Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: the 2017 Update

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Introduction

This is the fifteenth annual update of the HIV/AIDS bibliography series on Ethiopia. It includes, like all previous issues, published and unpublished research on HIV/AIDS and related health conditions, including tuberculosis, other sexually transmitted infections, opportunistic infections, and socioeconomic, behavioral and cultural conditions, gender violence, sexuality, family planning, relevant policy and interventions. All references are listed under the following eight categories: 1) basic medical research, 2) epidemiological, behavioral, socioeconomic and cultural research, impacts research, 4) prevention research, 5) treatment, care and clinical research, 6) health services and policy research, 7) health informatics and evaluation research and 8) research on Ethiopians in the diaspora. Section 9 lists the bibliography which was published in 2017 and section 10 lists relevant websites as sources of additional references. The text preceding each of the eight lists of references summarizes patterns and trends of and needs for further research and highlights key findings of the studies presenting new approaches, concepts and tools. We recommend that readers interested in any one area of research also review other sections in this update because of the increasing complexity of issues bearing on HIV/AIDS transmission, prevention and control.

We used the same method and sources as in previous updates to identify and classify references. Literature searches using the keywords "Ethiopia AND HIV AND 2017[dp]" and "Ethiopia AND AIDS AND 2017[dp]" were made in Pub Med, CINHAL, Econ Lit, Embase, Global Health, POPLINE, PsycINFO, Social Services Abstracts, and other majordatabases that archive pertinent published articles, dissertations and reports. We made additional online searches on major national and international HIV/AIDS resource centers and organization, mostly http://www.etharc.org and http://unaids.org.

This article lists 543 references, 107 more than the 2016 update.

Trends in Published Studies Archived in PubMed:

PubMed is the largest database of abstracts of scientific publications dating back many decades. In 1988, 30 years ago, the first report in the literature on HIVAIDS in Ethiopia, a scientific accomplishment that required deft navigation of the political environment of the time, was published (Lester FT, Ayehunie S, Zewdie D. Acquired immunodeficiency syndrome: seven cases in an Addis Ababa hospital. Ethiop Med J. 1988 Jul;26(3):139-45. PubMed PMID: 3416846). PubMed, therefore, can be used to monitor trends in publication of HIV/AIDS related studies. Applying the approach we used in previous Updates, we searched for published studies archived in PubMed database using the following terms: Literature searches using keywords "Ethiopia AND HIV AND 2017[dp]" and "Ethiopia AND AIDS AND 2017[dp]" were made in PubMed.Using PubMed search results from previous years, the results for 2017 were added to generate Figure 1, which presents the number of unique articles archived in PubMed for each year.

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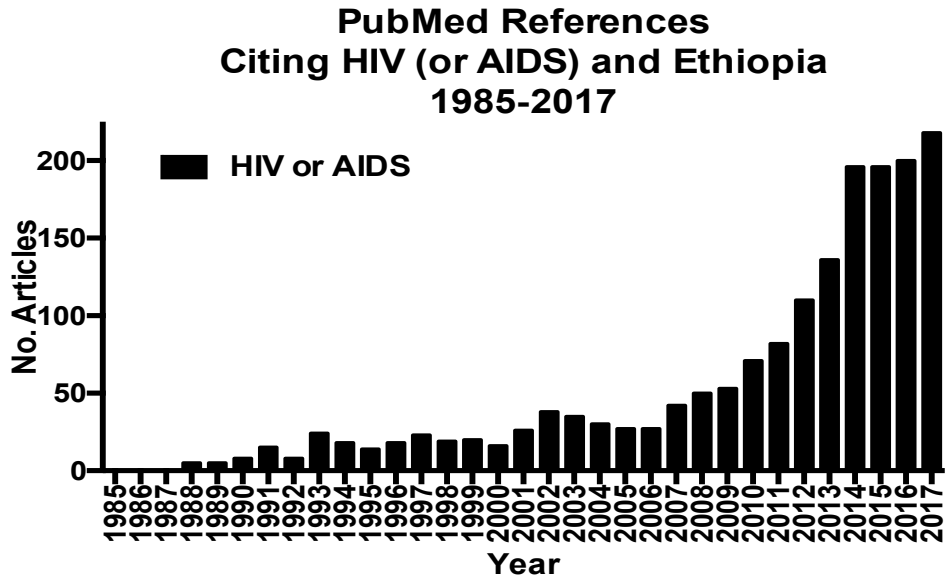

Figure 1: **Publications cited in Pub Med concerning Ethiopia and HIV or AIDS, 1985-2017**

For Figure 2, the Pub Med search terms were: Ethiopia AND HIV AND 2017[dp]; Ethiopia AND AIDS AND 2017[dp]; Ethiopia AND malaria AND 2017[dp]; Ethiopia AND tuberculosis AND 2017 [dp]; Ethiopia AND helminth AND 2017 [dp]. Again, using PubMed search results from previous years, the results for 2017 were added to generate the figure.

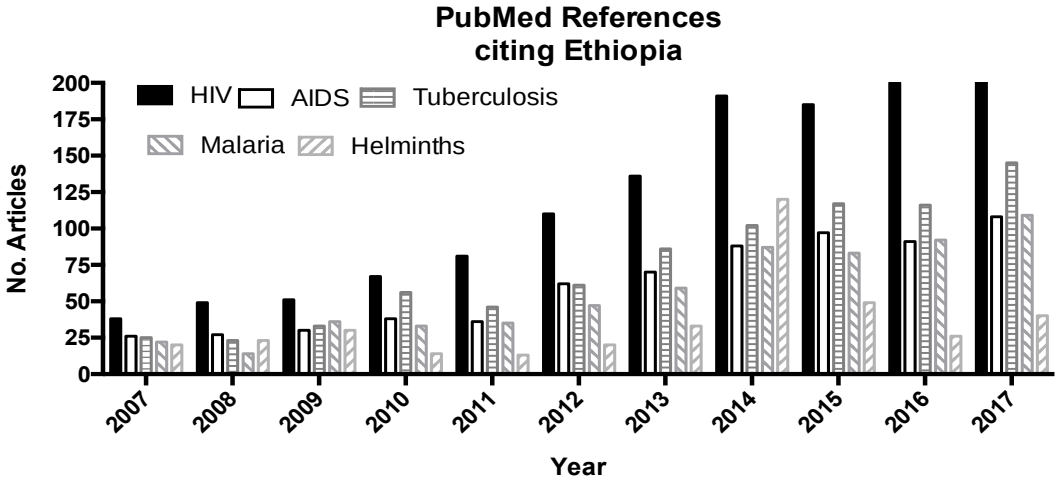

Figure 2: **Publication cited in Pub Med concerning Ethiopia and HIV, AIDS, Tuberculosis, Malaria, and Helminths, 2007-2017**

Section 1: Basic Biomedical Research

This section covers laboratory-based biomedical research, including studies on HIV structure, replication, and host immune responses; co-infection with other agents; development and testing of laboratory procedures; and other related laboratory studies.

In 2017, there are 15 references classified as Biomedical Research, less than half the number in 2016 but more than in 2015. Six of the references concern tuberculosis, 5 of which are theses and one a presentation at the EPHA meeting. There is one published reference concerning HIV. There are also 3 published references concerning leishmaniasis diagnosis and likewise 2 published papers on hepatitis B virus. There is a conference presentation on schistosomiasis, and also one on methicillin-resistant *Staphylococcus aureus*. Finally, there is a publication on the frequency of the HIV-resistance host genetic marker, CCR5-Δ32, in stem cell donors living in Europe.

Adem et al. (3) found that extracting *Leishmania* DNA, including kinetoplast DNA and PCR improves sensitivity to detect low parasitemia, and is the preferred method to diagnose *Leishmania* in asymptomatic HIV-infected subjects in an endemic region in northwest Ethiopia. Using only light microscopy, Diro et al. (6) determined that visceral leishmaniasis (VL) could be ruled-in with peripheral blood microscopy in a substantial number of VL

suspects and may reduce the number of spleen and bone marrow tissue aspirations required in HIV-infected subjects. Assessing urine as a noninvasive source of material to diagnose leishmaniasis in HIV-infected subjects, Vogt et al. (14) reported that Katex test sensitivity for VL diagnosis was moderate overall, and good in patients with high parasite loads and low CD4 counts. Diagnostic accuracy for treatment failure was poor. All three papers concluded that more sensitive diagnostics remain a high priority to improve and scale up VL care for HIV-coinfected patients. Hepatitis D virus (HDV) is a defective RNA virus and an obligate satellite of hepatitis B virus that infects humans either concomitantly with HBV or after HBV infection. Belyhun et al. (4) detected anti-HDV antibody in 3.2% of blood donors, 8.0% of HIV co-infected individuals and 12.7% of liver disease patients in northwest Ethiopia. In a study of HIV-infected individuals, Deressa et al. (5) found 5.5% HBV/HIV co-infected cases. Most were receiving first generation anti-HBV therapy with a low genetic barrier to resistance, and several carried mutations associated with anti-HBV (3TC) drug resistance. Their data underscore the importance of integrating HBV screening to the HIV treatment guidelines for better management and prevention of HBV-related liver disease.

Kalu et al. (8) reported that HIV-1C epidemic is monophylogenetic, i.e., nearly 100% of HIV cases are of the C type, in all regions of Ethiopia and the R5-tropic virus (i.e., the virus uses the CCR5 receptor) dominates, even in patients with advanced immunodeficiency. Comparing the frequency of R5-tropic viruses with viral samples from the mid-1980s, the proportion of X4-tropic virus (i.e. viruses that use the CXCR4 receptor) seems to have increased over time. Solloch et al. (13) compared the frequency of the CCR5-Δ32 in stem cell donors presenting at hospitals in Germany, Poland, and the United Kingdom originating from 87 countries. Uniquely, none of the Ethiopian donors (n=76) had the variant whereas it was present in 16.4% of 64 Norwegian donors. The number of donors for most countries was small and the criteria for ethnic origin was based on self report. In 194 Eritrean donors, the allele frequency of 0.26% was also low but apparently present while the frequency was over 2% in 70 Somalis and nearly 3% in 84 Kenyans.

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Section 2: Epidemiological, Behavioral, Socio-Economic and Cultural Research

This section includes studies on the epidemiology of HIV and other opportunistic infections, AIDS and related diseases, and risk and protective behaviors. It also covers research on the biological, psychosocial, socioeconomic, cultural, structural, and other contextual determinants of HIV transmission and prevention.

This section contains 131 references: 49 published articles (37.4%), 39 (29.8%) conference abstracts, 41 (31.3%) master theses, 1 (0.8%) dissertation, and 2 (1.5%) reports. As in previous years, the broad categories of research interest within this section included: 1) HIV prevalence and associated factors; 2) mother to child transmission (MTCT) of HIV; 3) opportunistic infections and other comorbidities; 4) HIV-related risk and protective behaviors; 5) sexual and gender-based abuse and violence; and 6) other existing or trending HIV/AIDS research topics.

In this update, we highlight the findings of the 2016 Ethiopia Demographic and Health Survey (EDHS) – the most comprehensive survey that covers information at the regional and national levels pertinent to the HIV epidemic, including levels of HIV infection, risk and protective behaviors, beliefs and attitudes associated with HIV, and various social and contextual factors that are directly or indirectly related to the spread of HIV infection in the country. The EDHS was conducted from January 18, 2016, to June 27, 2016 by the Central Statistics Agency of Ethiopia, in collaboration with the Federal Ministry of Health, the Ethiopian Public Health Institute, local governments, and various international agencies. The survey included a nationally representative sample of 15-49 year old women (n = 15,683) and 15-59 year old men (n = 12,688) in randomly selected households (n = 16,650) across Ethiopia. The findings of this survey were published in two reports in July, 2017 (39) and January, 2018 (40). In the following subsections, we present some of the results from these two reports along with other small scale studies published in journals, presented at conferences, or submitted in partial fulfillment of the requirements of a master or doctoral degree.

HIV Prevalence and Associated Factors

The 2016 EDHS revealed that HIV prevalence among 15-49 year old people in Ethiopia was 0.9%. It was higher among women (1.2%) than men (0.6%) and in urban (2.9%) than rural areas (0.4%). There was also a significant regional variation with highest in Gambela (4.8%) and the lowest in Somali (0.1%) administrative regions. The 2016 EDHS was the third to collect blood samples for HIV testing; the first two occurred as part of the 2005 EDHS and 2011 EDHS. While the HIV testing algorithms were slightly different between the years, trend analyses indicate that HIV prevalence among 15-49 year old people in Ethiopia decreased slightly between 2005 and 2016 and between 2011 and 2016. Gender specific analyses show some variations. The decreases in HIV prevalence among women between 2005 and 2016 and between 2011 and 2016 were statistically significant, whereas among men only the decrease from 2011 to 2016 was statistically significant.

Other studies have looked at prevalence of and associated factors for HIV infection among a small group of people or in specific geographic locations. For example, Abera and colleagues (7) conducted a community survey in East and West Gojjam zones using standard serological tests. The authors found an HIV prevalence rate of 3.3% in a sample 481 adults. The higher rate of HIV prevalence in this study, compared to the national average, suggests that HIV is not uniformly distributed across Ethiopia. Other researchers examined prevalence of HIV/AIDS in Arsi Zone (120), among patients presenting at emergency departments (84), and among pregnant women attending antenatal clinics (64). Three other studies have assessed the prevalence transfusion transmissible infections among blood donors (38, 73, 107), although we were unable to determine if all had included HIV testing in their study.

Mother – to - Child Transmission (MTCT) of HIV

Although significant strides have been made in preventing MTCT of HIV worldwide, it is still a significant problem in Ethiopia and other developing countries where pregnant women do not have access to preventive messages and medicines. Moges and colleagues (90, 91) conducted a study to determine the rate of HIV transmission and associated factors among HIV-exposed infants in selected health facilities in East and West Gojam zones in northwest Ethiopia. Three hundred five infants and their mothers were included in this study. The rate of HIV transmission at the end of 24 months was 5.9% (95% CI: 3.9%-7.9%). Transmission of HIV was more likely among infants born from older mothers, among infants whose mothers could not get PMTCT intervention, and among infants

whose mothers became pregnant after they knew their HIV-positive status. Two theses reported on prevalence of MTCT and associated factors among samples of HIV exposed infants in Addis Ababa (32) and Dessie (26). The above findings need to be interpreted within the context of knowledge about MTCT of HIV. The 2016 EDHS reports that only 51% and 61% of 15-49 year old women and men respectively knew that the risk of MTCT of HIV infection can be reduced by taking special medication. Although knowledge has increased for both women (from 10% in 2005 to 51% in 2016) and men (from 29% in 2005 to 61% in 2016), there is still more room for improvement and opportunities to cut down MTCT in Ethiopia. Thus, continued research on developing, implementing, monitoring and evaluating PMTCT programs is warranted.

Opportunistic Infections and Comorbidities

HIV infection continues to be part of a syndemic of multiple interacting infectious diseases that put extreme burden on vulnerable populations in Ethiopia. Researchers have continued their focus on understanding the magnitude and associated factors for other infectious diseases among PLWH. As in previous updates, the most commonly studied co-infections among PLWH were tuberculosis (2, 5, 74, 81, 84, 99, 116), hepatitis B (HBV; 7,72, 84, 108), hepatitis C (HCV; 7, 46, 72, 84, 108), other sexually transmitted infections (41, 76, 108), and other opportunistic infections (3, 24, 86). In addition, other studies reported on co-infections of HIV with intestinal parasites (48, 60), malaria (37, 65), *Toxoplasma gondii* (93, 131) and leishmaniasis (10, 121). Beyond documenting the burden of these co-infections among PLWH, some of these studies presented evidence about the interactive effects of HIV and other infections in compromising the health outcomes of PLWH. For example, Teklu and colleagues conducted a longitudinal study to examine the effects of tuberculosis infection among a sample of 3,889 PLWH who were on antiretroviral therapy. The authors found tuberculosis among 9% of the sample. More importantly, the authors found a significantly higher likelihood mortality among PLWH who had tuberculosis compared to those who did not have tuberculosis. Two other studies showed that infection with malaria was significantly associated with hematological abnormalities among PLWH, including higher likelihood of anemia and thrombocytopenia (37, 105).

Researchers also reported on the prevalence, risk factors, and impacts of various infectious diseases in community or clinical samples not selected based on HIV status. Interest in research on tuberculosis was high. Multiple studies explored the prevalence, associated factors for, and/or perceptions of tuberculosis infection among community residents (61, 101), prisoners (16, 64), pregnant mothers (54), university students (56), and among symptomatic or asymptomatic patients in various health settings (19, 88, 99, 100, 106, 115). Other infectious diseases studied include malaria (11, 42, 75, 90, 128); schistosomiasis (78, 120, 123,) hepatitis B, C, D, or E infections (6, 9, 20, 43) sexually transmitted infections other than HIV (21, 57, 87, 129), and intestinal infections (15, 122).

As in previous updates, there were limited studies on non-communicable disease burden among PLWH in Ethiopia. In a master thesis, Lemma (82) reported on the prevalence and risk factors for non-communicable diseases among HIV patients in selected health facilities in Addis Ababa. In a conference abstract, Diop and Adoukonou (45) noted the increasing prevalence of non-communicable diseases including, including diabetes, obesity, dyslipidemia, hypertension, and stroke. PLWH are more likely to suffer from non-communicable diseases, such as cardiovascular diseases and mental health issues, partly because HIV's effects on their immune systems, the side effects of antiretroviral treatments, or the social and psychological stress associated with living with HIV diagnosis. Further research in this area will be important to fill the knowledge gap.

HIV-Related Risk and Protective Behaviors

The 2016 EDHS data show that comprehensive knowledge about HIV/AIDS prevention has increased over the years. For example, the percentage of respondents who know that using condoms consistently and limiting sexual intercourse to one uninfected partner can reduce the risk of HIV has increased from 32% in 2000 to 49% in 2016 among women and from 58% in 2000 to 69% in 2016 among men. Progress made in changing community behavioral norms that help prevent HIV infection are documented in 2016 EDHS reports. For example, the percentages of 25-49 years old women and men who have had sexual intercourse by age 18 have declined from 69% in 2000 to 62% in 2016 for women and from 25% in 2000 to 17% in 2016 for men. However, only 20% of women and 51% of men who had a non-cohabiting partner in the past 12 months reported using a condom during last sexual intercourse with such a partner. While these increasing trends are encouraging, more work has to be done to improve knowledge of prevention methods and even more has to be done to bring about consistent behavior change to prevent acquiring or transmitting HIV infection.

Several other studies examined the patterns of sexual initiation and premarital sexual activities among young people (14, 29, 62, 83, 125). In addition, research on a variety of sexual and drug use related HIV risk behaviors and factors associated with those behaviors have been reported (1, 29, 35, 36, 49, 62, 77, 85, 94, 95, 103, 118, 127, 130). Of these, we highlight three studies for their unique focus. Molla and colleagues (94) focused on risky sexual practice and associated factors among 513 adult HIV positive clients attending antiretroviral treatment clinics at Gondar University Referral Hospital. The study revealed that the prevalence of one or more risky sexual practices (including having multiple sexual partners, casual sex, sex without or inconsistent use of condom even with regular partner, sex with the influence of substance like

alcohol) in the past three months was 38% (95% CI: 33.3%, 42.3%). Engagement in risk behaviors was more likely among the young, unmarried, and those whose CD4 count was greater than 500/mm3. The findings imply the need to expand HIV prevention messages for young and relatively healthy people living with HIV.

There were very limited studies on drug use and its connection with HIV infection (17, 36). An important study by Berhanu and colleagues (36) examined the associations between khat use and HIV risk and status among 684 voluntary counseling and testing center clients in Addis Ababa. Their results indicate that khat use was significantly associated with other risk behaviors, including alcohol use and greater number of lifetime sex partners. More importantly, the study found a statistically significant association between khat use, the number of lifetime sexual partners, and HIV-positive status. Interestingly, the association between khat use and HIV status remained significant after adjusting for age, marital status, and number of sex partners in one's lifetime. The results demonstrated that drug and sexual risk behaviors may have interactive and independent effects on HIV infection. This is an area that needs further attention as anecdotal evidence suggests a growing drug use problem in urban areas of Ethiopia.

Finally, Mazengia and colleagues (85) conducted a qualitative research to explore the anal sex experience and HIV risk awareness of female sex workers in Dire Dawa. The authors found that female sex workers practiced anal sex without risk reduction approaches and lacked adequate knowledge about the higher risk associated with anal sex for HIV transmission. Among the reasons for engaging in anal sex included financial gain, intimacy and love, coercion, and peer pressure. The authors recommended that public health agencies incorporate programs to increase awareness about risk of anal sex and methods of risk reduction for female sex workers. This is an important line of research into specific sexual acts, that are often taboo subjects for discussion, but that carry high risk for HIV infection and as a result deserve further attention.

Sexual and Gender-based Abuse and Violence

Sexual and gender-based harassment, abuse or violence are pervasive social problems that lead to multiple psychosocial and physical problems among victims, including potential spread of HIV infection. The 2016 EDHS monitored a variety of attitudes and behaviors that are tied to sexual and gender-based abuse and violence, including attitudes toward wife. Overall, the survey revealed that 63% and 28% of 15-49 years old Ethiopian women and men respectively believe that a husband is justified in beating his wife in at least one of the five specified circumstances (if she burns the food, she argues with him, she goes out without telling him, she neglects the children, and she refuses to have sex with him). This attitude, however, is declining over time from 85% in 2000 to 63% in 2016 for women and from 76% in 2000 to 28% in 2016 for men. Despite the positive trends, women in Ethiopia experience a combination of different forms of violence. The 2016 EDHS revealed that 16% of women experienced physical violence only, 3% experienced sexual violence only, and 7% experienced both physical and sexual violence, with an overall rate 26% of 15-49 year old women to have had experienced either physical or sexual violence, or both.

Several theses and conference abstracts examined the prevalence, associated factors, and/or consequences of various forms of sexual and gender-based harassment, abuse, and violence against young school-age girls, female college students, married women, visually impaired women, and commercial sex workers (22, 25, 33, 52, 53, 68, 69, 80, 98) and sexual abuse among children (18, 114, 124). The titles of studies indicate interest in documenting the physical and psychological consequences of sexual and gender-based violence (18, 22, 25, 80). Unfortunately, we do not have the abstracts or the full-text of these theses to summarize their key findings. It will be very important to support the publication of these theses for a wider reach and further expansion of the knowledge-base for prevention and mitigation of the effects of sexual and gender-based abuse and violence in Ethiopia.

Female genital mutilation or cutting (FGM/C) is considered a gender-based violence against women, a violation of human rights, a cause of serious medical complications, and a potentially facilitator of HIV infection. According to the 2016 EDHS, 65% of 15-49 year old women were circumcised with the highest rate in Somali (99%) and lowest in Tigray (23%). Mothers reported that 16% of their 0-14 year old girls were circumcised, and that the rate of girls being circumcised increased if their mothers were circumcised themselves. According to the survey, only 18% of mothers interviewed believed that the practice should be continued. The intergenerational differences (65% of 15-49 year old versus 16% of 0-14 year old children) and the lower proportion of women preferring to continue the practice indicates that attitudes and practices are changing towards elimination of FGM/C. In addition to the EDHS, two other studies examined the determinants of FGM/C in East Gojam Zone in Amhara Region (23) and knowledge, attitudes and practices of FGM/C in Shebelle community, Somali Region (92).

Other Existing or Trending HIV/AIDS Research Topics

There were also studies that reported on other topics covered in previous updates or areas that may be trending. Four studies reported on issues relevant to cervical cancer, including knowledge and attitude to cervical cancer screening among health workers (30), assessment of girls' preference for HPV vaccination (27); burden and genotype distribution of risk of HPV (47); factors associated with cervical precancerous lesions among screened women (59); and cervical cancer patients' presentation and survival (65). Studies on the fertility desires of (13) and unintended pregnancy among PLWH (13) have also been reported. As in previous updates, nutritional status or nutritional

abnormalities among PLWH (119) and children (12, 44, 55) have also been explored. The incidence and patterns of surgical glove perforations (31) and needle stick injuries (70) still point to the discontinued presence of risk of exposure to healthcare workers to HIV and other infectious diseases. Finally, researchers have continued to explore knowledge, attitudes, and practices related to HIV/AIDS or reproductive health among young people (28, 66, 112, 127).

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Section 3: Impact Research

This section covers 22 studies of the demographic, social, psychological, and economic impacts of HIV/AIDS on individuals, families, communities, institutions and the nation. It is comprised of 11 journal articles (1, 2, 5, 8, 11, 15, 17, 19-22) AAU masters theses (4, 6, 7, 10, 14, 16), and 4 EPHA annual conference presentations (3, 9, 12, 13).

Five of the studies in this section (4, 8, 14, 19, 22) deal with anxiety, depression, psycho-social and neuro-cognitive disorders – including suicidal ideation among HIV patients on or without anti-retroviral therapy. Atoma's thesis (4) and the article by Yeneabat et al. (22) looked at anxiety and depression among patients enrolled in ART, while Gebremariam's article (8) described prevalence and associated factors of suicide ideation among ART users. Ochofe's thesis (14) addresses psychosocial distress and coping mechanisms among low income pregnant women living with HIV/AIDS, and the article by Tsegaw et al. (19) screened HIV associated neuro-cognitive disorders among patients on ART.

Malnutrition and energy deficiency among patients on ART, as well as the growth of infants of mothers with HIV were discussed in two of the conference presentations (9, 13) and two of the journal articles (11, 21). One conference presentation (3) looked at undernutrition and related factors among tuberculosis patients, while another one (12) identified determinants of low birth weight among institutional deliveries. An AAU thesis by Seifu (16) assessed the gestational weight gain and associated factors among HIV-negative and HIV-positive women in Addis Ababa.

Impacts seen on children were topics of some of the articles in this section. Tadesse et al. (18) evaluated the psychological wellbeing of primary school children orphaned by HIV/AIDS. There was a thesis research by Doda (6) that looked at depression among institutionalized children; and a journal article by Smith et al. (17) described the prevalence of hearing loss among HAART- treated children in the Horn of Africa. An article by Tsegaye et al. (20) compared the magnitude of cytopenia among HAART-naïve and HAART-experienced children in the Bahir Dar area.

Two journal articles by Amemayehu et al. (1, 2) were concerned with health-related quality of life of HIV patients with or without visceral leishmaniasis co-infection in northwest Ethiopia.

Stigma and discrimination among PLHIV on ART were issues raised by Gebremariam's (7) thesis research, while a thesis by Kinfu (10) described borderline sex work and its socio-cultural effects in the northwest border area of Ethiopia.

The article by Azagew et al. (5) described high prevlance of pain among adult HIV patients at Gondar University Hospital, while that of Schonfeld et al. (15) showed the prevalence and impact of STIs among pregnant women in central Ethiopia.

1. Alemayehu M, Wubshet M, Mesfin N, Gebayehu A. Perceived quality of life among visceral leishmaniasis and HIV coinfected migrant male-workers in northwest Ethiopia: a qualitative study. *BMC Public Health* 2017;17(1):204. Epub 2017/02/18. doi: 10.1186/s12889-017-4132-z. PubMed PMID: 28209209; PubMed Central PMCID: PMCPMC5314622.

2. Alemayehu M, Wubshet M, Mesfin N, Tamiru A, Gebayehu A. Health-related quality of life of HIV-infected adults with and without visceral leishmaniasis in northwest Ethiopia. *Health and Quality of Life Outcomes* 2017;15(1):65. Epub 2017/08/31. doi: 10.1186/s12955-017-0636-6. PubMed PMID: 28851361; PubMed Central PMCID: PMCPMC5576231.
3. Anbese AT. Undernutrition and associated factors among adult tuberculosis patients in public health facilities of Shashemene, Ethiopia. Abstracts of the 28th Annual Conference of the Ethiopian Public Health Association; Harar, 2017.
4. Atoma EB. Anxiety and depression among people living with HIV enrolled in antiretroviral treatment in AIDS Healthcare Foundation Yeka Clinic. Thesis, Addis Ababa University; 2017.
5. Azagew AW, Woreta HK, Tilahun AD, Anlay DZ. High prevalence of pain among adult HIV-infected patients at University of Gondar Hospital, Northwest Ethiopia. *Journal of Pain Research* 2017;10:2461-9. Epub 2017/10/28. doi: 10.2147/jpr.S141189. PubMed PMID: 29075137; PubMed Central PMCID: PMCPMC5648308.
6. Doda Y. Level of depression among institutionalized orphan children. Thesis, Addis Ababa University; 2017.
7. Gebremariam BT. The lived experiences of PLWHA regarding stigma and discrimination among ART users at W/ro Belethachew Health Center in Lideta Sub City, Addis Ababa. Thesis, Addis Ababa University; 2017.
8. Gebremariam EH, Reta MM, Nasir Z, Amdie FZ. Prevalence and associated factors of suicidal ideation and attempt among people living with HIV/AIDS at Zewditu Memorial Hospital, Addis Ababa, Ethiopia: a cross-sectional study. *Psychiatry Journal.* 2017;2017:2301524. Epub 2017/05/12. doi: 10.1155/2017/2301524. PubMed PMID: 28491869; PubMed Central PMCID: PMCPMC5405386.
9. Gedle D, Gelaw B, Muluye D, Mesele M. Prevalence of malnutrition and its associated factors among adult people living with HIV/AIDS receiving anti-retroviral therapy at Butajira Hospital, southern Ethiopia. Abstracts of the 28th Annual Conference of the Ethiopian Public Health Association; Harar, 2017.
10. Kinfu T. Borderland commercial sex work and its sociocultural effects: the case of Metema Yohannes Tow, northwestern Ethiopia. Thesis, Addis Ababa University; 2017.
11. König Walles J, Balcha TT, Winqvist N, Bjorkman P. Growth pattern in Ethiopian infants - the impact of exposure to maternal HIV infection in relation to socio-economic factors. *Global Health Action* 2017;10(1):1296726. Epub 2017/05/05. doi: 10.1080/16549716.2017.1296726. PubMed PMID: 28470110; PubMed Central PMCID: PMCPMC5496093.
12. Mathewos S, Mekuria A. Determinants of low birth weight: the case of institutional deliveries in Gamo-Gofa Zone hospitals, southern Ethiopia: institution-based cross-sectional study. Abstracts of the 28th Annual Conference of the Ethiopian Public Health Association; Harar, 2017.
13. Melak MF, Tsegaye AT, Mesele TAA, T.A. A. Chronic energy deficiency and associated factors amog adults living with HIV in Gondar University Referral Hospital: institution-based coss-sectional study design. Abstracts of the 28th Annual Conference of the Ethiopan Public Health Association; Harar, 2017.
14. Ochofe TW. Psychological distress, resilience and coping among low income pregnant women living with HIV/AIDS; the case of women in Addis Ababa Ketema Sub City. Thesis, Addis Ababa University; 2017.
15. Schonfeld A, Feldt T, Tufa TB, Orth HM, Fuchs A, Mesfun MG, et al. Prevalence and impact of sexually transmitted infections in pregnant women in central Ethiopia. *International Journal of STD & AIDS* 2018;29(3):251-8. Epub 2017/08/05. doi: 10.1177/0956462417723545. PubMed PMID: 28776463.
16. Seifu B. Assessment of gestational weight gain and associated factors among HIV-negative and HIV-positive women in Addis Ababa, 2017. Thesis, Addis Ababa University; 2017.
17. Smith AF, Ianacone DC, Ensink RJH, Melaku A, Casselbrant ML, Isaacson G. Prevalence of hearing-loss among HAART-treated children in the Horn of Africa. *International Journal of Pediatric Otorhinolaryngology* 2017;98:166-70. Epub 2017/06/07. doi: 10.1016/j.ijporl.2017.04.050. PubMed PMID: 28583495.
18. Tadesse M, Tigistu M, Seyoum D. Psychological wellbeing of children orphaned by HIV/AIDS: a comparative study in public promary schools of Jimma town, southwest Ethiopia. Abstracts of the 9th IAS Conference on HIV Science, Paris, France. Abstract no. MOPEC0645.
19. Tsegaw M, Andargie G, Alem G, Tareke M. Screening HIV-associated neurocognitive disorders (HAND) among HIV positive patients attending antiretroviral therapy in South Wollo, Ethiopia. *Journal of Psychiatric Research* 2017;85:37-41. Epub 2016/11/09. doi: 10.1016/j.jpsychires.2016.10.016. PubMed PMID: 27799651.
20. Tsegay YG, Tadele A, Addis Z, Alemu A, Melku M. Magnitude of cytopenias among HIV-infected children in Bahir Dar, northwest Ethiopia: a comparison of HAART-naive and HAART-experienced children. *HIV/AIDS* (Auckland, NZ) 2017;9:31-42. Epub 2017/03/07. doi: 10.2147/hiv.S125958. PubMed PMID: 28260948; PubMed Central PMCID: PMCPMC5325102.
21. Weldehaweria NB, Abreha EH, Weldu MG, Misgina KH. Psychosocial correlates of nutritional status among people living with HIV on antiretroviral therapy: a matched case-control study in Central Zone of Tigray, northern Ethiopia. *PLoS One* 2017;12(3):e0174082. Epub 2017/03/17. doi: 10.1371/journal.pone.0174082.

PubMed PMID: 28301592; PubMed Central PMCID: PMCPMC5354448.
22. Yeneabat T, Bedaso A, Amare T. Factors associated with depressive symptoms in people living with HIV attending antiretroviral clinic at Fitche Zonal Hospital, Central Ethiopia: cross-sectional study conducted in 2012. *Neuropsychiatric Disease and Treatment* 2017;13:2125-31. Epub 2017/09/02. doi: 10.2147/ndt.S131722. PubMed PMID: 28860769; PubMed Central PMCID: PMCPMC5558878

Section 4: Prevention

This section includes reports on research and programmatic activities that aimed at provision of prevention services targeted at HIV/AIDS and related opportunistic infections. Information and behavioral change communication, provision of voluntary testing and counseling and prevention of mother-to-child transmission, community mobilization, and other risk-reduction efforts against HIV/AIDS are studies included in this section.

This section summarizes 91 studies, 41 more than the 2016 Update. They include 39 master theses, 36 published articles, 14 conference presentations and 2 reports. Breast feeding practices and its relation to HIV infection, covered also in previous updates, was addressed by 14 studies, more studies than on any other topic. Several studies addressed breastfeeding intention and use among women in HIV care. Abdissa's study examined mothers' reluctance to get breast milk from a human breast milk in the era of HIV/AIDS while another study by Ahmed identified determinants of early initiation of complementary feeding (1). A study by Assefa et al. (16) showed HIV-free survival and morbidity among breast-fed and formula-fed infants and young children in a prevention of MTCT of HIV program. Another study, by Birhanu (27), documented fathers' attitudes towards breast feeding and associated factors among fathers who accompanied their spouses for delivery in selected governmental hospitals in Addis Ababa, Ethiopia. Markos (60) assessed fathers' attitudes towards breast feeding and associated factors among fathers who accompanied their partners for delivery in selected government hospitals in Addis Ababa. Bogale (29) explored breastfeeding practices among employed mothers and perception of employers in Addis Ababa. Nine studies focueds on exclusive breastfeeding. Earsido (36) reported on the prevalence and predictors of exclusive breastfeeding practices among infants in Hosanna Town. Bayissa (23) studied exclusive breast feeding status and its determinants among HIV-positive women in West Showa Zone. Yenit et al. (89, 90) documented the exclusive breastfeeding and associated factors among HIV-positive mothers attending governmental hospitals in North Gondar Zone. Fenta (40) did a study on a single 24 hour recall overestimate of exclusive breast feeding practices among infants aged less than six months in rural Ethiopian communities. Genetu et al. (47) found breastfeeding counseling and support to be associated with continuous exclusive breastfeeding from one week to six months of age among HIV-exposed infants in North Gondar Zone. A survival analysis of predictors of exclusive breast feeding duration among women who had a 6-12 months old child in Gurage Zone was carried out by Kasahun et al. (55). Sinshaw et al. (75) studied exclusive breast feeding and associated factors among mothers in Debre Markos Town and Gozamen District, East Gojjam Zone. The prevalence and predictors of early breastfeeding initiation among mothers and children under 24 months of age in rural parts of western Ethiopia were assessed by Wolde et al. (86). Tafese et al. (77) descibed infant feeding practices in urban and rural communities in Gojjam.

Ten studies addressed sexual and reproductive health services utilization, including those by Abebe (3), in Addis Ababa and by Addis and Kebeda (6) on attitudes of HIV-positive pregnant women toward family planning and its associated factors in public hospital of Addis Ababa. Ansha et al. (13) studied reproductive health services utilization and associated factors among adolescents in Anchar Woreda. Atnafseged (17) assessed the relationship between comprehensive sexuality education and adolescent risky behavior among adolescents and Gelagay (44) and Temesgen (82) studied sexual and reproductive health services utilization and associated factors among students. Four studies revisited the already widely treated issue of contraceptives and associated factors, including one which assessed the provision of implanom oral contraceptives by extension workers in health posts (34) and one examining the use of emergency oral contraceptives in relation to risky sexual behavior among university students (37). Meshesha (63) described the utilization of reproductive health services among students with disabilities. Abera (4) examined the intention to use condoms among students of Debre Work Senior Secondary and Preparatory School. Four studies addressed issues of HIV counselling and testing (66, 73, 87), including one on the implementation of early infant diagnosis and CD4 testing (72).

Cervical cancer prevention was given due attention by nine studies of cervical cancer knowledge, screeing practices and associated factors, as well as the use of preventive health services among HIV-positive women in clients of health facilities, army women, women attending ANC services, gynecological outpatient clinics in selected hospitals in Addis Ababa (12, 15, 26, 61); among women aged 30 years and above in Woliso Town (64), women of childbearing age in Hosanna Town (19), among women living with HIV/AIDS in northwest Ethiopia (39,62) and among HIV-positive women in Gondar University Referral Hospital (44). All of these studies have consistently shown low levels of comprehensive knowledge and uptake of cervical cancer screening in different parts of Ethiopia.

Mother-to-child transmission (MTCT) of HIV, a persisting major problem in HIV epidemiology in Ethiopia which accounts for about 10% of all new infections in children (58), was addressed by 11 studies. Balcha (20, 21) focused on the practice and quality of the prevention of mother-to-child

transmission of HIV services in public hospitals of Hadiya Zone. Belkato et al. (25) examined the involvement of male partners in the prevention of mother-to-child transmission of HIV in Hadiya Zone and Delelegn and Yemiamrew in South Wollo Zone (32). Mohammed (67) explored the role of male partners in women accessing and using ANC/PMTCT of HIV in Addis Ababa. Alemayehu (10) described the HIV MTCT knowledge of antenatal clients in Addis Ababa hospitals. Girma et al. (50) studied the uptake and effectiveness of HIV MTCT prevention and early HIV diagnosis in infants. Alemayehu and Haidar (9) addressed the issue of male involvement in prevention of mother-to-child transmission of HIV in the context of partner testing in Goba town and Alemu et al. (11) described the utilization of HIV testing services among pregnant mothers in low income primary care settings in northern Ethiopia. Ansha (19) assessed the quality of prevention of mother-to-child transmission of HIV services in public hospitals of Hadiya Zone. The cohort study by Israel et al. (54) showed that 11.9%, 15.7% and 22.6% of pregnant and breastefeding mothers discontinued the ART program after 6, 12 and 24 months, respectively. Due to the high loss rates shortly after commencement of treatament, among younger females, and in women attending hospitals, the authors recommend targeted HIV care and treatment programs. Mama et al. (59) assessed the effectiveness of the HIV MTCT program in Assela Hospital. An economic study using the human capital approach found that productivity losses incured by HIV-positive women/infant pairs using PMTCT services amounted to 16% of househol incomne in urban areas and 7% in rural areas (91).

Communication of information on sexuality and sexual disease risk between parents and their children and in the school environment continues to constitute a challenge in prevention efforts. Alaro (8), Feyisa (41) and Gudeta (51) examined parent-adolescent communication on sexuality and reproductivity. The communication strategy of the Ministry of Education for use in schools was described in a 2013 report (65). Tesfaw (83) assessed the integration of comprehensive sexual and reproductive health education in three high school is Addis Ababa. As shown in earlier HIV/AIDS Updates, means of communication, as well as adolescent's reproductive health problems and service preferences and accessibility will have to be addressed to promote adolescent's sexuality health (57).

Three studies focused on tuberculosis prevention. Geleto et al. (45) studied TB case finding and isoniazid preventive therapy for positive children n East Harari Region. Datigo et al. (30) found that isoniazid prevention therapy at the household level identified additional TB cases and resulted in higher acceptance rates and better treatment outcomes among children. Getahun and Yimer (49) reported on practices of health care providers in the prevention and control of multi-drug resistant tuberculosis.

Domestic violence against women, a problem reported by numerous earlier studies, was addressed by Erisa (38), who assessed much-needed interventions by Addis Ababa City Administration. Hailu (52) proposed prevention strategies from a social work perspective that involve community policing. Mulugeta (70) explored the possibility of child participating in the prevention of violence against children, a promissing but untested approach.

The remaining studies addressed sociocultural factors in family planning among PLWHIV (33), utilization of voluntary counceling and testing services among teachers (34), the disclosure of HIV status to infected children (81), the psychosocial profile of child commercial sex workers and their use of counseling (5), sustainability of HIV/STI projects without donor support (85), the need for youth-friendly sexual and reproductive health services for adolescent students, family planning needs and practices (68, 74, 80, 84), the contribution of adult education on the prevention and control of HIV/AIDS (78), and the use of traditional contraceptive methods among Surma women (71).

1. Abdissa ZA. Perception of breast fedding mothers regarding breast milk donation and establishment of a human breast milk bank. Thesis, Addis Ababa University; 2017.
2. Abebaw TA, Aderaw Z, Gebremichael B. Hepatitis B virus vaccination status and associated factors among health care workers in Shashemene Zonal Town, Shashemene, Ethiopia: a cross sectional study. *BMC Research Notes*. 2017;10(1):260. Epub 2017/07/08. doi: 10.1186/s13104-017-2582-0. PubMed PMID: 28683822; PubMed Central PMCID: PMCPMC5501475.
3. Abebe A. Assessement of sexual and reproductive health service utilization by secondary school students in Addis Ababa. Thesis, Addis Ababa University; 2017.
4. Abera H, Tamiru F, Kibret GD. Intention toward condom use and its associated factors among students of Debre Work Senior Secondary and Preparatory School, East Gojjam Zone, Amhara Region, Ethiopia. *HIV/AIDS* (Auckland, NZ). 2017;9:137-43. Epub 2017/07/12. doi: 10.2147/hiv.S130145. PubMed PMID: 28694711; PubMed Central PMCID: PMCPMC5490431.
5. Adamu M. The psychosocial profile of child commercial sex workers and counseling services at Forum on Sustainable Child Empowerment in Addis Ababa. Thesis, Addis Ababa University; 2017.
6. Addis N, Kebeda E. Attitudes of HIV-positive pregnant women toward family planning and its associated factors in public hospital of Addis Ababa, Ethiopia. *Ethiopian Journal of Reproductive Health.* 2017;9(1):25-35. PubMed PMID: 330783.
7. Ahmed KY. Determinants of early initiation of complementary feeding in Sinana District, northwest Ethiopia: a case control study. Abstracts of the 28th Annual Conference of the Ethiopian Public Health Association; Harar, 2017.

8. Alaro M. Parent-adolescent communication on sexuality: focus on school adolescents in Addis Ababa. Thesis, Addis Ababa University; 2017.
9. Alemayehu MT, Haidar J. Male involvement in prevention of mother-to-child transmission of HIV in the context of partner testing in Goba town, Ethiopia: a facility-based cross-sectional study. *South African Medical Journal* = Suid-Afrikaanse tydskrif vir geneeskunde. 2017;107(10):864-70. Epub 2017/10/13. doi: 10.7196/SAMJ.2017.v107i10.11371. PubMed PMID: 29022530.
10. Alemayehu Y. Prevalence and knowledge of mother-to-child transmisison of HIV among ANC users at selected public hospitals in Addis Ababa, Ethiopia. Thesis, Addis Ababa University; 2017.
11. Alemu YM, Ambaw F, Wilder-Smith A. Utilization of HIV testing services among pregnant mothers in low income primary care settings in northern Ethiopia: a cross sectional study. *BMC Pregnancy and Childbirth*. 2017;17(1):199. Epub 2017/06/26. doi: 10.1186/s12884-017-1389-2. PubMed PMID: 28646888; PubMed Central PMCID: PMCPMC5483315.
12. Anley M. Assessment of factors that lead to delay for the diagnosis and treatment of cervical cancer among patients attending health care services at Tikur Anbessa Specialized Hospital Radiotherapy Center, Addis Ababa, Ethiopia. Thesis, Addis Ababa University; 2017.
13. Ansha MG, Bosho CJ, Jaleta FT. Reproductive health services utilization and associated factors among adolescents in Anchar District, east Ethiopia. *Journal of Family and Reproductive Health.* 2017;11(2):110-8. Epub 2017/12/29. PubMed PMID: 29282419; PubMed Central PMCID: PMCPMC5742664.
14. Asfew E. Factors associated with the utilization of the prevention of mother-to-child HIV transmission service in Ethiopia applying count regression. Abstracts of the 28th Annual Conference of the Ethiopian Public Health Association; Harar, 2017.
15. Ashagrie A. Assessment of cervical cancer knowlledge, screeing practices and associated factors among HIV-positive women in health facilities in Addis Ababa, Ethiopia. Thesis, Addis Ababa University; 2017.
16. Assefa M, Worku A, Yesuf A. HIV-free survival and morbidity among breast-fed and formula-fed infants and young children in a prevention of MTCT of HIV program in Addis Ababa, Ethiopia, 2014. *Asian Pacific Journal of Tropical Disease*. 2017;7(4):225-32. PubMed PMID: 616388476.
17. Atnafseged B. Correlation between comprehensive sexualiyt education and adolescent risky behavior, Addis Ababa, Ethiopia. Thesis, Addis Ababa University; 2017.
18. Awungafac G, Delvaux T, Vuylsteke B. Systematic review of sex work interventions in sub-Saharan Africa: examining combination prevention approaches. *Tropical Medicine and International Health* : TM & IH. 2017;22(8):971-93. Epub 2017/04/28. doi: 10.1111/tmi.12890. PubMed PMID: 28449198.
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20. Balcha B. Quality of prevention of mother-to-child transmisison of HIV services in public hospitals of HadiyaZone, Southern Ethiopia. Thesis, Jimma University; 2017.
21. Balcha B. Prevention of mother-to-child transmission of HIV services in public hospitals of Hadiya Zone, Southern Ethiopia. Thesis, Jimma University; 2017.
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23. Bayissa ZB. Exclusive breast feeding status and its determinant among HIV positive women in West Showa Zone Oromia Region Ethiopia. *Journal of AIDS and Clinical Research.* 2017;8(1). PubMed PMID: 20173320994.
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25. Belato DT, Mekiso AB, Begashaw B. Male partners involvement in prevention of mother-to-child transmission of HIV services in southern central Ethiopia: In case of Lemo District, Hadiya Zone. *AIDS Research and Treatment.* 2017;2017:8617540. Epub 2017/04/15. doi: 10.1155/2017/8617540. PubMed PMID: 28409027; PubMed Central PMCID: PMCPMC5376926.
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27. Birhanu E. Assessmentt of fathers' attitudes towards breast feeding and associated factors among fathers who accompanied their patrners for delivery in selected governmental hospitals, Addis Ababa, Ethiopia, 2017. Thesis, Addis Ababa University; 2017.
28. Bizuayehu L. Knowledge, attitudes and practices about cervical cancer screening and associated factors among HIV-positive women in health institutions of Bahirdar Town, northwest Ethiopia. Thesis, Addis Ababa University; 2017.

29. Bogale F. Explore breastfeeding practices among employed mothers and perception of employers in Addis Ababa, Ethiopia. Thesis, Addis Ababa University; 2017.
30. Datiko DG, Yassin MA, Theobald SJ, Cuevas LE. A community-based isoniazid preventive therapy for the prevention of childhood tuberculosis in Ethiopia. The International *Journal of Tuberculosis and Lung Disease:* the official journal of the International Union against Tuberculosis and Lung Disease. 2017;21(9):1002-7. Epub 2017/08/23. doi: 10.5588/ijtld.16.0471. PubMed PMID: 28826449; PubMed Central PMCID: PMCPMC5566998.
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32. Delelegn T, Yemiamrew G. Male partner support and associated factor on PMTCT option B+ among HIV positive pregnant and lactating mothers in South Wollo Zone, north east Ethiopia. *Clinics in Mother and Child Health.* 2017;14(3). PubMed PMID: 20183152215.
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37. Edo M. Correlation of emergency oral contraceptive use with risky sexual behavior among female students of Wolkite University. Thesis, Addis Ababa University; 2017.
38. Erisa G. Factors, impacts and management strategies of domestic violence against women: a case study of Addis Ababa City Administration. Thesis, Addis Ababa University; 2017.
39. Erku DA, Netere AK, Mersha AG, Abebe SA, Mekuria AB, Belachew SA. Comprehensive knowledge and uptake of cervical cancer screening is low among women living with HIV/AIDS in northwest Ethiopia. *Gynecologic Oncology Research and Practice*. 2017;4:20. Epub 2017/12/26. doi: 10.1186/s40661-017-0057-6. PubMed PMID: 29276611; PubMed Central PMCID: PMCPMC5738137.
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41. Feyisa M. Parent adolescent sexual and reproductive health communication among secondary and preparatory schools in Fiche Town, central Ethiopia. Thesis, Addis Ababa University; 2017.
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Section 5: Treatment, Care and Clinical Research
This section includes studies on the characteristics and clinical course of HIV infection and opportunistic infections, treatment for HIV infection and opportunistic infections, effects and outcomes associated with treatment, and clinical and non-clinical care and supportive services provided for people living with HIV/AIDS.

This section contains 184 references, 80 (76.9%) more than the 2016 Update. This increase reflects mounting interest in studying a broader range of issues and interrelations between the treatments of AIDS, TB and concomitant and opportunistic infections as well as on the impacts of treatment and non-adherence on ART; 130 (70.7%) of these references are to published articles, 34 conference papers, 18 MA and MSc theses, and 2 reports. One-hundred forty-one the references were to studies of general populations, 23 of children, 11 of women (including 4 on pregnant women), 2 of adolescents, one each of mother-to-child transmission and medical students, and 4 were case studies.

ART Initiation, Treatment Outcome and Clinical Studies: The largest number (30, 16.8%) of the references pertained to HIV diagnosis, ART initiation, immunological parameters, and treatment outcome in HIV mono-infections. Kafele et al. addressed the urgent issue of viral load testing and early infant diagnosis of HIV (16). Two studies focused on initiation of ART (136, 137); they reported high psychological distress among new ART patients, mostly among those who were recently diagnosed and initiated treatment late. Twenty-eight of the outcome studies dealt with HIV treatment, including 7 on ART failure (24, 28, 45, 49, 155, 158, 178) and 2 on drug resistance of HIV (7, 132). Although drug resistance surveillance is recommended by WHO and the Ethiopian Ministry of Health due to the increased use of antiretrovirals, recent ART data on drug resistance, as well as treatment failure in Ethiopia are scarce (7). Drug resistance and treatment failure are on the rise in an increasing number of countries worldwide and are one of the markers of HIV programs. Four HIV studies reported on mortality during ART and examined HIV mortality predictors (9, 19, 152, 184), 3 on renal and liver toxicity (26, 27, 179**),** 2 on liver toxicity (140, 151), 1 on eye manifestations (13), 3 on HIV stigma (42, 95-97), 3 on general physical health, including 1 each on chronic energy deficiency, quality of life, and sleep disturbance during ART (68, 119, 156), on reduced neurocognition (34), hearing loss (99), anemia and renal insufficiency (71), on the underuse of pain medications (135), on ART effects on genome variability (35), on the time to the development of adverse drug reactions among people on ART (111), on the time to immunological recovery among HIV-infected patients on ART (89). Two studies assessed clinical and immunological parameters of tenofovir and zidovudine (22, 23). One study evaluated cotrimoxazole as a preventive therapy for HIV infections (1). One study each examined the hematological profiles of HIV-infected adults (73) and children (79, 133). One study assessed lipid peroxidation and antioxidant profiles in pediatric ART cases (120), and Petrosz et al. (139) associated a genetic marker with anti-TB and ARV drugs induced liver cancer.

Two studies addressed fertility issues in HIV infection. Meseret et al. (127) studied the incidence of pregnancy among HIV-infected women on ART and Mekonnen and Enquselassie (122) the relationship between fertility intention and prolonged ART. This study found that the number of children women on ART for 12 months wanted was higher than at initiation of treatment and that ART was significantly associated with these higher fertility intentions. These results raise the question whether ART may contribute to overcoming unmet fertility needs.

Six studies examined nutritional aspects of HIV infection and ART. Tadesse et al. (159) associated anemia in antenatal clients with undernutrition, specifically inadequate intake of dark green vegetables and chicken, trimester of current pregnancy and HIV infection. Dedha et al. (53) found the prevalence of undernutrition (body mass index) among patients on ART to be significantly and independently associated with duration on ART (>12 months), diarrhea, severe food insecurity, and *khat* chewing and called for nutritional assessments during follow-up and routine nutritional therapy for undernutrition. Mekuria et al. (122) reported that the recovery rates from severe malnutrition among children aged 6-59 months were highest in older children and those who were given folic acid. Kedir et al. (107) found diabetic ketoacidosis to be the leading cause of admission to the intensive care unit of St. Paul's Hospital Medical College in Addis Ababa. Getachew et al. (85) examined the relationship between nutritional status and CD4 counts in patients on HAART and Mulu et al. (133) assessed hematological and CD4 reference ranges among healthy adults in Gojam. Hussen et al. (98) assessed the link between nutritional status of HIV-infected persons on HAART and opportunistic infections.

***Treatment and Clinical and Immunological Studies of Comorbidities*:** Seventeen studies described treatment of comorbidities. Most of these studies were on coinfection of HIV and TB, which continue to result in poor treatment outcomes. Fourteen studies focused on HIV/TB coinfections, including drug resistance (4, 29, 40, 63, 108, 121, 126, 142, 148, 153, 154, 156, 163, 180). One study each reported on the treatment of HIV/cryptococcal infection (37), on the cost-effectiveness of two treatment regimens for toxoplasmic encephalitis in HIV/AIDS patients (77), skin manifestations in HIV/AIDS patients (5), clinical findings of tetanus/HIV coinfections (117), amphotericin B treatment failure in a VL patient 15 years after exposure (62), the development of HBV

drug resistance in HIV infections in the absence of HBV co-management (10), antibody response to hepatitis B vaccine in HIV-infected children (31), the role of HIV infection and ART on childhood hepatitis B vaccine response in HIV-positive children (139), the association between *Helicobacter pylori* infection, CD4 cell counts and HIV infection (36), and HIV/non communicable disease comorbidities (50).

Abossie and Yohannes (4) found a significant decrease in tuberculosis burden in ART patients using preventive isoniazid treatment. Kefale and Anagaw (108), Megersa and Phaladze (121) and Birru et al. (40) examined the relationship between isoniazid prophylactic therapy initiation appropriateness, adverse reactions and adherence in HIV patients. Haile at al. (91) analyzed the time to initiation of ART in HIV-positive TB patients. Reepalu et al. (142) reported poor ART/TB treatment outcome. They concluded that TB coinfections did not affect treatment outcomes but found high levels of unsatisfactory long-term treatment outcomes and slow immunological recovery of coinfected HIV patients. Imama et al. (100) studied the preventive therapy utilization rate in adult HIV/AIDS patients in Jimma Hospital. In a study in Hawassa University Hospital, Simieneh et al. (153) found that although ART and co-trimoxazole preventive therapy reduced the prevalence of TB/HIV coinfections, only a few patients received this treatment. Sinshaw et al. (156) reported successful TB treatment outcomes below the target of the Global Plan to Stop TB 2011-2015 and recommended strengthening TB/HIV management activities. Mohammed et al. (129) identified biomarkers for drug-induced liver injury (DILI) using human samples from both healthy volunteers and persons with DILI (including a cohort of HIV and TB-infected persons). The utility of the potential DILI biomarkers in drug development and clinical practice remains to be evaluated. Gebremichael et al. described the lipid profile of TB and TB/HIV coinfected patients.

Twelve studies were carried out on visceral leishmaniasis (VL) and VL/HIV treatment, an area which obtains urgency because of increased transmission of VL in Ethiopia and frequent poor treatment outcome. Abongomera et al. (3) found high visceral leishmaniasis relapse rates in HIV-VL coinfected patients, which increased from 15% at 6 months after VL treatment to 26% at 12 months and 35% after 24 months. Welay et al. (170) reported unsatisfactory treatment outcome in regard to mortality, treatment failure and non-adherence and recommended early diagnosis and treatment of VL and VL/HIV patients. A case of treatment failure in an immunosuppressed VL patient was described by Eichenberger et al. (62). Three studies reported on the prevalence and outcome of ART in HIV/VL coinfected patients (12, 168, 169) and 1 study found that VL patients starting ART within 4 weeks after VL diagnosis had significantly lower mortality than patients who were already on ART before VL diagnosis (6). Kimutai (110) evaluated the quality of sodium stibogluconate and paromomycin combination for VL treatment. Yizengaw et al. (183) reported on the restoration of impaired neutrophil functions in VL patients after treatment and Adriaensen et al. (8) examined CD40 ligand levels in HIV/VL co-infected patients. Den Boer et al. (55) reviewed the literature on the use of mobile teams in clinical monitoring of VL, a new approach in Sub-Saharan Africa.

***Treatment of Tuberculosis and Other Diseases*:** Thirteen studies dealt with tuberculosis treatment. Five studies described drug resistance patterns in TB (54, 67, 101, 102, 132, 147), including 2 on multidrug resistance of *Mycobacterium tuberculosis* (54, 147) and 1 on rifampicin resistance (134). One study each presented data on survival time and mortality (15), the contribution of community health workers to improving treatment outcomes (52), patient's satisfaction with a DOT strategy (86), data from a 17 year retrospective study of TB in children (141), the need for treatment follow-up appropriate for pastoralists (87), culturally determined causes and culturally accepted treatment of tuberculosis in different parts of Ethiopia (88), and on the outcome of tuberculosis treatment in Jinka General Hospital (176). One study reported on a case of intracranial tuberculoma without pulmonary tuberculosis (69) and another case study of a NS tuberculoma (165). Getnet et al. (87) addressed the question whether retreatment TB patients require special treatment response. Additional studies of individual diseases described the treatment of acute malnutrition (123), malaria (25) and pneumonia (30).

Delays to Seek Treatment: The problem of delays in treatment was addressed by 9 studies. Asres et al. (17) found that most TB patients on DOTS in a rural area waited longer than the expected time to seek diagnosis and treatment, largely due to the type of TB (extra pulmonary), prior visits to traditional healers and use of holy water (*tsebel*). Gesesew et al. (82) reported that widespread delays to seek diagnosis and ART in developing countries, including Ethiopia, due to perceived HIV stigma. According to Bilie et al. (39), ART was changed for a considerable number of patients, mostly due to toxicity, followed by comorbidity. The HAART combinations least likely to be changed in this study were tenofovir + lamivudine + evafirenz and tenofovir + lamivudine + nevirapine. Teklu et al. (162) associated patients' interrupting and restarting treatment with high risk of unfavorable ART outcomes. Kulkarni et al (113) found that HIV-positive adults who opted to be tested only once initiated ART 12 times faster than those who decided to undergo multiple tests. This finding is relevant for providers when counseling people who test positive. Additional studies reported the prevalence, outcomes, and risk factors of late presentation for ART (80), anti-tuberculosis (32, 44), and malaria (56) treatments.

Adherence to Treatment and Loss to Follow-Up: Poor adherence to treatment and loss to follow-up also continue to contribute significantly to unsatisfactory adherence and treatment outcomes. Sixteen studies addressed these two issues in HIV treatment (38, 46,

60, 70, 78, 83, 84, 103,115, 124, 130, 149, 160, 162, 172) and four in TB (20, 144, 166, 167) treatment. The extent of non-adherence to ART is indicated by the following three studies: A multimethod study found that 97% of HIV/AIDS patients reportedly adhered to ART but only 27% of them did so based on pharmacy refill records (124). In a cohort study of 4,900 HIV-infected adult patients between 2003 and 2015, one out of five patients discontinued ART, with increasing rates over time (84).

Hatau (94) reported that gestational age at ART initiation affects retention in HIV PMTCT services. Bezabih et al. 38) found that HIV patients enrolled in a food assistance program had a significantly higher ART adherence rate than patients not receiving food assistance. If these results can be validated by further studies then food security should be adopted as a major strategy to improve adherence to ART. A review of nine studies of discontinuation from ART by the same authors revealed that whereas living in a rural area, being illiterate, unmarried, a smoker, mentally handicapped, and bedridden were risk actors, being coinfected with HIV/TB and having a HIV-positive partner were protective factors (83). Desta et al. (59) identified disclosure of HIV status and use of memory aid as facilitators of ART. Gadissa et al. (72) studied the disclosure history of persons starting ART in six clinics. WHO stage IV, cotrimoxazole prophylactic therapy, and adolescents having a widowed parent were significantly associated with optimum adherence to ART in three hospitals in Addis Ababa (70). Sibhatu et al. (150) compared adherence levels using the Self Report (SR) method currently in nation-wide use with the "gold standard" of outcome-HIV viral suppression. Due to the low sensitivity of the SR method, the authors called for studies to evaluate current treatment practices by HIV clinicians. Tesfaye et al. (164) reported on ARV adherence among HIV-positive pregnant women. Ayele et al (20) self-reported adherence to isoniazid preventive therapy for latent tuberculosis among PLWHIV found high adherence levels.

The reports of intermittent ART use raise the question if alternative sources of medications or alternative medical practices, such as the use of traditional medicine, were used by patients interrupting and restarting prescribed treatments. The use of traditional medicine by people living with HIV/AIDS is well known (92). The use of *khat*, also widespread among HIV-infected persons entering ART programs in Ethiopia (116), also tends to jeopardize adherence to treatment (117). Poor adherence-discontinuing and restarting ART- is widespread in Ethiopia and carries a high risk of poor treatment outcome (162). Sedi (145) reported that 3.8% of 418 HIV-infected patients used alcohol concurrently with ARV drugs.

***Patient Care*:** The need for chronic care for the increasing number of HIV patients on ART and existing care practices and programs were addressed by 19 studies, constituting the second largest subcategory in this section (14, 33, 42, 43, 47, 48, 65, 81, 95, 96, 104, 114, 118,125, 168, 168, 171, 181). Two articles (14,47) described how the integration of the Yekokeb Berhan Project within government structures and processes positively influenced the sustainability of case management and helped to ensure a holistic response to the needs of affected children and their families. Similarly, retention in care, quality of life and reduction in stigma could be achieved by engaging trained community health workers who were HIV-positive (114). Biru et al. (42) described the fear of caregivers to disclose the HIV diagnosis of their children due to stigma and discrimination; they recommended further studies on stigma reduction and caregiver support structures. The same researchers found that children of caregivers/parents who were substance abuser or who did not use ART themselves were less likely to adhere to the prescribed dose (41). Hoffman et al. (95, 96) reported similar findings for adult patients. Little is known about the support structure of faith-based organizations. In a survey of the willingness of followers of the Ethiopian Orthodox Tewahedo Church to receive psychosocial care from religious leaders, most respondents had not pursued this option (65). However, the use of traditional medicine for HIV/AIDS is common. Endale et al. (64) reported that 43.7% of HIV/AIDS patients used traditional, complementary and alternative medicines, mostly spiritual and herbal remedies, along with ART. Mall et al. (118) developed an innovative mental health plan to meet the long-term care needs of people with mental illness. Jerene et al. (104) reported on the success of the national ambulatory service delivery model in sharply increasing the number of TB service facilities and reducing multi-drug resistant tuberculosis in two regions.

***Treatment services*:** Three studies addressed quality of treatment and care and two studies assessed access to HIV services. Low quality of sexually transmitted infection case management was reported by Burussie (48). Getahun (86) found that two-thirds of TB patients in a survey in Addis Ababa were satisfied with DOTS but that all defaulted TB patients were dissatisfied, largely due to shortcomings in the TB and associated services. The author recommended the inclusion of a measure of patient satisfaction of the DOTS services which informs health care workers and managers. Jerene et al. (105) assessed the sustained impact of a mental health task-shifting program on HIV care programs. Mohammed et al. (131) found that women who experienced emotional, physical and sexual violence by partners were less likely to have their first ANC visit, be tested for HIV and were less likely to deliver at health facilities. The review by Peter et al. (138) concluded that further access to viral load testing in Sub-Saharan countries will further facilitate up scaling of ART programs. The Ethiopian Ministry of Health implemented a viral load monitoring program at the national level. Between October 2017 and March 2017; 128,615 viral load tests were performed, achieving 48.8% coverage of all HIV patients receiving ART and viral load suppression in 73% of pediatric patients and 83.9% of adult patients (16).

***Additional references*:** A chronic hepatitis B treatment program, one of the first in sub-Saharan Africa, showed that nearly one third of a cohort of Ethiopian adults had significant liver fibrosis (2). Atun's (18) review documented the displacement of HIV by diabetes and other chronic non-infectious diseases in sub-Saharan Africa. Ayele et al. (21) studied the prevalence of anemia among ANC attendees**.** Dubale (61) described anti-malaria treatment patterns in an Oromia Zone. Koricha (112) found no association between malaria infection and hemoglobin levels in 2-9- year- old children. Gebre Egziabher (74)analyzed the influence of prescription drug promotion on the prescribing behavior of physicians and private hospitals, and Sedi (146) described the effect of promotion on medical students' prescribing behavior. Guda and Abdulahi (90) reported on labor, delivery and postpartum complications in women who underwent genital cutting. Kebede et al. (106) described antimicrobial susceptibility of enteric bacterial pathogens among PLWHIV. Tadesse et al. (157) studied the prevalence of intestinal parasites among pre-ART and ART HIV patients.

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Section 6. Health Services and Health Policy Research

This section includes reports on research and programmatic activities that aimed at expanding and improving the healthcare system, including such issues as expansion of services for people living with HIV/AIDS, health resource economics and management, healthcare staff training, and national as well as international policies, laws, and guidelines for the provision of services and the protection of people living with HIV/AIDS, women, children, and other vulnerable groups.

This section comprises 34 references, including 15 master theses (all from AAU), 12 journal articles, 4 conference presentations, 1 sector report, 1 university report, and 1 newsletter article. They deal with a range of issues ranging from health services and health policy across broad sub-categories from service quality, access, equity, utilization, and client satisfaction; ART related drugs supply chain management; the role of health extension services in HIV/AIDS and SRH services to risk behavior, stigma, discrimination, and disclosure issues related to HIV/AIDS.

Efficiency effectiveness of drug supply chain management is the topic of most of the articles included in this category. One journal article (1) described the expectations and satisfaction with HIV related pharmaceutical care in a university hospital. Five MSc theses (3, 4, 18-20), one PhD dissertation (25), and one journal article (12) deal with ART related supply chain management and two MSc theses (21, 23) assessed the implementation of integrated pharmaceutical logistics systems within public health facilities. One journal article (1) discussed the expectations and satisfaction of HIV/AIDS patients towards the pharmaceutical care provided by a public teaching hospital.

Issues of service utilization, quality and effectiveness of services and role of health extension workers are topics covered by 11 articles in this category (7-9, 11, 14, 17, 29-33). Bekele and Belay's conference presentation (7) discussed the role of health extension workers in medicine management, and Bobo's presentation (8) raised the issue of equity in the utilization of reproductive and maternal health services. The Federal Ministry of Health survey (9) reported on health service utilization and expenditure among PLHIV in 2015/2016, while Worku's thesis (29) highlighted the utilization of a reproductive health package among high school adolescents in Addis Ababa. Yimer's conference presentation (32) looked at the STI related health care needs of daily laborers in Debre Markos. Yakob and Nacama (30) discussed measuring the health system's responsiveness, Yilma (31) assessed HIV services quality within public facilities, and Zegeye et al. (33) addressed the issue of economic evaluation in health sector decision making in Ethiopia. Hailemelekot (14) discussed the

competency level of health extension workers in implementing primary health care, and Kenyon (17) highlighted the precision needed in the response for HIV/AIDS.

Rights to health perspectives were raised by a couple of articles (22, 24). Both of these articles by Ross and Santelli (22) as well as Stack pool-Moore et al. (24) try to link sexual and reproductive health and rights and HIV services to young people. On the other hand, Wolde's conference presentation (26) showed the prevalence and factors associated with disrespectful and abusive maternity care behavior in a district in northern Ethiopia.

Psycho-social, behavioral, and contextual factors related to HIV infection are the themes of a couple of articles (2, 13). Adamu's thesis (2) described the psycho-social profile child commercial sex workers; while Habte (13) described the effects of preparation for repatriation on the lifestyle and risk behaviors for HIV and other STIsin the Ethiopian Jewish (Falasha) community residing in temporary camps in Addis Ababa. Issues related to blood donation are themes of one thesis (10) and one journal atticle (34). Fantahun's thesis (10) assessed first time voluntary blood donors' return rate and influential factors, and the journal article by Zewoldie (34) described transfusion transmissible infections among blood donors.

There was a group of articles (6, 15, 16) that dealt with resources for HIV/AIDS programs. Olivia Bako (6), highlighted the annual sports event sponsored by Rainbow for the Future that was able to raise a substantial sum for orphans and HIV-positive women. A Johns Hopkins University report (15) highlighted the institutionalization of the National AIDS Resources Center within the Federal Ministry of Health, while Karim et al. (16) warns against the closure of the NIF Fogarty Center as threatening global health.

Fentie's thesis (11) highlights practices, perspectives and barriers of HIV disclosure to children and adolescents by health care workers. Two journal articles in this category, both by Wodajo et al. (27, 28) dealt with issues related to HIV stigma and discrimination.

The article by Agyepong Agyepong of the Lancet Commision on the Future of Health in sub-Saharan Africa (5) lauds the many successes by Africans that include greater control during the HIV and malaria epidemics.

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Section 7: Health Informatics, Monitoring and Evaluation

This section deals with the diverse but interlinked components of health informatics, monitoring and evaluation of HIV/AIDS, malaria, TB and other associated problems. Health informatics components evidently generate useful information on the design of tools, systems and procedures to improve evidence generation, monitoring and management of HIV and AIDS diagnosis and treatment.

Sixty-three publications, academic theses and conference presentations are included in this section. Forty-seven of the references were articles published in peer-reviewed journals, 8 were academic theses and 8 papers were presented at conferences organized by Ethiopian and international medical and public health associations. Forty-seven percent of the papers dealt

with HIV and AIDS and the remaining ones focused on HIV-TB coinfections, leishmaniasis, maternal health and related technologies and metrics.

The studies were categorized into three broad themes. The first category includes cross- sectional studies that focus, among others, on measuring HIV and HIV/AIDS prevalence, determinants and predictors. Most of these studies provided information on and methods of specific metrics of HIV/AIDS, HIV/TBco-infections, malaria and other parasitosis, including prevalence and trends, associations, and predictors (5, 15,19-21, 23, 29, 30, 36, 40, 43-46, 49, 50, 52, 54, 55, 58, 60, 62, 63).

The second category of studies focuses on the evaluation and utilization of technologies in diagnosis, recording, documentation, monitoring and reporting of diagnostic, clinical and treatment procedures (2, 4, 12, 14, 16-18, 24, 25-27, 33, 38, 40, 51, 53, 59, 61).

The third category of studies focuses on the design, implementation and evaluation of prevention and control programs and their performances. Measurements were made against global standards, national strategies and systematic reviews to determine changes in prevalence, death and programmatic interventions over time (1, 3, 7-11, 12, 22, 23, 28, 29, 31, 32, 34, 35, 37, 39, 41, 42, 47, 49, 56, 64).

The studies in this section introduce and evaluate new and existing diagnostic, treatment and monitoring programs and tools for HIV, AIDS, TB and other opportunistic infections and approaches to facilitate the development and implementation of prevention and control programs.

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Section 8. Diaspora Research

This section includes studies on HIV/AIDS among Ethiopians in the Diaspora and of Ethiopian health professionals in the Diaspora contributing to HIV/AIDS interventions in Ethiopia.

Three studies are included in this section. Ebrahim et al. (1) examined psychosocial factors of intention to use condoms among Ethiopian and Somali immigrants in the They concluded that improving self-efficacy among older men and strengthening desirable normative influence among women should be considered in

interventions aimed at increasing condom use in these groups. Neill et al. (2) described a case of female circumcision in a sexual health clinic. Van Kesteren and Wojciechowski (3) reported on the health status of 315 children with a mean age of 3 years who were adopted from Ethiopia between 2008 and 2014. None of the children tested positive for HIV but 4 of them had hepatitis B and 62% of them tested positive for intestinal parasites.

1. Ebrahim NB, Davis S, Tomaka J. Psychosocial determinants of intention to use condoms among Somali and Ethiopian immigrants in the U.S. *Psychology, Health & Medicine* 2017;22(5):611-617. Epub 2016/06/29. Doi:10.1080/13548506.2016.1204463.PubMed PMID:27349275.
2. Neill L, Dolan Z, Murphy S, McSorley J, Brook G, editors. Experience of female genital mutilation (FGM) in a sexual health clinic. *Sexually Transmitted Infections BMJ* June 2017-06-10, Publishing Group Ltd.
3. Van Kesteren L, Wojciechowski M. International adoption from Ethiopia: an overview of the health status at arrival in Belgium. *Acta Clinica Belgica* 2017;72(5):300-305.

Section 9. Previous bibliographies

This section lists the previous year's update and potentially other bibliographies that were published during 2016. Another 13 bibliographies were published between 2003 and 2015 in this journal.

1. Mulatu MS, Kloos H, Converse PJ, Kaba M, Haile Mariam D, Mekonnen W. Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: The 2016 Update. Ethiop J Health Dev 2017; 28(1): 45-72.

Section 10. Selected Websites Featuring HIV/AIDS in Ethiopia

2. Ethiopian Public Health Association: http://www.etpha.org/
3. Ethiopian AIDS Resources Center: http://www.etharc.org
4. Family Health International: http://www.fhi360.org/countries/Ethiopia
5. Federal HIV/AIDS Prevention and Control Office of Ethiopia: http://www.hapco.gov.et
6. Christian Relief and Development Association: www.crdaethiopia.org
7. People to People Organization: http://www.peoplepeople.org Save the Children: http://www.savethechildren.org/site/c.8rKLIXMGIpI4E/b.6234245/k.A159/HIVAids_Programs.htm?msource=weilpres0511#Ethiopia
8. United Nations Children's Fund (UNICEF): http://www.unicef.org/ethiopia/hiv_aids_464.html
9. United Nations Joint Program on AIDS (UNAIDS):http://www.unaids.org/en/Regionscountries/ Countries/Ethiopia
10. United States Agency for International Development: http://www.usaid.gov/ethiopia/global-health
11. United States Centers for Disease Control and Prevention (CDC): http://www.cdc.gov/globalaids/Global-HIV-AIDS-at-CDC/countries/Ethiopia/
12. University of California, San Francisco HIV In Site: http://hivinsite.ucsf.edu/global?page=cr09-et-00
13. The International Technical Training and Education Center on HIV (I-TECH) of the University of Washington: https://www.go2itech.org/?s=ethiopia
14. The International Center for AIDS Care and Treatment Programs (ICAP) at Columbia University's Mailman School of Public Health: http://icap.columbia.edu/where-we-work/ethiopia
15. World Health Organization: http://www.who.int/countries/eth/en/
16. Management Sciences for Health's Ethiopia Network for HIV/AIDS Treatment, Care and Support (ENHAT-CS) Project: http://www.msh.org/our-work/projects/ethiopia-network-for-hivaids-treatment-care-support
17. The Twinning Center: http://www.twinningagainstaids.org/ethiopia.html