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Decomposing Gender Gaps in HIV Service Outcomes

[version 1]

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Abstract

This study uses Population-based HIV Impact Assessments (PHIA) survey data to examine factors associated with gender disparities in HIV outcomes. The analysis examined the share of adult males and females living with HIV who are aware of their status, are on treatment, and have achieved viral load suppression (VLS) across 13 African countries. The study then used the Blinder-Oaxaca statistical method to decompose these gaps into three core elements: (1) the part caused by observed differences in characteristics between the two groups, (2) the part caused by unobservable differences between the groups, often attributed to structural barriers, and (3) the unexplained portion of the gap. The study then compares how these gaps and decomposition have changed over time. The model confirms that males have poorer outcomes than females across all three indicators, with structural barriers contributing to the majority of this gap. As a group, males had higher levels of individual characteristics such as age, wealth and education, which would be expected to support higher HIV outcomes. However, structural barriers lead to poorer outcomes across all three indicators. The gap in service outcomes between men and women has decreased over time, with structural or cultural barriers showing the greatest improvement. Additional investment into and evaluation of male-friendly services is essential to understand what interventions have contributed to decreasing this gap. This knowledge should be used to inform future investments to support individual-level treatment outcomes and

prevent new infections.

Keywords
HIV/AIDS, Global Health, PEPFAR, Disparities

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Summary Box

What is already known on this topic
In PEPFAR-supported countries, there is a lower share of men living with HIV who are aware of their status, on treatment, and have achieved viral load suppression (VLS) when compared to women. Lower treatment coverage among men leads to worse individual health outcomes and is linked to increased infections among adolescent girls and young women.

What this study adds - summarise what we now know as a result of this study that we did not know before
While there is significant evidence of these gaps, there are few studies that explore the factors that lead to this gap. The present analysis decomposes outcome gaps into three core components including group-level differences in individual characteristics such as wealth and education, structural components, and other unobserved factors. The present study shows that structural factors account for a majority of the gap between men and women, and that structural barriers have decreased over time.

How this study might affect research, practice or policy
Using these findings, program managers and policy makers can invest in HIV services that mitigate structural barriers to care such as cultural norms, stigma, or other barriers to care for men. Current interventions targeting men have likely contributed to improved outcomes, yet future research is needed to evaluate these programs in order to understand best practices and expand these interventions.

Introduction
Financial and infrastructure investments from country governments and international donors have allowed for wide-spread availability of HIV services free from user fees; however, evidence shows that there remain gaps in who accesses these services. HIV outcome disparities occur based on sex, urban versus rural residence, age, and wealth, among other factors.[1] While some gaps in service access may relate to differences in residence area, income, age, or access to education, many of the gaps may relate to structural elements or cultural norms which can impact access and health seeking behaviours.

Achieving UNAIDS targets, which aim for 95% of people living with HIV to know their HIV status, 95% of those who know their status to be on treatment, and 95% of those on treatment to attain viral load suppression (VLS), is crucial to ending the HIV epidemic.[2] As we near these targets, it is critical to understand which, if any, subpopulations are being left behind and what is contributing to these gaps.[3] Disparities between subpopulations represent missed opportunities to connect people with lifesaving treatment and limit new infections, hindering progress toward epidemic control.[4]

Gender disparities currently pose a barrier to achieving UNAIDS targets across the three indicators.[5] One study found that females are nearly twice as likely as males to be aware of their status and have a suppressed viral load.[6] Previous policy and program recommendations have attempted to address barriers in HIV service delivery to address this gap.[4–7] A descriptive paper using Population-based HIV Impact Assessments (PHIA) data on HIV services usage from 13 African countries found that HIV positive females were more likely than males: (1) to be aware of their positive status, (2) had ever been on antiretroviral therapy (ART) treatment, and (3) to achieve VLS. Even in countries with advanced epidemic control, such as Eswatini and Namibia, where VLS among females reaches as high as 77% to 82%, men's rates are still approximately 7 to 8% lower.[1] In an earlier study on HIV testing conducted in rural Zimbabwe, 78.7% of females had tested for HIV prior to the survey, compared to 66.1% of men, indicating that HIV testing coverage was significantly lower in males compared to females.[8] This disparity in HIV outcomes is observed globally and is not confined to specific regions. A report on 15 PEPFAR countries found similar results, with males consistently performing more poorly than females across all three outcomes—awareness, treatment, and VLS.[9] This raises a critical question of determining which factors most strongly contribute to the gap. Identifying these key drivers is essential for designing and implementing services that effectively address gender disparities.

One study of HIV prevalence in young adults in Malawi, Tanzania and Zambia, using a Blinder-Oaxaca decomposition model for gender gaps, found that prevalence is higher for females than males largely because they tend to live in urban areas and have older partners than do males.[10] Both of these factors represent higher risk levels for females than they would be for comparable males. Young adults face unique challenges in the HIV care process. Research shows that females under age 25 are the least likely to be aware of their HIV status, while males aged 25-34, once aware, are the least likely to initiate ART.[11] Additionally, males under 25 are the least likely to achieve VLS even after initiating ART, indicating that age, together with gender, influences outcomes of HIV service delivery. While this is an informative starting point, there is a need for greater understanding of what contributes to these disparities on both individual and societal levels.

This paper uses Population-based HIV Impact Assessments (PHIA) data for 13 African countries to examine gaps between adult males and females in HIV outcomes, specifically for awareness of HIV status, being on treatment, and VLS. We use the Blinder-Oaxaca statistical method[12,13] to decompose these gaps into three core elements: the portion of the gap due to observed differences in characteristics between the two groups, unobservable differences between the groups – most often attributed to structural barriers - and the residual or additional unexplained portion of the gender gap. The analysis includes results for the pooled sample of the 13 African countries included in this study, individual country results, and analyzes results over time for seven countries with two rounds of PHIA data.

Methods

Data

We used data from the 13 countries included in the first round of PHIA surveys conducted between 2015 and 2018 and seven countries that also have a second round of PHIA surveys. The PHIA project[14] was initiated in 2014 and has since conducted surveys in 15 countries with high HIV epidemic rates to measure progress toward achieving the UNAIDS '95-95-95' targets. The data collection was done through a cross-sectional survey that includes interviews with household heads to gather household characteristics, and with household members, to assess individual characteristics, including those of adolescents, adults (age 15+), and in some surveys, children. The survey captures HIV outcomes such as awareness, treatment, and VLS, as well as access to preventive measures and healthcare. Voluntary blood samples were collected for testing where applicable. The PHIA project is country-owned, with the Ministry of Health of the host country providing leadership with support from ICAP at Columbia University.[14]

Sample

The initial pooled dataset consisted of 13 African countries with PHIA surveys conducted between 2015 and 2018, including Cameroon (2017), Côte D'Ivoire (2017), Eswatini (2016), Ethiopia (2017), Kenya (2018), Lesotho (2016), Malawi (2015), Namibia (2017), Rwanda (2018), Tanzania (2016), Uganda (2016), Zambia (2016), Zimbabwe (2015). The pooled dataset contained 302,355 observations. Second round surveys are included for Eswatini (2021), Lesotho (2020), Malawi (2020), Tanzania (2022), Uganda (2020), Zambia (2021), and Zimbabwe (2020). We included only respondents whose blood tests confirmed HIV-positive status (n = 25,243). We then excluded all respondents with missing values in the relevant variables, resulting in a final analytical sample of 24,668 individuals, of whom 7,807 were males and 16,861 were females.

Measures

We used three outcome measures as captured by PHIA surveys and blood tests. The first outcome measure, *awareness*, measured the share of people living with HIV who were aware of their status; the second outcome measure, *ART*, measured the share of people living with HIV who had ever been on antiretroviral treatment; the third outcome measure, *VLS*, measured the share of people living with HIV who had reached viral load suppression. All outcome measures were operationalised as dichotomous variables. Covariates included dichotomous biological sex (male/female), age (continuous), a first wealth-quintile variable (dichotomous) to identify lowest-income status, a secondary or higher education variable (dichotomous) to identify high education level, employment in the past 12 months (dichotomous), ever being married (dichotomous), and urban/rural residence (dichotomous). The distribution of missing data for the variables of interest is as follows: HIV outcomes (Awareness, ART, and VLS) – 417; wealth quintile – 24; education – 116; employment – 15; and ever married – 18.

Statistical analysis

We used logit multivariate regression models to estimate the likelihood of the three outcome measures. Then, we used the Oaxaca-Blinder decomposition methodology to decompose the gender gap into three components: (1) the portion of the gap attributable to observed differences in characteristics between the two groups (endowments portion), (2) the portion of the gap due to the unobservable differences (coefficients portion), and (3) the residual or unexplained portion of outcome differences. This gap decomposition methodology is attributed to Blinder and Oaxaca.[12,13]

The equation to derive a measure of an expected outcome using difference in outcome Y between males and females was:

$$\begin{aligned} Mean\,(Y_W) - Mean\,(Y_M) &= B_W\,Mean\,(X_W) - B_M\,Mean\,(X_M) \\ &= B_W\,(Mean\,(X_W) - Mean\,(X_M)) + Mean\,(X_M)\,(B_W - B_M) \end{aligned}$$

Where X_W and X_M are the covariates, and B_W and B_M are regression coefficients measuring how the covariates influence the rate of Y for male and females, respectively. We presented pooled and weighted results for all 13 countries, along with individual country results, in figures with percentages in the results section. A significance level of 0.05 was used for all statistical tests. We conducted all analyses using STATA 18.

Patient and public involvement

Patients and the public were not involved in the design, conduct or dissemination of this research.

Results

Logistic multivariate models

The logistic regression examined factors associated with awareness of HIV status, being on treatment, and VLS in a pooled model and by country. The model controls for urban versus rural residence, wealth quintile, education, age, ever being married, and working outside the home in the past 12 months. The findings indicate that females are significantly more likely to be aware of their HIV status compared to males in the pooled analysis (adjusted odds ratio (aOR) = 1.61, $p < 0.01$) and in each individual country, except in Côte d'Ivoire and Rwanda, where there was no significant difference. Several covariates led to higher outcomes in the pooled model including rural residence (aOR = 1.09, $p < 0.1$), having secondary education (aOR = 1.17, $p < 0.01$), being older than 25 (aOR = 3.30, $p < 0.01$), while working outside of the home led to lower results (aOR = 0.77, $p < 0.01$). Similarly, females show a higher likelihood of being on treatment in both the pooled results (aOR = 1.48, $p < 0.01$) and most individual countries, with the exception of Cameroon, Côte d'Ivoire, Eswatini, Rwanda, and Zambia, where the differences were not significant. Several covariates contributed to higher outcomes in the pooled model including rural residence (aOR = 1.07, $p < 0.1$), being older than 25 (aOR = 2.85, $p < 0.01$),

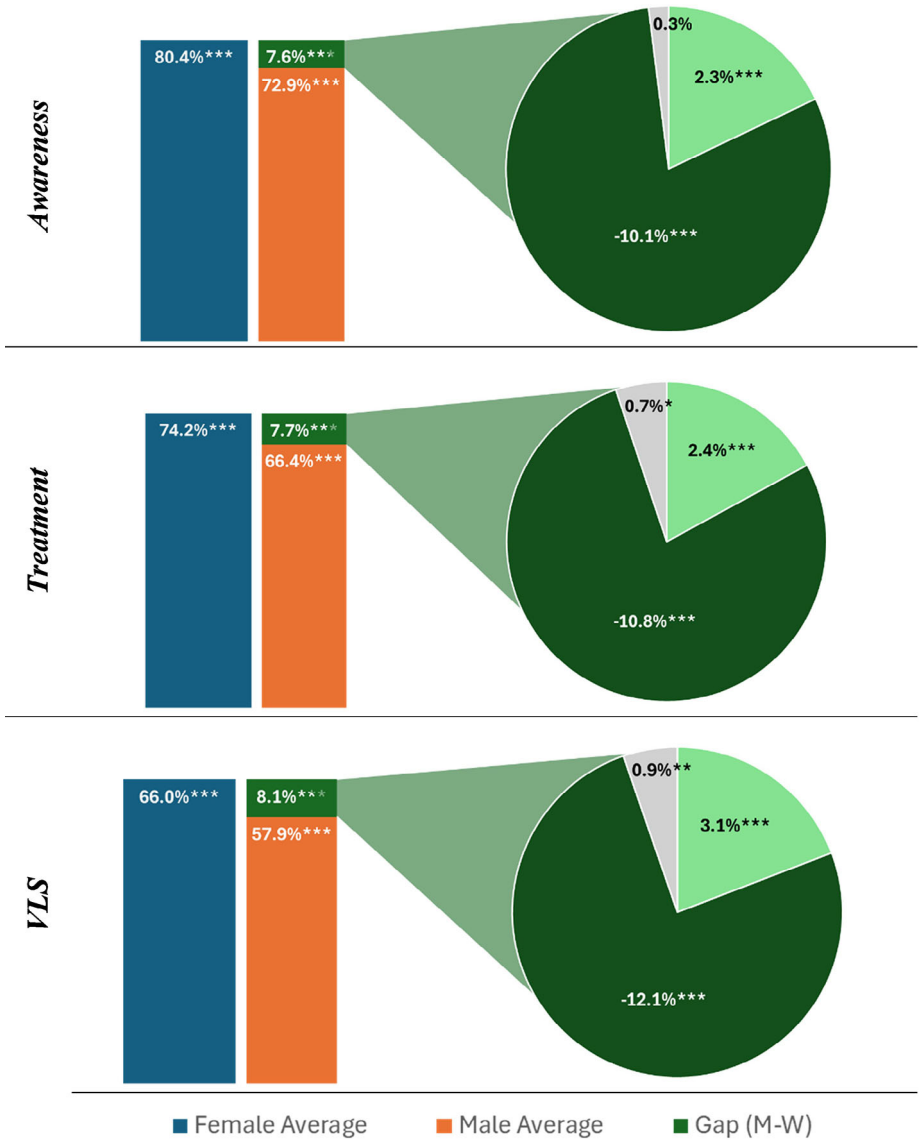


Figure 1. **XXX.**

while ever being married (aOR = 0.91, $p < 0.1$) and work outside of the home (aOR = 0.75, $p < 0.01$) led to lower outcomes. For VLS, females are also more likely to achieve viral suppression in the pooled analysis (aOR = 1.46, $p < 0.01$) in most countries, except in Cameroon and Ethiopia, where the results were not statistically significant. In the pooled results rural residence (aOR = 1.10, $p < 0.01$) and being older than 25 (aOR = 2.98,$p < 0.01$) were associated with higher results, while work outside the home (aOR = 0.80,$p < 0.01$) was associated with lower outcomes. Logistic regression results look at the gaps between males and females while controlling for other factors; the Blinder-Oaxaca portion of the model compares mean outcomes between the groups while breaking them down into what accounts for these gaps through a decomposition.

Pooled results

Pooled results show that, across all three indicators, males have lower average outcomes than females. When decomposing this gap, structural factors account for the largest contributor to lowered male outcomes. Males hold a higher level of protective characteristics (i.e. age, wealth quintile, education) that would otherwise lead to higher HIV outcomes as indicated through small positive values. However, large negative impacts from structural factors lead to worse performance among males across awareness of HIV positive status, being on treatment, and viral suppression. Within awareness, males had 7.6 percentage point (pp) lower awareness of their HIV status when compared to females. Structural factors lead to males having 10.1 pp lower results than females, but the protective individual characteristics reduce this gap by 2.3 pp, resulting in the observed 7.6 pp disparity. In awareness, there was no significant residual. See Figure 1 for a breakdown of pooled results.

The full pooled model results show that age, education and wealth endowments are positively related to increased levels of awareness of one's HIV status, being on treatment, and VLS. Conversely, working outside the home in the past 12 months and ever being married are negatively related to outcomes. Urban versus rural residence did not have a significant impact on outcomes. Taken together in the endowments portion of the model for awareness, these factors give males an estimated 2.3 pp advantage, due largely to advantages associated with older age, wealth, and education, along

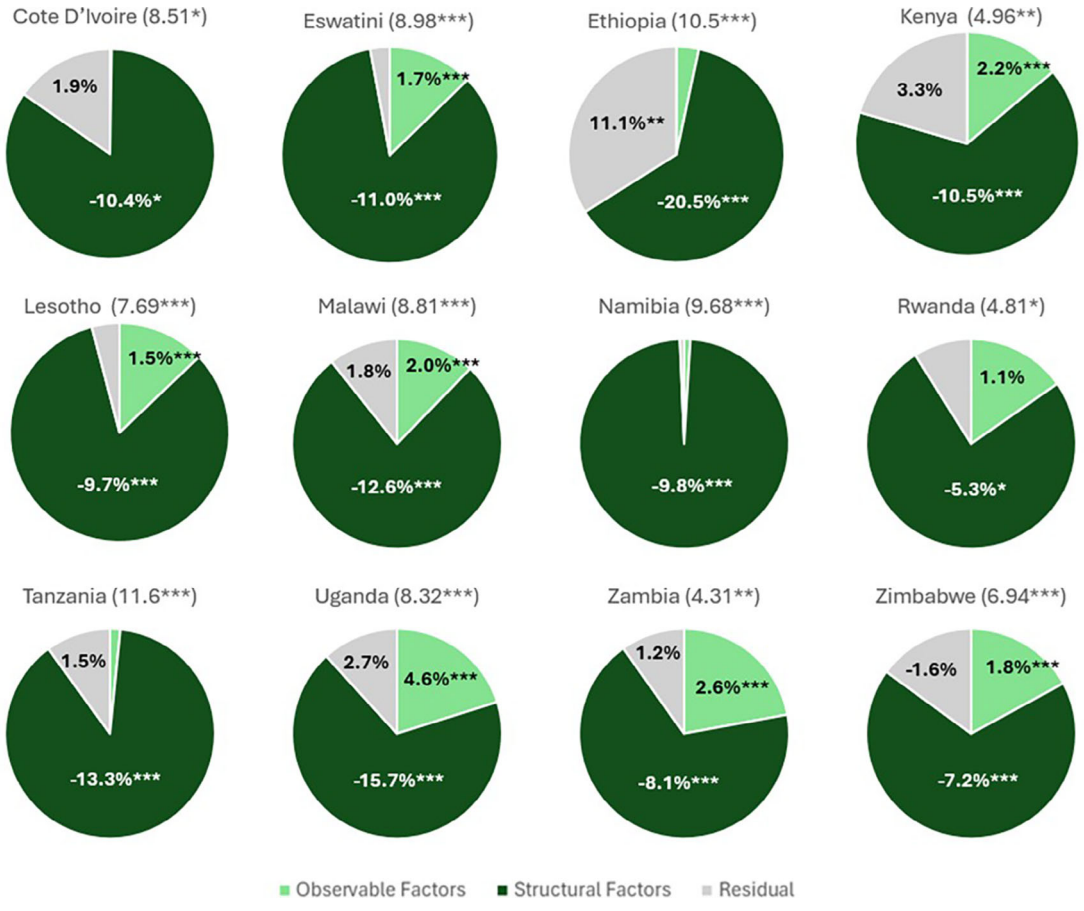


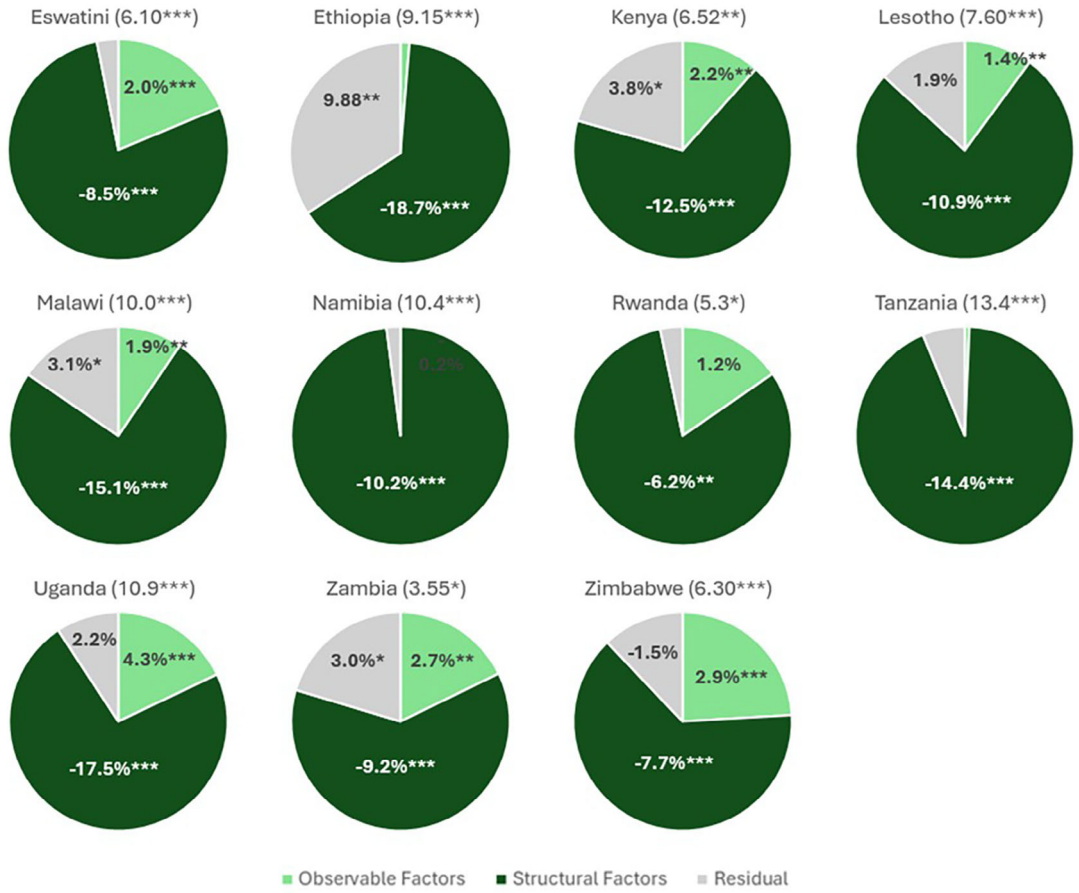
Figure 2. XXX.

with the slight disadvantage of working outside the home. The large negative values in the coefficients portion of the awareness model indicates that structural factors have a large negative impact on men. The models show that the factor with significantly more risk for females is being in the workplace.

Within treatment, there was a roughly 7.7 pp lower share of males on treatment when compared to females. Similar to awareness, this was primarily due to structural barriers (-10.8 pp), while individual characteristics (2.4 pp) and residual effects (0.7 pp) provided a small protective factor. Within VLS, males performed 8.1 pp worse than females with structural barriers accounting for a majority of this gap (-12.1 pp). Individual characteristics (3.1 pp) and residual effects (0.9 pp) provided a slight protection, reducing the overall negative impact of structural factors. Data from the second round of PHIA surveys shows that the gap between males and females decreased across all three indicators and that structural barriers or cultural norms continue to account for a majority of the remaining gap.

Individual country results

The analysis also provides individual country decomposition models for awareness, treatment, and VLS (See Figures 2-4). Tanzania has the largest gaps, with females performing better across awareness, share on treatment, and viral load suppression (11.6, 13.4, 13.6 pp, respectively). Cameroon is the only country without a significant gap between males and females across all three outcomes. Cote d'Ivoire does not have a significant difference between males and females on the share of treatment, while Ethiopia and Kenya have no significant difference between males and females on VLS. For all 13 countries with disparities, the basic pooled pattern of results holds: the gender gap favoring higher outcomes for females arises due to structural factors (coefficients). If other factors were the same, males would have a small advantage based on observable risk factors such as age, education, and wealth based on the endowments portion of the model. These findings reaffirm the pooled country results, that structural factors (coefficients) are the main driving force between these disparities.



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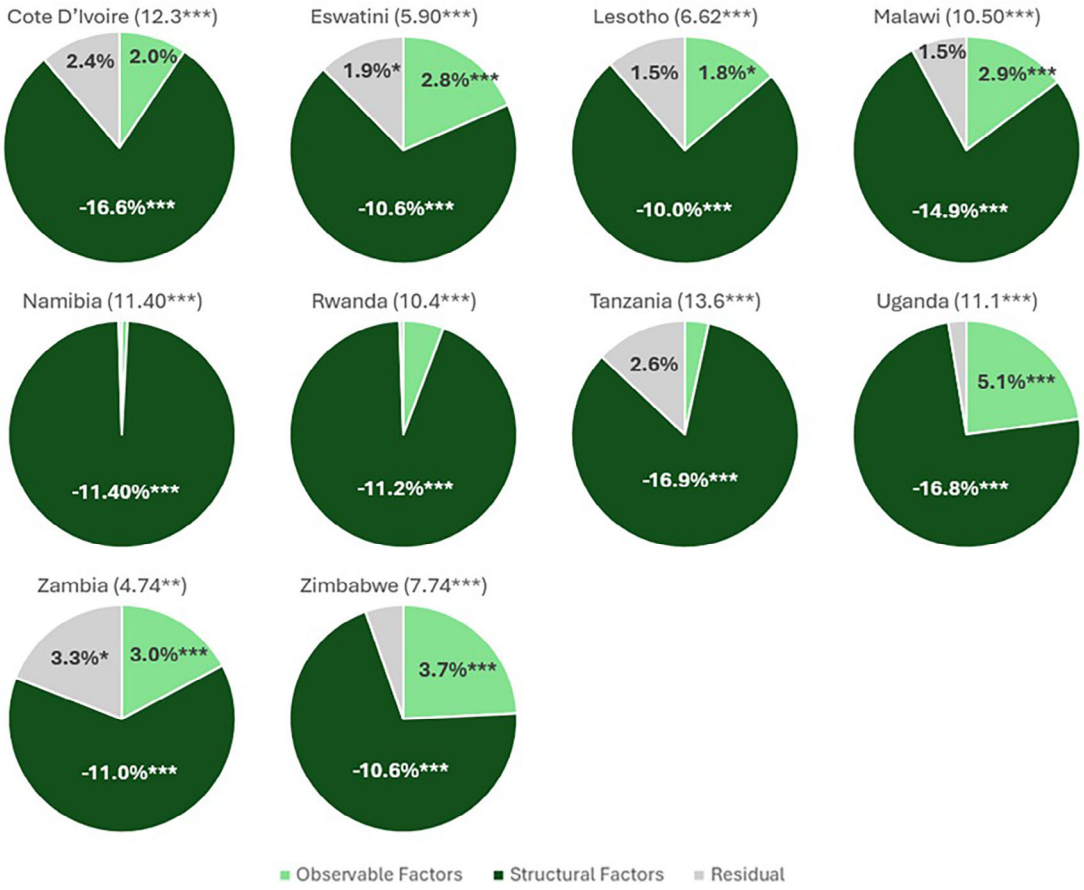

Figure 4. **XXX.**

Awareness

All countries except Cameroon show greater rates of awareness among females than males, with the average gap being 7.6 pp. Tanzania, Ethiopia and Namibia have the greatest gaps (11.6, 10.5, and 9.7 pp, respectively) (See Figure 2). The smallest gaps exist in Zambia and Rwanda (4.3 and 4.8 pp, respectively). Results in nine countries indicate that males held a greater number of observable characteristics that serve as protective factors, playing a role in lowering the gap. The endowments (observable) portion of the model was not significant in Ethiopia, Côte D'Ivoire, Namibia, and Tanzania, indicating that observed characteristics were not a significant factor in disparities within these countries. Structural factors (coefficient results) across all countries with disparities provided an average 10.1 pp contribution to the gap in favor of females. The largest coefficient gaps favoring females were observed in Ethiopia, Uganda, Tanzania, and Malawi (-20.5, -15.7, -13.3, and -12.6 pp, respectively). Rwanda and Zimbabwe have smaller coefficient margins favoring females at -5.3 and -7.2 pp, respectively. The residual output was significant in Ethiopia, at 11.1 pp.

Treatment

The average gender gap in share on treatment is 7.7 pp. The largest gaps were found in Tanzania, Uganda, Namibia, and Malawi (13.4, 10.9, 10.4, and 10.0 pp, respectively) while the smallest gaps were found in Zambia, and Rwanda (3.6, and 5.3 pp, respectively). There was no significant outcome gap between males and females in Cameroon and Cote d'Ivoire. See Figure 3 for full results. Endowment results for the treatment gap are generally positive, indicating that these characteristics are more often observed in males, play a small role in increasing male's average result, and thereby decrease the gender gap. Endowment results weren't significant in Ethiopia, Namibia, Rwanda, and Tanzania, indicating that differences in individual-level characteristics did not play a significant role in outcome differences between the two groups. All countries with treatment gaps show significant negative estimates of the portion of the treatment gap explained by coefficients or unobservable factors such as discrimination or cultural norms. Like awareness, these results favor higher treatment rates for females. The coefficient portion of the model plays the strongest role in Ethiopia, Uganda,

and Malawi (18.7, 17.5, and 15.1 pp, respectively) showing that these factors play the strongest role in these countries. The coefficient, or structural, portion of the model plays the smallest role in Rwanda, Zimbabwe, and Eswatini at 6.2, 7.7, and 8.5 pp, respectively. The residual impact was significant across pooled countries (0.71 pp), Ethiopia (9.88 pp), Kenya, (3.81 pp), Malawi (3.12 pp) and Zambia (3.03 pp).

VLS

The gender gap (males - females) in VLS is about 8.1 pp for all countries pooled together, with an average VLS rate of 58% for males and 66% for females. Tanzania, Côte d'Ivoire, Namibia, and Uganda displayed the largest gaps, at 13.6, 12.3, 11.4, and 11.1 pp respectively (See Figure 4). There was no significant difference between VLS rates between males and females in Cameroon, Ethiopia, and Kenya. The endowment portion of the model provided a roughly 3.07 pp advantage to males. Uganda, and Zimbabwe showed the highest endowment results at 5.14 and 3.65 pp, respectively. Endowments did not play a significant role in VLS differences in Cote d'Ivoire, Namibia, Rwanda, and Tanzania. The coefficient portion of the decomposition favors females by roughly -12.1 pp, with results significant across all countries. Tanzania, Uganda, Côte d'Ivoire, and Malawi displayed the largest coefficient impact at 16.9, 16.8, 16.6, and 14.9 pp, respectively. Lesotho, Zimbabwe, and Eswatini had the lowest results at 10.0, 10.6, and 10.6 pp, respectively. The residual effect was significant in the pooled model (0.9 pp), Eswatini, and Zambia (1.9 and 3.3 pp, respectively).

Results over time

The seven countries with two rounds of PHIA survey data show that while outcomes for both males and females have improved, male outcomes have improved faster females which has led to a smaller gap across countries. These results show that in the five to six years between surveys the gaps that had favored women by between 7 – 8 pp reduced to only 3 – 5 pp.

Among the included countries, Tanzania made the largest improvements across each indicator, reducing the gender gap by 7.68 pp, 8.87 pp, and 7.93 pp for awareness, treatment, and VLS, respectively. Tanzania had some of the lowest

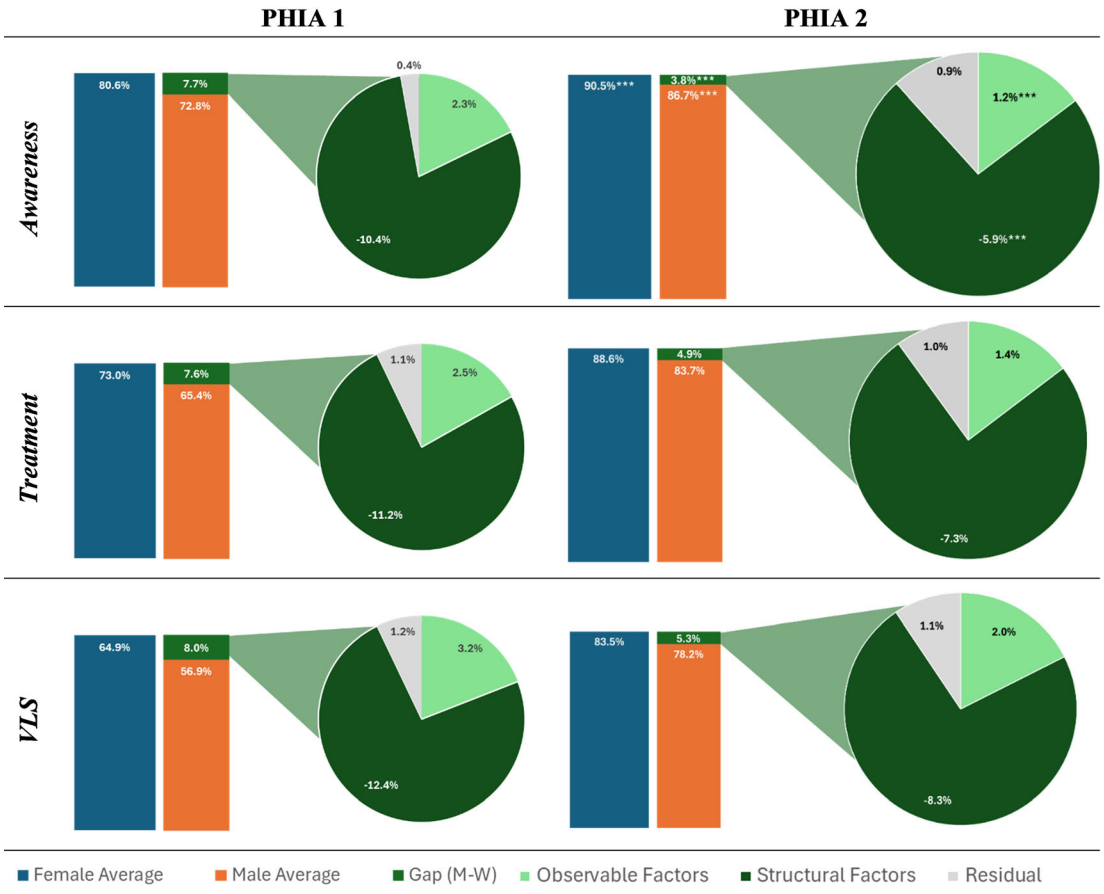

Figure 5. XXX.

outcomes during PHIA 1 with only 53.8% of men aware of their status, 48.4% on treatment, and only 40.8% virally suppressed which increased to 82.9%, 80.9%, and 75.4%, respectively. The gender gap decreased across countries, with the exception of Zambia where treatment rates for women improved more quickly than men, leading to a slightly larger treatment gap between genders at 3.9 pp in PHIA 1 to 4.3 pp in PHIA 2.

The endowments portion of the model decreased in all but one country, indicating that men and women share a higher level of individual-level characteristics (i.e. wealth, age, education, etc.) than during the first survey, and therefore these characteristics play less of a protective factor for men at this time. Similar to the round 1 PHIA surveys, structural barriers or cultural norms continue to be the largest contributor to the gender gap, as seen through the coefficients portion of the model. See Figure 5.

Discussion

Factors impacting male treatment outcomes. The present analysis confirms that there is a significantly lower share of males living with HIV who are aware of their status, on treatment, and have achieved viral load suppression, when compared to females living with HIV. The exceptions to this are Cameroon across all three indicators, Cote d'Ivoire in treatment, and Ethiopia and Kenya in VLS, where there wasn't a significant gap. Beyond this, the analysis confirms that in countries with gaps, males tend to carry more protective individual-level factors such as higher wealth, age, and levels of education than females, however structural barriers still lead to worse outcomes for males. These findings show that, if individual characteristics between the groups were the same, the observed gaps would be larger across countries with disparities. This reveals that structural challenges, whether they are discrimination, cultural norms, or other unobservable factors, drive lower outcomes among men. These disparities represent a significant barrier to achieving UNAIDS 95-95-95 targets and ending the HIV epidemic. Addressing structural barriers can be a challenge, as it often involves behaviour change, cultural norms, addressing deeply rooted ideas about personal health decisions, or other factors that are more difficult to measure. Recent work has shown that while the HIV outcome gap between males and females has reduced over time, there remains the need to understand the factors that contribute to this disparity, along with effective solutions.[5]

Understanding structural factors. Previous research has shown certain norms and beliefs can impact health seeking behaviour, including the idea that males are expected to display more 'masculine' traits or mindsets. Researchers in Zimbabwe observed that this mindset was characterised by the ability to be in control, be financially reliable, resilient, healthy, and at times engaging in risky sexual behaviour.[15] These traits can be at odds with traits needed to prevent and treat HIV such as consistent condom use, regular testing for HIV or sexually transmitted infections, and adherence to treatment. These factors may also impact willingness to access services or follow medical advice from nurses, a female-dominated profession.[15] This is backed by a UNAIDS study in Mpumalanga, South Africa, where 26% of males perceived seeking healthcare as a sign of weakness, and tended to overestimate the extent to which their peers shared this view.[16] Other studies have shown in communities where males face economic hardships, males are more likely to engage in transactional sex as it is a perceived venue to assert their masculinity. In contrast, for females, transactional sex is often driven by financial need, emotional connection, social status, or the desire to maintain a modern lifestyle.[17]

Beyond these behaviours, there may be gaps in knowledge. Almost half (47%) of males from ages 18-30 in South Africa who partnered with females reported perceiving no chance of getting HIV in their lifetime.[17] This is shown through risky behaviours as males who reported inconsistent condom use and transactional sex were more likely to also have concurrent sexual partnerships, perpetrate intimate partner violence, and believe they had no chance of acquiring HIV.[17] Beyond this, fears of stigma, clinic wait times, confidentiality, limited clinic hours, and fear of testing positive serve as barriers to accessing testing and care.[18]

UNAIDS comprehensive strategy notes that due to gender norms that emphasise resilience and independence, males exhibit poorer health-seeking behaviour, leading to lower HIV awareness and treatment rates, with a result that males receiving ART face a 70% higher mortality risk from HIV compared to females.[16]

Poorer outcomes among adult males have rippling effects. When someone living with HIV knows their status, is on treatment, and achieves VLS they can no longer transmit the virus to a loved one through sexual or blood contact.[19] Low VLS among adult males represents a missed opportunity for leveraging treatment as prevention. Adolescent girls and young women in sub-Saharan Africa are more likely to have a sexual partner who is five or more years older than their male peers.[10] As such, low VLS coverage among males is a key contributor to the disproportionate number of new infections among adolescent girls and young women, who are three times more likely to acquire HIV than young men.[5] Increasing testing, treatment, and retention in care for males is key to supporting individual health, preventing new infections, and ending the HIV epidemic.

While this evidence shows how traditional views of 'masculinity' along with stigma surrounding HIV may impact health seeking behaviour among men, there is also evidence that tailored programming can help to breach this gap.[15,20]

Despite the barriers, the Zimbabwe study showed a promising opportunity; after receiving education on the lifesaving benefits of ART and its impact on their well-being, some males adjusted their perceptions of masculinity and became more adherent to ART.[15] Early communications on HIV often provided stigmatizing messages, highlighting illness or stigmatizing the behaviours of people living with HIV.[21] Stigma is directly linked to lower rates of testing, accessing treatment, and remaining on treatment once started.[21] This research shows that shifting towards messaging that highlights the lifesaving benefits of treatment and that one can no longer transmit the virus to loved ones when you reach viral suppression (Undetectable = Untransmittable U=U),[19] may play a role in both reversing this stigma and creating a positive perception of HIV testing and treatment.

Historically, much of the global HIV response in Africa focused on females due to higher perceived risk, and as part of very successful prevention of mother-to-child-transmission programs.[22] However, an increasing number of interventions are being tailored to target men.

Improving results over time. Countries with two rounds of PHIA data showed significant improvements among men and a corresponding reduction in the gender gap. Structural or cultural barriers (from the coefficients portion of the model) were the largest contributor to this gap across both surveys, however it played a much smaller role during PHIA 2. Each of these countries have attempted to tailor services to overcome barriers to care for men. To increase awareness, each of these countries have scaled up HIV self-testing in various venues such as pharmacies, workplaces, faith communities, or public spaces (such as vending machines, in Uganda).[23,24] In Eswatini, among other countries, this is paired with social media campaigns on the importance on knowing your status and accessible clinics for confirmatory testing.[25] The social network strategy in Malawi and Tanzania, among other countries, engages 'recruiters' to encourage people in their social networks whether friends, sexual partners, family, or part of the same faith community to get tested.[26–29] These interventions are paired with recency testing, which allows for programs to target testing and prevention services in areas with high rates of new infections.

The PEPFAR Faith and Community Initiative (FCI) attempted to work with community leaders, faith-based organizations, and faith communities to reach men, replacing previous stigmatizing messages with messaging around the lifesaving role of testing and treatment.[30] In Zambia, they worked with faith leaders in high transmission areas and saw a twelve fold increase in newly identified males living with HIV. Of these men, 95% were linked to treatment and 92% remained in care.[30] Congregations in Eswatini tailored a 'Messages of Hope' series with a focus on testing, initiating on treatment, and the 'new hope', highlighting the lifesaving role that HIV services can play. These services leaned strongly into undetectable = untransmittable (U=U) messaging,[19] increasing both testing uptake and pre-exposure prophylaxis for prevention.[30]

These countries have also implemented strategies to ensure that treatment is accessible for men. Male-friendly clinics or corners have been found to support higher levels of adherence and have been implemented across each of these countries.[23–27,31,32] These are often characterized by expanded hours, peer support from male expert clients,[33] being a one-stop-shop to ensure minimal time is spent in the appointment and often engage male healthcare workers. Lesotho increased integration of HIV services into primary healthcare and has also increased decentralized treatment delivery in mobile clinics, collect & go e-lockers, along with pharmacy pick up points to minimize the amount of time men spend going to and from appointments or pharmacies.[31] For those who drop out of treatment, Tanzania has employed peer counselors who follow up with clients for appointment reminders and peer-counseling, community ART groups for peer support to encourage them to engagement in care.[27]

Community partners in Lesotho completed a root-cause analysis which showed that 80% of treatment disruptions could be avoided with scaling up multi-month dispensing (MMD), a finding supported by additional research.[31,34] This strategy addresses the barriers of men being away from home, traveling out of the country, being at work, or a lack of transportation as a barrier. Community-led monitoring of these services in Lesotho informs their model to ensure continuous quality improvement based on client needs and barriers.[31] Principles from the MenStar Coalition approach provide service guidance to ensure that men are able to overcome cultural and structural barriers across the care continuum – see a summary of these principles in Table 1, below, from Lesotho's COP22 Strategic Direction Summary.[31,35]

While these interventions provide a promising starting point, there is a need for continuation of these services, along with evaluation of these programs to assess impact. Future studies may examine the effectiveness of these programs or utilise

Table 1. COP22 retention strategies aligned to the MenStar approach and framework.

Descriptor	Who are they	Key health care need	Key emotional need	COP22 priority
Newly in Treatment	Newly initiated in treatment. First 90 days are critical	A positive healthcare experience from day one	Support to incorporate treatment into his life	Peer engagement expands men's clinics at high impact sites. HRH optimization/re-allocate expert men clients. Treatment literacy messaging
Interruption in treatment	Interruption in treatment, including those who cycle in and out of care	Proof that the medication and the clinic/system have changed and will now meet his needs	Proof that it's "worth it" to give it another try	Addresses client needs related to expanded hours, stigma reduction, and long wait times. Peer engagement
Virally Suppressed	Engaged in treatment and virally suppressed	Convenient differentiated service delivery options	Continued access to support and a move towards the feeling that HIV does not define him	Differentiated Service deliver Models (DSDM) Scale-up 6-month drug supply from current 85% for adult males

Source[31]: Notes: COP denotes country operational plan; HRH denotes human resources for health.

community-led monitoring to center service users in the evaluation of service provision. Despite this progress, the future of these interventions is uncertain due to political pressure to reduce funding for the program, along with the recent dismantling of the U.S. Agency for International Development (USAID), one of PEPFAR's primary implementing agencies.[36,37] Continued investment in these programs, along with evaluation, can serve as a starting point to increasing the number of males living with HIV who know their status, are on treatment, and reach viral suppression.

Limitations

Ethiopia does not have data on rural versus urban residence so their results were not broken down in this regard. The residual value in Ethiopia was larger than in any other country. While this may be partially attributable to the lack of data on urban versus rural residence, further research is needed to understand which factors weren't captured into the current model to better understand if additional individual-level characteristics impact service outcomes in the country.

Conclusion

This study confirms that across twelve out of thirteen countries studied, females perform better than males across outcomes of awareness of one's HIV status, being on treatment, and viral load suppression. The study confirms that a majority of this gap is attributable to structural barriers to care. While males as a whole hold individual-level characteristics that would otherwise increase their expected outcomes, the larger role of these structural barriers reinforces this gender gap. Policymakers and program managers should consider how cultural norms, ideas towards health seeking behaviour, and other structural factors may impact male's access to services. Continued investment into and evaluation of male-friendly services is vital to decrease this gap and understand effective strategies to link males to HIV care. Future studies may explore existing approaches to increase evidence-based strategies to improve HIV outcomes.

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Ethics statement

Patient consent for publication: Not applicable.

Ethics approval: This study used data from the Population-based HIV Impact Assessments (PHIA) survey from ICAP at Columbia University. All PHIA survey protocols, consent forms, screening forms, refusal forms, referral forms, recruitment materials and questionnaires were reviewed and approved by in-country ethics and regulatory bodies and the institutional review boards of Columbia University Medical Center, Westat, and the U.S. Centers for Disease Control and Prevention. Further approval for this study was not required since data are freely available in the public domain.

Patient and public involvement

Patients and the public were not involved in the design, conduct or dissemination of this research.

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Data availability statement

The data that support the findings of this study are available from PHIA at Columbia University.

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