MATHEWS

Research Article

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Men's Adherence to HIV Testing in Ghana: The Role of Educational Level and Urban-Rural Dynamics

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ABSTRACT

Background: Globally, HIV transmission is ongoing in all countries making new infections hit around 1.5 million annually. Some evidence suggests that when people know their HIV status, they may be more likely to take steps to remain free from HIV. **Objective:** Based on this, the study aimed to investigate how educational level and urban-rural dynamics play a role in men's adherence to HIV testing in Ghana. **Methods:** The 2022 DHS survey took place in Ghana and was conducted cross-sectionally with quantitative approach. Participants enrolled were 7,263 men age 15–59 years and 7,044 were successfully interviewed, yielding a response rate of 97%. The main fieldwork commenced on 17th October 2022 and ended on 14th of January, 2023. In all, three (3) months were used to gather the data. Socio-demographic characteristics of participants were: age; date of birth; duration of residency; previous residency; literacy; education; access to media; mobile phone use; use of the internet and place of residence. The questionnaire used to gather the data was composed of HIV: knowledge of HIV, of ways of transmission, sources of information, behaviour to avoid STIs and HIV, stigma, history of HIV testing. Results: The study found primary education to be significantly related to men's adherence to HIV testing at p<0.001, (OR=2.169, 95%CI ([1.689-2.786]). Secondary education was significant at p=0.001, (OR=3.877, 95%CI [3.221-4.666]). Higher education was significant at p=0.001, (OR=8.998, 95%CI [6.470-12.513]). Residing in rural setting was significant at p<0.001, (OR=0.367, 95%CI ([0.310-0.433]). **Conclusion:** Adherence to HIV testing among rural men in the study was low. This was attributable to urban-rural dynamics. Based on this, the study recommends that HIV testing services be made readily available in rural setting to empower men get tested regularly.

Keywords: Adherence, Educational Level, HIV Testing, Men, Urban-Rural Dynamics.

INTRODUCTION

Globally, HIV transmission is ongoing in all countries making new infections hit around 1.5 million annually [1-4]. To date, HIV has claimed an estimated 42.3 million lives worldwide [3]. In 2023, it was noted that

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approximately 86% of people living with HIV knew their HIV status globally [1] while about 5.4 million people did not know they had HIV and still needed access to HIV testing services [1]. Universally, knowledge of HIV status is lower among men and boys, and antiretroviral therapy coverage of men lags behind that of women [5]. Testing for HIV remains the critical first step for linkage into the HIV cascade of care [6-8]. However, HIV testing is normally affected by stigma, fear of a positive result, low awareness of HIV risk and how to navigate the healthcare system, absence of discreet testing environments and limited knowledge about testing and prevention [7,8]. Aside that, facilitators such as social support, knowledge of the effectiveness of treatment, education, awareness campaigns, convenient access, trust in healthcare providers and access to healthcare facilities also serve as militating factors to HIV testing [7,8]. Some evidence suggests that when people know their HIV status, they may be more likely to take steps to remain free from HIV [1,3,9]. It is clear that low HIV testing rates among men endanger their own health and increase their risk of unknowingly transmitting HIV to their sexual partners [10,11]. HIV testing is the gateway to lifesaving treatment for people living with HIV and a means to reinforce prevention among people who are free from HIV. This can decrease morbidity, mortality and risk of transmission, and contribute to people living longer and healthier lives [1,10,12].

Early testing allows for timely medical intervention and treatment, improving health outcomes and extending life [13,14]. Knowing one's HIV status is crucial for preventing virus transmission, enabling individuals to take precautions and protect their partners [10,15,16]. HIV testing connects individuals to care, support, and resources, facilitating access to healthcare professionals and support networks [5,17-19]. World Health Organisation (WHO) recommends that people at increased risk of acquiring HIV should seek testing and treatment. The WHO's 2022–2030 global health sector strategy on HIV aims to reduce HIV infections from 1.5 million in 2020 to 335 000 by 2030, and deaths from 680 000 in 2020 to under 240 000 in 2030 [20,21].

In general, HIV testing rates and early detection tend to be lower in rural areas compared to urban areas [22-24]. Urban areas often show higher HIV prevalence and better access to testing compared to rural areas [25-28], HIV/AIDS has long been viewed as an urban problem, while rural areas are often believed to be free of the pandemic [22,26]. This assumption is false, as HIV/AIDS is no longer restricted to urban centers [26]. Although most attention has been paid to urban areas, the number of people living with HIV/AIDS may, in absolute numbers, be greater in rural areas [22,25,26]. This is in part due to the fact that many of the countries that are most affected by HIV/AIDS are primarily rural [26,27]. In addition to other consequences of HIV/AIDS, the pandemic places strain on sustainable agriculture, which many rural households, especially those in developing countries, rely upon for food consumption [26,29,30]. HIV/AIDS has an additional impact on rural areas because many HIV+ urban dwellers choose to return to their village of origin when they become ill, placing a greater burden on rural areas to care for the increasing numbers of people living with HIV/AIDS [26,27,31].

This destructive disease (HIV) is not only a life-threatening condition, but it also affects economic and human development, while exacerbating the cycle of poverty [32]. Despite no cure or vaccine being available, education has proven to be among the most cost-effective ways to prevent the spread of this disease [32]. In fact, education can save lives, by providing individuals with the knowledge of understanding of why they should access HIV testing to know their HIV status and if the results are positive or negative it will help them to reduce the spread [32,33]. Testing and diagnostics are critical components of the United Nations' 95-95-95 targets to end the HIV epidemic [34]. HIV testing services and infant diagnosis support the first target of 95% of people living with HIV to know their HIV status [34,35].

Although Ghana has made significant strides in increasing HIV testing rates, with national HIV status awareness rising from 43% in 2014 to 72% in 2023 [36-38]. However, there is, therefore, a greater gap in meeting all three 95–95–95 targets among men in Ghana [36,39,40]. Hence, a concern. Based on this, the study aimed at investigating how educational level and urban-rural dynamics play a role in men's adherence to HIV testing in Ghana by specifically: 1) examining if educational level plays a role in men's adherence to HIV testing in Ghana; 2) analysing whether urban-rural dynamics play a role in men's adherence to HIV testing in Ghana. The study further hypothesised that there is no statistically significant relationship between level of education, urban-rural dynamics and men's adherence to HIV testing in Ghana.

METHODS

Data Source

Data for the study were extracted from the 2022 GDHS. These datasets were carefully studied and data revolving these variables (educational level, urban-rural dynamics and

HIV testing) were carefully extracted for analysis.

Sample Design

For the 2022 GDHS survey to achieve its objectives, a national stratified representative sample of 18,450 households was selected in 618 clusters, which resulted in 15,014 interviewed women age 15–49 and 7,044 interviewed men age 15–59 (in one of every two households selected). The sampling frame used for the 2022 GDHS is the updated frame prepared by GSS based on the 2021 Population and Housing Census.

Sampling Procedure

The sampling procedure used in 2022 GDHS is a stratified two-stage cluster sampling, designed to yield representative results at the national level, for urban and rural areas, and for each of the 16 regions, for most DHS indicators. Stage 1, 618 target clusters were selected from the sampling frame using probability proportional to size (PPS) for urban and rural areas in each region. Then the target number of clusters was selected with equal probability, systematic random sampling of the clusters selected in the first phase, for the urban and rural areas in each region. Stage 2, after selection of the clusters, a household listing and map updating operation was carried out in all the selected clusters, to develop a list of all the households in the cluster. The list served as a sampling frame for selection of the household sample. The household listing was carried out using tablet computers, with software provided by The DHS Program. A fixed number of 30 households in each cluster was randomly selected from the list for interview.

Inclusive and Exclusive

The inclusive criteria were a man who lives in Ghana and age 15–59years while men < 15years and 60years and older were excluded from the survey.

Measures

Independent Variables

The independent variables (IVs) in the study were educational level and urban-rural dynamics. These factors were carefully chosen to assess their influence on men's adherence to HIV testing in Ghana. The variables were indicators themselves.

Dependent Variable

The dependent variable (DV) was HIV testing. HIV testing was itself an indicator. HIV has been on the run in Ghana therefore, it was necessary to ascertain men ever tested for HIV and know their status which would serve as a cue to action or a reminder for them to be making healthy decisions regarding sex in Ghana.

Questionnaires

Four questionnaires were used for the 2022 GDHS: The Household Questionnaire, the Woman's Questionnaire, the Man's Questionnaire, and the Biomarker Questionnaire. The questionnaires, based on The DHS Program's Model Questionnaires, were adapted to reflect the population and health issues relevant to Ghana. In addition, a self-administered Fieldworker Questionnaire collected information about the survey's fieldworkers. For the purpose of this study only the components of Man's Questionnaire are presented below.

The Man's Questionnaire consists of following sections: 1) Background characteristics: age, date of birth, duration of residency, previous residency, literacy, education, access to media, mobile phone use, use of the internet; 2) Reproduction: children ever fathered, attending ANC and delivery for the most recent child under age 24 months; 3) Contraception: knowledge of contraception, information on family planning, discussion of family planning with a health provider, knowledge of the risk of pregnancy, attitude towards women who use contraception; 4) Marriage and sexual activity: marital status, age at first marriage, number of unions, age at first sexual intercourse, recent sexual activity, number and type of sexual partners, use of condoms, contraceptive use during last sex; 5) Fertility preferences: desire for more children, ideal number of children, gender preferences; 6) Employment and gender roles: employment, source of earnings, and decisions about use of earnings; house and land ownership, attitude towards wife beating; 7) HIV: knowledge of HIV, of ways of transmission, sources of information, behaviour to avoid STIs and HIV, stigma, history of HIV testing; 8) Other health issues: circumcision, smoking and alcohol use, health insurance coverage.

Fieldwork

The main fieldwork commenced on 17th October, 2022 and ended on 14th of January, 2023. In all, three (3) months were used to gather the data. Field assistants were assisted with computer tablets to collect the data.

Ethical Consideration

Ethical approval for this current study was not necessary because the dataset used were secondary in nature. Though, for these data to be collected, the program implementers (Ghana Statistical Service [GSS] and ICF) submitted the survey protocol to appropriate review boards for consideration. For instance, GSS obtained approval from

Ghana Health Service Ethical Review Committee (ERC) and ICF also obtained approval to carry out the survey from the Institutional Review Board (IRB). This was necessary to assure that the survey procedures were in accordance with Ghana's and ICF's ethical research standards.

Data Processing and Analysis

Data extracted from the 2022 GDHS were analysed with frequency, percentages, Pearson's chi-squared test of independence and binary logistic regression. Further, the frequency and percentages were used to summarise participants responses into proportions. The Pearson's chi-squared test of independence was used to test whether there exists any relationship between the IVs and the DV or not. So that a decision can be made either to accept or reject the null hypotheses postulated in the study. However, the binary logistic regression was also used to test the influences the IVs have on the DV.

RESULTS

To be able to ascertain the proportion of men who had ever been tested for HIV and those never been tested for HIV in Ghana instigated a question which requested participants to indicate whether they had ever been tested for HIV or not, the results revealed that 69.0% had never been tested for HIV while almost a third (31.0%) reported ever tested for HIV.

Table 1 presents the outcome of educational level among men in Ghana. When men were asked about their level of education, the results revealed that more than forty per cent (45.2%) had secondary education while nearly thirteen per cent (12.9%) indicated primary education.

Table 1. Education Level among Men in Ghana

Variable	Frequency	Percentage
Education level		
No education	832	28.7
Primary	372	12.9
Secondary	1308	45.2
Higher	382	13.2
Total	**2894**	**100.0**

Source: GDHS (2022).

Table 2 has the outcome of Pearson's chi-squared test of independence on educational level and men's adherence to HIV testing in Ghana. This analysis was conducted to test the hypothesis there is no statistically significant relationship between educational level and men's adherence to HIV testing in Ghana. Statistically significant relationship was found between educational level [p<0.001] and men's adherence to HIV testing in Ghana.

Table 2. Relationship between Educational Level and Men's Adherence to HIV Testing in Ghana

Variable	No (%)	Yes (%)	Total n (%)	χ2	P-value
Educational level				314.750	0.000
No education	57.0	43.0	832(100.0)		
Primary	37.9	62.1	372(100.0)		
Secondary	25.5	74.5	1308(100.0)		
Higher	12.8	87.2	382(100.0)		

Note: Row percentages in parenthesis, Chi-square significant at (0.001), (0.05), (0.10)

No: never tested Yes: tested.

Source: GDHS (2022).

In Table 3 has outcome of binary logistic regression of educational level and men's adherence to HIV testing in Ghana. This analysis was conducted to ascertain the influences of educational level on men's adherence to HIV testing in Ghana.

Table 3. Binary Logistic Regression of Education Level and Men's Adherence to HIV Testing in Ghana

Variable	B	Wald	Sig.	Exp(B)	95 CL	
Educational level (No education=1.0)						
Primary	0.774	36.730	0.000	2.169	1.689	2.786
Secondary	1.355	205.555	0.000	3.877	3.221	4.666
Higher	2.197	170.473	0.000	8.998	6.470	12.513
Constant	**-0.281**	**16.067**	**0.000**	**0.755**		

Source: GDHS (2022). Significant at 0.05.

Overall, the logistic regression model after processing the data was significant at -2LogL = 3407.667; Nagelkerke R^2 of 0.144; $\chi 2$= 319.684; p<0.001 with correct prediction rate of 69.6%. More importantly, the Model Summary which shows a Nagelkerke R^2 of 0.144 suggests that the model explains 14.4% of variance in the likelihood of men's adherence to HIV testing in Ghana. With this percentage contribution to the entire model, the results confirmed the whole model significantly predict men's adherence to HIV testing in Ghana.

It emerged in Table 3 that primary education was significant to men's adherence to HIV testing at p<0.001, (OR=2.169, 95%CI ([1.689-2.786]). This factor tags those men to have 2.2times more likely to adhere to HIV testing compared with men who had no formal education. Further, secondary education was significant at p=0.001, (OR=3.877, 95%CI [3.221-4.666]). This variable labelled those men to have 3.9times more likely to adhere to HIV testing compared with men who had no formal education (see Table 3). Furthermore, higher level of education was significant at p=0.001, (OR=8.998, 95%CI [6.470-12.513]). This factor labels those men to have 8.9times more likely to adhere to HIV testing compared with men who had no formal education (see Table 3).

Table 4 presents the outcome of urban-rural dynamics among men in Ghana. When men were asked about their type of place of residence, the results revealed that more than half (58.4%) of the men reside in rural areas while nearly forty-two per cent (41.6%) reside in urban areas.

Table 4. Urban-Rural Dynamics among Men in Ghana

Variable	Frequency	Percentage
Type of place of residence		
Urban	1204	41.6
Rural	1690	58.4
Total	**9894**	**100.0**

Source: GDHS (2022).

Further analysis was conducted with Pearson's chi-squared test of independence on urban-rural dynamics and men's adherence to HIV testing in Ghana. This analysis was necessary to test the hypothesis there is no statistically significant relationship between urban-rural dynamics and men's adherence to HIV testing in Ghana. Statistically significant relationship was found between urban-rural dynamics [p<0.001] and men's adherence to HIV testing in Ghana (see Table 5).

Table 5. Relationship between Urban-Rural Dynamics and Men's adherence to HIV Testing in Ghana

Variable	No (%)	Yes (%)	Total n (%)	$\chi 2$	P-value
Type of place of residence				143.198	0.000
Urban	21.9	78.1	1204(100.0)		
Rural	43.4	56.6	1690(100.0)		

Note: Row percentages in parenthesis, Chi-square significant at (0.001), (0.05), (0.10)

No: never tested Yes: tested.

Source: GDHS (2022).

Table 6 has outcome of binary logistic regression of urban-rural dynamics and men's adherence to HIV testing in Ghana. This analysis was conducted to test the influences of urban-rural dynamics on men's adherence to HIV testing in Ghana.

Table 6. Outcome of Binary Logistic Regression of Urban-Rural Dynamics and Men's Adherence to HIV Testing in Ghana

Variable	B	Wald	Sig.	Exp(B)	95CI	
Type of place of residence (Urban=1.0)						
Rural	-1.003	138.627	0.000	0.367	0.310	0.433
Constant	**1.270**	**332.403**	**0.000**	**3.561**		

Source: GDHS (2022).

Overall, the logistic regression model after processing the data was significant at -2LogL = 3579.623; Nagelkerke R2 of 0.069; $\chi 2$= 147.728; p<0.001 with correct prediction rate of 65.5%. More importantly, the Model Summary which shows a Nagelkerke R2 of 0.069 suggests that the model explains 6.9% of variance in the likelihood of men's adherence to HIV testing in Ghana. With this percentage contribution to the entire model, the results confirmed the whole model significantly predict men's adherence to HIV testing in Ghana.

It emerged in Table 6 that residing in rural area was significant related to men's adherence to HIV testing at p<0.001, (OR=0.367, 95%CI ([0.310-0.433]). This factor categorises men residing in rural area to have 0.4times less likely to adhere to HIV testing compared with their counterparts in cities.

DISCUSSION

Analysis of educational level among men in Ghana graciously brought to light that men in Ghana prioritise education. Due to this, they had varied levels of education which enables them carry out their day-to-day activities. Per the study findings, we observed that more than forty per cent (45.2%) had secondary education, 13.2% had tertiary and nearly thirteen per cent (12.9%) had primary education. The plausible explanation to this finding could partly be due to the fact that men have the conviction that, it is only education that can help them grow by expanding their knowledge, improving their cognitive abilities, and foster critical thinking among them. Ultimately, these men might have thought that education is the only medium through which they can be enlightened and be able to navigate life and contribute to society once they become older. Men that have acquired some level of education are well equipped and are better able to make decision. The level of education an individual (man) has can act as a facilitator for HIV testing by equipping him with knowledge, empowering him to make informed decisions, and potentially reduce stigma, fear of a positive result, increase awareness of HIV risk and how to navigate the healthcare system and discrimination surrounding HIV.

However, nearly thirty per cent (28.7%) of the men had no formal education. People who lack education have trouble getting ahead in life, have worse health and are poorer than the well-educated. Major effects of lack of education include: poor health, lack of a voice, shorter lifespan, unemployment, no representation in society, lack critical thinking, exploitation and gender inequality. Moreover,

lower levels of education may present barriers to HIV testing due to limited access to information and understanding of the importance of testing. This finding is almost similar to a study conducted in Zambia which found that half (55%) of adults have secondary, 37% post-secondary, while 27% have primary schooling and 18% have no formal education [41]. The finding disagrees with a study conducted in Sudan which found that only 9% completed primary education, 6% completed secondary education, and a mere 1% completed higher education in rural areas [42].

The study found that a statistically significant relationship exists between level of education and men's adherence to HIV testing in Ghana. As a result of this, the null hypothesis was not confirmed. A p-value of <0.001 found, suggests a strong relationship between level of education and men's adherence to HIV testing. This relationship suggests that higher education is often associated with increased likelihood of adherence to HIV testing. This finding corroborated with previous studies conducted in South Africa and Nigeria that there is a likelihood of having an HIV test uptake increased as the education level of the individual increased [43,44].

The study found that the varied levels of education men had translated to higher odds of adherence to HIV testing. This finding suggests that education is positively associated with men's adherence to HIV testing. Education serves as a facilitator to enable men have an increased knowledge about HIV and AIDS, have better understanding of the benefits of being tested for HIV, and a greater likelihood of seeking healthcare services which ultimately leads to higher rates of HIV testing uptake. Getting tested for HIV is an important step toward prevention. With education, one is empowered to make informed decisions about his or her health and being encouraged to get tested and help reduce the spread of the virus. This finding corroborated with previous research conducted in Southern Africa and Ghana which found that men with secondary or higher levels of education were more likely to take an HIV test than men with no education [28,45-47].

In Ghana, more than fifty per cent (58.4%) of men reside in a rural setting while approximately forty-two per cent (41.6%) reside in an urban setting. Studying urban-rural dynamics is crucial for understanding how it impacts the various aspects of one's life including health, well-being, social interactions, academic or professional outcomes, development, addressing inequalities, and promoting sustainable inclusive growth because it reveals how these areas are interconnected and how policies can impact both. Having this kind of study will also help policymakers design targeted intervention to enhance HIV testing and also help to reduce the spread of the virus. It is also crucial that if individuals know their status, it will allow them take proactive steps to protect their health and prevent transmission to others, if the results are positive or negative. This finding disagrees with previous studies conducted in US and Bangladesh which found that about 80% participants reside in urban setting while nearly 20% reside in rural setting [48,49] respectively.

We found that a statistically significant relationship exists between urban-rural dynamics and men' adherence to HIV testing in Ghana. Due to this, the null hypothesis was ignored. A p-value of <0.001 found, indicates a strong relationship between urban-rural dynamics and men's adherence to HIV testing. This suggests that a place of residence is associated with increased likelihood of men's adherence to HIV testing. This finding is not consistent with a previous study conducted in Eastern Africa that men residing in rural settings had lower odds of being tested for HIV [50].

Place of residence was noted in the study to influence men's adherence to HIV testing. But we realised that men from rural setting had a lower odd of being tested for HIV. This suggests that men living in rural areas might not see the need to get tested for HIV. Also, it could partly be due to the fact that they do not want to be stigmatised and also lose their prestige in the society if it happens the results prove positive. This finding corroborated with previous research conducted in Malawi [51] and Ethiopia [52,53] which found that men from rural areas had a lower likelihood of being tested for HIV. This suggests that HIV testing services are readily available and accessible in urban areas than in rural areas. On the contrary, the result contradicted previous research conducted in Nigeria [54], Burkina Faso [55], and Cambodia [56].

CONCLUSION

Adherence to HIV testing among rural men in the study was low. This was attributable to urban-rural dynamics. Based on this, the study recommends that HIV testing services be made readily available in rural setting to empower men get tested regularly. Also, it is recommended that AIDS service organisations partner with healthcare providers to identify people at high risk for HIV for testing [57,58].

LIMITATIONS OF THE STUDY

Though effort was made to minimize errors and biases in the study. However, the use of the 2022 GDHS data made it impossible. Hence, the 2022 GDHS data is a sample, not a

census, therefore it might not perfectly represent the entire population. The 2022 GDHS made used of cross-sectional design which has its associated limitations and that same limitations are likely to be introduced into the current study. Therefore, there results should be interpreted with caution.

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DECLARATION

ETHICAL APPROVAL

We did not seek ethical approval. Hence, 2022 GDHS data were used.

COMPETING INTERESTS

No conflict of interest was registered.

FUNDING

No fund was received.

AVAILABILITY OF DATA AND MATERIALS

The study made used of the 2022 DHS data. Therefore, it is publicly available online at https://dhsprogram.com/data.

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