

Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: The 2014 Update

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Introduction

This twelfth annual update of the HIV/AIDS literature on Ethiopia is the largest one thus far presented. Like the previous issues, it includes references to studies covering all major public health aspects of this infection in Ethiopia and in some issues facing 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 and trends and highlights major findings of studies presenting new approaches, concepts and tools.

We hope that this annual update will, like previous issues, help to identify and encourage research in neglected, but relevant and promising areas in HIV/AIDS epidemiology, prevention, control, care and support. Because of the increasing complexity of the pertinent issues and relationships at hand and the fact that we do not cross reference any entries in our updates, we encourage readers interested in any one area of research to review also other sections in this update.

We used the same methods as in previous updates to identify and classify references. Literature searches using keywords “Ethiopia AND HIV AND 2014” and

“Ethiopia AND AIDS AND 2014” were made in PubMed, CINHALL, 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>.

The large number of references in this update (578, 188 more than in the 2013 update) is due largely to the inclusion of 156 references from six major conferences, including the 25th Annual Conference and Silver Jubilee Anniversary of the Ethiopian Public Health Association (94 references), the International AIDS Conference in Melbourne (32 references), and the IGAD (Intergovernmental Authority on Development) (20 references) and to the large number of published articles (304). But there were only 113 theses (22 fewer than in 2013), including 112 Master theses and 1 PhD dissertation; 100 of them were from Addis Ababa University and 13 from Jimma University. It was not possible to access theses from Gondar, Hawassa and Mekele universities as in 2013. The remaining references were unpublished reports by different agencies and organizations.

We used the following PubMed search terms: Ethiopia AND HIV AND 2014[dp] or Ethiopia AND AIDS AND 2014[dp].

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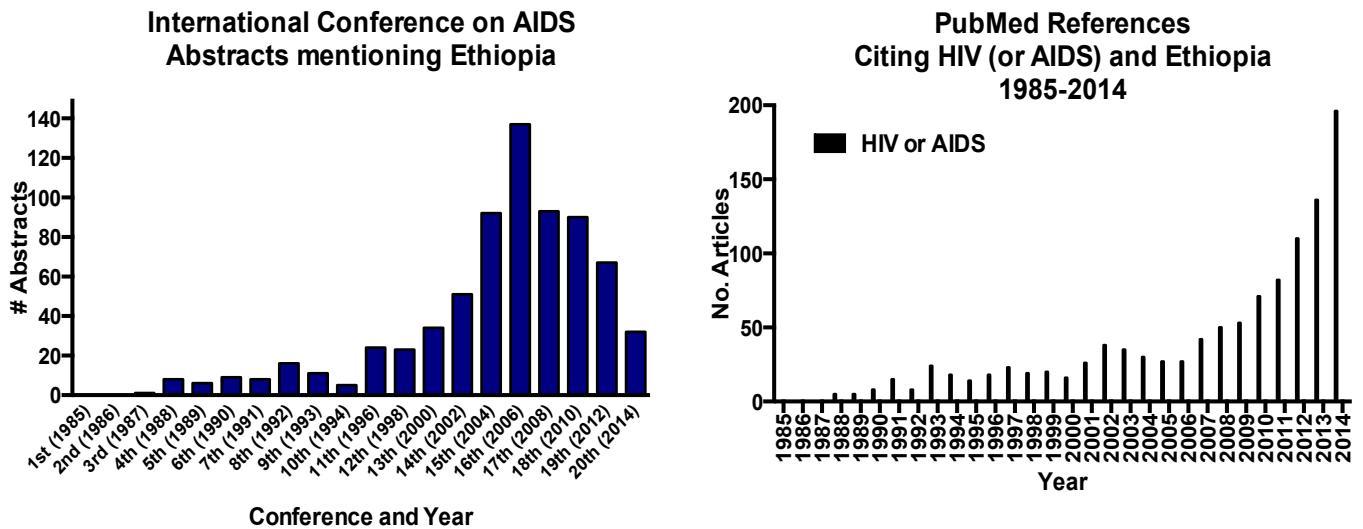


Figure 1: Presentations at the International Conference on AIDS (A) and Publications cited in PubMed (B) concerning Ethiopia and HIV or AIDS. The increase in presentations in recent years seems to be followed by an increase in material becoming full-length manuscripts. The highest number of presentations (137) was in Toronto in 2006; conferences in Bangkok, Mexico City, and Vienna all had ~90 presentations*. There was a decline in attendees (presentations, 67) in Washington, possibly because of visa issues and in Melbourne, presumably due to the expense of travel.

*A. Conference locations: 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).

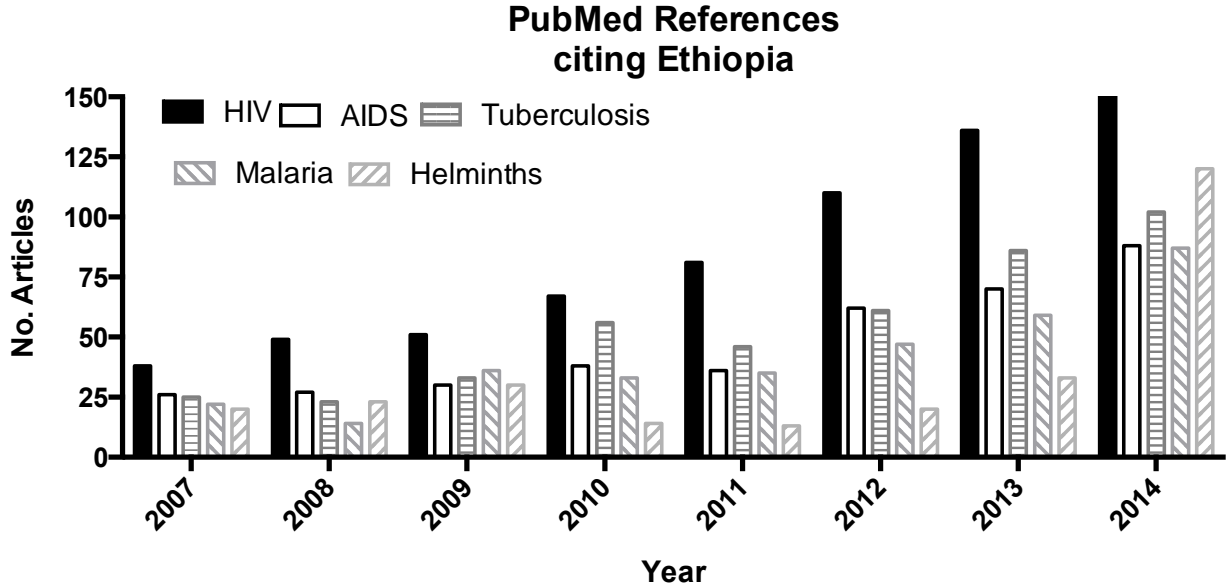


Figure 2: Publications Cited in PubMed Concerning Ethiopia and HIV, AIDS, Tuberculosis, Malaria, and Helminths

Section 1. 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. (1-29)

This year there were 29 references categorized as concerning basic biomedical research, a number similar to recent years, but somewhat less as a percentage of all the HIV references. Half of the references were published in scientific journals and two were presented at the Ethiopian Public Health Association annual meeting. The remaining 12 studies (43%) were Masters (MSc) theses.

Of the 29 references, 23 dealt with tuberculosis and 16 of those evaluated diagnostic methods. Of the latter group, at least 4 (MSc theses by Assefa (6) and Dejene (12); a published meeting abstract by Adelman et al. (5), and a full paper by Biadlegne et al. (10) studied the performance of the relatively new Cepheid GeneXpert point-of-care technology which utilizes a small device with one to four modules to identify *M. tuberculosis* DNA by PCR and to probe for mutations in the *rpoB* gene that confer resistance to the critical drug rifampin. Rifampin (RIF) was introduced to Ethiopia for TB treatment only in the 1990s, long after the other well-established first line drug, Isoniazid (INH). Accordingly, for historical operational reasons alone, but also biological reasons, INH monoresistance is much more common than resistance to RIF alone. Detection of RIF resistance in *Mtb* is usually associated with concurrent INH resistance, the definition of multi-drug resistance (MDR-TB). It is possible to make these determinations within hours rather than the weeks necessary for culture and drug susceptibility testing (with considerable risk of culture contamination and, thus, no information). In addition, acid-fast or the more sensitive fluorescent smear microscopy give no information about drug susceptibility and appropriate treatment. A major drawback of the Xpert system is that even with concessional pricing, the availability of this system is limited in resource-constrained settings such as Ethiopia. Adelman et al. (5) reported that patients receiving anti-retroviral therapy (ART) were less likely to have sputum samples test positive at ALERT Hospital in Addis Ababa and that the prevalence was lower than in previous studies of people living with HIV (PLHIV). Possibly, due to the low prevalence, the increased sensitivity compared to microscopic smear was not statistically significant. In contrast, Biadlegne et al. (10), evaluating fine needle aspirates (FNAs) from lymphadenitis patients in northern Ethiopia found, compared to culture, high (94%) sensitivity even in 5/11 contaminated cultures and 56/188 culture negative cases. Specificity was nearly 70%. In addition, mutations in *rpoB* were in complete concordance with phenotypic resistance to RIF and a mutation was also found in a culture negative sample. Biadlegne et al. concluded that the test performs well for a difficult to diagnose form of TB (as may have been discussed in the MSc theses by Zewdie (29) and D. Gebre-Tsadik (13), as well as the EPHA presentation by Nigus et al. (22), while being simple and suitable for use in remote areas – if electricity is available.

Other TB diagnostic studies included a thesis by Abaye (1) evaluating the detection of *Mtb* in stool samples of HIV seropositive patients with pulmonary disease, a method that might be particularly valuable in patients such as children who have difficulty producing sputum.

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Abdissa et al. (3) found that adding bacteriological culture to cytological analysis of FNA of lymph nodes from lymphadenitis cases increased diagnostic accuracy and experienced low rates of culture contamination. Tadesse et al. (26) found that concentration of lymph node FNA by centrifugation doubled the detection rate of smear microscopy. Balcha et al. (7) reported that the detection of *Mtb* lipoarabinomannan (LAM) in urine had low sensitivity except in patients with very low (<100) CD4 counts. This topic was also evaluated in a thesis by Ifa (15) and an EPHA conference presentation by Niguse et al. (23). The advantages and disadvantages of interferon- γ release assays (IGRAs) compared to traditional tuberculin skin testing remains a subject of evaluation. Belay et al. (9) found that the issue of reversion to negativity in the Quantiferon assay was rare in patients and contacts, while conversions to positivity were common in contacts, highlighting the need for follow up investigations in the contacts of TB patients in Addis Ababa clinics. A different antigen, α -crystallin, or ACR, of *Mtb*, from that currently used in IGRA was tested by Mamo et al. (17) Responses to ACR were more frequent in community controls than in patients with active disease and may be a good marker for latent infection. A thesis by M. Gebre Tsadik (14) compared conventional acid-fast and fluorescent smear microscopy as well as time of day of sputum collection. The thesis by Omar (24) entertained radiological and pathological diagnosis of TB.

Other researches on tuberculosis included, a study by Belay et al. (8) characterizing by molecular techniques the strain diversity present in pulmonary TB suspects among pastoralists in the Afar Region. A high level of strain clustering, particularly in HIV seropositive patients, suggests recent transmission has occurred in this population. Molecular characterization was also used by Debebe et al. (11) to help map *Mtb* strain distribution in northwest Ethiopia as well as by Temesgen et al. (27) in northeast Ethiopia. The latter study also documented frequent monoresistance, but no MDR-TB in this population in and near Dessie. Mariam (18) reported that *Mtb*, present in raw milk samples, was no longer detectable after 7 days fermentation at room temperature (as often practiced in rural households) in the presence of certain lactic acid bacteria. Mihret et al. (19) assessed gene expression patterns in TB patients, household contacts, and latently infected subjects and found distinct expression patterns of single genes and combinations of genes that have the potential to be biomarkers of outcomes of exposure to *Mtb*.

Another final TB study by Sutherland et al. (25) involved study subjects from sites in Malawi, South Africa, the Gambia, and Ethiopia in the quest for immunological biomarkers that potentially distinguish active from latent tuberculosis from no infection. Remarkably, the FCGR1A gene, expressed by monocytes and macrophages and induced by interferon- γ , was found to be increased in active TB, regardless of HIV status.

Successful TB treatment resulted in reduced FCGR1A expression. This pattern was found in all four sites. There were genes found to be more frequently different between HIV+ and HIV- subjects, but those differences were not as marked.

Apart from studies of tuberculosis, there were studies on HIV and opportunistic infections associated with HIV. The MSc thesis by Adane (4) evaluated HIV-1 viral load testing with dried blood spots. Abdissa et al. (2) found that an immunoassay to detect plasma concentrations of the anti-HIV drug, efavirenz, agreed well with more precise liquid chromatography tandem mass spectrometry techniques to identify low, medium, and high concentrations of the drug. An MSc thesis by Moges (20) reported the species identification and antifungal susceptibility of yeast isolates in a hospital in Addis Ababa. Mulu et al. (21) found that the higher HIV-1 type C viremia in helminth co-infected individuals is more likely a result of immune activation rather than sequence variation in the NFKappaB binding sites of the HIV-1 long terminal repeat. HIV-1 infection does not typically result in rapid development to AIDS. Tsegay (28) evaluated effector T cell responses to different HIV-1 antigens in “elite controllers” and “long term non-progressors” with suppressed viremia or no detectable viral load who show little or no symptoms long after infection.

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Addis Ababa. MSc Thesis: Addis Ababa University; 2014.

Section 2. Epidemiological, Behavioral, Socioeconomic 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 (1-173).

This section attracted the second largest share of research activity related to HIV/AIDS in Ethiopia, after the Treatment section. It contains 173 references: 93 (53.7%) published articles, 42 (24.3%) conference abstracts, 36 (20.8%) Masters theses, 1 (0.6%) doctoral dissertation, and 1 (0.6%) report. The categories of research interest within this section are very similar to those of the previous update. Researchers focused on investigating 1) HIV prevalence and factors associated with HIV infection; 2) prevalence and impacts of opportunistic infections and other comorbidities; 3) sexual and other risk behaviors for HIV infection; 4) awareness and knowledge about HIV/AIDS and related issues; 5) reproductive preferences and risk behaviors of PLWHA; 6) occupational risk exposure and protection; 7) broader social drives of HIV/AIDS; 8) violence and harmful traditional practices; and 9) other existing and emerging research areas.

HIV prevalence and risk factors associated with HIV infection were studied in different settings and among different sectors of the population (31, 32, 41, 66, 78, 104, 126, 144). Two of these references reported data from the same study that examined the prevalence of HIV infection and associated factors among infants born to women living with HIV, in South Gondar Zone, Amhara Region, Ethiopia (31, 32). After reviewing the charts of 434 HIV-positive pregnant women, the authors found a 10.1% prevalence of HIV among their newborn infants. In addition, the authors found association between mother-to-child transmission of HIV and inadequate use of antiretroviral therapy and skilled delivery care. With advances in PMTCT, these infections could have been avoided. Thus, further research into the barriers to implementing PMTCT programs is highly recommended. Two other references examined the prevalence of HIV among women and their partners who are using PMTCT programs (41, 78). In one of these reports, HIV prevalence among pregnant women receiving PMTCT services in Omo Zone, southern Ethiopia was higher (3.4%) than the national average (2.1%). A Masters thesis and a published article examined the prevalence of sero-discordance among couples (143, 144). The findings of the published article (142) are revealing about the increased vulnerability of

women to HIV than perhaps men. In this study, HIV testing data from 154 couples who lived together for at

least a year found higher levels of HIV prevalence among the women (5.3%) than among their male partners (2.0%). Other studies examined HIV prevalence among emergency department patients (104), pastoral communities (126), and adult men and women nationally using data from the Ethiopian Demographic and Health Survey (66). Overall, these 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.

Consistent with previous updates, the largest number of references in this section is devoted to the epidemiology of viral, bacterial, or parasitic infections among people living with HIV. In this update, the most frequently studied co-infections were HIV and tuberculosis (11, 13, 65, 71, 110, 111, 113, 163). Those studies focused not only on the co-occurrence of HIV and tuberculosis, but also on the impact of one infection on immune response, treatment, and health outcomes of the other. Of increasing concern in this area is the prevalence of multi-drug resistant tuberculosis (MDR-TB). A meta-analysis of 24 studies showed that the odds of having MDR-TB among HIV positive cases was significantly higher by 24% regardless of study design, study base, and type of MDR-TB (110, 111). This finding led the authors to recommend strengthening the capacity for diagnosis of MDR-TB, provision of antiretroviral treatment, and collaborations between HIV and TB control programs. HIV and hepatitis B (HBV) or C virus (HCV) co-infections and the risk factors for co-infections have attracted several investigations (4, 98, 116, 163, 168, 170, 173). In addition, researchers examined other co-infections, including HIV and intestinal parasites (96, 112, 145), HIV and *Cryptosporidium* (6, 77), HIV and *Toxoplasma gondii* (83, 172), HIV and herpes simplex virus (91), HIV and meningitis (115), HIV and salmonellosis (142), and HIV and other infectious and non-infectious co-morbidities (85, 129, 140, 151, 162).

Given the strong and syndemic relationships between HIV and tuberculosis, this update also includes several studies focusing on the epidemiology of tuberculosis alone in a wide variety of settings and geographic regions in Ethiopia (5, 7, 15, 21, 22, 30, 36, 37, 38, 39, 46, 64, 69, 92, 101, 133, 155, 156). These studies documented prevalence and associated factors (5, 92, 133), healthcare seeking (7, 101), co-morbidities (46, 21), knowledge and awareness (154), and the emergence of multi-drug resistant tuberculosis (15, 36, 37, 38, 39, 64). Two of the references in this area deserve to be highlighted. Kebede and colleagues (92) conducted the first national survey (n = 46,697) to determine the prevalence of pulmonary TB in the general adult population aged 15 years in 2010-

2011. The survey revealed that the prevalence of smear-positive TB was 108/100,000 (95% CI 73-143), and that of bacteriologically confirmed TB was 277/100,000 (95% CI 208-347) among the general adult population. This study is valuable since it provides more reliable baseline information essential for planning and decision making for TB control programs in Ethiopia. Biadlegne and colleagues (38) conducted a systematic review of the literature on MDR-TB in Ethiopia. The authors identified 23 studies that met their eligibility criteria; of those, six reported high prevalence of MDR-TB in the range of 3.3%-46.3%, and two reported XDR-TB in the range of 1% - 4.4%. This review indicated that MDR-TB in Ethiopia is a serious public health problem that needs strong early case detection and proper treatment of drug-susceptible tuberculosis. While the number of studies reported is relatively small, this update also includes the prevalence and determinants of other sexually transmitted diseases (18, 73) and HBV infections (62).

In this update, five studies are included that explored the epidemiology of leishmaniasis in Ethiopia are included (53, 94, 106, 132, 157, 158). As two previously noted references (53, 158) indicate, leishmaniasis is a neglected tropical disease whose linkage to HIV/AIDS has become increasingly more evident in East Africa, including Ethiopia. HIV and leishmaniasis co-infection has been found to be associated with diagnostic and treatment challenges, including high rates of treatment failure and relapse of visceral leishmaniasis among HIV-co-infected patients. In fact, one of the authors called for consistent inclusion of leishmaniasis co-infection as an AIDS-defining condition (157). One of the references describes the evolving nature of leishmaniasis in Ethiopia, and summarizes the etiology, hosts, life cycle and transmission, vector ecology, distribution, risk factors, and diagnosis and treatment of leishmaniasis in the country (94). Two other studies examined other comorbidities associated with leishmaniasis (106, 132).

As in previous updates, researchers continue to examine the patterns of sexual, drug use, and other risk behaviors for HIV acquisition and spread, and the demographic and psychosocial factors associated with these risk behaviors. Sexual risk behavior studies covered such topics as sexual initiation, pre-marital sexual activity, sex with multiple partners, and unprotected sex (9, 29, 40, 44, 67, 87, 93, 99, 100, 118, 122, 128, 135, 136, 139, 143, 148). Nearly all of the those studies were conducted with youth in high school and university settings, with the exception of those studies that involved out-of-school youth (122), taxi drivers (93), and men who have sex with other men (143). Some of these studies also examined risk awareness or perceptions among the studied populations (99, 100, 122, 136). Unfortunately, there were only two studies that examined the role of substance use as potential factors for acquisition of HIV infection (50) and as co-occurring problem among people living with HIV (137). Future epidemiological studies need to address this gap, particularly given that substance use among

young people in Ethiopia is very likely to be on the rise than on the decline.

Compared to previous updates, there are relatively small numbers of studies reporting on HIV/AIDS related knowledge, awareness and attitudes in this update (16, 27, 47, 75, 130, 149). Those studies covered assessment of awareness of HIV/AIDS and VCT among power project workers (149), knowledge of MTCT and/or antenatal care among women (16, 130), awareness and perceived empowerment to negotiate safe sex among married women (47), adolescents' attitudes towards sexual orientation (75), and knowledge of STI and HIV/AIDS among high school students (27). Two of those studies used data from the Ethiopian Demographic and Health Survey (EDHS). In one study, using the 2011 EDHS data, the authors found that ANC use was the highest among HIV-positive women with high-levels of knowledge about MTCT (130). In the other study, the authors examined changes in HIV awareness and safer sex negotiation among married women in Ethiopia using 2005 and 2011 EDHS data. The study found significant increases in knowledge of HIV and the ability to negotiate safer sex from 2005 to 2011, suggesting a positive trend in gender empowerment among married Ethiopian women (47). Both studies show encouraging signs of the effects of HIV prevention programs in improving awareness and behavioral changes, including use of preventive services.

Epidemiological, behavioral and social research among PLWHA continues to explore reproductive health issues, including fertility intentions, infant feeding practices, and sexual risk behaviors. Three studies examined the fertility intentions and unintended pregnancy outcomes of women living with HIV/AIDS (24, 103, 138). One of those studies examined the fertility intentions of 456 women living with HIV in western Ethiopia and found that 42.1% of them had intention to have children in the future. Three studies examined knowledge, attitude and/or practices in relation to infant feeding, including breast feeding and cessation, among women living with HIV/AIDS (12, 81, 82 102). Researchers also focused on HIV risk and protective behaviors among people living with HIV (55, 59, 60, 165). In a cross-sectional study of 667 PLWHA who were receiving ART, Engedashet and colleagues (60) found that the prevalence of unprotected sexual practices among PLWHA was high at 22.2% [95% CI: (19.0-25.4)]. In addition, the authors found that unprotected sexual practices were significantly associated with being female, being divorced/widowed/separated, length of stay with the current partner for ≥ 49 months, and not discussing or partly discussing safe sex and condom use with sexual partner. Given that HIV/AIDS affects the most reproductively active sector of the population, the findings regarding fertility intentions or unprotected sexual behaviors indicate the gaps in HIV prevention and reproductive health services for PLWHA.

Although occupational risk of HIV infection is rare (except for commercial sex workers) in developed countries, it remains to be public health problem in developing countries where healthcare resources are limited, work environments are unsafe, and universal safety measures are not fully implemented. In this update, five studies explored issues relevant to potential occupational exposure to HIV and other blood borne infections, including prevalence of risk exposure and knowledge of universal precautions (8, 23, 35, 54, 109). Two of the published studies reported extremely high levels of exposure to occupational risk for HIV infections. In one study (23), the prevalence of occupational exposure of healthcare workers to HIV risk was found to be 88.6% in the past 12 months. The authors found that contact to potentially infectious body fluids accounted for the largest proportion (56.7%) followed by needle stick injury (31.5%) and glove breakage (28.8%). In another study (35), 40.4% of healthcare workers, in the study reported at least one incident of occupational exposure to HIV/AIDS risky conditions in the last one year. In addition, the authors found that occupation risk was associated with lack of training on infection prevention, years of work experience, long working hours, absence of work guidelines, and dissatisfaction with the current job. While the estimates of potential exposures from those studies are different, the high-levels of exposure highlight the need for further research into programs designed to prevent occupational risk to HIV and other blood borne infections in the country.

Researchers also examined broader social and structural factors that are directly or indirectly related to the spread of HIV in Ethiopia by increasing the vulnerability of various population segments. In four studies, the effects of mobility and migration among domestic workers and seasonal laborers were explored (48, 79, 152, 159). The roles of socio-economic vulnerabilities among women, among those living in urban areas, and among couples in sero-discordant relationships were also discussed in three studies (88, 108, 167). Three other studies took a closer look at the effect of parental and familial influences, or lack thereof, on HIV vulnerability among youth (57, 63, 107). While limited, the trends, determinants, and impacts of HIV-related social stigma have also been the subject of investigation (56, 84). Interestingly, there was one conference presentation that examined the relationship between exposure to explicit sexual images and materials and HIV risk related behaviors among youth (51). With the expansion of internet and satellite television in the country, the potential influence of unregulated sexual content in social media on attitudes and behaviors of young people Ethiopia may require closer scrutiny.

As in previous updates, researchers continued to examine sexual, physical, and other forms of violence and harmful traditional practices and their connections to poor health outcomes, including increased risk for HIV infection and

reproductive health problems. In this update, six references present findings on the prevalence, determinants, and/or health-related consequences of violence (14, 25, 28, 72, 90, 117, 169). Different forms of violence were investigated, including sexual harassment in public transportation systems (117), sexual coercion among female university students (28), gender-based violence among women in general and commercial sex workers (90, 169), sexual assault among women who presented themselves for treatment (14), awareness about and risk factors for trafficking of young girls (25), and prevalence and impacts of violence among orphan children (72). Two studies reported on the prevalence of and assessment of knowledge and attitudes toward female genital mutilation (42, 86).

Several other references explored issues covered in previous updates, including water, sanitation and hygiene practices among PLWHA (34, 166), psychological and quality of life issues among PLWHA (68, 137, 167), preventive behaviors, including condom use, adoption of contraceptives, male circumcision (1, 55, 127, 156), and disclosure of HIV status (10, 74, 124). Of particular note regarding disclosure of HIV status is the study reported by Alemayehu and colleagues (10) where disclosure was studied among 315 HIV-positive women in northern Ethiopia. The authors found that only 63.8% of women had disclosed their HIV status to their partners. More importantly, the authors also found that disclosure was significantly associated with women's knowledge of the HIV status of their sexual partners, having received pretest counseling, knowing someone who disclosed their HIV status, and discussing about HIV with their partners prior to HIV testing. Given that those associated factors can be intervened on, research on the design and implementation of programs to increase disclosure of HIV status to sexual partners needs to be encouraged. Unlike previous updates, only two studies dealt with nutritional issues, one focusing on prevalence of anemia among pregnant women (105) and the other looking at anemia and intestinal parasites among HIV patients (112). Few methodological papers are also included in this update, covering such topics as modeling the causes of death (160), modeling HIV or tuberculosis (52, 153), benefits of population surveys (76), and validation of a scale to measure of HIV-related stigma (70).

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Section 3. Impacts Research

The 12 references in this section cover psychological and psychosocial challenges (2, 9, 10), stigma (3), and nutritional (5, 6), physical (8) and mortality (4,7) impacts, as well as resilience to HIV infection (1,11) and the cost of TB to patients and their families (12). Most of these impacts have already been studied and their results reported in earlier Updates. A worldwide review of the changing prevalence of maternal mortality between 1990 and 2013 shows that rates in Ethiopia are still among the highest in developing countries, but that they have declined relatively faster than in other countries during that 13 year period. The study estimated that 1.5% of maternal deaths in sub-Saharan Africa, but 6.2% in southern sub-Saharan Africa, were due to HIV, consistent with national HIV rates (4). One of the few studies to date pertaining to cost of TB found a high mean total cost for outpatients and their families (3,158 Birr per case), reemphasizing the need for prevention and early case detection and treatment of patients (12). Using physical activity energy expenditure and physical capacity measurements, Olsen et al. (9) reported significantly lower levels of physical activity in AIDS patients at initiation of ART. Further studies are needed on the impact of antiretroviral treatment on stigma, employment, disclosure of HIV infection, use of VCT services, and risky sexual behavior.

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Section 4. Health Services and Health Policy Research

This section provides an insight into a range of subjects including expansion of services for people living with HIV/AIDS, health resources management, capacity building of healthcare providers, national and international policies, laws and guidelines on the provision of health services and protection of people living with HIV/AIDS (1-56).

The integrated approach to service provision and the need for its use has been extensively dealt with in several articles. Specific details were on the scale-up of integrated community case management (1) and adolescent contraceptive services (23), scaling up and integration of family planning with ART service provision (4, 30, 52, 54) and integration of HIV with community MCH outreach (16). A thesis (55) also dealt with integrated pharmaceutical logistics for improving the supply and management of HIV and TB laboratory

diagnostics supplies. Furthermore, in this issue, some interest was found in NCDs; one article (44) focused on the linkage between cervical cancer and HIV, while another one (3) looked at HIV prevalence among laboring women.

Improved service provision, including HIV counseling and testing, counseling service among depressed HIV patients, TB case detection and screening for cryptococcal disease, and mortality due to cryptococcosis were included in this section (2, 5, 7, 10, 15, 22, 33).

The bulk of this section has given prominence to HIV service delivery in the form of clinical, information and community level care and determinants of services targeting the major age groups of the population: children, adolescents and youth and adults. Compared to previous years, focus was given to HIV targeting pastoral communities (41). Besides, cost of HIV treatment, including innovative financing and cost sharing were highlighted in three of the abstracts covered in this section (31, 46 and 49). Most of the remaining abstracts emphasized different aspects of HIV service delivery and determinants (27, 32, 34, 37, 43, 47) at community and facility levels. Community level capacities and roles to provide HIV and AIDS services were discussed in some of the abstracts. Emphasis were given to the role of associations and networks of people living with HIV (8), gate keepers (56), religious leaders and soul fathers (45, 51), empowerment of community (30), community level health workers, including volunteers (38, 39), and Integration of community home based care programs within national primary health care (1) were assessed.

Several articles paid attention to capacity building in the form of training, community health worker's engagement for HIV service provision at community level, community empowerment to scale service, including PMTCT, and the role of community service organizations in capacity building for the HIV response (12, 13, 30, 38, 39).

Two articles emphasized the need for stronger partnerships in the fight against HIV and AIDS (42, 50). One article (24) outlines how the Nursing Education Partnership Initiative (NEPI), a program supported by the US Global AIDS Coordinator, has strengthened nursing education in Africa.

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Section 5. Prevention Research

With 80 references, this section ranks after Treatment, Care and Clinical Research and Epidemiology, Behavioral, Socio-economic and Cultural Research as the third largest section of this Update. Eighteen references are to counseling and testing studies (1,4,5,6,23,25,29,34,35,37,42,46,52,53,59,61,69,76).

Those included neglected areas of HIV testing among pregnant women (1,61) and individuals with disabilities (5,6), utilization of youth-friendly testing services (29), the unaccepted practice of covert HIV testing (46), and informed choice for HIV testing among antenatal care attendants (61). The finding that living with both parents and mental disabilities were negatively associated with the utilization of VCT services (5, 6) indicates that educating parents and families may potentially overcome barriers. Additional studies identified impediments to VCT utilization among female sex workers (25) factors in VCT uptake among students (34,76), KAP surrounding utilization of students' utilization behavior (37) and provider-initiated HIV testing among TB patients (52,59) and outpatients (53). Persistence of the perception among students that sexual activities pose little risk of HIV infection and low use of VCT services reemphasize the need for the provision of youth-friendly preventive services and integration of sex education in the school curriculum (69). Seventeen studies addressed issues surrounding prevention of mother-to-child transmission (PMTCT) of HIV, including breastfeeding by HIV-infected mothers (10,11,15,22, 30,33,41,43-45,47,54,55,67,74,77). Some of those studies addressed the understudied issues of male partner involvement in PMTCT (10,74), the role of mother support groups in PMTCT (67), adherence to the Option B+PMTCT

program (33), sero-conversion of HIV-exposed and breastfeeding infants (41), and longitudinal patterns of infant and child feeding index in relation to the nutritional status of HIV-exposed infants (44).

Seven studies examined contraceptive use and method preference among HIV-positive women, including women on ART (3,12,57,58,40,66,70,78) and five studies focused on unmet need for family planning and fertility intentions by PLHIV (7,13,17,28,71). One study each assessed the prevalence and factors of condom use among female commercial sex workers (26), patients on ART (51), at-risk university students (64) and of male circumcision (38).

Eight studies were in the area of information, education and communication (IEC). Bekalu and Eggermont (19) found that 23 songs widely used in HIV prevention in Ethiopia cover most aspects of HIV prevention and recommended that songs be utilized to achieve improved HIV/AIDS outcomes. They also reported that messages promising gain or loss outcomes in HIV prevention generated different levels of intention of respondents to get HIV tested (20). Bekalu et al. (21) reviewed DHS in 11 sub-Saharan African countries, including Ethiopia, and found that mass media plays more in reducing HIV-caused stigma among urban than rural areas; they called for more appropriate, rural focused IEC interventions to overcome that gap. Dessalegn (31) found a high level of missed opportunities for antenatal IEC in several public health facilities and recommended that health care providers be adequately trained in communication and counseling skills. Woldetsadik and Lumadi (79) reported that the HIV/AIDS awareness education programs by three NGOs were not gender responsive largely due to project design and administrative shortcomings. Kabeta et al. (49) compared the impact of community-based education and radio messages on gender violence and HIV risk behavior and Mohamed (62) assessed the interpretation of prevention messages by university students. The remaining studies focused on prevention messages among young people (16), and a summary of HIV and AIDS education and the curriculum in Ethiopia (75).

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Section 6. Treatment, Care, and Clinical Research

This section includes studies on the characteristics and clinical course of HIV infection and opportunistic infections, treatment to 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 (1-179).

This section includes 105 articles published in journals, 44 conference abstracts, and 30 Masters theses (27 at Addis Ababa and 3 at Jimma Universities) that are focused on a wide range of treatment and care issues associated with HIV and TB.

The bulk of the studies were on ART adherence, including role of social support, as well as barriers to ART uptake (3, 10, 14-16, 27, 31-33, 37, 47-49, 57, 61, 80-82, 88, 119, 131, 133, 139, 148, 170). There were also those that looked at issues of: parameters for monitoring ART (21); task-shifting in ART (30); ART in children (136); WHO's guidelines and eligibility criteria for ART (34, 151); as well as KAP on adverse effects of HAART (64), including KAP on ART among VCT clients (165).

Next in frequency were studies dealing with issues related to diagnosis and treatment of tuberculosis: delay in diagnosis and treatment (29, 43, 59, 83, 174, 175); multi-drug resistant (MDR) TB (1, 23, 90, 92, 105); TB treatment trial and drug susceptibility, including DOTS (2, 117, 142, 169); and TB treatment adherence/outcome, including guidelines; TB of the cervix (40); quality of care in TB (88); TB self-treatment among pastoralists (111); as well as KAP on TB infection and control (37, 52, 75, 77, 79, 92, 102, 104, 113, 116, 119, 123, 154, 159, 162). Two studies also looked at late (17) and early (66) diagnosis of HIV.

Several studies focused on opportunistic infections among PLWHA and those on ART, including the following: co-trimoxazole and isoniazid prophylaxis; as well as HIV related hypocalcemia, neuropathy, anemia, hyperglycemia, hyperlipidemia, microbial translocation, and metabolic syndromes (4, 12, 58, 60, 89, 109, 120, 125-127, 143, 144, 155, 157, 168, 177); case of giant condyloma in an immunocompromised patient (35); cervical lymph nodes among PLWHA (50); drug resistance and reactions (70, 144, 146, 150); as well as nutritional issues (75, 98, 100, 108, 132, 172) among those on ART. Other related set of studies looked at hematologic and immunologic profiles (including CD4 recovery, CD4 reference levels, and immunologic

response failures), renal function tests, arginase activity and bioequivalence, as well as rate of viral suppression among patients on ART (5, 22, 42, 53, 69, 72, 73, 84, 93, 97, 137, 138, 160, 163, 164, 176, 179).

There are also studies related to TB-HIV co-infection and treatment: MDR among HIV patients (18); biomarkers for TB-HIV as well as treatment, including liver toxicity of patients on ART & anti-TB (25, 114, 173, 178); HIV-TB on patients on HAART (26, 40, 44, 62, 63, 123, 162); analyses of mortality and survival among patients on ART as well as those with TB-HIV (6-8, 46, 99, 121, 141, 149, 159); as well as an incidental finding of a *Schistosoma* ova on cesarean section in an HIV-negative woman (56).

Gordon et al. (95) published a well-written report on a presumed case of Buruli ulcer (BU) in a young HIV+, malnourished boy in Gondar, the first ever in Ethiopia. BU, named after a county in Uganda, caused by *Mycobacterium ulcerans*, is present in Australia and West Africa, and has been reported from nearly all continents (see Converse et al. 2011 below*). Due to diagnostic uncertainty and facility limitations, diagnosis was based on clinical presentation and detection of clusters of acid-fast bacilli at the lesion's undermined edge. Culture (32°C for 8-12 weeks), a biopsy, and PCR could not be done. Suspecting cutaneous anthrax, ciprofloxacin treatment was continued when BU seemed more likely. Tuberculosis was considered and 4-drug anti-TB therapy was started. Standard BU treatment is rifampin plus streptomycin for 8 weeks, but the latter was unavailable. Ciprofloxacin is a substitute. The patient responded well to treatment, supporting the BU diagnosis. Clinicians should consider placing specimens in transport medium or cell-lysis solution and seek assistance ultimately from the WHO to have confirmatory PCR carried out. In addition, immunodeficiency can lead to more severe forms of BU (see Vincent et al. below†).

Mental disorders and mental health services are issues of focus among a number of studies in this category: psychological distress (55) and spirituality (106) among PLWHA and integrated mental health care (104) as well as HIV treatment among the mentally ill (107, 169); and mental disorders among malaria patients (156). There are also six papers on prevalence of malaria and trends in

* Converse PJ, Nuernberger EL, Almeida DV, Grosset JH. Treating *Mycobacterium ulcerans* disease (Buruli ulcer): from surgery to antibiotics, is the pill mightier than the knife? *Future Microbiol.* 2011 Oct;6(10):1185-98. doi: 10.2217/fmb.11.101. Review. PMID: 22004037; PMC3243445.

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malaria deaths as well as HIV testing among malaria patients (28, 79, 94, 102, 147), six papers on leishmaniasis and HIV (66-68, 96, 166, 167), and three papers dealt with helminth infection also in relation to TB, including drugs used for helminths and giardia (85, 86, 145). One paper dealt with partnership in pediatrics clinical care (38) and another (124) looked at IMCI.

There are three papers (13, 71, 77) related to caregivers and home-based care, two papers focusing on KAP about post exposure prophylaxis for HIV (20, 24), two papers on VCT utilization and KAP among high school students (41, 116), one paper (53) on T-cell regulation in leprosy, one paper (110) on test-and-treat approach to HIV, one paper (140) on condom use among PLWHA, two papers (45, 135) on willingness and acceptability of cervical cancer screening among PLWHA, one paper (11) on drug use (including those for malaria) among pregnant women, one paper (154) on use of mobile phones in HIV related consultations, as well as three papers on medicinal plants (9) and camel milk (19, 55) used for the treatment of STI, malaria and HIV.

Furthermore, there were studies that looked at advances in ART (113), HIV subtyping (130), and pharmacogenomics (152). Two papers pointed out the need for virological monitoring (129) and for drug resistance testing prior to ART initiation (128). The former found drug resistance among HIV-infected children and adults receiving ART for up to 6 years and the latter among chronically infected treatment naïve patients with drug resistance levels exceeding the WHO estimates.

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Section 7. Health Informatics, Monitoring and Evaluation Research

This section, includes research concerning monitoring and evaluation of HIV/AIDS programs and the development and use of quantitative and qualitative assessment, analytic and communication methods. It covers the systematic application of information, computer science, and technology for HIV/AIDS prevention, care, research and evaluation. (1-39).

More than half of the studies in this section focus on the development of assessment, analytic and communication tools, mostly models, epidemiological, diagnostic and scaling methods, and the remaining studies deal mostly

with monitoring and evaluating HIV/AIDS, TB, malaria and mortality programs. Streatfield et al. (29-33) examined all-cause mortality from non-infectious and infectious diseases, including HIV/AIDS, in different age groups at 12 sites in Ethiopia and 7 other Sub-Saharan countries using the InterVA-4 methodology, which captures the uncertainty surrounding cause of death for individuals (29). The results of these population-based studies for HIV/AIDS mortality largely correspond with modeled estimates and provide important baselines for further studies of mortality in AIDS patients who had been on ART (32). A separate article reported that most deaths among reproductive age females were due to HIV/AIDS and TB (18). Another longitudinal international study reported that Ethiopia achieved the second highest HIV incidence reduction rates in Eastern Sub-Saharan Africa after Djibouti between 2000 and 2013 (21). Based on recent declines in mortality in the 25 most populous countries, including Ethiopia, Norheim et al. (23) suggest that two-thirds of HIV, TB and malaria deaths can be avoided by 2030. Woldeamanuel and Girma (39) found that tuberculous meningitis continues to be a highly fatal disease in Africa, including Ethiopia, and recommended a range of health infrastructure and socioeconomic improvements to control it (39). Two additional longitudinal epidemiological studies reported on trends and experiences from TB and HIV surveillance programs (11, 13, 38) and progress toward the Millennium Development Goals (35). Mohamed (12) provided an overview of HIV/AIDS among pastoralists in the eight IGAD countries of Northeast Africa, including Ethiopia, a topic which remains understudied. Temesgen et al. (36) used direct and indirect methods to estimate the size of the female sex worker population in Addis Ababa and Gebreegziabher et al. (9) used spatial methods to estimate the coverage of comprehensive clinical services for sex workers in Ethiopia.

A number of studies developed or validated various recently developed diagnostic, assessment, analytic and communication tools. Two studies applied models to further improve rapid malaria diagnostic test results (3,4). Seid (25) compared joint and separate models in examining the relationship longitudinally between CD4 cell counts and defaulting from HAART and Mekonnen et al. (16) presented models of integrating HIV and sexual and reproductive health by an NGO, and Lerebo et al. (15) evaluated a multilevel model in identifying factors in the uptake of the prevention of mother-to-child HIV transmission program in Tigray Region. Shimelis and Tadesse (27) found the CoproStrip™ *Cryptosporidium* test suitable for use in resource constrained areas. Two TB monitoring tools, the Bantim TB score (24) and a clinical scoring system based on clinical variables and CD4 cell strata (5,28), were found to be useful in pulmonary TB case finding and in assessing immunosuppression in TB/HIV co-infections, respectively. Abrhame (1) evaluated the effectiveness of mid-upper arm circumference in adult patients on ART. Three studies examined the role of communication

interventions: Bekalu and Eggermont (6) assessed the impact of exposure to HIV/AIDS related media and the intention to use HIV testing services. Mohamed (20) employed indigenous communication system among Afar pastoralists to promote health and social development; Nelson et al. (22) evaluated mobile phone-based expert consultation for HIV/AIDS care. One study each used the verbal autopsy (17) and comparison of burial and hospital surveillance data to estimate rates and causes of mortality (19).

The remaining references are to studies on participatory survey results for use by faith leaders in addressing HIV stigma (8), an effort to standardize WHO guidelines on visceral leishmaniasis in HIV infection (10), scalability issues in using the “Single Visit Plus” method of cervical cancer prevention in HIV-infected females (14), validation of the condom use self-efficacy scale in Ethiopia (26), and the development of a monitoring and evaluation guide of the Ethiopian Public Health Association (34).

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39. Woldeamanuel YW, Girma B. A 43-year systematic review and meta-analysis: case-fatality and risk of death among adults with tuberculous meningitis in Africa. *J Neurol*. 2014 May;261(5):851-865.

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. (1-10).

Of the 10 publications included in this section, two present prevalence data for HIV, STDs (8,9), and intestinal parasites (1) among Ethiopian immigrants to Israel and among asylum seekers in Malta (9). One study concluded that although several *M. tuberculosis* strains were associated with Ethiopians, transmission of the infection between Ethiopian immigrants and Israeli-born patients could not be demonstrated (4). Bishara et al. (2) investigated the delay in diagnosis of TB in a pregnant Ethiopian woman who recently immigrated to Israel and the problem of initiating treatment in unconfirmed TB. One of the few health studies of Ethiopian adoptees in other countries found that 4.8% of 251 adopted children were positive for HIV (7). Three articles reported on another neglected topic, the risk of HIV infection among cross-border Ethiopian sex workers in Sudan (3), Somaliland (5) and Kenya (6).

1. Ben-Shimol S, Sagi O, Greenberg D. Differences in prevalence of parasites in stool samples between three distinct ethnic pediatric populations in southern Israel, 2007-2011. *Parasitol Int.* 2014 Apr;63(2):456-462.
2. Bishara H, Lidji M, Vinitzky O, Weiler-Ravell D. Indolent pneumonia in a pregnant recent immigrant from Ethiopia: think TB. *Prim Care Respir J.* 2014 Mar;23(1):102-105.
3. Gezie L. Cross-border commercial sex workers and HIV. *Ist IGAD International Scientific Conference on Health*; December 3-6, 2014; Addis Ababa. p. 58.
4. Goldblatt D, Rorman E, Chemtob D, Freidlin PJ, Cedar N, Kaidar-Shwartz H, et al. Molecular epidemiology and mapping of tuberculosis in Israel: do migrants transmit the disease to locals? *Int J Tuberc Lung Dis.* 2014 Sep;18(9):1085-1091.
5. Kriitmaa K, Hussein I, Ali A, Guleed S, Taher S, Dominkovic Z, et al. Results of a second round of HIV surveillance among female sex workers in Hargeisa, Somaliland. *1st IGAD International Scientific Conference on Health*; December 3-6, 2014; Addis Ababa. p. 48.
6. Kriitmaa K, Irving G, Theede J, Mahfoud Z, Wanyungu J, Musioki H, et al. Cross-border migrant female sex workers in Nairobi, Kenya: HIV and STI prevalence and risk behaviours. *20th International AIDS Conference*; July 20-25, 2014; Melbourne, Australia. Abstract no. MOPE083.
7. Martinez Ortiz A, Dominguez Pinilla N, Wudineh M, Gonzalez-Granado LI. [International adoption from Ethiopia in a 5-year period] in Spanish. *An Pediatr (Barcelona).* 2015 May;82(5):302-307.
8. Olshtain-Pops K, Stein-Zamir C, Abramson N, Nagusa H, Haouzi-Bashan M, Maayan S. Association of HIV and syphilis seropositivity with transit stay in urban areas among Ethiopian immigrants to Israel. *Isr Med Assoc J.* 2014 Jul;16(7):427-430.
9. Padovese V, Egidi AM, Melillo TF, Farrugia B, Carabot P, Didero D, et al. Prevalence of latent tuberculosis, syphilis, hepatitis B and C among asylum seekers in Malta. *J Public Health (Oxford).* 2014 Mar;36(1):22-27.
10. Zohar M, Moshe L, Daniel C, Noa C, Itamar G. HIV prevalence in the Israeli tuberculosis cohort, 1999-2011. *BMC Public Health.* 2014;14:1090. Epub 2014/10/23

Section 9. Previous Bibliographies

This section lists bibliographies that were published during 2014.

1. Mulatu MS, Converse P, Kaba M, Haile Mariam D, Mekonnen W, Kloos H. Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: The 2013 Update. *Ethiop J Health Develop.* 2014; 28(1):46-72.

Section 10. Selected Websites Featuring HIV/AIDS in Ethiopia

1. Federal HIV/AIDS Prevention and Control Office of Ethiopia: <http://hapco.gov.et>
2. Center for International Health of the University of Bergen, Norway (also access to the Ethiopian Journal of Health Development): <http://ejhd.uib.no>
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. Johns Hopkins University Center for Clinical Global Health Education: <http://main.ccghe.net/CCG/country/ethiopia>
7. People to People Organization: <http://www.peoplepeople.org>
8. Save the Children: http://www.savethechildren.org/site/c.8rKLIXMGIpI4E/b.6234245/k.A159/HIV_Aids_Programs.htm?msource=weilpres0511#Ethiopia
9. United Nations Children's Fund (UNICEF): http://www.unicef.org/ethiopia/hiv_aids_464.html
10. United Nations Development Program (UNDP): <http://www.undp.org/content/undp/en/home/ourwork/hiv-aids/Projects-initiatives/hiv-epidemic-ethiopia-case-study-transformational-change/>
11. United Nations Joint Program on AIDS (UNAIDS): <http://www.unaids.org/en/Regionscountries/Countries/Ethiopia>
12. United States Agency for International Development: <http://www.usaid.gov/ethiopia/global-health>
13. United States Centers for Disease Control and Prevention (CDC): <http://www.cdc.gov/globalaids/Global-HIV-AIDS-at-CDC/countries/Ethiopia/>
14. AIDS Portal: <http://www.aidsportal.org/web/guest/ethiopia>
15. University of California, San Francisco HIV In Site: <http://hivinsite.ucsf.edu/global?page=cr09-et-00>
16. The International Technical Training and Education Center on HIV (I-TECH) of the University of *Ethiop. J. Health Dev.* 2015;29(1)

- Washington: <http://www.go2itech.org/itech?page=co-03-00>
17. 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>
 18. World Health Organization: <http://www.who.int/countries/eth/en/>
 19. 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>
 20. The Twinning Center: <http://www.twinningagainstaids.org/ethiopia.html>