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Proximate Context of HIV-Related Stigma and Women's Use of Skilled Childbirth Services in Uganda

Courtney K NG[1,*] **Alexander C TSAI**[2]

[1]Department of Global Health and Population, Harvard T.H. Chan School of Public Health, Boston, MA

[2]MGH Global Health, Massachusetts General Hospital, Boston, MA; Harvard Center for Population and Development Studies, Cambridge, MA

Abstract

HIV-related stigma compromises both HIV prevention and treatment and has recently been described as a barrier to utilization of skilled childbirth services in sub-Saharan Africa. This study uses the 2011 Uganda Demographic Health Survey to estimate the associations between HIV-related stigma, measured both at the individual and community level, and use of facility delivery among women. Consistent with theoretical predictions, higher levels of stigma are associated with reduced likelihood of facility delivery. The negative relationship between stigma and facility delivery is especially pronounced when stigma is measured at the community level, highlighting the importance of understanding the proximate context of HIV-related stigma and its potential effects on behavior. Reducing the stigma of HIV will be critical to achieving the twin goals of reducing overall maternal mortality and preventing mother-to-child HIV transmission.

Keywords

HIV stigma; skilled childbirth services; maternal health; PMTCT

Introduction

Despite progress toward Millennium Development Goal (MDG) 5 to achieve a 75% reduction in the maternal mortality ratio by 2015, only sixteen countries are thought to have achieved MDG 5 (1), and the world is far from achieving the new Sustainable Development Goal (SDG) 3.1 target of reaching a global maternal mortality ratio of less than 70 per 100,000 live births (2). Nearly 300,000 maternal deaths related to pregnancy occurred in 2013 (1), and the countries with the highest mortality rates are all located in sub-Saharan Africa (3–6). A primary driver of these maternal deaths, particularly in rural areas (6, 7), is lack of access to appropriate maternal health care, notably skilled birth attendance and utilization of health facilities for childbirth (8–12). A number of sociodemographic, sociocultural, and structural correlates of facility delivery have been identified, including educational attainment (13, 14), economic status (15–18), geographic proximity (5, 19, 20),

[*]Correspondence: Courtney K Ng, Harvard T.H. Chan School of Public Health, 665 Huntington Ave, 11th floor, Boston, MA 02115 (cng@mail.harvard.edu).

out of pocket costs (17, 21, 22), autonomy and empowerment (23, 24), and perceived benefit or need (25–27). Literature reviews trying to understand the determinants of facility delivery use have also been conducted (28, 29).

A growing body of literature has identified HIV-related stigma as structural factor that exerts influence on women's decisions to avoid facilities for childbirth (30–34). Despite ongoing HIV treatment scale-up, qualitative data from Kenya show that women of unknown serostatus avoid facility delivery because they fear being tested for HIV and having their test results involuntarily disclosed (30, 34). For women who are HIV-positive, participating in prevention of mother-to-child transmission (PMTCT) programs and having to receive services from a designated health facility may also be stigmatizing (32, 35–37). With the exception of the important studies by Turan et al. (30, 31, 34, 38, 39), however, there have been no population-based studies examining this important issue. Furthermore, this existing body of literature is limited in its conceptualization of HIV-related stigma as an individual-level phenomenon. Yet the proximate context of stigma, defined as the intensity of stigma present in a particular context near an individual, is an important community-level attribute that may have an important impact on health behaviors (40–42).

To address this gap in the literature, we used data from the 2011 Uganda Demographic and Health Survey to examine the relationship between HIV-related stigma and utilization of skilled childbirth services. Uganda represents an important setting in which to examine this study question because its total fertility rate is one of the highest in the world, the maternal mortality ratio is 360 deaths per 100,000 live births, and only 57% of pregnant women give birth in health facilities (3). In Uganda, the HIV epidemic is generalized (43), the implementation of PMTCT is widespread (3, 44), and HIV is highly stigmatized (45, 46). Furthermore, Uganda recently implemented the "B+ option" through the HIV and AIDS Prevention and Control Act (47), mandating HIV testing for all pregnant women and their partners and allowing providers to disclose women's HIV status (48), potentially exposing HIV-positive women to discrimination and abuse (49). We hypothesized that higher levels of HIV-related stigma, measured either at the individual or community level, would be associated with reduced likelihood of health facility delivery.

Methods

Data source and variables

Our analysis is based on the 2011 Uganda Demographic Health Survey (DHS), which is a publicly available, population-based survey implemented by the Uganda Bureau of Statistics with technical assistance from ICF International (through the MEASURE DHS project), the Ugandan Ministry of Health, Makerere University School of Public Health, and the Biochemistry Department of Makerere University. The DHS employed a multistage stratified design with probabilistic sampling, with enumeration areas selected from a list of previously sampled clusters and a fixed number of households selected from within each cluster. All women of reproductive age (15-49 years) who were either permanent household residents or visitors who slept there the night before the survey were eligible for participation. Among the 10,086 households selected, the response rate was 94 percent. Additional details regarding pretesting, field training, and survey implementation can be

found in the DHS country report (50). For this specific analysis, we only included women who had heard of HIV and who had given birth in the five years prior to the survey. The reason for the first sample restriction is because the questions about HIV-related stigma (described in more detail below) were administered only to women who indicated that they had heard of HIV. The reason for the second sample restriction is because questions about place of delivery were only asked of women who had given birth within the previous 5 years.

The main outcome variable was whether or not the study participant had utilized a health facility for her most recent childbirth. We selected this measure given that it is a commonly used health systems indicator relevant to maternal mortality (51–54). All public and private hospitals, health centers, and clinics were counted as health facilities in our analysis. We limited the analysis to the most recent childbirth (rather than analyzing all births in the five years prior to the survey) because it was the observation most proximal to measurement of the exposure. Depending on the woman's age, in some cases the "most recent" childbirth could have been up to five years prior to the survey (thereby posing a potential problem for interpretation of the analysis with an outcome that could in some cases precede the exposure by many years). To address this possibility, we conducted a sensitivity analysis limiting the sample to women whose most recent childbirth occurred in 2010 and 2011 (i.e., so that the exposure would be as contemporaneous with the outcome as possible).

The main explanatory variable of interest was HIV-related stigma, reflected in desires for social distance (55, 56) (e.g., due to instrumental concerns about casual transmission (57) and other factors attached to the negative social meaning of HIV/AIDS), captured through three DHS questions: "Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?" "If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?" and "In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?" Although the DHS included another HIV-related stigma question about anticipated stigma ("If a member of your family got infected with the AIDS virus, would you want it to remain a secret or not?") (55, 58), we only included the social distance measures in our analyses due to limitations on the interpretability of the DHS question on anticipated stigma as described by Nyblade et al. (59) and Yoder & Nyblade (60), and given its removal from the latest round of the DHS. The three social distance questions were summed into a single index and analyzed as a continuous variable (ranging from 0-3) for the main analysis, but we also conducted sensitivity analyses using the three social distance measures separately.

To measure HIV-related stigma at the community level, we created summary variables representing the mean level of each stigma variable at the level of the primary sampling unit (PSU) (excluding the index participant from the calculation). The PSU was the smallest clustering unit of analysis. In the DHS, the PSU typically represents a village or cluster of villages in rural areas and a ward or residential neighborhood in urban areas. For ease of exposition, in this manuscript we use the term "village" or "community" to refer to this level of analysis. Villages with fewer than five female participants were removed from the analysis (61). For each woman in our sample who lived in a village with five or more

women, a village-level mean stigma score that included all individuals (men and women) in the village except for the participant herself was generated for each stigma measure. In addition to the village-level stigma variables, we examined two other village-level variables, education and literacy, as potential confounders (62). In the multivariable regression models (described in more detail below), estimates were adjusted for age, marital status, residence, education, occupation, economic status, religion, parity of birth, and perceived distance to clinic. Economic status was based on the participant's quintile of household asset wealth index as provided by the DHS, which was calculated by applying principal components analysis to a set of household possessions and housing characteristics of each participant (63). Finally, we included a dichotomous indicator denoting whether the participant reported attending four or more antenatal care visits (64–66).

Statistical Analysis

All statistical analyses were conducted using Stata software (version 11.2, StataCorp LLP, College Station, Tex.). We fitted multivariable logistic regression models to the data, specifying health facility delivery as the dependent variable and HIV-related stigma, measured by the social distance index and individual social distance items, as well as the other potential confounders, as the explanatory variables. Cronbach's alpha was calculated to assess the internal consistency of the social distance index. First we estimated the association between individual-level stigma and health facility delivery. Then, after adjusting for covariates, we added village-level stigma to assess its additional explanatory power. In addition to the estimated odds ratios, we also computed marginal effects to aid in interpretation (67). All regression models employed cluster-correlated robust estimates of variance to account for dependence of observations within villages (68–70).

To explore potential explanations for any statistically significant associations found between stigma and health facility delivery, we tested for effect modification by prior HIV testing and women's healthcare decision making-power within the household. We examined these two variables specifically because fear of HIV testing has been proposed as a potential reason for why women avoid health facility delivery (30, 34, 71), and previous studies assumed stigma affects maternal health care utilization by shaping women's attitudes and choices towards health facility delivery (30, 31). We hypothesized that the negative association between stigma and health facility delivery would be stronger among women who had never been tested for HIV and among women who had relative autonomy in health care decision-making within the household. To assess the robustness of our findings, we conducted several sensitivity analyses. First, because the internal consistency of the social distance index was relatively low, we fitted three multivariable regression models using each of the three individual social distance items as the main explanatory variable. Second, as described above, to ensure that the exposure and outcome were as contemporaneous as possible given the limitations of the data, we restricted our sample to women who gave birth within the two-year window of the survey date (2010-11). Third, we fitted the same multivariable regression models specifying skilled birth attendance as the dependent variable.

Results

Our sample consisted of 4898 women ages 15 to 49 who had heard of HIV and who had given birth between 2007 and 2011. Summary characteristics of the sample are displayed in Table 1. The Cronbach's alpha for the social distance index was 0.58. In our sample, 2064 (42%) women endorsed at least one of the items in the social distance index. Most (3025 [62%]) women utilized a health facility for their most recent childbirth. 1107 (37%) women who had utilized a health facility endorsed at least one of the social distance items, compared to 957 (51%) women who had not utilized a health facility ($\chi 2=99.7415$, $P<0.001$). Multivariable regression suggested a negative and statistically significant association between facility delivery and social distance (AOR=0.86; 95% CI, 0.80-0.94) (Table 2). Expressed in terms of average marginal effects, each additional point on the social distance index was associated with a 2.7 percentage point lower probability of giving birth in a health facility (Table S1). In terms of the other covariates examined, higher levels of schooling, higher wealth index, first pregnancy, and having attended more than four ANC visits increased the likelihood of facility delivery, while rural residence and citing distance as a barrier decreased the likelihood of facility delivery.

When village-level stigma variables were added to the multivariate regression models, the signs of all estimated coefficients remained the same as in the models with only individual-level HIV stigma variables (Table 2). However, the addition of village-level stigma variables greatly reduced the strength of the association between individual-level HIV stigma and facility delivery. Women who lived in villages characterized by high levels of social distancing were much less likely to give birth in a health facility (AOR=0.55; 95% CI, 0.40-0.74). Stated differently, the predicted probability of facility delivery was 0.71 for women who lived in villages where social distancing was at the 25th percentile of intensity and 0.66 for women who lived in villages where social distancing was at the 75th percentile of intensity. When we included village-level education and literacy in the regression models, the estimated associations between village-level social distance and facility delivery remained statistically significant.

In testing for effect modification by prior HIV testing and women's healthcare decision making-power within the household, neither variable had a statistically significant interaction with stigma (Table 3). When we tested the explanatory power of the three social distance items individually, all three items had statistically significant associations with delivery at a health facility. For each item, the inverse association between village-level social distance (e.g., the proportion of persons in the village who would not purchase vegetables from an HIV-positive vendor) and facility delivery was statistically significant and was stronger than the association between the individual-level social distance item and facility delivery (Table S1). The inverse association between willingness to care for a HIV-positive relative and facility delivery was the strongest among the three social distance items (AOR=0.15; 95% CI, 0.06-0.37). When we restricted estimation to the women who gave birth within the two-year window of the survey date, the regression results were qualitatively similar to the primary analysis, with a statistically significant inverse association between village-level social distancing and facility delivery (AOR=0.51; 95% CI, 0.35-0.72). Finally,

village-level social distancing had a similar association with skilled birth attendance as with facility delivery (Table S2).

Discussion

In this population-based study of 4898 women in Uganda, we found that HIV-related stigma, as measured by social distancing, was negatively associated with utilization of skilled childbirth services. The estimated associations were statistically significant, large in magnitude, and robust to potential confounders. Furthermore, the contextual influence of HIV stigma (i.e., measured at the village level) appeared to be stronger than stigma measured at the individual level. We explored some potential reasons for the observed associations but did not identify any statistically significant effect modifiers suggestive of a mechanism. Taken together, our findings have important implications for policy and programmatic work in the field.

Our study confirms the findings of other studies showing that HIV-related stigma has a negative impact on maternal healthcare utilization (30–32, 34). A statistically significant negative association was observed between social distance and facility delivery, which was large in magnitude and robust to several different sensitivity analyses. When we examined specific expressions of social distance separately, willingness to care for a HIV positive relative was the most predictive of facility delivery. Although making comparisons to previous studies can be difficult given different study designs and varied reporting, the magnitude of our estimates using the social distance index can be compared to other, more well-established, risk factors in the literature. For example, the difference in predicted probability of facility delivery for a woman living in a village characterized by a high level of social distancing compared to a low level of social distancing was comparable to living an additional 5-10 km away from a health facility with a midwife or doctor on call for 24 hours (19). Thus, the estimated associations can be considered relatively large in magnitude.

There are several plausible explanations for the observed association between social distancing from HIV-related stigma and health facility delivery, such as the fear of being tested for HIV (30, 34, 71) or the fear of involuntary disclosure to others (31, 34). In Uganda, where PMTCT messaging is strong and HIV-positive women are encouraged to give birth in health facilities, women of unknown serostatus may fear being identified as HIV-positive (irrespective of whether they actually have a positive test result) if they were to do the same (32). Consistent with this hypothesis, a recent study from Kenya showed that lack of serostatus disclosure was negatively associated with facility delivery (39). The impacts of stigma may hold irrespective of women’s actual serostatus: HIV-positive women may avoid delivering at health facilities for fear of involuntary disclosure (72), while women of unknown serostatus may avoid delivering at health facilities for fear of being associated with HIV.

Notably, social distancing measured at the level of the village had an even stronger negative association with facility delivery. Our estimates suggest that women living in villages where HIV is highly stigmatized -- irrespective of their personal attitudes toward persons with HIV -- were more likely to avoid giving birth in health facilities. This novel finding is consistent

with themes that emerged in a qualitative study from Malawi, in which HIV-related stigma in the community was cited as a barrier to PMTCT uptake (72). It is also consistent with the finding of Turan et al. that perceived community discrimination against people with HIV was associated with greater odds of anticipating HIV stigma, which may then reduce maternal health care utilization (38). The stronger association with stigma at the village vs. individual level highlights the importance of understanding stigma as a structural variable rather than simply as a matter of individual belief (42), especially given that health behaviors like utilization of skilled childbirth services may be heavily shaped by structural factors and social norms (73).

While our findings are consistent with the potential explanations detailed above, we found no evidence for effect modification by prior HIV testing history or by health care decision-making power. It is therefore possible that women avoided facility delivery not out of fear of HIV testing but due to fear of involuntary HIV disclosure (in the event of a positive HIV test) or of being labeled as having HIV. However, the lack of effect modification by health care decision-making power also suggests that women were not necessarily making deliberate decisions about their delivery choices based on stigma. Further research is needed to understand the mechanisms through which HIV-related stigma compromises women's reproductive health.

Interpretation of our findings is subject to several limitations. First, we did not have access to participants' known HIV serostatus, so we could not assess the extent to which the associations between stigma and facility delivery differed for HIV-positive vs. HIV-negative women. The Uganda AIDS Indicator Survey (AIS) was implemented in Uganda in 2011, but the AIS could not be used for our analysis because (a) even though AIS participants are tested for HIV, the test results are not communicated to participants prior to the survey so it cannot be definitively shown that the HIV-positive participants are aware that they are HIV-positive (74); and (b) the AIS contains data on HIV-related stigma but does not contain data on women's birth histories. A second limitation is that the DHS questions on HIV-related stigma did not allow us to examine other aspects of HIV stigma, including enacted stigma (58) or internalized stigma (55) (among HIV-positive women), which may affect women's delivery choices differently. The many shortcomings of the only anticipated stigma question in the DHS also prevented us from using it for our analyses, restricting our analyses to the three social distance DHS questions (59, 60). Third, these data are cross-sectional, thereby precluding our ability to draw inferences about the extent to which the observed associations are causal. It is possible, for example, that women's childbirth experiences could have shaped their individual attitudes about persons with HIV -- thereby contaminating our estimated associations between facility delivery and individual-level stigma. However, it is unlikely that that an individual women's childbirth experiences could have shaped attitudes about persons with HIV in her village, so we believe our findings about community-level stigma are unlikely to have been affected by this potential source of bias. In a resource-limited setting with a generalized HIV epidemic and one of the highest total fertility rates in the world, we demonstrate that reducing HIV-related stigma may have important spillover impacts on maternal and child health. Our findings suggest that interventions should target individuals to reduce stigmatizing attitudes, but they should also aim to reduce stigma at the level of the community through the use of structural interventions (75, 76) to encourage an

environment that does not isolate or discriminate against persons with HIV. Specifically, in Uganda where the 2014 HIV and AIDS Prevention and Control Act mandates HIV testing for pregnant women and their partners and permits health care providers to disclose HIV serostatus, increased efforts to reduce HIV-related stigma will be needed to encourage pregnant women not to avoid health facilities for childbirth. Policy-makers should also be aware of potential inadvertent consequences of PMTCT campaigns, such as associating facility delivery and maternal healthcare utilization with HIV infection. As PMTCT efforts are promoted more widely, parallel efforts to reduce HIV-related stigma should be scaled up as well. Tackling HIV-related stigma will help advance the twin goals of lowering maternal and child mortality and HIV prevalence (76–78).

Conclusion

In summary, our study provides new quantitative evidence about the negative association between HIV-related stigma and women's decisions to utilize skilled childbirth services. Our findings reinforce the urgency to reduce HIV-related stigma, particularly at a structural level, in settings where HIV is prevalent and skilled childbirth services may inadvertently take on social meaning. The benefits of a non-stigmatizing environment on the use of skilled childbirth services and maternal mortality are essential for both HIV-positive and HIV-negative women.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Summary characteristics of the sample of women ages 15 to 49

	N (%) or Mean (SD)
Dependent variable	
Delivery at a health facility[a]	3025 (62)
Independent variables	
Accepting attitudes for all HIV stigma questions	1272 (26)
Social distance index[b]	0.66 (0.90)
Female teacher infected with HIV should not be allowed to teach	1236 (25)
Not willing to care for relative with HIV	541 (11)
Would not buy vegetables from vendor with HIV	1448 (30)
Explanatory variables	
Age (years)	28.69 (7.12)
Married or living with partner	4123 (84)
Education	
No formal schooling	855 (17)
Primary school	2844 (58)
Secondary school	966 (20)
Higher education	233 (5)
Residence	
Urban	1184 (24)
Rural	3714 (76)
Wealth index[c]	
Poorest	1190 (24)
Poorer	929 (19)
Middle	839 (17)
Less poor	793 (16)
Least poor	1147 (23)
Religion	
Catholic	2132 (44)
Protestant	1377 (28)
Muslim	685 (14)
Pentecostal	565 (12)
Seventh Day Adventist	87 (2)
Other	52 (1)
First pregnancy	808 (16)
Four or more antenatal visits	2554 (52)
Distance a big barrier to health care facility[d]	2126 (43)
Total number of women	4898

SD Standard deviation

[a]Facility delivery includes delivery at all types of health facilities as indicated in the DHS survey.

[b]The social distance index was generated by summing the total number of responses to three questions about preferences for social distance from persons with HIV, with responses indicating a negative view of persons with HIV coded to equal 1. The three questions were, “Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?” “If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?” “In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?” The scale ranges from 1 to 3, with higher values indicating a greater degree of stigma.

[c]The household asset wealth index was calculated by applying principal components analysis to a set of household possessions and housing characteristics. The index is then defined as the first principal component and used to categorize participants into quintiles of household assest wealth. Further details on the construction of the asset index can be found in Filmer and Pritchett (62).

[d]Distance as a barrier to health facility delivery was a dichotomous variable based on a question about the participant’s perceived barriers to getting medical advice or treatment. Responses indicating distance to the health facility is a “big problem” are coded to equal 1.

Table 2.

Social distance as correlates of health facility delivery

Variables	individual-level social distance[a] only		individual- and community-level social distance	
	AOR	[95% CI]	AOR	[95% CI]
HIV-related stigma				
Individual-level stigma	0.863***	[0.80,0.94]	0.915*	[0.85,0.99]
Village-level stigma[b]			0.546***	[0.40,0.74]
Age (years)	0.999	[0.99,1.01]	0.998	[0.99,1.01]
Marital status				
Never married, widowed, divorced, or separated	Ref		Ref	
Married or living with partner	0.949	[0.79,1.15]	0.969	[0.80,1.17]
Education				
No formal schooling	Ref		Ref	
Primary school	1.325**	[1.10,1.60]	1.274*	[1.05,1.54]
Secondary school	2.168***	[1.63,2.88]	2.045***	[1.54,2.72]
Higher education	6.694***	[3.35,13.39]	6.372***	[3.20,12.69]
Residence				
Urban	Ref		Ref	
Rural	0.338***	[0.24,0.48]	0.375***	[0.26,0.54]
Region of residence				
Kampala	Ref		Ref	
Central 1	0.794	[0.46,1.38]	0.815	[0.47,1.42]
Central 2	1.413	[0.81,2.46]	1.544	[0.89,2.69]
East Central	1.571	[0.89,2.78]	1.746	[0.98,3.11]
Eastern	0.958	[0.53,1.73]	1.020	[0.56,1.85]
Northern	1.286	[0.72,2.30]	1.108	[0.62,1.99]
Karamoja	0.479*	[0.25,0.93]	0.736	[0.38,1.42]
West Nile	1.427	[0.80,2.54]	1.531	[0.86,2.73]
Western	0.893	[0.49,1.62]	0.915	[0.51,1.65]
Southwestern	0.579	[0.32,1.04]	0.602	[0.33,1.08]
Wealth index[c]				
Poorest	Ref		Ref	
Poorer	1.393**	[1.13,1.72]	1.360**	[1.10,1.68]
Middle	1.454**	[1.15,1.84]	1.418**	[1.12,1.79]
Less poor	1.552***	[1.21,2.00]	1.491**	[1.16,1.91]
Least poor	3.335***	[2.37,4.68]	3.139***	[2.23,4.42]
First pregnancy	1.633***	[1.30,2.05]	1.657***	[1.32,2.08]
Religion				

Variables	individual-level social distance[a] only		individual- and community-level social distance	
	AOR	[95% CI]	AOR	[95% CI]
Catholic	Ref		Ref	
Protestant	1.038	[0.85,1.26]	1.030	[0.85,1.25]
Muslim	1.148	[0.88,1.50]	1.149	[0.88,1.50]
Pentecostal	1.026	[0.81,1.31]	1.003	[0.79,1.27]
Seventh Day Adventist	1.673	[0.95,2.94]	1.682	[0.97,2.93]
Other	1.006	[0.51,2.00]	0.996	[0.49,2.02]
ANC visits				
less than 4 antenatal visits	Ref		Ref	
4+ antenatal visits	1.778***	[1.57,2.02]	1.780***	[1.57,2.02]
Distance a barrier to health facility				
Distance not a problem or not a big problem	Ref		Ref	
Distance a big problem	0.844*	[0.73,0.98]	0.860*	[0.74,1.00]
Number of women	4898		4897	

AOR adjusted odds ratio, *CI* confidence interval

$p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

[a]The social distance index was generated by summing the total number of responses to three questions about preferences for social distance from persons with HIV, with responses indicating a negative view of persons with HIV coded to equal 1. The three questions were, “Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?” “If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?” “In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?” The scale ranges from 1 to 3, with higher values indicating a greater degree of stigma.

[b]Village-level stigma for each woman was generated by calculating the average level of social distance stigma in the woman’s village (while excluding the participant’s own stigma score from the calculation).

[c]The household asset wealth index was calculated by applying principal components analysis to a set of household possessions and housing characteristics. The index is then defined as the first principal component and used to categorize participants into quintiles of household assest wealth. Further details on the construction of the asset index can be found in Filmer and Pritchett (62).

Table 3.

Prior HIV testing and health care decision-making power as potential moderators of the effect of social distance on health facility delivery

`	Social distance[a]	
	AOR	**[95% CI]**
Prior HIV testing		
Association between facility delivery and individual-level stigma		
Among women who have had an HIV test (N=4286)	0.95	[0.87,1.03]
Among women who have never had an HIV test (N=611)	0.98	[0.80,1.21]
Interaction term:	z=−0.14, P=0.892	
Association between facility delivery and community-level stigma		
Among women who have had an HIV test (N=4286)	0.55	[0.42,0.72]
Among women who have never had an HIV test (N=611)	0.51	[0.29,0.90]
Interaction term:	z=0.02, P=0.983	
Health care decision-making power (married or partnered women only)[b]		
Association between facility delivery and individual-level stigma		
Among women who do not make their own decisions (N=3100)	0.91	[0.82,1.00]
Among women who make their own decisions (N=958)	0.95	[0.76,1.15]
Interaction term:	z=−0.06, P=0.952	
Association between facility delivery and community-level stigma		
Among women who do not make their own decisions (N=3100)	0.57	[0.39.0.83]
Among women who make their own decisions (N=958)	0.51	[0.31,0.85]
Interaction term:	z=−0.33, P=0.741	

AOR adjusted odds ratio, *CI* confidence interval

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

[a]The social distance index was generated by summing the total number of responses to three questions about preferences for social distance from persons with HIV, with responses indicating a negative view of persons with HIV coded to equal 1. The three questions were, “Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?” “If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?” “In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?” The scale ranges from 1 to 3, with higher values indicating a greater degree of stigma.

[b]Health care decision-making power was assessed by question in DHS survey for married and partnered women about how health care decisions were made in household. A binary variable was generated by coding “1” for women who indicated they make their own health care decisions.