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Exploration of Comprehensive Knowledge and Positive Attitudes Among Reproductive Aged Women for HIV/AIDS Prevention in Bangladesh

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Keywords:	HIV/AIDS; Comprehensive knowledge; Positive attitude; Reproductive aged women; Bangladesh.
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Additional data availability information:	

16/07/2023

Emily Chenette

Editor in chief

PLOS ONE

Dear Emily Chenette,

Please find the attached manuscript entitled "**Exploration of Comprehensive Knowledge and Positive Attitudes Among Reproductive Aged Women for HIV/AIDS Prevention in Bangladesh**" for consideration to be published in the PLOS ONE.

In this paper, we investigate the level of comprehensive knowledge and positive attitudes about HIV/AIDS among reproductive-aged women in Bangladesh. We demonstrated sociodemographic factors, and geographic variations of the comprehensive HIV/AIDS knowledge and positive attitudes. Both mass and web media in this case plays a very crucial roles as the knowledge dissemination as well as awareness buildings.

The findings of the study will be suitable for informing the policy makers to established evidence-based policies and programmes to reduce the risks of transmission and development of the strategy Besides, these results will appeal to the scientific researcher mostly who are focused on the sexual and reproductive health, early marriage, women's health and relevant organization from the social viewpoint.

We declare that there is no conflict of interest to disclose, not previously published and not even submitted elsewhere. All the authors in this research article read and consented to publish the paper.

Sincerely

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Exploration of Comprehensive Knowledge and Positive Attitudes Among Reproductive Aged Women for HIV/AIDS Prevention in Bangladesh

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Abstract: 299 words

Exploration of Comprehensive Knowledge and Positive Attitudes Among Reproductive Aged Women for HIV/AIDS Prevention in Bangladesh

Abstract

Background: Despite the prevalence of HIV/AIDS is <1% in Bangladesh, the risk of transmission cannot be ignored, particularly among reproductive-aged women. Both comprehensive knowledge and positive attitudes about HIV/AIDS are crucial in preventing its transmission. Therefore, this cross-sectional study aimed to investigate the level of comprehensive knowledge and positive attitudes regarding HIV/AIDS among reproductive-aged women in Bangladesh.

Methods: Data was obtained from the Multiple Indicator Cluster Survey (MICS) 2019, a sample of 39,099 reproductive-aged women (15–49 years) who responded to HIV/AIDS knowledge (n = 9) and attitudes (n = 6) related items. To estimate the outcomes, the cumulated scores were calculated for each set of items and categorized using respective the median values. The explanatory variables included sociodemographic and media exposure-related variables. To explore the association between exposure and outcome variables, separate multiple binary logistic regressions were conducted for each outcome variable.

Results: More than half of women had low levels of comprehensive knowledge (51.6%) and positive attitudes (54.20%) regarding HIV/AIDS, with significant variations across districts. Women in higher age groups, with higher education, from wealthier families, residing in urban areas, and having exposure to newspapers, the internet, computers, and mobile phones, exhibited higher levels of comprehensive knowledge. While women with higher education levels, residing in rural areas, and having exposure to mobile phones and the internet displayed higher levels of

positive attitudes. However, contrasting results were found for women in higher age groups, married women, and having exposure to newspapers and computers, exhibited lower levels of positive attitudes.

Conclusion: The study results highlighted the urgent need for nationwide awareness programs that should target adolescents, low-educated rural residents, individuals from disadvantaged socioeconomic backgrounds, and regions with limited media access. Implementing HIV/AIDS awareness programs through online platforms and mass media can greatly contribute to improving their attitudes and knowledge levels.

Keywords: HIV/AIDS, Comprehensive knowledge, Positive attitude, Reproductive aged women, Bangladesh.

Background

Since the 1960s, HIV and AIDS have emerged as significant and enduring global epidemics. The global prevalence of HIV stands at a staggering 38.4 million individuals, with an estimated range of 33.9 to 43.8 million. Among them, approximately 36.7 million are adults aged 15 and above, representing a substantial burden [1]. In 2021 alone, over 1.5 million people were newly affected by HIV, with females accounting for 49% of these cases [1]. It is noteworthy that Asia and the Pacific regions rank second in HIV prevalence, with approximately 6 million individuals living with HIV, following sub-Saharan Africa [2-4].

In Bangladesh, the prevalence of HIV/AIDS remains relatively low, affecting around 0.1% of the general population. Currently, an estimated 15,000 individuals in Bangladesh are living with HIV/AIDS, with around 8,000 cases officially confirmed and 4,565 individuals accessing antiretroviral therapy (ART) treatment [4]. In 2021, there were 729 new cases reported, resulting in 205 HIV/AIDS-related deaths. Among the newly diagnosed cases, 26% were from the general population, 26% were from the Rohingya population, and 20% were from the general migrant population [5]. The majority of these cases are concentrated in Dhaka, Chattogram, Khulna, and Sylhet divisions [5].

However, it is crucial to highlight that Bangladesh is currently experiencing a significant increase in the number of migrants, reaching the highest level ever recorded [6]. A majority of these migrants bring their wives along, who occasionally join them for holidays. Unfortunately, due to traditional customs and power dynamics, women often face challenges in negotiating condom use with their partners [7-9], especially when uncertain about their partners' HIV/AIDS status [10-12]. Moreover, reproductive-aged women are often recognized as the most vulnerable group in the context of sexual and reproductive health practices—including HIV/AIDS [12-14]. They are at greater risk of HIV/AIDS transmission due to associated socioeconomic exposures compared to

men [15] due to persistent gender inequality and human rights violations [16]. This underscores the urgent need for targeted interventions and awareness campaigns aimed at preventing HIV/AIDS transmission, as well as improving access to care and treatment. However, in order to effectively address these challenges, it is crucial to have a comprehensive understanding of the knowledge and attitudes regarding HIV/AIDS among the reproductive aged women in Bangladesh.

Regrettably, there is a significant lack of studies addressing this issue in Bangladesh and other low- and middle-income countries (LMICs). The existing studies in Bangladesh primarily focus on assessing knowledge about HIV/AIDS and its associated sociodemographic factors [15, 17-25]. These studies often explore knowledge and myths as separate components [23, 25]. Some studies have exclusively targeted specific groups of respondents, such as school/college-going adolescents [19, 20], married migrant women [26]. In comparison to HIV/AIDS knowledge, there are few studies examining HIV/AIDS attitudes, which have primarily explored discrimination and stigmatization among the general population [14, 27-29], as well as among healthcare professionals [27, 30-32]. Additionally, there is a lack of exploration into factors contributing to comprehensive knowledge on HIV/AIDS [15, 18, 21, 22, 25, 33-38]. Furthermore, there is a dearth of research providing a comprehensive understanding of HIV/AIDS knowledge as well as attitudes among women in Bangladesh, including regional variations.

To address these gaps, this study was conducted to explore the knowledge and attitudes regarding HIV/AIDS among reproductive-aged women in Bangladesh, while also examining geographical variations.

Methods

Sampling and Data Sources: The data for this study was obtained from the 2019 Bangladesh Multiple Indicator Cluster Survey (MICS), conducted by the Bangladesh Bureau of Statistics (BBS)

in collaboration with UNICEF. The survey employed a two-stage stratified random sampling procedure to collect data at the household level from 64 administrative districts in Bangladesh. The sampling strata consisted of urban and rural areas within each district. Within each stratum, a specific number of census enumeration areas (EAs) were systematically selected using Probability Proportional to unit Size (PPS) sampling. After listing households within the selected EAs, a systematic sample of 20 households was drawn from each primary sampling unit (PSU). The survey included a comprehensive reproductive and maternal health related questionnaire administered to women aged 15–49 years, capturing insights on various aspects such as fertility, early childbearing, family planning, unmet need, antenatal care, neonatal tetanus, delivery care, birthweight, postnatal care, maternal morbidity and HIV/AIDS related knowledge and attitudes related items. Details of the sampling procedure can be found in the final report of the 2019 MICS [39].

Selection of the Study Sample: The sample for this study was selected based on two criteria: (i) women aged 15-49 years and (ii) respondents who provided their responses to HIV/AIDS knowledge and attitude-related items during the survey. A total of 39,066 women met these criteria and were included in the analysis. A detailed sample selection process was illustrated in supplementary figure 1.

Outcome Variables: Two outcome variables were considered: (i) Comprehensive knowledge about HIV/AIDS and (ii) positive attitudes towards HIV/AIDS. Total of nine and six questions were used in the survey for knowledge and attitudes, respectively. The questions were responded in three options ("yes", "no" and "don't know" for knowledge and "yes", "no" and "don't know/not sure/depends" for attitudes). The items were dichotomised: for comprehensive knowledge, we assign 1 if the answer is correct, otherwise 0 including "don't know"; while for positive attitudes, we assigned 1 for each item if the responses were positive to the HIV/AIDS, otherwise 0 including "don't know/not sure/depends". Later, the dichotomised items were added separately for comprehensive knowledge (range 0-9) and positive attitudes (0-6). The higher the

score the higher the comprehensive knowledge and positive attitudes. Finally, median value of each of the variable was used as the cut-off point for the high (>median value) and low (≤ median value) level of comprehensive knowledge and positive attitudes.

Explanatory Variables: Explanatory variables considered in this study were selected in two stages. Firstly, a comprehensive literature search was conducted in several databases to create a list of variables considered in other studies in LMICs [15, 18, 21, 22, 25, 33, 36-38, 40-51]. Secondly, the availability of these variables in the survey was checked, and the variables that were available were included in this study. These variables included women's age (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49), women's education (no education, primary, lower secondary, higher secondary, and higher), and marital status (never married, currently married, widowed/divorced/separated). The household wealth quintile variable (poorer, poor, middle, rich, richer), generated by MICS through principal component analysis of household assets such as ownership of radio or television, was also included. Factors related to media exposure were also considered, including reading newspapers or magazines (yes, no), listening to the radio (yes, no), watching television (yes, no), using a computer (yes, no), using the internet (yes, no), and using a mobile phone (yes, no). Geographical factors included place of residence (urban and rural) and divisions (Barisal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, Sylhet).

Statistical Analyses: Descriptive statistics were used to describe the characteristics of the respondents. Percentage distribution of each of the items of comprehensive knowledge and positive attitudes were reported. Spatial distribution was also presented to explore the geographical distribution of these variables. However, this study also examined the skewness of these dependent variables (See supplementary figure 2 and 3). Multiple logistic regression analysis was applied to explore the factors associated with comprehensive HIV/AIDS knowledge and positive attitudes. Two separate models were run, one for comprehensive HIV/AIDS knowledge and one for positive attitudes towards HIV/AIDS. Before running each model, multicollinearity was checked,

153 and if evidence of multicollinearity was found (determined if Variance Inflation Factor [VIF] was
154 >5%), relevant variable was deleted and the model was re-run. Complex survey design was
155 considered in all analyses [52]. STATA software (Stata Corp, TX) was used for all statistical
156 analyses while Arc GIS version 10.4 was used to explore geographical variations.

157 Results

158 Sample characteristics

159 The background characteristics of the respondents are presented in Table 1. The majority of
160 women were in their teenage years (15–19 years, 21.74%), had completed higher secondary
161 schooling (46.36%), and were currently married (75.99%). A significant proportion of women
162 belonged to the richer wealth quintile (28.93%). Approximately three-fourths of the total
163 respondents resided in rural areas and one-fourth (26.28%) of the total respondents resided in the
164 Dhaka division. Approximately 77.41% of the total respondents reported watching television,
165 77.12% used a mobile phone, 18.38% used the internet, 13.35% read newspapers, 7.18% used
166 computers and 3.88% listened to the radio.

167 Table 1. Sociodemographic and media related characteristics of the sample

Characteristics	n	%
Women's age		
15-19	8,495	21.74
20-24	7,394	18.93
25-29	6,763	17.31
30-34	6,279	16.07
35-39	4,890	12.52
40-44	3,056	7.82
45-49	2,190	5.61
Women's education		

No education	2,277	5.83
Primary	5,982	15.31
Lower secondary	7,779	19.91
Higher secondary	18,112	46.36
Higher	4,915	12.58
Women's marital status		
Never married	8,197	20.98
Currently married	29,685	75.99
Widowed	584	1.49
Divorced	418	1.07
Separated	183	0.47
Wealth index		
Poorer	4,198	10.75
Poor	6,101	15.62
Middle	8,004	20.49
Rich	9,458	24.21
Richer	11,303	28.93
Place of residence		
Urban	10,738	27.49
Rural	28,328	72.51
Division		
Barisal	1,642	4.20
Chattogram	7,011	17.95
Dhaka	10,265	26.28
Khulna	5,422	13.88
Mymensingh	2,491	6.38
Rajshahi	5,228	13.38
Rangpur	3,922	10.04
Sylhet	3,085	7.90
Reading newspaper		
No	33,850	86.65
Yes	5,216	13.35
Listening radio		
No	37,550	96.12

Yes	1,516	3.88
Watching television		
No	8,824	22.59
Yes	30,242	77.41
Use computer		
No	36,263	92.82
Yes	2,803	7.18
Use internet		
No	31,886	81.62
Yes	7,180	18.38
Use mobile phone		
No	8,940	22.88
Yes	30,126	77.12
Total	**39,066**	**100.00**

Profiling comprehensive knowledge and positive attitudes regarding HIV/AIDS

Table 2 presents the findings regarding the knowledge and attitudes of the women. More than two-thirds of the women acknowledged that HIV can be prevented by having an uninfected partner and consistently using condoms during sexual intercourses. Approximately 58% of the total women believed that a person who appears healthy can still carry the HIV virus. Additionally, one-third of the women held the misconception that mosquito bites can transmit HIV from an infected person to a non-infected person. Around 4% of the total women believed in the myth of supernatural HIV transmission. Regarding mother-to-child transmission, 72.97% of women agreed that HIV can be transmitted from mother to child during pregnancy, while 75.52% recognized the risk during breastfeeding. Moreover, 57.34% of women acknowledged the potential transmission of HIV from mother to child during delivery. Overall, the findings indicate that 51.6% (95% CI: 50.93- 52.32) of women had a low level of comprehensive HIV/AIDS knowledge, while 48.4% (95% CI: 47.68-49.07) demonstrated a high level of knowledge regarding HIV/AIDS.

183 Table 2. Percentage distribution of dichotomized comprehensive HIV/AIDS knowledge items

Comprehensive HIV/AIDS knowledge items	No n (%)	Yes n (%)
Can avoid HIV by having one uninfected partner	12,555 (32.14)	26, 511 (67.86)
Can get HIV from mosquito bites	26,862 (68.76)	12,204 (31.24)
Can avoid HIV by using a condom correctly every time	14,866 (38.05)	24,200 (61.95)
Can get HIV by sharing food with person who has HIV	24,503 (62.72)	14,562 (37.28)
Can get HIV through supernatural means	37,454 (95.87)	1,612 (4.13)
Healthy-looking person may have HIV	16,032 (41.04)	23,034 (58.96)
HIV from mother to child during pregnancy	10,561 (27.03)	28,505 (72.97)
HIV from mother to child during delivery	16,665 (42.66)	22,400 (57.34)
HIV from mother to child through breastfeeding	9,563 (24.48)	29,503 (75.52)
Level of HIV/AIDS knowledge[1],	**Prevalence (95% CI)**	
Low level of HIV/AIDS knowledge	51.62 (95% CI, 50.93- 52.32)	
High level of HIV/AIDS knowledge	48.38 (95% CI, 47.68-49.07)	

184 Note: [1] Individual with cumulated knowledge score >median value of knowledge had high levels
185 of comprehensive HIV/AIDS knowledge; and ≤ median value of knowledge had low levels of
186 comprehensive HIV/AIDS knowledge.

187 Table 3 provides insights into the attitudes regarding HIV/AIDS among the women. It reveals
188 that more than 48% of women expressed their reluctance to purchase fresh vegetables from
189 shopkeepers infected with HIV. Approximately 41% of women agreed that children with HIV
190 should not be allowed to attend school alongside other children. However, about 54% of women
191 indicated that they would not hesitate to undergo an HIV test due to concerns about how others
192 would react. Over 60% of women believed that negative rumors and gossip circulate about people
193 infected with HIV/AIDS and those who live with them. Furthermore, around 58% of women
194 perceived that individuals with HIV/AIDS or those living with an infected person experience a
195 loss of respect and dignity. Alarmingly, one out of every four women reported feeling ashamed of
196 residing with someone who has HIV/AIDS. Overall, the findings highlight that 54.2% (95% CI:

197 53.52-54.87) of women exhibited a low level of positive attitudes towards HIV/AIDS, while 45.8%
198 (95% CI: 45.13-46.48) demonstrated a high level of positive attitudes towards the disease.

199 Table 3. Percentage distribution of dichotomised attitudes towards HIV/AIDS items

Attitude items	**No** **n (%)**	**Yes** **n (%)**
Would buy fresh vegetables from shopkeeper with AIDS virus	19,074 (48.82)	19,992 (51.18)
Children living with HIV should be allowed to attend school with other children	16,102 (41.22)	22,964 (58.78)
People hesitate to take an HIV test because they are afraid of how other people react	21,100 (54.01)	17,966 (45.99)
People talk badly about people living with HIV, or who are thought to be living	15,333 (39.25)	23,733 (60.75)
People living with HIV, or thought to be living with HIV, lose the respect of others	16,454 (42.12)	22,612 (57.88)
Agreement with the following statement: I would be ashamed if someone in my family	29,178 (74.69)	9,888 (25.31)
Level of HIV/AIDS positive attitudes[1]	Prevalence (95% CI)	
Low level positive attitudes	54.20% (95% CI: 53.52-54.87)	
High level positive attitudes	45.80% (95% CI: 45.13-46.48)	

200 Note: [1] Individual with cumulated attitude score >median value of positive attitudes had high; and
201 ≤ median value of attitudes had low levels of positive attitudes towards HIV/AIDS.

202

203 **Spatial distribution of comprehensive HIV/AIDS knowledge and positive attitudes**

204 Figure 2 illustrates the spatial distribution of HIV/AIDS knowledge, while Figure 3 depicts the
205 spatial distribution of HIV/AIDS attitudes. In terms of knowledge, Tangail, Munshiganj,
206 Shariatpur, Madaripur, Narail, and Chattogram exhibited a range of 15% to 30% of women with
207 a high level of knowledge about HIV/AIDS. Conversely, Sylhet, Lalmonirhat, Rajbari, and Bhola

displayed a higher proportion, ranging from 69% to 84%, of women with a high level of comprehensive knowledge about HIV/AIDS.

In terms of attitudes, Panchagarh, Dinajpur, Kurigram, Lalmonirhat, Jamalpur, Mymensingh, Rajbari, Faridpur, Satkhira, Chandpur, Laksmipur, Bhola, Khagrachari, and Rangamati had a lower level of positive attitudes towards HIV/AIDS, ranging from 15% to 27% of women. Conversely, Cumilla and Madaripur stood out with 72% to 95% of women exhibiting a high level of positive attitudes towards HIV/AIDS.

215 Figure 1. Geographical distribution of the comprehensive HIV/AIDS knowledge among the reproductive aged women in Bangladesh

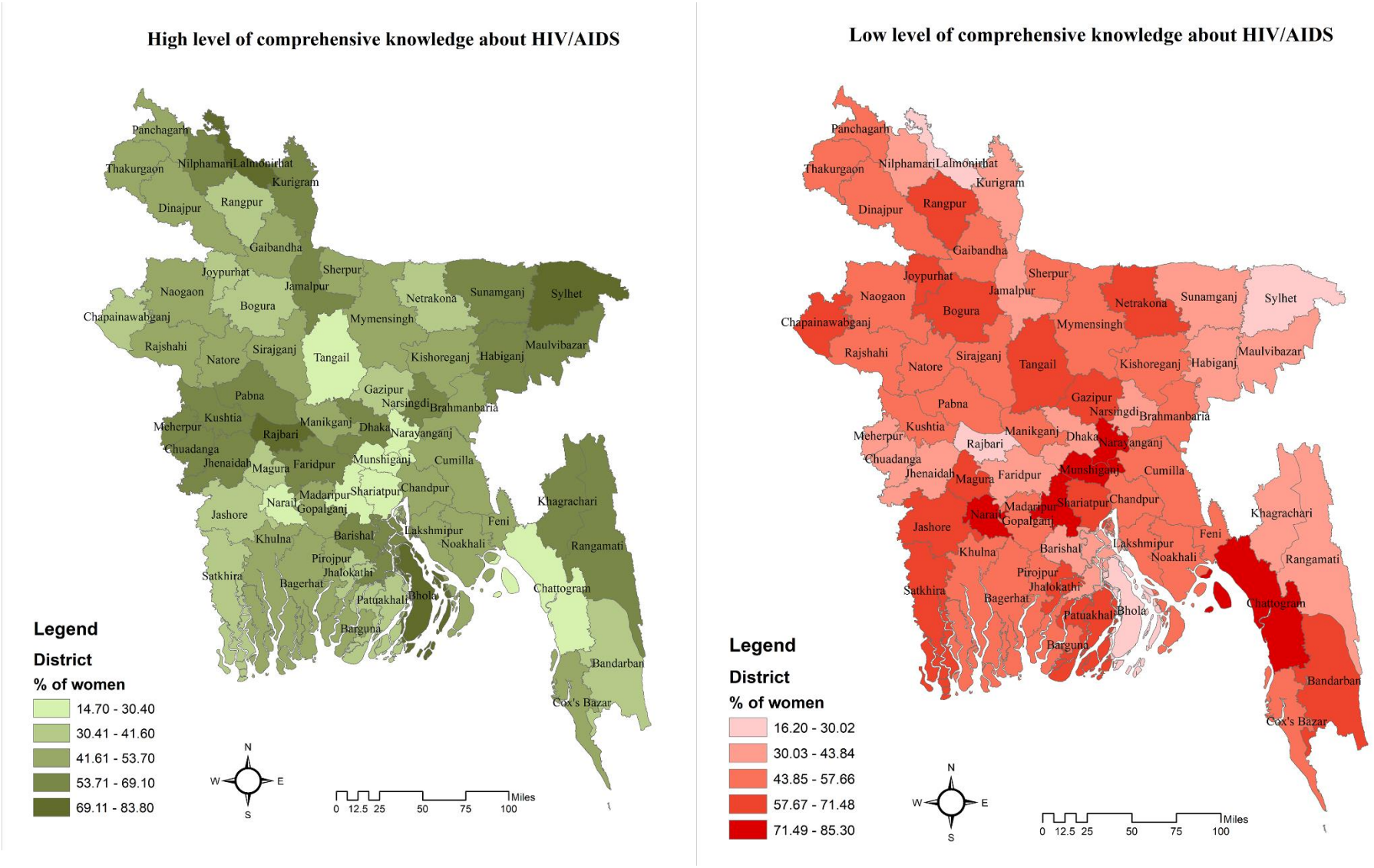
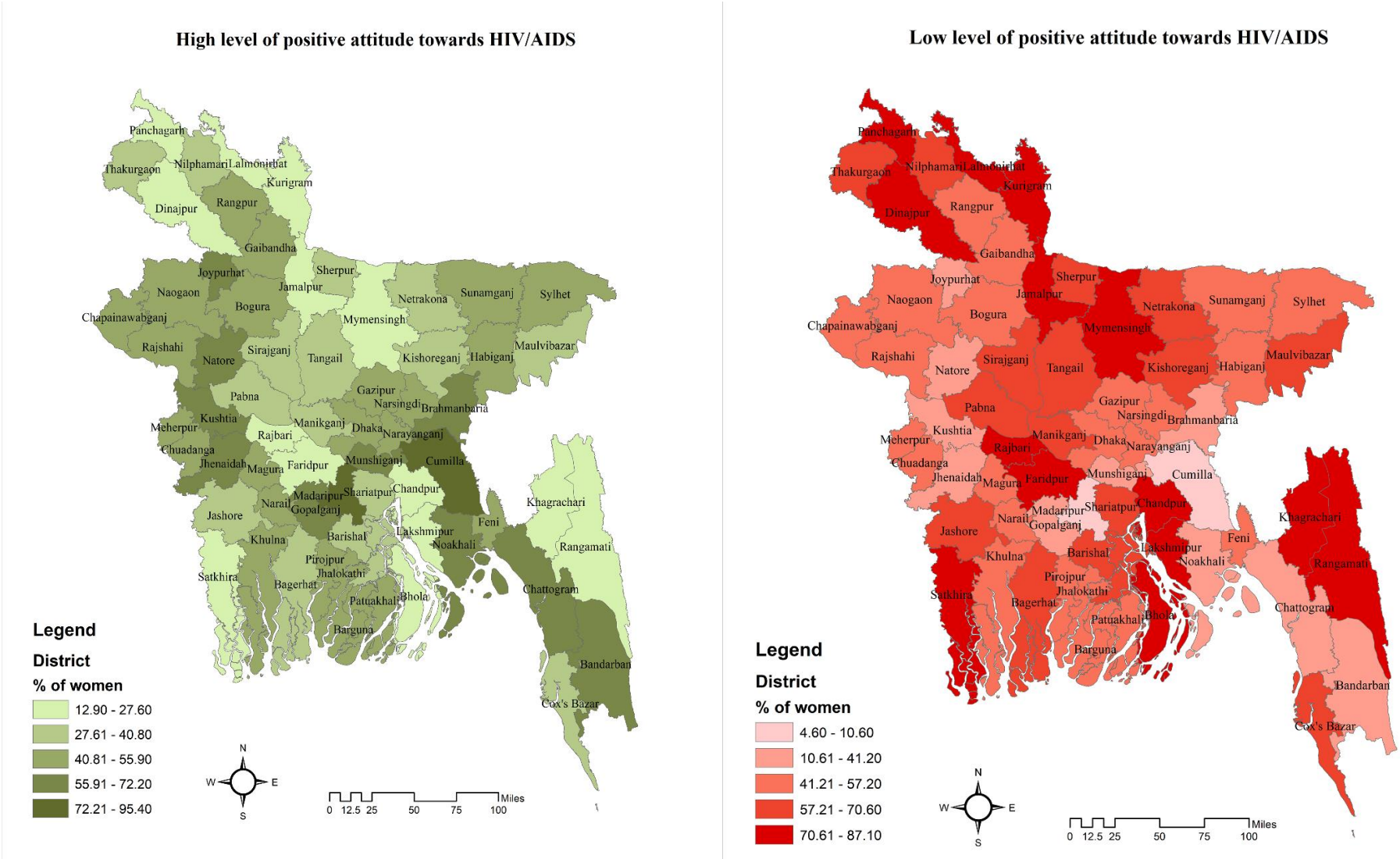


Figure 2. Geographical distribution of the positive attitudes towards HIV/AIDS among the reproductive aged women in Bangladesh



Association of comprehensive HIV/AIDS knowledge and positive attitude toward HIV/AIDS with explanatory variables

The association of explanatory variables with the outcomes variables are determined through chi-square test and the results are presented in Table 4. The study found significant variations in the level of comprehensive HIV/AIDS knowledge among different age groups, educational levels, marital statuses, household wealth quintiles, places of residence, and divisions (Table 4). Similar associations were also noted for positive attitudes towards HIV/AIDS except the place of residence, use radio and use of computer.

Table 4. Association of comprehensive HIV/AIDS knowledge and positive attitudes towards HIV/AIDS with socio-demographic and media exposure variables

Variables	Level of Comprehensive HIV/AIDS knowledge		Chi-square, df, p-value	Level of Positive attitudes towards HIV/AIDS		Chi-square, df, p-value
	Low	High		Low	High	
Women's age						
15-19	53.13	46.87		51.63	48.37	
20-24	47.43	52.57		52.41	47.59	
25-29	49.6	50.4	**<0.001**	54.07	45.93	**<0.001**
30-34	51.98	48.02		55.55	44.45	
35-39	53.61	46.39		56.74	43.26	
40-44	53.73	46.27		56.86	43.14	
45-49	57.82	42.18		57.28	42.72	
Women's education						
No education	67.1	32.9	**<0.001**	58.21	41.79	**<0.001**
Primary	64.74	35.26		59.33	40.67	
Lower Secondary	60.35	39.65		56.29	43.71	
Secondary	47.75	52.25		52.43	47.57	

Higher	28.95	71.05		49.29	50.71	
Marital status						
Never married	47.9	52.1		50.15	49.85	
Currently married	52.52	47.48	**<0.001**	55.19	44.81	**<0.001**
Widowed	57.2	42.8		55.82	44.18	
Divorced	51.16	48.84		59.19	40.81	
Separate	57.17	42.83		58.03	41.97	
Wealth quintile						
Poorer	60.18	39.82		61.68	38.32	
Poor	58.31	41.69	**<0.001**	58.16	41.84	**<0.001**
Middle	54.69	45.31		55.8	44.2	
Rich	51.24	48.76		53.35	46.65	
Richer	43.00	57.00		48.84	51.16	
Place of residence			**<0.001**			**ns p=0.181**
Urban	46.41	53.59		53.4	46.6	
Rural	53.60	46.40		54.50	45.5	
Division						
Barisal	47.12	52.88		57.13	42.87	
Chattogram	57.84	42.16		42.64	57.36	
Dhaka	54.59	45.41		52.34	47.66	
Khulna	53.54	46.46	**<0.001**	55.69	44.31	**<0.001**
Mymensingh	53.16	46.84		74.33	25.67	
Rajshahi	52.4	47.6		51.6	48.4	
Rangpur	47.53	52.47		65.31	34.69	
Sylhet	29.29	70.71		56.42	43.58	
Reading newspaper			**<0.001**			**<0.001**
No	54.37	54.34		54.34	45.66	
Yes	33.8	53.25		53.25	46.75	
Listening radio						**ns p=0.091**
No	51.97	54.3	**<0.001**	54.3	45.7	
Yes	43.04	51.57		51.57	48.43	

Watching television			**<0.001**			**<0.001**
No	55.6	57.58		57.58	42.42	
Yes	50.46	53.21		53.21	46.79	
Use computer						**ns p=0.084**
No	53.31	54.36	**<0.001**	54.36	45.64	
Yes	29.76	52.06		52.06	47.94	
Use internet						
No	53.61	55.5	**<0.001**	55.5	44.5	**<0.001**
Yes	42.83	48.38		48.38	51.62	
Use mobile phone			**<0.001**			**<0.001**
No	57.29	57.23		57.23	42.77	
Yes	49.94	53.29		53.29	46.71	

Multivariate modelling to determine factors associated with comprehensive HIV/AIDS knowledge and positive attitude towards HIV/AIDS

The factors associated with comprehensive HIV/AIDS knowledge and positive attitudes are presented in Table 5. In comparison to women aged 15-19 years, the likelihood of having comprehensive HIV/AIDS knowledge increased by 12% to 20% with higher age groups, except for women aged 45-49 where the likelihood increased by 11%. Women who completed primary, lower secondary, secondary, and higher education reported 10.8% to 300% increased likelihood of having comprehensive HIV/AIDS knowledge as compared to women with no formal education. Married women had a 9% higher likelihood of having a high level of comprehensive HIV/AIDS knowledge compared to never-married women. Rural women were observed to have a 10% lower likelihood of possessing a high level of comprehensive HIV/AIDS knowledge compared to urban women. Moreover, a gradual increase in comprehensive HIV/AIDS knowledge had been observed with the rise in household wealth quintile, ranging from 11% to 23% higher among households with greater wealth compared to poorer households. Women from

Chattogram, Dhaka, Khulna, Rajshahi and Mymensingh divisions were 14-41% less likely to have a high level of comprehensive HIV/AIDS knowledge, while women from Sylhet division had a 158% higher likelihood of having a high level of comprehensive HIV/AIDS knowledge compared to women from the Barisal division. Women who read newspapers or magazines, use computer, the internet, and mobile phones were 13-27% more likely to have high HIV/AIDS related knowledge, compared to women who did not expose to those media-related exposures, respectively.

In contrast to comprehensive knowledge, women of higher ages were found to be 4% to 14% less likely to possess a high level of positive attitudes towards HIV/AIDS compared to women aged 15-19. Married women exhibited a 14% lower likelihood of having a high level of positive attitudes towards HIV/AIDS compared to never married women. Conversely, rural women were 14% more likely to have a high level of positive attitudes compared to urban women. Moreover, women with higher education had an 18% higher likelihood of having a high level of positive attitudes compared to women with no education.

When it comes to household wealth, women from middle, richer, and richest households were 15% to 44% more likely to exhibit a high level of positive attitudes towards HIV/AIDS compared to women from poorer households. In terms of geographical divisions, women in Chattogram and Rajshahi reported a 63% and 22% higher likelihood of positive attitudes towards HIV/AIDS, respectively, compared to women in the Barisal division. On the other hand, women in Mymensingh and Rangpur divisions were 54% and 31% less likely to have a high level of positive attitudes compared to women in the Barisal division.

Additionally, women who read newspapers or magazines and those who use computer were 16% and 12% less likely, respectively, to report positive attitudes towards HIV/AIDS compared to those who did not engage in these activities. Conversely, women who used mobile phones had a 14%

higher likelihood of possessing a high level of positive attitudes towards HIV/AIDS compared to those who did not.

Table 5. Multivariate logistic regression analyses of comprehensive HIV/AIDS knowledge among the reproductive aged women in Bangladesh

Variables	Level of Comprehensive HIV/AIDS knowledge		Level of Positive attitudes towards HIV/AIDS	
	AOR (95% CI)	P-value	AOR (95% CI)	P-values
Women's age				
15-19	1.00		1.00	
20-24	1.12 (1.03-1.22)	<0.01	0.96 (0.88-1.04)	0.337
25-29	1.16 (1.05-1.27)	<0.01	0.93 (0.85-1.02)	0.118
30-34	1.19 (1.08-1.31)	<0.001	0.89 (0.81-0.98)	<0.05
35-39	1.20 (1.08-1.33)	<0.001	0.85 (0.77-0.94)	<0.01
40-44	1.20 (1.07-1.35)	<0.001	0.86 (0.76-0.96)	<0.05
45-49	1.11 (0.97-1.26)	0.126	0.86 (0.76-0.97)	<0.05
Women's education				
No education	1.00		1.00	
Primary	1.11 (0.98-1.25)	0.092	0.88 (0.78-0.98)	<0.05
Lower Secondary	1.41 (1.25-1.59)	<0.001	0.93 (0.83-1.05)	0.252
Secondary	2.34 (2.07-2.64)	<0.001	1.00 (0.89-1.12)	0.987
Higher	4.01 (3.45-4.65)	<0.001	1.18 (1.03-1.37)	<0.05
Marital status				
Never married	1.00		1.00	
Currently married	1.09 (1.00-1.19)	<0.05	0.86 (0.80-0.94)	<0.001
Widowed	0.97 (0.78-1.20)	0.773	0.88 (0.71-1.08)	0.214
Divorced	1.11 (0.88-1.39)	0.391	0.74 (0.58-0.94)	<0.05
Separate	0.99 (0.72-1.39)	0.991	0.78 (0.56-1.10)	0.157
Wealth quintile				
Poorer	1.00		1.00	
Poor	1.05 (0.95-1.15)	0.325	1.15 (1.04-1.27)	<0.01
Middle	1.11 (1.01-1.22)	<0.05	1.15 (1.04-1.27)	<0.01

Rich	1.17 (1.06-1.29)	<0.01	1.22 (1.11-1.36)	<0.001
Richer	1.23 (1.10-1.38)	<0.001	1.44 (1.28-1.62)	<0.001
Place of residence				
Urban	1.00		1.00	
Rural	0.90 (0.83-0.96)	<0.01	1.14 (1.06-1.22)	<0.001
Division				
Barisal	1.00		1.00	
Chattogram	0.59 (0.53-0.66)	<0.001	1.63 (1.47-1.81)	<0.001
Dhaka	0.65 (0.58-0.72)	<0.001	1.10 (0.99-1.23)	0.081
Khulna	0.79 (0.71-0.88)	<0.001	1.04 (0.93-1.15)	0.492
Mymensingh	0.86 (0.75-0.99)	<0.05	0.46 (0.39-0.53)	<0.001
Rajshahi	0.84 (0.75-0.94)	<0.01	1.22 (1.10-1.37)	<0.001
Rangpur	1.05 (0.93-1.18)	0.406	0.69 (0.61-0.77)	<0.001
Sylhet	2.58 (2.26-2.94)	<0.001	0.97 (0.85-1.10)	0.647
Reading newspaper				
No	1.00		1.00	
Yes	1.27 (1.16-1.39)	<0.001	0.84 (0.77-0.92)	<0.001
Listening radio				
No	1.00		1.00	
Yes	0.89 (0.77-1.02)	0.093	1.01 (0.88-1.16)	0.850
Watching television				
No	1.00		1.00	
Yes	1.04 (0.98-1.12)	0.184	1.06 (0.99-1.13)	0.086
Use computer				
No	1.00		1.00	
Yes	1.45 (1.28-1.64)	<0.001	0.88 (0.79-0.98)	<0.05
Use internet				
No	1.00		1.00	
Yes	1.16 (1.07-1.25)	<0.001	1.05 (0.98-1.14)	0.165
Use mobile phone				
No	1.00		1.00	
Yes	1.13 (1.06-1.20)	<0.001	1.14 (1.07-1.22)	<0.001

271 Note: AOR: Adjusted Odds Ratio; CI: Confidence Interval.

Discussions

The study findings indicate that the majority of women had a low level of comprehensive knowledge and positive attitudes regarding HIV/AIDS with significant regional variations. Various socio-demographic and mass-media-related factors were identified as associated with comprehensive knowledge and attitudes towards HIV/AIDS. Specifically, low levels of HIV/AIDS knowledge and attitudes were primarily observed among women with no formal education or primary education, rural women, and women in the poorest wealth quintile. Therefore, the findings of this study suggest the need for comprehensive policies and programs aimed at increasing knowledge and attitudes towards HIV/AIDS. Priority should be given to women who are disadvantaged in terms of socio-demographic factors.

According to this study, more than half of the women in Bangladesh lack sufficient knowledge about HIV/AIDS, and this knowledge gap varies across different regions. These findings are consistent with other studies conducted in Bangladesh [23, 24] and neighboring countries, including India [53, 54] and Pakistan [38]. Furthermore, it was observed that more than one-third of women in Bangladesh had never heard of HIV/AIDS, which aligns with the previous studies [23, 24]. The prevalence of stigmatizing attitudes towards HIV/AIDS was also found to be common, reflecting a situation similar to other South Asian countries [55]. Additionally, a significant number of women held myths and misconceptions, which hindered progress and contributed to negative attitudes. These findings suggest that the national strategic plan in Bangladesh to reduce HIV vulnerabilities has not been effective enough in generating knowledge about HIV/AIDS and improving attitudes [56].

There are several factors contributing to the lower levels of knowledge and attitudes regarding HIV/AIDS among women in Bangladesh. One key factor is the cultural sensitivity and social norms surrounding sexual issues, which often leads to feelings of shyness and reluctance to discuss

296 sexual and reproductive problems openly [57-59]. Over 70% of the population residing in rural
297 areas, access to information about HIV/AIDS is further limited to them. Women in these areas
298 are often isolated from discussions related to sexual and reproductive health [22, 60-64]. Stigma
299 and culturally ingrained superstitious beliefs also play a significant role [60-62]. This is particularly
300 true for women in lower-income societies, rural areas, and ethnic groups, who may face higher
301 levels of stigma and place greater belief in cultural norms and customs [17, 62, 64-67]. Collectively,
302 these factors contribute to the lower levels of knowledge and attitudes regarding HIV/AIDS
303 among women in Bangladesh, which has also explored in this study.

304 Restricted access to information about HIV/AIDS is another significant factor contributing to
305 lower levels of knowledge and positive attitudes [17, 48, 68-71], as reported in this study. These
306 restrictions manifest in various forms. For example, family members can play a crucial role in
307 raising awareness about HIV/AIDS, particularly older generations [61, 72, 73]. However, older
308 generations in Bangladesh often hold superstitious beliefs and stigmatize discussions related to
309 sexuality [74]. They have not been adequately targeted by awareness-building programs,
310 perpetuating their stigmatized attitudes [74]. Textbooks, healthcare facilities, and awareness-
311 building programs are essential sources for generating knowledge and shaping attitudes regarding
312 HIV/AIDS. While safe sexual and reproductive health-related topics are now included in
313 secondary education curricula in Bangladesh, these subjects are often not effectively discussed in
314 the classroom [75-77]. Consequently, women who dropped out of primary education miss out on
315 formal channels for receiving HIV/AIDS-related knowledge and developing attitudes.
316 Furthermore, door-to-door services aimed at disseminating information about HIV/AIDS are
317 mostly ineffective, as family planning workers, who are primarily responsible for these efforts,
318 often neglect sharing such knowledge due to their limited numbers, heavy workloads, and lack of
319 monitoring [14, 62, 74]. They prioritize distributing contraception and providing family planning

and maternal healthcare services, overlooking the importance of sharing HIV/AIDS-related knowledge [14].

This study found that different types of media exposure played distinct roles in influencing both comprehensive knowledge and attitudes towards HIV/AIDS. For instance, newspaper readers tended to have a higher level of comprehensive knowledge but exhibited lower levels of positive attitudes. Similar patterns were observed for computer users. On the other hand, women exposed to mobile phones and the internet were more likely to possess both knowledge and positive attitudes. These findings align with previous studies investigating HIV/AIDS-related knowledge [21, 23, 70]. However, it is essential to note that while media exposure may positively impact HIV/AIDS knowledge levels, it can lead to contrasting attitudes. This aspect bears significant implications for HIV prevention strategies. The experience with media contributions during the COVID-19 pandemic also highlights this issue, where media successfully translated and disseminated knowledge, but the lack of positive attitudes hindered the impacts of strategic interventions, particularly in remote rural areas of Bangladesh [78]. Therefore, there is still room for improvement because it is not effective for developing positive attitudes.

This study has many strengths and a few considerable limitations. the study focused on all the women who were at their reproductive ages that can help translating into HIV/AIDS prevention programs developing comprehensive awareness, and reducing negative attitudes. The analysed data represents the national estimates of the comprehensive knowledge and attitudes of women aged 15–49, and rigorous statistical analyses considering the cluster effects make these estimates more representative. However, this study limited to the women who had heard of HIV/AIDS, because the MICS survey only collects knowledge and attitude items from those who have heard of it. This study also excludes men and transgenders, therefore, the gender-based role on HIV/AIDS awareness are not being assessed.

Conclusions

The study found that around half of the women in Bangladesh lack comprehensive knowledge and positive attitudes towards HIV/AIDS. Specifically, low levels of HIV/AIDS knowledge and attitudes were primarily observed among lower-educated, rural women, women from lower socioeconomic status, and women where the media has been compromised. This study also recommend an urgent call for developing the HIV/AIDS awareness and positive attitudes for the women targeting those vulnerable groups. The media can be an effective intervention for promoting awareness about HIV/AIDS in this regard. However, the media promotion should be developed in such a way that it can also be utilized to reshape their attitudes towards the disease.

Abbreviations

HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
CI	Confidence Interval
AOR	Adjusted Odd Ratio
COVID-19	Coronavirus Disease 2019
STDs	Sexually Transmitted Diseases
df	Degrees of Freedom
SDGs	Sustainable Development Goals
MICS	Multiple Indicator Cluster Survey

Availability of Data and Materials:

The data is openly available to the UNICEF MICS databases in https://mics.unicef.org/surveys on request.

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There is no conflicting interest.

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Conceived and designed the experiments: MAB, RAMY Analyzed the data: MAB; Supervise and Review: RAMY, RMM, MNK; Wrote the paper: MAB, MNK, RAMY, RMM.

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STROBE checklists

Other