Disclosure of HIV seropositivity to sexual partner and psychosocial factors in Ethiopia: Systematic review and meta-analysis

Aklilu Endalamaw (✉ yakilulu12@gmail.com)
Department of Pediatrics and Child Health Nursing, School of Health Sciences, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, Ethiopia  https://orcid.org/0000-0002-9121-6549

Demeke Geremew
Department of Immunology, School of Biomedical and Laboratory Sciences, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

Habte Belete
Department of Psychiatry, School of Medicine, School of Health Sciences, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, Ethiopia

Berihun Assefa Dachew
School of Public Health Curtin University, Perth, WA, Australia, Department of Epidemiology and Biostatistics, Institute of Public Health, University of Gondar, Gondar, Ethiopia

Tesfa Dejenie Habtewold
Department of Epidemiology and Psychiatry, University of Medical Center Groningen, University of Groningen, Groningen, The Netherlands

Tesfa Dejenie Habtewold
6Department of Epidemiology and Psychiatry, University of Medical Center Groningen, University of Groningen, Groningen, The Netherlands

Rhonda Wilson
Institute of Clinical Research, Faculty of Health Sciences, University of Southern Faculty of Health, University of Canberra Hospital, Australia

Systematic Review

Keywords: Disclosure, HIV/AIDS, Psychosocial factors, sexual partner, Ethiopia

Posted Date: February 5th, 2020

DOI: https://doi.org/10.21203/rs.2.22045/v1

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Abstract

**Background:** The burden of HIV/AIDS again becomes a public health problem after substantial control of its transmission in Ethiopia. For effective HIV transmission control measures, sero-disclosure to sexual partner is indispensable. Once the infection is established, psychosocial factors would have a great influence on HIV disclosure status to sexual partners which is very important to control viral transmission. This review aimed to estimate the national proportion of HIV disclosure practice to sexual partner and identify associated psychosocial factors.

**Methods:** We searched PubMed, Scopus, African Journals Online, and Google Scholar databases. The Newcastle Ottawa quality assessment scale was used to assess the quality of studies. To ensure the absence or presence of publication bias, we used a funnel plot and performed Egger's regression test for the subjective and objective assessment, respectively. Variation across studies was assessed using the $I^2$ statistic. The pooled proportion was estimated by using weighted inverse variance random-effects model meta-analysis. We did subgroup and sensitivity analysis to explore the reason for heterogeneity and the impact of outlier finding on the overall estimation, respectively. Trend analysis was also performed to see the presence of time variation.

**Results:** The proportion of HIV sero-disclosure practice to sexual partners was 76.03 % (95% Confidence Interval (CI): 68.78, 83.27). Being on ART (AOR=6.19; 95% CI: 2.92, 9.49), cohabiting with partner (AOR=4.48; 95% CI: 1.24, 7.72), getting counseling (AOR=3.94; 95% CI: 2.08, 5.80), had discussion prior to HIV testing (AOR=4.40; 95% CI: 2.11, 6.69), awareness of partner’s HIV status (AOR=6.08; 95% CI: 3.05, 9.10), smooth relationship with partner (AOR=4.44; 95% CI: 1.28, 7.61), and being member of anti-HIV association (AOR=3.70; 95% CI: 2.20, 5.20) facilitates HIV status disclosure.

**Conclusions:** In Ethiopia, still more than one-fourth of HIV-infected adults did not disclose their HIV positivity status to sexual partners. Psychosocial factors were the contributing factors of HIV-positive status disclosure. Further work is still needed to increase HIV status disclosure so as to decrease the transmission rate of HIV in Ethiopia.

Background

Sustainable development goal aims to minimize the incidence of Acquired Immunodeficiency Virus Syndrome (AIDS) infection from 2015 baseline data (1). Human Immunodeficiency Virus (HIV) is the global burden disease with major occurrences in sub-Sahara African countries. By 2018, globally, nearly 37.9 million people were living with HIV/AIDS. Of these, 25.7 million were in sub-Sahara African nations (2). In Ethiopia, an estimated 722,248 people were living with HIV by the year 2017 (3).

Universal HIV tests, safe sexual intercourse, one-to-one relationship, and initiation of antiretroviral therapy (ART) help to prevent and control the epidemic transmission of HIV (4-6). In addition to screening for HIV infection, HIV status disclosure to their sexual partner is also a central strategy to further control the transmission of HIV to the second or third person (7). Partners disclosed their HIV status were more likely
to adhere to ART, improve retention in care, and viral-load suppression (8, 9). HIV status disclosure is also important to get social and psychological support from their families/partners though negative outcomes sometimes happen following disclosure due to stressful responses towards their status (10).

Psychosocial intervention and all the components therein could influence perception and psychological processes at the individual level. The psychological process influences the disclosure status of HIV infected individuals through direct psychobiological processes or modified behaviors and lifestyles (11). Psychosocial factors are identified as risky behaviors of patients with HIV/AIDS including not disclosing HIV status to sexual partner (12). Thus, the involvement of psychosocial aspects such as being employed, living in the same house with sexual partner, social supports, and counseling could improve self-esteem and confidence, perception to have emotional support, social integration, mental well-being, aspects of the social environment with a positive connotation, and not fearing negative outcomes of disclosure (13). As a result, HIV infected person takes the initiative to disclose their HIV status to their sexual partner. Besides, having ever seen a person who publicly discloses HIV status and getting financial and nutrition aid further avoids the fear of stigma and discrimination, thereby improving HIV disclosure (14-16). On the other hand, fear of resentment from the parent, fear of stigma, lack of employment, social exclusion, perceive that negative public opinion, fear of losing relationships or getting divorce, unaware of spouse/sexual partner's HIV status were some of the negatively associated factors (17).

It is thought that disclosure as an unremitting social and psychological process of sharing critical health and personal information with others (18). However, regardless of many supportive interventions, only 58.7% of HIV seropositive pregnant women disclose to their sexual partners in South Africa (19). Similarly, 50.9% of Nigerian people who were living with HIV disclose HIV status to their sexual partner (20); 50.5% of seropositive adults in HIV support groups in Kenya (21), and 66% of HIV-positive women attending care and treatment clinics in Tanzania (22) were disclosed their HIV status to their sexual partners.

Studies have shown that HIV status disclosure is important in HIV prevention. Although several individual studies have reported the proportion of HIV status disclosure to sexual partners in Ethiopia, to our knowledge, they could not be used as national representative data. Therefore, this systematic review and meta-analysis aimed to estimate the proportion of HIV disclosure practice to sexual partner and identify associated psychosocial factors in Ethiopia.

**Methods**

**Reporting**

The protocol's is registration number in the PROSPERO database is CRD42020149092. This review is reported by using the Preferred Reporting Items for Systematic Review and Meta-analysis guideline (23).

**Search**
We searched PubMed, Scopus, African Journal Online, and Google Scholar databases. The authors also retrieved gray literature from Addis Ababa University’s online research repository. The search terms and phrases were: HIV, Human immunodeficiency virus, AIDS, Acquired immunodeficiency syndrome, HIV/AIDS, HIV infection, HIV positive, HIV disclosure, reveal, expose, factors, predictors, determinant, reasons, Ethiopia. To formulate the search string, we used AND/OR Boolean Operators. Search string applied for Scopus database was HIV OR human AND immunodeficiency AND virus OR AIDS OR acquired AND immunodeficiency AND syndrome AND disclosure OR reveal OR expose AND factors OR determinants OR risk AND factors OR associated AND factors AND of AND psychosocial AND factors OR predictors AND (LIMIT-TO (AFFILCOUNTRY, "Ethiopia") AND (LIMIT-TO (LANGUAGE, "English"))). PubMed search strings was also ((HIV) OR Human immunodeficiency virus[MeSH Terms]) OR AIDS) OR Acquired immunodeficiency syndrome) AND disclosure[MeSH Terms]) OR reveal[MeSH Terms]) OR expose[MeSH Terms]) AND factors) OR associated factors[MeSH Terms]) OR determinants[MeSH Terms]) OR risk factors[MeSH Terms]) OR psychosocial factors[MeSH Terms]) OR Predictors[MeSH Terms]) AND Ethiopia). The search was done from October, 1 to December, 11/2019.

We used Endnote version X7 reference manager software to manage the articles collected through the searching process. After the first screening for duplications, the retrieved titles and abstracts were screened against the inclusion criteria. For studies that did not have the full-text results, we sent email text to the corresponding authors. For one published study with abstract only, we found the full-text unpublished format from Addis Ababa University research repository, Ethiopia.

**Inclusion criteria**

The articles included in this review were: 1) primary studies that are done through observational approach because no interventional studies were available during the search time, 2) studies conducted among people diagnosed for HIV-positive status, 3) studies done in Ethiopia, and 4) studies conducted and/or published in the English language.

**Population, Intervention, Comparison, and Outcome (PICO)**

The population considered in this review was all HIV-positive adults who had sexual partners. Each variable included in primary studies was considered as exposure and comparison group. The outcome was HIV-positive disclosure status to their sexual partners. For the aim of this review, HIV disclosure is defined as the willingness of people to disclose seropositive status to their sexual partners.

**Quality assessment**

The articles were systematically appraised by using the Newcastle Ottawa quality assessment tool (24). We assessed the representativeness of the sample to the target population, adequacy of sample size,
acceptability of response rate, reliability and validity of the tool, handling mechanism of confounding factors, outcome assessment mechanism, and appropriateness of statistical test. The third reviewer was involved to solve when discrepancies between two reviewers occur.

Data extraction

Two of the authors independently extracted data using Microsoft Excel (version, 2010). The first author, year of publication, study setting, study design, study participants, sample size, reported proportion, adjusted odds ratio (AOR), and source of the fund were extracted. Natural logarithm (LN), standard error, and uncertainty interval of proportion and AOR were also calculated by using Microsoft Excel worksheet for further analysis.

Data analysis

Extracted data exported to STATA version 14 for Windows (Stata Corp, 4905 Lake way Drive, College Station, Texas 77845 USA) statistical software for analysis. To ensure the absence of publication bias, we run a funnel plot for subjective and Egger’s regression test for objective measurement (25). Variation across the studies was assessed using $I^2$ statistic when 25%, 50% and 75% representing low, moderate and high heterogeneity, respectively (26). A weighted inverse variance random-effects model meta-analysis was run to estimate the pooled proportion (27). We did subgroup and sensitivity analyses to explore the reason for heterogeneity and the impact of outlier findings on the overall estimation, respectively.

Results

Search findings and study characteristics

The preliminary search retrieved 1,772 studies; from PubMed (n=1,634), Scopus (n=15), African Online journals (n=34), Google Scholar (n=62), Addis Ababa University online research repository (n=20), and by reviewing the reference lists of articles (n=7). Finally, we found 18 studies that fulfilled the eligibility criteria for further quality assessment (Figure 1).

All the included studies were cross-sectional studies. Three studies conducted by the year 2012, the other two in 2016, and four studies in 2018. For the other years, only one study in each was done. The maximum (91%) HIV status disclosure to sexual partner observed by the year 2017 and the minimum (57.4%) during 2015. While majority of studies (n=12) included both men and women study participants (28-39), the rest of the studies (n=6) six studies (40-45) included only women (Table 1).

Table 1: The characteristics of studies
| First Author / Year | Study area | Study participant | Sample size | Response Rate (%) | Source of fund |
|---------------------|------------|-------------------|-------------|-------------------|----------------|
| Alemayehu M et al/2014 (40) | Mekelle, Northern Ethiopia | Women | 315 | 100 | Sheba University College, Ethiopia |
| Sendo EG et al/2013 (41) | Addis Ababa, Central Ethiopia | Women | 107 | 95.5 | Alkan University college and NUFU/ GEMESO Research Project on HIV/AIDS |
| Erku TA et al/2012 (28) | Woldia, Northern Ethiopia | Both sex | 334 | 100 | University of Gondar, Ethiopia |
| Deribe K et al/2008 (29) | Jimma, Southwest Ethiopia | Both sex | 705 | 100 | Netherlands Government Multi-Country Support Program on Social Science Research in the field of HIV/AIDS |
| Deribe B et al/2018 (42) | Hawassa, Southern Ethiopia | Women | 207 | 100 | Not mentioned |
| Dessalegn NG et al/2019 (30) | Addis Ababa, Central Ethiopia | Both sex | 676 | 100 | Australian Department of Foreign Affairs and Trade and Western Sydney Sexual Health Clinic |
| Gari T et al/2010 (43) | Hawassa, Southern Ethiopia | Women | 384 | 100 | EPHA-CDC project |
| Geremew TD et al/2018 (31) | Bale, Southern Ethiopia | Both sex | 411 | 100 | Not mentioned |
| Genet M et al/2015 (32) | Mekelle, Northern Ethiopia | Both sex | 324 | 100 | Not mentioned |
| Seid M et al/2012 (33) | Kemissie, Northern Ethiopia | Both sex | 360 | 100 | Not mentioned |
| Study            | Location                      | Gender       | Sample Size | HIV Positive Disclosure Status |
|------------------|-------------------------------|--------------|-------------|--------------------------------|
| Tesfaye T et al/2018 (34) | Jimma, Southwest Ethiopia | Both sex     | 351         | 98.1                           |
| Gadisa T et al/2017 (35) | Six HIV clinic in Central Ethiopia | Both sex     | 1,180       | National Institutes of Health and President’s Emergency Plan for AIDS Relief |
| Kassaye KD/2005 (45) | Gore and Mettu, Southern Ethiopia | Women       | 42          | Menschen fur Menschen foundation IIRDP |
| Alema HB et al (36) | Axum, Northern Ethiopia | Both Sex     | 361         | 99.7                           |
| Kassahun G et al (44) | Jimma, Southwest Ethiopia | Women       | 337         | Jimma University               |
| Natae et al (37) | West shewa, Central Ethiopia | Both sex     | 420         | 99.5                           |
| Reda AA et al (38) | Eastern Ethiopia               | Both sex     | 1537        | Not mentioned                  |
| Koyira A (39) | Addis Ababa, Central Ethiopia | Both sex     | 341         | Ethiopia Public Health Association-Disease Control and Prevention |

**Publication bias and quality status**

In Egger’s regression test, p-value was 0.870. The distribution of original studies on the funnel plot is shown below (Figure 2). We excluded one study (45) due to poor quality status, significantly very low sample size for cross-sectional study design. The quality appraisal result is shown in the supplementary file (Supplementary file).

**HIV positive disclosure status**

The smallest and largest sample size considered in the analysis was 107 (41) and 1,537 (38), respectively. Seventeen studies with 8,009 individuals were included in the meta-analysis. The proportion
of HIV infected people that disclose their HIV positive status to their sexual partner was 76.03 % (95% CI: 68.78, 83.27) (Figure 3).

**Subgroup analysis**

Based on the subgroup analysis, 75.70% of women and 76.16% of men who were infected with HIV disclosed their HIV positive status to their sexual partners (Figure 4).

**Sensitivity analysis**

The sensitivity analysis showed that no study leaves have a significant impact on the overall estimation (Table 2).

**Table 2:** The proportion (P) with 95% CI of HIV sero-disclosure practice to sexual partner when one study omitted from the analysis a step at a time

| Study omitted  | Estimate | [95% Conf. Interval] |
|---------------|----------|----------------------|
| Alemayehu M et al | 76.789291 | 69.266319 84.312263 |
| Sende EG et al | 76.212303 | 66.692101 83.732513 |
| Erku TA et al | 75.98317  | 66.358295 83.628036 |
| Dariba K et al | 75.096009 | 67.415432 82.587968 |
| Derbie B et al | 76.220047 | 66.847045 83.792549 |
| Dessalegn NG et al | 75.619668 | 66.858932 83.380196 |
| Gari T et al | 75.420479  | 67.826332 83.014626 |
| Gerenew TD et al | 77.492012  | 70.396034 84.58799 |
| Genet M et al | 77.189674 | 69.826508 84.552849 |
| Seid M et al | 74.958412 | 67.524956 82.391869 |
| Tesfaye T et al | 75.239609  | 67.470475 82.774742 |
| Gadisa T et al | 75.086029 | 67.880409 82.480016 |
| Alemu HB et al | 78.168849 | 71.721474 84.615623 |
| Kassahun G et al | 75.069594  | 67.977776 83.201332 |
| Nates et al | 75.47023  | 67.851295 83.089172 |
| Reda AA et al | 76.635452 | 66.866798 84.404099 |
| Koyrira A | 75.360345 | 67.720632 82.999789 |

| Combined | 76.025496 | 68.780943 83.27005 |

**Trend analysis**

Considering the year of publication, the trend graph was generated. The trend line shows HIV status disclosure through time (Figure 5).

**Associated factors**

**Socio-demographic characteristics**
According to a single study report (34), those study participants below the age of 39 years were less likely (AOR=0.014; 95% CI= 0.005, 0.037) to disclose their HIV status to sexual partner than above 39 years old. Another study (35) revealed that being 40-44 years old (AOR=0.52; 95%CI:0.44, 0.61), 45 and above age group (AOR=0.38; 95% CI: 0.22, 0.65) was less likely to disclose the HIV status to their sexual partner compared to the age of 25-29.

Based on one study report, males (AOR=3.039: 95% CI=1.164, 7.935) (34) were more likely to disclose HIV status to their sexual partners. In support of this study, female was less likely (AOR=0.25; 95% CI: 0.14, 0.45) (35) to disclose their HIV status to their sexual partner.

As one study has shown, live in urban (AOR = 1.62; 95% CI=1.0, 2.60) (31) was in support of HIV disclosure practice.

One study (36) revealed positive association between unmarried (AOR=3.71; 95% CI=1.21, 11.39) and disclosure status while another study (37) found negative association (AOR = 0.12; 95% CI= 0.036-0.39). Those who had children (AOR=9.89; 95% CI= 2.68, 36.36 ) (42) were more likely to disclose their HIV positive status to sexual partners as reported from a single study. Those study participants who took the position of control-over household assets were less likely (AOR=0.21; 95% CI= 0.12, 0.36) to disclose their HIV status compared to counterparts (35).

Medical-related factors

Presence of comorbid medical illness (AOR= 2.5; 95%, CI= 1.5, 4.2) (34), and having any clinical symptoms for HIV (AOR= 2.98; 95% CI=1.72, 5.15) (34) were more likely to disclose once's HIV positive status to sexual partner. Advanced stage HIV disease at enrollment time to care was associated (AOR=3.26; 95 % CI= 1.76–6.04) with non-disclosure status (35). The other study (29) showed that those who were on the WHO clinical stage I and II found less likely (AOR=0.22; 95% CI =0.10-0.55) to disclose their HIV status. However, another single study found being on the WHO stage I and II were more likely (AOR=2.77; 95% CI= 1.32-5.79) to disclose their HIV status (34).

The pooled effect from two studies (28, 44) showed that being on ART was positively associated with HIV status disclosure (Table 3).

Psychosocial-related factors

Having open discussion on safer sex with partner (44), using condom always (AOR= 6.20; 95% CI= 2.52–15.25) (30), having greater social support (AOR=2.98; 95%CI=1.09, 8.14) (30), being the members of
close-knit social groups (AOR=2.78; 95% CI=1.1, 6.7) (35), being peer counselor (44), and low physical domain-related quality of life (AOR=3.83; 95% CI=2.01, 7.32) (34) were more likely to disclose HIV status to their partner. Those who had high social domain-related quality of life (AOR=0.053, 95% CI= 0.022, 0.125) (34) and low negative self-image (AOR=0.03; 95% CI= 0.04, 0.70) (29) were affect negatively their HIV disclosure status as showed each with single study.

Those who had a chance of seeing people with HIV positive who disclose their HIV status to the community (AOR= 2.1, 95% CI: 1.08, 4.01) (40) and knew other people living with HIV (AOR=4.76; 955CI= 2.63, 9.09) (35) were supportive factors to disclose HIV status to sexual partners.

The pooled effects of cohabiting with partner, smooth relationship with the partner, getting counseling, had a prior discussion with a partner about HIV/AIDS and HIV test, knowing partner’s HIV status, and being a member of anti-HIV association are illustrated on Table 3.

Table 3: List of variables with their pooled AOR (95% CI) and I-square percentage with its p-value

| Variables                             | AOR (95% CI)       | I-squared with p-value |
|---------------------------------------|--------------------|------------------------|
| Being on ART (28, 44)                 | 6.19 (2.92, 9.49)  | 84.5%, 0.011           |
| Cohabiting with partner (29, 30)      | 4.48 (1.24, 7.72)  | 0.0%, 0.454            |
| Getting counseling (28, 31, 40, 42)   | 3.94 (2.08, 5.80)  | 23.9%, 0.268           |
| Had discussion prior to HIV testing (29, 32, 37, 40, 41) | 4.40 (2.11, 6.69)  | 0.0%, 0.972            |
| Knowing partner’s HIV status (28, 30-32, 36, 37, 40) | 6.08 (3.05, 9.10)  | 27.3% 0.220            |
| Smooth relationship with partner (30, 34) | 4.44 (1.28, 7.61)  | 0.0%, 0.616            |
| Being member of anti-HIV association (36, 44) | 3.70 (2.20, 5.20)  | 28.9%, 0.236           |

Discussion

Disclosing once own HIV seropositive status to sexual partner have a great impact on the HIV prevention mechanisms though disclosing their HIV-positive status could be frustrating (18). Evidence about HIV disclosure status to their sexual partner is crucial to further prevent HIV transmission in culturally diverse community, like Ethiopia. This systematic review scrutinizes HIV status disclosure and psychosocial factors among HIV-infected people in Ethiopia.

The proportion of HIV-positive disclosure to sexual partner in the present meta-analysis was 76.03%. The finding of this study has been found higher compared to studies in Tanzania (66%) (22), Togo (60.9%) (46), Nigeria (50.4%) (47), Uganda (81%) (48), and South Africa (80%) (49). On the other hand, the result of the current meta-analysis is lower than that of a study done in Zimbabwe (89.3%) (50). Even though all these countries including Ethiopia are WHO listed countries and implementing WHO HIV guidelines, sociodemographic difference might have a contribution to this discrepancy.

The disclosure of HIV serostatus to sexual partner in Ethiopia has observed to decrease over time. This might be due to different attributes; public attention to the seriousness of HIV on the health and economic
aspects seem forgotten in Ethiopia. This might be due to Ethiopia is a less developing country and many health-related assets are depending on the support of non-governmental organizations. Recently many HIV-related volunteer organizations are either phasing-out or changing their thematic areas towards the emerging non-communicable chronic diseases because of the paradigm shift of developed countries from communicable disease to non-communicable disease prevention and control. Similarly, in Ethiopia, though infectious diseases including HIV are silently transmitting, the government attention is shifted to non-communicable diseases as developed nations do. Besides, there is no legal concern about HIV disclosure status in Ethiopia. However, in some other developed nations, disclosure of HIV-positive status is regarded as social and legal responsibility for HIV-infected individuals because non-disclosing their positivity status is devastatingly exposed others to HIV infection. Since 1987, when prosecutions were first initiated and HIV-specific criminal statutes enacted in the United States (51), increasing numbers of countries around the world have applied existing criminal laws and/or created HIV-specific criminal statutes to prosecute people living with HIV who have or are believed to have, put others at risk of acquiring HIV (52). In the other view, lack of governmental insurance for once infected with HIV infection for different incentives such as provide government employment, favors in housing, education opportunities, and other benefits for the partner may responsible for decrement or low disclosure rate in Ethiopia.

Based on this review, being on ART were more likely to disclose HIV status to sexual partner. This finding is supported by evidence in Uganda (16). The possible explanation might be ART initiation by itself pass a step in convincing the patient to live with HIV as a healthy individual. Moreover, through the process of taking ART, knowledge, and attitude about HIV prevention and treatment mechanism has increased and they disclose their status to sexual partner easily as a result.

HIV infection affects the physical, psychological, social, and spiritual aspects of HIV-infected people and their parents (53). These lead to psychosocial issues that support disclosure experiences through stabilizing psychological well-being because thinking to disclose once own HIV-positive status has raise psychosocial conflict and psychosocial problems, like HIV-related stigma, anxiety, depression, insomnia, suicidal thoughts, and substance use disorder. Thus, cohabiting with a partner, had a smooth relationship with the partner, getting counseling, had discussion prior to HIV testing with a partner, knowing partner's HIV status, and being a member of ant-HIV association were considered psychosocial related-factors of HIV-positive status disclosure practice. All these variables would help in enhancing problem-solving skills, lifestyle changes, helping the patient to identify choices, evaluate the value and consequences of choices, linking the patient to spiritual and psychological support, and providing a solution-focused counseling approach, support the wellness of the entire family, encourage peer contact and support, discourage use of drugs and alcohols, and increase their meaning in life.

In this meta-analysis we found that individuals cohabiting with a partner were more likely to disclose HIV status to sexual partners. Living together usually involves sexual activities and concerns about the risk of HIV transmission. It also increases a sense of well-being and helps to develop empathy between couples.
Moreover, this might be due to the relationship is more trusting and feel get social support intrinsically (54).

Relationship quality with a partner might act as either a risk or a resilience factor in the HIV status disclosure process (55). Similarly, this review found those who had smooth relationships with partner were more likely to disclose HIV status to sexual partner. This might be due to the fact that the probability of sharing a secret is high among those in good relationship with the partner. Fear of stigma, violence, and separation would be less if the relationship is smooth and thus HIV partner disclosure could be high. This evidence is supported by a study conducted in China, where disclosing HIV status to partners was significantly related to a better quality of relationships with partners and open and effective family communication (56).

Counseling is important to determine the presence of risky behavior, facilitate the expression of their concerns and worries, make the patient understand the risks of non-disclosure, bring change in behavior, and prevent and reduce psychological morbidity (57). Besides, receiving counseling about HIV test to have psychological preparation, relieve stress and anxiety, and forecast the benefit of disclosure. Deal with painful emotional issues, express thoughts, emotions, and behaviors, feel good about themselves, learn to function comfortably, act, change, adapt and/or achieve specified desired results (58). Besides, it improves ability to accept HIV positive results, increased knowledge about the HIV disease process, medication, and reduce fear to expose their HIV status. Having received alternative information from health professionals assists them to develop self-confidence and self-esteem. Even, they could prepare themselves how they solve the challenges following disclosure to the sexual partner. Therefore, those who received counseling could develop positive behavior towards their HIV infection and disclose their status to a partner. Similarly, this review revealed that HIV-infected people had got counseling were more likely to disclosed HIV status to sexual partners. A study from Uganda also found the same attributes (16).

Anti-HIV association is a group of people who share common beliefs and value that supports HIV disclosure practice. The current meta-analysis revealed that those HIV-positive people being part of anti-HIV association were more likely to disclose HIV positive status to sexual partner. Being part of HIV-related association helps to reduce negative myths and misinformation about HIV. It allows getting emotional, aid, structural, and functional support (59). It encourages better relationships between people and building a stronger sense of self and community. Being an anti-HIV association member allows being members of a peer support system that help to mutually give and receive help from one another, building on the key principles of respect, shared responsibility, and mutual agreement of what is helpful, and learn about healthy decision making. The effectiveness of this group comes from understanding another’s situation and showing empathy through shared experiences of emotional and psychological pain. Furthermore, it helps HIV-positive people to deal with a wide range of concerns that accompany their HIV diagnosis, and are important allies in the fight against stigma and discrimination so that they can easily disclose their HIV positive status.
According to this review, those HIV infected person who had a prior discussion about HIV and HIV test was more likely to disclose HIV status as compared to their counterpart. This might be due to the fact that prior discussion with partner avoids the fear of negative reactions from parent and the probability of accepting the positive result might be high if they have discussed before HIV testing. Furthermore, knowing partner’s HIV status helps to disclose their HIV status to sexual partner. This result was supported by a study done in South Africa (19) where disclosure was high among pregnant women known HIV status of their partner.

To achieve the goal of 90% of people know their HIV status and 90 of those knowing their status getting into care and to achieve the goal of zero new HIV infection by the end of 2035, reaching the partners of people who test HIV positive is crucial. Evidence of this meta-analysis will provide insight to the governmental and non-governmental organizations, which are working on HIV prevention and control in Ethiopia.

**Strength And Limitation**

To the best of our knowledge, this is the first review done to pool the national experiences and identified comprehensive determinants.

As to the limitation, though all the studies are done in Ethiopia, followed similar study design, similar measurement tool, and subgroup analysis is done, statistical heterogeneity value found to be high. In some instances, I-square is not the absolute measure of heterogeneity; this heterogeneity might be due to the command we used (“Metan” command was applied). Due to the nature of the cross-sectional study, the associated factors might not have a cause-effect relationship as it does in interventional or follow-up study.

**Conclusions**

In Ethiopia, still more than one-fourth of HIV-infected adults did not disclose their HIV positivity status to sexual partners. Being on ART, cohabiting with a partner, had a smooth relationship with a partner, getting counseling, had a discussion prior to HIV testing, knowing partner’s HIV status, being a member of an ant-HIV association, and being on ART were supporting factors of HIV-positive status disclosure. Behavioral change to disclose once seropositivity to sexual partner is highly needed to further decrease the transmission rate of HIV in Ethiopia which would be the focus on health and education sectors in the country.

**Declarations**

Ethical approval and consent to participate: Not applicable

Consent to publication: Not applicable
Availability of data and materials: All the required data are included in the manuscript.

Competing interests: The authors declare that they have no competing interests.

Funding: Not applicable

References

1. Bekker L-G, Alleyne G, Baral S, Cepeda J, Daskalakis D, Dowdy D, et al. Advancing global health and strengthening the HIV response in the era of the Sustainable Development Goals: the International AIDS Society—Lancet Commission. The Lancet. 2018;392(10144):312-58.

2. World Health Organization. HIV/AIDSData and statistics. 13 November 2019. Report No.

3. Ethiopian Public Health Institute. HIV Related Estimates and Projections for Ethiopia—2017. Addis Ababa.; 2017.

4. Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al. Disease control priorities in developing countries: The World Bank; 2006.

5. Bunnell R, Mermin J, De Cock KM. HIV prevention for a threatened continent: implementing positive prevention in Africa. Jama. 2006;296(7):855-8.

6. Varghese B, Maher JE, Peterman TA, Branson BM, Steketee RW. Reducing the risk of sexual HIV transmission: quantifying the per-act risk for HIV on the basis of choice of partner, sex act, and condom use. Sexually transmitted diseases. 2002;29(1):38-43.

7. O’Connell AA, Reed SJ, Serovich JA. The efficacy of serostatus disclosure for HIV transmission risk reduction. AIDS and Behavior. 2015;19(2):283-90.

8. Dessie G, Wagnew F, Mulugeta H, Amare D, Jara D, Leshargie CT, et al. The effect of disclosure on adherence to antiretroviral therapy among adults living with HIV in Ethiopia: a systematic review and meta-analysis. BMC infectious diseases. 2019;19(1):528.

9. Elopre L, Westfall A, Mugavero M, Zinski A, Burkholder G, Hook E, et al., editors. The role of HIV status disclosure in retention in care and viral-load suppression. Conference on retroviruses and opportunistic infections Seattle: International Antiviral Society-USA; 2015.

10. Atuyambe LM, Sseguija E, Ssali S, Tumwine C, Nekesa N, Nannungi A, et al. HIV/AIDS status disclosure increases support, behavioural change and, HIV prevention in the long term: a case for an Urban Clinic, Kampala, Uganda. BMC Health Services Research. 2014;14(1):276.

11. Chaudoir SR, Fisher JD. The disclosure processes model: understanding disclosure decision making and postdisclosure outcomes among people living with a concealable stigmatized identity. Psychological bulletin. 2010;136(2):236.

12. Gerbi GB, Habtemariam T, Robnett V, Nganwa D, Tameru B. Psychosocial factors as predictors of HIV/AIDS risky behaviors among people living with HIV/AIDS. Journal of AIDS and HIV research (Online). 2012;4(1):8.
13. Marmot MG. Improvement of social environment to improve health. The Lancet. 1998;351(9095):57-60.

14. World Health Organization. Statement on HIV testing and counseling: WHO, UNAIDS re-affirm opposition to mandatory HIV testing; Available on https://www.who.int/hiv/events/2012/world_aids_day/hiv_testing_counselling/en/.

15. Obermeyer CM, Baijal P, Pegurri E. Facilitating HIV disclosure across diverse settings: a review. American journal of public health. 2011;101(6):1011-23.

16. Kadowa I, Nuwaha F. Factors influencing disclosure of HIV positive status in Mityana district of Uganda. African health sciences. 2009;9(1):26-33.

17. Oseni OE, Okafor IP, Sekoni AO. Issues surrounding HIV status disclosure: Experiences of seropositive women in Lagos, Nigeria. International journal of preventive medicine. 2017;8.

18. Mayfield Arnold E, Rice E, Flannery D, Rotheram-Borus MJ. HIV disclosure among adults living with HIV. AIDS care. 2008;20(1):80-92.

19. Ramlagan S, Matseke G, Rodriguez VJ, Jones DL, Peltzer K, Ruiter RA, et al. Determinants of disclosure and non-disclosure of HIV-positive status, by pregnant women in rural South Africa. SAHARA-J: Journal of Social Aspects of HIV/AIDS. 2018;15(1).

20. Amoran O. Predictors of disclosure of sero-status to sexual partners among people living with HIV/AIDS in Ogun State, Nigeria. Nigerian journal of clinical practice. 2012;15(4):385-90.

21. Ndayala P, Ondigi A, Ngige L. Nature and extent of HIV self disclosure by seropositive adults in HIV support groups in Nairobi County, Kenya. Res Humanit Soc Sci. 2015;5:87-97.

22. Damian DJ, Ngahatilwa D, Fadhili H, Mkiza JG, Mahande MJ, Ngocho JS, et al. Factors associated with HIV status disclosure to partners and its outcomes among HIV-positive women attending Care and Treatment Clinics at Kilimanjaro region, Tanzania. PloS one. 2019;14(3):e0211921.

23. Moher D, Liberati A, Tetzlaff J, Altman D. Group P (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ 339: b2535. 2009.

24. Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. European journal of epidemiology. 2010;25(9):603-5.

25. Sterne JA, Egger M. Regression methods to detect publication and other bias in meta-analysis. Publication bias in meta-analysis: Prevention, assessment and adjustments. 2005:99-110.

26. Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. Bmj. 2003;327(7414):557-60.

27. DerSimonian R, Kacker R. Random-effects model for meta-analysis of clinical trials: an update. Contemporary clinical trials. 2007;28(2):105-14.

28. Erku TA, Megabiaw B, Wubshet M. Predictors of HIV status disclosure to sexual partners among people living with HIV/AIDS in Ethiopia. The Pan African Medical Journal. 2012;13.

29. Deribe K, Woldemichael K, Wondafrash M, Haile A, Amberbir A. Disclosure experience and associated factors among HIV positive men and women clinical service users in southwest Ethiopia. BMC Public
health. 2008;8(1):81.

30. Dessalegn NG, Hailemichael RG, Shewa-amare A, Sawleshwarkar S, Lodebo B, Amberbir A, et al. HIV Disclosure: HIV-positive status disclosure to sexual partners among individuals receiving HIV care in Addis Ababa, Ethiopia. PloS one. 2019;14(2):e0211967.

31. Geremew TD, Nuri RA, Esmael JK. Sero Status Disclosure to Sexual Partner and Associated Factors among Adult HIV Positive Patients in Bale Zone Hospitals, Oromia Region, Ethiopia: Institution Based Cross-Sectional Study. Open Journal of Epidemiology. 2018;8(02):43.

32. Genet M, Sebsibie G, Gultie T. Disclosure of HIV seropositive status to sexual partners and its associated factors among patients attending antiretroviral treatment clinic follow up at Mekelle Hospital, Ethiopia: a cross sectional study. BMC research notes. 2015;8(1):109.

33. Seid M, Wasie B, Admassu M. Disclosure of HIV positive result to a sexual partner among adult clinical service users in Kemissie district, northeast Ethiopia. African Journal of Reproductive Health. 2012;16(1).

34. Tesfaye T, Darega J, Belachew T, Adera A. HIV positive sero-status disclosure and its determinants among people living with HIV/AIDS following ART clinic in Jimma University Specialized Hospital, Southwest Ethiopia: a facility-based cross-sectional study. Archives of Public Health. 2018;76(1):1.

35. Gadisa T, Tymejczyk O, Kulkarni SG, Hoffman S, Lahuerta M, Remien RH, et al. Disclosure history among persons initiating antiretroviral treatment at Six HIV clinics in Oromia, Ethiopia, 2012–2013. AIDS and behavior. 2017;21(1):70-81.

36. Alema HB, Misgina KH, Weldu MG. Determinant factors of HIV positive status disclosure among adults in Axum Health Facilities, Northern Ethiopia: Implication on treatment adherence. Journal of AIDS and HIV Research. 2017;9(3):52-9.

37. Natae S, Negawo M. Factors Affecting HIV Positive Status Disclosure among People Living with HIV in West Showa Zone, Oromia, Ethiopia; 2013. Abnorm Behav Psychol. 2016;2(114):2.

38. Reda AA, Biadgilign S, Deribe K, Deribew A. HIV-positive status disclosure among men and women receiving antiretroviral treatment in eastern Ethiopia. AIDS care. 2013;25(8):956-60.

39. Koyira A. Assessment of Magnitude, Barriers and Outcomes Related with HIV Serostatus Disclosure among ART Users, in Addis Ababa ART Providing Health Facilitie. 2009.

40. Alemayehu M, Aregay A, Kalayu A, Yebyo H. HIV disclosure to sexual partner and associated factors among women attending ART clinic at Mekelle hospital, Northern Ethiopia. BMC public health. 2014;14(1):746.

41. Sendo EG, Cherie A, Erku TA. Disclosure experience to partner and its effect on intention to utilize prevention of mother to child transmission service among HIV positive pregnant women attending antenatal care in Addis Ababa, Ethiopia. BMC public health. 2013;13(1):765.

42. Deribe B, Ebrahim J, Bush L. Outcomes and Factors Affecting HIV Status Disclosure to Regular Sexual Partner among Women Attending Antiretroviral Treatment Clinic. J AIDS Clin Res. 2018;9(760):2.
43. Gari T, Habte D, Markos E. HIV positive status disclosure among women attending art clinic at Hawassa University Referral Hospital, South Ethiopia. East African Journal of Public Health. 2010;7(1).

44. Kassahun G, Tenaw Z, Belachew T, Sinaga M. Determinants and Status of HIV Disclosure among Reproductive Age Women on Antiretroviral Therapy at Three Health Facilities in Jimma Town, Ethiopia, 2017. Health Science Journal. 2018;12(2).

45. Kassaye KD, Lingerh W, Dejene Y. Determinants and outcomes of disclosing HIV-sero positive status to sexual partners among women in Mettu and Gore towns, Illubabor Zone southwest Ethiopia. Ethiopian journal of Health development. 2005;19(2):126-31.

46. Yaya I, Saka B, Landoh DE, Patassi AA, Aboubakari A-s, Makawa M-S, et al. HIV status disclosure to sexual partners, among people living with HIV and AIDS on antiretroviral therapy at Sokodé regional hospital, Togo. PloS one. 2015;10(2):e0118157.

47. Martins OF, Ngong HC, Dongs IS, Ngong KC. Rates, Factors, Timing and Outcomes of HIV Status Disclosure Among Patients Attending the Special Treatment Clinic of the National Hospital Abuja Nigeria. International Journal of HIV/AIDS Prevention, Education, and Behavioural Science. 2016;2(3):13-9.

48. Okello ES, Wagner GJ, Ghosh-Dastidar B, Garnett J, Akena D, Nakasujja N, et al. Depression, internalized HIV stigma and HIV disclosure. World Journal of AIDS. 2015;5(01):30.

49. Vu L, Andrinopoulos K, Mathews C, Chopra M, Kendall C, Eisele TP. Disclosure of HIV status to sex partners among HIV-infected men and women in Cape Town, South Africa. AIDS and Behavior. 2012;16(1):132-8.

50. Shamu S ZC, Shefer T, Temmerman M, Abrahams N Intimate Partner Violence after Disclosure of HIV Test Results among Pregnant Women in Harare, Zimbabwe. Plos One. 2014;9(10).

51. OHCHR U. International guidelines on HIV/AIDS and human rights. Geneva: Office of the United Nations High Commissioner for Human Rights and the Joint United Nations Programme on HIV/AIDS. 2006.

52. Glendon MA. The rule of law in the Universal Declaration of Human Rights. Nw UJ Int’l Hum Rts. 2004;2:1.

53. Stutterheim SE, Bos AE, Pryor JB, Brands R, Liebregts M, Schaalma HP. Psychological and social correlates of HIV status disclosure: The significance of stigma visibility. AIDS Education and prevention. 2011;23(4):382-92.

54. Calin T, Green J, Hetherton J, Brook G. Disclosure of HIV among black African men and women attending a London HIV clinic. AIDS care. 2007;19(3):385-91.

55. Smith C, Cook R, Rohleder P. Taking into account the quality of the relationship in HIV disclosure. AIDS and Behavior. 2017;21(1):106-17.

56. Qiao S, Li X, Zhou Y, Shen Z, Tang Z. AIDS impact special issue 2015: interpersonal factors associated with HIV partner disclosure among HIV-infected people in China. AIDS care. 2016;28(sup1):37-43.
57. Chippindale S, French L. HIV counselling and the psychosocial management of patients with HIV or AIDS. Bmj. 2001;322(7301):1533-5.

58. Green J, McCreaner A, Green J. Counselling in HIV infection and AIDS: Blackwell Science Oxford; 1996.

59. Molassiotis A, Callaghan P, Twinn S, Lam S, Chung W, Li C. A pilot study of the effects of cognitive-behavioral group therapy and peer support/counseling in decreasing psychologic distress and improving quality of life in Chinese patients with symptomatic HIV disease. AIDS patient care and STDs. 2002;16(2):83-96.

Figures
Figure 1
PRISMA flow chart displays the article selection process
**Figure 2**

Funnel plot shows the symmetrical distribution of the prevalence of original studies; the x-axis shows the natural logarithm of prevalence (LN of P) and standard error of prevalence (Se of P) plotted on the Y-axis.
Figure 3

Forest plot of the proportion (P) of HIV positive people who disclosed HIV positive status to their sexual partner and its 95% CI, the midpoint of each line illustrates the prevalence rate estimated in each study. The diamond shows the pooled prevalence.
Figure 4

Subgroup analysis based on the study participant included in the original study
Figure 5

Trend analysis exhibits the proportion of HIV sero-disclosure practice from the year 2008 to 2019 in Ethiopia

Supplementary Files

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