Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: The 2016 Update

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Introduction

This fourteenth annual update of the HIV/AIDS literature on Ethiopia includes references to studies covering all major public health aspects of this infection in Ethiopia and in Ethiopians in the diaspora. All references are again listed under eight main headings, as follows: 1) basic biomedical research, 2) epidemiological, behavioral socioeconomic and cultural research, 3) impacts research, 4) treatment, care and clinical research, 5) prevention research, 6) health services and policy research, 7) health informatics and evaluation research and 8) research on Ethiopians in the diaspora. The text preceding each list of references briefly summarizes patterns, trends, and major findings of studies, and attempts to highlight some of the new approaches, concepts and tools used and reported in 2016. As in previous updates, we used a simple categorization approach where a citation appears only in one section. In reality, complex studies cover multiple topics and areas. Thus, we continue to encourage readers interested in any one area of research to review also other sections in this update. Overall, we hope that this annual update will, like previous issues, serve as a resource for researchers interested in HIV/AIDS epidemiology, prevention, control, care and support in Ethiopia and among Ethiopians in the diaspora.

We used the same methods as in previous updates to identify and classify references. Literature searches using keywords "Ethiopia AND HIV AND 2016" and "Ethiopia AND AIDS AND 2016" were made in PubMed, CINHAL, EconLit, EMBASE, Global Health, POPLINE, PsycINFO, Social Services Abstracts, Sociological Abstracts, and other major databases that archive relevant published articles, dissertation, and reports from multiple sources. We made additional online searches on major national and regional HIV/AIDS resource centers and international organizations, mostly http://www.etharc.org and http://unaids.org.

There are 436 references in this update – 32 references fewer than the previous update. More than half (243 or 55.7%) of the references are published articles; 147 (33.7%) are conference abstracts, 45 (10.3%) are thesis, and 1 (0.2%) is a report. All of thesis were from Addis Ababa University. It was not possible to access theses from Jimma, Gondar, Hawassa, Mekele, or other universities as in some of the previous updates.

Trends in International AIDS Conference Presentations: We continued to monitor trends in conference presentations at the biannual International AIDS Conference (IAC) by searching for abstracts containing "Ethiopia" in the International AIDS Society's abstract archive (http://www.abstract-archive.org/). The years and conference locations were: 1st (Atlanta, 1985), 2nd (Paris, 1986), 3rd (Washington, 1987), 4th (Stockholm, 1988), 5th (Montreal, 1989), 6th (San Francisco, 1990), 7th (Florence, 1991), 8th (Amsterdam, 1992), 9th (Berlin, 1993), 10th (Yokohama, 1994), 11th (Vancouver, 1996), 12th (Geneva, 1998), 13th (Durban, 2000), 14th (Barcelona, 2002), 15th (Bangkok, 2004), 16th (Toronto, 2006), 17th (Mexico City, 2008), 18th (Vienna, 2010), 19th (Washington, 2012), 20th (Melbourne, 2014), 21st (Durban, 2016). As Figure 1, Panel A shows, conference presentations at the IAC increased linearly from 1985 to 2006 – with the highest number of presentations at 137 in Toronto in 2006. Since then, there has been a declining trend in IAC presentations presumably because of visa issues, travel expenses, or availability of other conference opportunities in Ethiopia and elsewhere.

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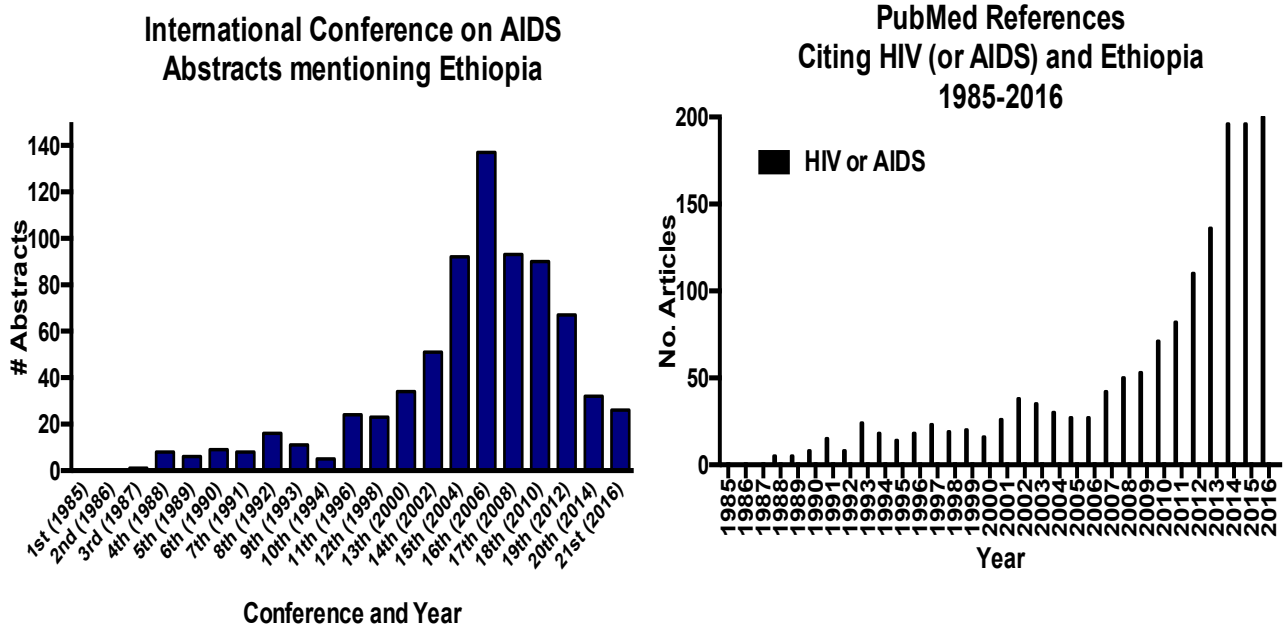

Figure 1: **Presentations at the International Conference on AIDS (A) and Publications cited in PubMed (B) concerning Ethiopia and HIV or AIDS, 1985-2016.**

Trends in Published Studies Archived in PubMed: As the largest database of abstracts of scientific publications, PubMed provides an opportunity to monitor the trends in publication of HIV/AIDS related studies. We searched for published studies archived in PubMed database using the following terms: Ethiopia AND HIV [dp] or Ethiopia AND AIDS [dp]. Covering the years 1985 through 2016. Figure 1, Panel B, presents the number of unique articles archived in PubMed for each year. There appears an increasing trend in published articles starting from 2006 and it has continued through 2016. While this trend may be tied to increasing number of online journals being archived in PubMed, it is also likely because of increased productivity of researchers. Similarly, Figure 2 presents trends in publications of articles on other common infections, including tuberculosis (TB) and malaria. Unlike previous updates, which included publication trends on schistosomiasis (until 2012), this update includes publication trends in helminth infections because of the growing relevance of parasitic infections in health outcomes of people living with HIV/AIDS in Ethiopia (see Section 2). For Figure 2, the Pub Med search terms were: Ethiopia AND HIV [dp]; Ethiopia AND AIDS [dp]; Ethiopia AND malaria [dp]; Ethiopia AND tuberculosis [dp]; Ethiopia AND helminth [dp]. These searches were further stratified by year of publication (2007-2016). The results show increasing trends in publications citing HIV, AIDS, tuberculosis, and malaria, but a stabilizing or declining trend for publications on helminths and Ethiopia.

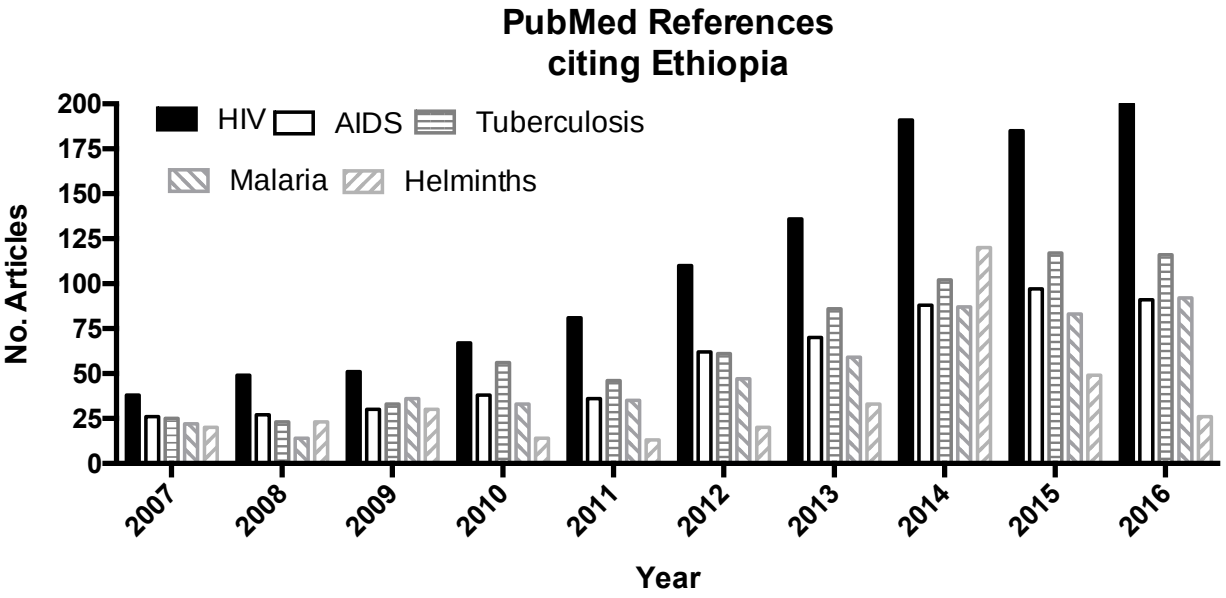

Figure 2: **Publications Cited in PubMed Concerning Ethiopia and HIV, AIDS, Tuberculosis, Malaria, and Helminths, 2007-2016**

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 2016, there are 32 references classified as Biomedical Research, up from only 11 in 2015. There are 19 references on different aspects of tuberculosis including 5 published papers, 5 theses, and 9 conference presentations. There are 3 papers, 2 theses, and 1 conference presentation focused on HIV. The remaining 7 references, including 4 papers, concerned various opportunistic infections and diseases that may be exacerbated in the context of HIV infection and immunodeficiency.

Derbie et al. (11) evaluated the relatively new, PCR-based Xpert-MTB/RIF assay for the detection of *M. tuberculosis* and drug-resistant TB in nearly 2,000 presumptive TB patients in Bahir Dar and Debre Tabor. The authors concluded that the test resulted in more accurate diagnoses of TB and multi drug-resistant (MDR) TB and would avoid inappropriate treatment of patients who actually do not have TB. The system is rapid and particularly suitable in places where bacterial culture facilities are not available. These findings were also presented at the Ethiopian Public Health Association (EPHA) Conference (10). TB diagnostics was also the topic of a presentation by Deriba et al. (12) at the EPHA meeting comparing cultural methods – the relatively new mycobacterial growth indicator tube (MGIT) system that gives time-to-positivity results with the classical Lowenstein-Jensen culture method that yields colonies of Mtb – at the national reference laboratory in Addis Ababa. In a presentation at the Ethiopian Medical Association (EMA) Fantahun et al. (15) compared cultural and molecular methods for the diagnosis of tuberculous lymphadenopathy at St. Paul's Hospital in Addis Ababa. A thesis by A. Gadissa (16) evaluated still another TB diagnostic technique, LED fluorescent microscopy, compared with Xpert at Ambo Hospital. At the EMA, Cherinet et al. (8) also evaluated LED fluorescent microscopy and the issue of stain fading. At the EPHA, Gebretsadik et al. (17) assessed the phenotypic and genotypic characteristics of *Mtb* isolates and their drug susceptibility in Debre Berhan. A thesis by S. Getachew (18) assessed *Mtb* isolates from lymphadenopathy patients by spoligotyping. A thesis by A. Meaza (23) along with a conference presentation by Meaza et al. (24) assessed another molecular assay, MTBDRplus, for TB diagnosis. A thesis (27) and EPHA presentation (28) by B. Sherefedin evaluated the use of the Xpert test in clinics in Addis Ababa. Tilahun et al. (29) presented their finding concerning Mtb molecular epidemiology and drug susceptibility in Ambo at the EPHA meeting. Also at the EPHA meeting, Zewdie et al. (32) presented their findings on the molecular epidemiology of Mtb isolates from lymphadenitis patients in Addis Ababa. A thesis by D. Addise (1) addressed the issue of decontamination of sputum samples with sodium hydroxide and its impact on the detection of mycobacteria and contaminating microbes. A paper by Awoniyi et al. (6) assessed production of multiple cytokines in response to novel Mtb antigens and their utility for TB diagnosis. Overall, it was encouraging to note the range of assays and settings in Ethiopia being evaluated for TB diagnosis in this year's papers, theses, and conference abstracts. The availability of and appropriate use of these assays should increase the diagnostic accuracy, specificity, and sensitivity for the control of TB.

In other TB-related research, a paper by Habtewold et al. (19) explored the pharmacological issues of the anti-

TB drug, rifampicin (RIF), administered together with the anti-HIV drug, efavirenz (EFV). They found no significant influence of RIF-based anti-TB co-therapy on the EFV pharmacokinetic exposure measures but cautioned that the regimen and high EFV metabolite levels could increase the risk of neurotoxicity in female patients with the CYP2B6*6 genotype. By exploring host gene expression in HIV+ patients with active and latent TB, Kassa et al. (21) identified increased expression of the chemokine CCL22 and immunoglobulin receptor, FCGR1A, in particular, and to a lesser extent, three other genes, as having potential to discriminate with active from latent TB. In another paper, Kassa et al. (20) also reported that the production of certain cytokine/chemokine markers in response to Mtb antigens in whole blood assays might also help discriminate active and latent TB in HIV-infected patients and also monitor patient responses to anti-HIV and TB treatment.

Using a variety of genetic tests to characterize the HIV-1 subtype C that predominates in Ethiopia, Amogne et al. (4) found that the HIV-1 C strains from Ethiopia, obtained in 2008, are more similar than those from other regions and that the distinctions are more detectable at near full-length than sub-genomic assessments. Drug resistance mutations were at low levels. Aralaguppe et al. (5) demonstrated the feasibility of a simple sequencing approach that can potentially be used in the molecular surveillance of HIV-1 for effective identification of subtypes and transmission clusters for operational public health intervention. Kobeb and Degu (22) showed that CD4 levels increase over the first 18 months in children in response to antiretroviral treatment and that the benefit is greater if HAART is initiated at higher CD4 levels. At the EPHA Conference, Mulu (26) reported that a 10-year study showed that HIV-1C strains retain homogeneity in spite of increasing trends of drug resistance. A thesis by E. Woldu (30) showed the importance of time and temperature on absolute CD4 counts. Using a rat model, the thesis by A. Wondimnew (31) explored the effects of a leaf extract on HAART-induced dyslipidemia and non-alcoholic fatty liver disease.

By reviewing the literature on antifungal drug resistance patterns in sub-Saharan Africa, Africa and Abrantes (2) concluded that there is a need for a revision of antifungal therapy guidelines with better controls in antimicrobial drug distribution and implementation of antimicrobial surveillance programs to reduce the high Candida drug resistance levels emerging the region. Moges et al. (25) found 31% resistance to six antifungal agents against oropharyngeal candidiasis (OPC) in HIV-infected patients in Addis Ababa, highlighting the need for study on the epidemiology of OPC and resistance to antifungal drugs. Alebachew et al. (3) found that bacterial sepsis was a major cause of admission for HIV infected patients in Gondar, predominantly *Staphylococcus aureus* and coagulase negative staphylococci species. Most of the isolates were multidrug resistant.

Diro et al. (13) showed that the sensitivity and specificity of buffy coat and peripheral blood mononuclear cell smear microscopy could be relatively high and much safer than tissue (e.g., spleen) biopsy in HIV co-infected visceral leishmaniasis patients. At the EPHA, Demeke et al. (9) reported on the immunogenicity of Leishmania-derived antigens in treated visceral leishmaniasis patients from southwest Ethiopia.

At the EMA Conference, Eshetu et al. (14) evaluated the burden and genotype distribution of high-risk human papilloma virus types and cytology abnormalities found in selected obstetric and gynecologic clinics in Addis Ababa. Birhanu et al. (7) reported to the EPHA the association of disease severity, hemozoin-containing leukocytes and hematological parameters in children with malaria in northwest Ethiopia. They excluded HIV-infected patients from the study.

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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 138 references: 72 (52.2%) published articles, 55 (39.8%) conference abstracts, and 11 (8.0%) masters theses. As in previous years, the broad categories of research interest within this section included: 1) prevalence and determinants of HIV infection; 2) prevalence and associated factors of opportunistic infections and other comorbidities; 3) HIV risk perceptions and risk behaviors; 4) HIV-related social norms and practices; 5) other existing research areas. An interesting focus area in this update is the epidemiology of cervical cancer.

HIV Prevalence and Determinants: While no major national surveys on HIV prevalence were reported in 2016, researchers continued to monitor the prevalence of HIV among samples of individuals, including among those who donate blood, receive services at emergency health departments or participate in voluntary HIV testing and counseling programs. In a retrospective review of the records of 2,606 blood donors screened at Gambo Rural Hospital in Western Arsi, HIV prevalence was found to be 0.7% (100). In another similar retrospective study involving analysis of 5 years of medical records (2009 to 2013) of blood donors at the blood bank of Yirgalem Hospital in Hawassa, HIV infection was found among 1.6% of 6367 donors (36). Abate et al. (1) reviewed the records of 6,827 blood donors aged 17-65 years in Jigjiga and found HIV positivity to be 3.16%. Three other studies found higher prevalence rates in samples from emergency departments or voluntary testing and counseling programs. In retrospective study that examined the prevalence of HIV and other infectious diseases among specimen samples left from 797 individuals who attended Tikur Anbessa Hospital in Addis Ababa, HIV infection was 11.2% (79). Sinku et al. (115) examined HIV prevalence and the associated factors among 2,120 voluntary counseling and testing (VCT) clients at the University of Gondar Teaching Hospital. The authors found that 17.1% of the sample to be seropositive for HIV. Shiferaw et al. (110) conducted a review of records of all new patients who were screened at a voluntary HIV testing and counseling center in Kombolcha town from February 8, 2005 to December 31, 2014. The authors found an overall HIV infection rate of 10.8%. The authors noted that the rate of infection declined significantly from 13.3% in 2005 to 4.5% in 2014.

The above and other studies (66, 67, 107) have documented increased vulnerability of some population groups because of their personal attributes, their position in society, or their geographical placement. For example, in a qualitative study that explored the social determinants of HIV infection, Kaba et al. (66, 67) found daily laborers, female sex workers, students who are living away from family, widows, separated and divorced women, those who work in restaurants and engaged in petty trade were found to be relatively more vulnerable population groups. While the variability of the prevalence estimates reflects the differences in the characteristics of the samples (general population vs. patient population; small vs. large town), they all suggest that HIV is still a major public health problem in Ethiopia despite positive national trends reported in previous updates. Continued monitoring of HIV prevalence, and when possible HIV incidence, would be important to monitor progress towards national HIV prevention goals and to inform public health programs.

Early diagnosis of HIV infection is critical to disrupt further transmission of HIV by providing an opportunity for reductions in risk behaviors and entry into treatment and subsequent viral suppression. Aniley et al. (20) studied factors associated with delayed diagnosis of HIV infection among a sample of 392

HIV-diagnosed persons, half of whom had a delayed diagnosis and the other half who were controls without delayed diagnosis. The researchers found having no understanding about HIV and ART, being tested for presence of symptoms/illness, and acquiring HIV through sexual contact were independent and significant factors associated with late HIV diagnosis – pointing the need for programs to raise awareness about the benefits of HIV testing and the effectiveness of antiretroviral therapies.

Overall, these highlighted studies underscore the need for continued research on the patterns and trends of HIV prevalence in the country with a focus on the most vulnerable groups of the population in order to design better HIV prevention, treatment, and care programs.

HIV and Opportunistic Infections: As in previous updates, a plurality of studies has examined the prevalence, determinants, or outcomes of co-infections of HIV and tuberculosis, including studies on tuberculosis among PLWH (13, 14, 15, 88), HIV among TB suspected cases (50), TB and HIV co-infection among prisoners (53), tuberculosis among PLWH on ART (55), and social determinants and delayed presentation among tuberculosis and HIV co-infected patients (59, 60). It is important to note that HIV and tuberculosis co-infections remain to be high, as shown by 27.7% tuberculosis infection among a sample of adult HIV patients in Amhara region (88) and roughly similar proportions (20-30%) of tuberculosis patients who were diagnosed with an HIV co-infection (50, 53). This level of co-infection should be seen within the broader context of tuberculosis infection among various population groups, which several studies in this update covered (7, 8, 30, 55, 76, 97, 105, 106, 133, 137), including studies on the prevalence, determinants, and impacts of multi-drug resistant tuberculosis (9, 34, 44, 86).

Several studies focus on the epidemiology of hepatitis virus infections in different population groups (blood donors, patients visiting emergency departments, VCT, antenatal care, or ART clinics, prisoners, and the general population). The most commonly studied hepatitis virus infections were infections with hepatitis B (HBV; 33, 36, 61, 69, 80, 84, 95, 100, 138) and hepatitis C (HCV; 1, 25, 33, 79, 80, 100, 103, 138), although infections with other hepatitis viruses, including hepatitis A (HAV; 33), hepatitis D (HDV; 33) or hepatitis E (HEV; 4, 33) have also been reported. The systematic review and meta-analytic study by Belyhun and colleagues (33) provides a summary and a good start to understand the magnitude, geographic and population distribution of hepatitis virus infections in Ethiopia. In this study, the authors conducted a systematic review of 68 studies and a meta-analysis of 55 studies to summarize viral hepatitis epidemiology and the potential clinical burdens in Ethiopia. Overall pooled prevalence estimates were 7.4% for HBV and 2.4% for HCV. The authors acknowledged that although there are relatively few studies on hepatitis virus HAV, HDV, and HEV, all types of viral hepatitis virus infections are endemic in Ethiopia and suggested adapting routine screening and treatment for hepatitis infections in healthcare systems and implementing prevention and control policies in the general population.

Researchers were also interested in prevalence of and risk factors for infections with other sexually transmitted disease, particularly syphilis, among HIV-negative and/or HIV-positive persons (1, 16; 32, 36, 39, 69). The 10-year trend data reported by Kassa et al. (69) showed a continuous decrease in syphilis in both HIV positive and negative pregnant women (from 2.5% to 1.1%) in Kombolcha, although prevalence rates of syphilis remained higher among HIV-positive women than those who were HIV-negative. There has also been continued interest in prevalence, risk factors, and impacts of intestinal parasites among people living with HIV/AIDS (49, 115, 120, 136) and other population groups (65). These studies find high levels of intestinal parasites among PLWHA and the general public, and lead to the recommendation that public health agencies expand routine screening, treatment, and prevention services for parasitic infections. Other infectious disease studied included malaria (5, 46), herpes (11), meningitis (74) and schistosomiasis (127). Further research on the interaction of these disease with HIV will be important to design treatment programs and improve the health outcomes of PLWHA.

HIV and Other Co-morbidities: In Ethiopia and other developing countries, the relationships between nutrition and HIV infection are complex. On one hand, poverty and food insecurity are closely tied to vulnerability to HIV infection and poor health outcomes. On the other, HIV disease and its treatment regimens contributes to nutritional disorders. Thus, researchers are interested in exploring the prevalence of malnutrition and nutritional deficiencies among the general population or among PLWHA (3, 12, 35, 49, 52, 58, 87, 94, 120). Mitiku et al. (87) and colleagues found undernutrition in 23.2% of a sample of HIV positive adults attending ART clinic in Dembia District. In another study, Mulu et al. (94) found indicators of malnutrition among 44-49% of HIV/AIDS patients attending Jimma University Specialized Hospital. Both studies found several factors to be associated with nutritional deficiencies, including CD4 count less than 200 cells/mL. These studies underscored the importance of addressing both nutritional deficiencies and HIV disease among PLWHA. One unique co-morbidity studied was the prevalence of common mental disorders among HIV-positive adolescents in Addis Ababa (64). Behavioral health issues, including substance abuse and mental health, are neglected areas and thus further researched would be highly valuable.

HIV Risk Perceptions and Risk Behaviors: As in previous updates, several studies have also reported on HIV/AIDS related knowledge, perceptions, and risk behaviors among young people, mostly in academic settings (10, 21, 42, 45, 70, 71, 82, 96, 101, 108) but also in other settings (37, 75, 117, 123). These studies

continue to document low levels of risk perception and high levels of sexual risk behaviors, including earlier sexual initiation, premarital sex, unprotected sex, sex with multiple partners, and sex with commercial sex workers. In addition, some these studies have also identified substance use behaviors that are associated with sexual risk behaviors, including *khat* chewing, consumption of alcohol, and use of illicit drugs. Most of these studies tend to be small, cross-sectional and limited to specific geographical locations, and should be treated as supplements to national level behavioral risk factors surveys that are crucial for monitoring trends in HIV-related knowledge, perception, and risk behaviors. Studies with other priority population groups, including commercial sex workers, out-of-school youth, men who have sex with other men, and persons who use drugs are still needed.

HIV-Related Social Norms and Practices: The role of prevailing social norms and practices that are detrimental to HIV infection were investigated in studies that examined the prevalence of and associated factors for gender-based or intimate partner violence and harassment against women, including pregnant women (2), married women (41, 92, 93), female federal police (72), women working in government institutions (41), and female university students (123). Manning-Geist et al. (81) conducted a retrospective analysis of the medical outcomes of 1,712 survivors of rape seen in two clinics in Adama and Hawassa. The researchers found that 13.3% of patients tested positive for a sexually transmitted infection (gonorrhea, hepatitis B, syphilis, or HIV), 9.0% were pregnant, 16.8% had genital injury, and 4.7% had evidence of other body trauma. Although most of these studies are conference presentations and their abstracts were unavailable for a review, they demonstrate continued interest in this topic and further help increase awareness and inform future research or interventions towards changing negative social norms. Three additional studies focused on another aspect of gender-based violence against girls and women – female genital mutilation or cutting (FGM; 19, 26, 68, 98). The research by Andualem (19) examined the prevalence and determinants of FGM among 730 women aged 15-49 years and their < 5 year old daughters. The study found out that 96% of the mothers and 49% of their daughters had experienced FGM. The likelihood of FGM among daughters was higher among parents with lower levels of education, those who resided in rural areas, and those who had a maternal history of FGM. In contrast, FGM was less likely among those who received health education, followed by health extension workers, and those who participated in anti-FGM interventions. These findings are encouraging because they hint that FGM may be declining and that health education and anti-FGM interventions can help reverse this negative social practice. Other social norms and practices studied include masculine norms that contribute to men's HIV-related risk behaviors (51), gender norms and family planning decisions among married men and women (56); marginality and social mobility among HIV-positive women (104); and infant oral mutilation and risk for infections (63). Further research on these social determinants of HIV infection will help advance social and structural interventions against HIV/AIDS.

Cervical Cancer Epidemiology: A higher than previously reported number of studies have focused on cervical cancer (23, 29, 47, 91, 111, 112, 113). In a conference abstract, Assefa (23) reported that 35.9 new cases of cervical cancer are diagnosed and 22.6 die from it per 100,000 women annually in Ethiopia. In a review of the patterns of genital cancer investigated at St Paul Hospital Millenium Medical College (SPHMMC) Ethiopian Public Health Institute (EPHI) pathology laboratory, the authors found that 30.6% of the 13,043 pathological tumors diagnosed at the hospital were cervical cancers (47). Four other studies examined knowledge and perceptions about cervical cancer among female students (91), among HIV-positive women (, 111, 112, 113). Shiferaw et al. (111, 112) found that knowledge about cervical cancer was generally low and concluded that awareness programs should be strengthened at both community and health facility levels with emphasis highlighting the causes, risk factors, care seeking behaviors, and treatment options for cervical cancer. In one of those studies, barriers to cervical cancer screening among HIV positive women in Addis Ababa were explored (113). Given the availability of vaccines that would help prevent most cervical cancers, research on epidemiology and knowledge and perceptions of cervical cancer would be valuable for informing future public health policy and practice.

Other Existing HIV/AIDS Research Topics: There were also studies that reported on other topics covered previous updates. Three studies reported research on healthcare related practices that might contribute to HIV acquisition or transmission among healthcare staff or patients, including one study on the incidence and patterns of surgical glove perforations (31) and two other studies on prevalence and risk factors for needle stick injury among healthcare workers (109, 129). Other studies explored issues including knowledge, attitudes, and practice related to mother-to-child transmission of HIV among pregnant women (6), determinants of fertility desires among PLWHA (90), infant feeding practices among HIV-positive women (125, 135), broader reproductive and sexual health needs among young people with disability (73), prisoners (39), and South Sudanese immigrants in Ethiopia (124).

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Section 3: Impact Research

This section covers studies of the demographic, social, psychological, and economic impacts of HIV/AIDS on individuals, families, communities, institutions and the nation.

This section includes 24 references to impact studies, 7 more than in the 2015 Update. Eleven of the studies dealt with mortality and survival from AIDS and TB (1-4, 6-8,14,16,19), mental health and quality of life (15,20,21,24), socioeconomic impacts (12,17,23), HIV and TB impacts on disease burden and other diseases (9,11,13,18,22), and the impact of HIV stigma on ART clients (10) and suicide (5).

Most studies of health impacts emphasized the need to diagnose health conditions and initiate appropriate counseling and treatment activities early to reduce morbidity and mortality levels (5,9,14,16,19,22) and reported on mortality and survival of patients with ART/TB coinfections (1,2,4,11,14,16) and on mental health impacts of HIV and AIDS (5,15,20,21,24).

A national burden of disease and injuries study using Global Burden of Disease data from 2013 (4) and various statistical estimation methods and age standardized data showed reduction of HIV/AIDS by 63% and of tuberculosis by 66% between 2005 and 2013. Contrary to these results, a longitudinal community-based study, using the verbal autopsy method reported that mortality from tuberculosis consistently increased during the six-year study period (2). Gebremariam et al. (11), in a 6-year retrospective study, found that TB patients who did not know their HIV status were significantly more likely to default and transfer out of treatment. These findings reemphasize the need for integrated HIV/TB testing at treatment initiation.

Five studies addressed mental health challenges faced by HIV/AIDS patients, an increasingly important issue in the ART era. Tesfaye et al. (21) found a strong link between food insecurity, mental health and quality of life. Vo et al. (24) reported significant higher overall function and life satisfaction scores than men. Whereas Surur (15) found no significant association between illness conditions and quality of life in a HIV/AIDS patient population in generally good health, Tesfaw et al. (20) reported a strong link between HIV stage III and depression and anxiety. Both studies identified different independent factors that were significantly associated with quality of life. Bitew et al. (5) reported that one-third of people living with HIV contemplated and 20% attempted suicide and called for early screening, treatment and referral of suicidal patients.

Three studies addressed socioeconomic impacts of HIV on the livelihoods of individuals and interventions at the community level. Tsiko (23) addressed the issue of access to land by HIV-infected women. He found that both urban and rural women had more access to own land than to acquire family land, indicating stigma and social ostracism against HIV-positive women. The impacts of HIV infection on socioeconomic conditions infected people reported by Hailu (12) were also reported by earlier studies. A sociological study of five Ethiopian NGOs engaged in strengthening of livelihoods in communities affected by HIV/AIDS reported suboptimal results of their programs due to deficient design, implementation, monitoring and evaluation of the interventions, which resulted in inadequate interactions between the NGOs and the communities (17).

One study reported on the impact of HIV stigma on treatment outcome. Fido et al. (10) found significant associations between duration of ART use and all three types of stigma (experienced, internalized, and perceived stigma), again emphasizing the need for early HIV counseling of new ART patients.

One of the first studies in Ethiopia of the association between undernutrition with increased risk of death at the initiation of ART indicates the need to integrate nutrition counseling at all stages of ART implementation to improve treatment outcome (19). Several maternal and pediatric studies addressed various issues related to HIV. Assefa et al. (3) found formula-fed infants to have four times lower risk of HIV infection than breast-fed infants and called for stepped up efforts to provide ARV for HIV-positive mothers to reduce the risk of mother-to-child transmission. However, there is a need to conduct additional studies in rural areas, where safe bottle feeding may be compromised by unsafe water, as reported in earlier studies. Bohn et al. (6) reported the highest mortality rates from all causes, including HIV/AIDS, early during hospitalization in a hospital in Addis Ababa. Deribew et a. (8), using various data

sources, found that mortality from all causes in Ethiopia in under 5-year olds declined from 20.05 per 100,000 to 16.67/100,000 between 1990 and 2013.

We are advising readers to visit other sections, which contains additional references to studies reporting on HIV linked mortality, morbidity, and other socio-economic impacts on patients, their families, communities, and the nation.

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3. Assefa M, Worku A. Survival and morbidity of breastfeeding versus formula feeding infants and young children of HIV-infected women who were on prevention of mother to child transmission follow-up in selected health facilities in Addis Ababa, Ethiopia. Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. 96.
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among ART initiators in Oromia, Ethiopia. AIDS Behav 2016;20(8):1682-1691.

Section 4: Prevention Research

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 51 papers that focus on HIV prevention that were published, presented at conferences or produced for partial fulfillment of Masters of Public Health training during 2016. Updates in this section are classified as theses (12), papers presented at national as well as international conferences (19) and published articles in peer reviewed journals (20). All the papers were outcomes of cross sectional studies except one (34), a randomized control trial. This control trial looked into the persistent educational activities and its implication on HIV testing.

The papers in this section were categorized into sexual behavior including contraceptives, reproductive and condom (12), social and behavioral change communication and knowledge, attitudes and practices as relates to HIV and AIDS (10), male/partner involvement in HIV intervention including in PMTCT (5), cervical cancer and HIV focusing on single visit services (4) adherence to treatment (3), VCT (2) and others (single references on TB-HIV, breast feeding, PICT, and lost to follow-up).

The sexual behavior including contraceptives (1, 3, 6, 20, 22, 28, 33, 40, 41, 43, 48 and 50) highlighted various areas related to condom, family planning and other contraceptive service use among those who live with the virus. The second set of references was on social behavioral change communication including knowledge, attitude and practices related to HIV and AIDS (3,11,13,15,16,17,18, 30, 37 and 49). Papers in this category mainly addressed behavior change strategies/approaches, interventions and impacts, predictors of behavior change. In this section, one paper took behavior change communication and KAP to providers where communications and language use in a medical setting was addressed (16).

Male/partner involvement (4, 27, 35, 46 and 51) is another category in this section that focuses on role of male/partner in PMTCT and VCT service use and partner notification. One of the papers in this category assessed progress, impact and next steps in rolling out medical male circumcision for HIV prevention in 14 priority countries of Eastern and Southern Africa. This is believed to shade light on prevailing practices on medical male circumcision and next steps.

In this update a new area of research output on single visit service for cervical cancer and HIV testing (7, 25, 32 and 44) was recorded. Lessons drawn from prevention of cervical cancer, screening experiences and documentation of years of the single visit approach to cervical cancer were the major focus. Three papers on levels of adherence and predictors were recorded in this section (9, 10, 47).

Unlike previous years', research interest in voluntary counseling and testing, TB-HIV co-infection, breast feeding and PICT was limited during this year. There were only 2 papers (14,45) that focused on factors affecting VCT uptake, two papers on TB-HIV co-infection (8,21) one focusing on the practice of TB contact screening and childhood isoniazid preventive therapy while another one documented the evolution of Mycobacterium TB and implication for vaccine development. One paper each was found on predictors of exclusive breastfeeding (5) and predictors of provider -initiated HIV counseling and testing refusal among out-patients (19).

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2. Abiye A. A study of the social and behavioral change communication strategies of Ethiopia to prevent HIV/AIDS. Thesis, Addis Ababa University; 2016.
3. Alemu T. Modern contraceptive use by female ART attendants in Arada sub-city, Addis Ababa, Ethiopia: A cross sectional study. Thesis, Addis Ababa University: 2016.
4. Amano A, Musa A. Male involvement in PMTCT and associated factors among men whom their wives had ANC visit 12 months prior to the study in Gondar Town, north west Ethiopia, December, 2014. Pan Afr Med J 2016;24:239.
5. Arage G, Gedamu H. Exclusive breast feeding practice and its associated factors among mothers of infants less than six month of age in Debre Tabor Town, northwest Ethiopia: a cross sectional study. Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. Poster 15.
6. Asimamaw B. The role of peers in influencing adolescents' sexual behavior in the case of Beshale secondary and preparatory school. Thesis, Addis Ababa University; 2016.
7. Asnake M, Kassahun K, Shiferaw N, Belayihun B. "Addis tesfa" (new hope) project's lesson on the prevention of cervical cancer in Ethiopia. Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. 103.
8. Assefa B. The practice of TB contact screening and childhood isoniazid preventive therapy (IPT) in Addis Ababa. Thesis, Addis Ababa University; 2016.

9. Ayele HT, Mourik MSV, Bonten M. Predictors of adherence to isoniazid preventive therapy in HIV patients in Ethiopia: a prospective cohort study. Paper presented at the 17th International Congress on Infectious Diseases; Hyderabad, India; 2016, Abstract no. 43.089.
10. Ayele HT, van Mourik MS, Bonten MJ. Predictors of adherence to isoniazid preventive therapy in people living with HIV in Ethiopia. Int J Tuberc Lung Dis 2016;20(10):1342-1347.
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15. Degefa N. Assessment of knowledge, attitude, and preventive practices towards sexually transmitted infections among Arsi Negelle Kiture preparatory school students, West Arsi Zone, Oromia, Ethiopia, 2016. Thesis, Addis Ababa University; 2016.
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17. Ebrahim NB, Davis S, Tomaka J. Attitude as a mediator between acculturation and behavioral intention. Public Health Nurs 2016;33(6):558-564.
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19. Facha W, Kassahun W, Workicho A. Predictors of provider-initiated HIV testing and counseling refusal by outpatient department clients in Wolaita Zone, southern Ethiopia: a case control study. BMC Public Health 2016;16:783.
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21. Gagneux S. Evolution of Mycobacterium tuberculosis and implications for vaccine development. Ethiop Med J 2016;54(2):95-100.
22. Gelaw B. Assessment of magnitude and factors affecting intention of women living with HIV to use long-acting and permanent family planning methods in Addis Ababa City government public health hospitals, Addis Ababa, Ethiopia. Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. 13.
23. Geletu ZA, Kowalski M, Tesfaye A, Umer S. Reaching key populations in urban settings through home-based HIV testing and counseling by urban health extension professionals in Ethiopia. Paper presented at the 21st International AIDS Conference; Durban, South Africa; 2016, Abstract no. THPEE516.
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26. Girma A. Assessment of PMTCT and ART services in Hawassa Health Centre, Ethiopia. Paper presented at the American Public Health Association's 2016 Annual Meeting and Expo; Denver, CO, USA; 2016, Abstract no. Board 4.
27. Harling G, Barnighausen T. The role of partners' educational attainment in the association between HIV and education amongst women in seven sub-saharan african countries. J Int AIDS Soc 2016;19(1):20038.
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Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. Poster 6.
32. Kassahun K, Shiferaw N, Tilahun Y, Lew C, Osakwe C, et al. From pilot to national scale up: the legacy of pathfinder international-Ethiopia's single visit approach for cervical cancer prevention among HIV-positive women. Paper presented at the 21st International AIDS Conference; Durban, South Africa; 2016, Abstract no. WEPEE533.
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37. Mekonnen S. Analysis of HIV/AIDS prevention messages communicated to university students: message framing in focus. Thesis, Addis Ababa University; 2016.
38. Mitiku I, Arefayne M, Mesfin Y, Gizaw M. Factors associated with loss to follow-up among women in option B+ PMTCT programme in northeast Ethiopia: a retrospective cohort study. J Int AIDS Soc 2016;19(1):20662.
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Section 5: Treatment, Care and Clinical Research

This section includes studies in the characteristics and clinical course of HIV infection and opportunistic infections, treatment of AIDS and opportunistic infections, effects and outcomes associated with treatment, clinical and non-clinical care and supportive services provided to people living with HIV/AIDS.

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 103 references in this category, 35 fewer than in the 2015 update. Sixty-one are published documents, all except 1 of them journal

articles, 33 are conference abstracts and the remaining 9 are masters theses. The most common research topics in this Update are treatment outcome (30 references), adherence to treatment, attrition and loss to follow-up (21 references), and clinical and antiretroviral drug evaluation studies (3, 23, 26,29, 30, 45, 65, 70, 73, 76, 80, 94, 98).

Most studies of treatment outcome dealt with treatment of HIV/TB and HIV/hepatitis B coinfections (5, 15, 31, 36, 74, 98, 100), TB treatment (3, 12, 13, 28, 53, 62, 82, 83, 102, 103), ART failure (14, 27, 35, 66, 88), ART treatment (24, 42, 54, 55), chronic care of HIV-infected persons (1, 41, 44, 90, 96,97), including one study on client satisfaction (97) and one on accessibility of HIV/AIDS treatment (96), which are two understudied issues, and causes and outcomes of the timing of initiating drug therapy (16, 36, 63, 92). Three studies reported on the difficulties of treating visceral leishmaniasis (49, 76, 798) and one study on the impact of visceral leishmaniasis treatment on poor treatment outcome in HIV patients (4).

This Update presents additional studies of the role of different aspect of nutrition status and food supplementation in the treatment process, including the impact of therapeutic food on ART outcome and patient retention (20, 39), the impact of HAART on nutritional and immunological status in HIV-infected children (23), on vitamin D levels (99) and anthropometric parameters (78). Other studies investigated the role of ART on hematological abnormalities (29), anemia (61), metabolic syndrome (38), atherosclerosis (34), hepatitis B genome variability (1), renal and liver function (94,98), pre-term births (60) and quality of life (68).

Several studies measured the progression of ART in patients. Three studies modeled CD4 counts in HIV-positive individuals on ART (33, 72, 75). Wondafrash et al. (93) evaluated the dried blood spot test in testing the viral treatment status of HIV-exposed children. Kalibala et al. (41) evaluated several algorithms for HIV care and treatment. A global study of research on scaling up access to HIV viral load testing for patients receiving ART emphasized the crucial need for early ART initiation through universal access and equity of viral load testing for HIV treatment monitoring to meet the UN Program on HIV/AIDS 90-90-90 goals by 2020 (69). Mamuye et al. (48) recommended the use of fingerstick whole blood samples of HIV patients for on-site diagnosis of cryptococcal meningitis.

The nine maternal and pediatric studies in this section are in line with an increase of these studies since the 2013 Update. Two studies each examined adherence of children to ART (8,21) and chronic care of HIV-exposed and sick children (36,44). Additional studies reported on testing children on ART to monitor their treatment status ((93), the effect of ART on the clinical interventions (40), ART adherence of pregnant and lactating mothers in a PMTCT program (89), the association between protease inhibitor based ART during pregnancy and pre-term birth (6) and a study of outcome of tympanoplasty, which showed higher treatment failure among HIV-infected children (40).

One study reported no significant differences in treatment outcomes between new HIV patients in primary health care facilities and hospitals (51). These results contradict the widely held belief that hospitals provide better treatment for HIV-infected persons but additional studies are required to validate these findings.

Most studies of the continuum and interruption of ART and TB drug treatment focused on adherence/discontinuation and its associated factors (8,17,21,25,32,47,50,52,56,64,85,87,89,90) and the relationship between adherence and treatment outcome (16,18,20, 28, 69,74). One study examined adherence to isoniazid preventive therapy by AIDS patients (15).

A number of studies addressed perceptions about ART and TB treatment delays and methods to increase and monitor adherence. Tymejczyk et al. (90) found that few adults initiating ART believed that if can prevent sexual transmission of HIV and many thought that holy water *(tsebel*) could cure AIDS. Erku et al. found stigma to cause interruption of ART adherence (25). Tiruneh et al. (85) attributed daily irregularities in adherence to dose schedules to patients' perception and beliefs. Tola et al. (87) found that psychological and educational interventions guided by the Health Belief Model significantly reduced non-adherence to TB treatment, indicating the usefulness of behavioral theories in routine treatment strategy. Wondiye et al. (95), using the grounded theory approach, examined a wide range of barriers to ART, including individual, medical, environmental and economic factors. These various results have potential application for behavioral interventions addressing non-adherence to ART, which continues to be high in Ethiopia and many other countries. Salla Munro et al., in a review of health behavior theories to promote long-term medication adherence for TB and HIV/AIDS, BMC Public Health, 2007, examined 11 theories and called for urgent research and analysis to identify the models which may be most effective in improving adherence to treatment regimens for chronic infectious diseases.

Several studies evaluated recently developed methods to monitor and facilitate ART adherence. Platt et al. (71) found multiplex cathepsin zymography to be a reliable and low-cost electrophoresis-based assay for monitoring ART adherence in resource limited settings. Mekuria et al. (56-58) used mixed methods to identify the most reliable adherence measure. Two studies reported on the acceptability of using text messages to send medication reminders to patients on ART (43) and on the effectiveness of ART adherence supporters in re-enlisting patients lost to care (79). Biru et al. (24) advocated large-scale studies using a combination of adherence measuring methods to more precisely define the extent and predictors of ART non-adherence.

The remaining studies in this section addressed cost-effective and economic aspects of treatment (6,19) and self-medication practices among university students (9).

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98. Yemaneberhan N. Magnitude of hepatitis B virus (HBV) and hepatitis C virus (HCV) among HAART taking patients and its association with liver function and renal function tests and cd4+t cell level. Thesis, Addis Ababa University; 2016.
99. Yilma D, Kæstel P, Olsen MF, Abdissa A, Tesfaye M, et al. Change in serum 25-hydroxyvitamin D with antiretroviral treatment initiation and nutritional intervention in HIV-positive adults. Br J Nutr 2016;116(10):1720-1727.
100. Yilma M, Seid Y, Assefa N, Desalegn Z. The effect of HIV co-infection on tuberculosis treatment in North Shoa, Ethiopia: retrospective cohort study. Paper presented at the 52nd Annual Medical Conference of the Ethiopian Medical Association; Addis Ababa; 2016, Abstract no. P005.
101. Zenebe T, Genet C, Tefera E, Ke;lebecha A. Effectiveness of directly observed treatment, short course on treatment of tuberculosis patients in Afar Region, Ethiopia. Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. Poster 39.
102. Zenebe T, Tefera E. Tuberculosis treatment outcome and associated factors among smear-positive pulmonary tuberculosis patients in Afar, eastern Ethiopia: a retrospective study. Braz J Infect Dis 2016;20(6):635-636.

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 is comprised of 43 journal articles, 24 conference presentations, one masters thesis, and one newswire article that deal with a range of issues related to health services and health policy across broad sub-categories of (1-69): from service quality, access, utilization, and client satisfaction; HIV/AIDS and family planning; infection prevention including needle prick and transfusion related transmissions; training and capacity building including diagnostic developments; to cost, financing and policy related issues.

Clinical as well as laboratory quality were issues dealt with majority of the articles (10, 19, 25, 27, 28, 30, 34, 35, 39, 43, 44, 49, 57, 58, 66). Regarding service quality Burusie (19) found the quality of case management for sexually transmitted infection in facilities in Adama town to be poor, while Getnet et al. (25) presented a systematic review and meta-analysis (in which a number of studies were from Ethiopia) related to delays in diagnosis of pulmonary tuberculosis in low and middle-income country settings. According to Tadesse et al. (58), concerns about covert HIV testing are associated with delayed presentation of adults with suspected malaria cases. The study by Gizaw et al. (27) showed that one third of the health workers in public facilities in Addis Ababa had relatively poor knowledge and nearly half of them had unsatisfactory practice on tuberculosis infection control. Through the evaluation of Ethiopia's health extension program, Haregreaves et al. (28) presented the key aspects of measuring implementation strength methodology to be used in evaluating public health strategies in low and middle-income settings; while Johnson et al. (30) looked at the accuracy of eligibility for early medical abortion by community health workers using a simple checklist tool in Ethiopia India, and South Sudan. Tadele and Lamaro (57), in a community based study, assessed antenatal care service utilization and associated factors in southern Ethiopia; while Yakob and Ncama (66) investigated factors associated with perceived access to HIV/AIDS Treatment and care services in Wolaita Zone, Ethiopia. Pertaining to laboratory service quality, Asrat (10) and Mosissa et al. (43) assessed the performance of tuberculosis smear microscopists on external quality assessment, and Mossie et al. (44) assessed the knowledge, attitudes and practice of tuberculosis infection control among medical laboratory professionals in selected health facilities in Addis Ababa. Kebede A, et al. (34) stressed the importance of accreditation in point-of-care testing for quality control outside the laboratory environment, while Kebede Y, et al. (35) highlighted the feasibility of public-private partnership in improving specimen referrals and

improving quality of laboratory services. Ndihokubwayo et al. (49) present the preliminary results of WHO-AFRO's Stepwise Laboratory (Quality) Improvement Process towards Accreditation (SLIPTA) process in which nine public laboratories from Ethiopia were included.

The themes of the next group of articles (8, 12, 24, 32, 41, 47, 52, 59, 67, 68) included training, capacity building including developments in diagnostic capacity. Alemu and Alemayehu (8) presented on partnering to fill biomedical engineer and technician human resource gaps in Ethiopia, while Bacha et al. (12) presented on initiatives to improve emergency and critical care services for pediatric HIV patients. Getachew and Haile (24) explored continuing professional development needs of general medical practitioners; while, using task analysis, Yigzaw et al. (68) generated evidence for strengthening midwifery education, practice, and regulation. Kalibala et al. (32) reported the experiences in implementation and publication of operations research interventions. The presentation by Mizwa et al. (41) dealt with longitudinal north-south partnership in pediatrics to improve HIV/AIDS care and treatment, while Mumford et al. (47) discussed the progress in international twinning partnership between European palliative care centers and a non-governmental hospice in Ethiopia. In terms of investments in diagnostic capacity, Tadesse (59) presented an assessment of diagnosis and treatment facilities for cervical cancer in public health institutions in Addis Ababa; while Price and Asgary (52) described the implementation and feasibility of an adapted two-stage visual inspection with acetic acid/cryotherapy-based cervical cancer screening program for HIV-infected women in the same city. Similarly, Yebyo et al. (67) explored the pattern of C-reactive protein point-of-care testing and antibiotic prescribing for acute respiratory tract infections in rural primary health centers of north Ethiopia.

Another group of articles (13-15, 26, 31, 37, 45, 60, 63) raised issues of patterns of service utilization including access and delivery arrangements. Bane et al. (13) retrospectively studied medical admissions and outcomes at Saint Paul's Hospital in Addis Ababa, Ethiopia; Belayihun et al. (15) presented trends in antenatal care attendance and their link to skill delivery services; Girmye and Berhan (26) presented on skilled antenatal care service utilization and its association with the characteristics of women's health development team in southwest Ethiopia; while Bayu et al. (14) looked at cervical cancer screening service uptake and associated factors among age eligible women in Mekelle Zone. Kaba et al. (31) qualitatively explored why women in urban settings fail to use available maternal health services; and King et al. (37) similarly looked at the utilization of maternal health services in Ethiopia. Motuma et al. (45) presented on the utilization of youth friendly services and associated factors among youth in east Ethiopia; while Tekleab et al. (60) looked at antenatal care and women's decision-making power as determinants of institutional delivery in a rural area. According to Workalemahu et al. (63), drop-in centers drive higher yield and better linkage to treatment for female sex workers.

There were a group of articles (21, 22, 29, 46, 53, 69) that dealt with cost, financing, and investment needs, as well as a couple (36, 54, 56) related to policy and framework issues. De Cuevas et al. (21) estimated patient side direct costs for tuberculosis diagnosis, and Fieno et al. (22) made a political economy analysis of human resources for health in Africa; while Hontelez et al. (29) discussed the investment needs and cost-effectiveness within changing HIV treatment eligibility under health system constraints in sub-Saharan Africa. Remme et al. (53) discussed the issue of financing the HIV response in sub-Saharan Africa from domestic sources; while Moucheraud et al. (46) claimed that PEPFAR investments in governance and health systems were one-fifth of countries' budgeted funds during 2004-2014. Furthermore, Zegeye et al. (69) conducted a cost-analysis of the prevention of mother to child transmission of HIV/AIDS services in Ethiopia. Kesetebirhan et al. (36) indicated a lesson on pro–poor pathway towards universal health coverage; Seyoum et al. (54) discussed the role of community knowledge and those of health extension workers on integrated diseases among households; and Shiferaw et al. (56) dealt with the policy, regulation and strategies for control and elimination viral hepatitis.

Six articles (4, 7, 17, 33, 42, 65) in this category dealt with issues of infection prevention including prevention of needle prick and transfusion related transmissions. Abraham (4), Kaweti & Abegez (33), as well as Worku et al. (65) presented on the prevalence of and response to needle stick injuries, including exposure to blood and blood fluids among health workers in hospitals in Addis Ababa and Hawassa. Alemayehu et al. (7) explored sharps injury and exposure to blood and body fluids among health care workers in health care centers of eastern Ethiopia; while Bisetegne et al. (17) as well as Mohammed and Bekele (42) looked at transfusion-transmissible infections among blood donors in different parts of Ethiopia.

HIV/AIDS and family planning and related issues were raised by five articles (2, 5, 61, 62, 64). Abeje and Motbaynor (2) explored the demand for family planning among HIV- positive women on anti-retroviral treatment in South Gondar and North Wollo Zones of Amhara Region. Adamchak et al. (5) presented results from a pilot test that developed indicators to monitor family planning and HIV service integration. Thomas et al. (61) discussed improving referrals and integrating family planning and HIV services through organizational network strengthening; while Wendwossen and Nigatu (62) delt with partnering to strengthen obstetrics and gynecology training as a way to prevent new HIV infections, and Worke et al. (64) studied the utilization of contraception among sexually active HIV- positive

women attending ART clinic in University of Gondar Hospital.

More than a couple of articles in this category (1, 3, 23, 51) have dealt with issues related to client satisfaction in the delivery of care. Abebe et al. (1) found overall low level of satisfaction among respondents with pharmaceutical services provided at Gondar University Hospital; Aberra et al. (3) present early experiences from a pilot program for treatment of chronic hepatitis B in Ethiopia; Getachew described patients' satisfaction and associated factors towards health services in the adult emergency department of Tikur Anbsssa Hospital, while Obsa and Worji (51) describe factors associated to satisfaction with outpatient services at Assela Teaching Referral Hospital in Arsi Region.

Patterns of drug supply including adverse reactions were dealt with by three articles (11, 16, 20) in this category. Ayisa et al. (11) presented on knowledge, practice and associated factors towards adverse drug reaction reporting among nurses working in district hospitals in northwest Ethiopia; Berhanemeskel et al. (16) described HIV/AIDS related commodities supply chain management in public health facilities of Addis Ababa; and Dayo et al. (20) explored the pattern of student interventions on international pharmacy rotation.

Aklilu et al. (6) assessed knowledge and perception of health professionals towards toxoplasmosis in selected towns; an anonymous poster presentation (9) on bridging to a sustainable future in global health was made at the 7th Conference of Consortium of Universities for Global Health; and according to Burki (18), Ethiopia is considered as showing that it is single-minded in tackling diseases. Kitaw (38) outlined lessons for the future in the health sector in Ethiopia. Mall et al. (40) reported on a qualitative study to inform development of care for people with severe mental disorders in rural Ethiopia.

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management in public health facilities of Addis Ababa, Ethiopia: A cross-sectional survey. J Pharm Policy Pract 2016;9:11.
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22. Fieno JV, Dambisya YM, George G, Benson K. A political economy analysis of human resources for health (HRH) in Africa. Hum Resour Health 2016;14(1):44.
23. Getachew T. Patients' satisfaction and associated factors towards health services in adult Emergency Medicine Department, Tikur Anbessa Hospital, Addis Ababa, Ethiopia. Paper presented at the 52nd Annual Medical Conference of the Ethiopian Medical Association; Addis Ababa; 2016, Abstract no. P010.
24. Getachew Y, Haile K. Continuing professional development needs assessment of general medical practitioners in Ethiopia. Paper presented at the 52nd Annual Medical Conference of the Ethiopian Medical Association; Addis Ababa; 2016, Abstract no. P028.
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26. Girmye M, Berhan Y. Skilled antenatal care service utilization and its association with the characteristics of women's health development team in Yeky District, southwest Ethiopia. Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. Poster 64.
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31. Kaba M, Taye G, Gizaw M, Mitiku I, Adugna Z, et al. Why women in urban settings fail to use available maternal health services: A qualitative study in selected towns/cities of Ethiopia. Paper presented at the 27th Annual Conference of the Ethiopian Public Health Association; Addis Ababa; 2016, Abstract no. 88.
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42. Mohammed Y, Bekele A. Seroprevalence of transfusion transmitted infection among blood donors at Jijiga blood bank, eastern Ethiopia: Retrospective 4 years study. BMC Res Notes 2016;9:129.
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61. Thomas JC, Reynolds HW, Alterescu X, Bevc C, Tsegaye A. Improving referrals and integrating family planning and HIV services through organizational network strengthening. Health Policy Plan 2016;31(3):302-308.
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Section 7: Health Informatics, Monitoring and Evaluation

This section deals with the use of modeling and prediction, quantitative assessment, analytic and communication methods and research concerning monitoring and evaluation of HIV/AIDS programs. It covers the systematic application of information, computer science, and technology for HIV/AIDS prevention, care, research and evaluation.

There are 17 articles and reports in this section. The first report by Adepoju revealed a drone delivery system to get the desperately needed blood and medical supplies to outlying hospitals and doctors in Rwanda that had been developed by the San Franciso based tech start-up Zipline which was found very successful and can be scaled-up to neighboring African countries.

On the other hand, Statistical modeling of ART outcomes by Awoke et al, Dali et al, Hissaini et al and Sibhatu MK have also show different levels of improvement in the treatment outcomes of HIV/AIDS patients. The study by Dali and colleagues, for instance, informed the direction of research capacity and best practices for HIV testing strategies for population-based interventions in sub-Saharan Africa in addition to the understanding of what factors can influence rates of testing that could prove critical to improving testing, treatment and prevention processes. Hissaini and colleagues have also developed and used a model for the transmission dynamics of anthroponotic visceral leishmaniasis (AVL) and human immunodeficiency virus (HIV) in a population to assess the impact of the spread of each disease on the overall transmission dynamics.

Moreover, Fetene employed data mining technique for measuring the prognosis of HIV/AIDS whereas Inzaule and colleagues indicated an affordable HIV drug-resistance testing for monitoring of antiretroviral therapy in Sub-Saharan Africa. Besides, seminal works by Gebriel et al, Letebo and Shiferaw, Menberu, Olana et al, Ondoa et al, Tesfaye et al and Woldeamanuel et al showed validated and adapted data collection tools and diagnosis procedures which were found effective in a low income setting. Gebriel and colleagues demonstrated the reliability and validity of an interviewer-administered adaption of the youth self-report for mental health screening of vulnerable young people in Ethiopia. Letebo and Shiferaw adapted HIV patient and program monitoring tools for chronic non-communicable diseases in Ethiopia, while Menberu assessed the performance of the WHO 2011 TB symptom screening algorithm for pulmonary TB diagnosis among HIV-infected patients. Tesfaye and colleagues adapted and validated the short version WHOQOL-HIV in Ethiopia while Woldeamanuel and his colleagues developed, validated and field tested an instrument for clinical assessment of HIV-associated neuropathy and neuropathic pain in resource-restricted and large population study settings. On the other hand, Olana and colleagues have shown an early infant HIV diagnosis procedure using DNA-PCR using an eight years data. A new matrix for scoring the functionality of national laboratory networks in Africa by introducing the Labnet Scorecard was developed by Ondoa and colleagues.

In addition, two articles focused the economic implication of the HIV/AIDS pandemic. Hernandez-Villafuerte and colleagues documented the bibliometric trends of health economic evaluation in Sub-Saharan Africa while, Zegeye and colleagues showed the economic costs of patients attending the prevention of mother -to- child transmission of HIV/AIDS (PMTCT) services in Ethiopia in both an urban and rural settings. A web-based TB patient follow-up information system has been designed by Shekur.

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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.

We found only two published studies on HIV among Ethiopians in the diaspora. In the first study, Daw et al. analyzed the prevalence of HIV and HIV-HCV co-infection in serum samples collected among 14,205 immigrants from North and Sub-Saharan Africa. Overall, 309 (2.3%) individuals were found to be positive for HIV and 109 (0.8%) for HIV/HCV coinfection. Immigrants from Burkina Faso/Ivory Coast (7.8%), Nigeria/Ghana (6%), and Ethiopia (5.2%) had the top three highest levels of HIV infection. Among Ethiopian immigrants with HIV, 29.7% had HCV co-infection, which was lower than the average 35.3% for all immigrants combined. Van Kesteren and Wojciechowski (2) conducted a retrospective analysis of the medical records of 315 adopted Ethiopian children in Belgium. The results indicate high prevalence of stunting and intestinal parasites but none of the children tested positive for HIV, syphilis or hepatitis C.

1. Daw MA, El-Bouzedi A, Ahmed MO, Dau AA, Agnan MM, et al. Prevalence of human immune deficiency virus in immigrants crossing to Europe from north and Sub-Saharan Africa. Travel Med Infect Dis 2016;14(6):637-638.
2. Van Kesteren L, Wojciechowski M. International adoption from Ethiopia: an overview of the health status at arrival in Belgium. Acta Clin Belg 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.

Converse, PJ, Haile Mariam D, Kloos H, Mekonnen W, Mulatu MS, Kaba M. Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: The 2015 Update. Ethiop J Health Dev 2016; 30(3): 103-276.

Section 10: Selected Websites Featuring HIV/AIDS in Ethiopia

1. Federal HIV/AIDS Prevention and Control Office of Ethiopia: http://www.hapco.gov.et
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. Christian Relief and Development Association: www.crdaethiopia.org
6. People to People Organization: http://www.peoplepeople.org
7. 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
15. University's Mailman School of Public Health: http://icap.columbia.edu/where-we-work/ethiopia
16. World Health Organization: http://www.who.int/countries/eth/en/
17. 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-HIV-AIDS-treatment-care-support
18. The Twinning Center: http://www.twinningagainstaids.org/ethiopia.html