



# HIV Serostatus Disclosure and Its Predictors Among Children Living With HIV in Ethiopia: A Systematic Review and Meta-Analysis

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**Background:** HIV disclosure among children refers to when the caregiver is having disclosed to the child that he or she has HIV specifically. Disclosure significantly improved adherence to treatment and quality of life among children living with HIV/AIDS. Even though, the benefits of disclosure are considerable, informing a child of his or her own HIV status is often delayed. There is a dearth of studies on HIV serostatus disclosure among children in Ethiopia. Therefore, this study aimed to assess the pooled prevalence of HIV serostatus disclosure and associated factors among children living with HIV in Ethiopia.

**Methods and Materials:** Using a combination of search terms and Boolean operators, studies were retrieved from Pub Med/MEDLINE, EMBASE, CINAHL, Science Direct, Scopus, Web of Science, Cochran library, and Google Scholar. Five authors independently assessed the quality of each study using the modified Newcastle Ottawa Scale (NOS) for cross-sectional studies. STATA Version 11 software was used for statistical analyses. The random-effects (Der Simonian and Laird) method was used for the meta-analysis. The heterogeneity test was carried out with the help of *I*-squared ( $I^2$ ) statistics. A leave-one-out sensitivity analysis was carried out.

**Results:** A total of 12 articles with 3,410 participants were included in this systematic review and meta-analysis. The pooled prevalence of HIV serostatus disclosure among children was 36.87% (95% CI: 29.30, 44.44;  $I^2 = 95.8\%$ ). Children aged older than 10 years ( $p = 0.003$ ) and caregivers with primary and above education ( $p < 0.001$ ) were factors significantly associated with HIV serostatus disclosure among children.

**Conclusions:** The finding of this study showed that HIV serostatus disclosure among children is relatively low. Therefore, developing clear guideline on HIV serostatus disclosure among children, strengthening public health education or community awareness creation about HIV/AIDS to promote the benefits of disclosure and extensively provision of counseling by health care providers are essential to enhance HIV serostatus disclosure among children.

**Systematic Review Registration:** [https://www.crd.york.ac.uk/prospero/display\\_record.php?ID=CRD42021239035](https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021239035).

**Keywords:** children, disclosure, HIV, serostatus disclosure, Ethiopia

## INTRODUCTION

Human immunodeficiency virus infection/Acquired immune deficiency Syndrome (HIV/AIDS) is still a major public health problem around the world (1). Globally, in 2020, there were 37.7 million (30.2–45.1 million) people living with HIV (PLWH) and 1.7 million children (0–14 years) have been infected with HIV and 99,000 children have died of HIV (2, 3); about 20.7 million PLWH live in Eastern and Southern Africa (4). Besides, Ethiopia has achieved great progress in combating the HIV/AIDS epidemic over the last decade, HIV was still one of public health problem in the country; the prevalence remains extremely high in urban areas, with estimates indicating a 3% prevalence rate compared to <1% nationally (5). In Ethiopia nearly 620,000 adults and children were living with HIV; of which 44,000 were children <15 years old in 2020. In addition, 13,000 of adults and children died due to AIDS (6).

HIV disclosure among HIV-infected children refers to when the caregiver has disclosed to the child that he or she has HIV infected (7, 8). Disclosing one's HIV-positive serostatus can help both HIV-positive people and public health preventive initiatives (9). In HIV-positive children, disclosure enhanced clinical outcomes such as viral suppression, drug adherence, retention in care, and HIV knowledge (10–12). However, one of the most difficult decisions for parents is whether or not to tell their children about their HIV status (9).

According to World Health Organization (WHO) guidelines on HIV counseling for children under the age of 12, children of school age should be informed of their HIV-positive status (13). HIV status disclosure significantly improved adherence to treatment and quality of life among children living with HIV/AIDS (14). Furthermore, disclosing HIV-positive serostatus has advantages for children, parents, and family dynamics (15). However, disclosing a child's HIV status has its own set of difficulties (16). Disclosure requires providing persons with access to appropriate physical and psychological support, which is a critical component of secondary prevention (17). Many people have their own particular disclosure strategies and objectives, which are carefully considered to achieve beneficial results (18).

Treatment must be scaled up even more, especially for HIV-infected children. Globally, only 54% (37%–69%) of children (0–14 years old) were receiving ART at the end of 2020 (3). Also, only 38% of them were on antiretroviral therapy (ART) in Ethiopia (19). HIV disclosure can improve social support, antiretroviral adherence, and healthcare attendance for people living with HIV (20, 21). Despite this, children's HIV disclosure remained low. According to one systematic review, in low- and middle-income countries the overall rate of HIV-positive status disclosure to HIV-infected children was low, which ranges from 1.7 to 41% (7).

Furthermore, disclosure of HIV status among children living with HIV has both beneficial and challenging aspects (7). Developing countries have a lower rate of HIV-positive status disclosure than developed countries (22). Even though, the benefits of disclosure are considerable, informing a child of his or her own HIV status is often delayed (23). This systematic review and meta-analysis sought to fill the gaps in the Ethiopian

literature by estimating the pooled effect of disclosure status among children living with HIV in Ethiopia. We believe that our findings will be relevant to those involved in designing interventions to improve HIV serostatus disclosure among HIV-infected children.

## Objectives of the Review

### General Objectives

- To assess the HIV serostatus disclosure and its predictors among children living with HIV in Ethiopia.

### Specific Objectives

- To determine the pooled prevalence of HIV serostatus disclosure among children in Ethiopia.
- To identify the predictors of HIV serostatus disclosure among children in Ethiopia.

## METHODS AND MATERIALS

### Study Design and Search Strategy

The protocol was registered with in PROSPERO (<https://www.crd.york.ac.uk/>), registration number (ID: CRD42021239035). This systematic review and meta-analysis were conducted under the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement (24, 25). All published articles were searched from major international databases like PubMed /MEDLINE, EMBASE, CINAHL, Science Direct, Scopus, Web of Science, Cochran library, and Google Scholar. A second search was done by using all identified keywords and index terms across all included databases. Also, the reference list of all identified reports and articles was searched for additional studies. The search was performed using key terms such as HIV Disclosure, Disclosure of HIV, HIV positive status disclosure, HIV status disclosure, Disclosure of HIV status, HIV related disclosure, Disclosure of HIV serostatus, Children, Young children's, pediatrics, childhood, children's, pediatrics, pediatric and Ethiopia. The searching periods were from October 1 to 31, 2021.

### Study Selection and Eligibility Criteria

Study participants included HIV positive children who were booked in ART clinic in Ethiopia. This study included all published and unpublished observational (cross-sectional and case-control) studies on the HIV serostatus disclosure among children in Ethiopia. This review included studies done until November 1, 2021, and was written in the English language.

### Data Extraction and Quality Appraisal

The data were extracted by three independent authors (TL, MS, and BT) using a data extraction format prepared in a Microsoft Excel 2010 spread sheet. The extracted data were: the first author's name, publication year, study area, region, study design, sample size, sampling method, HIV serostatus disclosure, and associated factors with their odds ratio. The quality of each study was assessed using the modified Newcastle-Ottawa Scale (NOS) for cross-sectional studies (26). The tool's key components were methodological quality, comparability, outcomes, and statistical

analysis of each original study, which were graded from five to two and three stars, respectively. The NOS included three categorical criteria with a maximum score of 10 points. Studies with a medium score (50% of quality evaluation criteria) and above were included in the analysis (27). The quality of each study was evaluated independently by five authors (TL, MS, TT, KD, and TM) and any disagreements were resolved by discussion and consensus.

### Publication Bias and Heterogeneity

To assess the existence of publication bias, funnel plots were used and Egger’s test was computed. A *p*-value < 0.05 was used to declare the statistical significance of publication bias. *I*<sup>2</sup> test statistics were used to check the heterogeneity of studies. *I*<sup>2</sup> test statistics of < 50, 50–75, and > 75% were declared as low, moderate, and high heterogeneity respectively (28).

### Outcome

HIV serostatus disclosure.

### Exposure

Determinants of HIV serostatus disclosure. The only factor identified as a significant factor in the two and above studies was included in this review and meta-analysis.

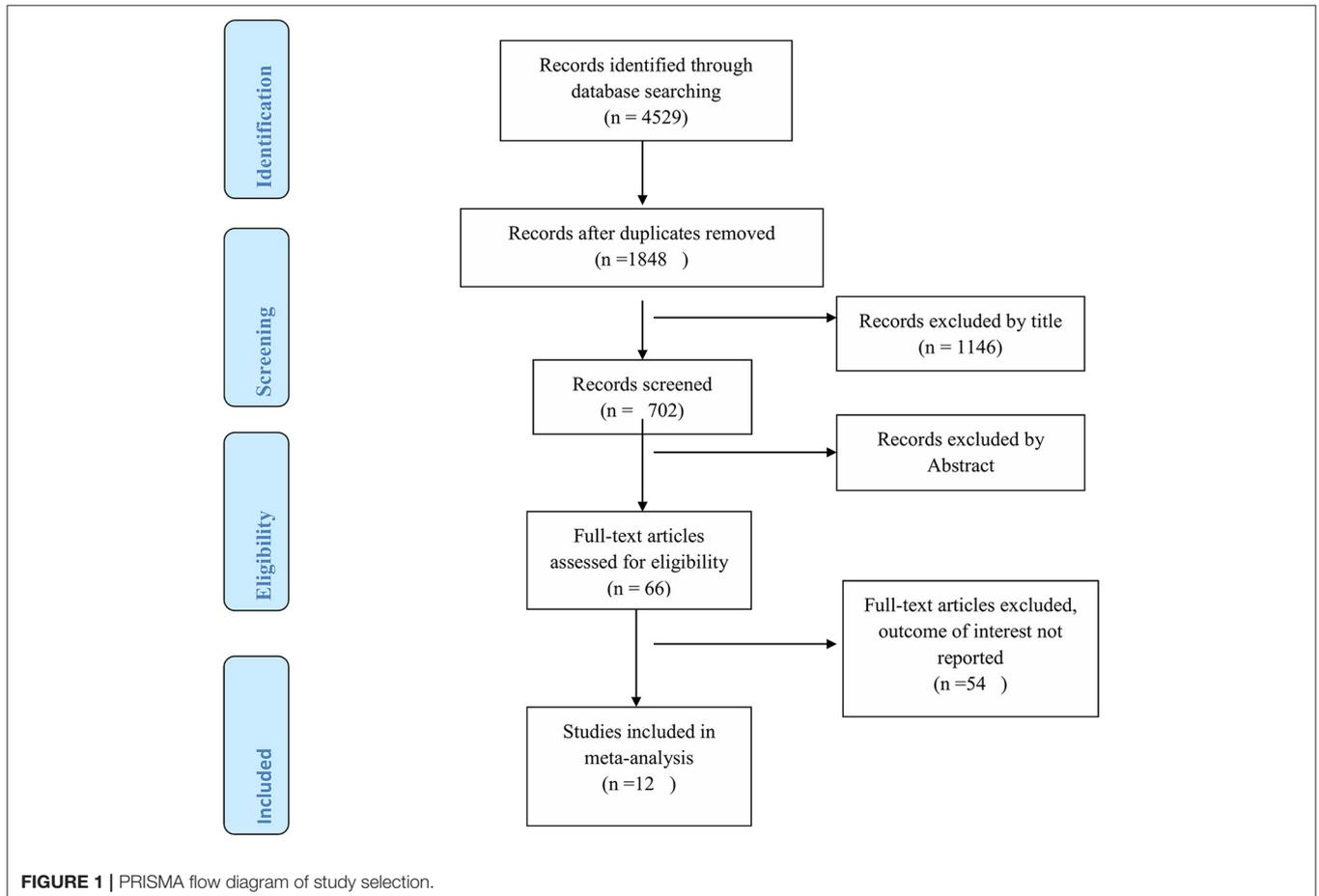
### Data Synthesis and Analysis

STATA version11 software was used to conduct the analysis. The heterogeneity test was conducted by using *I*-squared (*I*<sup>2</sup>) statistics. The pooled prevalence of HIV serostatus disclosure was carried out using a random-effects (Der Simonian and Laird) method. To minimize the potential random variations between studies; the sources of heterogeneity were analyzed using subgroup analysis, and meta-regression. A sensitivity analysis was also conducted.

## RESULTS

### Study Screening

Initially, a total of 4,529 studies were retrieved from the databases and manual searching. From this, 1,848 duplicates were found and removed. Their title screened the remaining 1,146 articles, and abstract 636 irrelevant studies were removed. Sixty-six full-text articles were assessed for eligibility, and 52 of them were excluded due to not reporting the outcome of interest, and two articles with poor methodological quality. Finally, a total of 12 studies fulfilled the inclusion criteria and enrolled in the study (Figure 1).



### Study Characteristics

A total of 12 (29–40) articles with 3,410 participants were included in this systematic review and meta-analysis. All the included studies were cross-sectional studies and the sample size ranged from 172 (33) to 428 (39). Most studies were conducted in the Amhara region. Among the included studies, HIV serostatus disclosure among children ranged from 16.3 (33) to 60.6 (35).

### HIV Serostatus Disclosure Among Children

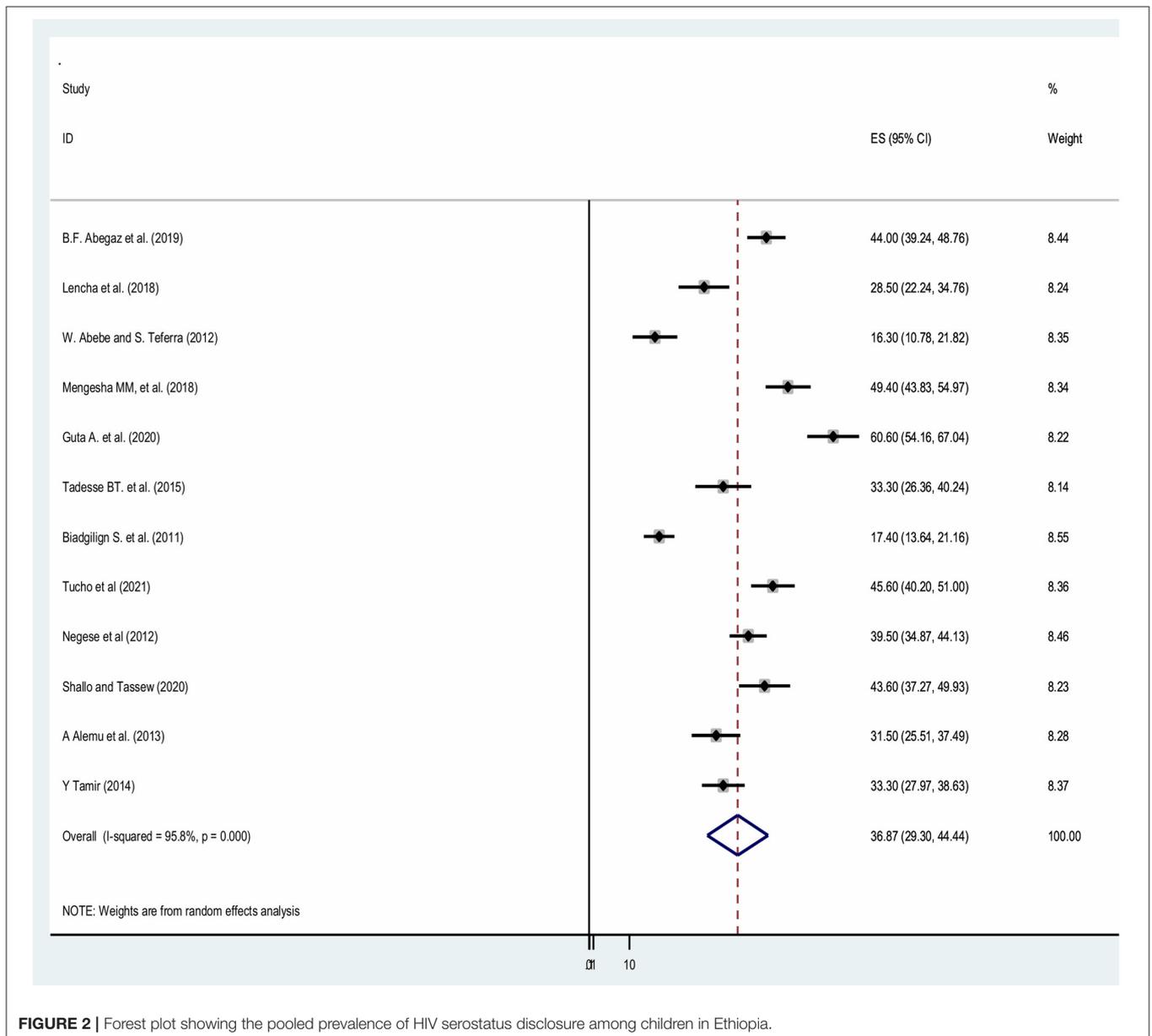
By including the 12 published research articles we had estimated the pooled prevalence of HIV serostatus disclosure among children in Ethiopia. Accordingly, the overall estimated pooled prevalence of HIV serostatus disclosure among children with a random-effects model was 36.87% (95% CI: 29.3, 44.4) with a heterogeneity index ( $I^2$ ) of 95.8% ( $p < 0.001$ ; **Figure 2**).

### Subgroup Analysis

Subgroup analyses revealed a marked variation across regions. Based on the subgroup analysis result, the highest (54.92%; 95% CI: 43.95, 65.90),  $I^2 = 74.4%$ ) seen in Dire Dawa region and the lowest (16.83%; 95% CI: 12.92, 20.75),  $I^2 = 0%$ ) seen in Addis Ababa (**Figure 3**).

### Heterogeneity and Publication Bias

Meta-regression was conducted to identify the source of heterogeneity using sample size and publication year as a covariates. It was indicated that there is no effect of sample size on heterogeneity between studies. But, the year of publication showed that there is heterogeneity between the studies (**Table 1**). The presence of publication bias was checked using the Egger's test, and a graphical Funnel plot, the result of egger's test was



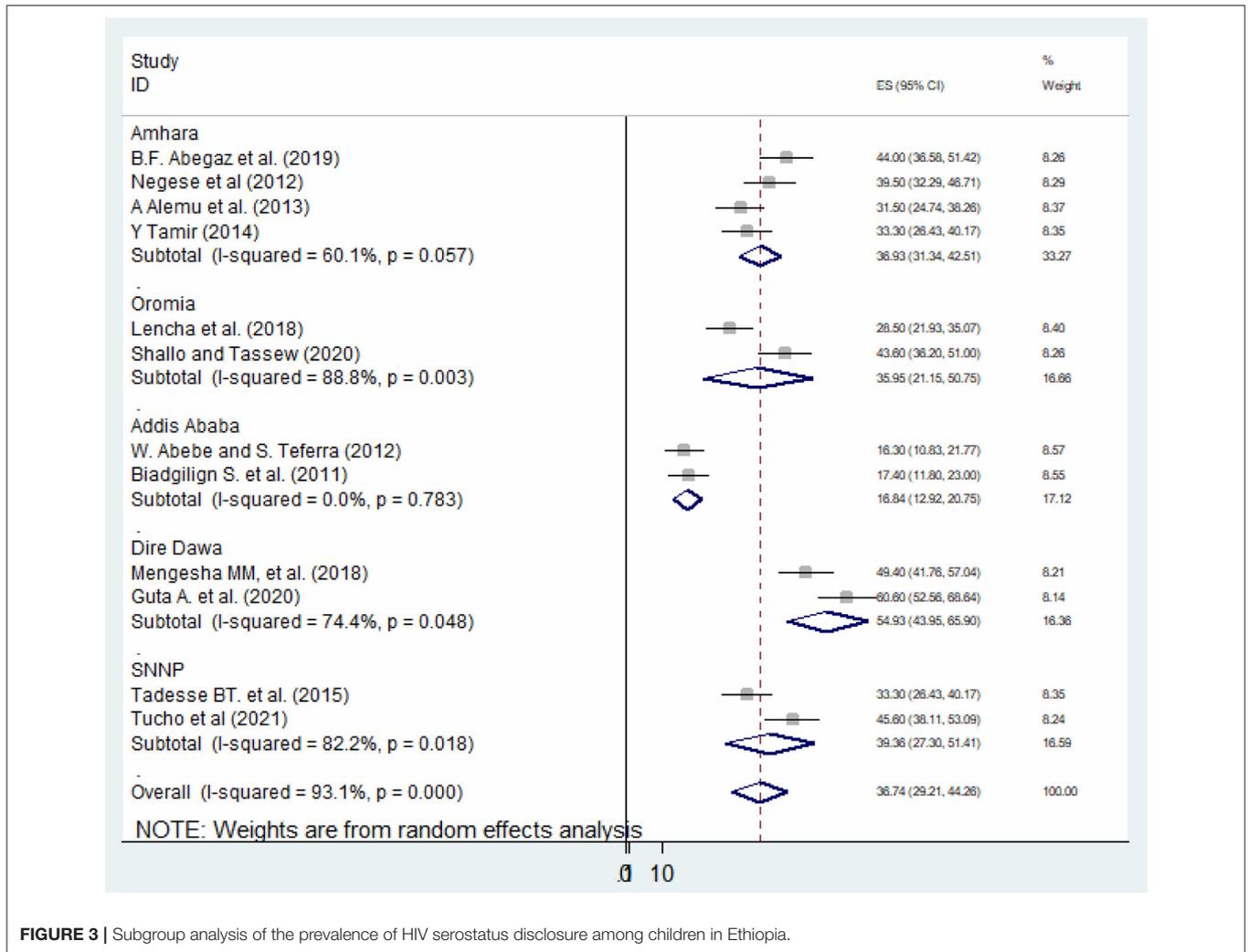


FIGURE 3 | Subgroup analysis of the prevalence of HIV serostatus disclosure among children in Ethiopia.

TABLE 1 | Meta-regression analysis of factors affecting between-study heterogeneity.

Heterogeneity source	Coefficients	SE	p-value
Sample size	0.0187308	0.0439353	0.679
Publication year	2.693511	0.7247188	0.004

found significant ( $p < 0.001$ ), as a result of estimating the number of missing studies that might exist in a meta-analysis we conducted Duval and Tweedie’s trim and fill analysis, but is not significant. Also, visual inspection of the funnel plot indicated asymmetrical distribution showing publication bias (Figure 4).

### Sensitivity Analysis

All studies have been included in the review, then a sensitivity analysis performed by study quality by leave-one-out studies step by step to evaluate the effect of a single study on the overall effect

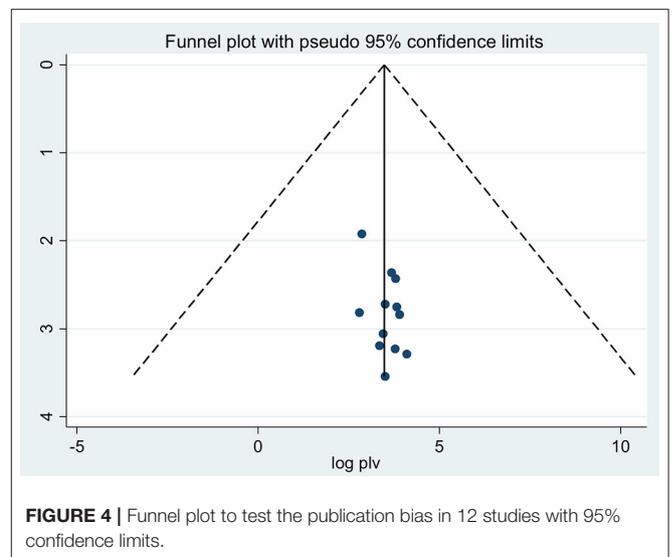
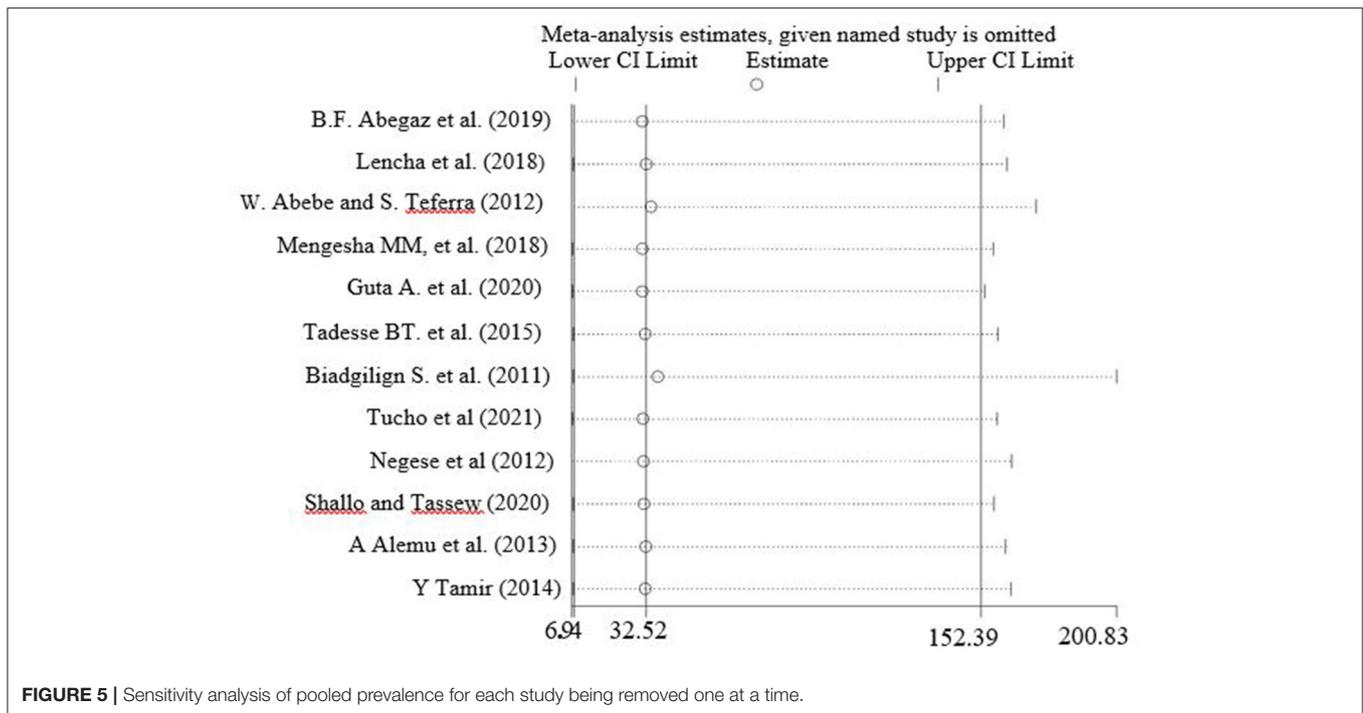


FIGURE 4 | Funnel plot to test the publication bias in 12 studies with 95% confidence limits.



estimate. The result indicated removing a single study did not have a significant influence on pooled prevalence (Figure 5).

### Factors Associated With HIV Serostatus Disclosure Among Children

Six variables were extracted to identify factors associated with HIV serostatus disclosure among children. Of these, age of children and educational status of caregivers were found to be significantly associated with HIV serostatus disclosure among children (Table 2).

Children whose aged older than 10 years were 11 times more likely to know their HIV positive status compared to their counterparts (AOR = 11.15, 95% CI: 4.82–11.98),  $p = 0.003$ ,  $I^2: 66.2\%$ , the heterogeneity test ( $p < 0.001$ ). Those caregivers of HIV-positive children with primary and above education were three times more likely to have disclosed HIV status to their children compared to those with no formal education (AOR = 3.21, 95% CI: 1.01–10.18),  $p = <0.001$ ,  $I^2: 93.8\%$ , the heterogeneity test ( $p < 0.001$ ).

### DISCUSSION

In this systematic review and meta-analysis, the overall pooled prevalence of HIV serostatus disclosure among children was 36.87% (95% CI: 29.30, 44.44). This result is relatively low, because according to WHO guidelines children of school age should be informed of their HIV-positive status (13). According to the results of the subgroup analysis, the highest prevalence of HIV serostatus disclosure among children was found in the Dire Dawa region (54.92%), while the lowest prevalence of disclosure rate was found in Addis Ababa (16.83%). The possible

variation might be due to the difference in study period; because community awareness about HIV and related information improve over time which might increase the disclosure by the caregivers. Also, socio-cultural difference might have role for the difference between these studies.

In the current study, child age was significantly associated with HIV serostatus disclosure. Children whose aged older than 10 years were 11 times more likely to know their HIV positive status compared to their counterparts (AOR = 11.15, 95% CI: 4.82–11.98),  $p = 0.003$ ,  $I^2: 66.2\%$ , the heterogeneity test ( $p < 0.001$ ). This is consistent with a review conducted in Sub-Saharan Africa (7, 41). This might be because the caregivers may have believed that the older children were mature enough to understand the illness and recognize the complex causes and consequences of the illness. Also, children in these age groups were more interested in knowing why they were taking medication and what their illness was like.

Furthermore, parental/care giver’s educational status also significantly associated with HIV serostatus disclosure among children. Those caregivers of HIV-positive children with primary and above education were three times more likely disclosed the HIV status to their children compared to those care givers with no formal education (AOR = 3.21, 95% CI: 1.01, 10.18),  $p = <0.001$ ,  $I^2: 93.8\%$ , the heterogeneity test ( $p < 0.001$ ). This is consistent with the review conducted in resource-limited settings (42). This could be because caregivers with a higher educational level have been exposed to more information about disclosure which allowing them to understand the importance of disclosure and well prepared to handle the disclosure process.

This review showed that HIV serostatus disclosure among children in Ethiopia was not sufficient enough which is difficult

**TABLE 2** | Factors associated with HIV serostatus disclosure among children in Ethiopia.

Determinants	Comparisons	Number of studies	Sample size	OR (95% CI)	p-value	I <sup>2</sup> (%)	Heterogeneity test (p-value)
Age	<10 vs. ≥10 years	9	2,600	11.15 (4.82–11.98)	0.003	66.2	<0.001
Duration of ART	≤5 vs. >5 years	4	979	6.67 (4.18–10.65)	0.176	39.2	<0.001
Care givers education	No formal vs. primary and above	4	1,340	3.21 (1.01–10.18)	<0.001	93.8	0.047
Death of family	Yes vs. no	2	649	2.49 (1.76–3.51)	0.301	6.5	<0.001
Sex	Male vs. female	2	457	2.4 (1.63–3.53)	0.862	0	<0.001
Age at diagnosis of HIV	≤5 vs. >5 years	2	431	3.31 (2.16–5.07)	0.774	0	<0.001

to achieve the global target of HIV free generation and sustainable development goal 3 which aims to ensure healthy lives and promote wellbeing for all at all ages, including people living with HIV. Therefore, this review informed the following recommendations; first, healthcare providers should give more attention on the purpose of disclosure to infected children. Furthermore, public health education/ community education should be strengthened to promote HIV/AIDS as a shared burden which eventually enhance community/familial acceptance of living with HIV infected children. Finally, further studies are needed to identify other determinants of HIV serostatus disclosure practices among children in resource-limited countries.

### Strength and Limitation of the Study

The strength of this review were the study was conducted using a very thorough systematic search, with an international standardized protocol for the search strategy and internationally approved tools for a critical appraisal system for each study's quality assessment. However, only three regions and two administrative cities out of nine regional states were included in this analysis that might reduce its representativeness for the country. Also, lack of studies.

### CONCLUSIONS

According to the findings of this study, only one-third of caregivers disclosed their child's HIV serostatus. Age of infected children and the educational status of care givers were found to be significantly associated with HIV serostatus disclosure among children. As a result, authors suggest that designing

strategies by developing clear guideline on HIV serostatus disclosure among children, strengthening parental/caregiver health education/training or community awareness creation about HIV disclosure and HIV/AIDS related information to promote the benefits of disclosure and extensively provision of counseling by health care providers are essential to enhance HIV serostatus disclosure among children.

### DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/Supplementary Material.

### AUTHOR CONTRIBUTIONS

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas, took part in drafting, revising, or critically reviewing the article, gave final approval of the version to be published, have agreed on the journal to which the article has been submitted, and agree to be accountable for all aspects of the work.

### SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.859469/full#supplementary-material>

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