCSH provides outpatient and inpatient services to the northeast Ethiopian population like Afar region for not only Amhara region, which includes medical, surgical, pediatrics, accident and emergency services, maternal and child health (MCH), obstetric and gynecological care and Comprehensive HIV care testing and treating services. Totally the hospital is serving more than 8 million people, and giving referral service for North Wollo zone, South Wollo zone, Oromia Special administrative zone, North Shewa Zone, and part of Afar and southern Tigray region. In addition to DCSH, only 3 health centers in Dessie (Dessie health center, Segnoge-baya health center, Buabuha health center) also provide outpatient and inpatient services to residents. They are giving comprehensive MCH and ART services. Other health centers did not provide ART service.

Kombolcha town health institution also comprised of Kombolcha General Hospital and 4 health centers (02, 03, 05, and 07). Kombolcha town is located in North Eastern part of Ethiopia at a distance of 379 kilometer from the capital city, Addis Ababa. The town had a total population of 162,533. Those institutions are providing, MCH, outpatient and inpatient department, obstetric and gynecological care and ART services for HIV positive patients including children. However, 07-health center did not provide ART service.

4.2 Study design and period

A facility based Cross-sectional study design was conducted from August 15 to October 2024 at Dessie and Kombolcha town selected public health facilities.

4.3 Population

4.3.1 Source population

All HIV positive children less than 15 years of age who were linked at Dessie and Kombolcha town selected public health facilities.

4.3.2 Study population

Randomly selected HIV positive children of less than 15 years of age who were enrolled in the ART clinic at Dessie and Kombolcha town selected public health facilities during this study period.

4.3.3 Study Unit

Randomly selected HIV positive children less than 15 years of age who was fulfill eligibility criteria and were enrolled in HAART at Dessie and Kombolcha town selected public health facilities.

4.4 Inclusion and Exclusion Criteria

4.4.1 Inclusion Criteria

All HIV positive children less than 15 years who were enrolled in HAART at Dessie and Kombolcha town selected public health institutions at ART clinic from August 15 to October 30 2024.

4.4.2 Exclusion Criteria

HIV positive children less than 15 years of respondents were not willingness to participate to study was excluded from the study.

4.5 Sample Size Determination

The sample size for objective one was calculated using Single population proportion

$$n = (Z_{\alpha/2})^2 \times p(1-p) / d^2$$

The sample size was calculated using the single population proportion formula with the following assumptions: 5% marginal error and 95% confidence interval ($\alpha=0.05$) and from the previous study the proportion or prevalence of late ART initiation based on the study in the University of Gondar was 53.2% [4], so based on the above information the total sample size was calculated as follows:

$$n = (Z_{\alpha/2})^2 \times p(1-p) / d^2$$

Where, $Z_{\alpha/2} = 1.96$ (95% confidence level)

d =margin error (5%)

$P = 53.2\%$ Proportion of late ART initiation taken from based on previous study [4]

n = the minimum sample size required for the study

$$\text{Therefore: } n = (1.96)^2 \times 0.532 \times 0.468 / (0.05)^2$$

$$n = (3.8416 \times 0.2490) / 0.0025$$

n=383 and considering non response rate at 10% = n =422

Sample size for the second objectives

Table 1: Sample size calculation for identify associated factors of delayed ART initiation among HIV positive children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region 2025.

Variable name	Level of Confidence	Power	OR	Sample size	Reference
Presence of Chronic diseases	95% confidence Level	80	4.1	92	[4]
History of OI	95% confidence Level	80	2.0	304	[38]
CD4 count	95% confidence Level	80	5.4	78	[38]

The sample size of the first objective was found to be higher than the second objectives, since the sample size for this study was used 422.

4.6 Sampling procedure

Dessie and Kombolcha town public health facilities were included in the study. All HIV positive children who were started on ART at those Dessie and Kombolcha town selected health institutions registered HIV positive children are 809. From Dessie town health facilities DCSH, Dessie health center, Buanbuha health center and Segno gebeya health centers were selected; other health centers did not provide ART service. Similarly, from Kombolcha town public health facilities; Kombolcha General Hospital, 02, 03 and 05 health centers are respectively selected.

Random sampling technique used to select the study participants from every ART site in the study area. The sample size required for each health facility was allocated proportionally to the number of HIV positive children. ART clinic of the two respective towns ART follow data log book was the sampling frame to get HIV positive children who have follow up during this data collection period at the selected health facilities.

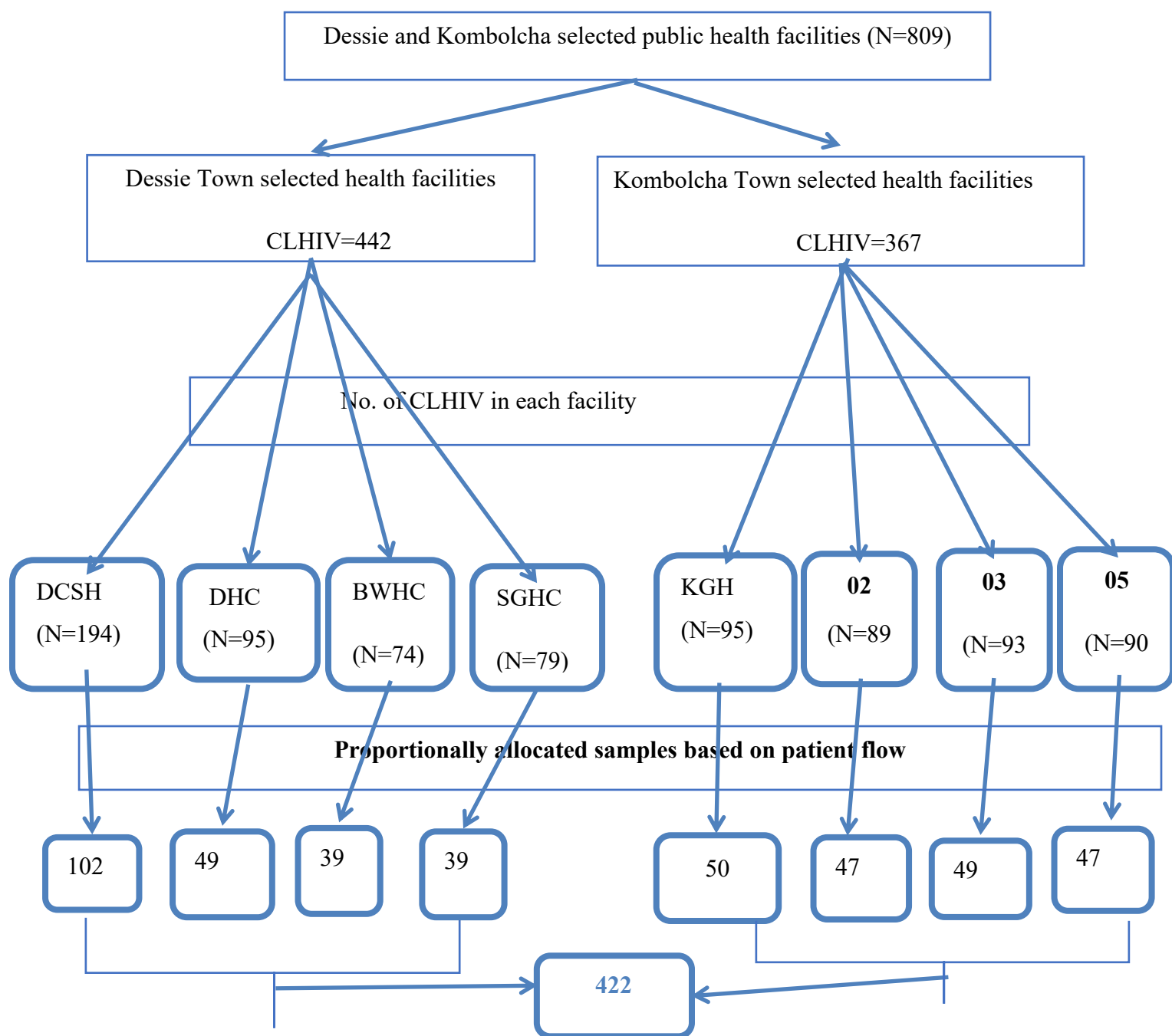


Figure 2: Sampling procedure for assessing prevalence of delayed ART initiation

Key: DCSH=Dessie comprehensive specialized hospital, DHC=Dessie Health center, BWHC=Buanbuha Health center, SGHC=Segnogebeha health centre, KGH= Kombolcha General hospital, 02, 03, and 05 are names of health center in Kombolcha town respectively

4.7 Data collection procedure

Data were collected through an interviewer administered pre-tested questionnaire. Patients was interviewed to obtain socio-demographic data, clinical and treatment related factors of participants from their medical history and laboratory parameters was obtained from patients' HIV intake and follow-up care form. One supervisor (principal investigator of this study) and two data collectors, (BSc nurses) were participated in the data collection process.

4.8 Data quality control measure

To assure the quality of data, the tool was tested by interviewing 21 samples (5%) from total sample in Woldia comprehensive specialized hospital. HIV positive children towards delayed ART initiation among HIV positive children two weeks before the actual data collection and a necessary correction were applied. The questionnaire was prepared in English, translated into local languages, Amharic for data collection, and then re-translated back to English with maintaining its consistency.

Data quality was control through the provision of training to the data collectors about the overall data collection procedures and the techniques of interviewing. The collect data was checked for completeness, consistency, accuracy and clarity by the supervisor and the principal investigator on a daily basis.

4.9 Data Analysis and Management

All collected data was entered to EPI-data version 4.7.0 and was transferred to STATA 15 statistical software for its analysis. The findings were presented using descriptive statistics such as frequency and percentage. Logistic regression model was used for assessing odds of delayed ART initiation among HIV positive children. The multicollinearity effect was checked by using variance inflation factor (VIF) and tolerance for continues independent variables. After inclusion of predictors to the final logistic regression model, the Hosmer and-Lemeshow goodness-of-fitness statistic was used to check if the data is fit to the logistic regression model and the p-value was $> (0.05)$. The regression of the dichotomous response variables was calculated using a binary logistic regression model using crude odds ratio and 95% confidence interval; variables which had a p-value of ≤ 0.25 in bi-variable analysis was considered as candidates for multi-variable logistic regression analysis. Variable with a p value < 0.05 in multi-variable logistic regression was considered statistically significant for delayed ART initiation in HIV positive children.

4.10 Operational definitions

Delayed ART initiation: Is defined as the initiation of ART beyond seven days of confirmation of HIV status. those who had either TB or Cryptococcal meningitis opportunistic infections which requires differing of ART for two up to eight weeks to prevent serious adverse effects [4].

Time to ART initiation; is the time interval in a day from the confirmation of HIV test till the patient is enrolled into ART [34].

Universal test and treat strategy: is defined as the rapid (within seven days) initiation of ART irrespective of patients WHO clinical staging as well as CD4+ cell counts [14].

WHO stage 1: HIV infection in children is asymptomatic or present with Persistent generalized Lymphadenopathy [39].

WHO stage 2: Children can develop unexplained persistent hepatosplenomegaly, Recurrent or chronic upper respiratory tract infections and/or various types of skin lesions [14].

WHO stage 3: Characterized by unexplained moderate malnutrition not adequately responding to standard therapy and unexplained persistent diarrhea lasting >14 days and unexplained persistent fever lasting >1 month and others [39].

WHO stage 4: Children is characterized by severe immunodeficiency or advanced AIDS Syndrome [39].

4.11 Variable of the study

4.11.1 Dependent Variable

- ✓ Delayed initiation of ART in HIV positive children (Yes, No)

4.11.2 Independent variables

Socio-demographic characteristics: Caregiver of the child, living condition, age, sex, marital status of caregiver, educational status of caregiver, occupational status of caregiver and residence, and primary caregiver.

Clinical and Treatment Related Characteristics of Children: Age of child at ART initiation, medication before ART initiation, OI, TB treatment, chronic disease, Immunization status, WHO stage, CD4 count, viral load, hemoglobin level

Institution related factor: Distance of health institution, service availability and comprehensiveness of services.

4.12 Ethical Consideration

Ethical approval was obtained from Ethical review committee of Woldia University department of public health. Then written consent was secured from Dessie and Kombolcha town health institutions to get permission. Verbal informed consent for participation was obtained from each study participant and the collected data was stored in a file, without the name of study participant.

The study was help HIV positive children to support them by reassessing strategies for bringing more ART supportive services that bring good adherence and to get better life. It supports to coordinate stakeholders who were worked on HIV focusing children.

4.13 Dissemination plan of Result

The finding of the study was submitted to College of Health Science, Woldia University. The research findings were presented to, Dessie and kombolcha town selected public health facility and different stakeholders.

5. RESULTS

5.1 Prevalence of delayed ART initiation

From 422 children under 15 years of age with HIV who started ART, 414 respondents were included in the analysis due to incomplete card registration for the study's target variables at Dessie and Kombolcha public health facilities. The overall prevalence of delayed ART initiation was 44.20% (0.4420, 95% CI: 0.39473, 0.4904) at Dessie and Kombolcha public health facilities.

5.2 Socio-demographic characteristics

Out of 414 HIV-positive children who started ART, 83(20.0%) were patients who had aged less than 12 months, 186(44.9%) were patients who had age between 12-60 months, 145(35%) were patients who had age >60 months (Table 2). More than half of the patients 235 (56.8%) were females and the rest 179(43.2%) were males. Regarding child living conditions 249(60.1) were children living with parents and the rest 165(39.9%) were children living without parents. Concerning the residence of patients, 208(50.2%) where patients lived in rural and 206(50.2%) where patients lived in urban (Table 2).

Table 2: Socio-demographic characteristics of HIV positive children who were enrolled in ART at Dessie and Kombolcha town public health facilities, South Wollo Zone, Ethiopia, 2025

Variables	Category of variables	Within 7 days (%)	>7days (%)	Total (%)
Age in months	<12 months	50(60.2)	33 (39.8)	83(20.0)
	12-60months	111 (59.7)	75 (40.3)	186(44.9)
	>60months	70 (48.3)	75 (51.7)	145(35.0)
Sex	Female	132 (59.7)	89 (40.3)	235 (56.8)
	Male	99 (51.3)	94 (48.7)	179(43.2)
Religion of patients	Orthodox Christian	95 (60.5)	62 (39.5)	157(37.9)
	Muslim	80 (53.7)	69 (46.3)	149(36.0)
	Catholic	38 (54.3)	32 (45.7)	70(16.9)
	Protestant	18 (47.4)	20 (52.6)	38(9.2)
Child has primary caregiver	Yes	192 (65.1)	103 (34.9)	295(71.3)
	No	39 (32.8)	80 (67.2)	119(28.7)
Child living condition	with parent	152 (61.0)	97 (39.0)	249(60.1)
	without parent	79 (47.9)	86 (52.1)	165(39.9)
Residence of patients	Rural	81 (41.3)	115 (58.7)	208(50.2)
	Urban	150 (68.8)	68 (31.2)	206(49.8)

Approximately, half of the patients 213 (51.4) with 106 (49.8%) observed events were age of caregiver greater than 40 years and 181(43.7%) with 66 (36.5%) observed events were age of caregiver less than 40 years. Regarding caregiver sex 241(58.2%) with 108 (44.8) observed events were female and the rest 173(41.8%) with 75 (43.4%) observed events were male (Table 3).

Table 3: Socio-demographic characteristics of caregivers of HIV positive children at Dessie and Kombolcha town public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

Variables	Category of variables	Within 7 days (%)	>7days (%)	Total (%)
Caregiver age of patients	< 40 years	115 (63.5)	66 (36.5)	181(43.7)
	≥ 40 years	107 (50.2)	106 (49.8)	213(51.4)
	I don't know	9 (45.0)	11 (55.0)	20(4.8)
Caregiver sex	Female	133 (55.2)	108 (44.8)	241(58.2)
	Male	98 (56.6)	75 (43.4)	173(41.8)
Relation to child	Mother	95 (60.9)	61 (39.1)	156(37.7)
	Father	55 (60.4)	36 (39.6)	91(22.0)
	both mother and father	51 (61.4)	32 (38.6)	83(20.0)
	Other relative	30 (35.7)	54 (64.3)	84(20.3)
Occupation status of mother/caregiver	Housewife	74 (56.1)	58 (43.9)	132(31.9)
	Employed worker	72 (63.2)	42 (36.8)	114(27.5)
	Daily laborer	23 (42.6)	31 (57.4)	54(13.0)
	Merchant	62 (54.4)	52 (45.6)	114(27.5)
HIV status of caregiver	Positive	131 (64.9)	71 (35.1)	202(48.8)
	Negative	68 (44.4)	85 (55.6)	153(37.0)
	Unknown	32 (54.2)	27 (45.8)	59(14.3)
Mother's/caregivers educational level	Illiterate	59 (55.7)	47 (44.3)	106(25.6)
	Read and write	52 (53.6)	45 (46.4)	97(23.4)
	Elementary	34 (53.1)	30 (46.9)	64(15.5)
	High school	32 (69.6)	14 (30.4)	46(11.1)
	Diploma	23 (47.9)	25 (52.1)	48(11.6)
	1st degree and above	31(58.5)	22 (41.5)	53(12.8)

5.3Base Line Information of respondents

From the total participant of HIV-positive children who started ART, 248(59.9%) were parents receiving their child's HIV test results, the rest of 166 (40.1%) parents who didn't receive their child's HIV test results among the parents who receive HIV test result (Table 4).

Regarding baseline CD4+ count, 247(59.7%) has less than 350 baseline CD4 count and the rest 167 (40.3%) who have greater than or equal to 350cells/ul baseline CD4 count. Concerning children who received his/her Immunizations, 206 (49.8%) received his/her immunizations, 116 (28.0%) did not receive his/her immunization, and the rest of 92 (22.2%) with 39(42.4%) were who didn't know whether receive or not receive his/her immunization (Table 4).

Table 4: Baseline information of HIV positive children who were enrolled in ART at Dessie and Kombolcha town public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

Variables	Category of variables	Within 7 days	>7 days	Total
ever receive your child's HIV test results	Yes	151 (60.9)	97(39.1)	248(59.9)
	No	80 (48.2)	86(51.8)	166 (40.1)
Baseline WHO stage	I	73(45.9)	86(54.1)	159 (38.4)
	II	94(58.4)	67(41.6)	161 (38.9)
	III	57(67.1)	28(32.9)	85 (20.5)
	IV	7(77.8)	2(22.2)	9 (2.2)
Baseline CD4+ count	< 350 cells/μl	122 (49.4)	125 (50.6)	247 (59.7)
	≥350 cells/μl	109 (65.3%)	58 (34.7)	167 (40.3)
Baseline viral load	< 1000 copies/ml	46(23.8)	147(76.2)	193 (46.6)
	≥1000 copies/ml	185(83.7)	36(16.3)	221 (53.4)
Hemoglobin level at base line	<10 mg/dl	115(89.1)	14(10.9)	129 (31.2)
	≥10 mg/dl	116(40.7)	169(59.3)	285 (68.8)
child received his/her Immunizations	Yes	111(53.9)	95(46.1)	206 (49.8)
	No	67(57.8)	49(42.2)	116 (28.0)
	I don't know	53(57.6)	39(42.4)	92 (22.2)
Time started Immunization of the child	Appropriate r age	75(48.7)	79(51.3)	154 (37.2)
	Not appropriate age	30(63.8)	17(36.2)	47 (11.4)
	Not Immunized	3(100.0)	0(0.0)	3 (0.7)

5.4 Clinical and Treatment Related

Out of 414 HIV-positive children who started ART, 232 (56.0%) of children took medication before ART initiation and then the rest of 182 (44.0%) of children who didn't took medication before ART initiation. Regarding TB treatment history, 125 (30.2%) were children who have TB treatment history and the rest of 289(69.8%) were children who have no TB treatment history (Table 5).

Regarding the presence of chronic disease 115(27.8%) were children who have chronic disease and the rest 299(72.2%) were children who have not chronic disease (Table 5).

Table 5: Clinical and treatment related characteristics of HIV positive children who were enrolled in ART at Dessie and Kombolcha town public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

Variables	Category of variables	Within 7 days	>7 days	Total
Child take any medication before ART initiation	Yes	115(49.6)	117(50.4)	232(56.0)
	No	116(63.7)	66(36.3)	182(44.0)
the child has Past OI at ART enrollment	Yes	67(43.2)	88(56.8)	155(37.4)
	No	164(63.3)	95(36.7)	259(62.6)
Types of OI	Pulmonary TB	0	32(52.5)	61(14.7)
	Extra-pulmonary TB	0	28(50.9)	55(13.3)
	Pharyngeal candidacies	4(33.3)	8(66.7)	12(2.9)
	PCP	5(31.3)	11(68.8)	16(3.9)
	Cryptococcal meningitis	2(18.2)	9(81.8)	11(2.7)
The child on Cotrimoxazole prophylaxis	Yes	154(55.4)	124(44.6)	278(67.1)
	No	77(56.6)	59(43.4)	136(32.9)
use INH prophylaxis for the child	Yes	77(52.4)	70(47.6)	147(35.5)
	No	154(57.9)	112(42.1)	266(64.3)
child have TB treatment	Yes	67(53.6)	58(46.4)	125(30.2)

history	No	164(56.7)	125(43.3)	289(69.8)
Have Chronic disease	Yes	66(57.4)	49(42.6)	115(27.8)
	No	165(55.2)	134(44.8)	299(72.2)

5.5 Health Facility-Related Characteristics

The study showed that about 75(40.5) of observed events were children who have barriers that limit their access to healthcare, and the rest of 229(55.3%) with 108(47.2%) of observed events were children who have not barriers that restrict their access to healthcare. Regarding health facilities' location, 241(58.2%) with 95(39.4%) observed events were children who have a health facilities located near their residence, and the rest 173(41.8%) with observed events were children who have no health facilities had located near their residence. Moreover, 226(54.6%) with 95(42.0%) observed events were children who had gate all necessary medication from health facility, 188(45.4%) with 88(46.8%) observed events were children who had not gate all necessary medication from health facility(Table 6).

Table 6: Health facility-related characteristics of HIV positive children who were enrolled in ART at Dessie and Kombolcha town public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025

Variables	Category of variables	Within 7 days	>7 days	Total
have you access to healthcare	Yes	110(59.5)	75(40.5)	185(44.7)
	No	121(52.8)	108(47.2)	229(55.3)
hospital located near your residence	Yes	146(60.6)	95(39.4)	241(58.2)
	No	85(49.1)	88(50.9)	173(41.8)
the hospital gives all necessary medication available	Yes	131(58.0)	95(42.0)	226(54.6)
	No	100(53.2)	88(46.8)	188(45.4)

5.6 Determinate of Delayed Antiretroviral Therapy Initiation

The bivariable analysis result showed age of child, sex, child has primary caregiver, child living condition, residence, age of caregiver, relation to child, HIV status of caregiver, received child's HIV test results, baseline WHO stage, baseline CD4+ count, baseline viral load, base line hemoglobin level, taking any medication before ART initiation, child have past OI at ART enrollment, have barriers access to health care, and hospital locate near to residence were a

candidate variables for multivariable logistic regression with p-value less than 0.25, while the other variables were excluded from the multivariable logistic regression (Table 7). Similarly, multivariable analysis revealed that the following factors were significantly associated with delayed ART initiation at $p < 0.05$, the child's primary caregiver, residence, baseline CD4+ count, baseline viral load, baseline hemoglobin level, taking any medications prior to ART initiation, past OI at ART enrollment, and hospital located near the residence.

Those children whose primary caregiver were 0.35 times less likely to use delayed ART initiation than those who had no primary caregiver [AOR = 0.35; 95% CI: (0.14, 0.87)]. The odds of using delayed ART initiation was higher among households residing were 2 times in rural areas than living in urban areas [AOR = 2.44; 95% CI: (1.12, 5.32)]. The odds of using delayed ART initiation was higher among baseline CD4+ count greater than 350 cells/mm³ were 20 times than those baseline CD4+ count less than 350 cells/mm³

[AOR = 20.09; 95% CI: (8.76, 46.04)]. The baseline viral load greater than or equal to 1000 copies/ml were 0.06 times less likely to use delayed ART initiation than those baseline viral load less than 1000 copies/ml [AOR = 0.06; 95% CI: (0.02, 0.13)]. Being hemoglobin level at base line ≥ 10 mg/dl were 18 times more likely to use delayed ART initiation than those hemoglobin level at base line less than 10 mg/dl [AOR = 18.42; 95% CI: (6.99, 48.56)]. The odds of using delayed ART initiation was 2 times higher among child had past OI than those child had not past OI [AOR = 2.36; 95% CI: (1.04, 5.36)]. Taking any medication before ART initiation were 3 times more likely to use delayed ART initiation than those who did not taking any medication before ART initiation [AOR = 2.67; 95% CI: (1.19, 6.00)]. Finally, the odds of using delayed ART initiation with residing located near to hospital were 0.33 times less likely than living in far from hospital [AOR = 0.33; 95% CI: (0.14, 0.74)] (Table 7).

Table 7: Bivariable and multivariable logistic regression analysis of factors associated with delayed ART initiation among HIV positive children at Dessie and Kombolcha Town health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025.

Variables	Category of variables	COR (95% CI)	AOR (95% CI)
Age in months	<12 months	1	1
	12-60months	1.02 (0.60, 1.74)	
	>60months	1.62 (0.94, 2.81)	
Sex	Female	1	
	Male	1.41 (0.95, 2.08)	
Child has primary caregiver	Yes	0.26 (0.17, 0.41)	0.35 (0.14, 0.87)*
	No	1	1
Child living condition	with parent	1	1
	without parent	1.71 (1.15, 2.54)	2.37 (0.94, 5.97)
Residence of patients	Urban	1	1
	Rural	3.13 (2.09, 4.69)	2.44 (1.12, 5.32)**
Caregiver age of patients	< 40 yearss	1	1
	≥ 40 years	1.73 (1.15, 2.59)	1.03 (0.45, 2.37)
	I don't t know	2.13 (0.84, 5.41)	2.59 (0.39, 7.42)
Relation to child	Mother	1	1
	Father	1.02 (0.60, 1.73)	1.35 (0.49, 3.71)
	both mother and father	0.98 (0.57, 1.69)	2.36 (0.82, 6.83)
	Other relative	2.80 (1.62, 4.86)	1.03 (0.31, 3.45)
HIV status of caregiver	Positive	1	1
	Negative	2.31 (1.50, 3.55)	1.19 (0.51, 2.78)
	Unknown	1.56 (0.86, 2.80)	1.36 (0.41, 4.53)
received your child's HIV test results	Yes	0.60 (0.40, 0.89)	0.49 (0.22, 1.09)
	No	1	
Baseline WHO stage at ART enrollment	I	1	
	II	0.61 (0.39, 0.94)	0.88 (0.35, 2.20)
	III	0.42 (0.24, 0.72)	0.62 (0.21, 1.79)
	IV	0.24 (0.05, 1.20)	1.20 (0.08, 7.75)
Baseline CD4+ count	< 350 cells/mm3	1	
	≥ 350 cells/mm3	17.71(10.71,29.31)	20.09 (8.76, 46.04)**
Baseline viral load	< 1000 copies/ml	1	
	≥1000 copies/ml	0.06 (0.04, 0.10)	0.06 (0.02, 0.13)*

Hemoglobin level at base line	<10 mg/dl	1	
	≥10 mg/dl	11.97 (6.55, 21.87)	18.42 (6.99, 48.56)**
Taking any medication before ART initiation	Yes	1.79 (1.20, 2.66)	2.67 (1.19, 6.00)*
	No	1	
Child have Past OI at ART enrollment	Yes	2.27 (1.51, 3.40)	2.36 (1.04, 5.36)**
	No	1	1
have barriers that limit your access to health care	Yes	0.76 (0.52, 1.13)	
	No	1	
hospital locate near to your residence	Yes	0.63 (0.42, 0.93)	0.33 (0.14, 0.74)*
	No	1	

*Significant at p-value <0.05

**Significant at p-value< 0.001

6. DISCUSSION

This study aimed to analyze the prevalence of delayed ART initiation and its associated factors among HIV-infected children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2025. In this study, the overall proportion of delayed ART initiation among children on ART was 44.2% (95% CI: 39.47 - 49.04%). It is lower proportion with studies done in Gonder (53.2%) [4] and Addis Ababa, Ethiopia 52.3% [24], Uganda 54.4% [22], Kenya 53% [23], Mozambique 48% [24], Rural Zambia 60% and 72.4% [26, 40], Democratic Republic Congo 66.8% [41], and Canada (48%) [28]. This could be due to the variation in sample size and study area or the study period, which is currently the awareness of individuals about timely ART initiation. However, this study was higher than studies done in China (37.8%) [42], Cameroon (35.5%) [43], and Uganda (37.7%) [44]. This may be the economic level, awareness level of individuals or the governmental practices to solve the problems in this nation's.

The odds of delayed ART initiation among children of rural community were nearly 3 times higher as compared to those urban residents (AOR = 2.65, 95% CI: 1.32, 5.31). This finding was supported by studies Gonder, Ethiopia [24], Uganda and systematic review conducted in developing countries, respectively [23, 45]. It is due to high transportation cost, inaccessibility of ART service and tedious long distance traveling to reach health facilities.

Similarly, the odds of delayed ART initiation among children who took medication before ART were 3 times higher than children who had not took medication before ART (AOR = 3.19, 95% CI: 1.32, 5.31). This is consistence with the study done in Iran [17] showed that medication causes fear of pill burden and advanced disease. This may be due to persons believe that before starting ART, first finish the medication that was starting before testing status of child. The odds of delayed ART initiation among children of hemoglobin level at base line >10mg/dl were 18 times higher than <10mg/dl. This study is consistence with the study done in Kenyatta National Hospital, Kenya [16] showed that the increased level of hemoglobin level causes delayed ART initiation and missing treatments. This may be due to normal Hemoglobin leads to HIV patients assume they are normal health status.

The odds of delayed ART initiation was more likely among children who had a past opportunistic infection before or at enrollment were nearly 3 times than children who had no a past opportunistic infection before or at enrollment ART. It is supported by a study in Gonder, Ethiopia [4]. Similarly, a study from South Africa showed that opportunistic infection was

related to delayed initiation of ART in children [35]. This is due to the principle of treating opportunistic infection first may delay initiation of ART.

Odds of delayed ART initiation among HIV positive children who have CD4+ count > 350 cells/mm³ 20 times higher than who have less than <350cells/mm³. This is consistent with a previous narrative review conducted in the region, which reported that the increased amount of CD4 count causes delayed ART initiation [46, 47] . This is due to patients with a higher CD4 count might feel too healthy to require ART.

The log likelihood of delayed ART initiation was less likely with children who had viral load (AOR= 0.06, 95% CI; 0.02, 0.13) more than 1000 copies/ml than children who had less than 1000 copies/ml. This study is consistent with the study conducted in Iran [18] showed that less amount of viral load causes delayed ART initiation. This may be due to patients with less viral load count might feel too healthy to require ART.

The log likelihood of delayed ART initiation was less likely with child has primary caregiver (AOR = 0.35, 95% CI: 0.14, 0.87) compared to child has no primary caregiver. This study was supported by the study done in Kigali, Rwanda [48] showed that child caregiver was a significant factors of delayed ART initiation. However different study used age of caregiver, sex of caregiver, caregiver HIV status, and caregiver on ART but not significantly affect delayed ART initiation of children [49, 50]. This may be due to the study design, this study used cross sectional study design, which helps to gather the full information about the characteristics of child caregiver in addition to child status.

The log likelihood of delayed ART initiation was less likely with children who had hospital locate near to your residence (AOR = 0.33, 95% CI: 0.14, 0.74) compared to hospital locate far to your residence. This finding was supported by studies conducted in Uganda and systematic review conducted in developing countries, respectively [45, 51]. The presence of service availability and its effects on bringing a shorter time and distance to get ART initiation also resulted in a higher uptake of ART as compared to their counterparts [37]. Increasing service availability and accessibility, which provide sufficient information and awareness of staff and patients of the ART services, to offer ART, more quickly following HIV diagnosis was negatively associated with delayed ART [19, 37]. It is due to high transportation cost, inaccessibility of ART service and tedious long distance traveling to reach health facilities and awareness about ART service were so inefficient that causes delayed ART use.

The results of the study showed that the factor variables such sex of child, age child in months, educational level of parents', occupation status of parents', HIV status of caregiver, baseline WHO stage at ART enrollment were not significantly affect the delayed initiation of ART follow up in this study. This study is consistence with the study done in Gondar, Northwest Ethiopia [52] showed that the independent variables sex, child living condition, caregiver age, caregiver occupational status, relation to child, and caregiver HIV status were not associated with delay in ART initiation among children. Similarly, this study was supported by the study found in the South African [30] showed that the occupation of mothers or caregivers was not related to delay in ART initiation in HIV-positive children. This was also supported in Ethiopia where occupation wasn't significantly associated with delay in ART [4].

On other hand, this study was contracted with the previous studies found in South Africa [30] and Ethiopia [4] stated that significant factor for delay initiation of ART in which the older the child's age the higher being delay for treatment ART initiation. Similarly, the study found in Southeast Nigeria showed that the occupation of HIV-positive children's mothers or caregivers was not associated with delay in ART initiation among children [6]. Regarding to educational level this study was contradicted with the study conducted in Iran [17] and South Africa [30] revealed that parents educational status were found barriers to ART initiation among children. Similarly, the results of this study on stage of WHO were contradict with previous done in in Africa [32] and Rural Mozambique [16] showed that advanced stage WHO clinical stages were found associated factors of delay ART initiation among HIV cases of childhood.

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

This study revealed that nearly half of the CLHIV were delayed ART initiation among less than 15 years of children on ART follow up at Dessie and Kombolcha town selected public health facilities. The factor variables such as residence, child has primary caregiver, baseline CD4 count, hemoglobin level, baseline viral load, taking any medication before ART initiation, child have past OI at ART enrollment, and households residing locate near to hospital were predictors of delayed ART initiation of HIV-infected children.

7.2 Recommendations

According to the finding of the study, the following recommendations were drawn to reduce the prevalence of delayed ART initiation and its associated factors among HIV-infected children.

- ❖ The health facility ART clinic staffs to have strict monitoring and early initiation of ART on CLHIV.
- ❖ The health facility ART clinic staffs shall to inspire patients who had low viral load, high CD4 count, and high hemoglobin level to use ART initiation of HIV-infected children as soon as possible.
- ❖ The health care workers should provide intensive counseling and education about the early initiation of ART for those children's caregiver.
- ❖ The government should be fulfilling availability of services for rural residence.
- ❖ The health care workers better to focus on early HIV testing mechanisms and timely linkage to HIV care by advocating "Test-and-Treat" should be strengthened.

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Annex 1

Information Sheet

Research Title: assessing prevalence of delayed ART initiation and its associated factors among HIV positive children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2024

Hello! My name is MeseretGetachew. I am here for a study focus on “delayed ART initiation and its associated factors among HIV positive children at Dessie and Kombolcha town selected public health facilities”.

This thesis proposal aims to assess the magnitude and factors for delayed ART initiation among CLHIV in Dessie and Kombolcha town ART site public health facilities to ensure viral suppression and control of complication by timely initiation of treatment for children living with HIV virus.

Contact address:

- (1) MeseretGetachew (BSc, Mph Fellow) +251912807275. Woldia University, Woldia, Ethiopia
- (2) Dr. GetachewDerbew (DVM, MSc, Ass. Prof) +251921815756 Woldia University, Woldia, Ethiopia. Email: derbew1953@gmail.com/getachewderbew@su.edu.et
- (3) Woldia University IRB, +251932470327: For any issues that might raise by concerned bodies

(I) Purpose of the Research

This research proposal aims to assess the prevalence and factors associated with delayed in ART initiation for Children with HIV. Children with HIV are not in care at as high a proportion as adults with HIV in Africa, and their outcomes are not as good in most programs. These studies will help to reduce mortality for HIV-infected children on ART by minimizing time to initiate treatment and identify related factors for those problems. That would help to set goals and plan for interventions focusing on children with HIV.

2) Participants

The potential participants for this study are mothers or care givers for CLHIV

Your participation in this study is completely voluntary. The data collectors will ask a few questions, which will take about 30 minutes. You are free to refuse consent and to withdraw consent at any time.

3) Risks and Benefits

There might be minimal psychological discomfort and no such risks in participating in this study. If they exist, it will be resolved through counseling and comprehensive and continual support from HIV counselor, health professionals and others volunteers in the topic area.

There will be no direct benefits to participants of this study. However, your opinions and experiences will help to ensure better clinical outcomes and extremely reduce mortalities for CLHIV or the future generation of adults.

4) Confidentiality

Your participation in this study is completely voluntary. The investigator will not be sharing information about you with anyone outside of the research teams. The information that the investigator records for this study will be maintained anonymously. The personal identifier will not be used during result dissemination, presentations, and reporting of the findings to concerned bodies.

Principal Investigator Assurance Form

Proposal Title: Prevalence of delayed ART initiation and its associated factors among HIV infected children at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia, 2024

By signing below, I certify that (1) The information submitted within the application is true, complete and accurate to the best of my knowledge; (2) that any false, fictitious, or fraudulent statements or claims may subject me personally the criminal, civil, or administrative penalties; and (3) that I agree to accept responsibility for the scientific conduct of the proposal and to provide the required progress reports if a grant is awarded as a result of the application.

Principal Investigator (PI):

Name: **Meseret Getachew** Signature----- Date

CONSENT FORM

Hello, my name is Meseret Getachew, Post Graduate Student at Woldia University. This is a study to be conducted at Dessie and Kombolcha town selected public health facilities, South Wollo Zone, Amhara region, Ethiopia for assessing prevalence of delayed ART initiation and its associated factors among HIV positive children. I believe this study would help to identify prevalence and its associated factors of delayed ART initiation. Therefore, you are kindly requested to participate in this study and provide information required from you by responding to the questions.

Your participation in this study is completely on voluntary basis and you have the right to refuse to take at any time. Your responses to any of the questions will not be given to anyone else and no reports of the study will ever identify you. The interview will take about 30 minutes.

May I get your permission to continue my interview?

Yes-----1

No-----2

Thanks for your participation

If No stop here, if yes, just let's I am asking you some questions on delayed ART initiation

Date of visit: /-----/-----/----- DD |MM |YYYY

Code-----

If need to contact at any time to use those addresses

Principal investigator: MeseretGetachew

Mobile +251912807275

Woldia, Ethiopia



Woldia University Research, and Publication Ethics Review
Board (WDU/IRB)

Approval letter

Date (D/M/Y): 15/8/2024

No: 010/2024

Protocol number	WDU/IRB010/01/2024	
Protocol title:	Prevalence of Delayed Antiretroviral Therapy Initiation and its Associated Factors Among HIV-Infected Children at Dessie and Kombolcha town Selected Public Health Facilities, South Wollo Zone, Amhara Region, Ethiopia	
Principal Investigator	Meseret Getachew (BSc, MPH fellow)	
Institute	Woldia University, Woldia	Contact number: +251932470327
Total participants: 422	study sites: Dessie and Kombolcha town public health facilities	
Elements Reviewed	<input checked="" type="checkbox"/> Attached <input type="checkbox"/> Not attached	
Final decision	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Approved with Recommendation <input type="checkbox"/> Resubmitted <input type="checkbox"/> Disapproved	

Obligation of the Principal investigator:

1. Should comply with the standard international and national scientific and ethical guidelines.
2. All amendments and changes made to the protocol need WLDU/IRB approval.
3. Serious Adverse Events (SAE), breaches of confidentiality, protocol deviation, or others issues related to this study should report within 10 days of the event
4. End of the study, including manuscripts and research works should be reported to WLDU/IRB.

Approval date: August 15/2024

Approved period: **August 15, 2024** to **August 15, 2025**

Follow up report expected in

Months _____ 6 Months _____ 9 Months _____ one year ☒

Curriculum Vitea

Personal information	
Full name	Meseret Getachew Asmare
Sex	Female
Marital status	Married
Nationality	Ethiopian
Current address	Woldia, Ethiopia
Work experience	
<ul style="list-style-type: none"> 14 years' work experience in Gidan wereda health centers, and Woldia university student clinic 	
Training and certificate	
<ul style="list-style-type: none"> ART treatment guidelines training May 2021GC Delayed initiation of ART May 2022 GC Prevention and treatment of HIV/AIDS may 2022GC 	
Statistical Model and software skill	Level of expertise
Logistic Model (Basic, Advanced)	Excellent
Factor Analysis ,Basic computer skill Descriptive statistics SPSS software Epidata software ,End Note software	Excellent
Research skill : I have participated in a research for my fulfillment of BSc degree	
References: Dr. Getachew Derbew (DVM, MSc, Ass. Prof. in Biostatistics and health informatics)	

Questionnaire (English version)

Socio-demographic characteristics of respondents

Table 4. Socio-demographic characteristics for assessing prevalence of delayed ART initiation and its associated factors among HIV positive children at Dessie and Kombolcha Town health facilities, South Wollo Zone, Amhara region, Ethiopia, 2024

Nº	Questions	Responses/Coding category	Skip to
101	Age in months	1)<12 months 2)12-60months 3) >60months	
102	Sex	1)Female 2)Male	
103	What is your religion	1)Orthodox Christian 2)Muslim 3)Catholic 4)protestant	
104	Does the child has primary caregiver	1)Yes 2)No	
105	Child living condition	1) with parent 2) without parent	
106	Residence	1)Rural 2)Urban	
107	Caregiver age	1)< 40 years 2)≥ 40 years 99. I don't know	
108	Caregiver sex	1)Female 2)Male	
109	Relation to child	1)Mother 2)Father 3)Other relative	
110	Occupation status of mother/caregiver	1)Housewife	

		2)Employed worker 3)Daily laborer 4)Merchant	
111	HIV status of caregiver	1)Positive 2)Negative 3)Unknown	
112	Mother's/caregivers educational level	1) Illiterate 2) Read and write 3) Elementary 4) High school 5) Diploma 6) 1st degree 99. Others (specify)_____	

II. Base Line Information

Table 5: Baseline information of participants for assessing prevalence of delayed ART initiation and its associated factors among HIV positive children at Dessie and Kombolcha Town health facilities, South Wollo Zone, Amhara region, Ethiopia, 2024

Nº	Questions	Responses/Coding category	SKIP TO
201	Date of HIV test confirmed.	-----DD/MM/YYYY	
202	Did you ever receive your child's HIV test results?	1)Yes 2)No	
203	when commenced ART after confirmed HIV diagnosis of the child	-----DD/MM/YYYY	
204	Age of the child at initiation of ART	-----/Months/	

205	Baseline WHO stage at ART enrollment	1) I 2) II 3)III 4) IV	
206	Baseline CD4+ count	-----	
207	Baseline viral load	-----	
208	Hemoglobin level at base line	-----	
209	Has your child received his/her Immunizations?	1)Yes 2)No 3)I don't know	If No go to 211
210	When is started Immunization of the child?	1)Appropriate for age 2)Not appropriate for age 3)Not Immunized	

III. Clinical and Treatment Related Characteristics of study participants

Table 6: Clinical and treatment related characteristics of study participants for assessing prevalence of delayed ART initiation and its associated factors among HIV positive children at Dessie and Kombolcha Town health facilities, South Wollo Zone, Amhara region, Ethiopia, 2024

Nº	Questions	Responses/Coding category
301	Does the child take any medication before ART initiation?	1)Yes
		2)No
302	Does the child have Past OI at ART enrollment?	1)Yes
		2)No
303	Opportunistic infections	1)No OI 2)pulmonary TB 3)Extra pulmonary TB 4)Pharyngeal candidacies 5)PCP 6)Cryptococcal meningitis

304	Does the child on Cotrimoxazole prophylaxis?	1)Yes 2)No
305	Do you use INH prophylaxis for the child?	1)Yes 2)No
306	Does the child have TB treatment history?	1)Yes 2)No
307	Do you have Chronic disease?	1)Yes 2)No
308	WHO stage at HIV test	1)I 2)II 3)III a) IV

IV

Nº	Questions	Responses/Coding category	Skip to
401	Had availability of services exist in your residence?	1)Yes 2)No	
402	Does the health facility locate near to your residence?	1)Yes 2)No	
403	Does the hospital give all necessary medication available?	1)Yes 2)No	

መጠይቅ

ምላሽ ሰጪዎች ማህበረ-ሕዝብ ባህሪያት

ሠንጠረዥ 1. በአማራ ክልል ደቡብ ወሎ ዞን ደሴ እና ኮምቦልቻ ከተማ የመንግስት ጤና ተቋማት የዘወድ የፀረ-ኤች አይቪ መድሀኒት አጀማመር እና ተያያዥ ምክንያቶችን ለመገምገም ማህበረ-ሰነ-ህዝብ ባህሪያት

ኮድ ቁ.-----

ተ.ቁ	ጥያቄዎች	ምላሾች / ኮድ የመስጠት ምድብ	የሚታለፍ
101	እድሜ	1) <12 ወር 2) 12-60 ወር 3) > 60 ወር	
102	ፆታ	1) ሴት 2) ወንድ	
103	ሃይማኖት/ሽ ምንድን ነው?	1) ኦርቶዶክስ ክርስቲያን 2) ሙስሊም 3) ካቶሊክ 4) ፕሮቴስታንት;	
104	ልጁ የመጀመሪያ ደረጃ ተንከባካቢ አለው?	1) አዎ 2) የለም	
105	የሕፃናት የኑሮ ሁኔታ	1) ከወላጅ ጋር 2) ከወላጅ ወጭ	
106	መኖሪያ	1) ገጠር 2) ከተማ	
107	የተንከባካቢ ዕድሜ	1) <40 ዓመት 2) ≥40 ዓመት 99 አላውቅም	
108	የተንከባካቢ ፆታ	1) ሴት 2) ወንድ	
109	ከልጁ ጋር ያለው ግንኙነት	1) እናት	

		2) አባት 3) ሁለቱም 4) ሌላ ዘመድ	
110	የእናት/አሳዳጊ የስራ ሁኔታ	1) የቤት እመቤት 2) ተቀጣሪ ሠራተኛ 3) የቀን ሰራተኛ 4) ነጋዴ	
111	የተንከባካቢው የኤች.አይ.ቪ ሁኔታ	1) ቫይረሱ ያለበት 2) ቫይረሱ የሌለበት 3) ያልታወቀ	
112	የእናቶች/ተንከባካቢዎች የትምህርት ደረጃ	1) ያልተማረ 2) ማንበብ እና መጻፍ የሚችል 3) የመጀመሪያ ደረጃ ት/ምት 4) ሁለተኛ ደረጃ ት/ምት 5) ዲፕሎማ 6) 1 ኛ ዲግሪ 99. ሌሎች (ይግለጹ)_____	

II. መሠረታዊ መረጃ

ሠንጠረዥ 2፡ በአማራ ክልል ደቡብ ወሎ ዞን በደሴና በኮምቦልቻ ከተማ የመንግስት ጤና ተቋማት የዘገየ የፀረ ኤች አይ ቪ መድሃኒት አጀማመርና ተያያዥ ምክንያቶችን ለመገምገም የተሳታፊዎች መረጃ

ተ.ቁ	ጥያቄዎች	ምላሾች/ኮድ የሚሰጥበት	የሚታለፍ
201	የህፃኑ የኤችአይቪ ምርመራ የተረጋገጠበት ቀን ?	-----ቀን/ወወ/ዓ.ም	
202	የልጅዎን የኤችአይቪ ምርመራ ውጤት ተቀባል/ሽ	1) ተቀብያለሁ 2) አልተቀባልኩም	
203	የልጅዎ የኤችአይቪ ምርመራ ከተረጋገጠ በኋላ ፀረ-ኤችአይቪ መድሃኒት መቼ ጀመረ	-----ቀን/ወወ/ዓ.ም	

204	በፀረኤች አይ ቪ.መድሃኒት ጅማራ ላይ የልጁ ዕድሜ	-----ወር	
205	የመነሻ መስመር WHO Stage በART ምዝገባ/ጅማሪ ላይ	1) I 2) II 3) III 4) IV	
206	የመነሻ መስመር CD4+ ቆጠራ	----	
207	የመነሻ የቫይረስ መጠን	----	
208	በመሠረታዊ መስመር ላይ የሂሞግሎቢን መጠን	----	
209	ልጅዎ ክትባት መቼ ጀምረ?	1) በትክክለኛ እድሜ 2) ትክክለኛ ባለሆነ እድሜ 3) ያልተከተቡ	ካልሆነ ወደ 211 ይሂዱ
210	የልጅዎን ክትባቶች ተቀብሏል ?	1) አዎ 2) አልተቀበልኩም	

III. የጥናት ተሳታፊዎች ክሊኒካዊ እና ህክምና ተዛማጅ ባህሪያት

ሠንጠረዥ 3: በአማራ ክልል ደቡብ ወሎ ዞን በደሴና በኮምቦልቻ ከተማ ጤና የመንግስት ተቋማት የዘገየ የፀረ ኤች አይ ቪ. መድሃኒት አጀማመር እና ተያያዥ ምክንያቶችን ለመገምገም የጥናት ተሳታፊዎች ክሊኒካዊ እና ህክምና ባህሪያት 2024

አይ	ጥያቄዎች	ምላሾች/ኮድ የሚሰጥበት ምድብ	ዝለል
301	ልጁ ART ከመጀመሩ በፊት ማንኛውንም ዓይነት መድሃኒት ወስዷል?	1)ወስዷል 2) አልወሰደም	
302	ልጅዎ በፀረ-ኤች አይቪ መድሃኒት ምዝገባ ጊዜ ተጓዳኝ በሽታ አለው?	1) አዎ 2) የለውም	የለም ከሆነ ወደ 304 ይሂዱ
303	የትኛው ተጓዳኝ በሽታ	1)Pulmonary TB 2) Extra pulmonary TB 3)pharyngeal Candidacies 4)PCP 5)Cryptococcal meningitis	
304	ልጁ Cotrimoxazole prophylaxis ወስዷል	1) አዎ 2) አልወሰደም	
305	ለልጁ የINH prophylaxis ይጠቀማሉ?	1) አዎ 2) አልጠቀምም	

306	ልጁ የቲቢ ሕክምና ታሪክ አለው?	1) አለው/ት 2) የለውም/ላትም	
307	ሥር የሰደደ በሽታ አለበት?	1) አዎ 2) የለኝም	
308	የ WHO stage በኤችአይቪ ምርመራ ጊዜ	1) I 2) II 3) III 3) IV	

IV.ከጤና ተቋም ጋር የተያያዙ ባህሪያት

ተ.ቁ	ጥያቄዎች	ምላሾች/ኮድ የመስጠት ምድብ	የሚታለፍ
401	በአካባቢዎ ጠና ተቋም/አገልግሎት ሰጭ/አለ	1) አዎ 2) የለም	
402	ጤና ተቋሙ ከመኖሪያዎ አጠገብ ይገኛል?	1) አዎ 2) አይገኝም	
403	የጤና ተቋሙ ሁሉንም አስፈላጊ መድሃኒቶች ያቀርባል?	1) አዎ 2) አያቀርብም	

