

Special Edition
"HIV-related Stigma across
the Lifespan"

Research

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Relationship between Knowledge of Someone Infected With HIV/AIDS and HIV Stigma: A Moderated Mediation Model of HIV Knowledge, Gender and HIV Test Uptake

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ABSTRACT

Introduction: Sub-Saharan Africa has been particularly impacted by the HIV epidemic with an estimated 24.7 million out of 36.9 million people living with HIV/AIDS (PLWH). Nigeria has the second highest number of people living with HIV/AIDS in the world. Despite various prevention efforts, HIV related knowledge and HIV testing remain low while stigmatizing attitudes for PLWH are still high. Previous research has shown that people who know someone with HIV tend to have lower stigmatizing attitudes; however the role that HIV related knowledge plays in this relationship has not been examined.

Aim: The purpose of this study is to examine the relationship between knowledge of someone infected by HIV/AIDS (KSIH) and HIV stigma, and whether HIV related knowledge mediates this relationship. We further examined the moderating role of gender and HIV test uptake.

Methodology: The current study utilized data from the 2013 Nigeria Demographic Health Survey, a nationally representative cross-sectional survey designed to obtain data on key health related indicators. Descriptive statistics and vicariate correlations were first conducted. Structural equation modeling was then used to conduct mediation and moderated mediation analyses.

Results: Results showed that HIV related knowledge mediated the relationship between knowledge of someone infected with HIV and HIV stigma. Moderated mediation results revealed that gender the indirect effect of HIV knowledge of the relationship between KSIH and HIV stigma, with the conditional effect being stronger for women. Additionally, HIV test uptake moderated the relationship between KSIH and HIV stigma, with the effect being stronger among those previously tested for HIV.

Conclusion: This is the first study to show the mediating role of HIV related knowledge in the relationship between KSIH and HIV stigma in addition to the effect of various social demographic factors. Further, the study highlights clinical and outreach implications of including anti-stigma messages as part of HIV testing counseling and campaigns.

KEYWORDS: HIV/AIDS; Stigma; Knowledge; Testing; NDHS; Nigeria.

INTRODUCTION

Sub-Saharan Africa has been disproportionately impacted by the HIV/AIDS epidemic with about 70% of all new infections worldwide.¹ Nigeria, with over 3.4 million people living with HIV/AIDS (PLWH) has the second highest number of PLWH in the world.^{1,2} HIV/AIDS is the third cause of death in Nigeria, responsible for 9% of all deaths.³

Similar to other African countries, the HIV epidemic in Nigeria is generalized, with wide variation in prevalence within the country. While a general decline in the incidence of HIV/AIDS has been reported from 270,667 in 2010 to 227,518 in 2014, the numbers are still high.² Some of the main drivers for the HIV epidemic in Nigeria include: (a) HIV stigma, (b) HIV knowledge, (c) HIV test uptake, (d) sexual behavior, and socio-demographic factors including knowledge of someone infected with HIV/AIDS, gender and ethnicity.

HIV stigma is defined as the negative feelings and behaviors towards HIV infected persons, groups, and communities that are characterized by high rates of HIV infections.⁴ Stigma associated with HIV is troubling because it creates an environment where individuals avoid testing, engage in risky sexual behavior, and potentially lose social support.^{5,6} Babalola found that in Nigeria, HIV stigma at the community level significantly influenced men's decision to get tested.⁶ In many Nigerian villages, individual, family and community lives are closely intertwined, thus having a condition that is stigmatized can have far reaching effects on the individuals and his/her family. PLWH may be isolated within their family or hidden away from visitors.⁷ While there is well documented literature indicating that has a negative effect on HIV/AIDS treatment and care, Okoror and colleagues in a qualitative study involving 35 PLWH in southwest Nigeria found that anticipated stigma from the from the physical manifestation of HIV/AIDS, such as weight loss, was a motivator for PLWH adherence to antiretroviral therapy.⁸

HIV knowledge is the amount of correct information a person knows about HIV, including transmission, testing, and awareness of myths.⁹ Increasing HIV knowledge offers the first step in HIV/AIDS prevention as individuals with higher HIV knowledge are more likely to protect themselves from becoming infected, and have lower HIV stigma.¹⁰ The level of HIV knowledge in Nigeria is low despite the implementation of various programs aimed at increasing the knowledge.¹¹⁻¹³ Low HIV knowledge extends to healthcare professionals some who refuse to treat and/or care for PLWH.¹⁴⁻¹⁶ The 2013 Nigeria National Demographic Health Survey results indicate that only 26% of women and 37% of men have comprehensive knowledge about AIDS.¹⁷

HIV/AIDS testing is an important aspect of HIV risk management. Those who are HIV positive can get treatment that can extend their lifespan and keep them healthy, while avoiding behaviors that put them at risk of spreading the disease.¹⁸ Despite efforts to increase access to HIV/AIDS testing including an increase in the number of testing facilities from 2,391 in 2012, to 7,075 in 2013,¹⁹ HIV test uptake remains low. The most recent report on HIV/AIDS test uptake in Nigeria indicate that 23.5% of men and 29.2% of women have taken an HIV test in their life time, and only 63% and 68% of women and men respectively received their results.²

Risky sexual behavior including early sexual debut, having multiple sexual partners, having sex while under the in-

fluence of alcohol/drugs, and unprotected sexual behaviors is one of the major ways of contracting HIV/AIDS.^{18,20} Literature shows that there is high prevalence of unprotected sex especially among high risk populations in Nigeria including men who have sex with men,²¹ and sex workers.²²

Knowledge of someone with HIV/AIDS is an important predictor of HIV risk behavior,^{23,24} HIV stigma^{25,26} and HIV test uptake.²⁷ A pooled analysis involving adult men from Kenya, Zambia and Uganda found that men who knew someone with HIV/AIDS were more likely to reduce their risk behaviors.²⁸ Similar results have been reported in population-based studies in Zimbabwe²⁴ and South Africa.²³ Myer et al²⁹ found that negative attitudes towards both sexuality and childbearing for women living with HIV were persistently associated with not knowing someone infected with HIV.

In terms of gender, women in Nigeria have consistently reported higher incidence of HIV than men; in 2014, women made up of 54.3% new HIV infections.² Gender disparity is often attributed to a variety of factors including biology, education, socioeconomic status, and low bargaining power to engage in preventative behaviors.^{30,31} Some Nigerians still view HIV as a social problem resulting from immorality. Smith³² noted that in Nigeria, the dominant religious discourse about HIV/AIDS has been that it is a scourge visited by God on a society that has turned its back on the church.

While previous research has shown that people who know someone with HIV tend to have lower stigmatizing attitudes,^{25,26} the role that HIV knowledge plays in this relationship has not been examined. The purpose of this study is to examine the relationship between knowledge of someone infected by HIV/AIDS and HIV stigma, and whether HIV knowledge mediates this relationship. Further, the moderating role of gender and HIV test uptake will be examined. Specifically, the hypotheses for the current study are as follows:

Hypothesis 1. HIV knowledge will mediate the relationship between knowledge of someone infected with HIV/AIDS and HIV stigma.

Hypothesis 2. Gender will moderate the strength of the mediated relationship between knowledge of someone infected with HIV/AIDS and HIV stigma.

Hypothesis 3. (a) HIV test uptake will moderate the strength of the mediated relationship between knowledge of someone infected with HIV/AIDS and HIV stigma, such that the mediated relationship will be stronger for those previously tested than those who had never been tested. (b) The moderation of HIV test uptake will differ by gender.

METHODOLOGY

Dataset, Study Design, and Participants

The current study is based on data collected from a nationally

representative survey of Nigerians designed to obtain national and sub-national data on key health related indicators in 2013. Details of the design and data collection methods used have been published previously.¹⁷ The 2013 Nigeria Demographic Health Survey is a cross-sectional representative survey designed to obtain national and sub-national data on key health related indicators. The current study utilized data collected on knowledge, attitudes, and behaviors related to HIV/AIDS and socio-economic and demographic factors. A total of 38,948 women and 17,359 men were interviewed. The current study is restricted to 34,520 women and 16,150 men with complete data on the main variables of interest in the study i.e., HIV related stigma and knowledge of someone infected with HIV/AIDS.

Variables/Measures

HIV stigma served as the dependent variable and was measured using items corresponding to ways by which HIV stigma manifests including having negative feelings toward people with AIDS, blaming/shaming persons with AIDS, and avoidance people with AIDS⁴ in addition to secrecy and denial.³³ For example, “Would you buy fresh vegetables from a vendor if you knew that this person had the AIDS virus?” and “People with the AIDS virus should be blamed for bringing the disease into the community.” Participants’ responses were coded such that the most stigmatizing response had the highest number and least stigmatizing response lowest. A summary index of HIV related stigma was constructed, by counting the number of stigmatizing responses each person gave. Each respondent had a scale of 0-6, with 6 representing those with the most stigmatizing expressions.^{4,26,33} The Cronach’s alpha for this scale was 0.62.

Knowledge of someone infected by HIV/AIDS (KSIH) was the independent variable. This variable was ascertained using the question “Do you know someone who has, or is suspected of having HIV.” Responses were coded as 0- No and 1- Yes.

HIV knowledge was the mediator. This variable was created using recommendations by Measures Demographic Health Survey; whereby comprehensive knowledge is defined as correctly identifying (a) the two major ways of preventing the sexual transmission of HIV (i.e., using condoms and limiting sex to one faithful, uninfected partner), (b) rejecting common local misconceptions about HIV transmission (i.e., HIV is transmitted by mosquitos, one can get HIV by sharing food, and one can get HIV through witchcraft or supernatural powers), and (c) knowledge that a healthy-looking person can have HIV.¹⁷ A summary index of HIV knowledge was constructed with a scale of 0-6, with 6 representing those with the most HIV knowledge. The Cronach’s alpha for this scale was 0.56.

Gender and HIV test uptake were the moderators. In the demographics, participants indicated whether they were male (coded as 0) or female (coded as 1). HIV test uptake served as an additional moderator and was assessed using the question: Have you ever been tested for HIV/AIDS. Participants provided

yes (coded as 1) or no (coded as 0) responses. Other variables previously associated with HIV-related stigma including age, marital status, ethnicity, religion, education and the number of sexual partners in previous 12 months were entered as covariates.

Analysis Plan

Descriptive statistics and vicariate correlations were first conducted. Hypotheses 1 through 3 were tested using Structural Equation Modeling (SEM) utilizing procedures suggested by Preacher et al.³⁴ In all the analyses, sampling weights were utilized to ensure their presentativeness of the survey results.¹⁹ All statistical analyses were performed using STATA 12.³⁵

RESULTS

Descriptive

Table 1 presents the descriptive characteristics of the participants and vicariate correlations between the study variables. A majority of the participants were female, knew a PLWH, had never been tested for HIV/AIDS, were currently married, identified Islam as their religion and had one sexual partner in the past 12 months. Most factors had significant correlations.

Mediation

Hypothesis 1 was tested using Baron and Kenny causal steps³⁶, where by mediation is established when: (a) there is a significant relationship between the independent and mediating variable; (b) The independent and dependent variables are significantly related; (c) The mediator and dependent variable must be significantly related; and (d) The relationship between the independent variable and dependent variable should be non-significant or weaker when the mediator is introduced. Age, ethnicity, marital status, education, religion, and number of sex partners in the last 12 months were entered as control variables.

Table 2 shows that the relationship between the independent variable (KSIH) and mediator (HIV knowledge) was significant (Coeff. 0.180, $p < 0.01$), thus satisfying condition (a) In accordance with condition (b) KSIH significantly predicted the HIV stigma (Coeff. -0.444, $p < 0.01$) in the absence of HIV knowledge. The relationship between KSIH and HIV related stigma became weaker when the mediator (HIV knowledge) was added (Coeff. -0.409, $p < 0.01$), indicating that HIV knowledge was a partial mediator thus satisfying condition. The relationship between the HIV knowledge and HIV related stigma was significant in accordance with condition c (Coeff. -0.194, $p < 0.01$). Finally, the indirect effect of KSIH that passes through HIV knowledge was statistically significant (-0.035, $p < 0.01$). To further assess the significance of the mediation, Sobel’s test for indirect effects^{32,37} was conducted and produced significant results (Sobel=-15.80, $p < 0.01$).

	Mean (SD) or % ^a	1	2	3	4	5	6	7	8	9	10
1. HIV stigma	3.81 (1.65)	-									
2. HIV knowledge	4.51 (1.43)	-0.25**	-								
3. Knows PLWH		-0.15**	0.09**	-							
Yes	82.1										
No	17.9										
4. HIV test uptake		0.30**	-0.25**	-0.17**	-						
Tested	29.8										
Knows testing center	38.7										
Doesn't know center	31.5										
5. Gender		-0.01	-0.09**	-0.06**	0.00	-					
Male	31.8										
Female	68.2										
6. Age	29.10 (9.73)	-0.06**	0.04**	0.04**	-0.13**	-0.02**	-				
7. Marital Status		0.02**	-0.03**	0.03**	-0.07**	0.22**	0.58**	-			
Never married	31.9										
Currently married	64.3										
Formerly married	3.7										
8. Ethnicity		-0.14**	0.01*	0.12**	-0.11**	-0.04**	-0.02**	-0.03**	-		
Igbo/Ibo	15.1										
Hausa/Fulani	33.1										
Yoruba	14.6										
Ijaw/Izon	1.8										
Other	35.4										
9. Religion		0.19**	-0.04**	-0.07**	0.31**	0.00	0.01*	0.16**	-0.08**	-	
Catholic	11.9										
Other Christian	36.8										
Islam	50.1										
Other	1.3										
10. No. sex partners		-0.03**	0.04**	0.05**	-0.10*	-0.03**	0.33**	0.36**	0.02**	0.06**	-
None	25.4										
One	69.5										
Two Plus	5.0										
Missing	0.2										

^a Mean and Standard deviation for continuous variable and Percentages for categorical variables; *p<0.05 **p<0.01; All values are adjusted for weights.

Table 1: Descriptive statistics and bivariate correlations.

Moderated Mediation by Gender

Hypothesis 2 was tested by examining the conditional indirect effect of KSIH on HIV stigma through HIV knowledge as well as the direct effect of gender on the relationship between KSIH and HIV stigma. The first part of this analysis is the essence of moderated mediation³² and establishes whether the strength of the mediation *via* HIV knowledge differs by gender. Moderated mediation is demonstrated when the conditional indirect effect of KSIH on HIV stigma, *via* HIV knowledge differs by gender. Re-

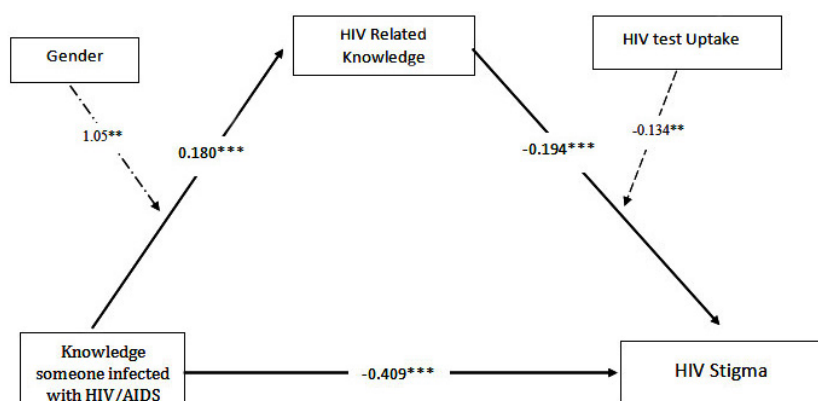
sults showed that there was a statistically significant interaction between KSIH and gender in the model with HIV knowledge (mediator) as the outcome (Coeff=1.05, *p*<.01), indicating that there is moderation of the indirect effect by gender (Figure 1).

To validate findings of moderated mediation effect, we examined the magnitude of the conditional indirect effect of KSIH *via* HIV knowledge for men and women, using bootstrap method with 5,000 samples. The conditional indirect effect of KSIH was stronger and significant among women

	Outcome: HIV related Knowledge	Outcome: HIV stigma	
		Total Effect	Direct Effect
HIV related knowledge	-	-	-0.194***
Knows PLWH	0.180***	-0.444***	-0.409***
Age	0.011***	-0.013***	-0.011***
Education	0.227***	-0.209***	-0.165***
Marital (Re: Never Married)			
Currently married	-0.131**	0.052	0.027
Formerly married	-0.006	-0.103	-0.105*
Ethnicity (Re: Agbo/Ibo)			
Hausa/Fulani	0.404***	0.112	0.190**
Yoruba	0.126**	0.401***	0.426***
Ijaw/Izon	0.156*	-0.248**	-0.218**
Other	0.146***	-0.310***	-0.281***
Religion (Re: Catholic)			
Other Christian	0.031	0.089*	0.095*
Muslim	0.100	0.201**	0.220***
Other	-0.136	0.322*	0.296**
Employment (Re: Unemployed)			
Professional/Technical	0.102**	-0.299***	-0.279***
Skilled/Clerical/Sales	-0.033	0.039	0.032
Unskilled/Agriculture	-0.255***	0.377***	0.328***
Other	0.001	-0.001	0.000
No. of sexual partners in last 12 months (Re: None)			
One	0.240***	-0.153***	-0.107***
Two Plus	0.295***	-0.027	0.030

Note: Values adjusted for weights. * $p < .05$; ** $p < 0.01$; *** $p < 0.001$

Table 2: Regression analysis results for testing mediation.



Note: Values adjusted for weights. * $p < .05$; ** $p < 0.01$; *** $p < 0.001$

Figure 1: Path coefficients for the moderated mediation of the relationship knowledge between of someone infected with HIV/AIDS and HIV stigma.

(coefficient=0.045, 95%CI [0.058-0.031] $p < .01$), while for men the effect was much smaller and insignificant (coefficient=0.019, 95%CI [-0.042-0.005], $p < .12$; Table 3).

Moderated Mediation by HIV Test-Uptake

Results show that there was a statistically significant interac-

tion between HIV knowledge and HIV test uptake in model with both men and women (Coeff= -0.134, $p < 0.01$; Figure 1) and when women (Coeff= -0.753, $p < 0.01$) and men (Coeff= -0.1212, $p < 0.01$) were analyzed separately. This indicates that there was moderation of the indirect effect by level of HIV test uptake in all the three models thus satisfying hypothesis 3.

	Combined Women & Men			Women			Men		
	Coef.	BC 95%	Conf.	Coef.	BC 95%	Conf.	Coef.	BC 95%	Conf.
Gender									
Men	0.019	-0.042	0.005						
Women	0.045***	0.058	0.031						
Ever been tested for HIV									
Yes	-0.049***	-0.060	-0.039	-0.051***	-0.063	-0.040	-0.036**	-0.062	-0.010
No	-0.029***	-0.035	-0.022	-0.031***	-0.039	-0.023	-0.020**	-0.034	-0.006

Note: Values adjusted for weights. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 3: Moderated mediation results for gender and HIV test uptake.

We further examined the magnitude of the conditional indirect effect at different levels of HIV test uptake for (a) both men and women combined and (b) separately. In all the three models, the conditional indirect effect of HIV test uptake on the relationship between KSIH and HIV related stigma through HIV knowledge was strong among those among who had been tested for HIV/AIDS compared to those who had not been tested (Table 3), with the strongest effect being among women who had been tested for HIV/AIDS (Coeff. = -0.051, 95% CI (-0.063, -0.040), $p < 0.001$).

DISCUSSION

The results of this study show that knowledge of someone infected with HIV/AIDS (KSIH) leads to significant decrease in HIV stigma with association being mediated by HIV knowledge. Additionally, the relationship between KSIH and HIV knowledge is moderated by gender while the relationship between HIV knowledge and HIV stigma was moderated by HIV test uptake (Figure 1).

Consistent with previous research, knowledge of someone with HIV is associated with lower HIV stigmatizing attitudes.^{6,26} Further, the current study is the first to establish that the relationship between knowledge of someone infected with HIV and HIV stigma was mediated by HIV knowledge. The mediating effect of HIV knowledge has important implications for HIV/AIDS prevention efforts, including reduction of stigma. Knowledge of someone infected with HIV/AIDS, especially if the individual is a close associate, may motivate individuals to learn more about the disease, thereby increasing their HIV knowledge and subsequently reduce stigmatization attitudes. Current efforts aimed at increasing HIV knowledge in Nigeria need to be enhanced and targeted to highlight the personal nature of the disease. Additionally, given that culture plays a significant role in the manifestation of stigmatizing attitudes in Nigeria³⁸; HIV prevention strategies should incorporate the cultural aspects of the given community. In the current study, ethnic differences were found in the expression of HIV stigma (See Table 2). For instance, compared to the Igbo/Ibo, Yoruba were significantly more likely to express high stigmatizing attitudes (Coef. 0.426, $p < 0.01$).

The indirect relationship between KSIH and HIV stigma through HIV knowledge was significant and higher among women; however for men the effect was insignificant. This concurs with previous literature indicating that the relationship between knowledge of someone infected with HIV and stigmatizing attitudes differs by gender.²⁶ The moderation of the indirect effect by gender reiterates the importance of having targeted HIV prevention programs and support Babalola's conclusion that HIV prevention "efforts should target social structures in order to change negative social norms".^{6(p.769)}

HIV test uptake moderated the indirect association between knowledge of someone infected with HIV and HIV stigma (via HIV knowledge).³⁹ The effect was higher among men and women who had previously been tested when compared to those who had never been tested. In other words, for men and women, the indirect effect of knowledge of someone infected with HIV (through HIV knowledge) had a greater impact in reducing HIV related stigma among those who had been previously tested for HIV than those who had never been tested.⁴⁰ This might suggest that knowledge of someone with HIV provides an opportunity for individuals to gain knowledge about HIV/AIDS, thereby increasing their likelihood for testing and subsequently reduce stigmatizing attitudes about HIV/AIDS.

LIMITATIONS AND CONCLUSION

Some of the limitations of the current study include the cross-sectional design which limits the ability to establish causality in the associations established. Further, there is a possibility that these results are subject to participation bias, though response rates were generally high.¹⁶ Additionally, we only utilized participants with complete data on our major variables. Lastly, the measure of stigma was limited to the available data, which addressed only accepting attitudes, avoidance, shaming and blaming.

Despite these limitations, the findings contribute to the body of literature by being among one of the first studies to identify the mediating effect of the relationship between knowledge of someone infected with HIV and stigmatizing attitudes. The moderating effect of gender reiterates the importance of taking

into consideration gender in the design and implementation of programs that aim to ameliorate stigma. In addition, social-cultural factors including ethnicity and religion should be considered in such programs. Lastly, the finding that individuals who had previously been tested for HIV were likely to express lower stigmatizing attitudes confirms the importance of HIV/AIDS test uptake as a possible HIV stigma prevention method. These findings also have clinical and outreach implications regarding the importance of including anti-stigma messages as part of HIV testing counseling and campaigns.

The surveys and informed consent were performed by DHS and Nigeria Information regarding study design and data collection has been previously published and can be obtained from the DHS website. Below is the full citation of the report:

- National Population Commission (NPC) [Nigeria] and ICF International. (2014). Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONSENT

Current study is based on a secondary data analysis of completely de-identified data obtained from: The Demographic and Health Surveys (DHS) program ICF International .

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