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The association of sociodemographic, behavioural and informational factors
with engaging in sexual intercourse among never-married adolescents aged

15 - 24 years in Indonesia:

A secondary analysis of DHS data from 2012.

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Abstract

Background: Sexual and reproductive health education and services are often of poor quality in Indonesia and although sexual intercourse among adolescents is not socially accepted, a change of norms is observable, putting adolescents at risk to acquire unwanted health outcomes.

Aim: To analyse associations of behavioural, sociodemographic and informational factors with engaging in sexual intercourse among never-married adolescents aged 15 - 24 in Indonesia and to analyse potential differences in age groups.

Methods: Data from 19,649 never-married male and female adolescents who ever went to school, obtained from the 2012 Indonesian Demographic and Health Survey, was used for analysis. Multiple logistic regression was applied to test for significance separately and after adjusting for variables.

Results: Among all adolescents, factors associated with engaging in sexual intercourse were: older age, male sex, ever drank alcohol, smoking and ever used drugs. After stratifying for age, the same associations were found for older and younger adolescents. Additionally, among younger adolescents (15 - 19 years), those from poorer households, with a higher educational level and those currently attending school were more likely to engage in sexual intercourse. Among older adolescents (20 - 24 years), those from poorer households and rural areas were more likely to engage in sexual intercourse.

Conclusions: Interventions are needed to equip male adolescents, those who ever drank alcohol, were currently smoking or ever used drugs with sufficient knowledge and tools to make informed decisions. Further qualitative research is needed to investigate the behaviour of adolescents towards sexual intercourse more in depth.

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List of Abbreviations

ARH	Adolescent Reproductive Health
DHS	Demographic and Health Survey
IDHS	Indonesian Demographic and Health Survey
MDG	Millennium Development Goal
PBT	Problem Behaviour Theory
SRHR	Sexual and Reproductive Health and Rights
STI	Sexually Transmitted Infection

1 Introduction

1.1 Problem Statement

There are 1.2 billion adolescents in the world, which currently comprise 18% of the world's population (1). 88% of these adolescents live in low- and middle-income countries with Southeast Asia and the Pacific region being home for more than half of the world's adolescents (1). Adolescence is a crucial period, since the body and brain are rapidly developing, especially the capacity for analytical and reflective thoughts is evolving (2). It is an important stage for children: they acquire increased capacity for complex problem-solving skills and critical thinking, while at the same time this maturation process overlaps with increased risk-taking behaviour as well as increased significance of peer influences on the adolescent (2). It denotes a time of opportunities as well as challenges, not only affecting themselves but everyone, since adolescents comprise the future generation (1). Adolescence is a sensitive developmental period in which puberty and rapid brain maturation lead to new patterns of behaviours and capacities that trigger or enable, amongst others, transitions in health behaviours (3). The transition to the responsibility for own health as well as the transition from family-living to autonomy, marriage and parenthood are important processes in the period of adolescence (3). Sexual and reproductive ill-health mostly affects women and adolescents since women are disempowered in many low- and middle-income countries and adolescents are being arguably disempowered everywhere (4).

Adolescents are central to every major current challenge in global health, but yet data is often not existing, which means that the needs of adolescents are often not considered when policy priorities are designed (5).

A substantial number of adolescents engage in sexual intercourse before their 15th birthday, globally (6). These adolescents engaging early in sexual intercourse are prone to diverse unintended health outcomes like sexually transmitted infections (STI), pregnancy and/or unsafe abortion (7). In relation to that, approximately 16 million girls aged 15 to 19 years give birth every year, which accounts for roughly 11% of all births worldwide and the vast majority of adolescents' births occur in low- and middle-income countries (8). The fertility rate among adolescents in Southeast Asia remains high, with 50 and 100 births per 1000 women aged 15-19 years in Cambodia and the Philippines, respectively (8). In the Lao People's Democratic, 37.3% of married women had their first baby before 18 years of age, while 29% of all first pregnancies were unintended (8). Also, early sex is found to be significantly associated with

unprotected sexual intercourse (9) and an increasing number of adolescents have multiple sex partners, which puts them at risk to acquire STIs (10). Approximately one half of all new HIV infections and one third of new STI infections worldwide occur among 15 to 24 year-olds (11,12). The rising number of new HIV infections among this young demographic group signals an urgent need to identify behaviours and situations that contribute to sexual and reproductive health among adolescents (6). Despite the call for universal access to reproductive health at the 4th International Conference on Population and Development in Cairo in 1994, sexual and reproductive health and rights (SRHR) were omitted from the Millennium Development Goals (MDG) and remained neglected (4). However, an additional target 5b under MDG number 5 was adopted by the United Nations General Assembly in 2006, which focused specifically on SRHR (13). The overall goal of this newly established MDG is to ‘Achieve, by 2015, universal access to reproductive health’ (14).

Traditionally, topics concerning sexuality are often considered as a taboo in Southeast Asia and despite the call for access to SRHR services globally, these services are absent or of poor quality and underused in many countries in Southeast Asia (4,15). Premarital sexual intercourse in general is not socially accepted in the Southeast Asian culture and thus also not in Indonesia (16).

At the same time, a change of norms influenced by the western world can be observed in Southeast Asia. This leads increasingly to the approval of premarital sex by society as well as to a rapid social change, including more permissive attitudes towards premarital sexual intercourse among adolescents (17). The change is due to societal development, evolvment in social and public media and because new role models influence adolescents, resulting in a change in attitudes and behaviours as adolescents start to question the current traditional norms in the society (18). This phenomenon poses a danger for adolescents since many of them do not hold the knowledge on how to act and on how to protect themselves and others from harmful consequences of sexual intercourse. Thus, studies in Southeast Asia have been undertaken to examine the factors which are associated with adolescents engaging in or abstaining from sexual intercourse (19–31).

1.2 Definition of Adolescents and Sexual Intercourse

There are various definitions of ‘adolescence’ existing, all describing the transformation from childhood to adulthood. The World Health Organization (WHO) defines it as the period between 10 and 19 years of age (32), while in many Indonesian studies adolescents are defined

as being between 15 and 24 years of age (33). The latter also applies for the Demographic and Health Survey (DHS) data set which will be used for the analysis of this thesis. Thus, the term 'adolescents' used in this thesis, is referring to the group of 15 to 24 year-olds.

In this thesis, only heterosexual, vaginal intercourse will be taken into account. Sexual intercourse is defined as follows: '[... it] refers to the physical union between the male and the female and involves insertion of the penis into the vagina' (34).

1.3 Sexual and Reproductive Health among Adolescents in Indonesia

In most Indonesian societies, puberty is often regarded as an individual's maturity and readiness for marriage and sexual activity (33). However, even though adolescents are considered as sexually mature, sexuality is rarely discussed, neither in families, nor in society (33). The regulation of adolescents' sexuality occurs through legal-moral mechanisms that allow sexual intercourse in marriage, but denies it in non-married adolescents, as it poses a threat to the norms which the state and religion feel responsible for (15). Furthermore, drinking alcohol and taking drugs is prohibited due to religious regulations (35).

In Indonesia, sex education in schools is often inadequate and so are the guidance and services concerning reproductive health (36,37). Even though adolescents nowadays receive better information regarding puberty and sexuality, misinformation is still evident and educational programmes in Indonesia are most often targeted at suppressing youth sexuality, rather than empowering them for informed decision making processes (15,33). It is argued, that adolescents are not just passive recipients of adult norms and messages in terms of sexuality but agents who actively construe meanings and navigate between what is expected from them and what they want, need and feel themselves (38). A positive, rights-based approach to sexual education for adolescents and a focus beyond health outcomes alone, to support adolescents to make sense of the multiplicity of messages they encounter and reduce unnecessary feelings of guilt and anxiety, is needed (38). Contraceptives for unmarried adolescents are hardly or not at all accessible in Indonesia (15). While in some developing countries condoms are available for adolescents in public institutions like schools, in parts of Indonesia their possession is a criminal offence (39). Abortion is legal in Indonesia if the life of the woman is in danger, otherwise it is handled as a criminal act (40).

It is difficult to estimate the prevalence of adolescents engaging in sexual intercourse in Indonesia, since various numbers concerning this topic exist. Several studies state that sexual intercourse prior to marriage among Indonesian adolescents is common, ranging from 10% to

more than 50% (15,33), while the latest DHS Report states that 1% of females and 8% of males engage in premarital sexual intercourse (41). It has to be noted that due to the fact that premarital sexual intercourse is not accepted by society, it is likely that the actual prevalence is higher (33). Commonly, boys are given more sexual freedom compared to girls and in many societies boys are even expected to have experienced sexual intercourse before marriage (33).

1.4 Factors associated with Engagement in Sexual Intercourse

The health of adolescents in general is strongly affected by social factors at personal, family, community and national levels (3). A multifactorial influence on engaging in and abstaining from sexual intercourse could also be identified by a non-systematic literature review, which was conducted by the author of this thesis, taking into account several countries in Southeast Asia and analysing studies conducted between 2005 and 2015 (19–31). Multiple studies identified drug use, smoking, drinking alcohol and male sex as the most important engaging factors (19–21,23–25,28–31), while school attendance, parental bonding, supportive peers and parental connectedness were associated with a decreased likelihood to engage in sexual intercourse, especially for females (19,23,24,27).

1.5 Rationale

Identifying engaging factors for adolescents in relation to sexual intercourse is crucial for the design of appropriate intervention programs. It is important to analyse the factors associated with engaging in sexual intercourse among adolescents since then, SRHR programs can be specifically tailored to the needs of adolescents in order to equip them with the required knowledge to protect themselves and others from harmful consequences of sexual intercourse and to be able to make informed and responsible decisions. So far, no studies could be identified analysing these factors for Indonesian adolescents with nationally representative data. Also, it is not known whether there exists a difference between older and younger adolescents concerning factors associated with engaging in sexual intercourse in Indonesia. This encompasses the research gap which this study addressed.

1.6 Concepts used and Concept Map

In consideration of the studies mentioned above, undertaken in Southeast Asia to examine factors associated with engaging in/ abstaining from sexual intercourse among adolescents, the outcome variable and several predicting variables have been selected.

The examined outcome variable in this thesis was ‘sexual intercourse’, while several predicting variables were included, which have been grouped in categories by the author. The questions asked by the interviewers to obtain the variables are described in section 2.4 of this paper. ‘Behavioural factors’ included ‘ever drank alcohol’, ‘currently smoking’ and ‘ever used drugs’, while ‘sociodemographic factors’ comprised of ‘wealth quintile of the household’, ‘age’, ‘sex’, ‘urban/ rural residence’, ‘highest obtained educational level’ and ‘current school attendance’. ‘Taught at school about HIV/AIDS’, ‘taught at school about other STIs’, ‘taught at school about birth control methods’ and ‘taught at school about the human reproductive system’ were accounted to ‘informational factors’.

Using the outcome and the predicting variables as described above, a concept map was developed, in order to give a visual illustration of the associations between the variables. It was expected, that there might be associations between the predicting variables, exemplified by means of the effect of ‘wealth quintile of the household’ on the ‘educational level’ of the adolescent in figure one.

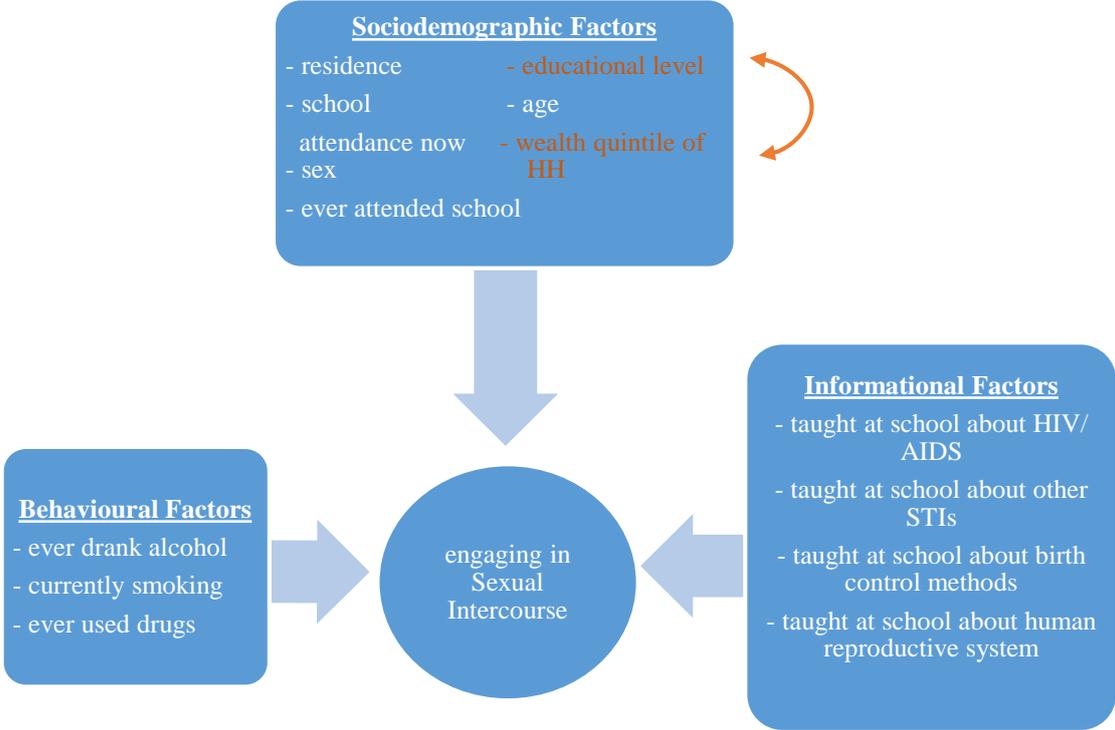


Figure 1: Concept Map, displaying the expected associations between the predicting variables and the outcome (engaging in Sexual Intercourse). Possible relationship between the predicting variables is exemplified by the orange arrow.

The research question is as follows:

‘How are behavioural, sociodemographic and informational factors associated with engaging in sexual intercourse among never-married adolescents aged 15-24 in Indonesia in 2012?’

1.7 Aim and Objectives

The aim of the thesis was to analyse the associations of behavioural, sociodemographic and informational factors with engaging in sexual intercourse among never-married adolescents aged 15 - 24 years in Indonesia through secondary analysis of Indonesia Demographic and Health Survey (IDHS) data from 2012.

Specific objectives are:

1. To analyse the associations of behavioural, sociodemographic and informational factors with engaging in sexual intercourse, using the Adolescent Reproductive Health (ARH) component of the IDHS dataset from 2012.
2. To stratify the age of the adolescents in two age groups (15 - 19 and 20 - 24 years of age) and to analyse the differences in the associations between predictors and outcome among the two groups.

2 Methods

2.1 Study Design

This study used cross-sectional data from the ARH, which is a component of the standard IDHS conducted in 2012. The 2012 ARH part is a follow-up to the 2007 and 2002-2003 ARH surveys and it was carried out by Statistics-Indonesia in collaboration with the National Population and Family Planning Board, as well as the Ministry of Health (41). Funding for the local costs of the survey was provided by the government of Indonesia (41).

The purpose of the ARH was to measure the level of knowledge of adolescents concerning reproductive health issues, to examine the attitudes of adolescents on various reproductive health issues, to measure the level of tobacco use, alcohol consumption, and drug use among adolescents, to measure the level of sexual activity among adolescents and to explore adolescents’ awareness of HIV/AIDS and other STIs (41).

The IDHS used four questionnaires: the Household Questionnaire, the Woman’s Questionnaire, including questions for never-married women aged 15 - 24, the Married Man’s Questionnaire

and the Never-Married-Man's Questionnaire (41). The latter included the same questions asked for never married women aged 15 - 24 (41). The questions being designed for never-married men and women aged 15 - 24 assessed additional background characteristics, knowledge of the human reproductive system, as well as attitudes towards marriage and having children and the role of the family, school, community and media (41). Also, use of smoking tobacco, alcohol and drug consumption as well as dating and sexual activity were assessed.

2.2 Study Setting

The Republic of Indonesia consists of approximately 17,000 islands and lies between Asia and Australia (see Figure 4 in the Annex) (42). The land area of Indonesia consists of 1.9 million square kilometres, while the majority of its territory is covered with water (42). Because of the large number of islands and the distribution over a wide area, a diverse culture is present with hundreds of ethnic groups of which each has its own language (42,43). Several religions are practiced with the majority being Muslims (44). Indonesia is part of Southeast Asia with approximately 252.8 million inhabitants in 2014 (45). The latest country census from 2010 accounted about 40.8 million of the population being aged between 15 and 24 years (46). According to the World Bank, Indonesia is a lower middle income country with a life expectancy of 71 years and 11.3% of the total population is expected to live under the poverty line (44,45). Maternal mortality declined considerably from 430 deaths per 100,000 live births in 1990 to 190 deaths per 100,000 live births in 2013 (47). The under-five mortality has halved since 1990 (48), with 29 deaths per 1,000 infants in 2013, according to the World Bank (49).

2.3 Study Population, Data Collection and Sample Size

The data within the ARH component of the 2012 IDHS survey was collected by 119 interviewer teams consisting of eight interviewers respectively: four female interviewers, two male interviewers, one female field editor and one male supervisor (41). Data collection took place from May 7th to July 31st 2012 (41).

In total, 46,024 households were selected in the sample of which 44,302 were occupied and thus eligible for the Household Questionnaire. 43,852 households were successfully interviewed, resulting in a response rate of 99% (41). In every interviewed household, male and female never-married adolescents aged 15-24 were identified for an individual interview, 12,381 and 9,442 respectively (41). After informing about the purpose of the study and explaining confidentiality and voluntary participation, completed interviews were obtained

from 10,980 male and 8,902 female adolescents, yielding response rates of 89 and 94 percent respectively (41). Participants who never went to school were excluded from this study, since the variables accounting to the group of ‘informational factors’ were based on knowledge which has or has not been obtained in school. Furthermore, 85 male individuals did not know, whether they had engaged in sexual intercourse or not and there were two missing observations. These 87 cases were also excluded from the analysis and thus the final sample size for this study comprised of 8,836 females and 10,813 males (see Figure 2 in section 3.1).

2.4 Variables included and Data Handling

The data was downloaded from the DHS website and all three datasets, the Women, Men and Household Dataset, were read into the statistical software R. Subsets with the relevant variables to be analysed were constructed and variables renamed. In the Men Subset as well as in the Women Subset, all individuals who never attended school were removed, since the ‘Informational Factors’ were referring to information which has or has not been obtained in school.

Outcome Variable

Sexual Intercourse: This outcome variable describes whether the participants engaged in sexual intercourse or not. Answers were coded in the following way: ‘yes’ = 1, ‘no’ = 2, ‘don’t know’ = 8. All adolescents who answered ‘don’t know’ (n = 85) and two missing values were removed before analysis took place in order to obtain a dichotomous outcome and because the outcome of interest was ‘engaging in sexual intercourse’.

Predictors - Sociodemographic Factors

Age: The adolescents were asked for their age at their last birthday and the given number was recorded in the questionnaire. The author of this study binned this variable into two equally sized groups, namely 15 - 19 year-olds and 20 - 24 year-olds. 15 - 19 year-olds were coded as ‘younger adolescents’ and 20 - 24 year-olds were coded as ‘older adolescents’.

Wealth quintile of the household: In order to assign the ‘wealth quintile of the household’ to the corresponding adolescents, the household questionnaire was merged with the Women’s and Men’s questionnaire respectively by the columns ‘household number’ and ‘cluster number’. These two variables were present in all of the datasets and were used as an indicator to assign the correct wealth quintile of the household to the respective adolescent living in it. The wealth quintile itself was calculated by Statistics Indonesia in three steps: wealth scores for households

were created in urban and rural areas using indicators common to these areas. Then, separate factor scores were produced for households in urban and rural areas using area-specific indicators. Thirdly, the separate area-specific scores were combined through a regression on the common factor scores (41).

Quintiles were coded in the following way: 'poorest' = 1, 'poorer' = 2, 'middle' = 3, 'richer' = 4 and 'richest' = 5.

Residence: Residence was asked in the household questionnaire and transferred to the individual questionnaires, with 'urban' = 1 and 'rural' = 2.

Highest educational level: The following question was asked, if the adolescent ever attended school: 'What is the highest level of school you attended: primary, junior high, senior high, academy or university?'. It was coded as follows: 'primary' = 1, 'junior high school' = 2, 'senior high school' = 3, 'academy' = 4, 'university' = 5.

School attendance now: The participants were asked whether they are currently attending school. 'Yes' = 1 and 'no' = 2.

Predictors - Behavioural Factors

Ever drank alcohol: The adolescents were asked whether they had ever drank an alcohol-containing beverage. Answers were coded as 'yes' = 1 and 'no' = 2.

Currently smoking: Adolescents were asked whether they were currently smoking cigarettes. 'Yes' = 1 and 'no' = 2.

Ever used drugs: The drug intake of the adolescents was assessed by asking whether they have themselves ever used drugs. The word 'drug' was interchanged with the local terms, such as 'fly', 'boat' or 'fantasize'. 'Yes' = 1 and 'no' = 2.

Predictors - Informational Factors

Taught at school about HIV/AIDS: Adolescents were asked whether they have ever been taught at school about HIV/AIDS. 'Yes' = 1, 'no' = 2 and 'don't know' = 8.

Taught at school about other STIs: Adolescents were asked whether they have ever been taught at school about other STIs. 'Yes' = 1, 'no' = 2 and 'don't know' = 8.

Taught at school about birth control methods: Adolescents were asked whether they were ever taught at school about methods of birth control. 'Yes' = 1, 'no' = 2, 'don't know' = 8.

Taught at school about human reproductive system: Adolescents were asked whether they have ever been taught at school about how the human reproductive system works. ‘Yes’ = 1, ‘no’ = 2, ‘don’t know’ = 8.

2.5 Statistical Analysis

All statistical analyses were performed using the R statistical software package, version 3.1.2 and the R Commander software, version 2.1-6 (50,51). The cut-off for significance was set at $p < 0.05$.

In order to summarise and describe the data, numerical summaries were conducted for age to determine the mean, standard deviation, range and quintiles of this continuous variable for men and women respectively (see graph 1 and 2 in the Annex). Graphs were created with Microsoft Excel 2013. For categorical variables, frequency distributions were performed and missing values were obtained (see table 1). Furthermore, two-way contingency tables were conducted in order to investigate the relationship between each categorical variables and the outcome (see table 2).

Since the outcome is binomial, logistic regression was used to investigate the relationship between predictors and outcome further. Firstly, each predictor was tested independently for the outcome (see ‘Crude OR’ in tables 3 - 5) and controlled for significance by checking the 95% Confidence Intervals of the Odds Ratio (OR). Secondly, all the significant predicting variables from one group of factors (sociodemographic, behavioural and informational factors respectively) were included in one logistic regression model to obtain the adjusted OR (see ‘AOR 1’ in tables 3 - 5). A second adjusted OR was obtained by including all significant variables from all three groups of factors in one logistic regression model (see ‘AOR 2’ in tables 3 - 5).

Lastly, the crude OR and the two adjusted OR as explained above, were calculated again for younger and older adolescents in order to compare the results between the two groups and to exclude age as a possible confounding factor (see tables 6 - 8).

2.6 Ethical Considerations

In general, strict standards were maintained in order to protect the privacy of respondents and household members in all DHS surveys (52). The ICF International Institutional Review Board reviewed the procedures and questionnaires for standard DHS surveys as well as the country-specific IDHS survey protocols (52). Also, it ensured that the survey complied with the U.S.

Department of Health and Human Services regulations for the protection of human subjects, while the host country IRB ensured that the survey complied with laws and norms in the country where the survey was undertaken (52).

Before the interviews were conducted, an informed consent statement was read to the adolescents, who could choose to accept or decline to participate. Emphasis was put on the voluntary participation of the adolescent and that they had the right to refuse to answer any question or terminate participation at any time (52). The adolescents' identity and information were kept confidential (52).

Privacy during the interview was especially important for the ARH component of the IDHS. To ensure the privacy and well-being of the adolescent, precautions were taken: interviewers were provided with additional training on administering the questions and dealing with crisis situations (52).

ARH data from the IDHS 2012 survey was obtained through the DHS website, after applying for access and stating the purpose and scope of the study.

3 Results

3.1 Participants

Participants who never attended school ($n = 146$) were removed from the sample size, since the 'Informational Factors' were based on information which has or has not been obtained in school. In addition to that, 85 individuals among the male adolescents did not know whether they engaged in sexual intercourse or not. Because sexual intercourse is the examined outcome, these individuals were also excluded from the sample size in order to obtain a dichotomous variable, along with missing values for two individuals in terms of the outcome (see figure 2). In total, 8,836 never-married female adolescents and 10,813 never-married male adolescents were included for analysis. The sample consisted of unmarried males and females being 15 - 24 years old, of which all have attended school at some point in their lives or were currently attending school. Figure two provides a flow-chart of the participants.

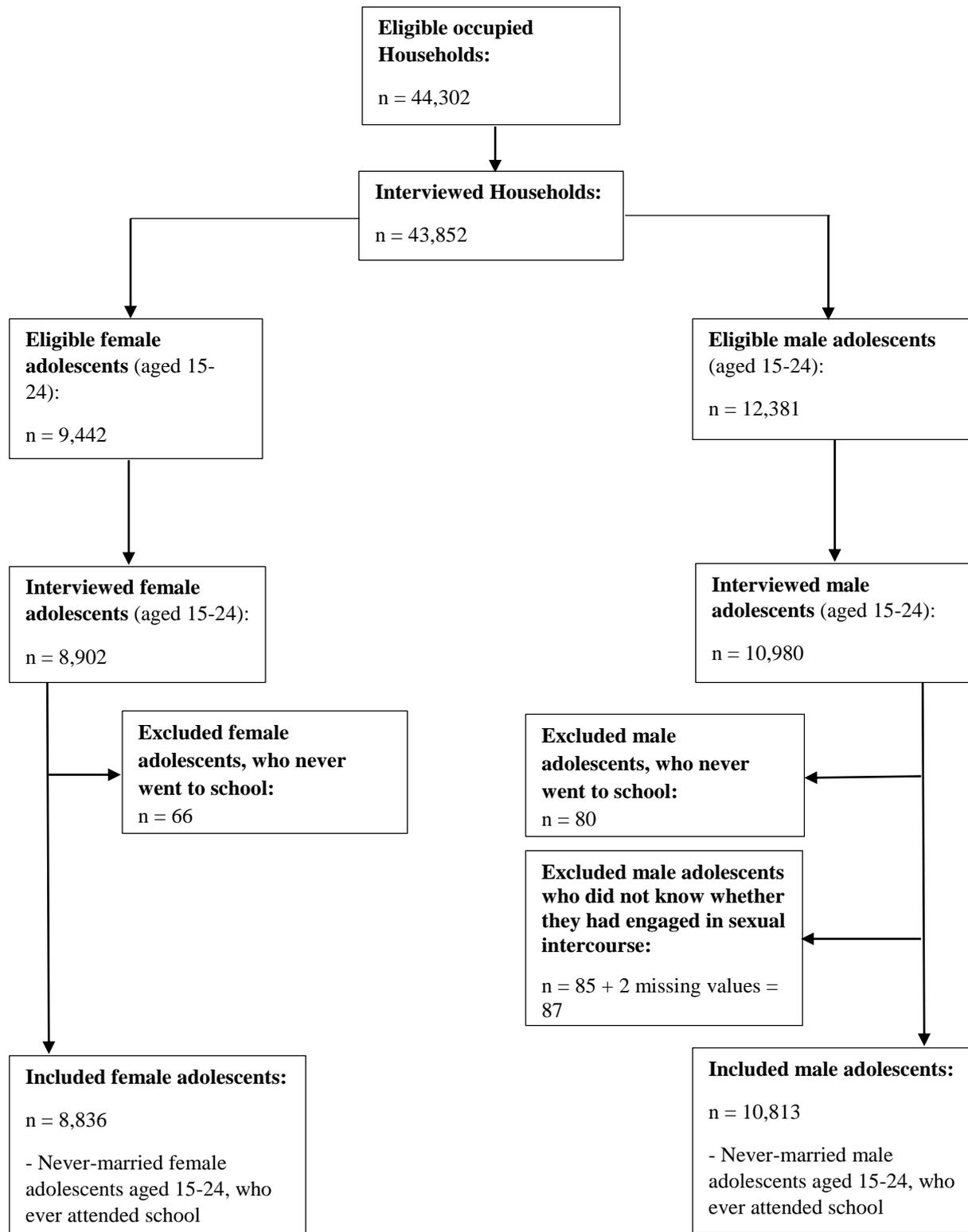


Figure 2: Flow-chart of the Participants used for this study, aged 15 - 24 years. Data was obtained from the Indonesian DHS survey from 2012.

3.2 Respondents' Characteristics

The predicting variables as well as the outcome variable were described in table 1. In total, 13% of males and 2% of females had engaged in sexual intercourse at the time of the interview. The majority of the adolescents were between 15 and 19 years of age (12,847 individuals), a detailed distribution of the age among male and female adolescents is displayed in graphs one and two in the annex. The amount of adolescents belonging to the different wealth quintiles of the household were evenly spread, the highest amount of females (24%) being in the richest quintile and the highest amount of males (22%) being in the poorest quintile. Nearly 10,000 adolescents out of the total sample size (n = 19,649) had obtained Senior High school as the highest educational level, with 47% of the males attending school during the time of the interview compared to 61% of the females.

In terms of the behavioural factors, differences appeared between the groups of male and female adolescents. 43% of males had ever drunk alcohol, compared to 6% of females. A similar trend was observable for smoking and the use of drugs: 79% of males were currently smoking when the interview was obtained and 4% had ever used drugs. In female adolescents, 12% were currently smoking and under 1% of individuals had ever used drugs.

Concerning the informational factors, 69% of male and 79% of female adolescents have been taught about HIV/ AIDS at school while about half of the adolescents had not been taught about other STIs. The majority of both, females and males, were also not taught about birth control methods (69% and 75% respectively), while approximately 78% of male and 88% of female adolescents obtained knowledge on the human reproductive system at school.

Overall, missing values were relatively low in the sample size, the highest being 104 out of 19,649 for the variable 'currently smoking'.

Table 1: Engagement in Sexual Intercourse, Sociodemographic Factors, Behavioural Factors and Informational Factors (n, %) among 15 - 24 year old unmarried, Indonesian adolescents, stratified by male (N = 10,813) and female adolescents (N = 8,836). Presented with rounded column percentages.

	Male adolescents	Female adolescents	Missing values
Engaged in Sexual Intercourse	n (%)	n (%)	n Male/ n Female
Yes	1360 (13)	167 (2)	0/ 0
No	9453 (87)	8669 (98)	
Sociodemographic Factors			
Age			0/ 0
15 - 19	6669 (62)	6178 (70)	
20 - 24	4144 (38)	2658 (30)	
Wealth quintile of HH			0/0
Poorest	2330 (22)	1505 (17)	
Poorer	2276 (21)	1710 (19)	
Middle	2261 (21)	1763 (20)	
Richer	1954 (18)	1759 (20)	
Richest	1992 (18)	2099 (24)	
Residence			0/ 0
Urban	5878 (54)	5289 (60)	
Rural	4935 (46)	3547 (40)	
Highest educational level			0/ 0
Primary	1368 (13)	639 (7)	
Junior High	2774 (26)	1871 (21)	
Senior High	5226 (48)	4441 (50)	
Academy	276 (2)	500 (6)	
University	1169 (11)	1385 (16)	
School attendance now			1/ 10
Yes	5069 (47)	5362 (61)	
No	5743 (53)	3464 (39)	
Behavioural Factors			
Ever drank alcohol			6/ 13
Yes	4644 (43)	517 (6)	
No	6163 (57)	8306 (94)	
Currently smoking			4/ 100
Yes	8552 (79)	1020 (12)	
No	2257 (21)	7716 (88)	
Ever used drugs			1/ 15
Yes	474 (4)	24 (0) ^a	
No	10338 (96)	8797 (100)	
Informational Factors			
Taught at school about HIV/ AIDS			34/ 42
Yes	7391 (69)	6924 (79)	
No	3129 (29)	1761 (20)	
Don't know	259 (2)	109 (1)	

Taught at school about other STIs			39/ 44
Yes	5028 (47)	4073 (46)	
No	5298 (49)	4418 (50)	
Don't know	448 (4)	301 (4)	
Taught at school about birth control methods			40/ 42
Yes	2106 (20)	2476 (28)	
No	8119 (75)	6097 (69)	
Don't know	548 (5)	221 (3)	
Taught at school about human reproductive system			35/ 42
Yes	8415 (78)	7736 (88)	
No	2066 (19)	935 (11)	
Don't know	297 (3)	123 (1)	

^aDue to rounding of the percentages, this value resulted in 0% but originally, it was 0.27%.

3.3 Sociodemographic Factors and Sexual Intercourse

3.3.1 Bivariate Analysis of Sociodemographic Variables in relation to the Outcome

All the sociodemographic variables except 'Residence' ($p = 0.832$) resulted in a significant Pearson's Chi Square Test with $p < 0.05$ and were thus significantly associated with the outcome 'engaging in Sexual Intercourse' (see table 2 in the Annex). 63% out of the adolescents who engaged in sexual intercourse were between 20 and 24 years of age and 89% were males. The highest amount of sexually active adolescents belonged to the lowest household wealth quintile (25%). Senior High School has been obtained as the highest educational level among most of the adolescents who engaged in sexual intercourse and those who did not engage in it (47% and 49% respectively). Out of those adolescents who engaged in sexual intercourse, 69% were not attending school at the time of the interview.

3.3.2 Multiple Analysis of Sociodemographic Variables in relation to the Outcome

In the crude OR, older adolescents were 3.65 times more likely to engage in sexual intercourse compared to younger adolescents and males were 7.49 times more likely to engage in sexual intercourse compared to females (see table 3). After adjusting for 'age', 'sex', 'wealth', 'educational level', 'school attendance now', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about HIV/ AIDS', 'taught at school about other STIs' as well as 'taught at school about human reproductive system' in the AOR 2, older adolescents were 1.95 times more likely and males were 1.91 times more likely to engage in sexual intercourse. Individuals who belonged to 'poorer', 'middle', 'richer' or 'richest' wealth quintile, were less

likely to engage in sexual intercourse compared to adolescents who were living in the poorest households in the crude OR, while 'Residence' was not tested significant (crude OR: 0.99, 95% CI: 0.89 - 1.10) in association with the outcome. In the crude OR, Individuals who obtained Junior High School or Senior High School as the highest educational level, were more likely to abstain from sexual intercourse as compared to adolescents who obtained Primary Education only. Results from the AOR 2 however pointed out that participants within the categories Senior High School, Academy or University were more likely to engage in sexual intercourse (AOR 2: 1.36, 95% CI: 1.06 - 1.74; AOR 2: 1.75, 95% CI: 1.18 - 2.57 and AOR 2: 2.17, 95% CI: 1.58 - 2.97 for Senior High School, Academy and University, respectively). Adolescents who were not attending school were 2.7 times more likely to engage in sexual intercourse in the crude OR and 1.52 times more likely in the AOR 2.

Table 3: Crude and adjusted Odds Ratios (OR) with 95% Confidence Intervals (95% CI) displaying the associations between sociodemographic factors and the outcome (engaging in sexual intercourse) in N = 19,649 male and female unmarried, Indonesian adolescents aged 15 - 24 years.

	Crude OR (95% CI)	AOR 1 (95% CI)¹	AOR 2 (95% CI)²
Age			
Younger adolescent	1	1	1
Older adolescent	3.65 (3.27 - 4.07)	2.31 (2.02 - 2.64)	1.95 (1.70 - 2.25)
Sex			
Female	1	1	1
Male	7.49 (6.36 - 8.82)	6.99 (5.93 - 8.30)	1.91 (1.52 - 2.41)
Wealth quintile of the HH			
Poorest	1	1	1
Poorer	0.87 (0.74 - 1.01)	0.81 (0.69 - 0.95)	0.80 (0.67 - 0.96)
Middle	0.76 (0.65 - 0.89)	0.63 (0.53 - 0.75)	0.60 (0.50 - 0.72)
Richer	0.69 (0.58 - 0.81)	0.60 (0.50 - 0.72)	0.57 (0.47 - 0.70)
Richest	0.58 (0.49 - 0.69)	0.51 (0.42 - 0.61)	0.47 (0.38 - 0.57)
Residence			
Urban	1	NA ³	NA
Rural	0.99 (0.89 - 1.10)	NA	NA
Educational level			
Primary	1	1	1
Junior High	0.58 (0.48 - 0.67)	1.03 (0.84 - 1.26)	0.96 (0.76 - 1.21)
Senior High	0.70 (0.60 - 0.83)	1.51 (1.26 - 1.81)	1.36 (1.06 - 1.74)
Academy	0.76 (0.56 - 1.02)	1.99 (1.41 - 2.77)	1.75 (1.18 - 2.57)
University	1.05 (0.87 - 1.27)	2.74 (2.13 - 3.53)	2.17 (1.58 - 2.97)
School attendance now			
Yes	1	1	1
No	2.73 (2.43 - 3.05)	2.10 (1.81 - 2.44)	1.52 (1.29 - 1.78)

¹ In the adjusted AOR 1, it has been adjusted for the variables 'age', 'sex', 'wealth', 'educational level' and 'school attendance now'. ² In the AOR 2, it has been adjusted for the variables 'age', 'sex', 'wealth', 'educational level', 'school attendance now', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about HIV/ AIDS', 'taught at school about other STIs' as well as 'taught at school about human reproductive system'. ³ Not included in the model, since this variable was not significant in the bivariate analysis.

3.4 Behavioural Factors and Sexual Intercourse

3.4.1 Bivariate Analysis of Behavioural Variables in relation to the Outcome

All behavioural variables (ever drank alcohol, currently smoking and ever used drugs) resulted in significant Chi-square Tests with $p < 0.05$ (see table 2 in the Annex). 78% out of the sexually active adolescents ever drank alcohol, 89% were currently smoking and 14% ever used drugs.

On the other hand, adolescents who never drank alcohol, were not smoking and never took drugs comprised the majority within the group of adolescents who never had sexual intercourse (78%, 54% and 98% respectively).

3.4.2 Multiple Analysis of Behavioural Variables in relation to the Outcome

In line with the findings from the bivariate analysis are the ones from the multiple analysis (table 4). Adolescents who never drank alcohol were 92% less likely to engage in sexual intercourse. After adjusting for ‘age’, ‘sex’, ‘wealth’, ‘educational level’, ‘school attendance now’, ‘ever drank alcohol’, ‘currently smoking’, ‘ever used drugs’, ‘taught at school about HIV/ AIDS’, ‘taught at school about other STIs’ as well as ‘taught at school about human reproductive system’ these adolescents were 82% less likely to engage in sexual intercourse. For the crude OR, similar numbers were obtained for the predictors ‘currently smoking’ and ‘ever used drugs’. In the AOR 2 however, adolescents who were not smoking were 51% less likely and those who never took drugs were 68% less likely to engage in sexual intercourse.

Table 4: Crude and adjusted Odds Ratios (OR) with 95% Confidence Intervals (95% CI) displaying the association between behavioural factors and the outcome (engaging in sexual intercourse) in N = 19,649 male and female unmarried, Indonesian adolescents, aged 15 - 24 years.

	Crude OR (95% CI)	AOR 1 (95% CI)¹	AOR 2 (95% CI)²
Ever drank alcohol			
Yes	1	1	1
No	0.08 (0.07 - 0.09)	0.15 (0.13 - 0.17)	0.18 (0.16 - 0.21)
Currently smoking			
Yes	1	1	1
No	0.10 (0.01 - 0.12)	0.30 (0.25 - 0.36)	0.49 (0.40 - 0.61)
Ever used drugs			
Yes	1	1	1
No	0.09 (0.07 - 0.11)	0.30 (0.25 - 0.37)	0.32 (0.26 - 0.40)

¹ In the AOR 1, it has been adjusted for the variables ‘ever drank alcohol’, ‘currently smoking’ and ‘ever used drugs’. ² In the AOR 2, it has been adjusted for the variables ‘age’, ‘sex’, ‘wealth’, ‘educational level’, ‘school attendance now’, ‘ever drank alcohol’, ‘currently smoking’, ‘ever used drugs’, ‘taught at school about HIV/ AIDS’, ‘taught at school about other STIs’ as well as ‘taught at school about human reproductive system’.

3.5 Informational Factors and Sexual Intercourse

3.5.1 Bivariate Analysis of Informational Variables in relation to the Outcome

Three out of four informational factors lead to significant results in the Pearson's Chi Square Test, 'taught at school about birth control methods' resulted in $p = 0.124$ and was thus not significantly associated with the outcome (see table 2 in the Annex). The percentages compared between the two groups ('sexual intercourse = yes' and 'sexual intercourse = no') remained similar for the different informational variables, e.g. among those who engaged in sexual intercourse, 70% were taught in school about HIV/ AIDS compared to 73% among those adolescents who did not engage in sexual intercourse.

3.5.2 Multiple Analysis of Informational Variables in relation to the Outcome

Different results were obtained for the informational factors after calculating the crude and adjusted OR (see table 5). When adolescents were not taught at school about HIV/ AIDS, they were more likely to engage in sexual intercourse (crude OR: 1.20, 95% CI: 1.07 - 1.35; AOR 1: 1.33, 95% CI: 1.13 - 1.55), but after adjusting for 'age', 'sex', 'wealth', 'educational level', 'school attendance now', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about HIV/ AIDS', 'taught at school about other STIs' as well as 'taught at school about human reproductive system', this variable was not significant anymore. In contrast to that, adolescents who were not taught at school about other STIs, were less likely to engage in sexual intercourse in the crude OR, AOR 1 and AOR 2. The variable 'Taught at school about birth control methods' was not significantly associated with the outcome in the crude OR. Adolescents who were not taught at school about the human reproductive system were 1.43 times more likely to engage in sexual intercourse (crude OR: 1.43, 95% CI: 1.25 - 1.63). However, in the AOR 2, this variable was not tested significant anymore (AOR 2: 1.15, 95% CI: 0.95 - 1.39).

Table 5: Crude and adjusted Odds Ratio (OR) with 95% Confidence Intervals (95% CI) displaying the association between informational factors and the outcome (engaging in sexual intercourse) in N = 19,649 male and female unmarried, Indonesian adolescents, aged 15 - 24 years.

	Crude OR (95% CI)	AOR 1 (95% CI)¹	AOR 2 (95% CI)²
Taught at school about HIV/ AIDS			
Yes	1	1	1
No	1.20 (1.07 - 1.35)	1.33 (1.13 - 1.55)	1.14 (0.95 - 1.37)
Don't know	1.28 (0.88 - 1.80)	1.67 (1.01 - 2.70)	1.46 (0.85 - 2.48)
Taught at school about other STIs			
Yes	1	1	1
No	0.78 (0.71 - 0.88)	0.61 (0.53 - 0.70)	0.74 (0.64 - 0.86)
Don't know	0.72 (0.52 - 0.96)	0.50 (0.33 - 0.73)	0.60 (0.39 - 0.91)
Taught at school about birth control methods			
Yes	1	NA	NA ^x
No	0.90 (0.80 - 1.02)	NA	NA
Don't know	1.07 (0.81 - 1.39)	NA	NA
Taught at school about human reproductive system			
Yes	1	1	1
No	1.43 (1.25 - 1.63)	1.52 (1.30 - 1.79)	1.15 (0.95 - 1.39)
Don't know	1.26 (0.89 - 1.75)	1.33 (0.87 - 1.97)	0.86 (0.55 - 1.31)

¹ In the AOR 1, it has been adjusted for the variables 'taught at school about HIV/AIDS', 'taught at school about other STIs' and 'taught at school about the human reproductive system'. ² In the AOR 2, it has been adjusted for the variables 'age', 'sex', 'wealth', 'educational level', 'school attendance now', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about HIV/ AIDS', 'taught at school about other STIs' as well as 'taught at school about human reproductive system'.
^xNot included in the model, since it was not significant in the bivariate analysis.

3.6 Stratification for age groups

In order to see whether there was a difference between the two age groups of adolescents in terms of factors associated with engaging in sexual intercourse, the stratification for age was carried out. With this stratification, it was hoped to estimate whether a change over time took place in terms of factors associated with engaging in sexual intercourse. In addition to that, the age of the adolescent was identified as a confounding factor, being significantly related to most of the predicting variables. By stratifying for 'age', the influence of this variable on the results was eliminated. The crude OR and the two adjusted ORs were calculated for younger adolescents (15 - 19 years) and older adolescents (20 - 24 years) respectively.

3.6.1 Sociodemographic Factors in relation to the Outcome, stratified by age groups

Among younger adolescents, all sociodemographic variables except the 'Residence' variable resulted in significant crude OR and CI (see table 6 in the Annex). Male adolescents were 6.27 times more likely to engage in sexual intercourse compared to female adolescents in the crude OR (95% CI: 4.94 - 8.06) and 6.3 times more likely to engage in sexual intercourse after adjusting for 'sex', 'wealth', 'educational level' and 'school attendance now' in the AOR 1 (95% CI: 4.95 - 8.12). After adjusting for 'sex', 'wealth', 'educational level', 'school attendance now', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about other STIs' and 'taught at school about the human reproductive system' in the AOR 2, male adolescents were 2.13 times more likely to engage in sexual intercourse (95% CI: 1.52 - 3.01). The adolescents who belonged to the wealthier household quintiles ('middle', 'richer', 'richest') were less likely to engage in sexual intercourse compared to the poorest household quintile in all three different logistic regression models (crude OR, AOR 1 and AOR 2). In the crude OR, the participants with Junior High School and Senior High School as the highest educational level were 44% and 25% less likely to engage in sexual intercourse, respectively, compared to those who had Primary Education. However, in both adjusted OR, Junior High School got insignificant but all the other educational levels got significant compared to Primary Education. Here, adolescents who had obtained Senior High School as their highest educational level were 73% more likely to engage in sexual intercourse and those with Academy completion were about four times more likely (AOR 2: 4.29, 95% CI: 2.01 - 8.70) to engage in it. Adolescents with a university degree were 3.72 times (AOR 2: 3.72, 95% CI: 2.14 - 6.39) more likely to engage in sexual intercourse. Adolescents who did not attend school at the time of the interview were more likely to engage in sexual intercourse in the crude and the two adjusted OR.

Among the group of older adolescents, the OR looked similar compared to the ones of younger adolescents for the variables 'Sex' and 'Wealth quintile of the HH' (see table 6 in the Annex). In contrast to the group of younger adolescents, older adolescents who lived in rural areas were 17% more likely to engage in sexual intercourse, but in both AOR, this variable was not significant anymore. 'Academy' and 'University' level were significant in the crude OR: adolescents with these educational levels were less likely to engage in sexual intercourse. But only 'University' remained significant after adjusting for 'sex', 'wealth', 'residence', 'educational level' and 'school attendance' in the AOR 1 and adolescents in that category were

43% more likely to engage in sexual intercourse. Older adolescents who did not attend school were 40% more likely to engage in sexual intercourse.

3.6.2 Behavioural Factors in Relation to the Outcome, stratified by age groups

All behavioural variables were significant in all three OR and in both groups, younger and older adolescents (see table 7 in the Annex). Younger adolescents who never drank alcohol were 91% less likely to engage in sexual intercourse (crude OR: 0.09; 95% CI: 0.07 - 0.10) and in the two adjusted OR, the number remains similar. OR and CI are alike for older adolescents, too. The same applies for the variables 'currently smoking' and 'ever used drugs': younger and older adolescents who never smoked or never took drugs, were much less likely to engage in sexual intercourse. However, there was a bigger change between the crude and the two adjusted OR for these two variables in both age groups of adolescents compared to the variable 'ever drank alcohol'. While younger adolescents who did not smoke were 87% less likely to engage in sexual intercourse in the crude OR, they were 66% less likely in the AOR 1, which has been adjusted for 'ever drank alcohol', 'currently smoking' and 'ever used drugs'. Younger adolescents, who were not smoking at the time of the interview were 45% less likely to engage in sexual intercourse in the AOR 2, which has been adjusted for 'sex', 'wealth', 'educational level', 'school attendance', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught in school about other STIs' and 'taught in school about the human reproductive system'. Numbers were similar for older adolescents. Older adolescents who never took drugs were 86% less likely to engage in sexual intercourse compared to being 62% less likely to engage in sexual intercourse in the AOR 1 and AOR2 respectively.

3.6.3 Informational Factors in Relation to the Outcome, stratified by age groups

Among younger adolescents, 'taught at school about other STIs' and 'taught at school about the human reproductive system' were significantly associated with the outcome (see table 8 in the Annex). Individuals who were not taught or did not know whether they were taught at school about other STIs than HIV/ AIDS were 22% and 39% less likely to engage in sexual intercourse respectively. In contrast to that, younger adolescents who were not taught about the human reproductive system, were 38% more likely to engage in sexual intercourse in the crude OR and results for adolescents who did not know whether they were taught about this topic were not significant. After adjusting for 'taught at school about other STIs' and 'taught at school about the human reproductive system' in the AOR 1, the association changes and the group of younger adolescents who did not know whether they were taught at school about the human reproductive

system became significant: participants who were not taught about the human reproductive system at school were 63% more likely to engage in sexual intercourse compared with being 94% more likely to engage in it when they did not know whether they received the information in school. In the AOR 2 (after adjusting for 'sex', 'wealth', 'educational level', 'school attendance', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about other STIs' and 'taught at school about the human reproductive system'), the variable 'taught about the human reproductive system at school' did not show significance anymore.

Among older adolescents, the variables 'taught at school about other STIs' and 'taught at school about the human reproductive system' obtained significant results in the crude OR (see table 8 in the Annex). Older adolescents who were not educated about the human reproductive system were 32% more likely to engage in sexual intercourse in the crude OR, but after adjusting for 'sex', 'wealth', 'residence', 'educational level', 'school attendance', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about other STIs' and 'taught at school about the human reproductive system' in the AOR 2, no significance was detected anymore.

4 Discussion

4.1 Key Findings

Summarizing the results obtained within this study for all adolescents, males were much more likely to engage in sexual intercourse compared to females. Older adolescents (aged 20 - 24 years) were also more likely to engage in sexual intercourse compared to younger adolescents (aged 15 - 19 years of age). In terms of behavioural factors, adolescents who had never consumed alcohol were less likely to engage in sexual intercourse. The same applies for adolescents who never smoked and who never used drugs. Controversial results were obtained for the informational factors. Adolescents who were not taught in school about other STIs than HIV/ AIDS, were less likely to engage in sexual intercourse in the adjusted OR. However, adolescents who were not taught about the human reproductive system were more likely to engage in sexual intercourse in the crude OR, while there was no significance anymore in the adjusted OR. The same goes for adolescents who were not taught about HIV/ AIDS in school.

After stratifying for age, male adolescents among the younger age group were more likely and adolescents living in wealthier households were less likely to engage in sexual intercourse. Adolescents with a higher education (Senior High School, Academy and University) and those who attended school during the time of the interview, were much more likely to engage in

sexual intercourse. Adolescents who had never drank alcohol, did not smoke and did not use drugs were much less likely to engage in sexual intercourse. After adjusting for all significant variables, those adolescents who did not know whether they were taught at school about other STIs were less likely to engage in sexual intercourse.

For older adolescents, a similar picture was obtained: male adolescents were more likely to engage in sexual intercourse, while adolescents living in wealthier households were less likely to engage in it. Adolescents living in rural areas were more likely to engage in sexual intercourse, while no significance was obtained for the educational level, nor the current school attendance. Adolescents who never drank alcohol, were not smoking and never used drugs were much less likely to engage in sexual intercourse. Finally, older adolescents who were not taught about other STIs in school were less likely to engage in sexual intercourse.

4.2 Relationships among the predicting variables

Older adolescents were identified as being much more prone to engage in sexual intercourse compared to younger adolescents in the crude OR. However, after adjusting for all significant variables, the AOR 1 and AOR 2 dropped extensively (see table 3). This change was considerably big and thus further investigation was conducted, namely manual stepwise logistic regression in order to examine when exactly the OR for older adolescents changed and what variable caused this change. All logistic regression models were redone and the variables were put manually one after another into the model in order to investigate under what circumstances the OR changed the most. A concept map was developed based on the results of this manual stepwise logistic regression in order to give a visual overview of the relationships between the predicting variables (see Figure 3). The highest drop in the OR for the variable ‘age’ was observed after adjusting for the variable ‘school attendance now’. Before adjusting for ‘school attendance now’, the AOR was 3.29 (95% CI: 2.92 - 3.70) and 2.31 (95% CI: 2.02 - 2.64) after adjusting for this variable (data from the manual stepwise logistic regression is not displayed). It can be assumed, that the variable ‘school attendance now’ is highly correlated with the age of the adolescent. Older adolescents tended to be finished with school already at the time of the interview and thus were not attending it anymore. Also, it can be assumed that the older the adolescent, the higher were the chances that he or she has engaged in sexual intercourse already.

For the variable ‘sex’ a comparable high change occurred between the crude and the adjusted OR. When adjusting for all significant variables one by one, the highest drop in the OR could be detected after adjusting for the variable ‘ever drank alcohol’. Before adjusting for it, the OR

for male adolescents to engage in sexual intercourse was 6.99 (95% CI: 5.93 - 8.30) and after adjusting it was 2.75 (95% CI: 2.29 - 3.32) only. Thus, the consumption of alcohol was highly correlated with the sex of the adolescent, which was already displayed in table 1: 43% of all male adolescents ever drank alcohol compared to 6% of all females.

An interesting difference between the crude and AOR 2 was detected for the variable 'highest educational level' (see table 3). Here, adolescents who obtained 'Senior High School' were 30% less likely to engage in sexual intercourse compared to adolescents who obtained 'Primary' as their highest education. Adolescents who obtained 'Academy' as their highest educational level were 24% less likely to engage in sexual intercourse, although the CI was borderline non-significant in this crude OR. However, in the AOR 2, adolescents with 'Senior High School' were 36% more likely to engage in sexual intercourse and adolescents with 'Academy' were 75% more likely to engage in it compared to adolescents who obtained 'Primary' education only. While adjusting stepwise for all the significant variables, the variables 'wealth quintile of the household' and 'school attendance now' had the greatest impact on the OR of 'Senior High School' and 'Academy'. Before adjusting for 'wealth quintile of the HH', the OR for 'Senior High School' was 1.02 (95% CI: 0.86 - 1.21) and for 'Academy' it was 0.94 (95% CI: 0.68 - 1.28); after adjusting for the wealth quintile, the OR changed to 1.23 (95% CI: 1.03 - 1.47) for 'Senior High School' and to 1.26 (95% CI: 0.90 - 1.74) for 'Academy'. After adjusting for 'School attendance now', the OR changed even more, namely to 1.51 (95% CI: 1.26 - 1.80) for 'Senior High School' and to 1.99 (95% CI: 1.41 - 2.77) for 'Academy'. The wealth of the household in which the adolescent was living in during the time of the interview and whether he or she was attending school or not at this time point were important confounding factors for the association of the highest educational level and the outcome (engaging in sexual intercourse). It can be argued, that adolescents who have obtained a higher level of education are older and older adolescents are in turn more prone to engage in sexual intercourse. Also, one could assume, that potential school fees might have influenced the fact that adolescents were possibly not able to attend school, due to a low socioeconomic status of the household that they were living in. In Indonesia, education is mainly financed by the government and from 1992 to 1993, 75% of all students at all educational levels were visiting public schools, with an enrolment in public schools of 97% for the primary level (53). However, a more recent study argued, that an increasing amount of non-governmental schools could be found in Indonesia, especially attracting children from low-income families (54). A tuition fee is charged, tailored to the capacities of low-income families and thus lower compared to ordinary private school fees. However, this type of school is often hardly accessible due to

long travel ways but was still in great demand, since even students with low exit scores from primary schools could access them (54). These students would otherwise not have been able to secure a space in a public, government-based school (54). An inadequate public sector was identified as one reason for this phenomenon (54). Another interesting observation made within that study was, that over 90% of all private schools in Indonesia were overseen by the Ministry of Religious Affairs and even though these schools are still required to follow the national curriculum, they were allowed to supplement it with additional religious content (54). Therefore, religion was one important reason, why the low-cost private schools existed, but it can be argued whether education concerning SRHR is taught in an adequate manner in religion based institutions, empowering adolescents to make informed decisions about their sexual behaviour.

After stratifying for age, there were still considerably high changes detected between the crude OR and AOR 2. For younger adolescents, the crude OR for males to engage in sexual intercourse was 6.27 (95% CI: 4.94 - 8.06). After adjusting for the variable 'ever drank alcohol', the OR dropped to 2.59 (95% CI: 1.98 - 3.42), before adjusting for it, the OR was 6.30 (95% CI: 4.95 - 8.12). A similar phenomenon was as well observed for all adolescents and is described above. Again, the consumption of alcohol seemed to be highly associated with the sex of the participant.

A big change between the crude OR and the AOR 2 for younger adolescents could be seen for the variable 'highest educational level', namely for 'Senior High School', 'Academy' and 'University'. In the crude OR, adolescents who had 'Senior High School' as the highest educational level, were 25% less likely to engage in sexual intercourse, but in the AOR 2, the picture changed and this educational level became a 'risk factor', meaning that adolescents were more likely to engage in sexual intercourse. When adjusting for the predicting variables one by one, a high change could be seen after adjusting for 'school attendance now': the OR for 'Senior High School' was 2.30 (95% CI: 1.70 - 3.13), for 'Academy' the OR changed to 7.72 (95% CI: 3.81 - 14.70) and for 'University' the OR was 6.35 (95% CI: 3.92 - 10.17) after adjusting for 'school attendance now'. However, after adjusting for the variable 'ever drank alcohol', the odds decreased considerably for 'Academy' (OR: 4.62, 95% CI: 2.34 - 9.02) and 'University' (OR: 4.60, 95% CI: 2.80 - 7.50). 'School attendance now' and 'ever drank alcohol' seemed to be very strong confounding factors for the variable 'highest educational level' among younger adolescents.

For older adolescents, the changes in the OR were similar and also due to predominantly the same adjusted variables. Examining the variable 'sex', male adolescents were considerably more likely to engage in sexual intercourse compared to female adolescents. The OR decreased the most after adjusting for the variable 'ever drank alcohol' (OR: 2.88, 95% CI: 2.25 - 3.72). As described before, the variable 'ever drank alcohol' had a strong correlation with the sex of the participants, male adolescents were more prone to ever having drunk alcohol. Also among older adolescents, the phenomenon could be observed that the educational level 'University' was associated with a decreased likelihood to engage in sexual intercourse in the crude OR, compared with an increased likelihood to engage in sexual intercourse in the AOR 1. However, after adjusting for all significant variables in the AOR 2, the category 'University' within the variable 'Highest educational level' was not significant anymore. The highest change in the OR could be detected after adjusting for 'school attendance now', resulting in an OR of 1.43 (95% CI: 1.03 - 1.99). Again, this variable seemed to be highly associated with the educational level.

Based on these strong confounding factors, which had a great impact on the results of the study, a concept map on the basis of Figure 1, which is displayed in the introduction, was developed in order to show the identified relationships between the predicting factors and the outcome after the results have been obtained (see Figure 3). In addition to these confounding factors described above, supplementary Pearson's Chi Square Tests were produced in order to check for further confounding factors (data not shown).

The blue arrows in figure three symbolize the identified strong relationship between the predicting variables, which influenced the obtained OR in the logistic regression to a high extend for all adolescents (which were not stratified for age). The variable 'school attendance now' had a great impact on the age of the adolescents. It can be assumed that younger adolescents tended not to be finished with their education and were thus more prone to be enrolled in a schooling program. In addition to that, the school attendance had a high impact on the educational level of the adolescent, since these two variables were also highly interlinked with each other: participants who had a lower educational level were more likely to still be enrolled in an educational program and were attending school at the time point of the interview. Also, 48% of males and 50% of females claimed to have 'Senior High School' as their highest educational level. Consequently, when older adolescents were interviewed (20 - 24 years of age), they were most likely to be finished with their education and were thus not attending school anymore when the interview took place. The variable 'ever drank alcohol' had a great impact on the OR of male adolescents to engage in sexual intercourse. It has been discussed

before, that male sex is highly related to the variable 'ever drank alcohol'. Lastly, for adolescents overall, the wealth of the household in which they were living in had an impact on their educational level. It can be discussed that the wealthier the household, the more likely it was, that the adolescent was able to go to school and consequently was able to obtain a higher educational level. This assumption is in accordance with the subgroup analysis of adolescents who never went to school: here, 69% lived in the poorest wealth quintile (see table 9 in the Annex).

The orange arrows in figure three represent the relationship of the predicting variables among younger adolescents, after the sample has been stratified for age. As described above, 'school attendance now' had an impact on the educational level and the variable 'ever drank alcohol' influenced the OR for the variable 'sex' among younger adolescents. Additionally, the consumption of alcohol strongly influenced the OR of the educational level as well.

The yellow arrows stand for the relationships between the predicting variables which have been investigated among older adolescents, after stratifying for age. In accordance with the observations discussed above for all adolescents and for younger adolescents, 'school attendance now' influenced the OR of the educational level considerably and 'ever drank alcohol' influenced the OR for the variable 'sex' to a high extend.

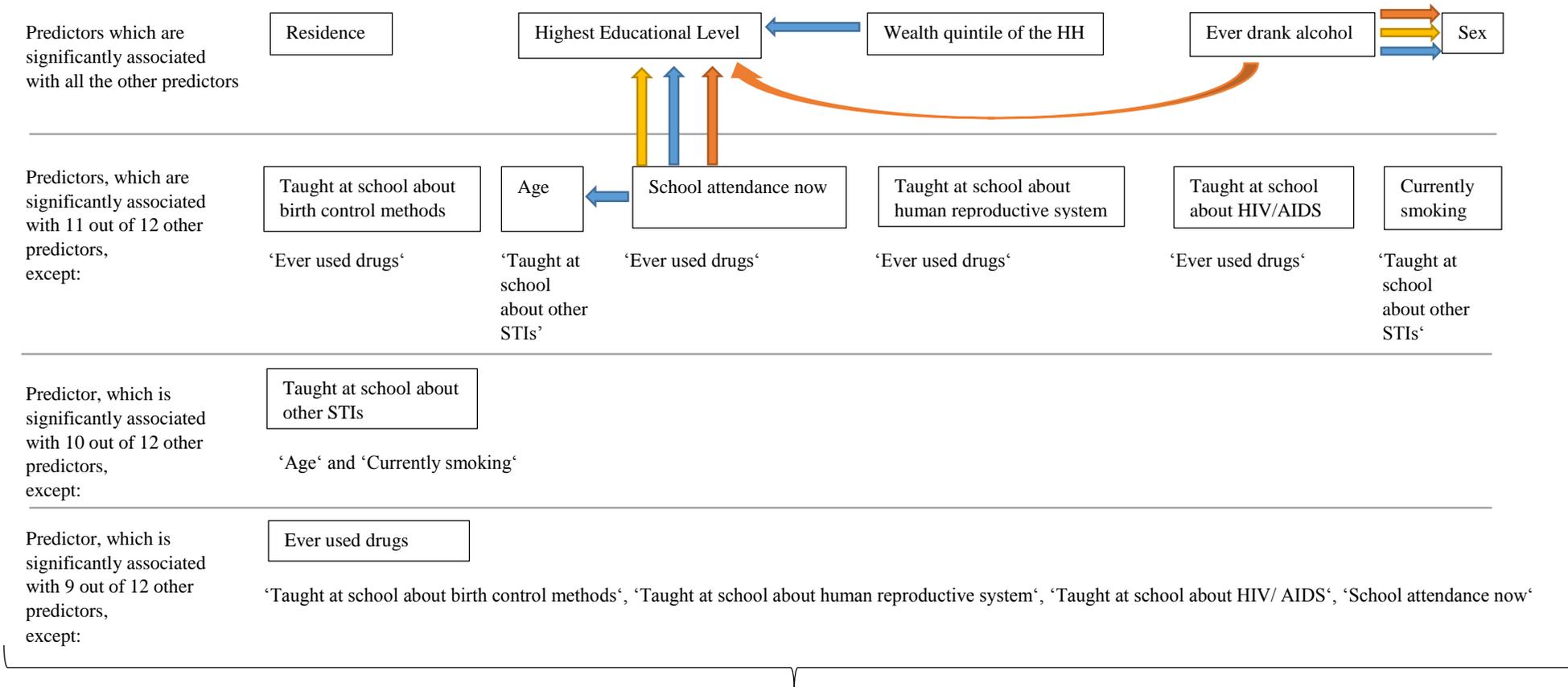


Figure 3: Concept map, displaying the relationships between the predicting variables and the outcome (sexual intercourse) based on obtained Pearson’s Chi Square Tests and Stepwise Logistic Regression. Blue arrows represent the investigated relationship for all adolescents, orange arrows represent the relationships for ‘younger adolescents’ and yellow arrows represent relationships for ‘older adolescents’ after stratifying for age.

4.3 Internal Validity

Besides the strong relationships between the variables, which are displayed in Figure 3, it is obvious, that most of the predicting variables were significantly associated with each other and the outcome. Five out of thirteen predictors were significantly associated with all, meaning twelve, of the other predictors, six were significantly related with eleven of the other predictors, while one predictor was associated significantly with ten other predictors and one was significantly associated with nine other predictors. Only the variables 'Residence' and 'taught at school about birth control methods' were not significantly associated with the outcome 'Sexual intercourse'. But since they were significantly associated with the other predicting variables, the concept of multicollinearity might have been introduced here. However, these two variables were not included in the logistic regression models due to the insignificant relationship with the outcome variable. Consequently, the influence of multicollinearity was excluded in the analysis and thus had no influence on the results.

The logistic regression models which were performed to investigate the association of the predicting variables and the outcome allowed for the author of this study to examine potential high changes in the OR and to identify the factors, being the cause for this change in the OR (see Figure 3). In order to have a binomial outcome for the analysis in this study, all individuals who did not know whether they engaged in sexual intercourse or not were removed ($n = 85$). It is possible that important information was lost, due to this exclusion. However, only 85 individuals had to be excluded out of 19,649 individuals in total. It was not expected, that the exclusion of these individuals would have contributed to a high change within the results. Also, in the main analysis, only those adolescents were analysed who attended school at some time during their life, because all the informational factors were based on knowledge which was or was not obtained in school. Consequently, all those adolescents who had never attended school were excluded from the analysis (see Figure 2), even though adolescents within this group might comprise valid information. In order to ensure that no important information was lost, a subgroup analysis was performed for those adolescents who never went to school (see tables 9 - 11 in the Annex). In total, 146 adolescents out of the total sample ($N = 19,649$) had never attended school in their lives and 144 individuals were included in the subgroup analysis. Two individuals had to be removed before the analysis took place, because they did not know whether they had engaged in sexual intercourse or not. The majority of adolescents who never went to school was between 15 and 19 years of age and 14 individuals, which equals 10%, engaged in sexual intercourse (see table 9 in the Annex). This value was similar to the one

obtained from the main analysis. Differences in relation to the sample in the main analysis were, that within the subgroup, 69% of adolescents belonged to the poorest wealth quintile and 74% of all households were located in rural areas. Also, 83% of the adolescents who never attended school, had never drank alcohol and one individual had ever used drugs. According to the bivariate analysis of this subgroup, the variables 'residence', 'ever drank alcohol' and 'currently smoking' resulted in significant p-values from the Chi Square Test (see table 10 in the Annex). As can be seen in table 11 in the Annex, a logistic regression model performed with these significantly tested variables resulted in a crude OR of 0.31 (95% CI: 0.10 - 0.98) for rural residence and adolescents who never drank alcohol were 84% less likely to engage in sexual intercourse. Similarly to this, adolescents who were not smoking, were 81% less likely to engage in sexual intercourse compared to adolescents who were smoking. Interestingly, after adjusting for 'Residence', the adjusted OR changed to 0.22 (95% CI: 0.32 - 0.94) for adolescents who were not smoking. After also adjusting for 'Ever drank alcohol', the OR changed considerably to 0.71 (95% CI: 0.08 - 6.44), incorporating a large confidence interval. Again, the variable 'Ever drank alcohol' was identified as a strong confounding factor, even in this subsample.

4.4 Findings in relation to other Studies

Concerning this study and others (21,23), male adolescents were much more likely to engage in sexual intercourse compared to female adolescents. This raised the question, with whom they do engage in sexual intercourse with, provided that the examined number of female adolescents who engage in sexual intercourse is true, since this might have had an influence on the sexual and reproductive health of the adolescents as well. Two studies could be identified addressing this issue: in 2006, 40% of the population aged 15 - 49 years, had their first sexual intercourse with their girl- or boyfriend, while 1.6% had sexual intercourse with a sex worker (55). Another study stated that 67% of sexually active Indonesian and Malaysian adolescents engaged in the first sexual intercourse with their boyfriend or girlfriend (56). In accordance with other studies, older age has been identified by this study as a factor influencing adolescents to engage in sexual intercourse (21,23). Contrary to these findings, one study has identified younger age in female adolescents as being associated with engaging in sexual intercourse (30). However, it has to be noted, that this particular study was conducted in the northern region of Thailand, where drug use and human trafficking were common and thus, the obtained results might not be generalizable to other societies. Ever used drugs, ever consumed alcohol and/ or smoking were identified as factors associated with engaging in sexual intercourse by several recent

studies (19,20,23,24,29–31), which were in accordance with the results of this study. Among female adolescents, a higher educational level was found to be associated with a decreased likelihood in engaging in sexual intercourse (22) and a lack of school attachment/ dropping out of school was identified with a higher likelihood to engage in sexual intercourse by several studies (20,24,25,28,29), which is in accordance with this study. Adolescents living in urban areas were more likely to engage in sexual intercourse according to Gibbs et al. (21), while in this study older adolescent living in rural areas were more prone to engage in sexual intercourse. In contrast to this study, no other studies could be examined investigating informational factors and the wealth index of the household in relation to sexual intercourse among adolescents. To calculate a wealth index, considerably many questions on indicators are needed and thus might have been beyond the scope of a study. Additionally, further factors related to sexual intercourse were identified by other studies due to the survey design posing different questions compared to the DHS questionnaire and due to applying qualitative research techniques which resulted in more in-depth and detailed factors. For instance, being very close to friends, having a wide social circle, not listening to parents and not following their advice were identified as factors associated with engaging in sexual intercourse by a study using a qualitative approach (29).

4.5 External Validity/ Generalizability

Since DHS data claims to be nationally representative, the results obtained from this study should be generalizable for the whole country. However, since Indonesia is a culturally and ethnically diverse country, habits among adolescents in terms of sexual intercourse could vary and thus generalizability of these study results might not apply for all regions within Indonesia.

4.6 Strengths and Limitations

The DHS Program is commonly known as collecting high quality data and for employing well trained as well as experienced staff for the data collection. A strength of the study is its large sample size, which makes the obtained results of the study nationally representative, which is also a pursued goal of DHS. In addition to that, the way of collecting the data was a strength of the study as well: all households were assigned to clusters and subsequently, households were chosen from these clusters for interviews. Despite the fact that many studies were conducted in Southeast Asia in terms of adolescents' sexual behaviour and the factors influencing it, only two studies could be identified from 2003 and 2004, analysing the situation in Indonesia (15,33). Thus, a strength of the study is, that it contributes to the knowledge of the factors which

are associated with engaging in sexual intercourse among never-married adolescents in Indonesia using the latest available DHS data. Furthermore, the data in this study was analysed very thoroughly, investigating the emerging confounding factors in depth. Lastly, the topic investigated is of a high public health relevance for Indonesia (see section 4.7).

However, the data collection took place in the homes of the adolescents and even though interviewers tried to create an environment of privacy where the adolescent is able to speak freely, this still might have been an issue for the adolescents. It has to be questioned whether they felt comfortable enough to tell the interviewer about their intimate experiences which are not accepted by society in most cases. In addition to that, even though confidentiality might have been assured, it can be argued whether the participants reported the truth. This is especially valid for female adolescents, since this group is not expected to engage in sexual intercourse prior to marriage. This social norm which incorporates a certain behaviour, might have led to an underreporting of females who engaged in sexual intercourse. Since the majority of the population in Indonesia belongs to the Muslim religion, the so called ‘honour killings’ might have been an underlying factor influencing female adolescents not to disclose potential sexual experiences prior to marriage. However, the concept of ‘honour killing’ does not seem to be very common in Indonesian societies according to two sources (57,58), and thus is assumed not to have influenced the answers of female adolescents to a considerable extent. Another aspect to discuss is, whether a different form of interview might have been more suitable for questions about an adolescents’ sexuality. In other studies conducted in Southeast Asia examining adolescents’ sexual activity, self-administered questionnaires were used to investigate this sensitive topic, partly computer-based and partly paper-based (19,20,23,24,28,30,31,36). In addition to that, another limitation of the study is, that due to the cross sectional nature, it is not possible to draw conclusions about causality, only associations between factors can be analysed. Reporting bias might have occurred, since adolescents might not have told the truth when it came to sensitive questions concerning their sexual behaviour or the consumption of substances like drugs. Recall bias might have occurred when the adolescents were asked whether they have obtained information regarding sexual and reproductive health in school or not. Furthermore, even if an adolescent claimed to be educated about sexual and reproductive health aspects in school, it is not known in what way and how in-depth this information was conveyed to the adolescents. As mentioned in the introduction, it is known that sexual education in schools in Indonesia is primarily aiming at suppressing adolescents’ sexual behaviour rather than empowering them to make informed choices (15,33). Finally, due to the design of the questionnaires used by DHS, only a limited number of questions could be included and

examined for their relationship with engaging in sexual intercourse. As discussed above, other important factors which were investigated by several studies and identified as being significantly associated with the adolescents engaging in sexual intercourse were thus missed for this study population.

4.7 The Results from the Perspective of the 'Problem-Behaviour Theory' by Jessor & Jessor (1977)

Since sexuality of adolescents represents a topic of high complexity, there was no theoretical framework developed to guide the research so far (59). Consequently, researchers have utilized a variety of theoretical perspectives or models (59). One of these models used to understand the behaviour of adolescents is the 'Problem Behaviour Theory' (PBT), initially developed by Jessor & Jessor in 1977 and further refined by Jessor, Donovan & Costa in 1991 (60). A review on adolescents' development stated, that PBT was amongst the most influential frameworks which dominated the research in this area (61). PBT is '... a systematic, multivariate, social-psychological conceptual framework' (62), with the premise that all behaviour is the result of a person-environment interaction and with the aim to explain dysfunction and maladaptation in adolescents (63). Problem behaviour is defined as the behaviour that is socially defined as a problem or as undesirable by social and/ or legal norms and is thus also labelled as unconventional behaviour or unconventionality (62). In the context of Indonesian adolescents and in relation to this study, this behaviour comprises of premarital sexual intercourse, drug use and alcohol consumption (33,35,36). In contrast to that, conventional behaviours are such, that are socially approved, normatively expected and/ or institutionalized as appropriate for adolescents, like church attendance, involvement in school activities and others (60).

The PBT is based on three systems of explanatory variables: the personality system, the perceived environment system and the behaviour system (60). Each system comprises of variables that function as either an instigation for engaging in problem behaviour or as controls to abstain from problem behaviour and it is the balance between instigations and controls that determines the proneness to engage in problem behaviour (60). In the personality system, unconventionality is amongst others reflected by a lower value on academic or school achievement, greater value on independence, lower attitudinal intolerance of divergent behaviour and lower religiosity (60). In the environment system, unconventionality is reflected by less compatibility between parents' and friends' expectations, greater friends' than parents' influence on decision-making processes and lower parental disapproval of problem behaviour (60). Lastly, in the behaviour system, unconventionality is presented by greater involvement in

various problem behaviours and lower involvement in conventional behaviours (60). Consequently, when the personality system and the perceived environment system clash, the behavioural problems appear (63).

Due to the linkages in the social environment of adolescents and the similar psychological meanings and functions that the behaviour may have, involvement in problem behaviour increases the likelihood of involvement in other unconventional behaviours (62). In addition to that, problem behaviour proneness in the behaviour system leads to low involvement in conventional behaviours, like attending and participating in schools and is furthermore negatively associated with health enhancing behaviour (60,62). Evidence states, that problem behaviours and conventional behaviours are related to health behaviours among adolescents and may have important implications for interventions (60). Health behaviour needs to be conceptualized as part of an interrelated and larger system, rather than as isolated and unrelated actions (60). As a consequence, this implies that intervention programs aiming at changing a certain part of the lifestyle of adolescents, tend to be most effective when addressing the whole lifestyle of the adolescents and not only focussing on one specific aspect, which in the case of this study, would be sexual intercourse (60). Another interesting aspect revealed by this theory is, that those adolescents who are most unconventional, meaning that they engage in the most problem behaviours, may be at a double risk. Unconventionality places them at greater risk to engage in health-compromising behaviour and abandon health-maintaining behaviour. At the same time, conventionality is linked to health, which makes those adolescents engaging the most in problem behaviour, the most resistant to intervention programs (60).

Applying PBT to this study, it becomes clear that not only factors that are associated with engagement in sexual intercourse are of importance, but that it is also necessary to investigate factors that act as controls and thus prompt adolescents to abstain from sexual intercourse. Furthermore, besides the analysis of the behaviour of the adolescents themselves, it is important to examine the environment system and the personality system of the adolescents (school attachment, parents and family behaviour and attitudes, friends' impact) as well, in order to fully understand the sexuality behaviour among this age group.

4.8 Practical Importance of the Study

Although no strictly clear results could be obtained from this study in terms of factors which are associated with engaging in sexual intercourse, the obtained results in combination with the identified strong confounding factors (see Figure 3), pointed towards a group of adolescents

which seemed to be more likely to engage in sexual intercourse compared to the other adolescents. Male adolescents and those who ever drank alcohol were identified as much more likely to engage in sexual intercourse compared to female adolescents and those who never drank alcohol. These two factors were identified in the analyses among all adolescents, younger and older adolescents and represent strong confounding factors (see Figure 3). Besides this, smoking, using drugs and, after stratifying for age, adolescents from poorer households, were identified as being more prone to engage in sexual intercourse. Especially policy makers might be interested in the results of this study: it is particularly important to point out the group of adolescents which might be more likely to engage in sexual intercourse, since combined with the predominant social norms and the behavioural change influenced from the western world, this group is of a higher risk to acquire negative health outcomes like STIs or unwanted pregnancies. This is why intervention programs for that specific group are needed in order to equip these adolescents with the knowledge and tools needed to make informed decisions and to protect themselves and others from harmful health outcomes. In that way, new infections with STIs and unwanted pregnancies can be reduced or even prevented. This might not only save the lives of many Indonesian adolescents but will also be of a high economic interest for the country, since money for the treatment of STIs and for the consequences of unsafe abortions would be saved. In addition, adolescents would be healthier and thus contribute to a higher extent to the workforce of the country. Therefore, adolescents themselves could benefit from the results of this study, as well as the government. However, it has to be considered, that diverse cultural norms and habits within different regions of Indonesia could still influence the behaviour of adolescents and that this has to be accounted for while designing intervention programs. Another point to add to this discussion is, that besides the above mentioned intervention programs for the specific risk group of adolescents, high quality sexuality education in schools in general is needed. Information and discussion about various aspects of SRHR are needed as well as the empowerment of the adolescents and not the suppression of sexuality, so that they are able to make their own informed decisions. This suggestion is backed up by the convention on the rights of the child from 1989, stating that adolescents have the right to make their own well-informed decisions whether they want to be sexually active or not and to protect themselves against unwanted health outcomes (37).

Nevertheless, it might be useful to conduct studies specifically designed to investigate the relationship between specific predictors and adolescents engaging in sexual intercourse. These factors could incorporate the relationship to the parents, whether the adolescent listens to the parent and follows their advice or not, the social circle of the adolescent as well as perceived

group pressure and permissiveness towards premarital sex within the community and among friends. These factors were identified as significant predictors in terms of sexual intercourse. Especially through a qualitative approach, a deeper understanding of other possibly important factors in relation to sexual intercourse can be investigated for adolescents in Indonesia. Also, according to the PBT, it is important to consider the social environment of the adolescents as well, in order to fully understand their behaviour and to investigate factors that influence adolescents to abstain from sexual intercourse. In addition to that, more research is needed to investigate the relationship between knowledge of SRHR and engaging in and abstaining from sexual intercourse, since in this study the fact whether information concerning SRHR was obtained in schools or not was accounted in the analysis only, but no knowledge scores were used.

5 Conclusion

Male sex, older age and adolescents who ever drank alcohol, were currently smoking or have ever used drugs were identified as being most prone to engage in sexual intercourse. After stratifying for age, those adolescents living in poorer households were identified as being more likely to engage in sexual intercourse. Interventions are needed to equip these groups with sufficient knowledge and tools to make informed decisions in order to protect themselves and others from harmful health outcomes. Further qualitative research is needed to investigate the behaviour of Indonesian adolescents towards sexual intercourse more in depth. Important is here, to also investigate potential factors which are associated with abstaining from sexual intercourse, so that interventions can be targeted on these factors as well, trying to emphasize and strengthen them in this particular demographic group. Lastly, the environment of adolescents such as family, friends and school impact their sexual behaviour as well and thus need to be considered in future studies.

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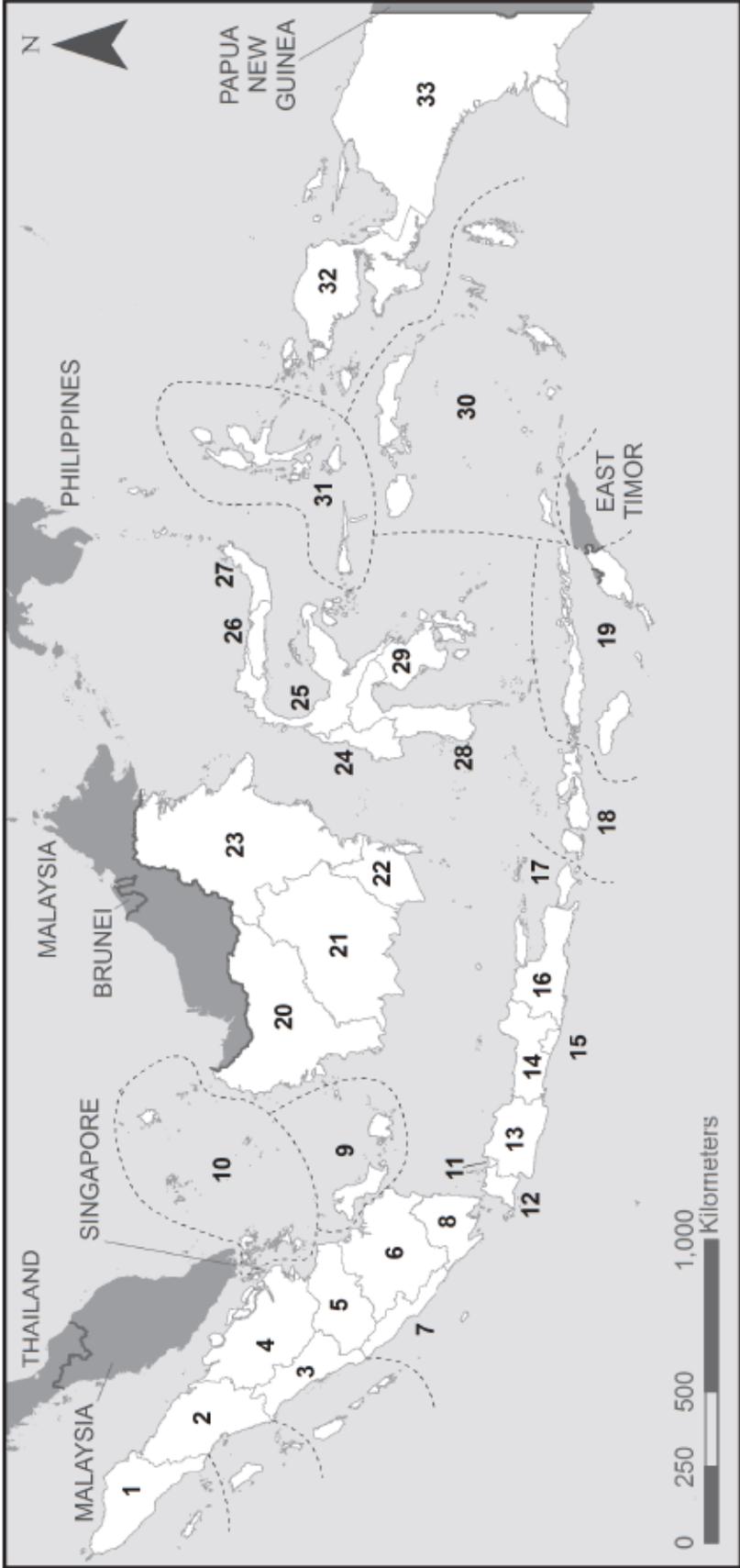
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Annex

Figure 4: Map of Indonesia with its Provinces (42).



- | | | | | | |
|----|-----------------|----|--------------------|----|--------------------|
| 1 | Aceh | 12 | Banten | 23 | East Kalimantan |
| 2 | North Sumatera | 13 | West Java | 24 | West Sulawesi |
| 3 | West Sumatera | 14 | Central Java | 25 | Central Sulawesi |
| 4 | Riau | 15 | DI Yogyakarta | 26 | Gorontalo |
| 5 | Jambi | 16 | East Java | 27 | North Sulawesi |
| 6 | South Sumatera | 17 | Bali | 28 | South Sulawesi |
| 7 | Bengkulu | 18 | West Nusa Tenggara | 29 | Southeast Sulawesi |
| 8 | Lampung | 19 | East Nusa Tenggara | 30 | Maluku |
| 9 | Bangka Belitung | 20 | West Kalimantan | 31 | North Maluku |
| 10 | Riau Islands | 21 | Central Kalimantan | 32 | West Papua |
| 11 | DKI Jakarta | 22 | South Kalimantan | 33 | Papua |

Table 2: Contingency tables with Pearson's Chi square Tests of associations between sociodemographic, behavioural and informational factors and the outcome (sexual intercourse) in N = 19,649 male and female unmarried, Indonesian adolescents aged 15 - 24 years. Presented with p-values and column percentages.

	Sexual Intercourse n (%)		p-value
	Yes	No	
Sociodemographic Factors			
Age			< 0.001
15 - 19 years	559 (37)	12,288 (68)	
20 - 24 years	968 (63)	5,834 (32)	
Sex			< 0.001
male	1,360 (89)	9,453 (52)	
female	167 (11)	8,669 (48)	
Wealth quintile of HH			< 0.001
Poorest	376 (25)	3,459 (19)	
Poorer	343 (22)	3,643 (20)	
Middle	306 (20)	3,718 (21)	
Richer	258 (17)	3,455 (19)	
Richest	244 (16)	3,847 (21)	
Residence			0.823
Urban	872 (57)	10,295 (57)	
Rural	655 (43)	7,827 (43)	
Highest educational level			< 0.001
Primary	203 (13)	1,804 (10)	
Junior High	284 (19)	4,316 (24)	
Senior High	709 (47)	8,958 (49)	
Academy	61 (4)	715 (4)	
University	270 (17)	2,284 (13)	
School attendance now ^a			< 0.001
Yes	472 (31)	9,959 (55)	
No	1,054 (69)	8,153 (45)	
Behavioural Factors			
Ever drank alcohol ^b			< 0.001
Yes	1,193 (78)	3,968 (22)	
No	332 (22)	14,137 (78)	
Currently smoking ^c			< 0.001
Yes	1,339 (89)	8,233 (46)	
No	167 (11)	9,806 (54)	
Ever used drugs ^d			< 0.001
Yes	222 (14)	276 (2)	
No	1,304 (86)	17,831 (98)	
Informational Factors			
Taught at school about HIV/ AIDS ^e			0.004
Yes	1,058 (70)	13,257 (73)	

No	429 (28)	4,461 (25)	
Don't know	34 (2)	334 (2)	
Taught at school about other STIs ^f			< 0.001
Yes	793 (52)	8,308 (46)	
No	679 (45)	9,037 (50)	
Don't know	48 (3)	701 (4)	
Taught at school about birth control methods ^g			0.124
Yes	381 (25)	4,201 (23)	
No	1,072 (70)	13,144 (73)	
Don't know	68 (5)	701 (4)	
Taught at school about human reproductive system ^h			< 0.001
Yes	1,179 (77)	14,972 (83)	
No	304 (20)	2,697 (15)	
Don't know	38 (3)	382 (2)	

^a Because of missing values, N for this variables is 19,638. ^b Because of missing values, N for this variables is 19,630. ^c Because of missing values, N for this variable is 19,545. ^d Because of missing values, N for this variable is 19,633. ^e Because of missing values, N for this variable is 19,573. ^f Because of missing values, N for this variable is 19,566. ^g Because of missing values, N for this variable is 19,567. ^h Because of missing values, N for this variable is 19,572.

Table 6: Crude and adjusted Odds Ratio (OR) with 95% Confidence Intervals (95% CI) displaying the association between sociodemographic factors and the outcome (engaging in sexual intercourse), stratified by age groups, in N = 19,649 male and female unmarried, Indonesian adolescents, aged 15 - 24 years.

	Younger adolescents (15 - 19 years)			Older adolescents (20 - 24 years)		
	Crude OR (95% CI)	AOR 1 (95% CI) ¹	AOR (95% CI) ²	Crude OR (95% CI)	AOR 1 (95% CI) ³	AOR 2 (95% CI) ⁴
Sex						
Female	1	1	1	1	1	1
Male	6.27 (4.94 - 8.06)	6.30 (4.95 - 8.12)	2.13 (1.52 - 3.01)	7.57 (6.10 - 9.51)	7.48 (5.99 - 9.45)	1.80 (1.32 - 2.47)
Wealth quintile of the HH						
Poorest	1	1	1	1	1	1
Poorer	0.84 (0.66 - 1.06)	0.77 (0.60 - 0.98)	0.73 (0.56 - 0.95)	0.76 (0.61 - 0.94)	0.80 (0.64 - 1.00)	0.84 (0.66 - 1.10)
Middle	0.69 (0.54 - 0.89)	0.63 (0.48 - 0.81)	0.61 (0.46 - 0.81)	0.60 (0.49 - 0.74)	0.61 (0.48 - 0.77)	0.58 (0.45 - 0.75)
Richer	0.59 (0.45 - 0.77)	0.52 (0.39 - 0.68)	0.50 (0.37 - 0.68)	0.58 (0.47 - 0.73)	0.63 (0.49 - 0.81)	0.61 (0.47 - 0.80)
Richest	0.46 (0.35 - 0.61)	0.42 (0.31 - 0.57)	0.39 (0.28 - 0.53)	0.49 (0.39 - 0.61)	0.55 (0.42 - 0.71)	0.52 (0.39 - 0.68)
Residence						
Urban	1	NA ^x	NA	1	1	1
Rural	1.14 (0.96 - 1.35)	NA	NA	1.17 (1.02 - 1.35)	0.86 (0.73 - 1.02)	0.98 (0.82 - 1.17)
Educational level						
Primary	1	1	1	1	1	1
Junior High	0.56 (0.42 - 0.77)	1.13 (0.82 - 1.56)	0.96 (0.67 - 1.38)	1.73 (0.84 - 1.38)	1.12 (0.87 - 1.45)	0.98 (0.72 - 1.32)
Senior High	0.75 (0.58 - 1.00)	2.30 (1.70 - 3.13)	1.73 (1.20 - 2.52)	0.97 (0.79 - 1.21)	1.23 (0.98 - 1.54)	1.09 (0.81 - 1.47)
Academy	1.16 (0.60 - 2.08)	7.72 (3.81 - 14.70)	4.29 (2.01 - 8.70)	0.47 (0.33 - 0.66)	1.12 (0.75 - 1.66)	1.00 (0.63 - 1.60)
University	1.04 (0.68 - 1.56)	6.35 (3.92 - 10.17)	3.72 (2.14 - 6.39)	0.72 (0.57 - 0.91)	1.43 (1.03 - 1.99)	1.20 (0.80 - 1.79)
School attendance now						
Yes	1	1	1	1	1	1
No	2.58 (2.17 - 3.06)	3.11 (2.56 - 3.79)	2.10 (1.70 - 2.60)	1.40 (1.20 - 1.65)	1.16 (0.90 - 1.50)	0.94 (0.71 - 1.23)

¹ In the AOR 1 for younger adolescents, it has been adjusted for the variables ‘sex’, ‘wealth’, ‘educational level’ and ‘school attendance now’. ² In the AOR 2 for younger adolescents, it has been adjusted for the variables ‘sex’, ‘wealth’, ‘educational level’, ‘school attendance now’, ‘ever drank alcohol’, ‘currently smoking’, ‘ever used drugs’, ‘taught at school about other STIs’ and ‘taught at school about the human reproductive system’. ³ In the AOR for older adolescents, it has been adjusted for the variables ‘sex’, ‘wealth’, ‘residence’, ‘educational level’ and ‘school attendance now’. ⁴ In the AOR 2 for older adolescents, it has been adjusted for the variables ‘sex’, ‘wealth’, ‘residence’, ‘educational level’, ‘school attendance now’, ‘ever drank alcohol’, ‘currently smoking’, ‘ever used drugs’, ‘taught at school about other STIs’ and ‘taught at school about the human reproductive system’. ^xNA = this variable was not included in the logistic generalized linear model, since it was neither significant in the crude OR nor in the Pearson’s Chi Square Test.

Table 7: Crude and adjusted Odds Ratio (OR) with 95% Confidence Intervals (95% CI) displaying the association between behavioural factors and the outcome (engaging in sexual intercourse), stratified by age groups, in N = 19,649 male and female unmarried, Indonesian adolescents, aged 15 - 24 years.

	Younger adolescents (15 - 19 years)			Older adolescents (20 - 24 years)		
	Crude OR (95% CI)	AOR 1 ¹ (95% CI)	AOR 2 ² (95% CI)	Crude OR (95% CI)	AOR 1 ³ (95% CI)	AOR 2 ⁴ (95% CI)
Ever drank alcohol						
Yes	1	1	1	1	1	1
No	0.09 (0.07 - 0.10)	0.16 (0.13 - 0.20)	0.19 (0.15 - 0.24)	0.10 (0.08 - 0.12)	0.17 (0.14 - 0.21)	0.18 (0.15 - 0.22)
Currently smoking						
Yes	1	1	1	1	1	1
No	0.13 (0.10 - 0.16)	0.34 (0.26 - 0.44)	0.55 (0.40 - 0.74)	0.11 (0.10 - 0.14)	0.32 (0.25 - 0.41)	0.46 (0.34 - 0.63)
Ever used drugs						
Yes	1	1	1	1	1	1
No	0.07 (0.05 - 0.10)	0.24 (0.18 - 0.34)	0.24 (0.17 - 0.34)	0.14 (0.11 - 0.18)	0.38 (0.30 - 0.49)	0.38 (0.29 - 0.49)

¹ In the AOR 1 for younger adolescents, it has been adjusted for the variables ‘ever drank alcohol’, ‘currently smoking’ and ‘ever used drugs’. ² In the AOR 2 for younger adolescents, it has been adjusted for the variables ‘sex’, ‘wealth’, ‘educational level’, ‘school attendance now’, ‘ever drank alcohol’, ‘currently smoking’, ‘ever used drugs’, ‘taught at school about other STIs’ and ‘taught at school about the human reproductive system’. ³ In the AOR 1 for older adolescents, it has been adjusted for the variables ‘ever drank alcohol’, ‘currently smoking’ and ‘ever used drugs’. ⁴ In the AOR 2 for older adolescents, it has been adjusted for the variables ‘sex’, ‘wealth’, ‘residence’, ‘educational level’, ‘school attendance now’, ‘ever drank alcohol’, ‘currently smoking’, ‘ever used drugs’, ‘taught at school about other STIs’ and ‘taught at school about the human reproductive system’.

Table 8: Crude and adjusted Odds Ratio (OR) with 95% Confidence Intervals (95% CI) displaying the association between informational factors and the outcome (engaging in sexual intercourse), stratified by age groups, in N = 19,649 male and female unmarried, Indonesian adolescents, aged 15 - 24 years.

	Younger adolescents (15 - 19 years)			Older adolescents (20 - 24 years)		
	Crude OR (95% CI)	AOR 1 ¹ (95% CI)	AOR 2 ² (95% CI)	Crude OR (95% CI)	AOR 1 ³ (95% CI)	AOR 2 ⁴ (95% CI)
Taught at school about HIV/ AIDS						
Yes	1	NA ⁵	NA	1	NA	NA
No	1.15 (0.94 - 1.39)	NA	NA	1.16 (0.99 - 1.34)	NA	NA
Don't know	1.16 (0.59 - 2.04)	NA	NA	1.24 (0.77 - 1.91)	NA	NA
Taught at school about other STIs						
Yes	1	1	1	1	1	1
No	0.78 (0.66 - 0.93)	0.69 (0.57 - 0.83)	0.82 (0.66 - 1.01)	0.79 (0.69 - 0.91)	0.69 (0.58 - 0.80)	0.73 (0.61 - 0.87)
Don't know	0.61 (0.34 - 1.00)	0.49 (0.26 - 0.84)	0.50 (0.27 - 0.90)	0.78 (0.52 - 1.12)	0.74 (0.48 - 1.10)	0.81 (0.50 - 1.28)
Taught at school about birth control methods						
Yes	1	NA	NA	1	NA	NA
No	0.83 (0.68 - 1.02)	NA	NA	1.15 (0.98 - 1.35)	NA	NA
Don't know	0.87 (0.52 - 1.38)	NA	NA	1.21 (0.86 - 1.68)	NA	NA
Taught at school about human reproductive system						
Yes	1	1	1	1	1	1
No	1.38 (1.10 - 1.71)	1.63 (1.28 - 2.07)	1.06 (0.79 - 1.41)	1.32 (1.11 - 1.56)	1.58 (1.31 - 1.90)	1.20 (0.94 - 1.52)
Don't know	1.40 (0.76 - 2.38)	1.94 (1.00 - 3.48)	1.05 (0.51 - 2.01)	0.95 (0.61 - 1.44)	1.10 (0.68 - 1.75)	0.84 (0.49 - 1.40)

¹ In the AOR 1 for younger adolescents, it has been adjusted for the variables 'taught at school about other STIs' and 'taught at school about the human reproductive system'. ² In the AOR 2 for younger adolescents, it has been adjusted for the variables 'sex', 'wealth', 'educational level', 'school attendance now', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about other STIs' and 'taught at school about the human reproductive system'. ³ In the AOR 1 for older adolescents, it has been adjusted for the variables 'taught at school about other STIs' and 'taught at school about the human reproductive system'. ⁴ In the AOR 2 for older adolescents, it has been adjusted for the variables 'sex', 'wealth', 'residence', 'educational level', 'school attendance now', 'ever drank alcohol', 'currently smoking', 'ever used drugs', 'taught at school about other STIs' and 'taught at school about the human reproductive system'. ⁵ NA = this variable was not included in the logistic generalized linear model, since it was neither significant in the crude OR nor in the Pearson's Chi Square Test.

Table 9: Prevalence of Variables (n, %) within the subsample of male and female, unmarried, Indonesian adolescents, aged 15 - 24 years, who never went to school (N = 144). Presented with rounded column percentages.

	n (%)	Missing values (n)
Sociodemographic Factors		
Age		0
15 - 19	83 (58)	
20 - 24	61 (42)	
Sex		0
Female	66 (46)	
Male	78 (54)	
Wealth quintile of HH		0
Poorest	99 (69)	
Poorer	16 (11)	
Middle	12 (8)	
Richer	7 (5)	
Richest	10 (7)	
Residence		0
Urban	38 (26)	
Rural	106 (74)	
Engaged in Sexual Intercourse		0
Yes	14 (10)	
No	130 (90)	
Ever went to school		0
Yes	144 (100)	
No	0 (0)	
Behavioural Factors		
Ever drank alcohol		0
Yes	25 (17)	
No	119 (83)	
Currently smoking		6
Yes	63 (46)	
No	75 (54)	
Ever used drugs		1
Yes	1 (0) ¹	
No	142 (100)	

¹ Due to rounding of the percentages, this value is now 0%, originally it was 0.7%.

Table 10: Contingency tables with Pearson's Chi square Tests of associations between sociodemographic and behavioural factors and the outcome (sexual intercourse) in N = 144 male and female unmarried, Indonesian adolescents, aged 15 - 24 years, who never went to school. Presented with p-values and column percentages.

	Sexual Intercourse n (%)		p-value
	Yes	No	
Sociodemographic Factors			
			0.272
Age			
15 - 19 years	10 (71)	73 (56)	
20 - 24 years	4 (29)	57 (44)	
Sex			0.814
male	8 (57)	70 (54)	
Female	6 (43)	60 (46)	
Wealth quintile of HH			0.378
Poorest	9 (64)	90 (69)	
Poorer	1 (7)	15 (12)	
Middle	3 (21)	9 (7)	
Richer	0 (0)	7 (5)	
Richest	1 (7)	9 (7)	
Residence			0.035
Urban	7 (50)	31 (24)	
Rural	7 (50)	99 (76)	
Behavioural Factors			
			< 0.001
Ever drank alcohol			
Yes	7 (50)	18 (14)	
No	7 (50)	112 (86)	
Currently smoking ^a			0.024
Yes	8 (80)	55 (43)	
No	2 (20)	73 (57)	
Ever used drugs ^b			0.751
Yes	0 (0)	1 (1)	
No	13 (100)	129 (99)	

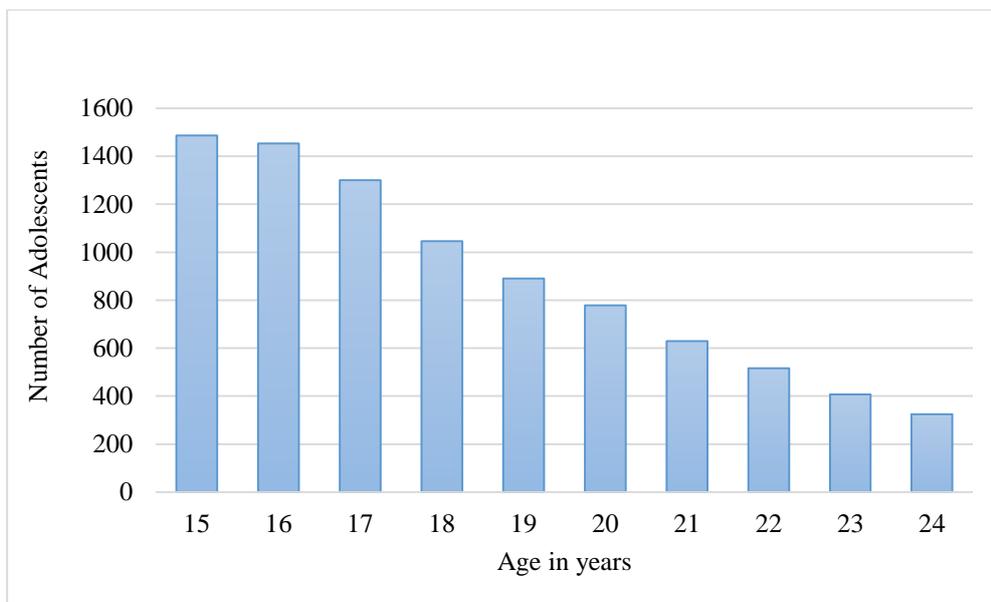
^aDue to missing values, N for this variables is 138. ^bDue to missing values, N for this variable is 143.

Table 11: Crude and adjusted Odds Ratios (OR) with 95% Confidence Intervals (95% CI) displaying the associations between the predictors ‘residence’, ‘ever drank alcohol’, ‘currently smoking’ and the outcome (engaging in sexual intercourse) in N = 144 male and female unmarried, Indonesian adolescents, aged 15 - 24, who never went to school.

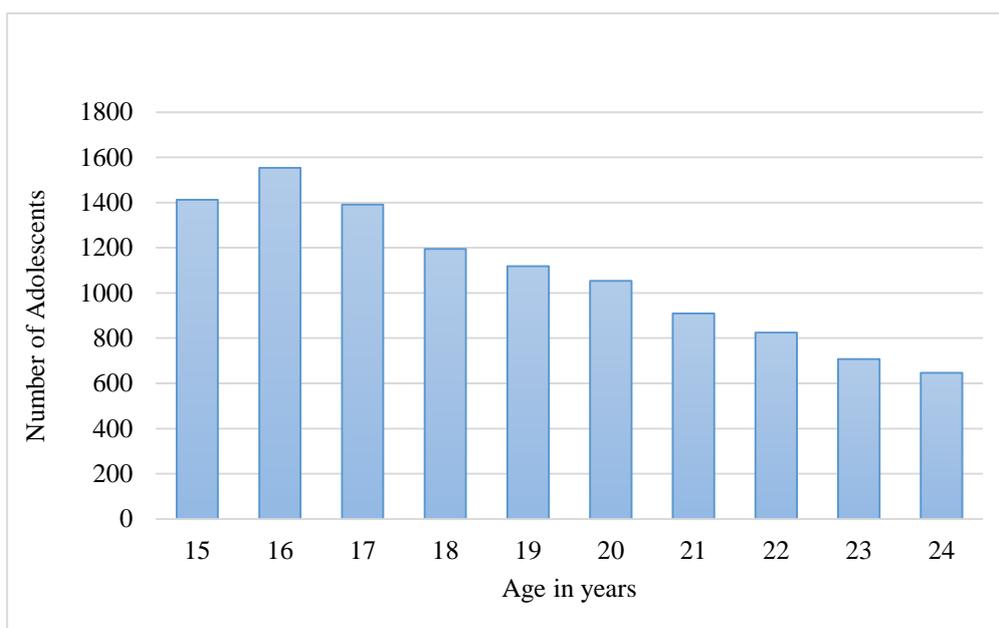
	Crude OR¹ (95% CI)	AOR² (95% CI)¹
Sociodemographic Factors		
Residence		
Urban	1	1
Rural	0.31 (0.10 - 0.98)	0.34 (0.08 - 1.44)
Behavioural Factors		
Ever drank alcohol		
Yes	1	1
No	0.16 (0.05 - 0.52)	0.11 (0.01 - 0.56)
Currently smoking		
Yes	1	1
No	0.19 (0.03 - 0.79)	0.71 (0.08 - 6.44)

¹ In the crude OR, the significant variables from the Pearson’s Chi Square Test (see table 10) were tested in a logistic regression.

² In the adjusted AOR, it has been adjusted for the variables ‘residence’, ‘ever drank alcohol’ and ‘currently smoking’, which were significant in the Pearson’s Chi Square Test (see table 10).



Graph 1: Distribution of age in female unmarried, Indonesian adolescents, aged 15 - 24.



Graph 2: Distribution of age in male unmarried, Indonesian adolescents, aged 15 - 24.