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# Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome Knowledge among Followers of Various Religions in India

## Abstract

**Introduction:** Effective educational interventions to knowledge, attitude, and prevention of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) may limit the spread of the disease. However, the relevance of HIV knowledge to followers of religions is unknown. We assessed the 2015–2016 Demographic and Health Survey (DHS) data from India to investigate the levels of knowledge of HIV/AIDS among Hindus, Muslims, Sikhs, Christians, and Buddhists in relation to standard sociodemographic variables in India. **Methods:** We used the individual and household level data from the internationally and temporally harmonized cross-sectional DHS. These data were representative of the national population and were collected from January 2015 to December 2016. **Results:** The age range of the population was 15–54 years ( $n = 224,531$ ). We found the highest level of knowledge of HIV/AIDS among Sikh men (than the followers of other religions (80.4%–92.7%). Conversely, Muslims and Hindus were least knowledgeable of HIV/AIDS (80.4% and 81.2%). Younger participants (82.5%), residents of urban areas (90.6%), more educated (98.6%), never married (84.9%), wealthier (95.5%), and having more access to mass media (90.4%–96.7%) were more aware of HIV/AIDS-related knowledge. Among various religions, Sikhs were more educated (16.1% with higher education), wealthier (59.5% in the top quintile), with higher exposure to communication means than Muslims, Hindus, and Christians. **Conclusion:** We report that Sikh men are most knowledgeable of HIV compared to Sikh women and followers of other religions. Our findings may help formulate public health strategies targeting various religious groups to reduce the incidence of HIV/AIDS.

**Keywords:** *Acquired immunodeficiency syndrome, human immunodeficiency virus, knowledge, religions, sociodemographic*

## Introduction

Human immunodeficiency virus (HIV) is an ongoing global health issue responsible for hundreds of thousands of new cases each year and 630,000 died from HIV-related causes in 2022.<sup>[1]</sup> According to the United Nations Program on HIV/acquired immunodeficiency syndrome (AIDS), HIV-positive patients with COVID-19 have more severe outcomes and associated comorbidities than HIV-negative people.<sup>[2]</sup> India has the third highest number of individuals living with HIV globally.<sup>[3]</sup> HIV incidence in India had an estimated peak level of 0.54% in 2000–2001. However, the prevalence of HIV declined in Indian adults (ages: 15–49 years) from this peak level to 0.33% in 2010 and 0.22% in 2020. In addition, HIV/AIDS-related mortality rates in India have dropped by 82% since 2010.<sup>[3]</sup>

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AIDS is not curable, and the prevention of transmission through appropriate knowledge seems to be one crucial practical approach to limit the spread of disease.<sup>[4]</sup> Therefore, lack of knowledge, poor awareness about modes of disease transmission, and false/negative opinions can robustly affect the preventive measures to control this syndrome. There is an urgent need to raise awareness of HIV/AIDS to counter the deadly endemic.<sup>[5]</sup> Several factors contribute to the variability in the knowledge of HIV/AIDS.<sup>[6,7]</sup> Religion is a critical social and cultural factor having a widespread influence on the norms, values, and even institutions in some countries, thereby affecting a person's behavior and decisions. The religiosity of a person and association with religious organizations have profound effects on the knowledge and practice of health measures.<sup>[8]</sup> In a recently concluded extensive meta-analysis of the studies conducted on the Indian population

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from 2010 to 2020, 40 studies reported the knowledge and 24 studies reported attitudes toward HIV/AIDS.<sup>[9]</sup> None of these studies discussed religion as affecting knowledge or attitude toward HIV/AIDS. However, very limited data are available regarding people of India from various religions and the differences in their knowledge of HIV/AIDS.<sup>[10]</sup>

Several gaps in the literature justify the need for this study. Most studies have primarily investigated the influence of religion on prevention activities, stigmatization, and attitude toward HIV/AIDS, whereas overlooking the levels of understanding/knowledge of HIV/AIDS.<sup>[11-13]</sup> Religion was initially considered to have a negative effect on HIV control since some religious communities consider HIV/AIDS as the punishment for sins and strongly oppose sex education and the use of condoms.<sup>[14,15]</sup> For example, in Muslim-majority countries, HIV/AIDS is presented as a disease brought from countries where sexual morals were corrupt.<sup>[16]</sup> Moreover, it is believed that obedience to Islam and its preaching is the best protective measure against HIV/AIDS.<sup>[16]</sup> In addition, sexual health education and the importance of protected sex are often taught as a subject in Christian schools, whereas considered a shame in schools related to other religions. Thus, sexual health awareness, a critical protector against the spread of HIV/AIDS, may differ across religious followers. Similarly, the use of condoms is considered controversial among Muslims, as followers of one school of thought believe it is prohibited and another group permits it. The importance of safe sex in preventing the spread of HIV/AIDS is well recognized.<sup>[17]</sup> Thus, sexual engagement risk may vary according to religious affiliation.<sup>[12]</sup> Moreover, gender differences among followers of various religions regarding knowledge and awareness about HIV/AIDS have never been explored previously. The literature is compounded by other socioeconomic factors such as age, residential status, wealth status, marital status, level of education, and exposure to media and communication, which can differentially affect the knowledge of HIV/AIDS. The limited literature on this topic involves a small cohort with indefinite conclusions, thereby emphasizing the importance of conducting a comprehensive study with a large sample size to obtain more meaningful and generally applicable results. Recently, the effectiveness of education programs to improve the awareness and knowledge of HIV among young women has been reported.<sup>[18]</sup> However, data related to the topic are limited to a small region and thus may not present a large-scale paradigm.

We aimed to fill these gaps by investigating the association of HIV/AIDS knowledge with religion among Hindus, Muslims, Sikhs, Christians, and Buddhists of India. We hypothesized that (1) knowledge/understanding of HIV/AIDS significantly differs among followers of five different religions; (2) gender-specific differences exist, with males being more knowledgeable than females; and (3) several socioeconomic factors such as age, residential status, wealth

status, marital status, level of education, and exposure to media and communication can affect the knowledge of HIV/AIDS among followers of various religions. We used data from the Demographic and Health Survey (DHS), a retrospective cohort study involving the population of India.

## Methods

### Data source

The data materials used originate from the DHS, a widely applied representative harmonized cross-sectional survey covering many less developed countries worldwide for several years.<sup>[19]</sup> We used the data from the 2015 to 2016 DHS, which used individual questionnaires for women and men.<sup>[20]</sup> After applying the related datasets (IAIR74FL.DTA, IAMR74FL.DTA, and IAHR74FL.DTA), we obtained a final dataset of 231,571 individuals (120,825 women and 110,746 males). The HIV-related estimates published by IIPS and ICF<sup>[20]</sup> and those replicated by us are very close, with only negligible estimate differences, boosting our confidence in the reliability of the data. The original sample size was even higher, but after excluding individuals with missing information for different variables, we ended up with 231,571 respondents.

The data were weighted by applying household weights (variable HV005), as described previously.<sup>[20]</sup> Since the dataset contains information on all individual household members, we used population weights, giving us estimates for the adult 15–49-year-old population.

### Measures

The variables included in measuring individuals' HIV knowledge cover whether the respondent knows about HIV, condom use reduces HIV risk; only having one uninfected partner can reduce the HIV risk; mosquito bites do not infect people with HIV; sharing food with an HIV-infected person does not give HIV; that a healthy-looking person may be HIV positive; blood transfusion can lead to HIV infection; injecting drugs can lead to HIV infection; drugs exist that can prevent HIV transmission from mother to baby; and drugs exist that can prolong the life of HIV-infected people [Table 1].

These 10 questions [Table 1] were transformed into a single index using principal component analysis.<sup>[21]</sup> The Cronbach's alpha was in the very acceptable range (0.88), and the eigenvalues were 4.88, 1.15, and 0.9 for the first, second, and third components, respectively. The first component represents 49% of the variation in the 10 HIV knowledge indicators, whereas the second component only adds another 11%. Therefore, we decided to continue with only one principal component as a composite index representation of HIV knowledge. The index produced from the Stata version 12.0. StataCorp LLC, Texas, USA statistical software package varied between -4.07 and 2.62 but was transformed linearly to take values between 0 and 100.

**Table 1: The composite human immunodeficiency virus knowledge index and the ten questions behind the index**

|  | A - Average | B - PCA | 1 - Heard | 2 - Condom | 3 - Partner | 4 - Mosquito | 5 - Food | 6 - Healthy | 7 - Blood | 8 - Injections | 9 - Baby | 10 - Prolong |
|--|-------------|---------|-----------|------------|-------------|--------------|----------|-------------|-----------|----------------|----------|--------------|
| A - Simple average of ten questions  | 1.00        | 1       |           |            |             |              |          |             |           |                |          |              |
| B - Principal component index  | 0.85        | 0.87    | 1         |            |             |              |          |             |           |                |          |              |
| 1 - Have you ever heard of HIV?  | 0.77        | 0.79    | 0.65      | 1          |             |              |          |             |           |                |          |              |
| 2 - Can people reduce their chances of getting HIV/AIDS by using a condom every time they have sex?  | 0.76        | 0.77    | 0.65      | 0.64       | 1           |              |          |             |           |                |          |              |
| 3 - Can people reduce their chances of getting HIV/AIDS by having just one uninfected sex partner who has no other sex partners?   | 0.65        | 0.63    | 0.54      | 0.41       | 0.41        | 1            |          |             |           |                |          |              |
| 4 - Can people get HIV/AIDS from mosquito bites?   | 0.62        | 0.61    | 0.51      | 0.40       | 0.40        | 0.49         | 1        |             |           |                |          |              |
| 5 - Can people get HIV/AIDS by sharing food with a person who has AIDS?  | 0.70        | 0.70    | 0.57      | 0.50       | 0.50        | 0.37         | 0.34     | 1           |           |                |          |              |
| 6 - Is it possible for a healthy-looking person to have HIV/AIDS?  | 0.76        | 0.79    | 0.68      | 0.57       | 0.53        | 0.37         | 0.37     | 0.49        | 1         |                |          |              |
| 7 - Can people get HIV/AIDS by blood products or blood transfusion?  | 0.74        | 0.76    | 0.64      | 0.54       | 0.50        | 0.36         | 0.33     | 0.46        | 0.72      | 1              |          |              |
| 8 - Can people get HIV/AIDS by injecting drugs?  | 0.58        | 0.54    | 0.36      | 0.35       | 0.35        | 0.26         | 0.23     | 0.33        | 0.32      | 0.32           | 1        |              |
| 9 - Are there any special medications that a doctor or a nurse can give to a woman infected with HIV/AIDS to reduce the risk of transmitting HIV/AIDS to the baby?       | 0.46        | 0.40    | 0.26      | 0.24       | 0.23        | 0.19         | 0.17     | 0.22        | 0.22      | 0.22           | 0.48     | 1            |
| 10 - Have you heard about special antiretroviral drugs (use local name[s]) that people infected with HIV/AIDS can get from a doctor or a nurse to help them live longer? |             |         |           |            |             |              |          |             |           |                |          |              |

Source: Own calculations based on the DHS 2015–2016 for India. Correlation coefficients. DHS: Demographic and health survey, HIV/AIDS: Human immunodeficiency virus/acquired immunodeficiency syndrome, PCA: Principal component analysis

### Statistical analysis

We hypothesized that potential differences exist between different religious groups' HIV knowledge. Therefore, tests were carried out to investigate inter-religion differences regarding the composite HIV knowledge index. The traditional *t*-test was not used since the index was not normally distributed. Instead, we relied on the Kruskal–Wallis rank test (on unweighted data).<sup>[22]</sup> In the case of significant differences in the percentage of the population who heard about HIV/AIDS, we rely on the Chi-square test (also on unweighted data).

### Results

The correlation between the ten questions and the average of the ten question answers is shown in Table 1, where the correlations between the composite index and the 10 questions were between 0.46 and 0.85. The gender distribution within religion was nearly the same. Regarding age distribution, the sample was nearly equally divided between 15–29 years old and 30–49 years old (30–54 for males). The highest fraction in rural areas was among Buddhists (76%), whereas the lowest fraction was among Muslims (58%). Sikhs had the highest share in the top wealth quintile (60%), Buddhists had the largest fraction in the middle class (81%), and Hindus had the largest fraction in the bottom quintile (19%). Muslims were most frequently in the no-education category (26%), Christians topped the primary/secondary category (74%), whereas Sikhs were most often in the higher education category (16%). The primary important information source for all religions was watching television. The demographics were generally uniformly distributed among the different religions, whereas the residence, education, wealth, and information sources markedly differed.

It is possible that the different background variables account for the differences in the knowledge of HIV [Table 2]. We investigated this factor in Table 3 by conducting regressions of the HIV knowledge index. Our findings confirm that the Sikhs had a broader knowledge of HIV than the followers of other religions, as they were 14.1 points above Hindus. Buddhists and Christians were in the middle of the HIV knowledge position and were 5.6 and 4.2 points above Hindus, respectively. An essential single factor in determining HIV knowledge was higher education since this raised the broad HIV knowledge by 21 points compared to people without schooling. Interestingly, daily orientation through television or newspapers (compared to no use) extended general HIV knowledge by more than being in the top quintile (compared to being in the bottom quintile), for example, 15.3 and 11.4 (television and newspaper) compared to 10.7 (wealth).

We next investigated the subdivisions of the population with relevance to HIV knowledge [Table 4]. Eighty-two percent of the followers of the five religions had heard

about HIV/AIDS. Among genders, more men than women had heard about HIV, whereas there was no marked difference between the two age groups. Residents of urban areas more often knew about HIV than the rural population. Regardless of religion, more wealth or education was associated with HIV knowledge. Similarly, more use of mass media, including radio, newspapers, or television, was associated with more HIV knowledge. In general, Sikhs had higher HIV knowledge compared to other religions, except for the top wealth quintile and higher education. Conversely, Muslims had the lowest fraction with HIV/AIDS knowledge among subpopulations. For all population subgroups, we report that the HIV knowledge differed across religions [Table 4].

The HIV knowledge composite index is displayed in Table 5 with an average score of 61. Sikhs had the highest knowledge with a score of 81, whereas Muslims were at the bottom with a score of 59. The knowledge of HIV was greater among men, urban people, never married, wealthier people, more educated, and among people with more information sources. Further, broad HIV knowledge significantly differed between religions for any subdivision of the population.

The fraction within each religion that had heard about HIV or AIDS is presented in Figure 1. Sikhs exhibited highest awareness of HIV, whereas the knowledge of HIV/AIDS was significantly low among Muslims and Hindus. The composite HIV knowledge index is displayed in Figure 2. Among the followers of different religions, Sikhs had the most knowledge of HIV (score above 80), Christians and Buddhists were in a middle knowledge category (score just below 70), whereas Muslims (score just below 60) and Hindus (score just above 60) were at the bottom.

### Discussion

We investigated how the religious beliefs of people in India relate to their knowledge of HIV/AIDS in the context of

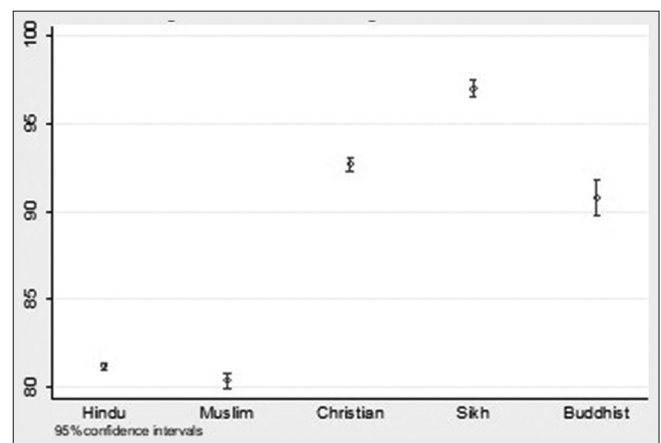


Figure 1: Percentage of followers of various religions who had heard about human immunodeficiency virus/acquired immunodeficiency syndrome (n = 231,571). Source: Own calculations based on the Demographic and Health Survey 2015–2016 for India

**Table 2: Distribution of the sample by socioeconomic characteristics, separately for religions (n=231,571) %**

|                      | Hindu   | Muslim | Christian | Sikh | Buddhist | Total   | n       |
|----------------------|---------|--------|-----------|------|----------|---------|---------|
| Gender               |         |        |           |      |          |         |         |
| Males                | 48.2    | 45.9   | 46.6      | 50.7 | 46.8     | 47.8    | 47.8    |
| Females              | 51.8    | 54.1   | 53.4      | 49.3 | 53.2     | 52.2    | 52.2    |
| Age (years)          |         |        |           |      |          |         |         |
| 15–29                | 48.6    | 53.8   | 46.5      | 48.1 | 43.0     | 49.1    | 49.1    |
| 30–54                | 51.4    | 46.2   | 53.5      | 51.9 | 57.0     | 50.9    | 50.9    |
| Residence            |         |        |           |      |          |         |         |
| Urban                | 29.2    | 41.6   | 32.2      | 30.1 | 23.8     | 31.2    | 31.2    |
| Rural                | 70.8    | 58.4   | 67.8      | 69.9 | 76.2     | 68.8    | 68.8    |
| Marital status       |         |        |           |      |          |         |         |
| Married              | 68.4    | 63.0   | 61.7      | 65.0 | 65.0     | 67.0    | 67.0    |
| Previously married   | 2.9     | 2.2    | 4.3       | 2.8  | 3.2      | 2.9     | 2.9     |
| Never married        | 28.8    | 34.8   | 34.0      | 32.2 | 31.8     | 30.1    | 30.1    |
| Wealth (%)           |         |        |           |      |          |         |         |
| Poorest 20           | 18.7    | 12.7   | 11.5      | 0.6  | 8.2      | 16.8    | 16.8    |
| Middle 60            | 61.8    | 67.2   | 71.5      | 39.9 | 81.3     | 63.1    | 63.1    |
| Richest 20           | 19.5    | 20.1   | 17.0      | 59.5 | 10.5     | 20.1    | 20.1    |
| Education            |         |        |           |      |          |         |         |
| None                 | 20.4    | 25.7   | 12.5      | 13.9 | 16.7     | 20.4    | 20.4    |
| Primary or secondary | 65.2    | 64.4   | 74.4      | 70.0 | 69.4     | 65.9    | 65.9    |
| Higher               | 14.4    | 9.9    | 13.1      | 16.1 | 14.0     | 13.6    | 13.6    |
| Newspaper reading    |         |        |           |      |          |         |         |
| Never                | 47.4    | 53.1   | 42.5      | 35.8 | 52.3     | 47.7    | 47.7    |
| Around weekly        | 31.5    | 30.8   | 38.6      | 39.7 | 36.3     | 32.1    | 32.1    |
| Around daily         | 21.1    | 16.0   | 18.9      | 24.5 | 11.3     | 20.1    | 20.1    |
| Radio listening      |         |        |           |      |          |         |         |
| Never                | 79.0    | 68.1   | 75.2      | 90.8 | 71.2     | 77.3    | 77.3    |
| Around weekly        | 15.8    | 22.0   | 19.4      | 7.7  | 21.1     | 16.9    | 16.9    |
| Around daily         | 5.2     | 9.9    | 5.5       | 1.4  | 7.7      | 5.8     | 5.8     |
| TV watching          |         |        |           |      |          |         |         |
| Never                | 18.8    | 25.5   | 15.5      | 4.1  | 10.8     | 19.1    | 19.1    |
| Around weekly        | 22.1    | 25.7   | 29.0      | 14.9 | 23.9     | 23.0    | 23.0    |
| Around daily         | 59.1    | 48.9   | 55.5      | 81.0 | 65.4     | 57.9    | 57.9    |
| Total                | 100     | 100    | 100       | 100  | 100      | 100     | 100     |
| Religion shares      | 74.8    | 14.5   | 7.2       | 2.0  | 1.5      | 100     |         |
| n                    | 173,199 | 33,599 | 16,588    | 4704 | 3481     | 231,571 | 231,571 |

Source: Own calculations based on the DHS 2015–2016 for India, DHS: Demographic and health survey

several essential sociodemographic factors. We report that religions play a significant role in people’s knowledge of HIV/AIDS. We found that the highest percentage of Sikh men had heard about HIV/AIDS as compared to Sikh women and the followers of other religions. Conversely, Muslim women had the least knowledge of HIV/AIDS compared to Muslim men and followers of other religions. However, Christians, Buddhists, and Hindus were between the two extremes. Similarly, after applying the HIV knowledge index comprising 10 key questions related to HIV/AIDS awareness, we found similar results with Sikh men being the most and Muslim women being the least aware. We also found that HIV knowledge was substantially influenced by several sociodemographic factors among followers of several religions. Study participants belonging to the younger age group, urban dwellers, never married,

wealthiest, highly educated, and having more access to mass media were more knowledgeable of HIV/AIDS.

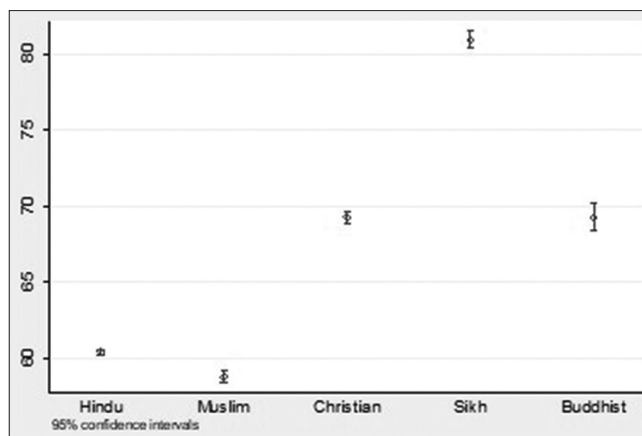
Our findings suggest an association of religious beliefs with the level of knowledge of HIV/AIDS. Among the followers of various religions, Sikh men demonstrated the highest knowledge of HIV/AIDS. This can be attributed to the fact, as seen in our study, that Sikhs more frequently: Are in the younger age group (15–29 years); who never married before; resided in urban areas of India; are wealthier; have a high literacy rate; received higher education; and have more exposure to mass media being more aware of HIV/AIDS as compared to Christians, Buddhists, Muslims, and Hindus. Indeed, the level of knowledge is associated with several sociodemographic factors such as wealth.<sup>[23]</sup> Overall, there is a trend that the higher the living standard, the higher the awareness rate. However, we found that

**Table 3: Regression of the human immunodeficiency virus knowledge index using socioeconomic variables**

|                                | Weighted  | Unweighted |
|--------------------------------|-----------|------------|
| <b>Religion</b>                |           |            |
| Hindu                          |           |            |
| Muslim                         | 1.262*    | 2.639***   |
| Christian                      | 4.209***  | 7.692***   |
| Sikh                           | 14.11***  | 13.93***   |
| Buddhist                       | 5.613***  | 5.316***   |
| <b>Gender</b>                  |           |            |
| Males                          |           |            |
| Females                        | -6.911*** | -6.359***  |
| <b>Age (years)</b>             |           |            |
| 15–29                          |           |            |
| 30–54                          | 0.255     | 0.738***   |
| <b>Residence</b>               |           |            |
| Urban                          |           |            |
| Rural                          | -2.024**  | -1.618***  |
| <b>Marital status</b>          |           |            |
| Married                        |           |            |
| Previously married             | -0.411    | -0.444     |
| Never married                  | -4.021*** | -3.323***  |
| <b>Wealth (%)</b>              |           |            |
| Poorest 20                     |           |            |
| Middle 60                      | 6.885***  | 7.233***   |
| Richest 20                     | 10.69***  | 11.61***   |
| <b>Education</b>               |           |            |
| None                           |           |            |
| Primary or secondary           | 11.16***  | 12.13***   |
| Higher                         | 20.87***  | 21.94***   |
| <b>Newspaper reading</b>       |           |            |
| Never                          |           |            |
| Around weekly                  | 10.34***  | 10.82***   |
| Around daily                   | 11.43***  | 11.90***   |
| <b>Radio listening</b>         |           |            |
| Never                          |           |            |
| Around weekly                  | 0.0609    | 1.648***   |
| Around daily                   | 0.619     | 3.642***   |
| <b>TV watching</b>             |           |            |
| Never                          |           |            |
| Around weekly                  | 8.827***  | 8.679***   |
| Around daily                   | 15.34***  | 13.86***   |
| Constant                       | 31.89***  | 29.70***   |
| <i>n</i>                       | 231,571   | 231,571    |
| <i>R</i> <sup>2</sup>          | 0.259     | 0.265      |
| <i>R</i> <sup>2</sup> adjusted | 0.257     | 0.262      |

\**P*<0.05, \*\**P*<0.01, \*\*\**P*<0.001. The left-out category is in italic font, Source: Own calculations based on the DHS 2015–2016 for India, DHS: Demographic and Health Survey

Sikh men were more aware of HIV/AIDS as compared to their female counterparts. This is understandable as women generally have a more conservative attitude toward learning about sex than men.<sup>[24]</sup> Furthermore, less awareness among Muslim women pertains to religious practices and less exposure to sex education in schools.



**Figure 2: Percentage of followers of various religions with knowledge of human immunodeficiency virus/acquired immunodeficiency syndrome based on the knowledge index (*n* = 231,571). Source: Own calculations based on the Demographic and Health Survey 2015–2016 for India**

Overall, the proportion of study participants with knowledge of HIV/AIDS exhibited some decline with increasing age. These results are consistent with previous findings that women 50 years and older had poor HIV/AIDS knowledge and higher misconception of HIV/AIDS transmission mode.<sup>[25,26]</sup> HIV knowledge scores were found to be lower among people older than 45 years of age.<sup>[27]</sup> Wealth status was seen to have a positive influence on HIV/AIDS knowledge. We found that the poorest study participants had the least awareness about HIV/AIDS, and this can be attributed to a lack of availability of higher education and less exposure to mass media. We found Sikhs to be the richest compared to followers of other religions.

We found a higher proportion of Sikhs living in urban than rural areas and as compared to followers of other religions. Our study demonstrates a positive association between HIV/AIDS knowledge among Indians and the type of residency, similar to previous findings in India.<sup>[28]</sup> In general, the level of knowledge of HIV/AIDS is significantly higher among urban dwellers than in the rural population.<sup>[29]</sup> The greatest differentials in knowledge were observed with education and wealth quintiles. Approximately only half of the people (57.4%) and half of the study participants in the lowest wealth quintile (57.1%) had heard of HIV/AIDS. At the same time, awareness of HIV/AIDS was almost universal among people at the highest education level and in the highest wealth quintile (95.5% and 98.6%, respectively). These data clearly show that being a follower of a religion affects HIV/AIDS knowledge awareness despite the presence of background standard sociodemographic variables. Educational attainment level and HIV/AIDS knowledge are positively correlated.<sup>[30,31]</sup> Residential status, wealth, and level of education are highly correlated and impactful variables regarding HIV/AIDS-related knowledge in a community. Urban dwellers are more likely to be educated than their rural counterparts, tending to be more aware and show more adherence to healthy behaviors,

**Table 4: Percentage of different religions who heard about human immunodeficiency virus**

|                      | Hindu   | Muslim | Christian | Sikh | Buddhist | Total   | <i>n</i> | <i>P</i> |
|----------------------|---------|--------|-----------|------|----------|---------|----------|----------|
| Gender               |         |        |           |      |          |         |          |          |
| Males                | 87.9    | 88.7   | 94.3      | 97.6 | 93.3     | 88.4    | 110,746  | <0.0001  |
| Females              | 75.0    | 73.5   | 91.3      | 96.3 | 88.3     | 75.6    | 120,825  | <0.0001  |
| Age (years)          |         |        |           |      |          |         |          |          |
| 15–29                | 82.2    | 80.1   | 93.6      | 97.7 | 91.3     | 82.5    | 113,690  | <0.0001  |
| 30–54                | 80.3    | 80.7   | 92.0      | 96.3 | 90.4     | 81.0    | 117,881  | <0.0001  |
| Residence            |         |        |           |      |          |         |          |          |
| Urban                | 91.1    | 86.2   | 97.2      | 97.7 | 97.4     | 90.6    | 72,177   | <0.0001  |
| Rural                | 76.1    | 75.0   | 89.3      | 96.6 | 86.5     | 76.7    | 159,394  | <0.0001  |
| Marital status       |         |        |           |      |          |         |          |          |
| Married              | 80.1    | 80.2   | 92.1      | 96.5 | 90.5     | 80.7    | 155,091  | <0.0001  |
| Previously married   | 72.8    | 69.2   | 86.8      | 97.5 | 82.2     | 73.4    | 6666     | <0.0001  |
| Never married        | 84.9    | 81.6   | 94.8      | 98.0 | 92.8     | 84.9    | 69,814   | <0.0001  |
| Wealth (%)           |         |        |           |      |          |         |          |          |
| Poorest 20           | 57.0    | 58.9   | 65.6      | 72.4 | 66.1     | 57.4    | 38,858   | <0.0001  |
| Middle 60            | 82.6    | 80.7   | 93.5      | 94.3 | 92.2     | 82.8    | 146,159  | <0.0001  |
| Richest 20           | 95.6    | 93.1   | 98.2      | 98.9 | 99.6     | 95.5    | 46,554   | <0.0001  |
| Education            |         |        |           |      |          |         |          |          |
| None                 | 55.5    | 61.0   | 76.9      | 89.6 | 65.7     | 57.1    | 47,326   | <0.0001  |
| Primary or secondary | 84.8    | 85.1   | 93.3      | 97.8 | 92.0     | 85.3    | 152,642  | <0.0001  |
| Higher               | 98.6    | 97.6   | 99.6      | 99.5 | 100.0    | 98.6    | 31,603   | <0.0001  |
| Newspaper reading    |         |        |           |      |          |         |          |          |
| Never                | 66.6    | 69.8   | 83.1      | 93.2 | 80.7     | 67.8    | 110,515  | <0.0001  |
| Around weekly        | 90.6    | 89.7   | 95.8      | 99.0 | 96.0     | 90.9    | 74,445   | <0.0001  |
| Around daily         | 96.8    | 95.2   | 99.0      | 99.4 | 98.4     | 96.7    | 46,611   | <0.0001  |
| Radio listening      |         |        |           |      |          |         |          |          |
| Never                | 79.2    | 77.7   | 92.1      | 96.8 | 89.3     | 79.7    | 178,995  | <0.0001  |
| Around weekly        | 87.4    | 88.3   | 93.8      | 98.8 | 95.5     | 87.9    | 39,056   | <0.0001  |
| Around daily         | 91.8    | 91.7   | 96.2      | 96.3 | 93.2     | 91.9    | 13,520   | <0.0001  |
| TV watching          |         |        |           |      |          |         |          |          |
| Never                | 53.2    | 59.9   | 71.7      | 87.1 | 72.3     | 54.9    | 44,284   | <0.0001  |
| Around weekly        | 77.1    | 81.0   | 89.9      | 95.0 | 87.1     | 78.3    | 53,256   | <0.0001  |
| Around daily         | 90.1    | 89.1   | 96.6      | 97.9 | 94.8     | 90.4    | 134,031  | <0.0001  |
| Total                | 81.2    | 80.4   | 92.7      | 97.0 | 90.8     | 81.7    | 231,571  | <0.0001  |
| <i>n</i>             | 173,199 | 33,599 | 16,588    | 4704 | 3481     | 231,571 |          |          |

Separately for socioeconomic groups, and Chi-square tests within those %. Chi-square tests were used to see whether there was independence between religion and whether people had heard about HIV. The test is carried out for each level of the socioeconomic variable. With the high sample size, the risk of type I error is small. Source: Own calculations based on the DHS 2015–2016 for India. HIV: Human immunodeficiency virus, DHS: Demographic and health survey

which are critical components for HIV/AIDS prevention. Less educated people are less likely to be aware of the effective preventive strategies for HIV/AIDS, even if being aware are more likely to be less compliant.<sup>[32]</sup> For example, educated men are more likely to be compliant with the use of condoms than uneducated men.<sup>[33]</sup> Conversely, uneducated with a lack of knowledge are more prone to stigmatization and at higher risk of being left undiagnosed. In addition to formal education, knowledge propagation through religious institutions can also improve HIV knowledge.<sup>[33]</sup>

Knowledge of HIV/AIDS was higher among the never married as compared to the previously married and married population. These findings are like a previous study reporting that 99.3% of unmarried women (15–24 years of age), comparable to

our younger study participants' group were aware of HIV/AIDS.<sup>[34]</sup> HIV/AIDS-related knowledge and sexual behaviors in unmarried are influenced by their religious affiliations and level of knowledge,<sup>[33]</sup> possibly due to educational opportunities provided by the religious-affiliated schools.

Our findings regarding the impact of reading newspapers, watching television, and listening to the radio on knowledge of HIV/AIDS further support the importance of education and spreading the knowledge of this syndrome. In India still, a sizeable proportion of the population lacks access to radio and television and relies on newspapers as a source of information. Moreover, radio is the source of disseminating knowledge in areas where access to television is limited. We found the highest awareness about

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**Table 5: Average of human immunodeficiency virus knowledge index for different religions**

|                      | Hindu   | Muslim | Christian | Sikh | Buddhist | Total   | <i>n</i> | <i>P</i> |
|----------------------|---------|--------|-----------|------|----------|---------|----------|----------|
| Gender               |         |        |           |      |          |         |          |          |
| Males                | 66.7    | 66.3   | 71.0      | 81.9 | 72.8     | 67.1    | 110,746  | <0.0001  |
| Females              | 54.5    | 52.5   | 67.8      | 79.9 | 65.8     | 55.1    | 120,825  | <0.0001  |
| Age (years)          |         |        |           |      |          |         |          |          |
| 15–29                | 61.4    | 58.7   | 70.4      | 82.1 | 68.9     | 61.6    | 113,690  | <0.0001  |
| 30–54                | 59.5    | 58.9   | 68.5      | 79.8 | 69.5     | 60.1    | 117,881  | <0.0001  |
| Residence            |         |        |           |      |          |         |          |          |
| Urban                | 70.0    | 64.4   | 74.6      | 82.8 | 77.2     | 69.3    | 72,177   | <0.0001  |
| Rural                | 55.5    | 53.6   | 65.3      | 80.1 | 64.2     | 56.0    | 159,394  | <0.0001  |
| Marital status       |         |        |           |      |          |         |          |          |
| Married              | 59.4    | 58.5   | 69.0      | 80.5 | 68.6     | 59.9    | 155,091  | <0.0001  |
| Previously married   | 51.4    | 49.3   | 65.7      | 76.6 | 63.4     | 52.3    | 6666     | <0.0001  |
| Never married        | 63.8    | 60.1   | 70.5      | 82.3 | 71.6     | 63.8    | 69,814   | <0.0001  |
| Wealth (%)           |         |        |           |      |          |         |          |          |
| Poorest 20           | 38.9    | 39.9   | 42.0      | 51.1 | 48.4     | 39.1    | 38,858   | <0.0001  |
| Middle 60            | 60.6    | 58.5   | 68.8      | 76.1 | 69.4     | 60.7    | 146,159  | <0.0001  |
| Richest 20           | 76.3    | 71.5   | 77.6      | 84.3 | 79.7     | 76.0    | 46,554   | <0.0001  |
| Education            |         |        |           |      |          |         |          |          |
| None                 | 36.9    | 41.8   | 50.8      | 69.2 | 44.6     | 38.3    | 47,326   | <0.0001  |
| Primary or secondary | 62.7    | 62.1   | 69.1      | 81.5 | 69.6     | 63.1    | 152,642  | <0.0001  |
| Higher               | 80.5    | 79.1   | 80.4      | 88.4 | 82.3     | 80.6    | 31,603   | <0.0001  |
| Newspaper reading    |         |        |           |      |          |         |          |          |
| Never                | 46.0    | 48.3   | 56.9      | 74.2 | 57.6     | 47.0    | 110,515  | <0.0001  |
| Around weekly        | 68.6    | 66.9   | 72.3      | 83.5 | 74.1     | 68.8    | 74,445   | <0.0001  |
| Around daily         | 77.2    | 74.9   | 78.4      | 86.8 | 80.3     | 77.2    | 46,611   | <0.0001  |
| Radio listening      |         |        |           |      |          |         |          |          |
| Never                | 58.6    | 56.4   | 68.9      | 80.8 | 67.9     | 59.0    | 178,995  | <0.0001  |
| Around weekly        | 65.9    | 65.7   | 70.1      | 83.0 | 73.0     | 66.1    | 39,056   | <0.0001  |
| Around daily         | 69.8    | 69.3   | 71.2      | 79.2 | 73.7     | 69.8    | 13,520   | <0.0001  |
| TV watching          |         |        |           |      |          |         |          |          |
| Never                | 36.6    | 40.8   | 49.3      | 67.8 | 51.0     | 37.8    | 44,284   | <0.0001  |
| Around weekly        | 55.5    | 57.7   | 64.0      | 76.7 | 64.0     | 56.4    | 53,256   | <0.0001  |
| Around daily         | 68.4    | 67.1   | 73.7      | 82.5 | 73.7     | 68.7    | 134,031  | <0.0001  |
| Total                | 60.4    | 58.8   | 69.3      | 80.9 | 69.3     | 60.8    | 231,571  | <0.0001  |
| <i>n</i>             | 173,199 | 33,599 | 16,588    | 4704 | 3481     | 231,571 |          |          |

Separately for socioeconomic groups and Kruskal–Wallis tests within those. Points, Kruskal–Wallis tests were used to see whether there were differences in overall HIV knowledge between different religions. The test is carried out for each level of the socioeconomic variable. Very low *P* values were also obtained using the ANOVA, but that has not been reported since data are not normally distributed. Source: Own calculations based on the DHS 2015–2016 for India. HIV: Human immunodeficiency virus, DHS: Demographic and Health Survey

HIV/AIDS among people having the highest access to these means of communication. These means of communication have a crucial role in knowledge dissemination and raising positive health behaviors. Our findings are consistent with previously published work<sup>[35]</sup> and highlight the importance of mass media in health promotion and disease prevention.

**Strength and limitations**

The strength of the study is based on a nationally representative large dataset enhancing the reliability of our results. The simplicity of questions in the survey ensures the reliability of data irrespective of the educational status of the participant. This dataset is from a geographically similar population limiting the confounding factors such as ethnicity and race. The

limitations of our study are that it is a cross-sectional survey; therefore, the temporal relationship between knowledge of the syndrome and the religiosity of a person cannot be inferred.

**Conclusion**

We conclude that the religious beliefs and knowledge obtained from religious schools/institutions significantly affect the awareness of people about HIV/AIDS. We found that Sikh men were significantly more knowledgeable about HIV/AIDS than their female counterparts and followers of other religions. Furthermore, residential, wealth, education, marital status, age, and mass media exposure to followers of various religions differed substantially and were found to have profound effects on comprehensive knowledge

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of HIV/AIDS. Our results emphasize the need for public health interventions targeting the poor, uneducated, rural, and sidelined residents of India in general and followers of Hinduism and Islam to improve their knowledge of HIV/AIDS, thereby reducing the incidence of this syndrome.

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### Conflicts of interest

There are no conflicts of interest.

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