Progress towards the 2020 Fast Track HIV/AIDS reduction targets in Ethiopia comparing with neighboring countries and across ages; using Global Burden of Diseases 2017 data

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Abstract

Background Sustainable Development Goal (SDG) 3.3, targets to eliminate HIV from being a public health threat by 2030. For better tracking of this target interim Fast Track milestones for 2020 and composite complementary measures have been indicated. This study measured the Fast Track progress in the epidemiology of HIV/AIDS in Ethiopia comparing with neighboring countries and across ages.

Methods The National Data Management Center for health's research team at the Ethiopian Public Health Institute has analyzed the Global Burden of Disease (GBD) 2017 data for the year 2010 to 2017 for Ethiopia and its neighbors. GBD 2017 data sources were census, demographic and a health survey, prevention of mother-to-child HIV transmission, antiretroviral treatment programs, sentinel surveillance, and UNAIDS reports. Age-standardized and age-specific HIV/AIDS incidence, prevalence, mortality, Disability-Adjusted Life Years (DALYs), incidence:mortality ratio and incidence:prevalence ratio were calculated with corresponding 95% confidence intervals.

Results Ethiopia and neighboring countries recorded slow progress in reducing new HIV infection in since 2010. Only Uganda would achieve the 75% target by 2020. Ethiopia, Tanzania, and Uganda already achieved the 75% mortality reduction target set for 2020. The incidence: prevalence ratio for Ethiopia, Rwanda, and Uganda were < 0.03, indicating the countries were on track to end HIV by 2030. Ethiopia had an incidence: mortality ratio <1 due to high mortality; while Kenya, Rwanda, Tanzania and Uganda had a ratio of >1 due to high incidence. The HIV incidence rate in Ethiopia was dropped by 76% among under 5 children in 2017 compared to 2010; the country would likely to attain the 2020 national target but far behind achieving the target among the 15-49 age groups.

Conclusions Ethiopia and neighboring countries have made remarkable progress towards achieving the 75% HIV/AIDS mortality reduction target by 2020, although they progress poorly in reducing HIV incidence. By having an incidence:prevalence ratio benchmark less than 0.03, Ethiopia, Rwanda, and Uganda are well heading towards epidemic control. Nonetheless, the high HIV/AIDS mortality rate in Ethiopia for its incidence requires innovative strategies to reach out undiagnosed cases and to build institutional capacity for generating strong evidence to ensure sustainable epidemic control.

Background

Southern and Eastern Sub-Sahara Africa regions have been known to carry a high burden of HIV/AIDS since the mid-1990s. In recent years, this situation is changing for the better. According to the 2018 UNAIDS update, the burden of HIV/AIDS in the region has been steadily declining for the past 10 years [1]. Ethiopia was one of the countries hardest hit by the HIV epidemic. Currently, the country is leading the way to HIV/AIDS epidemic control recording sustained reduction in the adult HIV incidence by 70% in 2016 compared to 1990, and the HIV/AIDS related mortality by 84% in 2017 compared to the peak in 2005 [2]. Country ownership of the HIV/AIDS prevention and control programs, strong political will and commitment were instrumental to the successes.
Capitalizing on this sustained progress, the East African countries including Ethiopia have targeted to end the AIDS epidemic from being a public health threat by 2030 endorsing Fast Track interim millstones, which targets to reduce new HIV infection and HIV/AIDS related deaths by 75% by 2020 from the 2010 baseline [1,3,4]. Aligned with the Fast Track target, the first Ethiopian Health Sector Transformation Plan (HSTP) set a target to reduce the adult HIV incidence by 60% and to reduce new HIV infections among children to zero by 2020 from the 2010 baseline [5,6].

Ethiopia is one of the countries long been known for having a generalized HIV epidemic fueled by unprotected sexual intercourse like many East African countries. Currently, with an adult HIV prevalence of 0.9%, Ethiopia has joined the counties having a concentrated epidemic. Although, reducing HIV prevalence and incidence rates are big successes for the county, currently tracking new infection has presented a challenge and required extra efforts to identify the highest contributors to new HIV infection, groups that carry the highest-burden and infected individuals who otherwise would have been missed with the existing system. To this end, the country has considered HIV/AIDS as one of the immediately notifiable diseases and established a case-based surveillance system integrating it with index case testing under the Public Health Emergency Management unit at the Ethiopian Public Health Institute (EPHI). Malawi, Kenya, and Tanzania have reported high HIV positive yield through index case testing over routine testing approaches [7, 8].

The main drives of the HIV/AIDS epidemic in Ethiopia had been sexually active adults (15-49 years) and were the primary target for the national HIV/AIDS prevention and control efforts. These efforts have significantly contributed to the reduced national burden of HIV/AIDS and for the recoded positive progress the country has made. However, these situations have changed, according to an urban-based HIV survey, the burden of HIV/AIDS was distributed across ages [9], which highlights the need for all-inclusive approaches. Lack of reliable and comprehensive data on the age-specific burden of HIV/AIDS precludes the Ethiopian Federal Ministry of Health (FMOH) and the Federal HIV/AIDS Prevention and Control Office (FHAPCO) and other concerned stakeholders from understanding the magnitude of the problem to institute targeted responses.

Outcome and impact indicators including incidence, mortality, prevalence, and Disability-Adjusted Life Years (DALYs) are commonly used epidemiological measures for tracking progress during the Millennium Development Goals era and beyond for estimating disease burden, to inform equitable resource allocation, policy formulation and for developing strategies. [1,10]. Following the calming of the HIV/AIDS epidemic globally, the UNAIDS has suggested dynamic composite measures; an incidence: mortality ratio
and an incidence: prevalence ratio for better tracking of countries’ progress towards the 2030 SDG target of ending AIDS as a public health threat [1]. The objectives of this study were to track the progress on the epidemiology of HIV/AIDS towards the 2020 Fast Track milestones in Ethiopia comparing with neighboring countries in East African using outcome and impact indicators and the UNAIDS suggested composite measures, and to estimate age-standardized and age-specific burden of HIV/AIDS in Ethiopia since 2010.

Methods

Countries in East Africa have shown remarkable progress over the years in preventing and controlling the HIV/AIDS epidemic, yet still, they carry a high burden of HIV/AIDS in the world. Eritrea, Kenya, Rwanda, Tanzania, and Uganda close neighbors to Ethiopia have similar HIV/AIDS epidemic burden, epidemiologic patterns, mode of transmission and all are UNAIDS focus countries to end HIV/AIDS by 2030. Heterosexual encounter is still the dominant mode of HIV transmission in these countries. Although the HIV/AIDS prevalence is higher among females, there is a high disparity between males and females to access HIV testing, treatment, and care services, where males are at odds than females. Having such a large number of males who do not know their status, who do not take ART and those who are not virally suppressed are big challenges in these countries as they could easily pass the virus to their sexual counterparts. This is highly concerning as young females in these countries are often engaged in transactional sex with these men for economic reasons. High-risk population such as female sex workers who have as high as 30% HIV prevalence have lower access to ART than the general female population in Kenya [1]. Despite 93% of pregnant women in the Eastern Africa region reportedly receiving ART, the rate of MTCT remains high at 10%, although it has shown a significant reduction from 18% in 2010. More than a third of children do not have access to ART [1].

Ethiopia has a national public health institute, named the Ethiopian public health Institute (EPHI). The institute has established a National Data Management Center for health (NDMC) in 2017. The goal of the center is to collect and archive available health and health-related data; undertake in-depth data analysis by integrating different data sources and applying robust statistical analytic methods; identify evidence gaps and research priorities and synthesize evidence for policy and decision. The center has a strong collaboration with the Institute of Health Metrics and Evaluation (IHME), the University of Washington, which produce the burden of diseases estimates for 195 countries and some sub-national regions. The center also has a Burden of Disease unit and is actively involved in the estimation of national and sub-national disease burden. This study has been developed as part of the center’s activity to provide evidence for tracking Fast Track interim HIV/AIDS reduction targets using GBD 2017 data.

In this study outcome and impact indicators were measured. These include incidence which, estimated new HIV infection; prevalence, which estimated all HIV/AIDS infection and mortality, which estimated all
HIV/AIDS related deaths. Moreover, the study reported Years of Life Lost (YLLs), which estimated the expected number of years of life remaining when the death occurred. Here deaths at a younger age have greater weight than deaths in old age. Years Lived with Disability (YLDs), were estimated by multiplying the HIV prevalence by its disability weight. Disability-Adjusted Life Years (DALYs), which estimated the sum of years of YLLs and YLDs. The total number of DALYs in a population for one year could be interpreted as the distance between the current health status of the population and a hypothetical, optimal scenario where the entire population has health life into old age. Rates for within-country analysis and comparing with other countries were presented in 100,000 person-year observations. The age-adjusted rates have taken into consideration demographic changes in the population, such as population growth and aging.

The study used an open access data published by the GBD project for the year 2017. Due to the nature of the data used, ethical approval and consent procedures were not needed. The GBD project collects published and unpublished health data from different sources including census, population and health registries, demographic and health surveys, and scientific publications. For countries like Ethiopia where population and health statistics are scares, modeling techniques are employed, taking data from other years, age groups, or similar settings to generate a complete set of estimates. The main data the GBD 2017 has incorporated for the estimation of the HIV/AIDS burden were Population and Housing Census data, Demographic and Health Surveys, and data from UNAIDS estimates. Moreover, the GBD 2017 dataset has prevalence and incidence data from antenatal care clinics and population-based seroprevalence surveys, CD4 progression rates, HIV/AIDS related mortality with or without antiretroviral therapy (ART), and mortality from all other causes. The estimation strategy links the GBD 2017 assessment of all-cause mortality and estimation of incidence and prevalence so that for each draw from the uncertainty distribution all assumptions used in each step are internally consistent. HIV/AIDS incidence, prevalence, and death with GBD versions of the Estimation and Projection Package and Spectrum software were estimated. GBD produces point estimates and 95% Confidence Intervals (CI) for Incidence, Prevalence, Mortality, DALYs, years, countries, and age groups. One can find detailed information on the GBD methods used for estimating Global, Regional and National HIV/AIDS Incidence, Prevalence, DALYs, and Mortality published in 2016 on Lancet [11].

This study presented countries' progress towards the 2020 interim Fast Track milestones that the United Nations General Assembly has proposed i.e a 75% reduction in incidence and mortality rates by 2020 from the 2010 baseline [1]. The study also used UNAIDS suggested complementary measures to estimate the burden of HIV/AIDS in a country and for tracking progress [1]. One of these is incidence:mortality ratio, which helps to track progress towards the SDG goal of ending AIDS as a public health threat by 2030. Combining HIV incidence and mortality measures yield a dynamic measure of the annual change in the number of people living with HIV within a given population. The ratio helps to forecast how current
investments will impact future resource needs. A ratio of >1 indicates a net increase in new HIV infections and the likely increase in the financial burden on the health system. A ratio of <1 indicates a net reduction in prevalent HIV cases due to mortality and the likely decrease in financial burden on the health system. However, a ratio <1 is undesirable [1].

The other one is incidence: prevalence ratio, which indicates the average duration of time a person lives with HIV in an epidemic that remains stable over many years and helps to track progress towards the achievement of the UNAIDS objective of “Preventing HIV infections and ensuring that HIV-positive people live long and healthy lives”. For this ratio, 0.03 has been selected by the UNAIDS as an epidemic transition benchmark, which corresponds to an average life expectancy after infection of 30 years. The assumption is that with this average life expectancy, the total HIV prevalent cases will gradually fall if the number of incident cases is less than three per 100 people living with HIV [1].

Results

Fast Track progress in Ethiopia comparing with neighboring countries in East Africa

**Progress in reducing new HIV infection**

To achieve SDG target 3.3, countries are expected to reduce new HIV infection by 75% between 2010 and 2020. The data has shown slow progress to achieve the 2020 milestone in Ethiopia and neighboring countries but Uganda has already achieved it. Ethiopia has reduced the HIV incidence by 13.3% while Eritrea has recorded a 13.6% increase between 2010 and 2017 (Fig 1).

*Fig 1. Age-standardized HIV incidence and HIV/AIDS related mortality rates per 100,000 populations from 2010 to 2017 in Ethiopia and neighboring East African countries*

**Progress in reducing HIV/AIDS related deaths**

All the countries in East Africa, neighboring Ethiopia recorded a significant decline in HIV/AIDS related mortality between 2010 and 2017. Ethiopia, Tanzania, Rwanda, and Uganda have already achieved 75% mortality reduction expected to happen by 2020, while Eritrea and Kenya achieved 56% and 53% respectively (Fig 1)

**Tracking progress using incidence:prevalence ratio**

According to the UNAIDS, an incidence:prevalence ratio less than 0.03 indicates a country’s positive progress towards an epidemic transition as described in the methods section. The ratio for Ethiopia had
been less than 0.03 since 2010, while Rwanda and Uganda achieved this benchmark in 2017. The ratio for Eritrea remained greater than 0.03 since 2010 showing a year by year increase (Fig 2).

**Fig 2. Age-standardized HIV incidence:prevalence ratio in Ethiopia and neighboring East African countries from 2010 to 2017**

**Tracking resource needs using incidence:mortality ratio**

As shown in fig 3, most of the East African countries neighboring Ethiopia have more people newly infected with HIV than those dying from HIV/AIDS, which gave a ratio of greater than 1. By contrast, Ethiopia had more people dying from HIV/AIDS than those who acquired new HIV infections. In 2017, the age-standardized incidence: mortality ratio for Ethiopia was 0.79. Kenya, Rwanda, Tanzania, and Uganda had a ratio of greater than 1 due to the high rate of new infections and these countries require more resources to address the problems.

**Fig 3. Age-standardized HIV/AIDS incidence:mortality ratio in Ethiopia and neighboring East African countries from 2010 to 2017**

**Burden of HIV/AIDS in Ethiopia across ages**

**Incidence across ages**

The age-standardized annual HIV incidence rate has declined by 13% in 2017 compared to 2010 (Table 1). This corresponds to a 13% decline in the number of people acquiring new infection from 16,676 (12,475, 21,796) in 2010 to 14,484 (8,277, 22,958) in 2017. The HIV incidence rate was highest among under 5 children from 2010 to 2015, while in 2017 the HIV incidence rate was highest among the 15-49 age group. Compared to the 2010 baseline, in 2017 the under 5 age group had recorded a 77% decline in HIV incidence rate, while the 15-49 age group recorded a 12% increase from compared to the 2010 baseline. The HIV incidence rate among 5 -14 age groups remained zero over the years (Table 1).

Of the total of 14,483 (8, 277.02 -22, 958,39) new HIV infections that occurred in 2017, 13.7% or 1,991 (1,344 -2,793) were among under 5 age group and 80.8% or 11,699 (6,108 -19,306) among 15 - 49 age group.
**HIV/AIDS prevalence across ages**

The age-standardized HIV/AIDS prevalence rate has reduced by 23% in 2017 compared to the 2010 baseline (Table 1). This corresponds to a 15% significant decline in the number of people living with HIV from 770,657 (682,580, 887,466) in 2010 to 657,394 (583,397 -738,517) in 2017. Between 2010 and 2017, the highest significant HIV prevalence rate decline (64%) was observed among the under 5 age group, followed by the 5-14 age groups (54%). On the contrary, the HIV prevalence rate among the 50-69 age groups had shown an increase of 37% between 2010 to 2017. The HIV prevalence rate was highest among the 15-49 age group until 2010, since then the 50-69 age group has taken over the lead (Table 1).

Of the total 657,394 people living with HIV/AIDS in 2017, 2.3% or 15,328 (11,405 -19,916) were under 5 years old children, 9.7% or 640,10 (52,934 -76,638) were 5-14 years of age, 67.8% or 445,588 (397, 219 -504, 089) were 15- 49 years of age and 18.4% or 121,018 (94,698 -156, 603) were 50 -69 years of age.

**Table 1. All age, age-standardized and age-specific HIV/AIDS incidence, deaths, prevalence, and DALYs rates per 100,000 populations in Ethiopia from 2001 to 2017,**

**HIV/AIDS related mortality across ages**

As shown in Table 1, the age-standardized mortality rate has declined by 74% from 74 deaths for 100,000 populations in 2010 to 19 for a 100,000 population in 2017. This corresponds to a 65% significant decreased in the number of people dying from HIV/AIDS from 49,484 (43,908, 55,643) in 2010 to 17,181 (14,600, 20,099) in 2017. Between 2010 and 2017, the HIV/AIDS related mortality has shown a 70% decline among the under 5 age group, 66.7% among the 15-49 years, and 63% the among the 50 -69 age group and 48% decline among the 5-14 age group (Table 1).

In 2017, an estimated 17,181 people died due to HIV/AIDS, of these 13% or 2,254 (1,652-2,988) were among <5 age group; 13 % or 2,274 (1,882-2,687) were among 5-14 age group; 63% or 10,831 (9,062-12,884) were among 15-49 age group and 10% or 1,734 (1,198-2,406) were among 50-69 age group. Over the years’ mortality remained highest among the 50-69 age group. The mortality gap across the age groups has narrowed down in recent years (Table 1)

**Disability Adjusted Life Years (DALYs) across ages**
As shown in Table 2, in 2017, the age-standardized rate of DALYs was 1.095.6/100 000 populations, which corresponds to 1,116,408 DALYs for all ages. In 2017, the age group 15-49 had the highest (1,335/100,000 populations) age-specific rate of DALYs followed by the under 5 age group (1.190/100,000 populations). DALYs has shown significant decline between 2010 and 2017 in all age groups but remained highest among 15-45 age group followed by under 5 age group. Under 5 age group recorded the highest decline (72%) in the rate of DALYs between 2010 and 2017, while the age group 5 -14 recorded the least (55%) (Table 1).

**Discussion**

The objectives of this study were to track progress towards 2020 Fast Track target, an interim millstones for the 2030 SDGs of “ending HIV from being a public health threat” [4] in Ethiopia comparing with neighboring countries in East Africa and estimating HIV/AIDS burden across ages. The study reported remarkable progress in reducing HIV/AIDS mortality, while slow progress in reducing HIV incidence across the countries towards the 75% interim milestone for 2020 from 2010 baseline. Ethiopia, along with Rwanda and Uganda have already achieved the incidence:mortality ratio of less than 0.03, which marks these countries are on track to meet the SDG 2030 target. In Ethiopia, the HIV/AIDS mortality rate surpassed the incidence rates contrary to most of its neighbors, which contributed significantly to the reported reduction in HIV/AIDS prevalence. This is contrary to the UNAIDS's objective of “ensuring that HIV-positive people live long and healthy lives” and needs serious considerations. According to the findings, next to heterosexual contact, MTCT was the major contributor to new HIV infection in Ethiopia followed by having a large proportion of HIV positive adults over 50 years who were not virally suppressed. For sustainable epidemic control where Ethiopia is heading, the source of new infections needs to be targeted and addressed and there is a need to build strong institutional capacity to track and monitor progress at national and local levels.

To achieve SDG target 3.3, countries are expected to reduce new HIV infection by 75% between 2010 and 2020 [1]. According to the findings, there has been slow progress to reduce HIV incidence in Ethiopia and most of its neighbors. Only Uganda has already achieved this target. According to UNAIDS 2018 update, although the countries in East Africa have made progress, they are still short of achieving the 90-90-90 targets. Rwanda has achieved the first 90, while Uganda is close to achieving it, the rest of the countries are far from achieving the target. Tanzania and Kenya have achieved ART coverage between 70-89%, Ethiopia achieved only 50-69%, while the rest of the countries have far less coverage. Ethiopia reduced its HIV incidence only by 13.3% between 2010 and 2017 and is unlikely to achieve not only the 2020 Fast track target but also its own HSTP plan of reducing adult HIV incidence by 60% between 2010 and 2020 [5, 6]. This is consistent with the HSTP midterm review findings, which highlighted Ethiopia's poor progress to achieve the target set for HIV prevention and control and data gaps for progress monitoring [5, 6].
Most of the countries in East Africa neighboring Ethiopia would achieve the Fast Track 75% mortality reduction target by 2020. Ethiopia along with Tanzania, Rwanda, and Uganda already achieved the target three years earlier. Eritrea and Kenya require making accelerated progress to achieve this target. In Ethiopia, the HIV/AIDS related mortality showed a declining trend across ages, with the under 5 age group followed by the 15 - 49 age group recording the highest decline, while the age group 5 -14 recording the lowest decline. In a recent study, the age group 50-69 years has carried the highest burden of the HIV/AIDS related mortality rate [9]. These reflect the reality on the ground that the HIV/AIDS positive people are aging and still most HIV/AIDS prevention, care, and treatment services are targeting adults (15-49 years of age) with little attention to older age groups. To realize Ethiopia’s path towards epidemic control, improving access to HIV testing, treatment, and care services, and retention into the care and treatment program for 50 years and older adults should be considered.

In 2017, the UNAIDS has endorsed the use of incidence:prevalence ratio, a composite measure for tracking a country’s progress to end the HIV epidemic by 2030 from being a public health threat [1]. Along with Rwanda and Uganda, Ethiopia has already achieved a less than 0.03 epidemic transition benchmark. According to the 2018 UNAIDS report, Ethiopia was the only African countries recording less than 0.03 epidemic transition benchmark [1]. Although this finding put Ethiopia on the lead in the HIV/AIDS epidemic control, the ever-decreasing prevalence rate in Ethiopian attributed to the high rate of mortality is worrisome and needs thorough consideration.

Incidence:mortality ratio is another composite measure the UNAIDS has endorsed to estimate resources needed for future HIV/AIDS treatment and care services in a country. Since 2010, this ratio for Ethiopia has been less than 1 contrary to neighboring countries and at the global level [1]. Although the ratio indicates that the country has fewer new infections than deaths, having high mortality is a reflection of either poor access or poor adherence to treatment and care services. Nonetheless, this finding contradicts what Ethiopia has recorded in the 90-90-90 Fast Track progress. According to the 2018 Ethiopia’s HIV/AIDS Impact Assessment survey, Ethiopia has achieved the last two 90s i.e putting more than 90% of the HIV diagnosed cases on ART and ensuring over 90% of the HIV/AIDS cases who received treatment achieved viral suppression among urban residents [9]. It is known that early initiation of ART and achieving significant viral suppression increases survival for patients infected with HIV. Despite these facts, the high mortality estimated in the present study could be attributed to having more than 40% undiagnosed HIV/AIDS cases in the country, which partly reflects population-level sub-optimal access and utilization of health services including HIV/AIDS care and treatment services. Recent evidence revealed gaps in achieving the first 90, as it is contingent upon access to health care services where HIV testing is largely taking place. Moreover, about 60% of the population in Ethiopia never tested for HIV and over 20% of the HIV positive people do not know that they are HIV infected, while only half of the HIV
positive pregnant women in Ethiopia have access to prophylaxis ART [3, 5,13]. Nevertheless, sociocultural barriers including poor health-seeking behavior and structural challenges to correctly map and reach out the high-risk groups before developing severe disease have significant contributions to the persistently high mortality due to HIV/AIDS. These prompted the government and partners working on HIV/AIDS, to consider other innovative active HIV case finding and reporting strategies and consider HIV as one of a notifiable disease. For this, a case-based surveillance (CBS) system integrated with index case testing and recency testing has been launched. These approaches have the potential to increase the number of HIV cases identified and put them on treatment. The next logical move for the country would be to expanding the role of CBS from being a case reporting system to a cohort by incorporating more sentinel events to ensure sustainable epidemic control and monitoring.

In Ethiopia, the HIV incidence among children under 5 years of age has shown a 77% decline between 2010 and 2017. With accelerated progress, the country is more likely to achieve the Zero new infection target set for 2020 [5, 6]. The recorded 12% increase in HIV incidence among adults (15-49 years) in 2017 from the 2010 baseline is against the 60% reduction target the country has set for 2020. This requires to revisit current strategies and initiatives and to come up with innovative approaches to move fast forward [5, 6]. Unlike other similar settings, the HIV incidence rate in Ethiopia was highest among under 5 age groups until 2015 compared to the other age groups [1]. This trend indicates the poor attention given to the PMTCT program and poor HIV/AIDS treatment and care services for under 5 children in earlier years. In response to the UNAIDS strategic target “Zero new infection” among children, Ethiopia has introduced “Option B plus” (initiating lifelong HIV treatment for all positive mothers irrespective of immunologic status and CD4 cell count) in 2013, which has brought remarkable progress in reducing MTCT [14-21]. However, Option B plus works only for children whose mothers have access to antenatal care and PMTCT services. In Ethiopia, access to antenatal care and PMTCT service is still low, although access is higher in urban compared to rural areas [13].

Considering prevalence and DALYs absolute measures, Ethiopia still carried a high burden of HIV infected people despite the country’s success story in the HIV/AIDS epidemic control. Having high prevalent cases that are not virally suppressed as in the case of the 50-69 age group, can sustain the production of new infections. According to the Ethiopian HIV/AIDS Impact Assessment data, in urban settings the 50-64 age group adults have carried the highest HIV prevalence (4.4%) in the country, whereas only 72.2% of the 55-64 years were virally suppressed [9]. Focusing on the declining HIV prevalence and incidence rates as a basis for financing HIV prevention and control activities could have serious consequences in a country having over 650,000 HIV infected people, whereby about 40% of them are undiagnosed.
Although the GBD presents a special opportunity for countries having limited data on vital event registration, the GBD estimation has its own limitation as argued by Kelly and Wilson [22]. In countries like Ethiopia where there is no comprehensive vital registration data, the GBD uses different data sources, where at times some of these data are not updated. HIV is a highly evolving case; hence relying on years-old data may provide misleading information for priority setting and resource allocation. Taking the weakness of the GBD into consideration, this study compares the HIV prevalence estimates with the 2016 EDHS data and found consistency and highlights the validity of the GBD 2017 estimates for program planning and policy formulation.

Conclusion

Ethiopia and neighboring East African countries have made remarkable progress in reducing HIV/AIDS related mortality but are in short of the target to reduce new HIV infections to attain the 2020 Fast Track interim milestones to end HIV from being a public health threat by 2030. Understanding the burden of HIV/AIDS along the age continuum is a step forward to sustainable epidemic control on top of instituting targeted interventions to identify new cases, to put them on treatment, and to ensure they all are virally suppressed. Current initiatives to scale up index case testing and considering HIV as a notifiable disease under the public health emergency management system show the country’s commitment and strong determination to control the epidemic. These endeavors require huge financial and human resources and strengthening the health system. Sustainable epidemic control requires investment in system building, not the least to generate up to date and high-quality evidence for monitoring outcome and impact and for tracking progress. Partners working on HIV needs to direct its investment to support countries to achieve national and international goals/targets through strengthening health and health data management systems.

Abbreviations
Declarations

Ethics approval and consent to participate

The manuscript used open access GBD 2017 data from the Institutes of Health Metrics and Evaluation (IHME), University of Washington Health Data portal.

Consent for publication

“Not applicable”

Availability of data and materials

The datasets generated during and/or analyzed for the study are available in the IHME data repository and can be accessed directly from, http://ghdx.healthdata.org/gbd-results-tool and has also been
submitted as supporting file with the manuscript

**Competing interests**

The authors declare that they have no competing interests.

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The study was conducted as part of a routine activity of the National Data Management Center for Health, Ethiopian Public Health Institutes. We used open-access data and did not receive funding.

**Authors’ Contributions**

A.H.M, S.A, E.A, A.W, and A.M conceptualized the manuscript, A.H.M analyzed the data. A.H.M drafted the manuscript, A.H.M, S.A, E.A, A.W, and A.M reviewed the manuscript. All authors read and approved the final manuscript.

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**References**

Federal Ministry of Health (FMOH); 2018.


Supporting Information


Table

[Please see the supplementary files section to view the table.]

Figures

![Figure 1](image)

Figure 1

Age-standardized HIV incidence and HIV/AIDS related mortality rates per 100,000 populations from 2010 to 2017 in Ethiopia and neighboring East African countries.
Figure 2

Age-standardized HIV incidence:prevalence ratio in Ethiopia and neighboring East 6 African countries from 2010 to 2017

Figure 3

Age-standardized HIV/AIDS incidence:mortality ratio in Ethiopia and neighboring East 6 African countries from 2010 to 2017

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.
• Table1.pdf
• S1.xlsx