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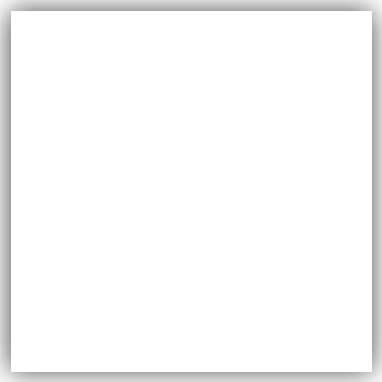
Original Article

Understanding Structural Determinants of HIV Testing in a Resource-Limited Setting: The Case of Ethiopian Women



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Abstract

Knowing HIV serostatus is a vital component of HIV prevention. Although significant progress is being made in controlling HIV infection, the uptake of HIV Testing and Counselling (HTC) remains low. Previous studies have mainly focused on individual level risk factors; however, structural determinants relevant to HIV prevention including HIV testing are largely unknown. The study objective was to identify key structural factors associated with HIV screening among women living in resource-poor countries like Ethiopia. Using Ethiopia's Demographic and Health Survey (sample = 8382), we examined structural determinants of HIV testing. The study revealed that four-in-ten women were ever tested for HIV. Both HIV testing enabling and inhibiting (barrier) environments significantly associated with HIV testing status. Exposure to mass media significantly improved HIV testing. Women who visited a health facility in the last 12 months were 94% more likely to be tested for HIV than women who did not. Among women who said physical structure related factors were a big problem, 32% were less likely to be tested than women who did not think these factors were a problem. Our findings suggest that structural interventions may improve the uptake of HIV testing among Ethiopian women.

Keywords: *Women; HIV Testing; Structural Factors; Ethiopia*

Introduction

The toll of the HIV epidemic in resource-limited countries such as Ethiopia is evident. More than 33,000 Ethiopians died from AIDS-related conditions in 2015, 800,000 people are living with HIV, and nearly 900,000 children were orphaned (Country Progress Report on the HIV Response, 2014). The estimated adult HIV prevalence is 1.5%; however, among women, the prevalence is twice as high (1.9%) as in men (1%) (Central Statistical Agency (CSA) & ICF International, 2012). A confluence of factors may have attributed to the gender inequity in HIV infection levels

including detrimental gender norms, differential schooling opportunities, inadequate access to basic reproductive health services, poor economic and living conditions, and pervasive sexual violence among women (UNAIDS, 2016). HIV infection prevention strategies focusing on women can avert AIDS-related maternal mortality and vertical transmissions of HIV (UNAIDS, 2014). Testing for HIV or knowing HIV serostatus is a vital component of HIV prevention and a pathway to antiretroviral therapy (ART). It allows early diagnosis and treatment that can extend life and decrease HIV transmissions (Cohen et al., 2011; Katz & Maughan-Brown, 2017). The potent therapeutic effect of ART not only decreases viral loads but prevents mother-to-child transmissions among pregnant women (World Health Organization [WHO], 2017).

In Ethiopia, significant decrease of HIV infection has been achieved, and services regarding HIV Testing and Counselling (HTC), Prevention of Mother-to-Child Transmission (PMTCT) and Antiretroviral Therapy (ART) coverage have increased; 79% of the nation's health facilities provide HTC services while 57% provide PMTCT and 24% ART services (WHO/CDC, 2015). Although, remarkable uptake of HTC has been attained, the estimated HTC coverage among adult population remains low (27%) (WHO/CDC, 2015).

Previous studies on HIV prevention in Ethiopia have mostly focused on individual level risk factors (Hong et al., 2008; Kenyon et al., 2015); however, structural determinants relevant to HIV prevention including HIV testing are largely unknown. Understanding key structural determinants of HIV testing may enhance the uptake of HIV testing and treatment. Structural determinants refer to environmental and social influences on a health behaviour, which to a large extent, are beyond individuals' control and may play a significant role in HIV transmission and acquisition (Cohen et al., 2000; Sumartojo, 2000). Health promotion interventions may target factors that are either under/or beyond individuals' control (Cohen et al., 2000). In ecological approaches of interventions, multiple levels of influences of health behaviour are targeted because changing individuals' behaviours alone may not bring lasting behavioural changes without corresponding changes of relevant environmental influences (DiClemente et al., 2013). Furthermore,

structural interventions are effective in changing behaviours at population-level (Cohen et al., 2000). Structural factors pertinent to health behaviour change include availability/accessibility of services, physical and social structures, and access to mass media (Cohen et al., 2000). Thus, we examined the following structural factors relevant to HIV testing: (1) HIV testing enabling environments: access to healthcare utilization (health clinic visit) and exposure to mass media. (2) HIV testing inhibiting or barrier environments: women's independence to use healthcare service (social structure), physical barriers (distance and transportation constraints), and health service delivery barriers (providers and health products availability).

Methods

We used data collected in the 2011 Ethiopia's Demographic and Health Survey (EDHS-2011) by the Ethiopian Central Statistical Agency (CSA). Study participants were selected by a two-stage stratified cluster sampling method. Enumeration areas (EAs) were sampling units in the first stage, and included 187 urban and 437 rural EAs. In the second-stage, 16,702 households were selected (CSA & ICF International, 2012). We applied sampling weight to generate representative sample. For the current study, out of 16,515 study participants who responded to women's questionnaire, we selected sexually active women between 15 and 49 years of age (n=8382). Although we used a nationally representative sample, the study has some limitations. The design is cross-sectional because measurements were obtained at a single point in time. Moreover, measurements were self-reported; hence, there may be a social desirability effect. Despite these limitations, our findings are generalizable to the study population.

The dependent variable was captured from women's responses to the question, "if they ever tested for HIV?" that elicited, yes/no, responses and coded, 1/0. The main independent variables included: access to mass media and healthcare utilization as HIV testing enabling environments, and women's independence, physical barriers, and health service delivery barriers as HIV testing inhibiting environments. Access to media was measured from weekly frequencies of reading newspapers or magazines, listening to radios, and watching TV broadcasts. Study participants were

dichotomized into "not exposed" to any mass media outlets, coded, "0" and the rest, any mass media exposure, coded, "1". Access to healthcare utilization was assessed by asking women "If they have visited health facility in the last 12 months?" eliciting, yes/no, and coded 1/0. HIV testing inhibiting environments included barriers related to women's independence, physical, and health service delivery barriers. Scores from the following four items were used to assess women's independence to utilize healthcare: (1) permission to go to health facility (2) not wanting to be alone, (3) finding money for treatment, and, (4) workload inside/outside house. Responses of women to these items were categorized into "not a problem," and coded "0" or "a big problem," coded "1". HIV testing inhibiting physical barriers to healthcare services was measured by two items: (1) physical distance to health facility and (2) the need to take transportation means to get to a health facility. Women's responses were categorized into "not a problem group," and coded "0" or "a big problem," coded "1" as well. Barrier of health service delivery was assessed in a similar way from responses to the following questions: (1) concern that no female health providers may be available, (2) concern that provider may not be available, and (3) concern that drug may not be available. Women's responses were dichotomized in a similar way. Also included were individual level factors related to HIV testing among women such as comprehensive knowledge of HIV transmission, condom use with most recent partner, STI in the last 12 months, pregnancy status, self-efficacy to avoid HIV infection. Women were classified as having high or low comprehensive knowledge depending on their responses to correctly identify three methods of preventing HIV transmission, and knowing that healthy looking person can have HIV and rejecting the misconception that one can get HIV from mosquito bites. Participants who had obtained 0-3 correct answers were grouped as having low comprehensive HIV transmission knowledge and coded "0." Participants who obtained 4 or 5 correct answers (≥ 80% correct) were grouped as having high comprehensive HIV transmission knowledge and coded "1." Responses to condom use with recent partner were "no/yes" and coded "0/1". Likewise, responses to the question "If study participants had STI in the last 12 months were "no/yes and coded "0/1". Women were also asked if they were pregnant and responded "no or unsure

/yes and coded "0/1". Self-efficacy to reduce HIV infection was measured from women's responses of two questions: (1) respondent can refuse sex and (2) respondent can ask partner to use a condom. Responses were 0=no, 1=yes, 3=depends /not sure. Women who responded "no" or "depends/not sure" or answered "yes" to one item were grouped as having low self-efficacy and coded "0" and women who responded "yes" to both items were grouped as having high self-efficacy in avoiding HIV infection and coded "1."

To illustrate basic features of the study population we ran descriptive statistics. We used the Chi-square statistic for bivariate associations between study variables and HIV testing status. Multivariate logistic regressions were fitted to understand the relationship between the main independent variables, the enabling and inhibiting structural factors of the HIV testing among Ethiopian women and HIV testing status. In Model 1, we controlled the effects of socio-demographic variables: age, residence, religion, wealth, education levels, and current employment status. In model 2, individual level factors (comprehensive HIV transmission knowledge, condom use with recent partner, STI in the last 12 months, pregnancy status, and self-efficacy to reduce HIV infections were entered. In model 3, HIV testing enabling and inhibiting structural factors were entered.

Results

Overall, 38% of women who were sexually active were ever tested for HIV in Ethiopia (Table 1). All variables in the bivariate analyses except pregnancy status were significantly associated with HIV testing status (Table 1). The proportion of women who were ever tested for HIV was highest (44%) among the youngest group (15-24) and was lowest (32%) among the oldest group (35-49). Seventy-three percent of women residing in urban areas were tested for HIV while only 30% of rural resident women were ever tested for HIV. Women who reported to follow Christian faith had the highest proportion (40%) of women ever tested for HIV, followed by Muslim women (34%) and women of traditional/other faiths (19%). The proportion of women ever tested for HIV steadily increased as the household wealth improved. Fifty-seven percent of women from rich households were ever tested for HIV. The corresponding proportions for middle income and poor households

were 31% and 22%, respectively. Similarly, among women who had no formal education only 26% were ever tested for HIV, but was twice as much (52%) among women who reported to have primary level education, and highest among women with secondary (85%) and higher education (89%) levels. Among women who were employed, 44% were ever tested for HIV; however, the corresponding figure for unemployed women was 34%. Women who reported to have high comprehensive knowledge of HIV transmission had twice as much higher proportion of ever tested for HIV (55%) than women with low level of HIV transmission knowledge (27%). Among women who reported to have used condoms with the last partner, 68% ever tested for HIV while 38% of women who did not use condom with their last partner reported to have ever been tested for HIV. Among women who reported to have STI in the last 12 months, 59% were tested for HIV. The corresponding figure among women who did not report to have STI in the last 12 months was 38%. Women who had shown high self-efficacy in reducing HIV infection, 57% were ever tested for HIV while women with low self-efficacy, 30% were ever tested for HIV. With regard to HIV testing enabling structural factors, among women who were exposed to mass media, 46% were ever tested for HIV; however, among women who were not exposed to media, 23% were ever tested for HIV. Among women who visited healthcare facility in the last 12 months, 52% were ever tested for HIV while women who did not visit a health facility in the last 12 months only 29% were ever tested for HIV. With regard to barriers to HIV testing, women who said independence in using healthcare was a big problem, 35% were ever tested for HIV while women who said independence was not a problem, 59% were ever tested for HIV. Women who said physical barriers (distance and transportation) were a big problem, 32% were ever tested for HIV. However, women who said physical barriers were not a big problem, 61% were ever tested for HIV. Similarly, women who said healthcare service delivery was a big problem, 35% were ever tested for HIV and those who did not think service delivery was not a problem 44% were ever tested for HIV.

Table 1: Socio-Demographic Characteristics and Prevalence of HIV Testing Among Ethiopian Women

Characteristics		Ever tested for HIV		χ^2/p*
		No n (%)	Yes n (%)	
Overall	8382*	5201(62.1)	3181 (37.9)	
Age in years				
15-24	2121	1192 (56.2)	929 (43.8)	
25-34	3541	2169 (61.3)	1372 (38.7)	
35-49	2721	1841(67.7)	880 (32.3)	68.13/<.001
Residence				
Urban	1510	406(26.9)	1104 (73.1)	967.03/<.001
Rural	6872	4795(69.8)	2077 (30.2)	
Religion				
Christian	5715	3434 (60.1)	2281(39.9)	41.52/<.001
Muslims	2548	1671 (65.6)	877(34.4)	
Traditional/others	118	96 (81.4)	22 (18.6)	
Household wealth				
Poor	3307	2574 (77.8)	733 (22.2)	
Middle	1715	1191 (69.4)	524 (30.6)	921.90/<.001
Rich	3360	1436 (42.7)	1924 (57.3)	
Educational level				
No education	5390	3968 (73.6)	1422 (26.4)	
Primary	2420	1159 (47.9)	1261 (52.1)	1098.94/<.001
Secondary	309	45 (14.6)	264 (85.4)	
Higher	263	29 (11.0)	234 (89.0)	
Current employment				
Employed	3137	1752 (55.8)	1385 (44.2)	82.41/<.001
Unemployed	5236	3445 (65.8)	1791(34.2)	
HIV transmission knowledge				
Low	4612	3348 (72.6)	1264 (27.4)	650.35/ <.001
High	3416	1519 (44.5)	1897 (55.5)	
Condom use with last partner				
No	8265	5164 (62.5)	3101 (37.5)	46.65/<.001
Yes	117	37 (31.6)	80 (68.4)	
STI in the last 12 months				
No	8293	5162 (62.2)	3131 (37.8)	12.72/<.001
Yes	68	28 (41.2)	40 (58.8)	
Currently pregnant				
No/unsure	7478	4631(61.9)	2837 (38.1)	.433/.51
Yes	904	570 (63.1)	334 (36.9)	

Self-efficacy				
Low	5929	4172 (70.4)	1757 (29.6)	517.56/<.001
High	2254	973 (43.2)	1281 (56.8)	
Media exposure				
No	3004	2317 (77.1)	687 (22.9)	451.81/<.001
Yes	5377	2884 (53.6)	2493 (46.4)	
Healthcare access, health facility visited, last 12 months				
No	5062	3618 (71.5)	1444 (28.5)	483.49/<.001
Yes	3315	1579 (47.6)	17.6 (52.4)	
Barrier, women independence				
Not a problem	936	383 (40.8)	555 (59.2)	201.93/<.001
A big problem	7444	4818 (64.7)	2626 (35.3)	
Barriers, physical factors (distance and transportation)				
Not a problem	1684	651 (38.7)	1033 (61.3)	489.68 /<.001
A big problem	6698	4550 (67.9)	2148 (32.1)	
Barrier, service delivery				
Not a problem	2492	1393 (55.9)	1099 (44.1)	56.98/<.001
A big problem	5890	3808 (64.7)	2082 (35.3)	

*Probability of significant association between the variables (Pearson's Chi-square); ** Total numbers may different from the total count in the cross-tabulation because of the cell counts have been rounded up or some missing values in the variables.

Table 2 presents results of the multivariate logistic regressions. All of the socio-demographic variables included in the study except religion and employment status remained significantly associated with HIV testing status of women in model 3. Older women (35-49) were 22% less likely to ever tested for HIV (OR=0.78, 95%CI: .68-.91) than women in the youngest group (15-24 years of age). Women from urban areas were 86% more likely to have ever been tested for HIV (OR=1.86, 95%CI: 1.57-2.21). The odds of ever tested for HIV among the women increased steadily as household wealth increased. Women from middle income households were 43% more likely (OR=1.43, 95%CI: 1.24-1.65) and women from rich households were 82% more likely (OR=1.82, 95%CI: 1.59-2.08) to have ever been tested for HIV than women from poor households. The association between educational levels and testing for HIV was also significant. Women who reported to have primary education, were 71% more likely (OR=1.71, 95%CI: 1.52-1.93) to have been tested for HIV than women who had no formal education. Women with secondary and higher education were 4 times more likely to having ever tested for HIV (See model 3). Among

individual level factors, comprehensive HIV knowledge and self-efficacy to reduce HIV infection associated significantly to having ever tested for HIV. Women with high comprehensive knowledge of HIV transmission were 88% more likely to ever tested for HIV (OR=1.88, 95%CI: 1.68-2.09) than women with low HIV comprehensive knowledge. Women who reported to have STI in the last 12 months were 2.41 times more likely to ever tested for HIV (OR=2.41, 95%CI: 1.38-4.21) and those women who had shown high level of self-efficacy to reduce the risks for HIV infection were 51% more likely to ever tested for HIV (OR=1.51, 95%CI: 1.34-1.70) than women with low self-efficacy.

Table 2: Adjusted Odds Ratios (OR) and 95% Confidence Intervals (95% CI) of Factors Associated With HIV Testing Among Ethiopian Women

Characteristics	Model 1		Model 2		Model 3	
	OR	95%CI	OR	95%CI	OR	95%CI
Age in years						
15-24	1		1		1	
25-34	0.89	0.79-1.02	0.89	.78-1.01	0.89	0.78-1.02
35-49	0.76***	0.66-0.87	0.78**	0.68-0.90	0.78**	0.68-0.91
Residence						
Rural	1		1		1	
Urban	2.57***	2.20-3.01	2.24***	1.90-2.63	1.86***	1.57-2.21
Religion						
Christians	1		1		1	
Muslims	1.05	.94-1.17	1.11	0.99-1.24	1.11	0.99-1.24
Traditional & others	0.48**	0.28-0.82	0.51*	0.30-.89	0.61	0.35-1.06
Household wealth						
Poor	1		1		1	
Middle	1.50***	1.31-1.72	1.47***	1.28-1.70	1.43***	1.24-1.65
Rich	2.15***	1.89-2.44	2.04***	1.79-2.33	1.82***	1.59-2.08
Educational level						
No education	1		1		1	
Primary	2.14***	1.91-2.39	1.85***	1.64-2.07	1.71***	1.52-1.93
Secondary	6.58***	4.56-9.50	4.59***	3.16-6.65	4.10***	2.82-5.97
Higher	6.62***	4.33-10.11	4.37***	2.84-6.72	3.70***	2.39-5.72
Current employment						
Unemployed	1		1		1	
Employed	1.17**	1.05-1.30	1.16*	1.04-1.29	1.11	1.0-1.24
HIV transmission knowledge						

Low	1		1	
High	2.05***	1.84-2.28	1.88***	1.68-2.09
Condom use with last partner				
No	1		1	
Yes	1.19	0.62-2.29	1.31	0.66-2.59
STI infection in the last 12 months				
No	1		1	
Yes	2.74***	1.59-4.72	2.41*	1.38-4.21
Currently pregnant				
No/unsure	1		1	
Yes	1.06	0.90-1.26	1.06	0.90-1.25
Self-efficacy				
Low	1		1	
High	1.54***	1.37-1.74	1.51***	1.34-1.70
Media exposure				
No			1	
Yes			1.43***	1.27-1.61
Healthcare access, health facility visited, last 12 months				
No			1	
Yes			1.94***	1.74-2.16
Barrier, women independence				
Not a problem			1	
A big problem			1.05	0.87-1.26
Barriers, physical factors (distance and transportation)				
Not a problem			1	
A big problem			0.68***	0.58-0.78
Barrier, service delivery				
Not a problem			1	
A big problem			1.00	0.89-1.13

*p<.05; ** p<.01; ***p<.001

With regard to the main independent variables, HIV testing enabling (access to media and access to healthcare) and inhibiting structural factors (distance and transportation) were significantly associated with women ever tested for HIV (Table 2, model 3). Women who were exposed to mass media outlets were 43% more likely (OR=1.43, 95%CI: 1.27-1.61) to ever tested for HIV than women who were not exposed. Likewise, the odds of ever tested for HIV among women who visited health facility in the last 12 months were 94% more likely (OR=1.94, 95%CI: 1.74-2.16) than women who did not visit a health facility in the last 12 months. Among HIV testing inhibiting structural factors, distance and transportation barrier were significantly associated with women ever tested for HIV. Women who

indicated distance and transportation was a big problem were 32% less likely (OR=0.68, 95%CI: 0.58-0.78) to ever tested for HIV than women who said it was not a big problem. Women's independence and service delivery barriers were not significantly associated with women ever tested for HIV.

Discussion

Our findings showed that 38% of sexually active women were ever tested for HIV, lower than what was reported from several sub-Saharan African women populations; 44% in Congo, 50% in Mozambique, 58% in Nigeria, and 76% in Uganda (Center et al., 2016); nonetheless, in agreement with HIV testing prevalence reported among Ethiopian women (Bradley et al., 2011). With the exception of religion and women employment status, all the socio-demographic variables included in the study significantly associated with HIV testing (Table 2, Model 3). Older women (35-49) were less likely to have ever tested for HIV than the younger women and our results agreed well with previous reports from sub-Saharan countries (Staveteig et al., 2013). This may stem from the perception that older women may not be vulnerable to HIV infection and/or lack or access to health education and awareness pertinent to preventing HIV infection. Likewise, urban resident women were significantly more likely to be tested than rural resident women and were largely the case across many sub-Saharan countries (Staveteig et al., 2013). Living in urban areas might have afforded extra advantages in accessing health information and facilities, but may also entail increased risks for HIV infection as demonstrated in the variance of HIV prevalence dynamics in urban (5.2%) vs. rural (0.8%) Ethiopia (CSA & ICF International, 2012). Women from middle and rich households were more likely to have ever tested for HIV because the better socio-economic position might have provided easy access to healthcare services as well as provider initiated testing. Similarly, women with formal education were more likely ever tested for HIV than women with no formal education. In other words, women's education imparts positive influence in the uptake of HIV testing and consistent with reports across sub-Saharan African countries (CSA & ICF International, 2012; Staveteig et al., 2013).

Among individual level factors, comprehensive knowledge about HIV transmission, reported sexually transmitted infections (STIs) in the last 12 months, and self-efficacy in avoiding HIV transmission significantly associated with the likelihood of being tested for HIV. Women with higher comprehensive knowledge were more likely to have ever tested for HIV than women with lower HIV comprehensive knowledge. Enhancing HIV transmission knowledge is thus appropriate given the UNAIDS's plan to end the HIV epidemic by 2020. The ambitious plan is based on achieving that 90% of all people living with HIV know their HIV status, 90% of infected people receive treatment, and 90% having suppressed viral loads (Joint United Nations Programme on HIV/AIDS & Joint United Nations Programme on HIV/AIDs, 2014). Our findings also indicate that women who reported to have contracted STIs in the last 12 months were significantly more likely to be tested for HIV because the presence of STIs may force one to visit a health facility and perhaps may trigger provider initiated or voluntary testing. Exposure to certain STIs may increase the likelihood of getting HIV, in part, because the same behaviour that elevates the risk of getting STIs also increase the risk of HIV infection (Centers for Disease Control and Prevention, 2015). Self-efficacy, a belief that one can perform a health behaviour even under difficult situations (Bandura, 1994), is a widely applied construct in public health promotion efforts and may be relevant in the context of HIV testing among Ethiopian women as highly self-efficacious women were more likely to be tested for HIV than women with lower self-efficacy.

Our results from nationally representative sample showed significant associations of the structural factors to HIV testing among women, specifically, exposure to media, access to healthcare, and physical barriers, were significant and independent predictors of HIV testing. The significant influence of media exposure is congruent with reports from other sub-Saharan Africa countries (Do et al., 2016; Sano et al., 2016); and propitious for health behaviour change across different populations (Flowers, et al., 2013; Robinson et al., 2014; Wakefield et al., 2010) presumably by creating an environment that is conducive for public discourse in relation to HIV prevention. Mass media's potential can also be exploited to raise awareness and

dispel the myth and stigma around HIV testing by fostering supportive ecosystem at individual and societal levels. Women who reported to have visited a health facility in the last 12 months were 94% more likely to be tested than women who did not, hence, could access health benefits better than women who did not visit a health facility. Among HIV testing inhibiting environments included in the study, physical barriers (distance to health facilities and transportation constraints) significantly decreased the odds of being tested for HIV among Ethiopian women. Women, who said physical structure related factors were a big problem, were 32% less likely to be tested than women who did not think these factors were a problem. Similarly, among sub-Saharan African populations, distance to health facility was cited as a major barrier in accessing healthcare services (Akullian et al., 2016; Eliason et al., 2014; Masters et al., 2013). In rural Uganda, for example, living farther than three kilometres away from a facility with HIV testing service, significantly associated with lower odds of being tested among pregnant women, specifically, among the poorest—an impediment to opportunities for linking HIV positive women to PMTCT services (Larsson et al., 2012). As well in Ethiopia, distance to health facilities and transportation barrier may play important role in the uptake of HIV testing as majority of Ethiopian women live in rural areas with fewer health facilities. In contrast, women's independence and health delivery barriers were not significant predictors for HIV testing. It is conceivable that women's independence to utilize healthcare services was not a significant barrier to HIV testing services, in part, because women's health is considered vital and is highly intertwined with household's and children's wellbeing. Similarly, healthcare service delivery (providers and product availability) barriers were not significantly associated with HIV testing among Ethiopian women— perhaps a reflection of Ethiopia's successful healthcare system's restructuring that improved access through community-level health service and involvement of female health extension workers across the country.

Conclusions

Four-in-ten women have ever tested for HIV in Ethiopia. We found several modifiable structural factors that independently associated with HIV

testing among Ethiopian women. Both enabling and inhibiting (barrier) environments were significant predictors of HIV testing among study participants after accounting for socio-demographic and individual level factors. Exposure to mass media and access to health services (visiting health facilities) significantly associated with improved uptake of HIV testing. Setting up measures that would improve women's visits to health facilities around the country (e.g., convenient opening hours, availability of skilled medical staff, and affordable services) may enhance the uptake of HIV testing. Transportation constraints and distance to health facilities were identified as structural barriers significantly affecting HIV testing, perhaps more relevant in rural settings than urban areas. Our study suggests that structural interventions may improve HIV testing among Ethiopian women.

Disclosure Statement

The authors declare that no potential conflict of interest exists.

References

Akullian, A. N., Mukose, A., Levine, G. A., & Babigumira, J. B. (2016). People living with HIV travel farther to access healthcare: A population-based geographic analysis from rural Uganda. *Journal of the International AIDS Society, 19*(1), 20171.

Bandura, A. (1994). Social cognitive theory and exercise of control over In R. J. DiClemente & J. Peterson (Eds.), *HIV infection. Preventing AIDS: Theories and methods of behavioral interventions* (pp. 25-59).Springer.

Bradley, H., Tsui, A., Kidanu, A., & Gillespie, D. (2011). Client characteristics and HIV risk associated with repeat HIV testing among women in Ethiopia. *AIDS and Behavior, 15*(4), 725-733.

Center, K. E., Gunn, J. K., Asaolu, I. O., Gibson, S. J., & Ehiri, J. E. (2016). Contraceptive use and uptake of HIV-testing among sub-Saharan African women. *PLoS One, 11*(4), e0154213.

Centers for Disease Control and Prevention. (2015). *STDs and HIV—CDC fact sheet.* http://www.cdc.gov/std/hiv/stdfact-std-hiv-detailed.html

Central Statistical Agency & ICF International. (2012). *Ethiopia demographic and health survey 2011*. Central Statistical Agency and

ICF International. http://dhsprogram.com/pubs/pdf/FR255/FR255.pdf

Cohen, D. A., Scribner, R. A., & Farley, T. A. (2000). A structural model of health behavior: A pragmatic approach to explain and influence health behaviors at the population level. *Preventive Medicine*, *30*(2), 146-154.

Cohen, M. S., Chen, Y. Q., McCauley, M., Gamble, T., Hosseinipour, M. C., Kumarasamy, N., ... & Godbole, S. V. (2011). Prevention of HIV-1 infection with early antiretroviral therapy. *New England Journal of Medicine*, *365*(6), 493-505.

Country Progress Report on the HIV response. (2014). The Federal Democratic Republic of Ethiopia. http://www.unaids.org/sites/default/files/country/documents/ETH_narrative_report_2014.pdf

DiClemente, R. J., Salazar, L. F., & Crosby, R. A. (2013). *Health behavior theory for public health: Principles, foundations, and applications.* Jones & Bartlett Publishers.

Do, M., Figueroa, M. E., & Kincaid, D. L. (2016). HIV testing among young people aged 16–24 in South Africa: Impact of mass media communication programs. *AIDS and Behavior*, *20*(9), 2033-2044.

Eliason, S., Awoonor-Williams, J. K., Eliason, C., Novignon, J., Nonvignon, J., & Aikins, M. (2014). Determinants of modern family planning use among women of reproductive age in the Nkwanta district of Ghana: A case–control study. *Reproductive Health*, *11*(1), 65.

Flowers, P., McDaid, L. M., & Knussen, C. (2013). Exposure and impact of a mass media campaign targeting sexual health amongst Scottish men who have sex with men: An outcome evaluation. *BMC Public Health*, *13*(1), 737.

Hong, R., Mishra, V., & Govindasamy, P. (2008). *Factors associated with prevalent HIV infections among Ethiopian adults: Further analysis of the 2005 Ethiopia demographic and health survey*. Macro International Inc. https://dhsprogram.com/pubs/pdf/FA57/FA57.pdf

Joint United Nations Programme on HIV/AIDS, & Joint United Nations Programme on HIV/AIDs. (2014). *90-90-90: An ambitious treatment target to help end the AIDS epidemic*. UNAIDS.

Katz, I. T., & Maughan-Brown, B. (2017). Improved life expectancy of people living with HIV: Who is left behind? *The Lancet HIV, 4*(8), e324-e326.

Kenyon, C. R., Tsoumanis, A., & Schwartz, I. S. (2015). HIV prevalence correlates with high-risk sexual behavior in Ethiopia's regions. *PloS One, 10*(10), e0140835.

Larsson, E. C., Thorson, A. E., Pariyo, G., Waiswa, P., Kadobera, D., Marrone, G., & Ekström, A. M. (2012). Missed opportunities: barriers to HIV testing during pregnancy from a population based cohort study in rural Uganda. *PloS One, 7*(8), e37590.

Masters, S. H., Burstein, R., Amofah, G., Abaogye, P., Kumar, S., & Hanlon, M. (2013). Travel time to maternity care and its effect on utilization in rural Ghana: A multilevel analysis. *Social Science & Medicine, 93*, 147-154.

Robinson, M. N., Tansil, K. A., Elder, R. W., Soler, R. E., Labre, M. P., Mercer, S. L., ... & Sokler, L. A. (2014). Mass media health communication campaigns combined with health-related product distribution: A community guide systematic review. *American Journal of Preventive Medicine, 47*(3), 360-371.

Sano, Y., Sedziafa, A. P., Amoyaw, J. A., Boateng, G. O., Kuuire, V. Z., Boamah, S., & Kwon, E. (2016). Exploring the linkage between exposure to mass media and HIV testing among married women and men in Ghana. *AIDS Care, 28*(6), 684-688.

Staveteig, S., Wang, S., Head, S. K., Bradley, S. E., & Nybro, E. (2013). *Demographic patterns of HIV testing uptake in sub-Saharan Africa.* ICF International.

Sumartojo, E. (2000). Structural factors in HIV prevention: concepts, examples, and implications for research. *Aids, 14*, S3-S10.

UNAIDS. (2014). *A focus on women: a key strategy to preventing HIV among children. 2014.* http://www.unaids.org/sites/default/files/media_asset/JC2538_preventingHIVamongchildren_en_0.pdf

UNAIDS. (2016). *Global AIDS update 2016.* http://www.unaids.org/sites/default/files/media_asset/global-AIDS-update-2016_en.pdf

Wakefield, M. A., Loken, B., & Hornik, R. C. (2010). Use of mass media campaigns to change health

behaviour. *The Lancet, 376*(9748), 1261-1271.

World Health Organization. (2017). *HIV/AIDS. Statement on HIV testing and counseling: WHO, UNAIDS re-affirm opposition to mandatory HIV testing*. http://www.who.int/hiv/events/2012/world_aids_day/hiv_testing_counselling/en/

WHO/CDC. (2015). *HIV/AIDS. Epidemiology. Progress in 2014.Update: Ethiopia.* https://www.afro.who.int/sites/default/files/2017-05/ethiopia_update-sheet-on-hiv---aids-programme_2014_final.pdf

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