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## Research Article

# Frequency of exposure to the media is associated with levels of HIV-related knowledge and stigmatising attitudes among adults in Ghana

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Studies show that increased knowledge of the human immunodeficiency virus (HIV) is achieved through exposure to mass media, which then contributes to positive attitudes and behaviours towards people living with HIV and acquired immune deficiency syndrome (AIDS). This study examined the relationship between the frequency of exposure to the media and the level of HIV-related knowledge and stigmatising attitudes towards HIV and AIDS among adults in Ghana. A weighted sample of 13 484 men and women 15 to 59 years old took part in the study. The main outcome variable was the HIV-related knowledge score, calculated based on responses to eight questions about general HIV concepts and HIV transmission modes. The frequency of exposure to the media was the primary explanatory variable. The relationship between the frequency of media exposure and the level of HIV-related knowledge was investigated using Poisson regression methods in Stata 13.0. Of the 13 484 respondents analysed, 25%, 88.2% and 79.7% reported reading print media, listening to the radio and watching TV at least once a week respectively. The average HIV-related knowledge score was 4.9 (SD 1.6), with 22.9% of respondents correctly answering five questions and about 2.0% correctly answering all eight questions. The frequency of exposure to the media, particularly print media and television, was associated with an increase in the level of HIV-related knowledge. When compared to having a low level of HIV-related knowledge, having a moderate and high level of HIV-related knowledge reduced the score of stigmatising attitude by 0.065 and 0.277 points, respectively. The adult population in Ghana has a very low level of HIV or AIDS knowledge, as well as a significant level of stigma associated with HIV or AIDS, which could stymie HIV prevention efforts. The media, on the other hand, provide a platform for these issues to be addressed.

**Keywords:** awareness, media exposure, stigmatising attitudes

## Introduction

The human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) are major public health concerns around the world, especially in sub-Saharan Africa (SSA). At the end of 2019, it was estimated that 38 million people worldwide were living with HIV and AIDS, a figure that had more than tripled in the previous two decades (UNAIDS, 2020). In the same year, 1.7 million new infections were recorded worldwide, with nearly 700 000 deaths due to AIDS. As a result, the global fast-track targets of reducing AIDS-related deaths to less than 500 000 and new HIV infections to less than 500 000 by 2020 were missed. According to a study published in 2019 (Ali et al., 2019), Ghana suffers from a low-level generalised HIV epidemic, with a population prevalence of 1.6% (albeit with regional variations). Ghana, like many other nations, has committed to ending the AIDS epidemic by 2030.

To receive effective HIV care and treatment, people must be aware of their HIV status and seek treatment if they are

infected. However, discrimination and stigmatisation of people living with HIV and AIDS are notable obstacles in the AIDS response. An HIV-stigma framework highlights that stigma is a complicated notion, and HIV-related stigma is a socially devalued attribute. How individuals respond to this stigma is dependent on their awareness of whether or not they have the discounted attribute (Earnshaw & Chaudoir, 2009). According to the framework, HIV-related stigma takes the form of prejudice, stereotyping and discrimination, all of which have an impact on HIV-infected people's psychological, behavioural and health consequences. HIV-positive people are also aware that their HIV status is a highly socially stigmatised element of their identity, and this awareness is experienced through at least three major stigma mechanisms: enacted stigma, expected stigma and internalised stigma. According to a Kenyan study, pregnant women who were afraid of being stigmatised by their male partners were more than twice as likely to decline HIV testing (Turan et al., 2011). In addition, a review of the factors impacting antiretroviral therapy adherence among

HIV-positive adolescents in SSA identified stigma as an important barrier (Ammon et al., 2018). In essence, stigma—as a result of HIV status disclosure to peers and stigma experienced inside families — appears to be a significant barrier to HIV testing, care and treatment in SSA. This is linked to a lack of understanding and misconceptions about the disease (Haroun et al., 2016; Letshwenyo-Maruatona et al., 2019).

There is mounting evidence that the dissemination and/or reporting of HIV and AIDS-related information in the media are connected to improvements in knowledge, attitudes and behaviours. Exposure to the media (reading newspapers/magazines, watching television and listening to the radio), for example, has been associated with comprehensive knowledge of HIV and AIDS (Asaduzzaman et al., 2016; Agegnehu & Tesema, 2020). Additionally, HIV testing among married men and women in Ghana has been related to exposure to the media (Sano et al., 2016). More generally, exposure to media can boost HIV awareness, improve knowledge of HIV testing services, increase demand for HIV testing and reduce stigmatising attitudes toward people living with HIV/AIDS (Li et al., 2009; Jesmin et al., 2013; Asamoah et al., 2017; Bago & Lompo, 2019; Letshwenyo-Maruatona et al., 2019). The “Reach Out, Show Compassion” campaign, which was launched in November 2002 in Ghana, used the media, including radio and television, at the national level, as one of its strategies to encourage compassion for people infected with HIV. According to a study that evaluated the campaign’s effectiveness, respondents who were exposed to the campaign through the media were more willing to care for an HIV-infected relative and more likely to believe that an HIV-infected female teacher should be allowed to continue teaching than those who were not (Boulay et al., 2008). Additionally, respondents exposed to the campaign also had significantly more favourable scores on an attitude scale measuring the belief that HIV-infected individuals should be isolated from others, an indication that media channels can effectively address HIV-related stigma on a national scale.

The Ghana National HIV and AIDS, Sexually Transmitted Infections (STIs) Policy, which highlighted the multisectoral response to ending AIDS in Ghana by 2030, recognised the need to disseminate HIV and AIDS information to the general public to increase awareness and reduce HIV-related stigma (Ghana AIDS Commission, 2019). One technique for communicating information and increasing awareness and knowledge about HIV and AIDS among Ghanaians is to use the media. Sano and his colleagues (2016) conducted research that demonstrated a link between media exposure and HIV testing among Ghanaian married couples. Other Ghanaian researchers investigated HIV and AIDS awareness and stigmatising attitudes among young women (15–24 years old) who, in general, do not have access to adequate health information (Asamoah et al., 2017; Darteh, 2020). A decline in the level of comprehensive HIV and AIDS knowledge among Ghanaians has also been reported. According to Fenny and her colleagues’ research (2017), comprehensive HIV and AIDS knowledge among Ghanaian adults fell from 68% in 2003 to 59% in 2014. According to a recent study, the level of comprehensive HIV and AIDS knowledge among Ghanaian adults fell by nearly 12% between 2008 and 2014 (Guure et al., 2020). On the

other hand, the relationship between media exposure and HIV-related knowledge among Ghanaian adults remains unknown. Furthermore, the aforementioned studies’ focus and samples limit the generalisability of the findings.

This study used nationally representative data from the 2014 Ghana Demographic and Health Survey (GDHS) to look at the relationship between media exposure (including newspapers or magazines, radio and television) and HIV-related knowledge, as well as the link between HIV-related knowledge and stigmatising attitudes toward people living with HIV and AIDS.

## Methods

### Study design

This study was designed to be cross-sectional and involved the analysis of nationally representative population-based secondary data.

### Data

We obtained data from the 2014 GDHS, a nationally representative dataset, to examine the association between frequency of exposure to the media and HIV-related knowledge.<sup>1</sup> The 2014 GDHS is the sixth in a series of population and health surveys conducted in Ghana as part of the global Demographic and Health Surveys (DHS) Programme. According to the final report, 427 clusters consisting of enumeration areas (216 in urban areas and 211 in rural areas) and 12 831 households were selected using a two-stage sample strategy. The methodology used in the 2014 GDHS and the details of the questionnaires used in the women’s and men’s surveys can be found in the final report (Ghana Statistical Service et al., 2015). In the 2014 GDHS, all women 15 to 49 years old who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey were eligible to participate in the women’s survey. Furthermore, in half of the selected households, all men 15 to 59 years old who were either permanent residents of the selected households or visitors who stayed in the households the night before the survey were also eligible to participate in the men’s survey. Overall, of the eligible women, interviews were completed with 9 396 women (97% response rate). In the male survey, 4 388 of the 4 609 eligible men completed the interviews (95% response rate).

For our study, both the women’s and men’s files were pooled for the analysis. The datasets were appropriate for the study because they contained information about participants’ background characteristics, including age, level of education, place of residence and wealth quintile, as well as the frequency of exposure to the media such as print media (newspaper/magazine), radio and television, and their knowledge of HIV and attitudes towards people with HIV infection. This study restricted the analysis to a total sample of 13 415 respondents: women 15 to 49 years old and men 15 to 59 years old who reported that they had heard of the illness called AIDS. By excluding missing and incomplete observations, we ensured that all the participants had information on our main explanatory variable and all the questions on HIV. The final sample was weighted for the analyses.

## Measures

### Dependent variables

Based on the available information on HIV and AIDS in the 2014 GDHS dataset, we focused on two dependent variables: level of HIV-related knowledge and level of stigmatising attitude towards people with HIV and AIDS. For HIV-related knowledge, we built a score of knowledge by including eight responses to questions on HIV. The respondents in the 2014 GDHS who reported that they had heard of AIDS were asked the following questions relating to HIV and its modes of transmission: (1) Is it possible for a healthy-looking person to have the AIDS virus?; (2) Can people get the AIDS virus from mosquito bites?; (3) Can people get the AIDS virus by sharing food with a person who has AIDS?; (4) Can people get the AIDS virus because of witchcraft or supernatural means?; (5) Can the virus that causes AIDS be transmitted from a mother to her baby during pregnancy?; (6) Can the virus that causes AIDS be transmitted from a mother to her baby during delivery?; (7) Can the virus that causes AIDS be transmitted from a mother to her baby during breastfeeding?; and (8) Are there any special drugs that a doctor or a nurse can give to a woman infected with the AIDS virus to reduce the risk of transmission to the baby? Responses to these questions were Yes, No or Don't know. We created a dummy variable for each question by providing "1 point" for the correct answer and "0 points" for the wrong answer. Respondents who chose "Don't know" were also given "0 points". We defined the level of HIV-related knowledge as a discrete score that equalled the number of correct answers the respondent gave. This scoring had a minimum value of 0 (which implied no HIV-related knowledge) and a maximum value of 8 (highest level of HIV-related knowledge).

For the level of stigmatising attitudes towards people with HIV or AIDS, respondents who had heard of AIDS in the 2014 GDHS were also asked several questions to assess stigmatising attitudes towards HIV/AIDS. Therefore, we used the responses to the following three questions in the dataset to create the level of stigmatising attitude towards HIV or AIDS: (1) Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?; (2) 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 (3) 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? Respondents could answer Yes, No or Don't know/Not sure/Depends. We assigned a score of "1 point" to responses that showed unwillingness or stigmatising attitudes towards HIV or AIDS and a score of "0 points" to responses that showed willingness or positive attitudes towards HIV or AIDS. We defined the level of stigmatising attitude towards people with HIV or AIDS using a discrete score that took values such as 0, 1, 2, or 3. A value of "3" implies the highest level of stigma.

### Explanatory variables

Our primary explanatory variable was the frequency of exposure to the media, which was defined by three dummy variables. The first one is the frequency of reading

newspapers/magazines (denoted "print media"). The second variable is the frequency of listening to the radio (denoted "radio") and the last variable is the frequency of watching television (denoted "TV"). These variables took on two values: "0" if the participant did not use the media at all (denoted "not at all") and "1" if the frequency of using this media is "less than once a week" or if the frequency of using the media is "at least once a week" (denoted "at least once a week"). We also included other explanatory variables including age, sex, the highest level of education, wealth and place of residence as confounding factors. The inclusion of the explanatory variables was guided by the existing literature and the availability of data in the 2014 GDHS dataset.

### Statistical analysis

We adopted both descriptive and inferential statistics. A descriptive analysis was performed to obtain the preliminary information about the study sample. The chi-square test was used to assess the differences in the distribution of the level of HIV-related knowledge by the background characteristics of the respondents. We performed a Poisson regression analysis using two models to examine the effect of exposure to media on the level of HIV-related knowledge. In model 1, we analysed the frequency of exposure to print media, radio and TV as explanatory variables of HIV-related knowledge. In model 2, we examined the relationship between the frequency of exposure to the media and the level of HIV-related knowledge while adjusting for confounding by factors such as age, gender, education, wealth quintile and place of residence.

Furthermore, multivariable Poisson regression was applied to examine the association between the level of HIV-related knowledge and the level of stigma towards people with HIV or AIDS. In this analysis, we used tertiles of HIV-related knowledge as the main explanatory variable, which are low knowledge, moderate knowledge and high knowledge. We controlled for the effects of age, sex, education, wealth and place of residence by including these factors as explanatory variables in the model. All the analyses were performed in Stata 13.0 SE (StataCorp LP, College Station, Texas, USA) at a 5% level of significance. We applied weighting factors to account for the unequal probability sampling techniques used by the demographic and health programme in the surveys to expand the number of cases and reduce sample variability for certain areas or subgroups for which statistics are needed (Croft et al., 2018). The analyses in this study involved a weighted sample of 13 484 respondents.

## Results

### Descriptive statistics

The background characteristics of the respondents are presented in Table 1. The results show that 68.2% of the respondents had at least a secondary education and 54.0% resided in urban areas. Regarding the frequency of exposure to the media, we found that of the total respondents, 25% reported reading print media at least once a week, 88.2% reported listening to the radio at least once a week, and 79.7% reported watching TV at least once a week.

**Table 1.** Background characteristics of respondents included in the present study (weighted  $N = 13\,484$ )

Variable	Number	Per cent
Age (years)		
15 to 24	4 549	33.7
25 to 34	4 033	29.9
35 or older	4 902	36.4
Sex		
Female	9 154	67.9
Male	4 330	32.1
Education		
No education	2 097	15.6
Primary	2 186	16.2
At least secondary	9 200	68.2
Wealth quintile		
Poorest	2 094	15.5
Poorer	2 355	17.5
Middle	2 739	20.3
Richer	3 053	22.6
Richest	3 243	24.1
Place of residence		
Urban	7 278	54.0
Rural	6 206	46.0
Frequency of exposure to print media		
Not at all	10 167	75.4
At least once a week	3 317	24.6
Frequency of exposure to radio		
Not at all	1 586	11.8
At least once a week	11 898	88.2
Frequency of exposure to television (TV)		
Not at all	2 743	20.3
At least once a week	10 741	79.7

### **Levels of HIV-related knowledge and stigmatising attitudes towards people living with HIV or AIDS**

The analysis of the levels of HIV-related knowledge and stigmatising attitudes toward people living with HIV or AIDS revealed that 1.0% of the total weighted sample used for analysis could not provide a correct response to any of the eight HIV-related questions, 22.9% provided correct responses to five questions and approximately 2.0% responded correctly to all eight questions. The mean score was 4.9 (SD: 1.6). The findings also revealed that among the study participants, there were misconceptions about the mode of transmission of HIV and a lack of awareness about the possibility of preventing mother-to-child transmission of HIV. For example, 59.0% of respondents believed that HIV could be acquired through witchcraft or supernatural means. Similarly, 83% of respondents were unaware that there were drugs available to prevent HIV transmission from mother to child (Table 2). Furthermore, we discovered that HIV-related knowledge was disproportionately distributed among study participants (data not shown).

Looking at the score related to the level of stigmatising attitudes towards people with HIV or AIDS, it was discovered that approximately 25.0% of the respondents did not stigmatise people living with HIV or AIDS, whereas 18.3% stigmatised people living with HIV or AIDS on all three questions measuring stigma and discrimination towards HIV or AIDS. Overall, 75.5% of Ghanaians exhibited at least one stigmatising attitude towards people living with HIV or AIDS (Table 2).

**Table 2.** HIV-related knowledge and stigma towards people living with HIV or AIDS (weighted  $N = 13\,484$  unless indicated)

Questions on HIV-related knowledge	Correct response	Number	Per cent
A healthy looking person can have HIV	Yes	11 388	84.5
Can get HIV from mosquito bites	No	8 372	62.1
Can get HIV by sharing food	No	9 441	70.0
Can get HIV by witchcraft or supernatural means	No	5 527	41.0
Drugs to prevent mother-to-child transmission of HIV	Yes	2 287	17.0
HIV can be transmitted during delivery	Yes	9 242	68.5
HIV can be transmitted during pregnancy	Yes	9 565	70.9
HIV can be transmitted during breastfeeding	Yes	10 676	79.2
Total scores for level of HIV-related knowledge			
0		134	1.0
1		299	2.2
2		626	4.6
3		1 321	9.8
4		2 536	18.8
5		3 083	22.9
6		3 209	23.8
7		2 035	15.1
8		241	1.8
Stigmatising attitudes towards people living with HIV or AIDS			
Stigma towards HIV positive food seller	No	4 342	32.2
Stigma towards HIV positive relative ( $n = 13\,481$ )	No	9 632	71.5
Stigma towards HIV positive teacher ( $n = 13\,481$ )	No	7 614	56.5
Scores for the level of stigmatising attitudes towards people living with HIV or AIDS			
0		3 305	24.5
1		3 969	29.4
2		3 743	27.8
3		2 467	18.3

### Association between frequency of exposure to the media and level of HIV-related knowledge

Results from the Poisson regression analysis on the association between the frequency of exposure to the media and levels of HIV-related knowledge are presented in Table 3. The results show that the frequency of exposure to the media was statistically significantly associated with the levels of HIV-related knowledge. From model 1, we found that compared to respondents who reported not reading print media at all in a week, those who read print media at least once a week had an increase in the level of HIV-related knowledge of 0.142 points. Similarly, compared to respondents who were not exposed to the radio at all, listening to the radio at least once a week increased the score of their level of HIV-related knowledge by 0.033 points. Furthermore, exposure to TV at least once a week was associated with a 0.068 point increase in the score of HIV-related knowledge compared to adults not exposed to TV at all (Table 3).

In model 2, we performed an adjusted multivariable Poisson regression by including age, sex, level of education, wealth quintile and place of residence. Overall, the results demonstrated that the frequency of exposure to print media and TV was statistically significantly associated with

the levels of HIV-related knowledge. We identified that, comparatively, exposure to print media and TV at least once a week increased the knowledge score by 0.105 points and 0.027 points respectively. In addition, we found that age, education, sex, wealth and place of residence were significantly associated with the levels of knowledge. For example, being in the age groups of 25 to 34 years old and 35 years old or older increased the score of HIV-related knowledge by 0.018 and 0.027 points respectively. Similarly, having primary education and at least secondary education increased the score of HIV-related knowledge scores by 0.028 and 0.116 points respectively. By contrast, being female, as opposed to male, resulted in a  $-0.019$  point drop in HIV-related knowledge (Table 3).

### Association between the level of HIV-related knowledge and the level of stigmatising attitudes towards people living with HIV or AIDS

We explored the association between the level of HIV-related knowledge and the level of stigmatising attitudes towards people living with HIV or AIDS. The results are presented in Table 4. The results show an inverse relationship between the level of HIV-related knowledge and the level of stigmatising attitudes towards people living with HIV or

**Table 3.** Poisson regression analysis of the association between exposure to media and level of HIV-related knowledge among adults in Ghana

Variable	Model 1		Model 2	
	$\beta$ (Standard error)	<i>p</i> -value	$\beta$ (Standard error)	<i>p</i> -value
Frequency of exposure to print media				
Not at all	Reference			
At least once a week	0.142 (0.0088)	<0.001	0.105 (0.0085)	<0.001
Frequency of exposure to radio				
Not at all	Reference			
At least once a week	0.033 (0.0125)	0.010	0.013 (0.0121)	0.275
Frequency of exposure to TV				
Not at all	Reference			
At least once a week	0.068 (0.1154)	<0.001	0.027 (0.0120)	0.022
Age (years)				
15 to 24			Reference	
25 to 34			0.018 (0.0077)	0.018
35 or older			0.027 (0.0078)	0.001
Sex				
Male			Reference	
Female			$-0.019$ (0.0084)	0.020
Education				
No education			Reference	
Primary			0.028 (0.0136)	0.034
At least secondary			0.116 (0.0122)	<0.001
Wealth quintile				
Poorest			Reference	
Poorer			0.069 (0.0150)	<0.001
Middle			0.066 (0.0160)	<0.001
Richer			0.079 (0.0169)	<0.001
Richest			0.089 (0.0176)	<0.001
Place of residence				
Urban			Reference	
Rural			0.042 (0.0110)	<0.001
Constant	1.474 (0.0147)	<0.001	1.360 (0.0203)	<0.001
Number of observations (unweighted <i>N</i> )	13 415		13 415	
Population size (weighted <i>N</i> )	13 484		13 484	
<i>F</i> -statistic	121.5		52.4	
Prob > <i>F</i>	<0.001		<0.001	

**Table 4.** Association between the level of HIV-related knowledge and level of stigmatising attitudes towards people living with HIV or AIDS

Variable	$\beta$ (Standard error)	<i>p</i> -value
Level of HIV-related knowledge		
Low	Reference	
Moderate	-0.065 (0.0205)	0.001
High	-0.277 (0.0318)	<0.001
Age (years)		
15 to 24	Reference	
25 to 34	-0.076 (0.0203)	<0.001
35 or older	-0.076 (0.0185)	<0.001
Sex		
Male	Reference	
Female	0.103 (0.0213)	<0.001
Education		
No education	Reference	
Primary	0.021 (0.0244)	0.376
At least secondary	-0.191 (0.0233)	<0.001
Wealth quintile		
Poorest	Reference	
Poorer	0.046 (0.0310)	0.134
Middle	-0.049 (0.0332)	0.134
Richer	-0.181 (0.0367)	<0.001
Richest	-0.314 (0.0440)	<0.001
Place of residence		
Urban	Reference	
Rural	-0.001 (0.0310)	0.954
Constant	0.611 (0.047)	<0.001
Number of observations (unweighted <i>N</i> )	13 415	
Population size (weighted <i>N</i> )	13 484	
<i>F</i> -statistic	47.1	
Prob > <i>F</i>	<0.001	

AIDS. In fact, compared to having a low level of HIV-related knowledge, having a moderate level of HIV-related knowledge decreased the score of stigmatising attitude by -0.065 points. Similarly, having a high level of HIV-related knowledge resulted in a decrease in the score of the stigma of -0.277 points. Furthermore, we found that belonging to the age groups of 25 to 34 years old and 35 years old or older, having at least a secondary education level and belonging to the richer and richest wealth quintiles significantly reduced the score of the level of stigmatising attitude. Nevertheless, the results also showed that being female increased the score of stigmatising attitudes by 0.103 points (Table 4).

## Discussion

Using nationally representative population-based data, this study looked at the relationship between the frequency of media exposure and HIV-related knowledge, as well as the connection between HIV-related knowledge and stigmatising attitudes toward people living with HIV or AIDS among adults in Ghana. From the results, according to the questions used to evaluate HIV-related knowledge, the majority of the adult Ghanaian population had a very low level of knowledge about HIV. Most of them did not know that HIV cannot be transmitted through supernatural means and that the risk of mother-to-child transmission of HIV can be minimised

using antiretrovirals. Additionally, a significant percentage of adults believed that one could get HIV from mosquito bites and by sharing food with an HIV-positive person. The data also showed high levels of stigmatising attitudes towards HIV and AIDS. The low level of HIV-related knowledge (defined by misconceptions about transmission and care) and the high level of stigmatising attitudes toward HIV or AIDS may impact negatively on the uptake of antiretroviral therapy, including HIV testing and treatment adherence by HIV-positive individuals. Indeed, stigma prevents people from learning their HIV status and prevents infected people from seeking treatment (Turan et al., 2011; Arnold et al., 2014; Croome et al., 2017; Ammon et al., 2018).

Subsequently, the analysis revealed that, after controlling for confounding factors such as age, level of education, place of residence and wealth quintile, the frequency of exposure to the media, particularly exposure to print media and television, was significantly associated with an increase in HIV-related knowledge. Other studies around the world have reported similar findings (Bago & Lompo, 2019; Agegnehu & Tesema, 2020). The findings also revealed that having a high level of HIV or AIDS knowledge reduced stigmatising attitudes towards HIV or AIDS patients, which is consistent with findings from a Botswana study (Letshwenyo-Maruatona et al., 2019). Using the media as part of an HIV-prevention intervention provides benefits such as broad reach, message standardisation and repetition and the ability to use a variety of content formats such as news and short advertisements. A meta-analysis of the effectiveness of mass media interventions for HIV prevention found that interventions delivered through the media increased condom use and improved transmission and prevention knowledge in low social and economic development settings (LaCroix et al., 2014). As a result, the mass media can serve a greater purpose in countries that require HIV interventions, such as Ghana. However, multichannel interventions are frequently thought to be more effective than single-channel interventions. It is also worth mentioning that those having greater access to the media may also have other HIV-related information sources. Therefore, in HIV and AIDS prevention campaigns, media channels can be used in conjunction with interpersonal sources of information, such as health workers and peer educators.

There were age and gender differences in HIV-related knowledge and stigmatising attitudes. The findings showed that being a young person (15–24 years old) or a female was associated with a decrease in HIV-related knowledge and an increase in stigmatising attitudes toward people living with HIV or AIDS. Previous research has also shown that the youth have low HIV-related knowledge and stigmatise people living with HIV or AIDS, which is related to incorrect knowledge about the disease (Asamoah et al., 2017; De Wet et al., 2019). In addition, whereas a study conducted in the United Arab Emirates (UAE) found no significant differences between males and females with regard to knowledge of HIV or AIDS (Haroun et al., 2016), other reports argue that women demonstrate higher levels of knowledge than males (Srihanaviboonchai et al., 2017; Letshwenyo-Maruatona et al., 2019). The disparities in the findings may reflect variations in intervention targeting, educational systems and media exposure. For example, in the UAE, tertiary

students are not routinely provided with education on HIV and/or AIDS (Haroun et al., 2016). The reasons for women's stigmatising attitudes being higher than men's in Ghana are not well understood. However, we recognise that the ability to read facilitates comprehension of written information such as newspaper articles, magazines and policy documents. Formal education also enables people to critically examine information that is disseminated and to decide what correct and incorrect knowledge is. It is worth noting that women in Ghana are less educated and less exposed to the media than men (Ghana Statistical Service et al., 2015). Therefore, as evidenced by the association between the frequency of exposure to the media and high educational status and a lower level of stigmatising attitudes toward HIV or AIDS in this study and others (Asamoah et al., 2017; Darteh, 2020), it is unlikely that these factors do not play important roles in perpetuating stigma against people with HIV or AIDS in women. Future research in this area would help us understand why females are more likely than males to have stigmatising thoughts.

Nonetheless, young people and women are regarded as the most vulnerable groups in terms of HIV and AIDS. In Ghana, national reports show that women have a higher HIV prevalence than men of all ages (Ghana Statistical Service et al., 2015). According to the same reports, while HIV prevalence among young people 15 to 24 years old is generally low, by the age of 23 to 24 years, women are more likely to contract HIV than men. More importantly, unequal gender norms that limit women's and girls' agency and voice reduce their access to education and economic resources, as well as stifle their civic participation, which contributes to the higher HIV risk faced by women in high HIV prevalence settings (UNAIDS, 2020). More efforts are needed to increase HIV knowledge and address HIV-related stigma among Ghana's youth and women.

### Strengths and limitations

This study used a nationally representative sample and robust statistical techniques to generate estimates that are generalisable to the entire Ghanaian population. Despite the importance of the study's findings for decision-makers and stakeholders, we acknowledge that there are limitations that must be addressed. Firstly, because the GDHS is cross-sectional, our conclusions are limited to statistical associations rather than causal relationships. Secondly, the questionnaires relied on self-reported responses, which are prone to recall bias, and the provision of socially desirable answers by participants cannot be ruled out. Thirdly, although the frequency of media exposure was associated with HIV-related knowledge, we are not attributing the level of HIV or AIDS knowledge to the sole effect of media exposure. We acknowledge that there may be alternative sources from which participants could have obtained information on HIV and AIDS. In reality, the National AIDS Control Programme (NACP) provides HIV testing and counselling in all teaching, regional and district hospitals and has developed educational programmes to create awareness and increase knowledge about HIV and AIDS to enhance positive behaviour change (Fobil & Soyiri, 2006).

Moreover, because our analysis was based on a secondary dataset, we were unable to assess what is contained in the media that seems to drive the positive behaviour change.

Another limitation of the current study is that it used a dataset that is more than five years old. We acknowledge that, since the 2014 GDHS, the media modalities, HIV or AIDS knowledge and stigma-related behaviours in Ghana may have changed. As a result, a national study would provide up-to-date information on the subject. Recent small cross-sectional studies in Ghana have revealed higher levels of HIV and AIDS knowledge. A study in the Ho Municipality of Ghana found that 64% of the adults surveyed had good knowledge of HIV/AIDS (Quarm et al., 2021). In another study (Anokye et al., 2019), 89% of respondents knew that HIV can be transmitted from mother to child during birth, which is slightly higher than the current study's 68.5%. Lastly, stigma is more complex because of its cross-cultural diversity and complexity. We are aware that a variety of questionnaires are used to assess stigmatising attitudes concerning HIV and AIDS. However, to quantify stigma, this study relied on three questions, which were limited by the data on this variable in the dataset. Similarly, the questions employed to assess HIV-related knowledge were based on the data available, which did not thoroughly measure HIV and AIDS knowledge. As a result, the results of this study should be considered in light of the limitations listed above.

### Conclusions

This study has provided evidence that adults in Ghana have a very low level of knowledge about HIV and AIDS and a high level of stigmatising attitudes towards HIV and AIDS. The findings also shed light on the relationship between the frequency of media exposure and HIV-related knowledge in Ghana. More broadly, the low level of HIV and AIDS knowledge and the high level of stigma are significant barriers to HIV prevention and therapy adherence. There is a need to increase HIV and AIDS knowledge in Ghana's general population to improve HIV-related knowledge and reduce stigmatising attitudes toward people living with HIV or AIDS.

The following recommendations are made: First, in addition to the use of mass media, HIV health campaigns conducted by religious authorities have shown promising results in addressing HIV-related stigma among Ghanaian youth at the national level and could be used for the dissemination of health information (Boulay et al., 2008). Second, recent reports suggest that the use of digital social media technologies, including Facebook and WhatsApp, by both the youth and adults in Ghana has become an essential mode of communication and networking (Meng, 2020). These platforms could be used to reach out to young people with health education messages to improve their HIV knowledge and reduce stigmatising attitudes. This recommendation is backed up by a review which found that digital media has enormous potential to engage the youth and improve their knowledge of HIV and other sexually transmitted infections (STIs) (Guse et al., 2012).

## Note

- <sup>1</sup>. Datasets used in this study can be accessed with permission from the DHS programme at [www.dhsprogram.com/data/available-datasets.cfm](http://www.dhsprogram.com/data/available-datasets.cfm).

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