

# Trends and Determinants of Condom Use Among Indonesian Adolescents: Evidence from 2007–2017 IDHS

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Shabrina Arifia Qatrannada<sup>1</sup>, Zahroh Shaluhiyah<sup>1\*</sup>, and Cahya Tri Purnami<sup>2</sup>

<sup>1</sup> Department of Health Promotion, Diponegoro University, Indonesia

<sup>2</sup> Department of Biostatistics, Diponegoro University, Indonesia

\* Zahroh Shaluhiyah, corresponding author. Email: shaluhiyah.zahroh@gmail.com

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## Abstract

Adolescent sexual and reproductive health remains a significant public health concern in Indonesia, particularly amid increasing reports of unprotected premarital sex. In 2022, adolescents accounted for approximately 50% of new HIV cases, underscoring the need for improved protection and education. This study aimed to examine trends in condom use among Indonesian adolescents from 2007 to 2017 and identify factors associated with protected sexual behavior. Data were drawn from three waves of the Indonesian Demographic and Health Surveys (IDHS) conducted in 2007, 2012, and 2017 using a two-stage stratified sampling design. Analyses included descriptive statistics and multivariable logistic regression. The proportion of adolescents reporting protected sex increased from 11.8% in 2007 to 20.6% in 2012, followed by a slight decline to 18.1% in 2017. HIV stigma was associated with a lower likelihood of condom use in 2017 (AOR = 0.75, 95% CI [0.57, 0.97]). Male adolescents had higher odds of condom use across survey years, as did adolescents residing in urban areas. Adolescents aged 18–24 and those with higher education showed increased odds of condom use in 2017. Exposure to condom-related information on television was consistently associated with higher odds of protected sex. In contrast, adolescents reporting sexual activity with non-sex workers had a lower likelihood of condom use in 2017 (AOR = 0.28, 95% CI [0.13, 0.70]). Although condom use has improved over time, its overall prevalence remains low. Strengthening comprehensive sexuality education and addressing structural and sociocultural determinants are essential to improve protective sexual behaviors among adolescents.

## Keywords

Adolescents; condom use; demographic and health surveys; protected sex behavior; trends analysis

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## Background

The global burden of Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) remains substantial. As of 2022, approximately 85.6 million people have been infected with HIV worldwide, with more than 40.4 million deaths reported to date (UNAIDS, 2023). In Indonesia, HIV continues to pose a significant public health challenge, particularly among adolescents and young adults. National data indicate that over 540,000 people were living with HIV in 2022, including approximately 24,000 new infections and 26,000 AIDS-related deaths (UNAIDS, 2023).

Approximately 50% of new HIV infections occur among individuals aged 15–24, highlighting the disproportionate vulnerability of adolescents and young adults (UNAIDS, 2023). This pattern suggests that many infections are acquired early in the life course, underscoring the urgency of addressing adolescent sexual health behaviors (Nisariati & Kusumaningrum, 2022). Although sexual initiation has become more common, consistent condom use remains low. This gap between sexual activity and protective behavior increases the risk of HIV, other sexually transmitted infections (STIs), and unintended pregnancies, emphasizing the need to better understand the contextual factors shaping preventive practices.

Despite increasing exposure to mass media and online information, adolescents' engagement with sexual health content does not consistently translate into safer behaviors. In many cases, exposure to sexualized content is not accompanied by accurate and comprehensive education, resulting in confusion and misinformation (Taquette & Souza, 2019). Limited access to reliable sexual health information contributes to insufficient knowledge of HIV and its transmission, which has been consistently associated with lower condom use. Adolescents with inadequate HIV knowledge are significantly more likely to engage in risky sexual behaviors (Adzani, 2015). This knowledge gap is further reinforced by limited school-based sexual education and restrictive family communication norms, particularly in more conservative regions of Indonesia (Adilah et al., 2017).

In many high-income countries, adolescent sexual health is a central focus of public health policy, supported by comprehensive sexuality education and broad access to contraceptives (Pinyopornpanish et al., 2017). In contrast, progress in Indonesia has been more limited, despite increasing awareness of HIV and AIDS (Puspita, 2008). Prevention efforts continue to be constrained by persistent stigma, cultural taboos surrounding premarital sex, and substantial gaps between knowledge and behavior (Nathan et al., 2023).

Condom use in Indonesia is often associated with promiscuity, reinforcing moral judgments that discourage its adoption. HIV-related stigma may further deter adolescents from accessing health services or seeking accurate information, thereby perpetuating misinformation and risky behaviors (Aventin et al., 2021). Within this sociocultural context, stigma functions as a subjective norm that shapes expectations and social approval related to sexual behavior, ultimately limiting adolescents' ability to adopt consistent protective practices (Cort & Tu, 2018).

Condom use is also influenced by a range of sociodemographic factors. Previous studies identify gender, age, educational level, place of residence, and employment status as key determinants of protective sexual behavior (Phiri et al., 2015). For example, adolescents in rural areas often face limited access to sexual health services and information, which may

reduce condom use (Ajayi & Akpan, 2018). Educational attainment is also associated with both knowledge and health-seeking behavior, with higher levels of education generally linked to a greater likelihood of condom use (Feyissa et al., 2012). Gender norms further shape these dynamics. Young men may resist condom use due to perceived reductions in pleasure or embarrassment, whereas young women may have limited negotiating power within sexual relationships (Madiba & Ngwenya, 2017).

Existing literature has rarely examined the interaction of these factors within the Indonesian context using nationally representative data across multiple time points. Although several studies have explored predictors of condom use, few have analyzed temporal trends or incorporated key psychosocial dimensions. To address this gap, the present study uses three waves of the Indonesian Demographic and Health Survey (IDHS) data (2007, 2012, and 2017) to examine trends in condom use among adolescents aged 15–24. Specifically, this study aims to assess changes in condom use over time and to identify factors associated with protected sexual behavior.

## Theoretical framework

This study is guided by the Social Ecological Model (SEM), which offers a comprehensive lens for examining how adolescent condom use is influenced by interactions among individual, interpersonal, community, and structural factors. Within this framework, health behaviors are conceptualized as processes embedded in broader social systems, including peers, media, education, and socio-demographic contexts. The SEM is particularly well-suited for trend analysis, as it allows examination of how influences evolve over time and across cohorts.

At the individual level, factors such as age, education, HIV knowledge, and sexual experience are considered key determinants of protective behavior. Interpersonal influences, including peer presence during sexual encounters and the number of sexual partners, reflect the immediate social environment shaping decision-making processes. Exposure to mass media is conceptualized as a community-level factor that contributes to adolescents' awareness of norms regarding sexual health. At the structural and cultural level, urban–rural residence and access to information represent broader environmental conditions that influence adolescent health behaviors.

Within this broader socio-ecological framework, the Indonesian context is characterized by pervasive HIV-related stigma, which operates both as a response to people living with HIV and as a societal mechanism of sexual regulation. In highly moralized contexts, such stigma can influence adolescents' perceptions of risk, constrain open communication about safe sex, and discourage access to protective tools such as condoms. Although stigma is often socially justified as a deterrent to premarital sexual activity, it may paradoxically increase vulnerability by reinforcing shame and misinformation. Within the SEM framework, HIV-related stigma is positioned as a structural and cultural factor shaping the environment in which adolescent sexual behavior occurs.

## Methods

### Data sources

This study utilized data from the Indonesian Demographic and Health Surveys (IDHS) conducted in 2007, 2012, and 2017 by the National Statistical Office on behalf of the Ministry of Health with financial and technical support from the United States Agency for International Development (USAID). These IDHS surveys were nationally representative, large-scale, cross-sectional studies.

The surveys employed a two-stage stratified cluster sampling design. In the first stage, a predetermined number of enumeration areas (EAs) was selected with probability proportional to size. In the second stage, a systematic sampling procedure was used to select households within each enumeration area. Detailed methodologies for each survey are documented in the respective final survey reports.

The IDHS were conducted in collaboration with the Indonesia Population and Family Planning Agency and the Indonesian Ministry of Health and are publicly available for research. The surveys were conducted at approximately five-year intervals and produced separate reports on household characteristics and adolescent reproductive health. The present analysis used data from the adolescent reproductive health reports and applied a cross-sectional design to estimate the prevalence of outcomes and exposures (Zou et al., 2022).

### Population and sample

The IDHS sampling framework was based on the 2010 Population Census Block Sample Master, with a total of 1,970 census blocks in urban and rural areas. The estimated sample size comprised 49,250 households using a two-stage stratified design. In the first stage, census blocks were selected with probability proportional to size. In the first stage, census blocks were selected with probability proportional to size, followed by systematic selection of 25 households from each block in the second stage.

The analytical sample for this study included unmarried adolescents aged 15–24 years who reported having ever had sexual intercourse and had complete data on all variables of interest. Based on these criteria, the sample size was 1,388 respondents for the year 2007; 1,630 respondents for the year 2012; and 1,676 respondents for the year 2017.

### Dependent variable

This study examines the influence of HIV-related stigma and other factors on unprotected sexual behavior among adolescents. The primary outcome variable was adolescent condom use during sexual intercourse. The response variable was dichotomized as “Yes” or “No.”

### Independent variables

The analysis included theoretically grounded variables to examine their associations with adolescent condom use. These variables were specified as independent explanatory factors to

assess their direct influence on protective sexual behaviors. Socio-demographic characteristics included sex, age, educational attainment, employment status, and place of residence (urban or rural). Previous studies link these characteristics to access to health information and decision-making autonomy among adolescents.

Mass media exposure was measured using a composite score on nine items assessing exposure to HIV-, STI-, or condom-related information via newspapers or magazines, radio, and television. The total score ranged from 0 to 9. This score reflected the respondent's level of exposure to HIV-related health communication across multiple media formats. HIV knowledge was measured using 10 dichotomous items commonly applied in DHS-based studies. The items captured an understanding of HIV prevention, transmission routes, and common misconceptions. The total number of correct answers was summed to create a knowledge score ranging from 0 to 10. Items included whether HIV was transmitted through mosquito bites, the effectiveness of condom use in reducing risk, and the possibility of healthy-looking individuals being HIV-positive. The resulting score represented the respondent's level of HIV-related knowledge.

Sexual experience was measured as a binary variable indicating whether respondents had ever engaged in sexual intercourse. Among sexually active respondents, the number of sexual partners was categorized as single or multiple. This variable captured both sexual initiation and the complexity of adolescents' sexual networks, which are central to understanding how protective behaviors such as condom use are negotiated.

HIV-related stigma was measured using an index constructed from four dichotomous items. These included willingness to care for a family member with AIDS at home, acceptance of an HIV-positive but asymptomatic child attending school with others, willingness to purchase fresh produce from an HIV-positive vendor, and agreement with the idea that a relative's HIV status must remain a secret. Collectively, these indicators reflected fears of casual HIV transmission and attitudes toward social inclusion.

## Statistical analysis

Descriptive analyses summarized the characteristics of the study population, including the prevalence of protected sexual behavior and levels of HIV stigma across survey years. Bivariate analyses using chi-square tests examined associations between HIV stigma, potential confounders, and protected sexual behavior.

Logistic regression models estimated the probability of engaging in protected sexual behavior. Potential confounders were identified through a literature review and preliminary bivariate analyses. Variables significantly associated with both independent and dependent variables were classified as confounders. These confounders were included as covariates in the logistic regression models to control for their effects.

Multivariate logistic regression analyses were conducted to examine determinants of protected sexual behavior among adolescents in Indonesia while adjusting for confounding factors. This modeling approach allowed estimation of the strength and direction of the association between HIV stigma and protected sexual behavior while accounting for covariates. Logistic regression also allows assessment of interaction effects, providing insight into how associations vary across conditions. The logistic regression model is specified as follows :

$$y = \log\left(\frac{P_i}{1 - P_i}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

$P_i$  denotes the probability of engaging in protected sexual behavior,  $1 - P_i$  represents the probability of unprotected sex,  $\alpha$  is the intercept, and  $\beta$  coefficients correspond to the independent variables ( $X$ ). Regression coefficients were exponentiated to obtain adjusted odds ratios (ORs) with 95% confidence intervals (CIs). Data were organized, tabulated, and analyzed in accordance with the objectives of the study using SPSS version 25.

## Ethical statement

This study utilized secondary data from the Indonesian Demographic and Health Surveys (IDHS) conducted in 2007, 2012, and 2017. The data are publicly available and de-identified. Ethical approval and informed consent were obtained by the original survey administrators and approved by the ICF Institutional Review Board (IRB). As this study involved secondary analysis of anonymized data, it did not involve direct human subjects. Ethical approval for this secondary analysis was granted by the ethics committee of the Faculty of Public Health, Diponegoro University (approval no. 198/EA/KEPK-FKM/2024).

## Results

### Characteristic of the study population

Table 1 shows the distribution of adolescents' characteristics across three waves of the Indonesian Demographic and Health Survey (IDHS). The proportion of respondents reporting protected sex increased from 11.8% in 2007 to 20.6% in 2012 before declining slightly to 18.1% in 2017. HIV-related stigma remained high in 2007 (87.6%) and 2012 (89.5%), then declined sharply in 2017 (45.3%).

The gender distribution remained relatively stable, with males representing the majority of respondents, accounting for 83.3% in 2007, increasing to 89.4% in 2012, and decreasing slightly to 88.1% in 2017. Most respondents were aged 18–24 years, with the proportion increasing from 80.9% in 2007 to 84.1% in 2012 and 85.6% in 2017, while the proportion aged 15–17 years declined over the same period. Educational attainment showed an overall upward trend, with the percentage of respondents with higher education rising from 56.9% in 2007 to 66.6% in 2012, before slightly decreasing to 66.1% in 2017. In contrast, the proportion of respondents with secondary education fluctuated, whereas that of those with primary education decreased consistently.

Occupational status changed over time, with the percentage of employed respondents increasing from 36.0% in 2007 to 62.0% in 2017, while those unemployed decreased from 63.9% to 38.0%. The distribution of residence showed a slight decline in urban residency from 56.6% in 2007 to 52.6% in 2017, while rural residency increased from 43.4% to 47.4%. Mass media exposure showed fluctuations in engagement with information about HIV, STIs, and condoms. Notably, reading about HIV decreased from 39.8% in 2007 to 30.2% in 2012 but increased to 47.4% in 2017. Levels of HIV knowledge improved over time, with the proportion of respondents with high knowledge increasing from 14.9% in 2007 to 41.9% in 2017. Medium knowledge levels increased from 50.0% in 2007 to 64.0% in 2012, then decreased to 46.3% in

2017, while low knowledge levels declined substantially from 35.1% in 2007 to 10.4% in 2012 and remained relatively low at 11.8% in 2017. Most respondents reported sexual intercourse with non-sex workers, and this proportion increased over time (94.7% in 2007, 96.0% in 2012, and 97.0% in 2017).

**Table 1:** Distribution of Selected Variables in the 2007, 2012, and 2017 IDHS

| Variable            | Category                                        | n (%)            |                  |                  |
|---------------------|-------------------------------------------------|------------------|------------------|------------------|
|                     |                                                 | 2007 (n = 1,288) | 2012 (n = 1,630) | 2017 (n = 1,676) |
| Protected sex       | Yes                                             | 164 (11.8)       | 335 (20.6)       | 304 (18.1)       |
|                     | No                                              | 1,224 (88.2)     | 1,295 (79.4)     | 1,372 (81.9)     |
| HIV stigma          | Yes                                             | 1,216 (87.6)     | 1,459 (89.5)     | 760 (45.3)       |
|                     | No                                              | 172 (12.4)       | 171 (10.5)       | 916 (54.7)       |
| Gender              | Female                                          | 232 (16.7)       | 173 (10.6)       | 199 (11.9)       |
|                     | Male                                            | 1,156 (83.3)     | 1,457 (89.4)     | 1,477 (88.1)     |
| Age                 | 15–17                                           | 256 (19.1)       | 259 (15.9)       | 241 (14.4)       |
|                     | 18–24                                           | 1,123 (80.9)     | 1,371 (84.1)     | 1,435 (85.6)     |
| Educational level   | Primary                                         | 260 (18.7)       | 228 (14.0)       | 206 (12.3)       |
|                     | Secondary                                       | 325 (23.4)       | 317 (19.4)       | 362 (21.6)       |
|                     | Higher                                          | 773 (56.9)       | 1,075 (66.6)     | 1,108 (66.1)     |
| Employment status   | Unemployed                                      | 888 (63.9)       | 1,090 (66.9)     | 637 (38.0)       |
|                     | Employed                                        | 500 (36.0)       | 540 (33.1)       | 1,039 (62.0)     |
| Type of residence   | Urban                                           | 789 (56.6)       | 910 (55.8)       | 881 (52.6)       |
|                     | Rural                                           | 602 (43.4)       | 720 (44.2)       | 795 (47.4)       |
| Mass media exposure | Read about HIV in newspapers or magazines       | 552 (39.8)       | 493 (30.2)       | 795 (47.4)       |
|                     | Read about STIs in newspapers or magazines      | 355 (25.6)       | 308 (18.9)       | 524 (31.3)       |
|                     | Read about condoms in newspapers or magazines   | 509 (36.7)       | 400 (24.5)       | 513 (30.6)       |
|                     | Heard about HIV on the radio                    | 485 (34.9)       | 416 (25.5)       | 539 (32.2)       |
|                     | Heard about STIs on the radio                   | 274 (19.7)       | 232 (14.2)       | 630 (37.6)       |
|                     | Heard about condoms on the radio                | 407 (29.3)       | 292 (17.9)       | 613 (36.6)       |
|                     | Watched information about HIV on television     | 811 (58.4)       | 910 (55.8)       | 802 (47.9)       |
|                     | Watched information about STIs on television    | 442 (31.8)       | 495 (30.4)       | 1,037 (61.9)     |
|                     | Watched information about condoms on television | 859 (61.9)       | 920 (56.4)       | 737 (44.0)       |
|                     |                                                 |                  |                  |                  |
| HIV knowledge       | Low                                             | 487 (35.1)       | 169 (10.4)       | 198 (11.8)       |
|                     | Medium                                          | 694 (50.0)       | 1,043 (64.0)     | 776 (46.3)       |
|                     | High                                            | 207 (14.9)       | 418 (25.6)       | 702 (41.9)       |
| Sexual partner      | Sex workers                                     | 73 (5.3)         | 67 (4.0)         | 53 (3.0)         |
|                     | Non-sex workers                                 | 1,318 (94.7)     | 1,563 (96.0)     | 1,623 (97.0)     |

## **Relationship between protected sex, HIV stigma, and background variables**

The relationship between protected sex, HIV stigma, and background variables was examined using chi-square tests (Table 2). Overall, adolescents reporting higher levels of HIV stigma tended to report lower proportions of condom use compared to those with lower stigma across survey waves ( $p < .05$ ).

Condom use also differed significantly by sex and age. Male respondents reported higher levels of condom use than females. In contrast, adolescents aged 18–24 years reported higher use compared to those aged 15–17 years across survey years (all  $p < .05$ ). Higher educational attainment was associated with higher proportions of condom use. In contrast, occupational status showed no statistically significant association.

**Table 2:** Bivariate Distribution of Protected Sex by Background Characteristics, 2007–2017

| Variable                                   | 2007 ( <i>n</i> = 1,288) |               |                | 2012 ( <i>n</i> = 1,630) |               |                | 2017 ( <i>n</i> = 1,676) |               |                |
|--------------------------------------------|--------------------------|---------------|----------------|--------------------------|---------------|----------------|--------------------------|---------------|----------------|
|                                            | Unprotected sex          | Protected sex | <i>p</i> value | Unprotected sex          | Protected sex | <i>p</i> value | Unprotected sex          | Protected sex | <i>p</i> value |
| <b>HIV stigma</b>                          |                          |               |                |                          |               |                |                          |               |                |
| Stigma                                     | 1,083 (89.1)             | 133 (10.9)    | .007           | 1,162 (79.6)             | 297 (20.4)    | .006           | 650 (85.5)               | 110 (14.5)    | .001           |
| No stigma                                  | 141 (82.0)               | 31 (18.0)     |                | 133 (77.8)               | 38 (22.2)     |                | 722 (78.8)               | 194 (21.2)    |                |
| <b>Gender</b>                              |                          |               |                |                          |               |                |                          |               |                |
| Female                                     | 221 (95.3)               | 11 (4.7)      | .001           | 150 (86.7)               | 23 (13.3)     | .012           | 165 (82.9)               | 34 (17.1)     | .017           |
| Male                                       | 1,003 (86.8)             | 153 (13.2)    |                | 1,145 (78.6)             | 312 (21.4)    |                | 1,207 (81.7)             | 270 (18.3)    |                |
| <b>Age</b>                                 |                          |               |                |                          |               |                |                          |               |                |
| 15–17                                      | 239 (90.2)               | 26 (9.8)      | .035           | 217 (83.6)               | 42 (16.4)     | .017           | 215 (89.2)               | 26 (10.8)     | .001           |
| 18–24                                      | 845 (85.9)               | 138 (14.1)    |                | 1,078 (78.7)             | 293 (21.3)    |                | 992 (69.2)               | 443 (30.8)    |                |
| <b>Educational level</b>                   |                          |               |                |                          |               |                |                          |               |                |
| Primary                                    | 241 (92.7)               | 19 (7.3)      | .036           | 191 (83.7)               | 37 (16.3)     | .004           | 183 (89.2)               | 23 (10.8)     | .002           |
| Secondary                                  | 289 (88.9)               | 36 (11.1)     |                | 270 (85.2)               | 47 (14.8)     |                | 309 (85.4)               | 53 (14.6)     |                |
| Higher                                     | 664 (85.9)               | 109 (14.1)    |                | 824 (76.7)               | 251 (23.3)    |                | 874 (79.4)               | 227 (20.6)    |                |
| <b>Employment status</b>                   |                          |               |                |                          |               |                |                          |               |                |
| Unemployed                                 | 779 (87.7)               | 109 (12.3)    | .503           | 856 (78.5)               | 234 (21.5)    | .194           | 839 (80.8)               | 200 (19.2)    | .132           |
| Employed                                   | 445 (89.0)               | 55 (11.0)     |                | 439 (81.3)               | 101 (18.7)    |                | 533 (83.7)               | 104 (16.3)    |                |
| <b>Type of residence</b>                   |                          |               |                |                          |               |                |                          |               |                |
| Urban                                      | 627 (79.7)               | 159 (20.3)    | .001           | 684 (75.2)               | 226 (24.8)    | .001           | 678 (77.0)               | 203 (23.0)    | .001           |
| Rural                                      | 488 (81.1)               | 114 (18.9)    |                | 611 (84.9)               | 109 (15.1)    |                | 694 (87.3)               | 101 (12.7)    |                |
| <b>Mass media exposure</b>                 |                          |               |                |                          |               |                |                          |               |                |
| Read about HIV in newspapers or magazines  | 462 (83.7)               | 90 (16.3)     | .001           | 352 (71.4)               | 141 (28.6)    | .001           | 694 (87.3)               | 101 (12.7)    | .001           |
| Read about STIs in newspapers or magazines | 298 (83.9)               | 57 (16.1)     |                | 222 (72.1)               | 86 (27.9)     |                | 421 (80.3)               | 103 (19.7)    |                |
| Read about condoms in                      | 425 (83.5)               | 84 (16.5)     |                | 278 (69.5)               | 122 (30.5)    |                | 412 (80.3)               | 101 (19.7)    |                |

| Variable                                        | 2007 ( <i>n</i> = 1,288) |               |                | 2012 ( <i>n</i> = 1,630) |               |                | 2017 ( <i>n</i> = 1,676) |               |                |
|-------------------------------------------------|--------------------------|---------------|----------------|--------------------------|---------------|----------------|--------------------------|---------------|----------------|
|                                                 | Unprotected sex          | Protected sex | <i>p</i> value | Unprotected sex          | Protected sex | <i>p</i> value | Unprotected sex          | Protected sex | <i>p</i> value |
| newspapers or magazines                         |                          |               |                |                          |               |                |                          |               |                |
| Heard about HIV on the radio                    | 412 (84.9)               | 73 (15.1)     |                | 288 (69.2)               | 128 (30.8)    |                | 435 (80.7)               | 104 (19.3)    |                |
| Heard about STIs on the radio                   | 224 (81.8)               | 50 (18.2)     |                | 161 (69.4)               | 71 (30.6)     |                | 495 (78.6)               | 135 (21.4)    |                |
| Heard about condoms on the radio                | 331 (81.3)               | 76 (18.7)     |                | 202 (69.2)               | 90 (30.8)     |                | 487 (79.4)               | 126 (20.6)    |                |
| Watched information about HIV on television     | 686 (84.6)               | 125 (15.4)    |                | 674 (74.1)               | 236 (25.9)    |                | 668 (83.3)               | 134 (16.7)    |                |
| Watched information about STIs on television    | 359 (81.2)               | 83 (18.8)     |                | 366 (73.9)               | 129 (26.1)    |                | 868 (83.7)               | 169 (16.3)    |                |
| Watched information about condoms on television | 716 (83.4)               | 143 (16.6)    |                | 681 (74.0)               | 239 (26.0)    |                | 621 (84.3)               | 116 (15.7)    |                |
| <b>HIV knowledge</b>                            |                          |               |                |                          |               |                |                          |               |                |
| Low                                             | 451 (92.6)               | 36 (7.4)      | .001           | 141 (83.4)               | 28 (16.6)     | .002           | 175 (88.4)               | 23 (11.6)     | .001           |
| Medium                                          | 599 (86.3)               | 95 (13.7)     |                | 801 (76.8)               | 242 (23.2)    |                | 643 (82.9)               | 133 (17.1)    |                |
| High                                            | 174 (84.0)               | 33 (16.0)     |                | 353 (84.4)               | 65 (15.6)     |                | 389 (77.3)               | 114 (22.7)    |                |
| <b>Sexual partner</b>                           |                          |               |                |                          |               |                |                          |               |                |
| Sex workers                                     | 42 (62.6)                | 25 (37.4)     | .005           | 48 (65.7)                | 24 (34.3)     | .003           | 28 (52.8)                | 25 (47.2)     | .001           |
| Non-sex workers                                 | 1,182 (89.5)             | 139 (10.5)    |                | 1,247 (80.0)             | 311 (20.0)    |                | 1,344 (83.0)             | 279 (17.0)    |                |

Note: Values are presented as *n* (%); *p* values were obtained using chi-square tests. Statistical significance was defined as *p* < .05.

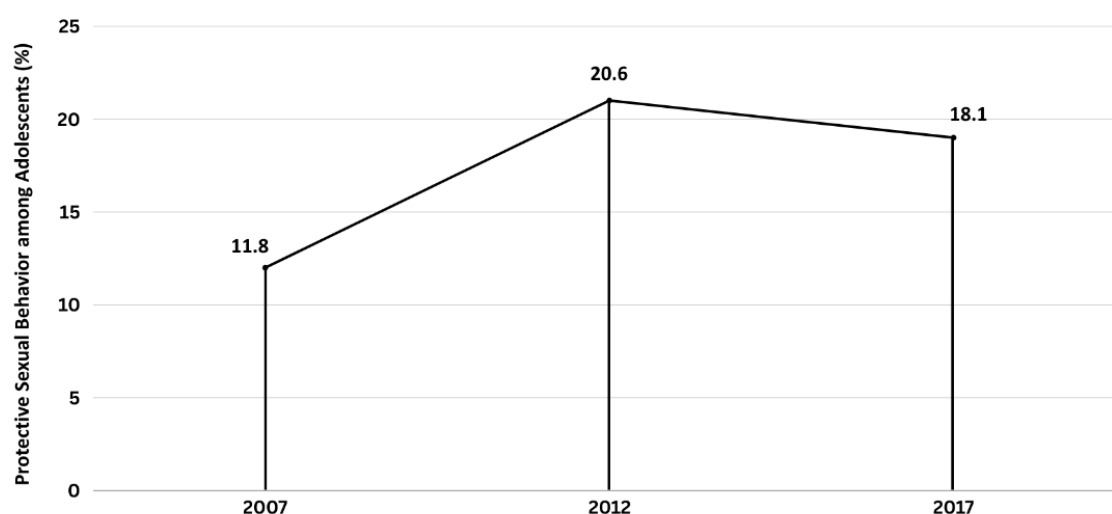
Respondents living in urban areas reported higher condom use than those in rural areas across survey years (all  $p < .05$ ). Exposure to mass media information related to HIV, STIs, and condoms was also associated with higher condom use. Condom use differed significantly by levels of HIV knowledge in bivariate analysis ( $p < .05$ ).

Most respondents reported sexual intercourse with non-sex workers, with condom use remaining low in both groups. However, condom use among adolescents reporting intercourse with sex workers increased between 2007 and 2017 ( $p < .05$ ).

## Protective sexual behavior across the years (2007, 2012, & 2017)

A significant shift in protective sexual behavior among adolescents was identified across the 3 reference years (Figure 1). In 2007, the proportion of adolescents who reported protected sex during their sexual intercourse was the lowest among the survey years. By 2012, this proportion had increased, showing a rise in condom use compared to 2007. However, in 2017, the reported condom use slightly declined from the 2012 level, yet it remained higher than the baseline established in 2007. The observed fluctuation showed that the prevalence of protective sexual behavior among adolescents did not follow a linear upward trend over 10 years. Instead, there was an initial improvement followed by a reduction, as shown in the comparative data across the 3 reference years.

**Figure 1:** Trends in Protected Sexual Behavior among Adolescents in Indonesia, 2007–2017



## Determinants of protected sex practices among adolescents

Table 3 presents the multivariable logistic regression results for factors associated with protected sex among Indonesian adolescents across survey years. HIV-related stigma showed a time-specific association with no significant relationship was observed in 2007 (AOR = 0.92, 95% CI [0.58, 1.45]) and 2012 (AOR = 1.13, 95% CI [0.75, 1.68]), whereas in 2017 adolescents reporting HIV-related stigma had lower odds of practicing protected sex (AOR = 0.75, 95% CI [0.57, 0.97],  $p < .05$ ).

Sociodemographic factors demonstrated heterogeneous patterns over time. Male adolescents were more likely to report protected sex in 2007 (AOR = 2.57, 95% CI [1.34, 4.94],  $p < .01$ ) and 2017 (AOR = 1.66, 95% CI [1.06, 2.61],  $p < .05$ ), while age was significantly associated only in 2017, with adolescents aged 18–24 years having higher odds of protected sex compared to those aged 15–17 years (AOR = 1.53, 95% CI [1.01, 2.32],  $p < .05$ ). Higher educational attainment also emerged as a significant predictor only in 2017 (AOR = 1.72, 95% CI [1.05, 2.82],  $p < .05$ ). Place of residence was a consistent determinant across all survey years, with adolescents residing in urban areas showing higher odds of protected sex than those in rural settings (2007: AOR = 2.55, 95% CI [1.74, 3.72],  $p < .001$ ; 2012: AOR = 1.53, 95% CI [1.16, 2.01],  $p < .001$ ; 2017: AOR = 1.86, 95% CI [1.42, 2.43],  $p < .001$ ).

Associations with mass media exposure varied by modality and time. Exposure to condom-related content via television was consistently associated with higher odds of protected sex across all surveys (2007: AOR = 2.62, 95% CI [1.49, 4.61],  $p < .01$ ; 2012: AOR = 1.45, 95% CI [1.05, 2.00],  $p < .05$ ; 2017: AOR = 1.58, 95% CI [1.42, 1.81],  $p < .01$ ), whereas radio-based exposure to HIV or STI information showed significant associations only in selected years, including HIV information in 2012 (AOR = 1.47, 95% CI [1.02, 2.10],  $p < .05$ ) and STI information in 2017 (AOR = 1.88, 95% CI [1.15, 3.06],  $p < .01$ ). HIV knowledge was not significantly associated with protected sex in any survey year. In contrast, sexual partnership patterns were relevant in 2017, as adolescents reporting sexual intercourse with non-sex workers had substantially lower odds of condom use (AOR = 0.28, 95% CI [0.13, 0.70],  $p < .05$ ).

**Table 3:** Multivariable Logistic Regression for Protected Sex Behavior

| Variables           | Category                                                         | AOR (95% CI)        |                     |                     |
|---------------------|------------------------------------------------------------------|---------------------|---------------------|---------------------|
|                     |                                                                  | 2007                | 2012                | 2017                |
| HIV stigma          | No                                                               | 1.00                | 1.00                | 1.00                |
|                     | Yes                                                              | 0.92 (0.58–1.45)    | 1.13 (0.75–1.68)    | 0.75 (0.57–0.97)*   |
| Gender              | Female                                                           | 1.00                | 1.00                | 1.00                |
|                     | Male                                                             | 2.57 (1.34–4.94)**  | 1.49 (1.09–2.50)*   | 1.66 (1.06–2.61)*   |
| Age                 | 15–17                                                            | 1.00                | 1.00                | 1.00                |
|                     | 18–24                                                            | 0.89 (0.55–1.44)    | 1.10 (0.75–1.61)    | 1.53 (1.01–2.32)*   |
| Educational level   | Primary                                                          | 1.00                | 1.00                | 1.00                |
|                     | Secondary                                                        | 1.03 (0.65–1.61)    | 0.70 (0.43–1.14)    | 1.32 (0.76–2.28)    |
|                     | Higher                                                           | 0.99 (0.65–1.50)    | 0.99 (0.64–1.52)    | 1.72 (1.05–2.82)*   |
| Place of residence  | Rural                                                            | 1.00                | 1.00                | 1.00                |
|                     | Urban                                                            | 2.55 (1.74–3.72)*** | 1.53 (1.16–2.01)*** | 1.86 (1.42–2.43)*** |
| Mass media exposure | Not read about HIV, STIs, and condoms in newspapers or magazines | 1.00                | 1.00                | 1.00                |
|                     | Read about HIV in newspapers or magazines                        | 1.11 (0.69–1.76)    | 1.13 (0.78–1.65)    | 0.86 (0.56–1.34)    |
|                     | Read about STIs in newspapers or magazines                       | 0.88 (0.51–1.36)    | 0.81 (0.54–1.22)    | 1.15 (0.75–1.75)    |
|                     | Read about condoms in newspapers or magazines                    | 0.98 (0.62–1.52)    | 1.34 (0.93–1.93)    | 1.03 (0.69–1.53)    |
|                     |                                                                  |                     |                     |                     |

| Variables      | Category                                            | AOR (95% CI)       |                   |                    |
|----------------|-----------------------------------------------------|--------------------|-------------------|--------------------|
|                |                                                     | 2007               | 2012              | 2017               |
| HIV knowledge  | Not heard about HIV, STIs, and condoms on the radio | 1.00               | 1.00              | 1.00               |
|                | Heard about HIV on the radio                        | 0.65 (0.41–1.04)   | 1.47 (1.02–2.10)* | 0.73 (0.47–1.13)   |
|                | Heard about STIs on the radio                       | 1.27 (0.76–2.13)   | 1.09 (0.72–1.66)  | 1.88 (1.15–3.06)** |
|                | Heard about condoms on the radio                    | 1.47 (1.34–2.31)*  | 1.07 (0.73–1.56)  | 0.95 (0.59–1.52)   |
|                | Not watched HIV, STIs, and condoms on television    | 1.00               | 1.00              | 1.00               |
|                | Watched information about HIV on television         | 0.91 (0.55–1.50)   | 1.34 (0.95–1.89)  | 1.29 (0.93–1.79)   |
|                | Watched information about STIs on television        | 1.62 (1.05–2.50)*  | 0.94 (0.68–1.28)  | 1.65 (1.48–1.89)** |
|                | Watched information about condoms on television     | 2.62 (1.49–4.61)** | 1.45 (1.05–2.00)* | 1.58 (1.42–1.81)** |
|                | Low                                                 | 1.00               | 1.00              | 1.00               |
|                | Medium                                              | 1.40 (0.81–2.41)   | 1.40 (0.89–2.18)  | 0.98 (0.57–1.67)   |
| Sexual partner | High                                                | 0.92 (0.58–1.45)   | 1.13 (0.75–1.68)  | 1.30 (0.75–2.26)   |
|                | Sex workers                                         | 1.00               | 1.00              | 1.00               |
|                | Non-sex workers                                     | 0.49 (0.13–1.40)   | 0.75 (0.24–1.31)  | 0.28 (0.13–0.70)*  |

*Note: Models were estimated using multivariable logistic regression and adjusted for all variables listed in the table. AOR = adjusted odds ratio; CI = confidence interval; ref = reference category. \* $p < .05$ , \*\* $p < .01$ , and \*\*\* $p < .001$ .*

## Discussion

A modest increase in condom use among Indonesian adolescents occurred between 2007 and 2012, rising from 11.8% to 20.6%, followed by a slight decline to 18.1% in 2017. Despite this improvement, the overall prevalence remained substantially below the national target of 45% for safe sexual practices among youth over the past decade (United Nations, 2015).

This limited progress reflects a combination of structural, policy, and sociocultural constraints shaping adolescents' access to condoms. During the early years of the decade, access to condoms was restricted, and national reproductive health policies provided limited support for adolescent sexual health. Prevention efforts primarily targeted key populations, particularly sex workers, through the 100% Condom Use Policy (CUP), while largely excluding adolescents (Puspita, 2008; Sarkar, 2008; UNAIDS & WHO, 2007). In parallel, prevailing cultural and religious norms often framed condom use as morally inappropriate for youth, reinforcing stigma and discouraging adolescents from seeking or using condoms (Bollen et al., 2010; Ministry of Religious Affairs, 2006).

The increase observed in 2012 may reflect the influence of large-scale HIV prevention campaigns, including *Aku Bangga Aku Tahu* (ABAT), which aimed to improve adolescents'

awareness of HIV and safe sex practices (National AIDS Commission, 2012). However, these initiatives faced public resistance. Religious leaders and conservative policymakers raised moral objections, resulting in the suspension or withdrawal of condom promotion programs targeting adolescents (East Java Provincial Office of Communication and Information Technology, 2013). This pushback weakened the momentum of earlier public health efforts (BBC Indonesia, 2012).

By 2017, additional barriers emerged. Regulations requiring parental consent further restricted adolescents' access to reproductive health services and limited their ability to obtain condoms (UNAIDS, 2017; Violita & Hadi, 2019). Although newer campaigns, including #UbahHidupLo, introduced more youth-friendly digital approaches (Kompas, 2017), their effectiveness remained constrained by the absence of supportive structural and policy environments. Sexuality has remained a politically contested issue in Indonesia, reflected in regulatory developments such as Law No. 17/2023 and Law No. 28/2024 (Ministry of State Secretariat, 2024a).

At the individual level, condom use decisions are shaped by trust in a partner, perceived risk, and internalized norms surrounding sexuality and responsibility (Okeke, 2022). These factors reflect the interaction between individual beliefs and broader social messages, often in the absence of comprehensive sexual health education or supportive systems (Gilliam et al., 2017). Although condom use showed only modest improvement, these patterns indicate persistent structural and contextual challenges within Indonesia's sexual health landscape (Ministry of State Secretariat, 2024b).

## **HIV stigma**

HIV-related stigma among adolescents remained persistently high, with approximately 70.0% of respondents across all survey years reporting stigmatizing attitudes toward people living with HIV (PLHIV). This prevalence contrasts sharply with the global target of “zero stigma” and underscores the ongoing challenge of reducing discriminatory perceptions. The persistence of stigma reflects broader societal discomfort and avoidance that extend beyond concerns about direct transmission (Stangl et al., 2019).

Rather than functioning as a deterrent to risky behavior, stigma was associated with a lower likelihood of condom use, particularly in 2017. This pattern suggests that HIV stigma operates not only as a marker of misinformation or fear but also as a structural barrier to adopting protective sexual behaviors among adolescents (Cort & Tu, 2018).

Adolescents reporting sexual activity with non-sex workers and inconsistent condom use also exhibited high levels of HIV stigma. This finding challenges the assumption that stigma primarily affects key populations and instead indicates that it is embedded within the general adolescent population. Although HIV prevalence remains concentrated among specific groups, including MSM, FSW, PWID, and transgender individuals, the association between stigma and unprotected sex among adolescents reflects broader societal dynamics (Billings et al., 2021). Furthermore, engagement in sexual activity with sex workers persisted across survey waves, indicating that stigmatizing attitudes do not necessarily translate into more cautious or protective behavior (Ali et al., 2021; Delavande & Kohler, 2012).

Evidence from other contexts supports this interpretation. A study among boda boda motorcyclists in Uganda found that individuals experiencing HIV-related stigma were more

likely to engage in risky sexual behaviors, including unprotected sex and multiple sexual partnerships (Nabifo et al., 2021). This pattern aligns with the concept of “splitting,” in which individuals categorize themselves as belonging to a perceived low-risk in-group, thereby fostering a false sense of safety and reducing motivation to adopt protective practices (Cort & Tu, 2018).

In Indonesia, sociocultural and religious norms further reinforce this dynamic. Condom use is often perceived as promoting premarital sex and, therefore, conflicting with prevailing moral frameworks. HIV is frequently framed as a consequence of immoral behavior, which intensifies stigma and discourages open discussion and preventive action (Htat et al., 2015; Shyan Fam et al., 2004). Efforts to normalize conversations about safe sex, such as the #CondomEmoji campaign, have attempted to reduce embarrassment and improve communication among young people (Alvarez, 2015). However, these initiatives have faced resistance among Indonesian adolescents, particularly among those who are not sexually active and those influenced by strong cultural and religious norms (Ridlo & Zein, 2018). This resistance reflects deeply rooted stigmas in Indonesia that complicate the effective promotion of safe sex practices.

## Sexual partner

Reported sexual activity with sex workers decreased across survey years, indicating a shift in adolescent sexual behavior patterns. Despite this trend, condom use remained inconsistent even in encounters perceived as higher risk, including those involving sex workers. This pattern suggests that risk awareness alone does not necessarily translate into protective behavior.

Only a small proportion of adolescents (less than 3.0% in each survey year) reported occupations potentially related to sex work. This distribution indicates that most sexually active respondents represent the general adolescent population rather than individuals engaged in transactional or commercial sex, thereby reflecting condom use patterns within normative relationships.

Adolescents reporting sexual activity with non-sex workers consistently demonstrated lower condom use. This pattern remained significant in 2017, with an adjusted odds ratio below 1.00 ( $p < .05$ ). These findings indicate that condom use is less likely within relationships perceived as familiar or emotionally close. Supporting this interpretation, adolescents were more likely to forgo condom use with known partners, such as boyfriends, girlfriends, or peers (Alam & Alldred, 2021).

Condom negotiation within these relationships is shaped more by emotional intimacy and perceived safety than by objective assessments of HIV or STI risk (Boraya et al., 2018). Introducing condom use may be interpreted as signaling distrust or moral suspicion, which can discourage its use (Elshiekh et al., 2020). In this context, condom non-use reflects efforts to maintain relational harmony rather than deliberate risk-taking (Motoki et al., 2017). Moreover, condoms are often associated with casual or transactional sex, reinforcing the perception that protection is unnecessary within romantic relationships (Fraser et al., 2021).

## Gender

Notable gender differences in condom use were observed across all three survey periods, with males consistently reporting higher levels of protected sex. This pattern aligns with previous studies showing that males often exert greater control over sexual decision-making (Teye-Kwadjo et al., 2018). However, this finding should be interpreted in light of important measurement limitations. Because protected sex was defined solely by condom use, it primarily captured male-initiated actions in heterosexual contexts and reflected only one dimension of protective behavior.

The inclusion of both sexes was intended to describe broader patterns of adolescent sexual behavior rather than to directly compare male and female responsibility. Among female adolescents, lower reported condom use may not indicate apathy or lack of knowledge, but rather constrained agency within intimate relationships, shaped by prevailing gender norms and power asymmetries (Madiba & Ngwenya, 2017). Although some evidence suggests that females may use condoms as a dual protection strategy, uptake remains limited in Indonesia due to restricted availability and sociocultural barriers (Phiri et al., 2015). Taken together, these findings suggest that gender disparities in condom use are driven more by structural and relational dynamics than by individual-level choice alone.

## Age

Adolescents aged 18–24 reported higher levels of protected sexual behavior in 2017 compared to those aged 15–17. This finding aligns with previous evidence showing that older adolescents are more likely to use condoms, with individuals over 18 nearly three times more likely to do so than their younger counterparts (Pinyopornpanish et al., 2017). Older age is often associated with greater exposure to sexual health information, higher perceived vulnerability to HIV and other sexually transmitted infections (STIs), and increased autonomy in sexual decision-making, all of which may contribute to higher condom use.

However, evidence from other contexts suggests more complex and sometimes contrasting age-related patterns. Studies from South Africa report more consistent condom use among adolescents younger than 17, while increasing age, higher sexual frequency, and longer relationship duration are associated with declining consistency of condom use (Muchiri et al., 2017). These findings indicate that the relationship between age and condom use is not linear, but rather shaped by contextual factors such as relationship dynamics, sexual norms, and patterns of sexual initiation. As adolescents grow older, greater familiarity with partners and longer-term relationships may reduce perceived risk, potentially offsetting gains in knowledge or access to condoms.

## Place of residence

Place of residence emerged as a key determinant of protected sexual behavior across all three survey waves, with adolescents in urban areas consistently reporting higher condom use than their rural counterparts. This pattern is consistent with previous evidence showing that adolescents in urban settings are significantly more likely to use condoms during sexual intercourse (Ajayi & Akpan, 2018).

Recent findings further highlight contextual disparities between urban and rural environments. Using national data from 2023, one study found that, despite increasing internet penetration in rural areas, adolescents who reported internet use were more likely to report condom non-use during their most recent sexual encounter (Murti & Sari, 2023). This suggests that internet exposure in rural settings may not be dominated by educational or sexual health-related content, but rather by entertainment or non-informative material, limiting its potential to support safer sexual decision-making. Consequently, this contributes to persistent information asymmetry between adolescents living in rural and urban areas (Chen et al., 2019).

Moreover, the greater availability and accessibility of condoms in urban settings reduce practical barriers to use and facilitate the adoption of protected sexual practices (Sarno et al., 2021). In contrast, rural areas continue to face structural challenges in disseminating sexual health information and ensuring access to contraceptives (Kosugi et al., 2019). Together, these findings underscore that the place of residence remains a critical structural determinant of condom use among adolescents.

## **Mass media exposure**

Mass media exposure, particularly through television-based information on sexually transmitted infections (STIs) and condoms, emerged as an important factor influencing protected sexual behavior across the three survey waves. Previous studies have shown that exposure to televised HIV/ AIDS content is associated with greater confidence in condom use, increased condom use with regular partners, and higher perceived risk of HIV infection (Xiao et al., 2015). In addition, television-based campaigns have been shown to outperform radio and print media in improving HIV-related knowledge, interpersonal communication, and behavioral outcomes (Keating et al., 2006).

In Indonesia, condom-related messages delivered through television have played a prominent role since 2007, when condom advertisements became more widely broadcast (Fitriana & Mulyadi, 2018). Compared to HIV or STI messages that often rely on fear-based framing, condom advertisements tend to present more direct, practical, and relatable messages, which may explain their stronger association with protective sexual behavior (Seabrook et al., 2017).

However, the influence of television-based messaging appears to have declined between 2007 and 2017, likely reflecting broader shifts in media consumption patterns. As television viewership decreased, adolescents increasingly turned to the internet as a primary source of information (Lotz, 2018). Supporting this shift, a recent study found that adolescents who used the internet were significantly more likely to report condom use during sexual activity (Murti & Sari, 2023). Taken together, these findings suggest that while television historically played a central role in promoting protected sexual behavior, digital media may now represent a more influential platform for reaching adolescents.

## **Policy recommendation**

Although HIV stigma remains prevalent among Indonesian adolescents, it does not appear to be the primary driver of unprotected sexual behavior, as reflected in its relatively lower odds ratios across survey years. Instead, the persistence of unprotected sex underscores the need to strengthen Comprehensive Sexuality Education (CSE) within schools as an upstream

intervention. By addressing both knowledge gaps and normative misconceptions surrounding condom use, CSE can play a critical role in promoting protected sexual behavior while indirectly reducing stigma related to HIV and sexual health discussions.

Strengthening CSE within the school curriculum is particularly important given its demonstrated effectiveness in HIV prevention. This policy direction aligns with Indonesia's National Medium-Term Development Plan (RPJMN) 2020–2024, which prioritizes the promotion of healthy behaviors among adolescents. Evidence from other settings further supports the effectiveness of CSE; for example, its implementation in the Philippines has been associated with reductions in risky sexual behaviors among adolescents (Commission on Higher Education, 2024). The coexistence of limited HIV knowledge, insufficient sexual and reproductive health (SRH) education, and persistent condom-related stigma indicates substantial vulnerability to future HIV transmission.

Beyond school-based interventions, broader community engagement is essential to address the structural and social determinants of adolescent sexual behavior. In Indonesia's culturally and religiously diverse context, targeted training programs for religious and community leaders are needed to correct misconceptions about HIV and foster more supportive social norms. Parental stigma may also discourage adolescents from practicing protected sex, highlighting the importance of parental involvement. Providing CSE-oriented education for parents can strengthen their capacity to communicate effectively with their children about sexual health and condom use. In addition, consultation programs for parents of adolescents engaging in premarital sex may support more constructive and informed responses. Strengthening knowledge and attitudes within adolescents' social environments may reduce HIV stigma and indirectly decrease unprotected sexual behavior.

In parallel, youth-friendly sexual health services, such as the GenRe (Generasi Berencana) program implemented by the National Population and Family Planning Board (BKKBN), play an important role in increasing awareness among adolescents. However, previous studies suggest that these programs may have limited reach, particularly among out-of-school adolescents (Marliania et al., 2018). Existing implementation tends to focus on school-going populations, potentially overlooking more vulnerable groups who have dropped out of school. Addressing this gap is essential to ensure equitable access to comprehensive sexual health information and services for all adolescents.

## Limitations

This study employed a cross-sectional design, which limits the ability to establish causal relationships between variables. However, the use of nationally representative data enhances the generalizability of the findings to Indonesian adolescents. The measurement of protected sexual behavior relied on a single-item indicator, which may limit the depth and nuance of behavioral assessment. In addition, the HIV stigma index consisted of four items primarily capturing care-related and social interaction dimensions, thereby reflecting only selected aspects of HIV-related stigma. Although limited in scope, the measure still provides insight into key social perceptions surrounding HIV within the population. The exclusion of cases with missing data may have reduced statistical power and introduced potential bias. Furthermore, several potentially important variables were not available in the 2007, 2012, and 2017 IDHS datasets, which may constrain the comprehensiveness of the analysis.

## Conclusion

Protected sexual behavior among Indonesian adolescents showed a modest overall increase between 2007 and 2017. Despite this trend, the prevalence remains suboptimal, and multiple sociodemographic and contextual factors continue to shape condom use. HIV stigma was associated with lower odds of condom use, indicating that stigma does not function as a protective factor against risky sexual behavior.

Gender, place of residence, and exposure to television-based information were consistently associated with condom use across survey years, highlighting the importance of structural and informational determinants. These findings emphasize that adolescent sexual health behaviors are shaped not only by individual knowledge but also by broader social, cultural, and environmental contexts.

This study contributes to the literature by examining trends in protected sexual behavior among the general adolescent population in Indonesia, which remains underrepresented in empirical research. By focusing on sexually active adolescents and utilizing three nationally representative survey waves, the analysis captures both continuity and change in condom use patterns over a decade. Future research should explore the underlying decision-making processes related to condom use and incorporate more recent data to reflect evolving patterns of media exposure and adolescent sexual behavior.

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