ORIGINAL ARTICLE

The Role of Education and Demographic Factors in Condom Use among Male Drug Users in Malaysia

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ABSTRACT

Introduction: The rising prevalence of human immunodeficiency virus (HIV) among people who inject drugs is a major public health issue. This study intends to explore education and demographic correlates of use of condoms among male drug users in Malaysia. **Methods:** Data were extracted from the Integrated Biological and Behavioral Surveillance Survey 2017. Pearson's chi-square tests and a logistic regression were used to examine the associations between condom use and education, and demographic factors. **Results:** Only a small proportion of drug users used condoms (25.7%). Educational backgrounds, age, ethnicity and marital status were associated with condom use. The likelihood of using condoms was lower among less educated drug users (aOR: 0.308–0.339). There was an interaction effect of education and age on condom use (aOR: 0.116–0.308). Chinese (aOR: 3.117) and those of other ethnicities (aOR: 2.934) were more likely to use condoms when compared with Malays. Being married (aOR: 0.291) or divorced/widowed (aOR: 0.346) was associated with reduced odds of using condoms. **Conclusion:** Education and demographic factors play an important role in influencing the decisions of Malaysian drug users to use condoms. Therefore, HIV-preventive measures targeting drug users could benefit by paying special attention to these factors.
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INTRODUCTION

The spread of human immunodeficiency virus (HIV) is one of the serious public health problems. To date, HIV has accounted for about 36.3 million mortalities worldwide (1). In 2020, nearly seven hundred thousand people passed away due to HIV, and around 37.7 million were living with it (1). In Malaysia, the first HIV case was reported in 1986. Since then, HIV incidence had been increasing steadily. The latest report shows that at least 87041 Malaysian people were living with HIV in 2018, but only 55% received antiretroviral treatment (2). Until 2018, the cumulative cases of HIV and HIV-related deaths were 118883 and 43843, respectively (2). In terms of economic costs, the recent data show that the Malaysian government spends around Ringgit Malaysia (RM) 90 million on HIV every year, and this amount is considered high for a middle-income country (2).

It is clearly evident that condom use is the most effective method of preventing HIV (3). Therefore, promotion of use of condoms could be seen as an effective intervention measure directed towards reducing the incidence of HIV. Drug users, especially males are the high-risk populations because of their needle-sharing behaviours and inconsistent use of condoms (4, 5). This is one of the reasons why drug users are often the focus population of public health policymakers. In Malaysia, approximately 156000 drug users were observed in 2017, and more than one-third (38.9%) were diagnosed with HIV (2, 6). Numerous empirical studies consistently found that a large proportion of drug users seldom used condoms (5,7-9).

Education is an important protective factor for risky health behaviours because it enhances health knowledge and interpreting skills, thereby increasing productive and allocative efficiencies in health improvements (10). Furthermore, education could lower the rate of time preference. This means that people who invest more in education tend to be more future oriented than those who invest less and consequently are less likely to indulge in

unhealthy behaviours (11). Since non-use of condoms is a high-risk behaviour, the present study anticipates that education can increase drug users' intention to use condoms. Previous studies examined factors associated with condom use and found that the likelihood of using condoms was higher among more educated than less-educated people (7, 12-15).

In addition to education, various demographic factors have been found to be associated with condom use. These include age, marital status, and ethnicity. Zhao et al. (16), using Chinese data, found that older drug users were less likely to use condoms when compared with their younger counterparts because they had a larger social circle. This negative relationship between age and use of condoms was also evidenced by Anderson et al. (17), who devoted their attention to adults in the United States (US). With regard to marital status, Semple et al. (18) used a multiple theories model and found the likelihood of using condoms to be higher among unmarried drug users than the married. Similar findings were observed by Zhao et al. (16). Although the association between ethnicity and condom use was not widely explored in the past, it was given attention by Rosengard et al. (8). Based on the US data, the authors found that White race was correlated with reduced odds of using condoms. This finding was shared by Anderson et al. (17), who found condom use to be more frequent among Blacks than Whites.

Despite the important role of education in risky health behaviours, little is known about the relationship between education and condom use behaviours among drug users in Malaysia. Previous studies often devoted their attention to countries with high economic performance, such as the US and China, where data were widely available (5, 9, 12, 16, 19, 20). The objective of the present study is to narrow this research void by examining the influences of education as well as demographic factors on condom use with a focus on male drug users. Given that education could affect the decisions of people to indulge in risky health behaviours, it is worth our while to gain insights into the relationship between education and use of condoms.

One of the contributions of the present study is the novelty of the population. The country of interest is a fast-growing developing country, Malaysia, where HIV issue is alarming, and studies related to condom use among drug users are lacking. Although demographic correlates of condom use among drug users have been explored from other areas (8, 16-18), less is known specifically about the population in Malaysia. Furthermore, we utilize a large sample of Malaysian drug users for in-depth analyses. Hence, our findings are important in the context of dealing with non-use of condoms among drug users in Malaysia.

Inclusion of an ethnic variable is another contribution. Malaysia is best known for its multi-ethnic population. Hence, the present study includes an ethnic variable, which consists of Malay, Chinese and Indian, in the analyses in addition to educational and demographic variables. This allows a novel investigation of the effect of ethnicity on condom use, especially in view of the fact that each ethnic group has its own religion and culture. Past studies often ignored the ethnic variable because of the homogenous characteristics of their target populations (12, 13, 19). Taken together, the present study hypothesizes significant relationships to exist between use of condoms and educational, demographic, and ethnic factors.

Last but not least, the present study explores the interaction effect of age and education on condom use. We anticipate that age moderates the relationship between education and use of condoms because exposure to HIV related information may vary across years of schooling. It is plausible that high educational levels cause the likelihood of using condoms to increase more for older drug users than younger drug users. Findings on this interaction are potential considerations when planning interventions and conducting research.

MATERIALS AND METHODS

Data

Data extracted from the Integrated Biological and Behavioral Surveillance Survey (IBBS) 2017 were used for secondary analyses (21). The IBBS 2017 is the latest nationwide survey conducted by the Ministry of Health Malaysia. Its objective is to provide policymakers and researchers with detailed information about HIV and risk behaviours among males who injected drugs, female sex workers and gender minorities. The survey period was between March and June 2017. A respondent driven sampling approach, that is, a type of snowball sampling, was adopted as the targeted respondents were the hard-to-reach populations and there was no clear sampling frame. In this approach, a link-tracing network sampling was used to collect data. This sampling utilised a social structure to enlarge the sample size.

In the survey, the initial respondents were asked to recommend their peers as potential respondents. Then, their peers referred other peers. As a result, there were several waves in the survey. In each selected survey setting, approximately three to five initial respondents were identified, and two of which were used to kick-start the recruitment chain. Initial respondents had to be reidentified if the recruitment process stopped or slowed down. The population of interest of the present study, male drug users, was adult males aged 18 years or above who had been injecting drugs for the past six months.

Prior to interviews, recruited respondents were screened. Those who met the exclusion criteria were rejected. The exclusion criteria were: 1) those who were unable to

understand the languages used by the interviewers; and 2) staff and research team members of the IBBS 2017. The initial respondents were provided with three coupons and incentives to gather the first wave of respondents from their networks. Then, respondents in each wave enrolled respondents in the next wave until the targeted sample size was obtained. Sample size calculation was based on the formula of simple random sampling. In particular, the sample size was calculated in light of the expected prevalence of HIV among drug users (18%) with 4% confidence limit and 95% confidence interval. This was then adjusted to the estimated population size (N = 170000) and design effect of 4. The targeted sample size was 1416 drug users, but only 1413 were interviewed. This was equivalent to a response rate of 99.8%.

The questionnaires were designed based on the Family Health International Guidelines for Repeated Behavioural Surveys in Population at Risk of HIV. They were prepared in Malay language and translated to English. A backward translation was conducted by a professional translator. Nevertheless, the interviewers were allowed to use languages other than English and Malay to interview the respondents. Informed consent was obtained from the respondents before conducting the interviews. Those who did not give consent were not allowed to take part. Ethical approval was sought from the National Research Committee of Malaysia (NMRR-17-998-33876).

Dependent variable

The dependent variable of the present study, use of condoms, was formatted as a categorical variable with a binary outcome (yes vs. no), indicating whether respondents used condoms during their last sex. In the interviews, respondents were asked to report their sexual behaviours: 'Have you ever had sex?' Those who answered 'yes' were then asked: 'Did you use condoms during the last sex?' The possible answers were 'yes' and 'no'.

Independent variables

The independent variables used in the present study consisted of educational and demographic variables (i.e., age, income, ethnicity, marital status, and employment status). These variables were selected in light of the findings from previous studies related to condom use as well as the availability of data (9, 12, 16, 22). The educational variable was segmented into three levels: primary, secondary and tertiary. Respondents reported their educational backgrounds when asked 'What is your highest academic qualification?' They responded with 'primary school', 'secondary school' or 'tertiary education'.

Respondents' age was grouped into four categories: ≤29, 30–39, 40–49 and ≥50 years. Respondents' monthly incomes (in RM) was segmented into five categories: ≤RM 499, RM 500–999, RM 1000–1499, RM 1500–1999 and ≥RM 2000. The present study categorised respondents' ethnicities into four groups: Malay, Chinese, Indian and other ethnicities (others). The three main ethnic groups in Malaysia are Malay, Chinese and Indian. Other ethnic groups consist of Iban, Kadazan Dusun, Bajau and Bidayuh. The survey asked respondents about their marital status: 'What is your current marital status?' The possible answers were 'single', 'married' and 'divorced/widowed'. Respondents' employment status was identified based on a question: 'What is your source of income in the past one month?' Those who answered 'student', 'unemployed' or 'retiree' were classified as the unemployed.

Statistical analyses

Out of the 1413 drug users, 1212 (85.8%) had ever had sex and were used in the statistical analyses. Before conducting multivariate analyses, descriptive statistics of all the variables were calculated. Then, Pearson's chi-square tests of independence were employed to examine education and demographic correlates of condom use. In terms of multivariate analyses, we used a binary logistic regression to regress condom use on education and demographic variables. Since all the independent variables were categorical, they were dummy coded before estimating the regression. An interaction term of education (primary-level) and age (≥50 years) was included in the regression to examine the interaction effect of low-educational status and older age on condom use. We expected that age could moderate the relationship between education and the decisions to use condoms. Adjusted odds ratios (aORs) were presented and interpreted. For the interaction term, aORs were calculated based on the formulas given by Chen (23). The Tarone's test of homogeneity was then performed to evaluate whether the odds of using condoms are homogeneous or heterogeneous across educational levels while taking into consideration the age stratification. This was to ensure that the interaction term was valid. The goodness-of-fit of the regression was assessed using the Hosmer-Lemeshow (HL) test (24). Additionally, the link test developed by Pregibon (25) was used to detect model specification errors. Moreover, variance inflation factors (VIFs) of all the independent variables were calculated to diagnose possible multicollinearities. Significance level of $p<0.05$ was chosen. Stata statistical software was used (26).

While the sample used in the present study is non-probability sampling, it may not cause any serious statistical issues. First, the Pearson's chi-square test is a non-parametric test, thus it does not require the assumption about distribution of population. Second, according to the Central Limit Theorem, the distribution of a sample approximates a normal distribution when the sample size becomes large. Since the present study has a large sample size (n = 1212), the estimates generated from the regression tend to be accurate. Furthermore, the

regression does not have many independent variables, hence a sample size of more than one thousand is perfectly adequate.

RESULTS

Of all the respondents, only the minority used condom (25.7%). More than two-third of respondents had secondary-level education (80.1%), while only 17.9% and 2% had primary- and tertiary-level education, respectively. A large proportion of respondents aged 30–39 (37.5%) and 40–49 years (34.8%). About 37.7% of respondents had a monthly income of RM 500–999. The majority of drug users were Malays (88.5%), followed by Chinese (6%), Indians (3.9%) and others (1.6%). Single (44.9%) and employed (89.5%) respondents comprised a large proportion of the sample (Table I).

There were ethnic and marital status variations in the proportions of drug users who used condoms. Of all the ethnic groups, use of condoms was the most frequent among respondents of other ethnicities (47.4%), whilst the proportion of not using condoms was the highest among Malays (76.5%). In terms of marital status, single respondents had the highest use of condoms (37.5%), while married respondents had the lowest (14.7%) (Table II).

With regard to the Tarone's test of homogeneity, we were able to reject its null hypothesis ($p < 0.05$), thereby suggesting that the association between condom use and education is different across age groups. In other words, the interaction term of education and age was valid. The values of HL and link tests were insignificant ($p > 0.05$), indicating that the regression was a good fit and well-specified. Furthermore, VIFs of all the variables were less than 10, and this suggested that the multicollinearity was not an issue (27). Respondents with primary- and secondary-level education were 0.308 and 0.339 times as likely to use condoms, respectively, as those with tertiary-level education. Although the age variable was insignificant, the interaction term of education and age was significant. For respondents aged ≤29 years, those with primary-level education were 0.308 time as likely to use condoms as those with tertiary-level education. Among respondents aged ≥50 years, the odds ratio for those with primary-level education versus with tertiary-level education was 0.116. For Chinese and respondents of other ethnic groups, the odds of using condoms were 2.934–3.117 times as large as the odds for Malays using condoms. Married and divorced/widowed respondents were 0.291–0.346 times as likely to use condoms as those single (Table III).

Table I: Summary statistics of variables (n = 1212)

Variables	Frequency	Percent
Dependent variable		
Condom use		
Yes	311	25.7
No	901	74.3
Independent variables		
Education		
Primary	217	17.9
Secondary	971	80.1
Tertiary	24	2.0
Age (years)		
≤29	96	7.9
30–39	454	37.5
40–49	422	34.8
≥50	240	19.8
Income (RM)		
≤499	215	17.7
500–999	457	37.7
1000–1499	381	31.4
1500–1999	108	8.9
≥2000	51	4.2
Ethnicity		
Malay	1073	88.5
Chinese	73	6.0
Indian	47	3.9
Others	19	1.6
Marital status		
Single	544	44.9
Married	361	29.8
Divorced/widowed	307	25.3
Employment status		
Employed	1085	89.5
Unemployed	127	10.5

Source: IBBS 2017.

DISCUSSION

Using a large sample of drug users, the present study attempted to throw new light on the relationships between condom use and education, and demographic factors. Results of the present study showed that only a small proportion of drug users used condoms, but it was still higher than the prevalence of condom use among drug users in other countries, such as China (16). Factors that were associated with condom use included education, interaction of education and age, ethnicity, and marital status. However, income and employment status variables were found to have no significant effect on condom use.

Even though the prevalence of condom use did not vary across educational levels, the educational variable was positively associated with the likelihood of using condoms. Drug users with tertiary-level education were more likely to use condoms compared with their peers who had a primary- or secondary-level educational attainment. This is simply because education improves

Table II: Number and proportion of respondents who used and did not use condoms

Variables	Use of condoms (n = 311)		Non-use of condoms (n = 901)	
	Frequency	Percent	Frequency	Percent
Age (years)				
≤29	27	28.1	69	71.9
30–39	112	24.7	342	75.3
40–49	116	27.5	306	72.5
≥50	56	23.3	184	76.7
p-value		0.581		
Education				
Primary	53	24.4	164	75.6
Secondary	249	25.7	722	74.4
Tertiary	9	37.5	15	62.5
p-value		0.380		
Income (RM)				
≤499	62	28.8	153	71.2
500–999	121	26.5	336	73.5
1000–1499	92	24.2	289	75.9
1500–1999	26	24.1	82	75.9
≥2000	10	19.6	41	80.4
p-value		0.579		
Ethnicity				
Malay	252	23.5	821	76.5
Chinese	34	46.6	39	53.4
Indian	16	34.0	31	66.0
Others	9	47.4	10	52.6
p-value		<0.001		
Marital status				
Single	204	37.5	340	62.5
Married	53	14.7	308	85.3
Divorced/widowed	54	17.6	253	82.4
p-value		<0.001		
Employment status				
Employed	277	25.5	808	74.5
Unemployed	34	26.8	93	73.2
p-value		0.762		

Note: *p*-values for Pearson's chi-square tests of independence. Percent refers to row percentages. Significance level of $p<0.05$ is selected.
Source: IBBS 2017.

Table III: Correlates of education and demographic variables to condom use (n = 1212)

Variables	Coef.	Robust SE	aOR	95% CI	*p*
Constant	0.336	0.565	–	–	0.552
Education					
Primary	-1.177	0.491	0.308	0.118, 0.807	0.016
Secondary	-1.082	0.453	0.339	0.140, 0.823	0.017
Tertiary	Ref.	–	–	–	–
Age (years)					
≤29	Ref.	–	–	–	–
30–39	0.026	0.264	1.026	0.611, 1.723	0.921
40–49	0.254	0.269	1.289	0.761, 2.185	0.346
≥50	0.052	0.310	1.054	0.574, 1.935	0.866
Primary Ч ≥50	-0.977	0.440	–	–	0.026
aOR_1	–	–	0.308	–	–
aOR_2	–	–	0.116	–	–
Income (RM)					
≤499	Ref.	–	–	–	–
500–999	-0.153	0.231	0.858	0.546, 1.349	0.507
1000–1499	-0.281	0.242	0.755	0.470, 1.212	0.245
1500–1999	-0.211	0.317	0.810	0.435, 1.508	0.506
≥2000	-0.511	0.418	0.600	0.264, 1.360	0.221
Ethnicity					
Malay	Ref.	–	–	–	–
Chinese	1.137	0.296	3.117	1.743, 5.573	<0.001
Indian	0.594	0.333	1.812	0.994, 3.478	0.074
Others	1.076	0.515	2.934	1.069, 8.052	0.037
Marital status					
Single	Ref.	–	–	–	–
Married	-1.233	0.179	0.291	0.205, 0.414	<0.001
Divorced/widowed	-1.060	0.182	0.346	0.243, 0.495	<0.001
Employment status					
Employed	0.250	0.281	1.284	0.740, 2.227	0.373
Unemployed	Ref.	–	–	–	–
Tarone chi-squared			13.210		
p-value			0.004		
Hosmer-Lemeshow			13.700		
p-value			0.090		
Prediction squared			-0.168		
p-value			0.171		
Maximum VIF			8.640		

Note: SE refers to standard error. aOR refers to adjusted odds ratio. CI refers to confidence interval. VIF refers to variance inflation factor. Significance level of $p<0.05$ is selected.
Source: IBBS 2017.

health awareness and reduces the rate of time preference. This finding is consistent with our hypothesis and the evidence of previous studies on the correlation between education and condom use. For instance, Emerson et al. (28) used survey data of women in a jail in the Midwest and found that condom use was more frequent among those with post-secondary educational attainments relative to those who had a low educational level. In the Carribean context, the odds of using condoms were found to be higher among well-educated people living with HIV than those with a low educational background (14). Similar findings were evidenced by Costa Andrade et al. (15), who pointed out a positive correlation between educational levels and attitude towards condom use. Using Chinese data, Lau et al. (12) observed a low educational level to be a predictor of non-use of condoms among sex workers. Lagarde et al. (19) based their study on African data and found likewise. In light of the findings of the present study, health education is seen as an essential component in the promotion of condom use programmes.

There was an interaction effect of age and education on the likelihood of using condoms, although age was not independently associated with condom use. This outcome is dissimilar from previous findings, which showed a direct negative relationship age and condom use (16, 17). In particular, we found that high educational levels could increase the tendency to use condoms among young and old drug users. Moreover, the effect of education on condom use was larger in the older age group and smaller in the younger age group, which implied that education played a more important role in promoting condom use among older drug users. This is perhaps because exposure to information about safe sex and risk of HIV varies across years of schooling. Therefore, interventions that could provide older drug users with better health education may lead to a significant increase in the prevalence of condom use.

In terms of ethnicity, Malay drug users had a lower likelihood of using condoms when compared with their non-Malay peers. The prevalence of condom use in the Malay ethnic group was also the lowest. One may, therefore, suggest that there could be an unobservable third variable related to both ethnicity and condom use, and culture could be this third variable, especially given that HIV is a sensitive topic in Islam. Barmania and Aljunid (29) conducted in-depth qualitative research focusing on HIV prevention in Islam, that is, the main religion of Malays, and found that a small number of Muslims still could not accept condoms because they thought that the use of condoms was an immoral behaviour as it was associated with premarital or casual sexual activities. In the contexts of other countries, ethnic differences in condom use were also observed (13, 19). For instance, Rosengard et al. (8), using data from a health service research study, found that White drug users were less likely to use condoms than Blacks. Their finding was supported by Anderson et al. (17), who made use of household survey data in their research. Our findings stressed the importance of the ethnic factor in the formulation of any nationwide HIV prevention policies. Policymakers could make a concerted effort to promote use of condoms with special attention on Malay drug users. This includes organising various nationwide health awareness campaigns and inviting spokespersons from the Malay ethnic group to highlight and deliver information related to the importance of condoms in HIV prevention and family planning. In addition, the government can utilise various language-based mass media to provide important facts about condoms with the aim of demolishing the Malays' misconception that use of condom is only for casual sex. Given the availability of data in the future, a quantitative study could examine culture as a mediator of the relationship between ethnicity and condom use.

The prevalence and likelihood of using condoms were found to be higher among single drug users than those married. Studies elsewhere in the world shared similar outcomes. For example, Semple et al. (18), focusing on methamphetamine users in California, found unmarried individuals to be more likely to use condoms compared with their married counterparts. In Jiangsu, Zhao et al. (16) found that being single increased the odds of using condoms among drug users. Outcomes of the present study may be attributable to the common belief that it is less risky to have sex with a steady sex partner. There is also a possibility that married partners may plan for pregnancy. As evidenced by Anderson et al. (17), 'seeking pregnancy', 'only having sex with one person' and 'having not risky sex' are among the top reasons that discourage drug users from using condoms. Considering these findings, a HIV-control policy is urged to take drug users' marital status into consideration with a focus on the marrieds.

Of note, income and employment status were not significantly associated with condom use. An identical way to express this was to say that even though higher income and employed drug users had better financial capabilities to purchase condoms than their lower income and unemployed counterparts, they did not have a higher tendency to use them. This implies that the decisions of drug users to use condoms are not subject to their budget constraints, and that condoms cannot be seen as a normal good, according to the economic theories (30). To obtain a deeper understanding of the relationship between income and condom use, a future study can consider estimating the income elasticity of demand for condoms.

The limitations of the present study are several. First, some minor reporting errors were unavoidable. There was a possibility that Malay drug users under-reported condom use because premarital or casual sexual activities were prohibited in Islam. Second, no causality can be assumed due to the nature of the cross-sectional data. Third, data analysis was limited to males. Therefore, gender differences in condom use could not be explored. Last, while the data have a large sample size, they may not be generalizable due to snowball sampling. If more data are available, examining the interaction effects of demographic factors and health characteristics on condom use could be a direction for future research. Despite these limitations, the present study has numerous strengths: (i) To the best of our knowledge, this is one of the small handful of studies that investigate the relationships between condom use and education, and demographic factors among drug users. Additionally, the interaction between age and education was explored. (ii) A fast-growing developing country with a lack of study related to condom use is the scope of the present study. Furthermore, a large sample of drug users is utilised to generate insightful findings. (iii) Use of multi-ethnic population data to identify how an ethnic variable influences the decisions of drug users to use condoms.

CONCLUSION

The present study offers important insights into correlates of condom use behaviours. Education and demographic factors play a key role in influencing use of condoms among drug users. In particular, drug users are more likely to use condoms if they are better educated, non-Malays and single. There is also an interaction effect of education and age on condom use. More specifically, the positive association between educational levels and the likelihood of using condoms exists in different age groups, and it is stronger in older drug users and weaker in younger drug users. These findings provide public health administrators with detailed information about which groups of drug users to be focused on, thereby preventing the spread of HIV.

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