**Factors associated with knowledge and awareness of HIV/AIDs among married women in Bangladesh: evidence from three consecutive multiple indicator cluster survey (MICS)**

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**Abastract**

Married women in Bangladesh share an indiscriminate burden and greater risk of the HIV epidemic and the associated socioeconomic consequences compared to men. Knowledge and awareness level largely contribute to describe the prevalence and consequences of HIV/AIDS among Bangladeshi married women. Previous studies have demonstrated the levels of HIV knowledge and awareness with it factors that influencing its prevalence among the married women in Bangladesh. However, in our knowledge no studies conducted that explain the prevalence, trends, and the determinants with several survey data in Bangladesh. So, it is required to conduct studies based on all recent survey data to explore the determinants of HIV awareness. In this study, we aimed to find the determinants of HIV knowledge and awareness level in relation to the socio-demographic variables influencing among the married women in Bangladesh. We used three waves of Multiple Indicator Cluster Survey (MICS) conducted in 2006, 2012, and 2019. This study included 33843 in 2006, 20727 in 2012, and 29724 in 2019 married women who heard about HIV. A score of the respondent’s knowledge and awareness was determined based on some questions. We used stepwise logistic regression models for analyzing the data. We found the prevalence of adequate knowledge and awareness level of different questions increased from 55.20% in 2006 to 58.69% in 2019 about the HIV/AIDS. Respondents’ education status, mass media access, place of living, and working status played significant role on the awareness. As expected, respondents with higher education were more aware than those with no education. Respondents having highest education had 4.03 (95% CI: 3.50-4.64) times more chance to obtain “High Score” in 2019 MICS which is 5.30 times in 2012 MICS (95% CI: 4.41-6.37) and 2.58 times in 2006 MICS (95% CI: 2.28-2.93) compared to illiterate married women. Moreover, respondents from urban area were 1.13 (95% CI: 1.04-1.22) times more chance to obtain “High Score” compare to rural area in 2019 MICS which is smaller in 2012 MICS 1.14 (95% CI: 1.01-1.29) and 2006 MICS 1.16 (95% CI: 1.06-1.26), respectively than the rural married women. Although a sizeable proportion of women had an adequate knowledge and awareness regarding the HIV/AIDS, but it is decreasing in recent survey. Thus, we recommend implementing educational programmes in the curriculum, mass media i.e., television or social media to ensure a standard level of awareness throughout the nation.

**Keywords:** Multiple Indicator Cluster Survey (MICS); HIV/AIDS; awareness; knowledge; mass media; Global health; Married women, Women health

**Introduction:**

Human Immunodeficiency Virus (HIV) / Acquired Immune Deficiency Syndrome (AIDS) is one of the most pandemic spreading diseases in worldwide and women in Bangladesh share a breeding ground of HIV compared to men1. Despite of major advancements in the information, diagnostics, treatment and prevention of HIV/AIDS, the number of deaths due to HIV and related complications continues to rise 2,3. Globally, 770000 people have died from HIV related causes and 37.9 million people are living with HIV as of 2018. Among all HIV cases, 24.5 million people living with HIV were under antiretroviral therapy, majority of them were married women aged 15-44 because women experience a lot of hormonal changes, microbial ecology and physiology4–7.

According to UNAIDS, at the end of 2013, in Asia and the Pacific there were 4.8 million people living with HIV, with China, India, Indonesia, Myanmar, Thailand, and Vietnam accounting for more than 90% of the people living with HIV in the region. The number of AIDS-related deaths in Asia fell by 37% between 2005 and 20138.

In Bangladesh, there is a low prevalence of AIDS, with the virus affecting 0.1 per cent of the general population. But evidence shows that new cases are on the rise. Till 1st December 2017, 5,586 HIV positive cases were detected in Bangladesh of whom 865 were new. Most of the newly identified people living with HIV were concentrated in Dhaka (54%), Chittagong (21%), Khulna (10%) and Sylhet divisions (6%)9. HIV is spreading beyond the key groups, such as sex workers and injecting drug users10. Though the number of infected cases among the women in Bangladesh is lower rate compared to men in recent years, the possibility of expanding rate of HIV among women can’t be underestimated11. In the past five years, the numbers of housewives and pregnant mothers with HIV have risen. The rise in female cases is seen globally as feminization and an early sign of epidemic10.

Women in Bangladesh are considered to be exposed with a high risk of HIV due to lack of opportunity for general and health education because of gender inequality and male dominance12. Mostly, women share a large percentage of the consequences of this disease due to their less advantaged socio-economic position, limited access of sexually and reproductive health care13–15 and that’s why women are in more vulnerable situation to HIV infection and transmission. It’s also true that women in Bangladesh about HIV/AIDS is contaminated with myths and rumors which increases the number of HIV infection or transmission16. The factors responsible for expanding the infections of HIV in Bangladesh are mainly poverty, medical facilities, education, lack of sufficient screening practices, and unprotected sexual practices1. Especially in the southern part of Bangladesh, with the influx of forcibly displaced Myanmar nationals or the Rohingya people in 2017, the risk of HIV infections increased due to increased sharing of syringes, needles, unprotected sexual practices and most importantly lack of knowledge17.

Many studies have been conducted to know the level of knowledge and awareness about HIV/AIDS among the married women in Bangladesh using both primary and secondary data. Similar findings were found in several studies like the findings from BDHS in 2007 and India’s national family health survey in 2005-200618,19. Since there is no cure still invented and there is now a high risk of spreading in Bangladesh, higher level of awareness is needed among the people. In this situation, further research can show the present view of knowledge level among the married women of Bangladesh. Therefore, in this study, we aimed to explore the knowledge and awareness of HIV among the married women in Bangladesh, using three waves of Multiple Indicator Cluster Survey (MICS) dataset. We also intend to find out the factors of changing knowledge, attitude and intensity of HIV as well as the impact where advancement is required to enhance the knowledge of HIV.

**Methods:**

**Data source and study variables**

We used three waves of Multiple Indicator Cluster Survey (MICS) conducted in 2006, 2012, and 2019. MICS is a large, multidimensional nationally representative household survey conducted by the UNICEF. This survey uses standardized questionnaires to provide the information and key indicators on the situation of children. Mostly, they focus on reproductive health, maternal and child health interventions, child nutrition status, and early childhood development. MICS also collects an identical set of socioeconomic characteristics of individuals and households20,21. Datasets were open access in the public domain 22.

**Sampling design and sample size**

The MICS survey is a two-stage cluster sampling procedure, randomly selecting women with reproductive age. MICS-2006 is based on a sample of 78260 women interviewed with a response rate of 92.5%, MICS-2012 is based on a sample of 59599 women interviewed with a response rate of 98.5% and 2019 MICS is based on a sample of 68709 interviewed with a response rate of 99.4%. Census enumeration areas were defined as primary sampling units (PSUs), and were selected from each of the sampling domains by using systematic pps (probability proportional to size) sampling procedures, based on the estimated sizes of the enumeration areas from the recent Population Census. MICS provides a comprehensive picture of children’s and women’s health in the seven administrative divisions (Dhaka, Chittagong, Sylhet, Rajshahi, Rangpur, Barisal, and Khulna) of Bangladesh. Districts were identified as the primary sample strata for sample selection at two stages20,21.

**Outcome**

Respondents who have ever heard of AIDS were asked 9 HIV knowledge and awareness related questions in 2012 and 2019 MICS survey and 10 questions were asked in 2006 MICS survey (Table 1). Where for each of the question, 1 was assigned for the correct answer and 0 was coded for the ‘wrong’ or ‘don’t know’ one. No deductions were done for any incorrect answer. Based on the summation of the scores, knowledge and awareness score was prepared which was used the outcome variable. In 2006 MICS survey, median was taken as 8 whereas medians were taken as 5 and 6 for 2012 and 2019 MICS survey. This had a possible range of 0 to 10, whereby higher scores indicated greater knowledge and awareness of HIV. Finally, scores greater than or equals to the median23 were assigned to ‘High score’ category and the rest scores were treated as to fall in the category, ‘Low score’24.

**Covariates**

A set of covariates such as ten years age group (15-24, 25-34, 35-44, 45+), residency type, respondent’s education, religion, wealth index, household’ education level, access to mass media and religion were used for this study. Two back-to-back 5 years age groups were merged to generate the 10 years age group variable. Access to mass media variable was generated by respondent’s condition to reach to at least one of three mediums television, newspaper or radio.

**Statistical analysis**

Descriptive statistics of each of the selected covariates and distribution of HIV score categories were shown by adjusting the sampling weight of the survey. Similarly, weighted percentages were calculated and Pearson’s chi-squared test was used to determine the association between HIV score categories and other socio-demographic characteristics. As our outcome is a binary variable, we first applied logistic regression models. Then, we fitted univariate models using all potential covariates with HIV score category variable. We used p—value of ≤ 0.05 as a criterion to include covariates in the multivariable models. We used stepwise procedures to select the best model. Therefore, in our final model, we had included all significant covariates and some key variables related to the outcome.

The Area under the Receiver Operating Characteristic (AUROC), the indicators of sensitivity, specificity, Calibration belt plot and Hosmer-Lemeshow goodness of fit test to evaluate the accuracy of best model. The higher ROC areas indicated a better performance of the models. In ROC curve, lower P-value conclude that the model actually does discriminate between two categories and area under curve is higher than the 0.5025. Calibration and Hosmer-Lemeshow goodness of fit test measures how well the model-estimated probabilities agree with the observed outcomes, and it is typically evaluated via a goodness-of-ﬁt test. Calibration belt plot and Hosmer-Lemeshow goodness of fit test with P-value greater than 0.05 suggest the ability of the model to correctly classify observations into outcome categories 26,27.

To account for the complex survey design, we used the Svyset command in Stata (StataCorp LP, College Station, Texas). The Svyset command helps us to use design elements such as the primary sampling unit, strata, cluster, and sample weight 28.

**Results:**

This study included 33843 in 2006, 20727 in 2012, and 29724 in 2019 married women who heard about HIV. The prevalence of achieved high score in knowledge and awareness questions increased from 55.20% in 2006 to 58.69% in 2019 (Figure-1 and Figure-2). According to wealth index31.2633.82 27.72 (Figure-3)In Sylhet division, following 2019 MICS survey, 8.66% respondents scored high score regarding HIV knowledge whereas in 2006 and 2012 MICS, these were 3.97% and 3.14% respectively. However, subjects from Dhaka division made the lowest percentage (24.73%) of high score in 2019, which were previously 34.90% and 35.44% in 2012 and 2006 MICS.

Table 1 shows the comparison of correct response rate over a thirteen-year period (2006 to 2019). Percentage of correct response to the questions about HIV related awareness have fallen all over the time period for most of the questions except the questions about using of condom every time which shows a drop down in 2012 against 2006 (65.89% to 52.31%) but shows a risen loop in 2019 against 2012 (52.31% to 62.42%) and table 1 also shows changes in the percentage of people who know HIV transmission is not possible by sharing food. The overall status of the percentage of knowing that HIV cannot be transmitted by food is 49.43% according to 2006 MICS survey whereas it is increased 52.14% in 2012 MICS survey and this percentage increased incredibly in 2019 showing 82.46%.

Table 2 represents the status of respondents affecting the levels of HIV score category by their socio-demographic characteristics by using chi square test showing the p-values. HIV

Over thirteen-year time period, household’s education level shows a significant change in score of HIV awareness. In 2019 MICS survey, 77.13% respondents having secondary or higher education level scored ‘high’ which was 70.29% in 2006 MICS survey.

Table 3 portrays the outcome of binary logistic regression analysis of HIV/AIDS related awareness, counting 95% CI for odds ratio. In brief, respondents aged 25-34 years were 1.11 (95% CI: 1.04- 1.19) times more likely to get ‘High Score’ in 2019 which is comparatively smaller than 2012 MICS’s “High Score” [1.20 (95% CI: 1.09-1.32)] and greater than 2006 MICS’s 1.06 (95% CI: 0.99-1.13) compared to 15-19 years married women. According to MICS 2019, HIV awareness in married women from Sylhet division were 2.42 (95% CI: 2.08-2.83) times more likely to get “High Score” which is lower in 2012 MICS 0.51 (95% CI: 0.42-0.61), 2006 MICS (OR=0.83, 95% CI: 0.71-0.98), respectively compared to Barisal division. As expected, respondents from urban area were 1.13 (95% CI: 1.04-1.22) times more chance to obtain “High Score” compare to rural area in 2019 MICS which is smaller in 2012 MICS 1.14 (95% CI: 1.01-1.29) and 2006 MICS 1.16 (95% CI: 1.06-1.26), respectively than the rural married women. Respondents who have mass media access were 1.13 (95% CI: 1.05-1.21) times more chance to obtain “High Score” in 2019 MICS which is smaller than 2012 MICS 1.36 (95% CI: 1.24-1.48) compared to married women who haven’t mass media access. Respondents having highest education had 4.03 (95% CI: 3.50-4.64) times more chance to obtain “High Score” in 2019 MICS which is 5.30 times in 2012 MICS (95% CI: 4.41-6.37) and 2.58 times in 2006 MICS (95% CI: 2.28-2.93) compared to illiterate married women.

Our model fitting criteria the AUC of receiver operating characteristic curve (ROC) was found to be 0.624 (Asymptotic p-value: 0.000 and 95% CI: 0.619–0.66), 0.677 (Asymptotic p-value: 0.000 and 95% CI: 0.669–0.685), and 0.657 (Asymptotic p-value: 0.000 and 95% CI: 0.651–0.663) indicating the final selected model for MICS-2006, MICS-2012, and MICS-2019 respectively showed higher area under curve than 0.50. The output of the Calibaration belt plot reports that the p-value of MICS-2006, MICS-2012 and MICS-2019 were 0.845, 0.680, and <0.001 which suggest that the hypothesis of good calibration is not rejected in MICS-2006 and MICS-2012 model but the calibration is not good for MICS-2019. According to Hosmer-Lemeshow chi-squared and p-value the MICS-2006 model fitted best following MICS-2012 and MICS-2019. Figure 4 also illustrate a classification plots which intersect sensitivity and specificity in a probability cutoff value. The intersect point is equivalent to classification accuracy of the model. The classification accuracy of MICS-2006, MICS-2012 and MICS-2019 were 59.92%, 66.97%, and 63.03%, respectively (Table 4).

**Discussion:**

We investigated the knowledge and level of consciousness about HIV/AIDS among sexually active women of Bangladesh. This study identified some socio-demographic and background determinants of HIV awareness such as age, residence type, level of education, wealth index, and so on.

We investigated the knowledge and level of consciousness about HIV/AIDS among sexually active women of Bangladesh. We observed that a large portion of the women (58.69%) had high score regarding HIV-related knowledge and awareness according to latest available MICS data.The figure was lower than that of a comparative study conducted in ; in which DHS data in each country was used;1,29 30 Many countries used mass communication through mass media to raise awareness of HIV/AIDS 31. One study encompassing information among people aged 15–24 from 137 countries figured that the rate of comprehensive knowledge about HIV prevention was lower among women compared to men (36 % among women vs 40 % among men) 32.

Findings of our study showed people of age group 25-34 years tend of having high HIV awareness compared to the people of other age groups, reflecting similarities with previous study 33. Since people of this age group generally get in touch with social platform and other ways of mass media, which support them to increase the HIV awareness among them. One Serbia based study revealed that 53% women of Serbian women aged 15-49 are likely to have immense knowledge about HIV/AIDS 34. A mixed model analysis of BDHS pooled data describes that women of different age group have different level of HIV/AIDS knowledge whereas women aged 20-29 years are more aware of HIV than young married women (15-19 years)35.

Level of education was also an important influencing factor among the determinants since this study revealed people of having secondary completed or higher education tend to have more HIV awareness than other, which is consistent with other previous studies 36–38. Previous studies have identified women’s education has wider repercussions and as per the current study education increases the chances of having higher HIV knowledge 39.

Our study also identified that married women who have access to mass media were likely to have higher knowledge about HIV awareness. Earlier publications showed the similar result about the influence of mass media accessibility regarding HIV awareness among the married women 40,41. Social barriers to increasing knowledge about sexually transmitted diseases are decreasing with the access of media and social media 42. Similarly richest respondents showed having comparatively higher knowledge regarding HIV than the other categories of wealth indexed people. In our study, household wealth status was significantly associated with levels of HIV knowledge. Poorest were less likely to be in the “High Score” group of HIV knowledge than for those who were in the richest group. The belief that economic solvency ensures access to basic necessities such as proper living condition, education, healthcare services which provides the condition for effective health communication and knowledge acquirement may not be directly playing a role in HIV knowledge 39. Because the people of this category have easy access to mass media and tend of having higher education which help them to know more about HIV awareness. Previous publication also shoed same result for this category of people 41,43.

We also noticed variations in awareness levels regarding HIV observed among the different people in different administrative divisions in Bangladesh. People living in Sylhet districts had higher HIV awareness in 2019 MICS compared to other division. This clearly indicates the unequal coverage of awareness building programs regarding HIV, so implementation of such programs in all divisions need to be prioritized. However, in an earlier study, people of Barisal division were found to be more aware regarding HIV awareness 41.

**Conclusion:**

This study revealed the levels of awareness regarding among the married women both from rural and urban area of Bangladesh associated with some influencing factors of HIV awareness such as mass media, levels of education, wealth index, and type of living place, age groups and divisions. Although a number of married women were found to be acknowledged regarding HIV awareness, more initiatives should be taken to implement HIV awareness related programs in all divisions and for all age groups people. Government, Non-governmental organizations, program organizers and policy makers should work together to implement the awareness raising strategies and facilitate more educational interventions among the married women. Moreover, awareness raising programs can be arranged in various places like schools, Mosques/Temples/Churches and different workplaces on regular basis. Thus, a strategic plan and proper implementation should be implied to mitigate the looming threat of an HIV/AIDS epidemic.

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**Tables and figures**

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| **Figure 2. Distribution of HIV score category of married women** | |
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| **Figure 3. Distribution of HIV score category of married women by wealth index** | **Figure 4. Distribution of HIV score category of married women by region** |

**Table 1: Comparison of correct response rate between three consecutive MICS survey.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Questions about HIV related awareness | Correct response | | | | | |
|  | 2006 | | 2012 | | 2019 | |
|  | Yes  N (%) | No  (%) | Yes  N (%) | No  (%) | Yes  N (%) | No  (%) |
| **Percentage who know transmission can be prevented by:** |  |  |  |  |  |  |
| Having only one faithful uninfected sex partner | 25340 (75.34) | 8503 (24.66) | 11640 (58.13) | 9087 (41.87) | 9783 (32.61) | 19941 (67.39) |
| Using a condom every time | 22226 (65.89) | 11617 (34.11) | 10617 (52.31) | 10110 (47.69) | 18277 (62.42) | 11447 (37.58) |
| A healthy-looking person can be infected | 25850 (75.85) | 7993 (24.15) | 11668 (56.15) | 9059 (43.85) | 17212 (58.30) | 12512 (41.70) |
| **Percentage who know that HIV cannot be transmitted by:** |  |  |  |  |  |  |
| HIV cannot be transmitted by sharing food | 16926 (49.43) | 16917 (50.57) | 10409 (52.14) | 10318 (47.86) | 24258 (82.46) | 5466 (17.54) |
| HIV cannot be transmitted by mosquito bites | 14667 (43.60) | 19176 (56.40) | 8638 (42.99) | 12091 (57.01) | 13609 (53.02) | 16115 (46.98) |
| HIV cannot be transmitted by supernatural means | 24223 (71.97) | 9620 (28.03) | 14440 (70.80) | 6287 (29.20) | 14903 (50.84) | 14821 (49.16) |
| HIV can be transmitted by sharing needles | 30994 (91.50) | 2849 (8.50) | - | - |  |  |
| **Percentage of women who know HIV can be transmitted from mother to child:** |  |  |  |  |  |  |
| HIV transmitted during pregnancy | 30373 (89.71) | 3470 (10.29) | 15078 (71.92) | 5649 (28.08) | 21827 (72.57) | 7897 (27.43) |
| HIV transmitted during delivery | 26055 (76.73) | 7788 (23.27) | 9546 (42.26) | 11181 (57.74) | 17298 (43.05) | 12426 (56.95) |
| HIV transmitted through breast milk | 30182 (89.04) | 3661 (10.96) | 14100 (65.83) | 6627 (34.17) | 22344 (75.11) | 7380 (24.89) |

**Table 2. HIV/AIDS knowledge and awareness score status at different levels of covariates\*.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Covariates | MICS 2006 | | | MICS 2012 | | | MICS 2019 | | |
|  | Low Score  N (%) | High Score  N (%) | P-value | Low Score  N (%) | High Score  N (%) | P-value | Low Score  N (%) | High Score  N (%) | P-value |
| **Total** | 15160 (44.80) | 18683 (55.20) | - | 7277 (35.07) | 13450 (64.93) | - | 12113 (41.31) | 17611 (58.69) | - |
| **Ten years age group** |  |  |  |  |  |  |  |  |  |
| 15–24 | 5218 (44.16) | 6540 (55.84) | 0.000 | 2027 (33.71) | 4131 (66.29) | 0.000 | 3148 (39.84) | 4971 (60.16) | 0.000 |
| 25–34 | 5225 (43.60) | 6831 (56.40) |  | 2882 (32.62) | 5694 (67.38) |  | 4775 (40.01) | 7352 (59.99) |  |
| 35–44 | 3545 (45.75) | 4209 (54.25) |  | 1836 (39.60) | 2896 (60.40) |  | 3220 (43.26) | 4276 (56.74) |  |
| 45 and above | 1172 (51.83) | 1103 (48.17) |  | 532 (41.42) | 729 (58.58) |  | 970 (47.87) | 1012 (52.13) |  |
| **Division** |  |  |  |  |  |  |  |  |  |
| Barisal | 1517 (44.88) | 1825 (55.12) | 0.000 | 597 (31.88) | 1276 (68.12) | 0.000 | 849 (37.85) | 1223 (62.15) | 0.000 |
| Chittagong | 2451 (42.45) | 3440 (57.55) |  | 1263 (40.73) | 1913 (59.27) |  | 1935 (42.36) | 2931 (57.64) |  |
| Dhaka | 4547 (45.85) | 5224 (54.15) |  | 1715 (31.46) | 3543 (68.54) |  | 2904 (45.37) | 3376 (54.63) |  |
| Khulna | 2379 (39.43) | 3621 (60.57) |  | 1789 (38.55) | 3209 (61.45) |  | 2413 (41.53) | 3476 (58.47) |  |
| Mymenshing | - | - |  | - | - |  | 615 (40.01) | 926 (59.99) |  |
| Rajshahi | 3315 (47.70) | 3565 (52.30) |  | 868 (33.37) | 1660 (66.63) |  | 1804 (46.55) | 1987 (53.45) |  |
| Rangpur | - | - |  | 553 (28.20) | 1317 (71.8) |  | 1045 (35.25) | 2131 (64.75) |  |
| Sylhet | 951 (49.35) | 1008 (50.65) |  | 492 (46.91) | 532 (53.09) |  | 548 (23.44) | 1561 (76.56) |  |
| **Type of place of residence** |  |  |  |  |  |  |  |  |  |
| Rural | 9360 (48.04) | 10120 (51.96) | 0.000 | 1335 (27.95) | 3321 (72.05) | 0.000 | 2587 (36.58) | 4586 (63.42) | 0.000 |
| Urban | 5513 (39.81) | 8109 (60.19) |  | 5942 (38.05) | 10129 (61.95) |  | 9526 (43.07) | 13025 (56.93) |  |
| Tribial | 287 (45.75) | 454 (54.25) |  | - | - |  | - | - |  |
| **Women Highest educational level** |  |  |  |  |  |  |  |  |  |
| No education | 4208 (57.36) | 3167 (42.64) | 0.000 | 1358 (55.74) | 1169 (44.26) | 0.000 | 1236 (57.52) | 904 (42.48) | 0.000 |
| Primary incomplete | 2535 (51.90) | 2356 (48.10) |  | 1163 (52.39) | 1169 (47.61) |  | - | - |  |
| Primary complete | 2272 (47.50) | 2520 (52.50) |  | 1198 (44.92) | 1464 (55.08) |  | 2911 (54.19) | 2524 (45.81) |  |
| Secondary incomplete | 4507 (40.08) | 6710 (59.92) |  | 2853 (32.54) | 5977 (67.46) |  | 6515 (42.36) | 9300 (57.64) |  |
| Secondary completed or Higher | 1637 (29.71) | 3929 (70.29) |  | 705 (15.93) | 3671 (84.07) |  | 1451 (22.87) | 4883 (77.13) |  |
| **Religion** |  |  |  |  |  |  |  |  |  |
| Islam | 13264 (45.22) | 15939 (54.78) | 0.003 | 6450 (35.35) | 11836 (64.75) | 0.322 | 10939 (41.61) | 15617 (58.39) | 0.0229 |
| Others | 1896 (41.64) | 2743 (58.36) |  | 827 (33.62) | 1614 (66.38) |  | 1174 (38.36) | 1994 (61.64) |  |
| **Accessibility to mass media** |  |  |  |  |  |  |  |  |  |
| Do not have mass media access | - | - | - | 3842 (45.25) | 9055 (54.75) | 0.000 | 3890 (45.90) | 4648 (54.10) | 0.000 |
| Have mass media access | - | - |  | 3435 (29.90) | 4395 (70.10) |  | 8223 (39.68) | 12963 (60.32) |  |
| **Husband/partner’s education level** |  |  |  |  |  |  |  |  |  |
| No education | 5463 (52.12) | 5033 (47.88) | 0.000 | 2450 (35.45) | 4423 (64.55) | 0.682 | 3293 (48.37) | 3638 (51.63) | 0.000 |
| Primary | 3756 (47.56) | 4177 (52.44) |  | 1786 (34.41) | 3429 (65.59) |  | 3544 (46.03) | 4306 (53.97) |  |
| Secondary or Higher | 5856 (38.42) | 9383 (61.58) |  | 2640 (35.05) | 4909 (64.95) |  | 3779 (40.23) | 5790 (59.77) |  |
| Non-standard curriculum | 36 (45.76) | 47 (54.24) |  | - | - |  | 1492 (28.25) | 3873 (71.75) |  |
| **Wealth Index** |  |  |  |  |  |  |  |  |  |
| Poorest | 1910 (55.46) | 1470 (44.54) | 0.000 | 1185 (48.47) | 1263 (51.53) | 0.000 | 1828 (49.47) | 1923 (50.53) | 0.000 |
| Poorer | 2547 (52.83) | 2332 (47.17) |  | 1363 (42.89) | 1930 (57.11) |  | 2431 (48.35) | 2673 (51.65) |  |
| Middle | 3240 (48.82) | 3497 (51.18) |  | 1660 (41.09) | 2581 (58.91) |  | 2733 (43.96) | 3666 (56.04) |  |
| Richer | 3830 (43.39) | 5065 (56.61) |  | 1691 (34.73) | 3471 (65.27) |  | 2787 (40.03) | 4468 (59.97) |  |
| Richest | 3633 (36.41) | 6319 (63.59) |  | 1378 (24.78) | 4205 (75.22) |  | 2334 (33.62) | 4881 (66.38) |  |
| **Household’s Head Sex** |  |  |  |  |  |  |  |  |  |
| Male | 14384 (44.92) | 17662 (55.08) | 0.327 | 5976 (34.65) | 11279 (65.35) | 0.077 | 11061 (41.35) | 16037 (58.65) | 0.704 |
| Female | 776 (43.39) | 1021 (56.61) |  | 905 (37.36) | 1487 (62.64) |  | 1052 (40.91) | 1574 (59.09) |  |

*\*\*Scores greater than or equals to the median were assigned to ‘High score’ category and the rest scores were treated as to fall in the category, ‘Low score’.*

**Table 3. Factors associated with the HIV/AIDS knowledge and awareness score of married women, MICS 2006, MICS 2012 and 2019.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Covariates | MICS 2006 | | MICS 2012 |  | MICS 2019 |  |
|  | **OR (95% CI)** | P-value | **OR (95% CI)** | P-value | **OR (95% CI)** | P-value |
| **Ten years age group** |  |  |  |  |  |  |
| 15–24 | 1 |  | 1 |  | 1 |  |
| 25–34 | 1.06 (0.99-1.13) | 0.081 | 1.20 (1.09-1.32) | 0.000 | 1.11 (1.04-1.19) | 0.003 |
| 35–44 | 1.02 (0.95-1.10) | 0.588 | 1.03 (0.92-1.17) | 0.810 | 1.06 (0.98-1.15) | 0.138 |
| 45 and above | 0.81 (0.72-0.91) | 0.001 | 0.96 (0.80-1.16) | 0.756 | 0.94 (0.84-1.07) | 0.399 |
| **Division** |  |  |  |  |  |  |
| Barisal | 1 |  | 1 |  | 1 |  |
| Chittagong | 1.03 (0.89-1.19) | 0.692 | 0.61 (0.51-0.72) | 0.000 | 0.78 (0.69-0.89) | 0.000 |
| Dhaka | 0.97 (0.84-1.11) | 0.644 | 0.89 (0.77-1.04) | 0.141 | 0.67 (0.59-0.76) | 0.000 |
| Khulna | 1.31 (1.14-1.49) | 0.000 | 0.84 (0.73-0.97) | 0.033 | 0.87 (0.77-0.98) | 0.025 |
| Mymenshing | - | - | - | - | 1.01 (0.86-1.18) | 0.947 |
| Rajshahi | 0.91 (0.79-1.04) | 0.178 | 0.94 (0.81-1.11) | 0.531 | 0.71 (0.63-0.81) | 0.000 |
| Rangpur |  |  | 1.14 (0.96-1.36) | 0.196 | 1.17 (1.02-1.34) | 0.000 |
| Sylhet | 0.83 (0.71-0.98) | 0.024 | 0.51 (0.42-0.61) | 0.000 | 2.42 (2.08-2.83) | 0.022 |
| **Type of place of residence** |  |  |  |  |  |  |
| Rural | 1 |  | 1 |  | 1 |  |
| Urban | 1.16 (1.06-1.26) | 0.001 | 1.14 (1.01-1.29) | 0.058 | 1.13 (1.04-1.22) | 0.003 |
| Tribial | 1.02 (0.76-1.37) | 0.901 | - | - | - | - |
| **Women Highest educational level** |  |  |  |  |  |  |
| No education | 1 |  | 1 |  | 1 |  |
| Primary incomplete | 1.20 (1.09-1.32) | 0.001 | 1.12 (0.97-1.29) | 0.084 | - | - |
| Primary complete | 1.42 (1.30-1.55) | 0.001 | 1.48 (1.28-1.71) | 0.000 | 1.12 (0.99-1.26) | 0.059 |
| Secondary incomplete | 1.83 (1.68-2.00) | 0.001 | 2.44 (2.13-2.79) | 0.000 | 1.77 (1.58-1.99) | 0.000 |
| Secondary completed or Higher | 2.58 (2.28-2.92) | 0.001 | 5.30 (4.41-6.37) | 0.000 | 4.03 (3.50-4.64) | 0.000 |
| **Religion** |  |  |  |  |  |  |
| Islam | 1 |  | 1 |  | 1 |  |
| Others | 1.07 (0.97-1.18) | 0.199 | 1.02 (0.90-1.18) | 0.743 | 1.01 (0.89-1.13) | 0.904 |
| **Accessibility to mass media** |  |  |  |  |  |  |
| Do not have mass media access | - | - | 1 |  | 1 |  |
| Have mass media access | - | - | 1.36 (1.24-1.48) | 0.000 | 1.13 (1.05-1.21) | 0.001 |
| **Husband/partner’s education level** |  |  |  |  |  |  |
| No education | 1 |  | 1 |  | 1 |  |
| Primary | 1.02 (0.95-1.10) | 0.595 | 1.04 (0.94-1.16) | 0.421 | 1.01 (0.93-1.09) | 0.889 |
| Secondary or Higher | 1.06 (0.98-1.14) | 0.156 | 1.03 (0.94-1.14) | 0.516 | 1.08 (0.99-1.17) | 0.071 |
| Non-standard curriculum | 1.18 (0.70-2.00) | 0.526 | - |  | 1.21 (1.08-1.35) | 0.001 |
| **Wealth Index** |  |  |  |  |  |  |
| Poorest | 1 |  | 1 |  | 1 |  |
| Poorer | 1.01 (0.92-1.12) | 0.793 | 1.07 (0.94-1.22) | 0.295 | 1.01 (0.91-1.12) | 0.902 |
| Middle | 1.12 (1.01-1.24) | 0.038 | 1.01 (0.87-1.15) | 0.949 | 1.10 (0.99-1.22) | 0.086 |
| Richer | 1.26 (1.14-1.40) | 0.000 | 1.13 (0.97-1.31) | 0.112 | 1.19 (1.06-1.32) | 0.002 |
| Richest | 1.32 (1.16-1.49) | 0.000 | 1.26 (1.04-1.52) | 0.018 | 1.21 (1.06-1.37) | 0.004 |

|  |  |  |
| --- | --- | --- |
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| E:\ResearchProject\Jamal Sir\Shumi\2006s.tif | E:\ResearchProject\Jamal Sir\Shumi\2012s.tif | E:\ResearchProject\Jamal Sir\Shumi\MICS 2019s.tif |
| Figure 4. Sensitivity analysis of fitted final multivariable logistic regression model | | |
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| MICS-2006 | MICS-2012 | MICS-2019 |
| Figure 5: Calibration belt plot | | |

Table 4:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Survey Year | Hosmer-Lemeshow Test | | Area Under ROC Curve | | Calibration test | | Correctly classified |
| Chi- square | P-value | AUC | P-value | Test-statistic | P-value |  |
| MICS 2006 | 4479.83 | 0.0492 | 0.6243 | <0.001 | 0.04 | 0.845 | 59.92% |
| MICS 2012 | 5498.68 | 0.0038 | 0.6768 | <0.001 | 0.17 | 0.680 | 66.97% |
| MICS 2019 | 6335.91 | 0.0003 | 0.6570 | <0.001 | 17.65 | <0.001 | 63.06% |