Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: The 2015 Update

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Introduction

This thirteenth 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 Ethiopians in the diaspora. All references are again listed under eight main headings, as follows: 1) basic biomedical research 2) epidemiological, behavioral, socio-economic 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 and 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. As such, literature searches was made using keywords “Ethiopia AND HIV AND 2015” and “Ethiopia AND AIDS AND 2015” 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.

The number of references in this update (468, 110 fewer than in the 2014 update, probably due to fewer conferences and abstracts) includes 86 references from 4 major conferences, including the 26th Annual Conference of the Ethiopian Public Health Association (51 references), and a large number of published articles (329). But there were only 47 theses (62 fewer than in 2014), including 37 Master theses and 3 PhD dissertation (no degrees were identified for 7 theses); all of them were from Addis Ababa University. It was not possible to access theses from Jimma, 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 2015[dp] or Ethiopia AND AIDS AND 2015[dp]. The findings indicate a linear increase in published articles from 2005 through 2015. The increase in conference presentations in recent years (see the trend in the 2014 Update for International AIDS Conference abstracts) appears to continue to be followed by an increase in presentation materials which are becoming full-length manuscripts. It is important to note that the trend in publications may be a product of both increased productivity and the expansion of the number and origins of journals indexed in PubMed. For example, the Ethiopian Journal of Health Sciences was indexed in PubMed only recently, permitting work done in Ethiopia to be counted in Figure 1. Other African journals that publish HIV/AIDS related articles from Ethiopia, (e.g. the Ethiopian Journal of Health Sciences and East African journals) have also been indexed in PubMed recently, although it is not clear when they were first included in the database.

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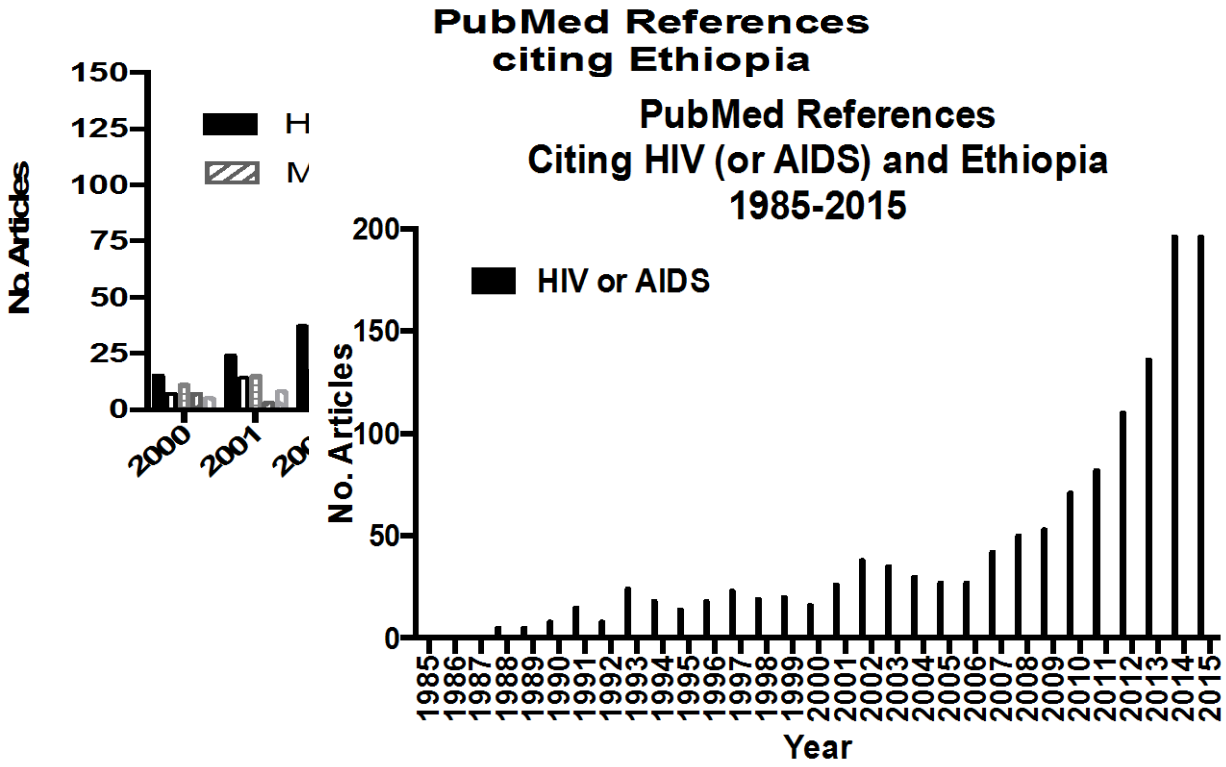

Figure 1: **Publications Cited in PubMed Concerning Ethiopia and HIV or AIDS**

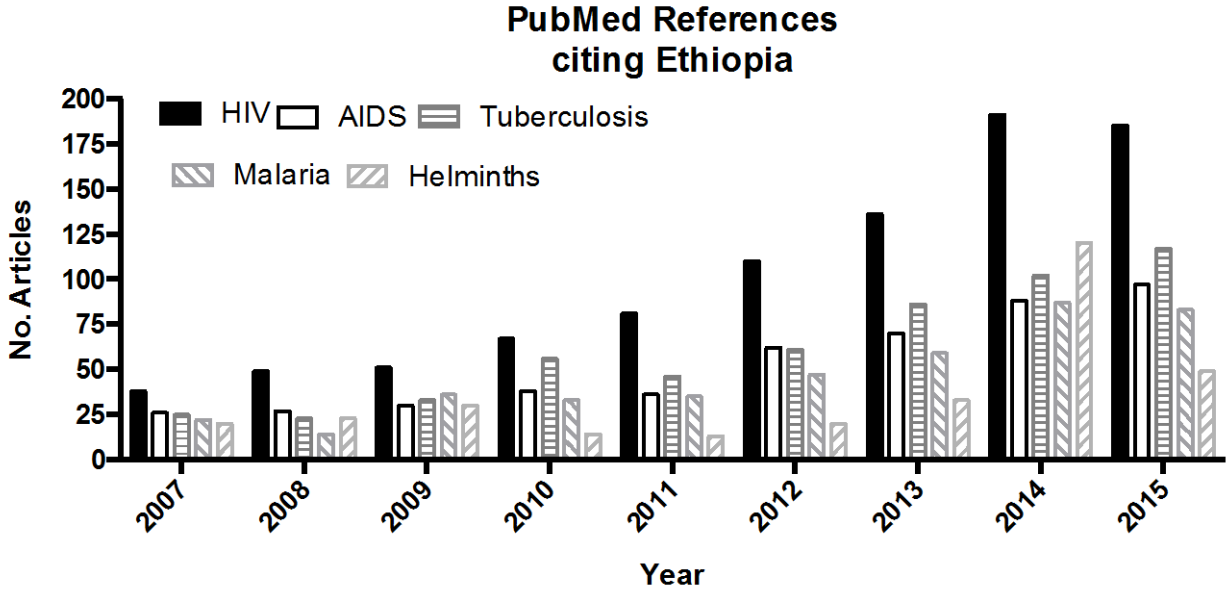

Figure 2: **Publications Cited in PubMed Concerning Ethiopia and HIV, AIDS, Tuberculosis, Malaria, and Helminthes**

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 PubMed search terms were: Ethiopia AND HIV AND 2015[dp]; Ethiopia AND AIDS AND 2015[dp]; Ethiopia AND malaria AND 2015[dp]; Ethiopia AND tuberculosis AND 2015[dp]; Ethiopia AND helminth AND 2015[dp]. In 2014, there was a large increase in the number of publications concerning HIV/ AIDS, and/or tuberculosis and Ethiopia. These numbers remained stable in 2015. (The authors note that this figure in the 2014 update was truncated at 150, thus not reflecting the true number). The number of papers concerning malaria continues at a steady level with 83 publications in 2015 similar to the 87 in 2014. Within the last four years, publication on helminthes appears to be increasing though it is down from the very high number in 2014.

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.

Only 11 articles were classified in the Biomedical Research category in 2015. Of these, seven were concerning tuberculosis, including one originally presented as a conference abstract. Thus, there were six independent studies related to TB. Of the remainder, Mudie et al. (7) presented an abstract documenting the protective effects for rat liver of an extract of *Nigella sativa* (black cumin, *tiqur azmud*) after exposure to HAART drugs. Mulu et al. (8) noted the absence of protease inhibitor resistance mutations in the prevalent HIV-1C strain or clade in 45 untreated patients. Shimelis and Tadesse (9), working in Hawassa, evaluated the performance of a kit to detect both syphilis and HIV infection and found positive and negative predictive values approaching or achieving a 100% performance. Tessema et al. (11) reported the declining trend of sulfadoxine-pyrimethamine (SP)-associated resistance mutations in isolates of *Plasmodium falciparum* in Pawe, Ethiopia, following discontinuation of SP use, and noted the possibility that cross-resistance to trimethoprim/sulfamethoxazole, used for treating HIV-associated opportunistic infections, might counteract the decline.

Returning to the tuberculosis studies, Ayana et al. (1) found that acid-fast microscopy for identifying TB bacilli performed at 8 laboratories ≥500 km from Addis Ababa often reported false negative results that may be due to lack or reagents or problems in the work environment; HIV seropositivity can also increase the rate of apparent negative results. Geleta et al. (2,3), working in Jigjiga >600 km from Addis, showed that diagnostic sensitivity can be increased through the use of the PCR-based Xpert MTB/RIF assay, which also can detect resistance to rifampin, but that this assay may not be as sensitive as culture in liquid or agar media, although culture is also prone to contamination. Getachew et al. (4) documented that auramine 0-based fluorescence microscopy for detection of Mtb in HIV-positive individuals is far more sensitive than traditional Ziehl-Neelsen acid-fast microscopy. Korma et al. (5) noted the increased frequency of extrapulmonary TB that has occurred since the onset of the HIV epidemic. Spoligotyping analysis suggested, however, that there are clusters of epidemiologically related strains possibly indicative of recent transmission. Although rifampin-resistance was detected, there were no multi-drug resistant strains found in the 200 cases studied. Manalebh et al. (6) used a cross-sectional design to evaluate the acid-fast sputum smear microscopy performance of public-private mix (PPM) clinics and other health care facilities in West Amhara Zone. The quality of this microscopy underlies the effectiveness of directly observed treatment programs for TB control. They observed, like Ayana et al. (1) that facilities were often cramped and the quality of staining reagents was often below standard as was the ability to detect low numbers of acid-fast bacilli. They concluded that regular external quality assessments are the best way to enhance laboratory performance of the PPM facilities, in particular. Testing plasma samples of 195 HIV+/TB+, 170 HIV-/TB+ patients and 31 controls for levels of the inflammatory markers, neopterin and C-reactive protein (CRP) that were correlated to CD4 lymphocyte count before and after anti-TB treatment, Skogmar et al. (10) found that both biomarkers were significantly elevated and that neopterin levels, in particular, had negative correlation with CD4 levels, suggesting that inflammation may account, in part, for the reduced levels but that neither marker was predictive of counts below 100 per ml.

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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, socio-economic, cultural, structural, and other contextual determinants of HIV transmission and prevention.

This section contains 138 references: 71 (51.4%) published articles, 39 (28.3%) conference abstracts, 25 (18.1%) masters theses, 2 (1.4%) doctoral dissertations, and 1 (0.7%) report. The broad categories of research interest within this section are very similar to those of the previous update. In this update, the primary areas of research focus are: 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) reproductive health knowledge, attitudes, and perception; 5) occupational risk exposure and protection; 6) violence and harmful traditional practices; and 7) other existing and emerging research areas.

HIV seroprevalence and its determinants were examined in several studies using different approaches, in different settings, and among a variety of population groups (40, 54, 62, 69, 74, 77, 83, 85, 87, 93, 104, 111). Of special note are two studies that linked HIV seroprevalence with broader socio-economic drivers of risk for HIV infection. Lakew and colleagues (85) used data from the 2011 Ethiopian demographic and Health Survey (DHS) to examine the link between HIV seroprevalence and multiple social factors, including wealth, age, occupation, knowledge of HIV, use of alcohol or khat, migration, religion, location of residence including administrative region, education, mass media exposure, gender, number of lifetime sexual partners, and marital status. The authors found high levels of HIV prevalence (10-21%) in some selected geographic hotspots in central, eastern and western geographic clusters of Ethiopia. In addition, HIV prevalence was associated with higher levels of wealth, education, and lifetime sexual partners. Furthermore, increased odds of HIV infection were observed among younger adults, merchants, urban residents and females than among older, unemployed, rural residents and males, respectively. Another analysis by Hargreaves and colleagues (74) used multiple years of DHS data from eastern and southern African countries and revealed different patterns of relationship between level of education and HIV prevalence (74). This study confirmed Lakew and colleagues' finding that in Ethiopia and Malawi, HIV prevalence was higher among more educated women, although the reverse relationship was found in Lesotho, Kenya and Zimbabwe. The authors also found that in Ethiopia HIV prevalence fell significantly from 2003-2005 to 2008-2012 only among adult women with no and secondary education. Another study in this area was by Pegurri and colleagues (117), who set out to estimate the burden of HIV in older children and the prevalence of HIV in orphans and vulnerable children (OVC) households. The researchers used data derived from the Ethiopian DHS of 2005 and 2011 and antenatal HIV sentinel surveillance, and the Spectrum/ Estimation and Projection Package (EPP), a software used globally to produce HIV estimates. The analysis estimated that there were 160,000 HIV-positive children under 15 years old and 800,000 orphans due to AIDS in 2013. An HIV prevalence of 11.9% was also found among almost 10,000 OVC under 18 years old. The authors concluded that there is a large population of children living with HIV in Ethiopia, the majority of

them were vertically infected and never identified nor linked into treatment. 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.

Consistent with previous updates, a large number of studies, in this section, are devoted to research on opportunistic infections and other comorbidities among people living with HIV infections. The incidence or prevalence of, risk factors for and impact of viral, bacterial, or parasitic infections among people living with HIV continued to be of significant interest to researchers. As in previous updates, the most frequently studied co-infections were HIV and tuberculosis (11, 14, 21, 41, 52, 98, 107). Ayalew and colleagues (14) found a high incidence rate of tuberculosis infection (4.9% per year) among HIV-positive children. In another study with 499 HIV-positive persons in southern Ethiopia, Fekadu and co-researchers (52) found that 18.2% of them had tuberculosis. Other researchers studied persons with known or suspected tuberculosis and determined prevalence of co-infection with HIV. For example, Belay and colleagues (21) conducted one of the earliest studies on the co-occurrence of HIV and tuberculosis among pastoral communities. In this study, among Afar pastoralists with bacteriologically confirmed pulmonary tuberculosis, 40.4% were co-infected with HIV. In addition to co-occurrence of HIV and tuberculosis, other studies focused on risk factors and the impact of co-infection on immune response, treatment, and health outcomes (11, 41, 52, 98, 107). In three studies, researchers examined prevalence and risk factors for co-infection of HIV with hepatitis B or C virus (4, 29, 136). Researchers were also interested in other co-infections including HIV and other sexually transmitted infections such as syphilis (29, 46, 59, 94, 115), HIV and intestinal parasites (11, 56, 84), and HIV and other infectious conditions (43, 84, 109, 116, 138). There has also been an interest in non-communicable co-morbidities among people living with HIV infection, including diabetes (100), anemia (44, 45), and cognitive impairment (105). Amare and colleagues (11) published a review paper that summarizes the burden imposed by HIV/AIDS, tuberculosis, chronic intestinal parasites, and multiple micronutrient deficiency in Ethiopia. This paper provides a brief review of evidence about the bi-directional and interactive nature of these conditions and their role in health outcomes of people living with HIV infection.

As with previous updates, and with recognition of the strong and syndemic relationships between HIV and tuberculosis, several studies focusing on the prevalence, risk factors, and impacts of tuberculosis are included in this update (9, 10, 22, 24, 30, 36, 47, 90, 98, 120, 126, 127, 130). Three of these studies focused on the growing problem of multi-drug resistant tuberculosis (90, 98, 130). In one of the studies, the overall prevalence multi-drug resistant tuberculosis was 5.7% among new and 13.9% among previously treated smear-positive tuberculosis patients (90). Given that multi-drug tuberculosis is increasing globally and it has been associated with poor health outcomes among people living with HIV infection, continued research in this area to document prevalence, identify risk factors, develop effective prevention and control measures will be warranted. In addition to tuberculosis, studies on other health problems associated with HIV, such as infections with intestinal parasites among tuberculosis patients (1, 2), hepatitis C infection in Africa (111), and pediatric leishmaniasis (49) are included in this update.

A large number of studies in this section dealt with 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 among youth, primarily those in high schools and colleges across Ethiopia (13, 17, 18, 23, 25, 27, 31, 35, 38, 58, 60, 68, 72, 81, 85, 93, 96, 102, 103, 108, 119, 123, 125, 128, 129, 134, 135). Some studies focused on sexual risk behaviors, associated factors, and health outcomes (e.g., HIV infection, unintended pregnancy) among commercial sex workers (3, 58, 90, 106, 122, 134, 135). There were also studies of migrant workers (18, 129). Of particular note is the study by Tiruneh and colleagues (129), which documented high levels of risky sexual behaviors among seasonal migrant laborers in northwestern Ethiopia. In this study, 74% of seasonal laborers reported sexual intercourse with commercial sex workers, 69% reported multiple sexual partners, and 49% admitted to unprotected sex within the preceding six months. This is a significant finding given that migrant labor is likely to become a prominent commodity with the growing economy of the country. Substance use as a potential behavioral risk for HIV infection is still understudied, with only two studies reporting khat chewing among youth in this update (70, 132). The prevalence and potential impact of alcohol and other illicit substance use is still poorly understood. There is a need for further study that examines a wide range of behavioral risk factors for HIV, including the interplay between substance use and sexual risk among vulnerable populations, such as commercial sex workers, migrant workers, and young people.

Although research on knowledge, attitudes, and perceptions around HIV/AIDS has declined, some relevant studies have still been reported. These studies covered the assessment of the link between comprehensive knowledge of HIV/AIDS and risk behaviors among college students (113), knowledge of pregnant women about mother-to-child transmission of HIV (28), HIV/AIDS knowledge and its relations with

stigma among women (50), knowledge and misconception of young women toward sexually transmitted infection and condom use (63), knowledge of healthcare workers about tuberculosis control (64), and perception of risk for HIV infection and its connection with utilization of voluntary counseling and testing services among college students (117). Other relevant topics that have been studied include knowledge and awareness about broader reproductive health issues among early adolescents (7), sexual discourse, socialization, and communication, including parent-adolescent communication about sex (55, 60, 101, 121), construction of masculinity and health behaviors (18), and assessment of religious attitudes towards sexuality among youth (101).

In this update, there appears to be a resurgence of interest in examining the 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. A large number of studies presented findings on the prevalence, associated factors, and/or health-related consequences of sexual abuse and gender-based violence against children, adolescent girls, maids, commercial sex workers, refugee women, and young women in high schools or colleges (6, 8, 15, 37, 53, 57, 82, 86, 89, 91, 92, 99, 114, 123). Lifetime sexual violence has been reported to be high. For example, in a study on 369 high school female students, Mekuria and colleagues (92) found a lifetime rate of rape among 11% of the students. In another study, Alemayehu and co-researchers (8) reported very high levels of sexual and physical violence among commercial sex workers including rape (44%), unwanted touch (62%), pressure to have sex without a condom (56%), and physical harm (46%). Researchers have also documented the immediate and long-term consequences of violence including post-stress traumatic disorders (37) and intergenerational psychosocial effects on survivors' children (15). Two traditional practices that are indirectly tied to HIV infection are early marriage and female genital cutting. These practices were the subject of investigation in four studies (5, 12, 32, 39); all focused on the magnitude and reproductive health consequences of these practices.

Six studies reported research on healthcare related practices that might contribute to HIV acquisition or transmission among healthcare staff or patients (20, 34, 75, 78, 88, 97). Bekele and colleagues (20) conducted a survey with a randomly selected sample of 362 healthcare workers to learn about their attitude, reporting behaviours, and management practices in relation to needle stick and sharp injuries. The authors found that 37.1% of their respondents had experienced injuries at work but 58.7 % of such injuries were not reported to appropriate management. The authors concluded that occupational needle stick and/or sharps injuries are common among healthcare workers in the study area and recommended provision of on-the-job training on the risk of occupational exposure to pathogens and the need for timely reporting and management of injuries. In a mixed methods study of the practices of health facilities in Dessie, Mesfin and co-researchers (97) reported widespread unsafe practices in handling injection and sharp objects that predisposed the patient, the health worker, and the community to risk of accidental needle stick injuries. Burssa and colleagues (34) provided evidence that indicated a decline in transfusion transmitted blood borne infections among blood donors, although the authors acknowledged that such infections continue to occur at an overall prevalence rate of 6.9% among blood donors – prevalence of HIV, HBV, HCV, and syphilis transmission being 0.9%, 4.3%, 0.7%, and 1.0% respectively. Overall, these studies underscore the need for further research into the prevalence and determinants of unsafe practices and programs designed to prevent occupational risk to HIV and other blood bone infections in the country.

Other studies explored issues covered in previous updates including HIV/AIDS related stigma (19, 50, 131), fertility desires of people living with HIV (51, 71), exposure to explicit sexual content and its associations with sexual behavior (48, 73) and sexual minority rights (133). Two studies covered relatively new areas – one on the potential effects of tourism on tribal communities (124) and the other on the relationships between physical exercise and HIV/AIDS. Further research on these and other broader social determinants of HIV/AIDS are warranted.

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Section 3: Impact Research

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

The HIV impacts examined in this Update include mental disorders associated with HIV/AIDS and tuberculosis (1,5,8,11,15), psychosocial adjustments of sexually abused persons (2,4), stress among caregivers of orphans (7), a comparative study of resilience and coping behavior of children affected by war and HIV/AIDS (13), the effect of HIV disclosure on ANC attendants (12), a

longitudinal study of the impacts of maternal mortality on infant and child survival (9) and different levels of society (11), the potential contribution of gardening to increasing food security of HIV affected families (16) and a historical study of socio-behavioral factors and mourning during the early era of the AIDS epidemic (17).

Whereas most of these issues have been covered in previous updates, this particular update is unique in presenting four types of impacts. First, two studies examined the role of psychological disorders on health-seeking behavior and tuberculosis treatment outcome (1,15). Identifying these barriers need to be considered in optimizing long-term outcomes of TB as well as HIV care and treatment. The increase in the number of HIV-infected persons on ART and the persistently high TB rates make such studies particularly pertinent. Second, a longitudinal, multi-country study of the comprehensive impacts of maternal mortality at all levels of society and in areas not only in health but also economic opportunities and poverty (9) highlighted the need to understand these relationships in planning post-millennium strategies and programs. Third, Moucheraud et al. (10) examined the short-term impact of maternal mortality on infant survival, showing that the risk of infants dying within a month of their mother's death was 46 times higher than among infants whose mothers lived. In view of the currently declining AIDS mortality, there is an increasing need to determine the impact of ART on the wellbeing of mothers, infants and children. Fourth, the first gendered study of health related quality of life among PLHIV receiving ART, females had significantly lower quality of life scores than males in regard to perceived stigma, psychological support from family members and clinical parameters (14). These results indicate the need for measuring and monitoring clinical care of PLHIV receiving ART by using quality of life assessment tools. Also noteworthy is the study that reported low level of social support received and high stress experienced by caregivers of HIV/AIDS-affected orphans (7). In view of the continuing increase in the number of orphans and vulnerable children on ART in Ethiopia and the heavy reliance on kinship care, what needs to be considered is the author's recommendation that policy makers and social service providers should explicitly acknowledge the role of kinship care and strengthen their support that can reduce stress levels in care givers.

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Section 4: 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, three published abstracts, two editorials, two conference presentations, two masters theses, and one PhD dissertation, one book, and one declaration document that deal with a range of issues related to health services that include: local commitment and innovation, adherence to guidelines, knowledge of treatment standards, cost assessment for HIV/AIDS, tuberculosis, STI, and reproductive health issues (1-56).

A number of articles in this category (1, 2, 4, 5, 12, 17, 20, 22, 32, 34, 38, 45, 48, 50, 54, 56) have dealt with strategies and health services related factors (including the referral system) for the promotion of the utilization of HIV/TB/STI and SHRH services. According to Abebe and Asnake (1), integrated multi-media interventions are important for the successful promotion of SRH related services. Abrahim et al. (2) highlight the importance of the efficiency of the referral system, while Alemayehu & Godana (4) emphasize the knowledge and practice of clinicians regarding syndromic management of STIs in the health seeking behaviors of clients. Ameyan and et al. (5) report the need for addressing numerous barriers to attract FSWs to HIV counseling and testing centers; while Deme and et al. (12) highlight the importance of the ANC program in rural areas in Ethiopia in detecting cases of hypertension, anemia, as well as HIV and STI. The findings of Dutta et al. (17) also emphasize the importance of symptomatic tuberculosis screening practice. According to Holcombe et al. (20) and Rehnstrom Loi et al. (38) attitudes and social as well as gender based reservations of health workers are important in the provision of abortion services. The findings of Imiru (22) and Muntean et al. (34) indicate the inadequacy of information dissemination for creating awareness on youth reproductive health services. Miller et al. (32) reported the low quality of care provided to sick children by HEWs. Shiferaw et al. (45) advocate a single visit approach as a sustainable cervical prevention strategy; while Soressa (48) highlights the importance of peer education programs for engaging young people and other stakeholders in SRHR services. Thomas et al. (50) report on an organizational network analysis for improving referrals and integrating family planning and HIV, while Wissow et al. (54) describe a model for integrating mental health into hospital-based HIV treatment services in Ethiopia. According to Yakob and Ncama (56), issues such as financial fairness, perceived transportation convenience, employment status, and distance from the health facility are important factors to consider for improving quality of HIV treatment services.

Local and international level partnerships are among the main themes of papers in this category (6-8, 10, 11, 13, 14, 40, 43, 47). In terms of local commitment and innovation, an editorial for the Bulletin of the WHO (6) highlights the need for support and understanding by partner organizations and donors for local innovations for sustainable development; while according to a "Lancet World Report" (7) Ethiopia's political commitment along with an army of thousands of health extension workers is helping it to successfully tackle tuberculosis. Another editorial for the Bulletin of the WHO (8) highlights the needs for local government support to WHO's effort in introducing guidelines on the role, education and integration of community-based practitioners. Datiko and et al. (10) report the needs to develop context embedded strategies to support and motivate health extension workers within community based TB control approaches, while De Rosis (11) views the organization of the fight against HIV/AIDS in Ethiopia as the complex result of the interplay between government strategies and the efforts of affected people themselves to face their condition by seeking care and support. Similarly, Derbew et al. (13), in an abstract published in Annals of Global Health, describe the collaboration between the medical and nursing professions and its relevance for advancing health workforce capacity to meet the efforts of achieving the President's Emergency Plan for AIDS Relief (PEPFAR) goals in Ethiopia of meeting the health care needs of persons with HIV within the health care systems of developing countries. Dida and et al. (14) highlight the needs for discussion between health workers and students as being important factors for the utilization of reproductive health services among university students in southeast Ethiopia. According to Kok et al. (24), health extension workers' relationships with the community and health sector can be constrained as a result of inadequate support systems, lack of trust, communication and dialogue and differing expectations. The results of a pilot project reported by Robinson (40,

41) show the importance of integration of religious leaders in health education for increasing the number of ANC visits including the level of understanding about HIV transmission. Lönnroth et al. (26)'s action framework also highlight the needs for multi-sectorial approaches for addressing the social determinants of TB. Lunsford et al. (27) present cases for supproting close-to-community HIV/AIDS related services providers through a community health system approach. The Maputo Plan of Action (2016-2030) (43) also calls for African governments, civil society, the private sector, and all multi-sectoral development partners to join forces and redouble efforts for implementation of SRHR. Smith et al. (47) highlight the need to support national and international actors for sustained and strategic family planning advocacy.

There are some articles in this category (9, 18, 25, 33, 39) that dealt with costing, financing as well as inequalities with regard to HIV/AIDS and SHRH services. Cooke (9) highlighted the potential of low cost IVF for contribution toward reducing the impact of infertility, particularly in low resource economies. Grosso et al. (18) reported underfunding and fewer resources on HIV programs serving MSM, especially in countries that criminate these groups; while according to Resch et al. (39), the prospect for HIV/AIDS funding in lower income countries, such as Mozambique and Ethiopia, would remain heavily dependent on donor funds. According to Laurence et al. (25), global cost related data for MDR-TB treatment are very limited as opposed to those for DS-TB treatment. Muluneh et al. (33) reported the existence of wealth-based inequalities in the provision of FP services in Ethiopia despite efforts to provide contraceptives for free at all public health facilities.

Issues related to unmet and client needs and utilization of family planning as well as TB related services were also subjects for some articles (23, 30, 31, 51, 55, 57). According to Balew et al. (23), there is a big variation in family planning use both at the individual and group levels; while Feyissa and Melka (30) repored high unmet need for modern FP in HIV-positive married women in western Ethiopia. Low case notification rates for childhood TB were reported by Mesay et al. (31) and Tulloch et al. (51), found that poor rural populations and women are at high risk of unmet health needs in terms of TB diagnoses. Woldie et al. (55) examined the nature of client needs and community centered home based care services provided for PLHIV and OVC in Ethiopia.

Two articles (3, 19) also indicated the decreasing trend in the prevalence of HIV/AIDS. Takele Mena (3) demonstrated a statistically significant decline in the total and HIV/AIDS related mortality between November 2005 and October 2013 among teachers at public primary and secondary schools in Addis Ababa. Haile Amlak's editorial (19) commended Ethiopia's progress in achieving MDG goals, especially in indicators related to child health and HIV/AIDS.

There were three articles (37, 44, 46) that paid attention to quality of laboratories for HIV/AIDS, TB, and STI. Putoto et al. (37) presented a harmonized model for African health laboratories with a list of procedures to challenge the major health problems – HIV/AIDS, malaria, tuberculosis (TB) – at each level of pyramidal health system. Shiferaw et al. (44) highlighted the need for strengthening external quality assessment programs and technical support for tuberculosis diagnostic laboratory systems. Sinishaw et al. (46) emphasized on the need for strengthening supply chain management for uninterrupted TB diagnostic service.

Adoption of approaches and guidelines for treatment were also subjects of a number of articles (15, 16, 50) within this category. Doherty and et al. (15) stressed that progress towards ending the AIDS epidemic by 2030 depends on the adoption and implementation of global guidelines with evidenced based approaches to treating people with HIV. According to Dutta et al. (16), the projected number of people receiving ART across three scenarios suggests that countries are unlikely to meet the 90-90-90-treatment target (81% of people living with HIV on ART by 2020) unless they adopt a test-and-offer approach and increase ART coverage. Summoro et al. (49) emphasized the need for improving prescribing patterns in developing countries including the reduction of injection use to prevent transmission of infections like HIV and other blood-borne pathogens.

There are also a few articles (21, 28, 29) related to motivation and incentives of health workers. According to Hotchkiss et al. (21) both financial and non-financial factors are important determinants of health worker motivation in the Ethiopian context. Maes (28) showed how positive change within HIV/AIDS treatment programs requires ethnographic analysis of how CHWs exercise capacities, also highlighting (29) the international admiration given to the salaried HEW system of Ethiopia.

Importance of family planning services to development by Osotimehin (36) is highlighted in the paper while effectiveness of PMTCT intervention by Abadula (42) was reported. A book by Anke van der Kwaak & Madeleen Wgelin-Schuringa (eds) (52) presented strategies, approaches, and tools to mainstream concerns of gender-equality in the formulation of health policy and practice.

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Section 5: 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 contains 46 references, considerably fewer than in the 2014 Update. Most references fell again into the testing and counseling category (1,3,5,9,10,12,13,15,17,21,22,27,28,29,33,34, 43-45), followed by studies of information, education and communication (IEC) (7,14,20,30,32, 35,39,40, the use of contraceptives (8,19,25,37,40,41), infant and child feeding (23,24,26,45), family planning (4,16,47), and 6 studies on various other subjects including the effectiveness of preventive therapy in TB (6) and integration of preeclampsia and anemia for ANC clients (11). In a study of provider-initiated HIV counseling and testing (PICT), 27% of respondents said that one should be tested anytime and only 8% stated that testing should be done when one is sick, indicating that counseling and testing has been able to increase knowledge about HIV and its prevention and treatment in recent years (1). The continued interest by researchers in HIV testing and counseling is encouraging since testing and counseling service utilization is still relatively low in Ethiopia and inadequately understood.

Social stigma was identified as a major barrier to PICT by pregnant women but more rural than urban women in Assosa Town accepted PICT (2). Marelign and Shikur (30) reported socio-demographic barriers to husbands participating in PMTCT commonly found by earlier investigators. A study of urban ANC clients identified discrimination by their husbands as a barrier to the use of Option B+ PMTCT (10). Use of voluntary counseling and testing services (VCT) in a northwestern highland community was similarly impeded by stigmatization and discrimination but use rates increased 4.2 fold if husbands came with their wives to clinics (12). HIV-positive pregnant women in hospitals in Tigray Region, on the other hand, reported that HIV status disclosure, in addition to counseling on medication, was a positive predictor of adherence to Option B+ PMTCT (15). In a community-based study of HIV-positive mothers in Addis Ababa, peer support from other PLHIV, faith and increasing optimism were reported the main facilitators of PMTCT uptake (17). One of the first studies of the timing and predictors of loss to follow-up in the Option+ PMTCT program revealed that younger women, those attending hospitals rather than health centers, patients starting ART on the day of their diagnosis, and missing CD4 information at ART initiation were lost to follow-up (33). Workagegn et al., using the health belief model, showed that the low rate of PMTCT services in government health centers in Addis Ababa was due to the perception that the service was not beneficial (45). Several studies reported on the use of TB tests (5) and testing services (6, cervical cancer screening (9,21).

The remaining studies focused on IEC, family planning, and infant and child feeding, among others. IEC studies dealt with HIV communication disclosure of HIV positive status (22), parent/adolescent sexual and reproductive health communication (14), and the use of newspapers and peer education in high schools in influencing sexual behavior (30,32) and of community conversation in facilitating the utilization of testing services (35). The potential use of traditional songs as media in HIV prevention was explored by Bekalu and

Eggermont (7), who identified 23 AIDS songs serving that purpose. Of the two studies of family planning (4,15), the one by Adamchak et al. (4) developed a system to monitor family planning and HIV service integration using existing data from health facilities in Ethiopia, Rwanda, Tanzania and Uganda. The system is expected to allow for monitoring the integration of family planning and HIV services but requires further improvements in daily and active client counts and recording. Three studies examined attitudes and other factors associated with infant and child feeding practices among HIV-positive mothers (23,26,47) and one study among non-infected mothers (24). Whereas the infant and young child feeding practices reported by Worku from Gondar Zone met the WHO recommendations (46), complementary feeding practices in southern Ethiopian communities were considered inadequate (23). The two MA theses focusing on breastfeeding (24,26) were not available online. Norheim et al. (36) analyzed the decline in mortality world-wide and found a 6.8% decline in under-5 mortality and a decline in TB and malaria mortality by half between 1990 and 2010, three years before the MDG4. They discuss these changes within the context of broadly based socioeconomic changes and government health programs and estimated that the remaining risks of premature deaths, particularly injuries and non-communicable diseases, will be halved again between 2010 and 2030.

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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.

The Treatment, Care and Clinical Research section of this update pulled all relevant literature. The major ones were on HIV co-morbidity with long established TB and relatively new studies in the series of update such as Leishmaniasis, malaria, anemia and diabetes. Besides, studies on ART adherence, treatment of opportunistic infections, care and support, domains related to fertility, nutrition and intestinal parasites in connection to HIV and ART, gender differentials to quality of life and survival, pediatric ART, outcomes of ART. These works were publications in peer review journals, conference abstracts and student thesis work. Of the 162 materials accessed, 124 were published documents, 31 were conference abstracts and the remaining 7 were master's thesis all of which were from Addis Ababa University. Some of the major entries under this section are highlighted below.

In this section of the update, HIV co-morbidity with TB, malaria, Leishmaniasis, anemia and diabetes are predominate – 23% of all collection under this section. The studies focused on case detection; prevalence of specific co-infection; magnitudes; risk factors, predictors and determinants. The majority of the collection were on TB-HIV co-infection (2,8,11,17,20,28-9,31,39,59,60,67,68,86,90,102,106,111,112,120,1232,144,151), while there are studies on malaria (13,78); Leishmaniasis, (51,52,64), anemia (26,61,67,69,114,142) and diabetes (154).

Next set of collection constituting 15% of all collection under this section focuses on the outcomes of ART and HAART. The studies emphasized mainly on the outcome of ART use including survival and mortality, immunologic failure, predicators and determinants, implications of late start of treatment. The studies were references under 27,30,32,35,37,43,92, 101,102,109,119,122,125,127,136,137,145,148,149, 151,156,160-62. Nearly similar proportion of studies (14%) included in this update has shaded light on drug outcomes focusing more particularly on dose, utility, efficacy, adverse reaction, determinants and implications of use of isoniazid preventive therapy combined with ART or ART alone (1,38,42,53,54,57,58,66,74,77, 82,94,105,117,124,126,127,143 and 159).

Similar proportion of studies (14%) was found to be on adherence to treatment. These studies focus on predictors and determinants of adherence role of disclosure in adherence and couple of studies one focusing on use of traditional medicine in adherence and text message as

reminder. Specific details on adherence related studies are found under reference numbers 10,12,34,36,41, 46,49,50,65,79,87,93,95,99,103,107,132,134,139,146, 147,152 and 158.

Unlike previous updates, this particular update has relatively more studies that focus on pediatric HIV. The studies focused mainly on immune response, impairments, recovery, immunologic failure, survival and mortality in connection to ART. These studies are found in references: 21,33,47,55,73,89,107,138,140.

This update has identified handful of studies that have focused on effects of nutrient supplements among patients on ART, determinants of dietary diversity, prevalence and determinants of anemia among HIV infected patients on ART, impact of HAART on nutritional status (4,14,19,45,56,88 and 141)

Studies on ART associated opportunistic infecitons were found to focus on incidence, prevalence, determinants and risks, CD4 counts, management, resistence to specific infecitons as referenced in 5,9,16,83,100,115,116,118,128,131 and 157. There were some studies that were found in reference to sexual behaviour, fertility desire, choice of contraceptive methods and pregnancy outcome among women living with the virus and/or are on ART as spelt out in references 3,15,24,44,133,135.

A collection of studies on deworming, prevalence of intestinal parasites and consequent compromised immunity were included in this update and shaded light on intestinal parasites and ART. These studies are referenced under 6,81,84,85,110,113 and 121. Care and support is an important component of this section where lived expereinces in caring for orphans and vulnerable children, support pathways, role of FBOs, determinants, barriers and income generating activities were referenced in 40,48,62,63,70,80,97 and 104.

The current update has new research outcomes that generated useful evidence on the domains of cervical cancer among those who are living with the virus. The studies documented on determinants of precancerous cervical and VIA postive leisions as well as prevneiton of cervical cacner using single vist approach among HIV positive women. The references are 71,72 and 91. Similar few studies on gender differentials in quality of life, survival are presented here 18,22 and 75.

Finally, there are different studies on ART with specific interest on eligibility, admission to service, serice delivery and treatement strategy, quality of service and life, beleifs. These studies are found in references: 25,96,98,108,150,153 and 155.

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Section 7: Health Informatics Monitoring, and Evaluation Research

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 (1-27). More than three quarter 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 dealt with monitoring and evaluating HIV/AIDS, TB and malaria.

Ababeye (1) revealed that pathways to change (PtC) appear effective in ensuring that behavior, rather than information, becomes the focus of behavioral interventions. The study indicated that PtC works by changing the way health promoters think and work; enables to understand how peer educators see their job and more importantly how they perform their job. Bekalu and Eggermont (6) used the integrative model of behavioral prediction to assess the impact of exposure to HIV/AIDS-related media content on HIV testing intention. On the other hand, a study by Nigatu et al. (18) documented providing sexual and reproductive health (SRH) information to university students and peer educators through short message service (SMS). Girma et al. (12) indicated signs and predictors of improvements for stigma against people with HIV/AIDS in rural Ethiopia.

Efforts were also made to model different aspects of the HIV/AIDS pandemic. Abraha and Nigatu (2) modelled trends of health and health related indicators in Ethiopia (1995-2008) while Shemamane (23) fitted a statistical model for CD4-cell measurements of adult patients after the start of highly active ART in Yekatit 12 Hospital. Parametric modeling of survival data based on HIV-infected adult patients under HAART in Zewditu Referral Hospital was done by Legesse (16). Mathematical analysis of a model for AVL-HIV co-endemicity was also done by Hussaini et al.(14). Granich at al.(15) analyzed trends in AIDS deaths, new Infections and ART coverage in the top 30 countries with the highest AIDS mortality burden; 1990-2013.

Moreover, monitoring and evaluation were also done by few researchers. Intensified tuberculosis case finding among HIV-infected persons using a WHO symptom screen and Xpert((R)) MTB/RIF was done by Adelman et al. (3). Assefa et al. (4) conducted a cross sectional study to evaluate routine contact investigation in Addis Ababa, Ethiopia which is a missed opportunity to prevent tuberculosis in Children. Another study by Barber-Madden et al. (6) demonstrated final performance evaluation of Ethiopia food by prescription [Vienna, Virginia]. Global epidemiology of HIV among female sex workers with a special focus on its influence of structural determinants was done by Shannon et al. (22). Short and Goldberg (24) did an estimate of the prevalence of children living with HIV-infected adults for 23 Countries in sub-Saharan Africa.

When it comes to improving HIV/AIDS care Beyene and Beyene (8) assessed predictors of late HIV diagnosis among adult people living with HIV/AIDS who undertake an initial CD4 T cell evaluation, Northern Ethiopia whereas Bizuayehu et al.(8) did an assessment of duration of staying free from acquiring rehappening opportunistic infections among pre-ART people living with HIV/AIDS between 2008 and 2013. HIV treatment scale-up and HIV-related stigma in Sub-Saharan Africa

was done by Chan et al. (9) using a longitudinal cross-country analysis. A community based cohort study in Southern Ethiopia documented follow-up of chronic coughers improves tuberculosis case finding Woldesemayat et al.(25).

A couple of studies were focused on the health care financing of HIV/AIDS programs. A quantitative study was conducted by Chin et al. (10) on PEPFAR funding and reduction in HIV infection rates in 12 focus Sub-Saharan African countries. Forsythe et al. (11) explored the past, present and future of HIV/ AIDS and resource allocation. The tracking of the Global Fund HIV/AIDS resources used for sexual and reproductive health service integration in Ethiopia was also done by Mookherji et al. (17). Moreover, a study by Johansson et al. (15) dealt with health gains and financial protection from pneumococcal vaccination and pneumonia treatment in Ethiopia using an extended cost-effectiveness analysis.

In additon, certain studies were focused on assessing the quality of diagnostic procedures. For instance, a study by Shanks et al. (19) assessed the impact of visceral leishmaniasis for accounting false positivity in HIV tests, while another study by Shanks et al. (20) conducted a novel alternative for confirmation testing in resource limited settings by employing dilution testing using rapid diagnostic tests in a HIV diagnostic algorithm. Another study by Shanks et al. (21) did an evaluation of HIV testing algorithms in Ethiopia by assessing the role of the tie-breaker algorithm and weakly reacting test lines in contributing to a high rate of false positive HIV diagnoses. Another study recommeded an effort should be exerted towards host-directed therapies for tuberculosis Zumla et al.(26).

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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.

Two of the seven studies in this section present evidence of HIV transmission among Africa-born persons in Canada (1,2) and in a county in Washington State in the USA (5). Although HIV transmission among these populations has been recognized in these and earlier studies, absence of information in local health records and in the national census on the national origin of African patients does not permit analysis of HIV prevalence by nationalities. A study of attitudes, perceptions and practices surrounding HIV testing among East African immigrant women living in Washington DC revealed many cultural and personal barriers to voluntary testing. Most women were tested inadvertently or as part of applying for visas or employment (3). The persistence of cultural and demographic barriers to HIV testing in the diaspora was also reported from Ethiopian immigrants in Sweden (6). Grossman et al. (4) found that the number of HIV-infected Ethiopia-born persons living in Israel increased 1.3-fold between 2005 and 2013. Their phylogenetic studies of HIV indicated cross-ethnic spread of the virus through various independent introductions by different immigrant groups. Martinez Ortiz et al. (7) carried out one of the few studies of HIV among Ethiopian children in the diaspora. They found that 4.8% of 251 children, mostly below five years old, who arrived in Spain between 2006 and 2010, were HIV-infected.

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from Ethiopia in a 5-year period. [Spanish]. Anales de Pediatria. 2015 01 May;82(5):302-307.

Section 9: Previous bibliographies

This section lists the previous year's update and potentially other bibliographies that were published during 2015. Another 12 bibliographies were published between 2003 and 2014 in this journal.

Haile Mariam D, Kloos H, Converse PJ, Mekonnen W, Mulatu MS, Kaba M, Beyene A. Bibliography on HIV/AIDS in Ethiopia and Ethiopians in the Diaspora: The 2014 Update. Ethiop J Health Dev 2015; 29(1): 43-78.

Section 10: Selected Websites Featuring HIV/AIDS in Ethiopia

1. Federal HIV/AIDS Prevention and Control Office of Ethiopia: http://hapco.gov.et
2. The Ethiopian Journal of Health Development): http://www.ejhd.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. 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/HIVAids_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 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