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24 July 2019

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Subject: Need correction for manuscript 914/19

Dear Dr. Najmah

Re: Article N0. 914/19: "The Role of Education, Occupation, Place of Residence, Marital and Socioeconomic Status on Hiv Knowledge Among Women of Childbearing Age in South Sumatra, Indonesia"

Thank you for submitting your manuscript to the Malaysian Journal of Public Health Medicine. We have reviewed your article and found it suitable for publication after making the editing suggested.

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EVALUATION FORM

914/18: THE ROLE OF EDUCATION, OCCUPATION, PLACE OF RESIDENCE, MARITAL AND SOCIOECONOMIC STATUS ON HIV KNOWLEDGE AMONG WOMEN OF CHILDBEARING AGE IN SOUTH SUMATRA, INDONESIA

Kindly fill in this form as accurate as possible. Thank you for your kind cooperation.

TOPIC/SECTION	ACCEPTABLE*	COMMENTS+
Title	X	**The title was too long, all significant variables write down in the title.** **It is not important to state secondary data and source of the data in title, write it in the methods, I suggest to use:** FACTORS INFLUENCING ON HIV KNOWLEDGE AMONG WOMEN OF CHILDBEARING AGE IN SOUTH SUMATRA, INDONESIA
Abstract	√	It is not common to use pValue only in result, add AOR and 95% CI for it. P<0.0001, p<0.05 looks odd with what looks like two pValues being reported. The author should report exact or keep to a standardized pValue reporting
Introduction	√	We found several redundant with same reference in introduction, such as : **About 40% of all new HIV-positive cases in the last five years in Indonesia were found among women, AND nearly four in every 10 new cases…and etc**
Methodology - Population - Sampling & Sample - Data Collection - Data Analysis - Definition	√	Put the information in title to the methods, especially in data collection. Statistical methods, we need to know the authors devided between high and low scores. It should be standardized across all indicators. How about cut off points, did the authors use something methods to cut it off, what is the justification? Indicator 1 should be independent of 2 to 4.
Results - Descriptive - Analytic / Hypothesis - Testing - Data Presentation = Tables, figures etc	√	It must be consistent to use dots or commas in number (tab 2); Age, year and mean 95% CI, re-write it Stratification of Knowledge Related to HIV in Table 1 move to the methods in data analysis section It was better to delete bivariate table (tab 4), and explain tab 5 in result
Discussion - Magnitude/Consist	X	Authors need more references. Health access is something should explain more. Supernatural beliefs were not included in analysis, but it is addressed in discussion. It should be a limitation because there may also

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SIGNATURE

ORIGINAL ARTICLE

~~THE ROLE OF EDUCATION, OCCUPATION, PLACE OF RESIDENCE, MARITAL AND SOCIOECONOMIC STATUS ON HIV KNOWLEDGE AMONG WOMEN OF CHILDBEARING AGE IN SOUTH SUMATRA, INDONESIA~~

(Secondary data analysis of Indonesian Demographic and Health Survey, 2012)

Commented [MP1]: FACTORS INFLUENCING ON HIV KNOWLEDGE AMONG WOMEN OF CHILDBEARING AGE IN SOUTH SUMATRA, INDONESIA

ABSTRACT

This study aims to provide detailed information on the role of the following social determinants (i.e. education, occupation, place of residence, marital and economic status) *in the acquisition of HIV knowledge among women* of childbearing age (15-49 years old). *The study uses secondary data from the 2012 Indonesian Demographic and Health Survey (IDHS). The IDHS used a quantitative analytical approach with a cross-sectional study design and multi-stage stratified sampling. The sample included 1,335 women aged 15 to 49 years old living in South Sumatra Province, Indonesia. Descriptive analysis, ANOVA, and t-test and multiple logistic regressions were performed in this study. The results show one out of two women have little HIV knowledge. The more highly educated women were positively associated with a greater degree of knowledge related to comprehensive knowledge related to HIV, HIV prevention, transmission from mother to child, HIV misconceptions and HIV services (P<0.0001, p<0.05). In addition, the women lived in urban areas had more knowledge related to HIV prevention and transmission, HIV tests, and myths about HIV compared to those who lived in rural areas (p<0.001, p<0.05). To conclude, education level was found to be the dominant factor associated with knowledge of HIV across all categories of knowledge after controlling by other determinants, age, marital status, working status and residence. HIV awareness and comprehensive HIV information among women who are considered to be in a low-risk group for HIV infection should be integrated with formal education as well as in maternal health services, particularly in rural areas.*

Commented [MP2]: P<0.0001, p<0.05 ? two

Keywords: *HIV/AIDS, Knowledge, Women of Childbearing Age, IDHS 2012*

INTRODUCTION

About 40% of all new HIV-positive cases in the last five years in Indonesia were found among women. Based on a 2017 MOH report, the number of HIV-positive women in Indonesia increased dramatically from 9,265 to 15,151 between 2011 and 2016[1]. In the last five years, **nearly four in**

every 10 new HIV cases have been women of childbearing age between 15-49 years old[1]. The number of HIV-positive pregnant women is predicted to increase from 15,517 or 0.38% of all pregnancies to nearly 20,000 cases (0.49% of pregnancies) between 2012 and 2016. Furthermore, it is predicted around 8,604 babies born with HIV will cost 42 billion Rupiah to care for[6]. Unfortunately, previous studies have found HIV-positive mothers in Indonesia typically find out about their HIV status long after they become infected, often when their children or husband becomes ill due to HIV/AIDS or when they are asked for a blood test during pregnancy[2,3,4].

Commented [MP3]: Redundant to first sentences with same reference

Social determinants of women's vulnerability to HIV include a range of social, economic and environmental factors, such as income, social status, education, violence, and sexual and cultural norms[5]. Previous studies in Indonesia by Angkasawati and Arifin (2010) and Iswanto (2011), using the 2007 National Basic Health Research (NBHR) and Indonesian Demographic and Health Survey (IDHS), proposed the following social determinants of HIV knowledge among women of childbearing age: education, marriage status, type of residence, working status and wealth [6,7]. Following those studies, the 2010 NBHR and the 2012 IDHS indicated that only 11.4% of the total of 91,433 women respondents and 12% of total of of 45,607 women surveyed respectively had comprehensive HIV/AIDS knowledge across 33 provinces[8,9,], an important determinant in HIV vulnerability. Understanding the social determinants that are associated with HIV knowledge among women of childbearing age (15-49 years old) therefore urgently need to be understood.

This article aims to provide detailed information on the roles of the following social determinants, namely, education level, occupation, residence, marital status, wealth index and age in the HIV knowledge acquisition among women of childbearing age in South Sumatra province of Indonesia. It draws data from the 2012 IDHS study. The level of HIV knowledge is divided into five parts: 1) comprehensive knowledge of HIV; 2) HIV prevention; 3) HIV misconceptions; 4) HIV transmission; and 5) HIV services. Findings from this article will contribute to the in-depth understanding of different levels of knowledge of HIV transmission, prevention, services, and misconceptions which can provide a framework for cost-effective and well-targeted health promotion relevant to specific social determinants and levels of HIV knowledge.

METHODOLOGY

Study Design and Sampling Procedure

This article utilises existing secondary data from IDHS-2012, which used a cross-sectional study design and multistage stratified sampling. Furthermore, to attain more accurate conclusions, complex sample design for this multi-stage sampling was used from the 2012 IDHS-. The South Sumatra sample was selected for our analysis and it included 1,355 women aged 15-49 years.

Data Collection Instruments and Data Collection Procedure

The survey questions used in the IDHS-2012 included knowledge about HIV/AIDS and variables related to selected social determinants, such as education level, occupation, residence, marital status, and age of women and their partners. Some variables were recoded including marital status, type of residence, education level and wealth index. All South Sumatra samples from the IDHS-2012 report were included in the data analysis. Three missing data were recoded into 'not known'.

Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of Medical Faculty of Sriwijaya University (No. 173/keprsmhfkunsri/2016). DHS is open sources data that can be accessed in http://dhsprogram.com/. DHS for Indonesia can be downloaded in http://dhsprogram.com/data/dataset/Indonesia_Special_2012.cfm?flag=0.

Data Processing and Analysis

Preliminary analysis was run using univariate analysis to examine the statistical properties (i.e. frequency, mean, max, min, standard deviation, or normal distribution of a particular variable). Mean and standard deviation are reported for numerical data, such as age, and frequency and proportion are reported for categorical variables, like questions of knowledge related to HIV and other variables related to the social determinants.

Questions related to knowledge of HIV were stratified based on previous studies[7,1011,12]. All questions in each category were scored "2" for a correct answer; "1" for an incorrect answer; and "0"for a 'do not know' answer and then calculated as total scores for each stratification. ANOVA and independent-

sample-test with 5% significance levels of alpha were performed to examine a mean difference in the total score of HIV knowledge across all social determinants. The results of the univariate analysis are presented in Tables 1 and 2, and bivariate analysis in Table 3. Then, a multiple logistic was performed by using a statistics software package (STATA) to find dominant variables associated with knowledge (dummy variables) (Table 4). A dummy variable of a comprehensive knowledge-indicator 1, was categorised as high and low level based on median of the total score, while the indicators 2 to 5 were categorized into high (all answers are correct) and low (only one or two correct answers).

Table 1 Stratification of Knowledge Related to HIV

Stratification of knowledge related to HIV		*Questions in IDHS-2012*
Indicator 1.	Comprehensive knowledge related to HIV	All questions from indicator 2-4
Indicator 2.	Knowledge of HIV prevention/transmission	Limiting numbers of sex partners, condom use and not using shared needle and syringe.
Indicator 3.	Knowledge of HIV misconceptions	Whether HIV is transmitted through mosquito bites, eating together with HIV positive person, supernatural power", and signs of people with HIV
Indicator 4.	Knowledge of mother-to-child transmission (MTCT)	Whether HIV can be transmitted through pregnancy, delivery and breastfeeding
Indicator 5.	Knowledge of HIV services	HIV test can be done by a blood test and whether they knew about voluntarily HIV/AIDS test and counselling (VCT) services

Note:
Adapted from Iswanto (2011), Husseini and Abu-Rmeilah (2007), Zainiddinov and Habibov (2016), Yaya et al (2016)- [7,10,11,12]

RESULTS

Women's education, occupation, residence, marital and economic status

Of the total 1,335 women surveyed, 67.85% (n=992) had heard about HIV, and they were selected for further analysis. Of those 992 women, 67.85% had completed at least secondary school and approximately one half lived in rural areas. Seventy-five percent of women were married and had poor to middle economic status. The average age of respondents was 31 years old (95% CI 30.44-31.22) (Table 2).

Table 2. Women's characteristics (n=922)

Variables	Category	Total (n=922)	Percentage (%)
Education level	Primary	227	24.59
	Secondary	546	59.21
	Higher	149	16.21
Occupation	Yes	532	57.74
	No	390	42.26
Residence	Urban	425	46.10
	Rural	497	53.90
Marital status	Not Married	214	23.23
	Married	687	74.53
	Ever Married/living together	21	2.24
Wealth index	Poorest	268	29.08
	Poorer	204	22.07

Middle	205	22.24
Richer	139	15.08
Richest	106	11.53
Age, year (Mean, 95% CI)	30,94 (30,44-31,33)	

Source: IDHS, 2012

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Knowledge about HIV

Table 3 includes different types of HIV related knowledge, including how HIV can be prevented, transmitted, diagnosed and tested. Comprehensive knowledge of HIV includes four groups of knowledge, including on HIV prevention, transmission, HIV testing services, and mother to child transmission. In summary, more than half of the childbearing aged women in this study knew how to prevent HIV transmission (i.e. limiting sexual partners, using condoms and not sharing needles or syringe); and about mother to child HIV transmission during pregnancy, delivery and breastfeeding. Of concern, however, only about 10% of these women knew about existing HIV testing and VCT (Voluntary and Counselling Test) services.

Table 3. Knowledge about HIV/AIDS

Knowledge related to HIV	Category	Total (n=922)	Percentage (%)
Comprehensive knowledge related to HIV	High	514	55.22%
Knowledge of HIV prevention (mean 4.6, SE 0.096)			
Limiting partners to do sexual intercourse to reduce the risk of HIV	Yes	655	72.6%
A person becomes less likely to be infected with HIV/AIDS by using condoms	Yes	475	52.7%
A person infected with HIV/AIDS because of using shared syringe and needle	Yes	823	91.3%
Knowledge of HIV Transmission from mother to children (mean 4.8, SE, 0.085)			
HIV can be transmitted during pregnancy	Yes	754	83.6%
HIV can be transmitted during a delivery/a labour	Yes	632	70.1%
HIV can be transmitted through breastfeeding	Yes	720	79.8%
Knowledge of HIV Test/Service (Mean 2.19, SE 0.02)			
Knowing someone is infected with HIV/AIDS by a blood test	Yes	94	10.5%
Having high self-awareness to do voluntarily HIV/AIDS test, followed by VCT, is expected to minimise the risk of HIV/AIDS	Yes	71	7.9%
Misconception related to HIV (mean 7.9, SE 0.095)			
Mosquito bites will not transmit HIV/AIDS	Yes	296	32.9%
Someone could be infected with HIV-positive by eating with the same plate with people with HIV/AIDS	Yes	416	46.1%
Someone could be infected HIV/AIDS through supernatural power	Yes	68	7.5%
People seem to be healthy can be affected by HIV/AIDS	Yes	698	77.4%
Physical changes can help to recognise HIV-positive person	Yes	274	30.4%

Behaviour changes might help to recognise HIV-positive person	Yes	34	3.8%

Source: IDHS, 2012

HIV All determinants were associated with having heard of HIV among the women, except working status (Table 4). Marriage status and age were not associated significantly with having heard about HIV (Table 5). Some stratification of knowledge related to HIV in this study includes the following parts.

1. Comprehensive knowledge related to HIV

Comprehensive knowledge of women comprises of women's understanding of how HIV can be transmitted, prevented, diagnosed and tested. About 55.22% of the 922 respondents had comprehensive knowledge of HIV (Table 2). Education, working status, and urban-rural residence were associated with having comprehensive knowledge after controlling possible confounders (Table 5).

2. Knowledge of HIV prevention and transmission

The majority of participants were aware of ways to prevent HIV transmission by limiting sexual partners and not sharing needles or syringes, and 52.7% knew that condoms could lower the risk of HIV transmission (Table 2). In the final logistic model, the women who had higher education, lived in urban areas and were employed had a better understanding of HIV prevention and transmission than those with lower education, lived in rural areas and were not employed (Table 5).

3. Knowledge of HIV misconceptions

Overall, the majority of the women had a low misconception about HIV transmission through a supernatural power and HIV person cannot be recognised through behaviour change. In addition, one to two in every four women believed that HIV could be transmitted by sharing food with HIV- positive persons from the same plate and they could identify someone as HIV positive from the person's physical appearance or health conditions (Table 2). Interestingly, about 70% of them believed that HIV could be transmitted through mosquito bites (Table 2). After controlling for the urban-rural residence and age, education level were the major social determinants associated with the women's HIV misconceptions (Table 5).

4. Knowledge of mother-to-child transmission (MTCT)

Up to 85% of the respondents knew that HIV can be transmitted during pregnancy, delivery/labour and breastfeeding (Table 4). Women with a higher education level and living in an urban area (AOR 3.2, 95 % CI 1.8-5.5) had a higher degree of knowledge related to MTCT transmission compared to those with a lower education level and living in a rural area after controlling their marital and employment status (Table 5).

5. Knowledge of HIV testing

Few women knew that HIV can be detected by doing a blood test. Less than 10% of them knew that free HIV testing was available through the Voluntary Counselling Testing (VCT) services (Table 3). Women who had higher education levels and those who were older (AOR 1.03, 95% CI 1.01-1.05) were more likely to know about HIV test and counselling (Table 5).

Table 4 Bivariate analysis of determinants of knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		OR (95% CI)	OR (95 % CI)	MD (SE)	MD (SE)	MD (SE)	MD (SE)
Education level (Primary as ref)	Secondary	5.6 (4.2-7.4)***	1.5 (1.1-2.2)***	0.7 (0.2)***	0.7 (0.1)***	0.2 (0.1)*	0.1 (0.02)**
	Higher	97.8 (23.4-409)***	3.8 (2.3-6.2)***	1.3 (0.1)***	1.6 (0.2)***	0.9 (0.1)***	0.3 (0.1)***
Working status (Unemployed as ref)	Yes	(0.7-1.3)*	1.5 (1.1-2.1)***	0.3 (0.1)**	0.3 (0.1)**	0.2 (0.1)*	0.05(0.03)*
Residence (Rural as ref)	Urban	5.1 (3.2-8.1)***	1.7 (1.2-2.4)***	0.7 (0.1)***	0.8 (0.1)***	0.6 (0.1)***	0.1 (0.03)**
Marital status (ever married/living together as ref)	Not married	2.9 (1.3-6.5)**	0.7 (0.3-1.9)*	0.01(0.1)*	0.2 (0.1)*	-0.5 (0.1)*	-0.1 (0.03)*
	Married	1.5 (0.7-3.0)*	0.9 (0.3-2.3)*	0.1 (0.1)*	-0.2 (0.1)*	-0.2 (0.1)*	-0.1 (0.02)*
Wealth index (Richest as ref)	Poorest	12.9 (7.9-21.0)***	1.5 (0.9-2.5)*	0.2(0.1)*	0.4 (0.1)*	0.1 (0.1)*	0.1 (0.03)*
	Poorer	3.6 (2.5-5.0) ***	1.4 (0.8-2.4)*	-0.003(0.1)*	0.2(0.2)*	0.1 (0.2)*	0.03(0.04)*
	Middle	3.7 (2.6-5.3) ***	1.2 (0.7-1.9)*	0.041 (0.1)*	0.2 (0.1)*	0.4 (0.1) *	0.05 (0.04)*
	Richer	1.8 (1.2-2.5) ***	1.2 (0.7-2.1)*	0.08 (0.2)*	0.1 (0.2)*	0.2 (0.2) *	0.08 (0.04) *
Age of reproductive women (mean difference, SE)		-0.02 (-0.03,0.005)***	0.01 (-0.01, 0.02)*	0.001 (-0.01)-0.01)*	-0.003 (-0.02)-0.01))*	0.01 (0.001-0.03)**	0.003 (-0.001)-0.007))*

Source: IDHS, 2012

*Note: significancy=***p value < 0.001; ** p value > 0.001 and< 0.05; *p value > 0.05; MD=mean difference; OR=odds ratio*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

Table 5 Logistic Regression Model for social determinants of HIV knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Education level (Primary as ref)	Secondary	*4.8 (3.4-6.7)****	*1.6(1.1-2.3)***	*2.5 (1.3-4.8)****	1.7 (0.9-3.4)*	*1.4 (0.9-2.3)**	*1.9 (1.0-3.8)***
	Higher	*72.6 (17.3-304.6)****	*3.7(2.2-6.2)****	*16.6(1.8-153.9)***	5.1(1.1-23.1)**	*11.1(3.3-36.9)****	*5.7(2.8-11.4)****
Working status (Unemployed as ref)	Yes	-	1.5(1-2.1)*	-	-	1.4 (0.9-2.1)*	-
Residence (Rural as ref)	Urban	*3.2 (2.1-5.1)****	-	*3.36 (1.8-6.2)****	1.4 (0.7-2.8)*	*3.2 (1.8-5.5)****	*1.6 (1.0-2.5)***
Marital status (ever married/living together as ref)	Not married	0.8 (0.2-2.4)*	0.5(0.2-1.5)*	0.9 (0.2-4.1)*	-	0.4 (0.1-1.8)*	-
	Married	1.3 (0.5-3.7)*	0.8(0.3- 2.3)*	1.9 (0.5-7.7)*	-	0.7 (0.1-3.)*	-
Wealth index (Richest as ref)	Poorest	*12.5 (7.6-20.6)****	-	-	-	-	-
	Poorer	*3.7 (2.5-5.4)****	-	-	-	-	-
	Middle	*3.7 (2.5-5.3)****	-	-	-	-	-
	Richer	*1.7 (1.1-2.7)****	-	-	-	-	-
Age of reproductive women (mean difference, SE)		0.99 (0.97-1.01)*	*0.9(0.9-1)**	-	0.98 (0.94-1.02)*	-	*1.03 (1.01-1.05)***

Source: IDHS, 2012

*Note:***p value < 0.001; ** p value > 0.001 and< 0.05; *p value >= 0.05; AOR=Adjusted Odds Ratio; ; CI=Confidence Interval*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

DISCUSSION

Women of childbearing age are considered as a 'bridge' in the HIV epidemic from low-risk to high-risk groups such as injecting drug users, men having sex with men, female sex workers, and transgender in Indonesia[2]. Hence, the enhancement of HIV knowledge related to HIV prevention, transmission and testing is urgently needed among women of childbearing age in Indonesia. Compared with two previous national surveys in Indonesia[8,13], this study showed a significant increase of HIV comprehensive knowledge in women of childbearing age by about fivefold. The last two surveys in 2007 and 2008 respectively, showed only 9% and 11% of women respectively had HIV comprehensive knowledge. In this study more than 50% women had acquired HIV comprehensive knowledge. Of note however, different cut-off points of categorisation of a comprehensive level of knowledge might lead to these differences.

Although an increased knowledge of MTCT transmission was found in this study compared with the previous surveys[8,13], only one in nine women knew about fee HIV testing and counselling services. Half of the women knew about condom use to prevent HIV, but this finding may suggest inadequate condom use in childbearing age women in South Sumatra. An absence of a government intervention to halt MTCT would increase the transmission of HIV by as much as 15-50%[14,15]. Therefore, quick implementation of Indonesia's Ministry of Health Regulation Number 43 (2016) that recommends that people with at least one of the risk factors of HIV become involved in relevant treatments like VCT and Prevention MTCT services, including HIV screening among pregnant women[16]. We have to stop assuming that women are a low-risk[3,17,18].

Of concern, women's misconception of HIV is still rampant. More than half of the women still believe that HIV can be transmitted by mosquito's bites and sharing foods in the same plate with HIV-positive persons. One of nine women believe that HIV can be transmitted through supernatural power. Similar findings were reported in IDHS 2007 and 2012 in 33 provinces[9,13]. A similar finding was also recently reported in similar national surveys conducted in Bangladesh and Cambodia[12,19]. A study by Yaya and colleagues (2016) also found that about one fifth women in Bangladesh believed that HIV could be caused by witchcraft or supernatural powers and about half of them believed that HIV can be transmitted by mosquito bites or sharing food from the same plate with HIV-positive persons[12]. A Cambodian Demographic and Health Survey in 2005 found that compared to their peers in Indonesia and Bangladesh, Cambodian women have a slightly better understanding about HIV misconceptions[19].

Our findings strongly suggest that, after controlling for possible confounders, education, employment status, and urban-rural residence are associated with having comprehensive HIV knowledge (Table 5). This finding concurs with other findings reported by Angkasawati (2007)[6], Yaya et al. (2016)[12] and Hong et al.[19] Unlike that reported by Yaya and colleagues, whereby being married was associated with having increased knowledge, our study did not support such association. In Iswanto's study (2011), the education level of both women and their husbands were related to the level of HIV knowledge. Men tend to have better HIV related knowledge compared to women[20,21]. However, Yaya (2016) found that women's status within the household also plays a significant role in HIV knowledge acquisition. Female heads of households in Bangladesh had a better understanding of HIV compared to male heads of households[12]. The interplay of a woman's education, marital status, and being the head of a household in explaining HIV knowledge acquisition, warrant further studies.

Our findings concur other studies conducted with Indonesian, Palestinian, Tajik, Cambodian, and Indian women[7,10,11,19,22,] that women who had a higher education were more likely to have good HIV related knowledge. Women living in urban area had a better understanding on HIV prevention and MTCT. Interestingly, while other studies, such as those of Husseini A and Abu Rehileh (2007) who worked with Palestinian women and Zainiddinov and Habibov (2016) who worked with Tajik women, found age was an important determinant in understanding HIV prevention and transmission[11], in our study, age tended to be a confounding factor for HIV knowledge acquisition. In our study older women were more likely to know about HIV testing (see Table 5). Lack of controlling for confounders might contribute to differences in results found between others' and our analysis.

CONCLUSION

- Of 922 respondents who have ever heard about HIV, 55.22% (n=514) have HIV comprehensive knowledge.
- Of the 514 women who have comprehensive knowledge, 84% (n=433) do not know that they can get free HIV tests.
- Education, employment status, and type of residence were positively associated with comprehensive HIV knowledge.
- After stratifying knowledge related to HIV, higher education levels were shown to be a dominant determinant associated with all types of HIV knowledge. Type of residence did not correlate with HIV knowledge.
- To reach more women in urban areas, as well as unemployed women, health services for mothers and children should be comprehensively integrated with HIV information services (prevention, transmission, and services) aimed at women of childbearing age and pregnant women in an early stage in order to mitigate the HIV transmission.
- Promoting detailed information related to HIV, including HIV testing, is urgently needed in formal education for women in rural areas.

LIMITATIONS

This study presented data from South Sumatra, one province of Indonesia. Further study is needed to obtain a comprehensive understanding of general versus specific social determinants of women's HIV vulnerability within provinces in Indonesia. Furthermore, determinants of this study are dependent on the availability of variables in the IDHS-2012, therefore there are limits.

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ORIGINAL ARTICLE

FACTORS INFLUENCING HIV KNOWLEDGE AMONG WOMEN OF CHILDBEARING AGE IN SOUTH SUMATRA, INDONESIA

Secondary data analysis of the 2021 Indonesian Demographic and Health Survey

ABSTRACT

This study aims to provide detailed information on the role of the following social determinants (i.e. education, occupation, place of residence, marital and economic status) *in the acquisition of HIV knowledge among women* of childbearing age (15-49 years old). *The study uses secondary data from the 2012 Indonesian Demographic and Health Survey (IDHS). The IDHS used a quantitative analytical approach with a cross-sectional study design and multi-stage stratified sampling. The sample included 1,335 women aged 15 to 49 years old living in South Sumatra Province, Indonesia. Descriptive analysis, ANOVA, and t-test and multiple logistic regressions were performed in this study. The results show one out of two women have little HIV knowledge. The more highly educated women were positively associated with a greater degree of knowledge related to comprehensive knowledge related to HIV (AOR: 3.7, 2.2-6.2, p.<0.05), HIV prevention (AOR:16.6, 1.8-153.9, p.<0.05), transmission from mother to child (AOR:11.1, 3.3-36.9), HIV misconceptions (AOR:5.1, 1.1-23.1, p.<0.05) and HIV services (AOR:5.7, 2.8-11.4, p < 0.05). In addition, the women lived in urban areas had more knowledge related to HIV prevention and transmission (AOR: 3.36, 1.8-6.2, p<0.05), and knowledge about mother-to-child of HIV transmission (AOR: 3.2, 1.8-5.5), p<0.05) compared to those who lived in rural areas. To conclude, education level was found to be the dominant factor associated with knowledge of HIV across all categories of knowledge after controlling by other determinants, age, marital status, working status and residence. HIV awareness and comprehensive HIV information among women who are considered to be in a low-risk group for HIV infection should be integrated with formal education as well as in maternal health services, particularly in rural areas.*

***Keywords**: HIV/AIDS, Knowledge, Women of Childbearing Age, IDHS 2012*

INTRODUCTION

About 40% of all new HIV-positive cases in the last ten years in Indonesia were found among women. Based on a 2018 MOH report, there is a rapid increase of reported cases in the last 10 years amongst women aged 15-49 years from 3,565 HIV cases in 2008, to 9,318 cases in 2012. In 2017, the number of new HIV cases among woman increased fivefold to 17,579 [(1).] The number of HIV-positive pregnant women is predicted to increase from 15,517 or 0.38% of all pregnancies to nearly 20,000 cases (0.49% of pregnancies) between 2012 and 2016 [(2)]. Without any intervention, it is predicted around 8,604 babies born with HIV will cost 42 billion Rupiah to care for annually [(3)]. Unfortunately, previous studies have found HIV-positive mothers in Indonesia typically find out about their HIV status long after they become infected, often when their children or husband becomes ill due to HIV/AIDS or when they are asked for a blood test during pregnancy [(4-6)].

Social determinants of women's vulnerability to HIV include a range of social, economic and environmental factors, such as income, social status, education, violence, and sexual and cultural norms [(7-11)]. Previous studies in Indonesia by Angkasawati and Arifin (2010), Iswanto (2011), and Pradnyani, Wibowo and Mahmudah (2019) using the 2007 National Basic Health Research (NBHR) and

2007 and 2012 Indonesian Demographic and Health Survey (IDHS), proposed the following social determinants of HIV knowledge among women of childbearing age: education, marriage status, type of residence, working status and wealth [12-14]. Following those studies, the 2010 NBHR and the 2012 IDHS indicated that only 11.4% of the total of 91,433 women respondents and 12% of total of of 45,607 women surveyed respectively had comprehensive HIV/AIDS knowledge across 33 provinces[15, 16], an important determinant in HIV vulnerability. Nevertheless, the decentralisation out of 34 provinces in Indonesia provides a space for each province in Indonesia to determine their health needs based on the local context[17]. The social determinants that are associated with HIV literacy among women of childbearing age (15-49 years old) therefore urgently need to be understood, specifically to low prevalence province in Indonesia, such as, South Sumatra, the research interest setting, with Strong Malay culture and Islamic teachings.

This article aims to provide detailed information on the roles of the following social determinants, namely, education level, occupation, residence, marital status, wealth index and age in the HIV knowledge acquisition among women of childbearing age in South Sumatra province of Indonesia. It draws data from the 2012 IDHS study. The level of HIV knowledge is divided into five parts: 1) comprehensive knowledge of HIV; 2) HIV prevention; 3) HIV misconceptions; 4) HIV transmission; and 5) HIV services. Findings from this article will contribute to the in-depth understanding of different levels of knowledge of HIV transmission, prevention, services, and misconceptions which can provide a framework for cost-effective and well-targeted health promotion relevant to specific social determinants and levels of HIV knowledge.

METHODOLOGY

Population, Sampling and Sample

This article utilises existing secondary data from IDHS-2012, which used a cross-sectional study design and multistage stratified sampling. Furthermore, to attain more accurate conclusions, complex sample design for this multi-stage sampling was used from the 2012 IDHS-. The South Sumatra sample was selected for our analysis and it included 1,355 women aged 15-49 years.

Data Collection

The survey questions used in the IDHS-2012 included knowledge about HIV/AIDS and variables related to selected social determinants, such as education level, occupation, residence, marital status, and age of women and their partners. Some variables were recoded including marital status, type of residence, education level and wealth index. All South Sumatra samples from the IDHS-2012 report were included in the data analysis. Three missing data were recoded into 'not known'.

Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of Medical Faculty of Sriwijaya University (No. 173/keprsmhfkunsri/2016). DHS is open sources data that can be accessed in http://dhsprogram.com/. DHS for Indonesia can be downloaded in http://dhsprogram.com/data/dataset/Indonesia_Special_2012.cfm?flag=0.

Data Analysis

Preliminary analysis was run using univariate analysis to examine the statistical properties (i.e. frequency, mean, max, min, standard deviation, or normal distribution of a particular variable). Mean and standard deviation are reported for numerical data, such as age, and frequency and proportion are reported for categorical variables, like questions of knowledge related to HIV and other variables related to the social determinants.

Table 1 Stratification of Knowledge Related to HIV

Stratification of knowledge related to HIV		*Questions in IDHS-2012*
Indicator 6.	Comprehensive knowledge related to HIV	All questions from indicator 2-4
Indicator 7.	Knowledge of HIV prevention/transmission	Limiting numbers of sex partners, condom use and not using shared needle and syringe.

Indicator 8.	Knowledge of HIV misconceptions	Whether HIV is transmitted through mosquito bites, eating together with HIV positive person, supernatural power", and signs of people with HIV
Indicator 9.	Knowledge of mother-to-child transmission (MTCT)	Whether HIV can be transmitted through pregnancy, delivery and breastfeeding
Indicator 10.	Knowledge of HIV services	HIV test can be done by a blood test and whether they knew about voluntarily HIV/AIDS test and counselling (VCT) services

Note:

Adapted from Iswanto (2011), Husseini and Abu-Rmeilah (2007), Zainiddinov and Habibov (2016), Yaya et al (2016)- [12, 14, 18-20]

Definition

Questions related to knowledge of HIV were stratified based on previous studies[7,1011,12]. All questions in each category were scored "2" for a correct answer; "1" for an incorrect answer; and "0"for a 'do not know' answer and then calculated as total scores for each stratification. ANOVA and independent-sample-test with 5% significance levels of alpha were performed to examine a mean difference in the total score of HIV knowledge across all social determinants. The results of the univariate analysis are presented in Tables 1 and 2, and bivariate analysis in Table 3. Then, a multiple logistic was performed by using a statistics software package (STATA) to find dominant variables associated with knowledge (dummy variables) (Table 4). A dummy variable of a comprehensive knowledge-indicator 1, was categorised as high and low level based on median of the total score because it wasn't fit of normality distribution, while the indicators 2 to 5 were categorized into high (all answers are correct) and low (only one or two correct answers). This is in accordance with the cut-off off the measurement of comprehensive knowledge related to HIV [12, 14].

RESULTS

Women's education, occupation, residence, marital and economic status

Of the total 1,335 women surveyed, 67.85% (n=992) had heard about HIV, and they were selected for further analysis. Of those 992 women, 67.85% had completed at least secondary school and approximately one half lived in rural areas. Seventy-five percent of women were married and had poor to middle economic status. The average age of respondents was 31 years old (95% CI 30.44-31.22) (Table 2).

Table 2. Women's characteristics (n=922)

Variables	Category	Total (n=922)	Percentage (%)
Education level	Primary	227	24.59
	Secondary	546	59.21
	Higher	149	16.21
Occupation	Yes	532	57.74
	No	390	42.26
Residence	Urban	425	46.10
	Rural	497	53.90
Marital status	Not Married	214	23.23
	Married	687	74.53
	Ever Married/living together	21	2.24
Wealth index	Poorest	268	29.08
	Poorer	204	22.07

Middle	205	22.24
Richer	139	15.08
Richest	106	11.53
Age, year (Mean, 95% CI)	30.94 (30.44-31.33)	

Source: IDHS, 2012

Knowledge about HIV

Table 3 includes different types of HIV related knowledge, including how HIV can be prevented, transmitted, diagnosed and tested. Comprehensive knowledge of HIV includes four groups of knowledge, including on HIV prevention, transmission, HIV testing services, and mother to child transmission. In summary, more than half of the childbearing aged women in this study knew how to prevent HIV transmission (i.e. limiting sexual partners, using condoms and not sharing needles or syringe); and about mother to child HIV transmission during pregnancy, delivery and breastfeeding. Of concern, however, only about 10% of these women knew about existing HIV testing and VCT (Voluntary and Counselling Test) services.

Table 3. Knowledge about HIV/AIDS

Knowledge related to HIV	Category	Total (n=922)	Percentage (%)
Comprehensive knowledge related to HIV	High	514	55.22%
Knowledge of HIV prevention (mean 4.6, SE 0.096)			
Limiting partners to do sexual intercourse to reduce the risk of HIV	Yes	655	72.6%
A person becomes less likely to be infected with HIV/AIDS by using condoms	Yes	475	52.7%
A person infected with HIV/AIDS because of using shared syringe and needle	Yes	823	91.3%
Knowledge of HIV Transmission from mother to children (mean 4.8, SE, 0.085)			
HIV can be transmitted during pregnancy	Yes	754	83.6%
HIV can be transmitted during a delivery/a labour	Yes	632	70.1%
HIV can be transmitted through breastfeeding	Yes	720	79.8%
Knowledge of HIV Test/Service (Mean 2.19, SE 0.02)			
Knowing someone is infected with HIV/AIDS by a blood test	Yes	94	10.5%
Having high self-awareness to do voluntarily HIV/AIDS test, followed by VCT, is expected to minimise the risk of HIV/AIDS	Yes	71	7.9%
Misconception related to HIV (mean 7.9, SE 0.095)			
Mosquito bites will not transmit HIV/AIDS	Yes	296	32.9%
Someone could be infected with HIV-positive by eating with the same plate with people with HIV/AIDS	Yes	416	46.1%
Someone could be infected HIV/AIDS through supernatural power	Yes	68	7.5%
People seem to be healthy can be affected by HIV/AIDS	Yes	698	77.4%
Physical changes can help to recognise HIV-positive person	Yes	274	30.4%
Behaviour changes might help to recognise HIV-positive person	Yes	34	3.8%

Source: IDHS, 2012

HIV All determinants were associated with having heard of HIV among the women, except working status (Table 4). Marriage status and age were not associated significantly with having heard about HIV (Table 5). Some stratification of knowledge related to HIV in this study includes the following parts.

6. Comprehensive knowledge related to HIV

Comprehensive knowledge of women comprises of women's understanding of how HIV can be transmitted, prevented, diagnosed and tested. About 55.22% of the 922 respondents had comprehensive knowledge of HIV (Table 2). Education, working status, and urban-rural residence were associated with having comprehensive knowledge after controlling possible confounders (Table 5).

7. Knowledge of HIV prevention and transmission

The majority of participants were aware of ways to prevent HIV transmission by limiting sexual partners and not sharing needles or syringes, and 52.7% knew that condoms could lower the risk of HIV transmission (Table 2). In the final logistic model, the women who had higher education, lived in urban areas and were employed had a better understanding of HIV prevention and transmission than those with lower education, lived in rural areas and were not employed (Table 5).

8. Knowledge of HIV misconceptions

Overall, the majority of the women had a low misconception about HIV transmission through a supernatural power and HIV person cannot be recognised through behaviour change. In addition, one to two in every four women believed that HIV could be transmitted by sharing food with HIV- positive persons from the same plate and they could identify someone as HIV positive from the person's physical appearance or health conditions (Table 2). Interestingly, about 70% of them believed that HIV could be transmitted through mosquito bites (Table 2). After controlling for the urban-rural residence and age, education level were the major social determinants associated with the women's HIV misconceptions (Table 5).

9. Knowledge of mother-to-child transmission (MTCT)

Up to 85% of the respondents knew that HIV can be transmitted during pregnancy, delivery/labour and breastfeeding (Table 4). Women with a higher education level and living in an urban area (AOR 3.2, 95 % CI 1.8-5.5) had a higher degree of knowledge related to MTCT transmission compared to those with a lower education level and living in a rural area after controlling their marital and employment status (Table 5).

10. Knowledge of HIV testing

Few women knew that HIV can be detected by doing a blood test. Less than 10% of them knew that free HIV testing was available through the Voluntary Counselling Testing (VCT) services (Table 3). Women who had higher education levels and those who were older (AOR 1.03, 95% CI 1.01-1.05) were more likely to know about HIV test and counselling (Table 5).

Table 4 Bivariate analysis of determinants of knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		OR (95% CI)	OR (95 % CI)	MD (SE)	MD (SE)	MD (SE)	MD (SE)
Education level (Primary as ref)	Secondary	5.6 (4.2-7.4)***	1.5 (1.1-2.2)***	0.7 (0.2)***	0.7 (0.1)***	0.2 (0.1)*	0.1 (0.02)**
	Higher	97.8 (23.4-409)***	3.8 (2.3-6.2)***	1.3 (0.1)***	1.6 (0.2)***	0.9 (0.1)***	0.3 (0.1)***
Working status (Unemployed as ref)	Yes	(0.7-1.3)*	1.5 (1.1-2.1)***	0.3 (0.1)**	0.3 (0.1)**	0.2 (0.1)*	0.05(0.03)*
Residence (Rural as ref)	Urban	5.1 (3.2-8.1)***	1.7 (1.2-2.4)***	0.7 (0.1)***	0.8 (0.1)***	0.6 (0.1)***	0.1 (0.03)**
Marital status (ever married/living together as ref)	Not married	2.9 (1.3-6.5)**	0.7 (0.3-1.9)*	0.01(0.1)*	0.2 (0.1)*	-0.5 (0.1)*	-0.1 (0.03)*
	Married	1.5 (0.7-3.0)*	0.9 (0.3-2.3)*	0.1 (0.1)*	-0.2 (0.1)*	-0.2 (0.1)*	-0.1 (0.02)*
Wealth index (Richest as ref)	Poorest	12.9 (7.9-21.0)***	1.5 (0.9-2.5)*	0.2(0.1)*	0.4 (0.1)*	0.1 (0.1)*	0.1 (0.03)*
	Poorer	3.6 (2.5-5.0) ***	1.4 (0.8-2.4)*	-0.003(0.1)*	0.2(0.2)*	0.1 (0.2)*	0.03(0.04)*
	Middle	3.7 (2.6-5.3) ***	1.2 (0.7-1.9)*	0.041 (0.1)*	0.2 (0.1)*	0.4 (0.1) *	0.05 (0.04)*
	Richer	1.8 (1.2-2.5) ***	1.2 (0.7-2.1)*	0.08 (0.2)*	0.1 (0.2)*	0.2 (0.2) *	0.08 (0.04) *
Age of reproductive women (mean difference, SE)		-0.02 (-0.03,0.005)***	0.01 (-0.01, 0.02)*	0.001 (-0.01)-0.01)*	-0.003 (-0.02)-0.01))*	0.01 (0.001-0.03)**	0.003 (-0.001)-0.007))*

Source: IDHS, 2012

*Note: significance=***p value < 0.001 (strong evidence against the null hypothesis [H0]); ** p value > 0.001 and< 0.05 (increasing evidence against H0); *p value > 0.05 (weak evidence against H0)[21]; MD=mean difference; OR=odds ratio*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

Table 5 Logistic Regression Model for social determinants of HIV knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Education level (Primary as ref)	Secondary	*4.8 (3.4-6.7)****	*1.6(1.1-2.3)***	*2.5 (1.3-4.8)****	1.7 (0.9-3.4)*	*1.4 (0.9-2.3)**	*1.9 (1.0-3.8)***
	Higher	*72.6 (17.3-304.6)****	*3.7(2.2-6.2)****	*16.6(1.8-153.9)***	5.1(1.1-23.1)**	*11.1(3.3-36.9)****	*5.7(2.8-11.4)****
Working status (Unemployed as ref)	Yes	-	1.5(1-2.1)*	-	-	1.4 (0.9-2.1)*	-
Residence (Rural as ref)	Urban	*3.2 (2.1-5.1)****	-	*3.36 (1.8-6.2)****	1.4 (0.7-2.8)*	*3.2 (1.8-5.5)****	*1.6 (1.0-2.5)***
Marital status (ever married/living together as ref)	Not married	0.8 (0.2-2.4)*	0.5(0.2-1.5)*	0.9 (0.2-4.1)*	-	0.4 (0.1-1.8)*	-
	Married	1.3 (0.5-3.7)*	0.8(0.3- 2.3)*	1.9 (0.5-7.7)*	-	0.7 (0.1-3.)*	-
Wealth index (Richest as ref)	Poorest	*12.5 (7.6-20.6)****	-	-	-	-	-
	Poorer	*3.7 (2.5-5.4)****	-	-	-	-	-
	Middle	*3.7 (2.5-5.3)****	-	-	-	-	-
	Richer	*1.7 (1.1-2.7)****	-	-	-	-	-
Age of reproductive women (mean difference, SE)		0.99 (0.97-1.01)*	*0.9(0.9-1)**	-	0.98 (0.94-1.02)*	-	*1.03 (1.01-1.05)***

Source: IDHS, 2012

*Note:***p value < 0.001; ** p value > 0.001 and< 0.05; *p value >= 0.05; AOR=Adjusted Odds Ratio; ; CI=Confidence Interval*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

DISCUSSION

Women of childbearing age are considered as a 'bridge' in the HIV epidemic from low-risk to high-risk groups such as injecting drug users, men having sex with men, female sex workers, and transgender in Indonesia[4]. Hence, the enhancement of HIV knowledge related to HIV prevention, transmission and testing is urgently needed among women of childbearing age in Indonesia. Compared with two previous national surveys in Indonesia[15, 22], this study showed a significant increase of HIV comprehensive knowledge in women of childbearing age by about fivefold. The last two surveys in 2007 and 2008 respectively, showed only 9% and 11% of women respectively had HIV comprehensive knowledge. In this study more than 50% women had acquired HIV comprehensive knowledge. Of note however, different cut-off points of categorisation of a comprehensive level of knowledge might lead to these differences.

Although an increased knowledge of MTCT transmission was found in this study compared with the previous surveys [15, 22], only one in nine women knew about free HIV testing and counselling services. Health services need to be made more accessible to women, particularly rural women. Half of the women knew about condom use to prevent HIV, but this finding may suggest inadequate condom use in childbearing age women in South Sumatra. An absence of a government intervention to halt MTCT would increase the transmission of HIV by as much as 15-50% [23]. In addition, a newly HIV-infected women is more likely to transmit HIV to her baby during pregnancy or post-partum [24, 25]. Therefore, quick implementation of Indonesia's Ministry of Health Regulation Number 43 (2016) that recommends that people with at least one of the risk factors of HIV become involved in relevant treatments like VCT and Prevention MTCT services, including HIV screening among pregnant women in all provinces in Indonesia, either with low- or high- prevalence provinces [26]. We have to stop assuming that women, particularly married women or *Ibu rumah tangga* (literally housewives) are a low-risk [4-6, 27-30].

Of concern, women's misconception of HIV is still rampant. For instance, more than half of the women still believe that HIV can be transmitted by mosquito's bites and sharing foods in the same plate with HIV-positive persons. While we have not discussed this in the analysis, we note here that one of nine women believe that HIV can be transmitted through supernatural power. Further research is warranted on this topic. Similar findings were reported in IDHS 2012 in 33 provinces, three out of 10 women think that someone can get HIV from witchcraft [14]. A similar finding was also recently reported in similar national surveys conducted in Bangladesh and Cambodia [19, 31]. A study by Yaya and colleagues (2016) also found that about one fifth women in Bangladesh believed that HIV could be caused by witchcraft or supernatural powers and about half of them believed that HIV can be transmitted by mosquito bites or sharing food from the same plate with HIV-positive persons[19]. A Cambodian Demographic and Health Survey in 2005 found that compared to their peers in Bangladesh, Cambodian women have a slightly better understanding about HIV misconceptions [19, 31]. Nevertheless, this study found that women in South Sumatra have better understanding on HIV knowledge that every healthy people can be affected HIV and physical changes cannot help to recognise HIV-positive person in wider population, similar to national level, Indonesia [14].

Our findings strongly suggest that, after controlling for possible confounders, education, employment status, and urban-rural residence are associated with having comprehensive HIV knowledge (Table 5). This finding concurs with other findings reported by Angkasawati (2007)([12], Yaya et al. (2016)[19] and Hong et al.[31]. Unlike that reported by Yaya and colleagues, whereby being married was associated with having increased knowledge, our study did not support such association. In Iswanto's study (2011)[13], the education level of both women and their husbands were related to the level of HIV knowledge. Men tend to have better HIV related knowledge compared to women [32, 33]. However, Yaya (2016)[19] found that women's status within the household also plays a significant role in HIV knowledge acquisition. Female heads of households in Bangladesh had a better understanding of HIV compared to male heads of households)[19] . The interplay of a woman's education, marital status, and being the head of a household in explaining HIV knowledge acquisition, warrant further studies.

Our findings concur other studies conducted with Indonesian, Palestinian, Tajik, and Cambodian women [14, 18, 20, 31], that women who had a higher education were more likely to have good HIV related knowledge. Women living in urban area had a better understanding on HIV prevention and MTCT. Interestingly, while other studies, such as those of Husseini A and Abu Rehileh (2007) who worked with Palestinian women and Zainiddinov and Habibov (2016) who worked with Tajik women, found age was an important determinant in understanding HIV prevention and transmission[18, 20], in our study, age tended to be a confounding factor for HIV knowledge acquisition. In our study older women were more likely to know about HIV testing (see Table 5). Lack of controlling for confounders might contribute to differences in results found between others' and our analysis.

CONCLUSION

This article has shown that of 922 respondents who have ever heard about HIV, 55.22% (n=514) have HIV comprehensive knowledge in South Sumatra with low-prevalence province in Indonesia. Of the women who have comprehensive knowledge, majority of the women do not know that they can get free HIV tests. We show that education, employment status, and type of residence were positively associated with comprehensive HIV knowledge. After stratifying knowledge related to HIV, higher education levels were shown to be a dominant determinant associated with all types of HIV knowledge. Type of residence did not correlate with HIV knowledge.

To reach more women in urban areas, as well as unemployed women, health services for mothers and children should be comprehensively integrated with HIV information services (prevention, transmission, and services) aimed at women of childbearing age and pregnant women in an early stage in order to mitigate the HIV transmission. Promoting detailed information related to HIV, including HIV testing, is urgently needed in formal education for women in rural areas and low-prevalence provinces in Indonesia. Finally, married women or *ibu rumah tangga* need to stop assuming that they are low risk of contracting HIV and need to enhance their HIV literacy from offline or online platforms.

LIMITATIONS

This study presented data from South Sumatra, one province of Indonesia. Further study is needed to obtain a comprehensive understanding of general versus specific social determinants of women's HIV vulnerability within high- versus low-prevalence provinces in Indonesia. Furthermore, determinants of this study are dependent on the availability of variables in the IDHS-2012, therefore there are limits. Potential limitations of secondary data bases are selection and measurement bias, confounding by indication, unmeasured or residual confounding and outcome misclassification, which may result in erroneous conclusion [34]. Further research on the impact of supernatural beliefs is also needed.

Declaration

Consent to publish

None declared

Availability of data and materials

None declared

Competing interests

The authors declare that they have no competing interests

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Authors' Contributions

The idea of developing idea of research and wrote the first draft of the manuscript by NA, IPS and TNK. IPS extracted, coded, and interpreted data. SA and SGD assisted with the manuscript and provided quantitative and English writing expertise.

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ORIGINAL ARTICLE

FACTORS INFLUENCING HIV KNOWLEDGE AMONG WOMEN OF CHILDBEARING AGE IN SOUTH SUMATRA, INDONESIA

Secondary data analysis of the 2021 Indonesian Demographic and Health Survey

ABSTRACT

This study aims to provide detailed information on the role of the following social determinants (i.e. education, occupation, place of residence, marital and economic status) *in the acquisition of HIV knowledge among women* of childbearing age (15-49 years old). *The study uses secondary data from the 2012 Indonesian Demographic and Health Survey (IDHS). The IDHS used a quantitative analytical approach with a cross-sectional study design and multi-stage stratified sampling. The sample included 1,335 women aged 15 to 49 years old living in South Sumatra Province, Indonesia. Descriptive analysis, ANOVA, and t-test and multiple logistic regressions were performed in this study. The results show one out of two women have little HIV knowledge. The more highly educated women were positively associated with a greater degree of knowledge related to comprehensive knowledge related to HIV (AOR: 3.7, 2.2-6.2, p.<0.05), HIV prevention (AOR:16.6, 1.8-153.9, p.<0.05), transmission from mother to child (AOR:11.1, 3.3-36.9), HIV misconceptions (AOR:5.1, 1.1-23.1, p.<0.05) and HIV services (AOR:5.7, 2.8-11.4, p < 0.05). In addition, the women lived in urban areas had more knowledge related to HIV prevention and transmission (AOR: 3.36, 1.8-6.2, p<0.05), and knowledge about mother-to-child of HIV transmission (AOR: 3.2, 1.8-5.5), p<0.05) compared to those who lived in rural areas. To conclude, education level was found to be the dominant factor associated with knowledge of HIV across all categories of knowledge after controlling by other determinants, age, marital status, working status and residence. HIV awareness and comprehensive HIV information among women who are considered to be in a low-risk group for HIV infection should be integrated with formal education as well as in maternal health services, particularly in rural areas.*

Keywords: *HIV/AIDS, Knowledge, Women of Childbearing Age, IDHS 2012*

INTRODUCTION

About 40% of all new HIV-positive cases in the last ten years in Indonesia were found among women. Based on a 2018 MOH report, there is a rapid increase of reported cases in the last 10 years amongst women aged 15-49 years from 3,565 HIV cases in 2008, to 9,318 cases in 2012. In 2017, the number of new HIV cases among woman increased fivefold to 17,579 [(1).] The number of HIV-positive pregnant women is predicted to increase from 15,517 or 0.38% of all pregnancies to nearly 20,000 cases (0.49% of pregnancies) between 2012 and 2016 [(2)]. Without any intervention, it is predicted around 8,604 babies born with HIV will cost 42 billion Rupiah to care for annually [(3)]. Unfortunately, previous studies have found HIV-positive mothers in Indonesia typically find out about their HIV status long after they become infected, often when their children or husband becomes ill due to HIV/AIDS or when they are asked for a blood test during pregnancy [(4-6)].

Social determinants of women's vulnerability to HIV include a range of social, economic and environmental factors, such as income, social status, education, violence, and sexual and cultural norms [(7-11)]. Previous studies in Indonesia by Angkasawati and Arifin (2010), Iswanto (2011), and Pradnyani, Wibowo and Mahmudah (2019) using the 2007 National Basic Health Research (NBHR) and 2007 and 2012 Indonesian Demographic and Health Survey (IDHS), proposed the following social determinants of HIV knowledge among women of childbearing age: education, marriage status, type

of residence, working status and wealth [12-14]. Following those studies, the 2010 NBHR and the 2012 IDHS indicated that only 11.4% of the total of 91,433 women respondents and 12% of total of of 45,607 women surveyed respectively had comprehensive HIV/AIDS knowledge across 33 provinces[15, 16], an important determinant in HIV vulnerability. Nevertheless, the decentralisation out of 34 provinces in Indonesia provides a space for each province in Indonesia to determine their health needs based on the local context[17]. The social determinants that are associated with HIV literacy among women of childbearing age (15-49 years old) therefore urgently need to be understood, specifically to low prevalence province in Indonesia, such as, South Sumatra, the research interest setting, with Strong Malay culture and Islamic teachings.

This article aims to provide detailed information on the roles of the following social determinants, namely, education level, occupation, residence, marital status, wealth index and age in the HIV knowledge acquisition among women of childbearing age in South Sumatra province of Indonesia. It draws data from the 2012 IDHS study. The level of HIV knowledge is divided into five parts: 1) comprehensive knowledge of HIV; 2) HIV prevention; 3) HIV misconceptions; 4) HIV transmission; and 5) HIV services. Findings from this article will contribute to the in-depth understanding of different levels of knowledge of HIV transmission, prevention, services, and misconceptions which can provide a framework for cost-effective and well-targeted health promotion relevant to specific social determinants and levels of HIV knowledge.

METHODOLOGY

Population, Sampling and Sample

This article utilises existing secondary data from IDHS-2012, which used a cross-sectional study design and multistage stratified sampling. Furthermore, to attain more accurate conclusions, complex sample design for this multi-stage sampling was used from the 2012 IDHS-. The South Sumatra sample was selected for our analysis and it included 1,355 women aged 15-49 years.

Data Collection

The survey questions used in the IDHS-2012 included knowledge about HIV/AIDS and variables related to selected social determinants, such as education level, occupation, residence, marital status, and age of women and their partners. Some variables were recoded including marital status, type of residence, education level and wealth index. All South Sumatra samples from the IDHS-2012 report were included in the data analysis. Three missing data were recoded into 'not known'.

Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of Medical Faculty of Sriwijaya University (No. 173/keprsmhfkunsri/2016). DHS is open sources data that can be accessed in http://dhsprogram.com/. DHS for Indonesia can be downloaded in http://dhsprogram.com/data/dataset/Indonesia_Special_2012.cfm?flag=0.

Data Analysis

Preliminary analysis was run using univariate analysis to examine the statistical properties (i.e. frequency, mean, max, min, standard deviation, or normal distribution of a particular variable). Mean and standard deviation are reported for numerical data, such as age, and frequency and proportion are reported for categorical variables, like questions of knowledge related to HIV and other variables related to the social determinants.

Table 1 Stratification of Knowledge Related to HIV

Stratification of knowledge related to HIV		*Questions in IDHS-2012*
Indicator 11.	Comprehensive knowledge related to HIV	All questions from indicator 2-4
Indicator 12.	Knowledge of HIV prevention/transmission	Limiting numbers of sex partners, condom use and not using shared needle and syringe.
Indicator 13.	Knowledge of HIV misconceptions	Whether HIV is transmitted through mosquito bites, eating together with HIV positive person,

		supernatural power", and signs of people with HIV
Indicator 14.	Knowledge of mother-to-child transmission (MTCT)	Whether HIV can be transmitted through pregnancy, delivery and breastfeeding
Indicator 15.	Knowledge of HIV services	HIV test can be done by a blood test and whether they knew about voluntarily HIV/AIDS test and counselling (VCT) services

Note:

Adapted from Iswanto (2011), Husseini and Abu-Rmeilah (2007), Zainiddinov and Habibov (2016), Yaya et al (2016)- [12, 14, 18-20]

Definition

Questions related to knowledge of HIV were stratified based on previous studies[7,1011,12]. All questions in each category were scored "2" for a correct answer; "1" for an incorrect answer; and "0"for a 'do not know' answer and then calculated as total scores for each stratification. ANOVA and independent-sample-test with 5% significance levels of alpha were performed to examine a mean difference in the total score of HIV knowledge across all social determinants. The results of the univariate analysis are presented in Tables 1 and 2, and bivariate analysis in Table 3. Then, a multiple logistic was performed by using a statistics software package (STATA) to find dominant variables associated with knowledge (dummy variables) (Table 4). A dummy variable of a comprehensive knowledge-indicator 1, was categorised as high and low level based on median of the total score because it wasn't fit of normality distribution, while the indicators 2 to 5 were categorized into high (all answers are correct) and low (only one or two correct answers). This is in accordance with the cut-off off the measurement of comprehensive knowledge related to HIV [12, 14].

RESULTS

Women's education, occupation, residence, marital and economic status

Of the total 1,335 women surveyed, 67.85% (n=992) had heard about HIV, and they were selected for further analysis. Of those 992 women, 67.85% had completed at least secondary school and approximately one half lived in rural areas. Seventy-five percent of women were married and had poor to middle economic status. The average age of respondents was 31 years old (95% CI 30.44-31.22) (Table 2).

Table 2. Women's characteristics (n=922)

Variables	Category	Total (n=922)	Percentage (%)
Education level	Primary	227	24.59
	Secondary	546	59.21
	Higher	149	16.21
Occupation	Yes	532	57.74
	No	390	42.26
Residence	Urban	425	46.10
	Rural	497	53.90
Marital status	Not Married	214	23.23
	Married	687	74.53
	Ever Married/living together	21	2.24
Wealth index	Poorest	268	29.08
	Poorer	204	22.07
	Middle	205	22.24

Richer	139	15.08
Richest	106	11.53
Age, year (Mean, 95% CI)	30.94 (30.44-31.33)	

Source: IDHS, 2012

Knowledge about HIV

Table 3 includes different types of HIV related knowledge, including how HIV can be prevented, transmitted, diagnosed and tested. Comprehensive knowledge of HIV includes four groups of knowledge, including on HIV prevention, transmission, HIV testing services, and mother to child transmission. In summary, more than half of the childbearing aged women in this study knew how to prevent HIV transmission (i.e. limiting sexual partners, using condoms and not sharing needles or syringe); and about mother to child HIV transmission during pregnancy, delivery and breastfeeding. Of concern, however, only about 10% of these women knew about existing HIV testing and VCT (Voluntary and Counselling Test) services.

Table 3. Knowledge about HIV/AIDS

Knowledge related to HIV	Category	Total (n=922)	Percentage (%)
Comprehensive knowledge related to HIV	High	514	55.22%
Knowledge of HIV prevention (mean 4.6, SE 0.096)			
Limiting partners to do sexual intercourse to reduce the risk of HIV	Yes	655	72.6%
A person becomes less likely to be infected with HIV/AIDS by using condoms	Yes	475	52.7%
A person infected with HIV/AIDS because of using shared syringe and needle	Yes	823	91.3%
Knowledge of HIV Transmission from mother to children (mean 4.8, SE, 0.085)			
HIV can be transmitted during pregnancy	Yes	754	83.6%
HIV can be transmitted during a delivery/a labour	Yes	632	70.1%
HIV can be transmitted through breastfeeding	Yes	720	79.8%
Knowledge of HIV Test/Service (Mean 2.19, SE 0.02)			
Knowing someone is infected with HIV/AIDS by a blood test	Yes	94	10.5%
Having high self-awareness to do voluntarily HIV/AIDS test, followed by VCT, is expected to minimise the risk of HIV/AIDS	Yes	71	7.9%
Misconception related to HIV (mean 7.9, SE 0.095)			
Mosquito bites will not transmit HIV/AIDS	Yes	296	32.9%
Someone could be infected with HIV-positive by eating with the same plate with people with HIV/AIDS	Yes	416	46.1%
Someone could be infected HIV/AIDS through supernatural power	Yes	68	7.5%
People seem to be healthy can be affected by HIV/AIDS	Yes	698	77.4%
Physical changes can help to recognise HIV-positive person	Yes	274	30.4%

Behaviour changes might help to recognise HIV-positive person	Yes	34	3.8%

Source: IDHS, 2012

HIV All determinants were associated with having heard of HIV among the women, except working status (Table 4). Marriage status and age were not associated significantly with having heard about HIV (Table 5). Some stratification of knowledge related to HIV in this study includes the following parts.

11. Comprehensive knowledge related to HIV

Comprehensive knowledge of women comprises of women's understanding of how HIV can be transmitted, prevented, diagnosed and tested. About 55.22% of the 922 respondents had comprehensive knowledge of HIV (Table 2). Education, working status, and urban-rural residence were associated with having comprehensive knowledge after controlling possible confounders (Table 5).

12. Knowledge of HIV prevention and transmission

The majority of participants were aware of ways to prevent HIV transmission by limiting sexual partners and not sharing needles or syringes, and 52.7% knew that condoms could lower the risk of HIV transmission (Table 2). In the final logistic model, the women who had higher education, lived in urban areas and were employed had a better understanding of HIV prevention and transmission than those with lower education, lived in rural areas and were not employed (Table 5).

13. Knowledge of HIV misconceptions

Overall, the majority of the women had a low misconception about HIV transmission through a supernatural power and HIV person cannot be recognised through behaviour change. In addition, one to two in every four women believed that HIV could be transmitted by sharing food with HIV- positive persons from the same plate and they could identify someone as HIV positive from the person's physical appearance or health conditions (Table 2). Interestingly, about 70% of them believed that HIV could be transmitted through mosquito bites (Table 2). After controlling for the urban-rural residence and age, education level were the major social determinants associated with the women's HIV misconceptions (Table 5).

14. Knowledge of mother-to-child transmission (MTCT)

Up to 85% of the respondents knew that HIV can be transmitted during pregnancy, delivery/labour and breastfeeding (Table 4). Women with a higher education level and living in an urban area (AOR 3.2, 95 % CI 1.8-5.5) had a higher degree of knowledge related to MTCT transmission compared to those with a lower education level and living in a rural area after controlling their marital and employment status (Table 5).

15. Knowledge of HIV testing

Few women knew that HIV can be detected by doing a blood test. Less than 10% of them knew that free HIV testing was available through the Voluntary Counselling Testing (VCT) services (Table 3). Women who had higher education levels and those who were older (AOR 1.03, 95% CI 1.01-1.05) were more likely to know about HIV test and counselling (Table 5).

Table 4 Bivariate analysis of determinants of knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		OR (95% CI)	OR (95 % CI)	MD (SE)	MD (SE)	MD (SE)	MD (SE)
Education level (Primary as ref)	Secondary	5.6 (4.2-7.4)***	1.5 (1.1-2.2)***	0.7 (0.2)***	0.7 (0.1)***	0.2 (0.1)*	0.1 (0.02)**
	Higher	97.8 (23.4-409)***	3.8 (2.3-6.2)***	1.3 (0.1)***	1.6 (0.2)***	0.9 (0.1)***	0.3 (0.1)***
Working status (Unemployed as ref)	Yes	(0.7-1.3)*	1.5 (1.1-2.1)***	0.3 (0.1)**	0.3 (0.1)**	0.2 (0.1)*	0.05(0.03)*
Residence (Rural as ref)	Urban	5.1 (3.2-8.1)***	1.7 (1.2-2.4)***	0.7 (0.1)***	0.8 (0.1)***	0.6 (0.1)***	0.1 (0.03)**
Marital status (ever married/living together as ref)	Not married	2.9 (1.3-6.5)**	0.7 (0.3-1.9)*	0.01(0.1)*	0.2 (0.1)*	-0.5 (0.1)*	-0.1 (0.03)*
	Married	1.5 (0.7-3.0)*	0.9 (0.3-2.3)*	0.1 (0.1)*	-0.2 (0.1)*	-0.2 (0.1)*	-0.1 (0.02)*
Wealth index (Richest as ref)	Poorest	12.9 (7.9-21.0)***	1.5 (0.9-2.5)*	0.2(0.1)*	0.4 (0.1)*	0.1 (0.1)*	0.1 (0.03)*
	Poorer	3.6 (2.5-5.0) ***	1.4 (0.8-2.4)*	-0.003(0.1)*	0.2(0.2)*	0.1 (0.2)*	0.03(0.04)*
	Middle	3.7 (2.6-5.3) ***	1.2 (0.7-1.9)*	0.041 (0.1)*	0.2 (0.1)*	0.4 (0.1) *	0.05 (0.04)*
	Richer	1.8 (1.2-2.5) ***	1.2 (0.7-2.1)*	0.08 (0.2)*	0.1 (0.2)*	0.2 (0.2) *	0.08 (0.04) *
Age of reproductive women (mean difference, SE)		-0.02 (-0.03,0.005)***	0.01 (-0.01, 0.02)*	0.001 (-0.01)-0.01)*	-0.003 (-0.02)-0.01))*	0.01 (0.001-0.03)**	0.003 (-0.001)-0.007))*

Source: IDHS, 2012

*Note: significance=***p value < 0.001 (strong evidence against the null hypothesis [H0]); ** p value > 0.001 and< 0.05 (increasing evidence against H0); *p value > 0.05 (weak evidence against H0)[21]; MD=mean difference; OR=odds ratio*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

Table 5 Logistic Regression Model for social determinants of HIV knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Education level (Primary as ref)	Secondary	*4.8 (3.4-6.7)****	*1.6(1.1-2.3)***	*2.5 (1.3-4.8)****	1.7 (0.9-3.4)*	*1.4 (0.9-2.3)**	*1.9 (1.0-3.8)***
	Higher	*72.6 (17.3-304.6)****	*3.7(2.2-6.2)****	*16.6(1.8-153.9)***	5.1(1.1-23.1)**	*11.1(3.3-36.9)****	*5.7(2.8-11.4)****
Working status (Unemployed as ref)	Yes	-	1.5(1-2.1)*	-	-	1.4 (0.9-2.1)*	-
Residence (Rural as ref)	Urban	*3.2 (2.1-5.1)****	-	*3.36 (1.8-6.2)****	1.4 (0.7-2.8)*	*3.2 (1.8-5.5)****	*1.6 (1.0-2.5)***
Marital status (ever married/living together as ref)	Not married	0.8 (0.2-2.4)*	0.5(0.2-1.5)*	0.9 (0.2-4.1)*	-	0.4 (0.1-1.8)*	-
	Married	1.3 (0.5-3.7)*	0.8(0.3- 2.3)*	1.9 (0.5-7.7)*	-	0.7 (0.1-3.)*	-
Wealth index (Richest as ref)	Poorest	*12.5 (7.6-20.6)****	-	-	-	-	-
	Poorer	*3.7 (2.5-5.4)****	-	-	-	-	-
	Middle	*3.7 (2.5-5.3)****	-	-	-	-	-
	Richer	*1.7 (1.1-2.7)****	-	-	-	-	-
Age of reproductive women (mean difference, SE)		0.99 (0.97-1.01)*	*0.9(0.9-1)**	-	0.98 (0.94-1.02)*	-	*1.03 (1.01-1.05)***

Source: IDHS, 2012

*Note:***p value < 0.001; ** p value > 0.001 and< 0.05; *p value >= 0.05; AOR=Adjusted Odds Ratio; ; CI=Confidence Interval*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

DISCUSSION

Women of childbearing age are considered as a 'bridge' in the HIV epidemic from low-risk to high-risk groups such as injecting drug users, men having sex with men, female sex workers, and transgender in Indonesia[4]. Hence, the enhancement of HIV knowledge related to HIV prevention, transmission and testing is urgently needed among women of childbearing age in Indonesia. Compared with two previous national surveys in Indonesia[15, 22], this study showed a significant increase of HIV comprehensive knowledge in women of childbearing age by about fivefold. The last two surveys in 2007 and 2008 respectively, showed only 9% and 11% of women respectively had HIV comprehensive knowledge. In this study more than 50% women had acquired HIV comprehensive knowledge. Of note however, different cut-off points of categorisation of a comprehensive level of knowledge might lead to these differences.

Although an increased knowledge of MTCT transmission was found in this study compared with the previous surveys [15, 22], only one in nine women knew about free HIV testing and counselling services. Health services need to be made more accessible to women, particularly rural women. Half of the women knew about condom use to prevent HIV, but this finding may suggest inadequate condom use in childbearing age women in South Sumatra. An absence of a government intervention to halt MTCT would increase the transmission of HIV by as much as 15-50% [23]. In addition, a newly HIV-infected women is more likely to transmit HIV to her baby during pregnancy or post-partum [24, 25]. Therefore, quick implementation of Indonesia's Ministry of Health Regulation Number 43 (2016) that recommends that people with at least one of the risk factors of HIV become involved in relevant treatments like VCT and Prevention MTCT services, including HIV screening among pregnant women in all provinces in Indonesia, either with low- or high- prevalence provinces [26]. We have to stop assuming that women, particularly married women or *Ibu rumah tangga* (literally housewives) are a low-risk [4-6, 27-30].

Of concern, women's misconception of HIV is still rampant. For instance, more than half of the women still believe that HIV can be transmitted by mosquito's bites and sharing foods in the same plate with HIV-positive persons. While we have not discussed this in the analysis, we note here that one of nine women believe that HIV can be transmitted through supernatural power. Further research is warranted on this topic. Similar findings were reported in IDHS 2012 in 33 provinces, three out of 10 women think that someone can get HIV from witchcraft [14]. A similar finding was also recently reported in similar national surveys conducted in Bangladesh and Cambodia [19, 31]. A study by Yaya and colleagues (2016) also found that about one fifth women in Bangladesh believed that HIV could be caused by witchcraft or supernatural powers and about half of them believed that HIV can be transmitted by mosquito bites or sharing food from the same plate with HIV-positive persons[19]. A Cambodian Demographic and Health Survey in 2005 found that compared to their peers in Bangladesh, Cambodian women have a slightly better understanding about HIV misconceptions [19, 31]. Nevertheless, this study found that women in South Sumatra have better understanding on HIV knowledge that every healthy people can be affected HIV and physical changes cannot help to recognise HIV-positive person in wider population, similar to national level, Indonesia [14].

Our findings strongly suggest that, after controlling for possible confounders, education, employment status, and urban-rural residence are associated with having comprehensive HIV knowledge (Table 5). This finding concurs with other findings reported by Angkasawati (2007)([12], Yaya et al. (2016)[19] and Hong et al.[31]. Unlike that reported by Yaya and colleagues, whereby being married was associated with having increased knowledge, our study did not support such association. In Iswanto's study (2011)[13], the education level of both women and their husbands were related to the level of HIV knowledge. Men tend to have better HIV related knowledge compared to women [32, 33]. However, Yaya (2016)[19] found that women's status within the household also plays a significant role in HIV knowledge acquisition. Female heads of households in Bangladesh had a better understanding of HIV compared to male heads of households)[19] . The interplay of a woman's education, marital status, and being the head of a household in explaining HIV knowledge acquisition, warrant further studies.

Our findings concur other studies conducted with Indonesian, Palestinian, Tajik, and Cambodian women [14, 18, 20, 31], that women who had a higher education were more likely to have good HIV related knowledge. Women living in urban area had a better understanding on HIV prevention and MTCT. Interestingly, while other studies, such as those of Husseini A and Abu Rehileh (2007) who worked with Palestinian women and Zainiddinov and Habibov (2016) who worked with Tajik women, found age was an important determinant in understanding HIV prevention and transmission[18, 20], in our study, age tended to be a confounding factor for HIV knowledge acquisition. In our study older women were more likely to know about HIV testing (see Table 5). Lack of controlling for confounders might contribute to differences in results found between others' and our analysis.

CONCLUSION

This article has shown that of 922 respondents who have ever heard about HIV, 55.22% (n=514) have HIV comprehensive knowledge in South Sumatra with low-prevalence province in Indonesia. Of the women who have comprehensive knowledge, majority of the women do not know that they can get free HIV tests. We show that education, employment status, and type of residence were positively associated with comprehensive HIV knowledge. After stratifying knowledge related to HIV, higher education levels were shown to be a dominant determinant associated with all types of HIV knowledge. Type of residence did not correlate with HIV knowledge.

To reach more women in urban areas, as well as unemployed women, health services for mothers and children should be comprehensively integrated with HIV information services (prevention, transmission, and services) aimed at women of childbearing age and pregnant women in an early stage in order to mitigate the HIV transmission. Promoting detailed information related to HIV, including HIV testing, is urgently needed in formal education for women in rural areas and low-prevalence provinces in Indonesia. Finally, married women or *ibu rumah tangga* need to stop assuming that they are low risk of contracting HIV and need to enhance their HIV literacy from offline or online platforms.

LIMITATIONS

This study presented data from South Sumatra, one province of Indonesia. Further study is needed to obtain a comprehensive understanding of general versus specific social determinants of women's HIV vulnerability within high- versus low-prevalence provinces in Indonesia. Furthermore, determinants of this study are dependent on the availability of variables in the IDHS-2012, therefore there are limits. Potential limitations of secondary data bases are selection and measurement bias, confounding by indication, unmeasured or residual confounding and outcome misclassification, which may result in erroneous conclusion [34]. Further research on the impact of supernatural beliefs is also needed.

Declaration

Consent to publish

None declared

Availability of data and materials

None declared

Competing interests

The authors declare that they have no competing interests

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Authors' Contributions

The idea of developing idea of research and wrote the first draft of the manuscript by NA, IPS and TNK. IPS extracted, coded, and interpreted data. SA and SGD assisted with the manuscript and provided quantitative and English writing expertise.

All authors read and approved the final manuscript.

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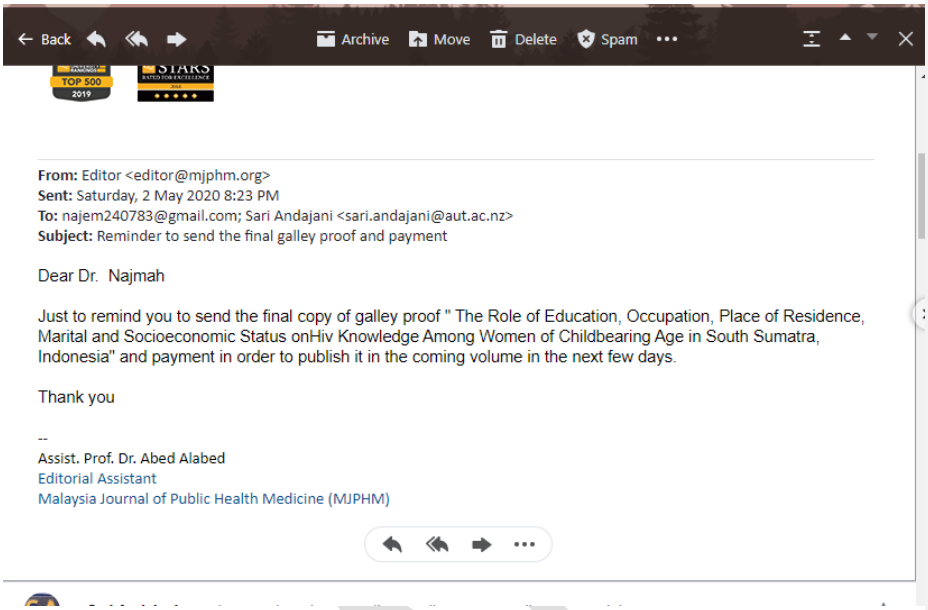

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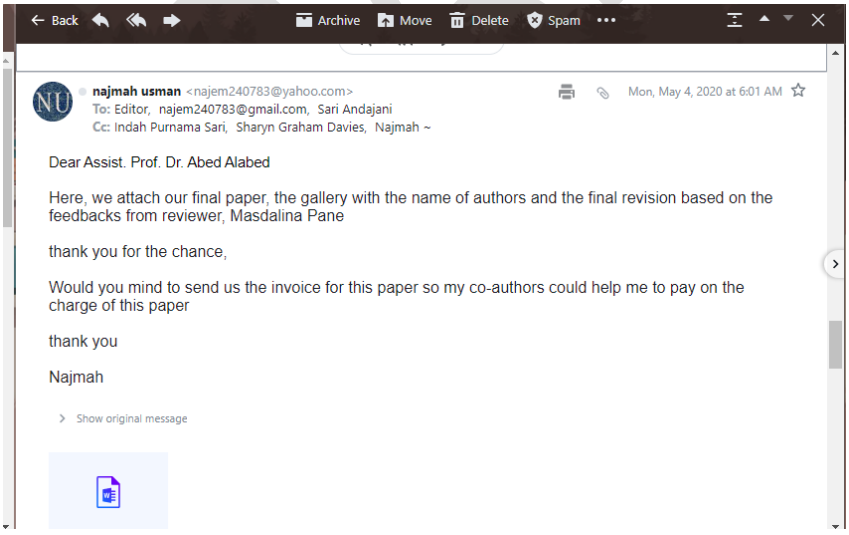

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Malaysian Journal of Public Health Medicine xxxx, Vol. x (x): xxx-xxx

ORIGINAL ARTICLE

FACTORS INFLUENCING HIV KNOWLEDGE AMONG WOMEN OF CHILDBEARING AGE IN SOUTH SUMATRA, INDONESIA

Secondary data analysis of the 2012 Indonesian Demographic and Health Survey

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ABSTRACT

This study aims to provide detailed information on the role of the following social determinants (i.e. education, occupation, place of residence, marital and economic status) *in the acquisition of HIV knowledge among women* of childbearing age (15-49 years old). *The study uses secondary data from the 2012 Indonesian Demographic and Health Survey (IDHS). The IDHS used a quantitative analytical approach with a cross-sectional study design and multi-stage stratified sampling. The sample included 1,335 women aged 15 to 49 years old living in South Sumatra Province, Indonesia. Descriptive analysis, ANOVA, and t-test and multiple logistic regressions were performed in this study. The results show one out of two women have little HIV knowledge. The more highly educated women were positively associated with a greater degree of knowledge related to comprehensive knowledge related to HIV (AOR: 3.7, 2.2-6.2, p.<0.05), HIV prevention (AOR:16.6, 1.8-153.9, p <0.05), transmission from mother to child (AOR:11.1, 3.3-36.9, p <0.05), HIV misconceptions (AOR:5.1, 1.1-23.1, p <0.05) and HIV services (AOR:5.7, 2.8-11.4, p < 0.05). In addition, the women lived in urban areas had more knowledge related to HIV prevention and transmission (AOR: 3.36, 1.8-6.2, p <0.05), and knowledge about mother-to-child of HIV transmission (AOR: 3.2, 1.8-5.5, p <0.05) compared to those who lived in rural areas. To conclude, education level was found to be the dominant factor associated with knowledge of HIV across all categories of knowledge after controlling by other determinants, age, marital status, working status and residence. HIV awareness and comprehensive HIV information among women who are considered to be in a low-risk group for HIV infection should be integrated with formal education as well as in maternal health services, particularly in rural areas.*

***Keywords**: HIV/AIDS, Knowledge, Women of Childbearing Age, IDHS 2012*

INTRODUCTION

About 40% of all new HIV-positive cases in the last ten years in Indonesia were found among women. Based on a 2018 MOH report, there is a rapid increase of reported cases in the last 10 years amongst women aged 15-49 years from 3,565 HIV cases in 2008, to 9,318 cases in 2012. In 2017, the number of new HIV cases among woman increased fivefold to 17,579 [(1).] The number of HIV-positive pregnant women is predicted to increase from 15,517 or 0.38% of all pregnancies to nearly 20,000 cases (0.49% of pregnancies) between 2012 and 2016 [(2)]. Without any intervention, it is predicted around 8,604 babies born with HIV will cost 42 billion Rupiah to care for annually [(3)]. Unfortunately, previous studies have found HIV-positive mothers in Indonesia typically find out about their HIV status long after they

become infected, often when their children or husband becomes ill due to HIV/AIDS or when they are asked for a blood test during pregnancy [4-6].

Social determinants of women's vulnerability to HIV include a range of social, economic and environmental factors, such as income, social status, education, violence, and sexual and cultural norms [7-11]. Previous studies in Indonesia by Angkasawati and Arifin (2010), Iswanto (2011), and Pradnyani, Wibowo and Mahmudah (2019) using the 2007 National Basic Health Research (NBHR) and 2007 and 2012 Indonesian Demographic and Health Survey (IDHS), proposed the following social determinants of HIV knowledge among women of childbearing age: education, marriage status, type of residence, working status and wealth [12-14]. Following those studies, the 2010 NBHR and the 2012 IDHS indicated that only 11.4% of the total of 91,433 women respondents and 12% of total of of 45,607 women surveyed respectively had comprehensive HIV/AIDS knowledge across 33 provinces[15, 16], an important determinant in HIV vulnerability. Nevertheless, the decentralisation out of 34 provinces in Indonesia provides a space for each province in Indonesia to determine their health needs based on the local context[17]. The social determinants that are associated with HIV literacy among women of childbearing age (15-49 years old) therefore urgently need to be understood, specifically to low prevalence province in Indonesia, such as, South Sumatra, the research interest setting, with Strong Malay culture and Islamic teachings.

This article aims to provide detailed information on the roles of the following social determinants, namely, education level, occupation, residence, marital status, wealth index and age in the HIV knowledge acquisition among women of childbearing age in South Sumatra province of Indonesia. It draws data from the 2012 IDHS study. The level of HIV knowledge is divided into five parts: 1) comprehensive knowledge of HIV; 2) HIV prevention; 3) HIV misconceptions; 4) HIV transmission; and 5) HIV services. Findings from this article will contribute to the in-depth understanding of different levels of knowledge of HIV transmission, prevention, services, and misconceptions which can provide a framework for cost-effective and well-targeted health promotion relevant to specific social determinants and levels of HIV knowledge.

METHODOLOGY

Population, Sampling and Sample

This article utilises existing secondary data from IDHS-2012, which used a cross-sectional study design and multistage stratified sampling. Furthermore, to attain more accurate conclusions, complex sample design for this multi-stage sampling was used from the 2012 IDHS. The South Sumatra sample was selected for our analysis and it included 1,355 women aged 15-49 years.

Data Collection

The survey questions used in the IDHS-2012 included knowledge about HIV/AIDS and variables related to selected social determinants, such as education level, occupation, residence, marital status, and age of women and their partners. Some variables were recoded including marital status, type of residence, education level and wealth index. All South Sumatra samples from the IDHS-2012 report were included in the data analysis. Three missing data were recoded into 'not known'.

Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of Medical Faculty of Sriwijaya University (No. 173/keprsmhfkunsri/2016). DHS is open sources data that can be accessed in http://dhsprogram.com/. DHS for Indonesia can be downloaded in http://dhsprogram.com/data/dataset/Indonesia_Special_2012.cfm?flag=0.

Data Analysis

Preliminary analysis was run using univariate analysis to examine the statistical properties (i.e. frequency, mean, max, min, standard deviation, or normal distribution of a particular variable). Mean and standard deviation are reported for numerical data, such as age, and frequency and proportion

are reported for categorical variables, like questions of knowledge related to HIV and other variables related to the social determinants.

Table 1 Stratification of Knowledge Related to HIV

Stratification of knowledge related to HIV		*Questions in IDHS-2012*
Indicator 16.	Comprehensive knowledge related to HIV	All questions from indicator 2-4
Indicator 17.	Knowledge of HIV prevention/transmission	Limiting numbers of sex partners, condom use and not using shared needle and syringe.
Indicator 18.	Knowledge of HIV misconceptions	Whether HIV is transmitted through mosquito bites, eating together with HIV positive person, supernatural power", and signs of people with HIV
Indicator 19.	Knowledge of mother-to-child transmission (MTCT)	Whether HIV can be transmitted through pregnancy, delivery and breastfeeding
Indicator 20.	Knowledge of HIV services	HIV test can be done by a blood test and whether they knew about voluntarily HIV/AIDS test and counselling (VCT) services

Note: Adapted from Angkasawati (2007), Husseini and Abu-Rmeilah (2007), Yaya et al (2016), Pradnyani et.al (2019), Zainiddinov and Habibov (2016) [12, 14, 18-20]

Definition

Questions related to knowledge of HIV were stratified based on previous studies[7,1011,12]. All questions in each category were scored "2" for a correct answer; "1" for an incorrect answer; and "0"for a 'do not know' answer and then calculated as total scores for each stratification. ANOVA and independent-sample-test with 5% significance levels of alpha were performed to examine a mean difference in the total score of HIV knowledge across all social determinants. The results of the univariate analysis are presented in Tables 1 and 2, and bivariate analysis in Table 3. Then, a multiple logistic was performed by using a statistics software package (STATA) to find dominant variables associated with knowledge (dummy variables) (Table 4). A dummy variable of a comprehensive knowledge-indicator 1, was categorised as high and low level based on median of the total score because it wasn't fit of normality distribution, while the indicators 2 to 5 were categorized into high (all answers are correct) and low (only one or two correct answers). This is in accordance with the cut-off off the measurement of comprehensive knowledge related to HIV [12, 14].

RESULTS

Women's education, occupation, residence, marital and economic status

Of the total 1,335 women surveyed, 67.85% (n=922) had heard about HIV, and they were selected for further analysis. Of those 922 women, 67.85% had completed at least secondary school and approximately one half lived in rural areas. Seventy-five percent of women were married and had poor to middle economic status. The average age of respondents was 31 years old (95% CI 30.44-31.22) (Table 2).

Table 2. Women's characteristics (n=922)

Variables	Category	Total (n=922)	Percentage (%)
Education level	Primary	227	24.59
	Secondary	546	59.21
	Higher	149	16.21
Occupation	Yes	532	57.74
	No	390	42.26
Residence	Urban	425	46.10

	Rural	497	53.90
Marital status	Not Married	214	23.23
	Married	687	74.53
	Ever Married/living together	21	2.24
Wealth index	Poorest	268	29.08
	Poorer	204	22.07
	Middle	205	22.24
	Richer	139	15.08
	Richest	106	11.53
Age, year (Mean, 95% CI)		30.94 (30.44-31.33)	

Source: IDHS, 2012

Knowledge about HIV

Table 3 includes different types of HIV related knowledge, including how HIV can be prevented, transmitted, diagnosed and tested. Comprehensive knowledge of HIV includes four groups of knowledge, including on HIV prevention, transmission, HIV testing services, and mother to child transmission. In summary, more than half of the childbearing aged women in this study knew how to prevent HIV transmission (i.e. limiting sexual partners, using condoms and not sharing needles or syringe); and about mother to child HIV transmission during pregnancy, delivery and breastfeeding. Of concern, however, only about 10% of these women knew about existing HIV testing and VCT (Voluntary and Counselling Test) services.

Table 3. Knowledge about HIV/AIDS

Knowledge related to HIV	**Category**	**Total (n=922)**	**Percentage (%)**
Comprehensive knowledge related to HIV	High	514	55.22%
Knowledge of HIV prevention (mean 4.6, SE 0.096)			
Limiting partners to do sexual intercourse to reduce the risk of HIV	Yes	655	72.6%
A person becomes less likely to be infected with HIV/AIDS by using condoms	Yes	475	52.7%
A person infected with HIV/AIDS because of using shared syringe and needle	Yes	823	91.3%
Knowledge of HIV Transmission from mother to children (mean 4.8, SE, 0.085)			
HIV can be transmitted during pregnancy	Yes	754	83.6%
HIV can be transmitted during a delivery/a labour	Yes	632	70.1%
HIV can be transmitted through breastfeeding	Yes	720	79.8%
Knowledge of HIV Test/Service (Mean 2.19, SE 0.02)			
Knowing someone is infected with HIV/AIDS by a blood test	Yes	94	10.5%
Having high self-awareness to do voluntarily HIV/AIDS test, followed by VCT, is expected to minimise the risk of HIV/AIDS	Yes	71	7.9%
Misconception related to HIV (mean 7.9, SE 0.095)			
Mosquito bites will not transmit HIV/AIDS	Yes	296	32.9%
Someone could be infected with HIV-positive by eating with the same plate with people with HIV/AIDS	Yes	416	46.1%
Someone could be infected HIV/AIDS through supernatural power	Yes	68	7.5%
People seem to be healthy can be affected by HIV/AIDS	Yes	698	77.4%

Physical changes can help to recognise HIV-positive person	Yes	274	30.4%
Behaviour changes might help to recognise HIV-positive person	Yes	34	3.8%

Source: IDHS, 2012

HIV All determinants were associated with having heard of HIV among the women, except working status (Table 4). Marriage status and age were not associated significantly with having heard about HIV (Table 5). Some stratification of knowledge related to HIV in this study includes the following parts.

16. Comprehensive knowledge related to HIV
Comprehensive knowledge of women comprises of women's understanding of how HIV can be transmitted, prevented, diagnosed and tested. About 55.22% of the 922 respondents had comprehensive knowledge of HIV (Table 2). Education, working status, and urban-rural residence were associated with having comprehensive knowledge after controlling possible confounders (Table 5).

17. Knowledge of HIV prevention and transmission
The majority of participants were aware of ways to prevent HIV transmission by limiting sexual partners and not sharing needles or syringes, and 52.7% knew that condoms could lower the risk of HIV transmission (Table 2). In the final logistic model, the women who had higher education, lived in urban areas and were employed had a better understanding of HIV prevention and transmission than those with lower education, lived in rural areas and were not employed (Table 5).

18. Knowledge of HIV misconceptions
Overall, the majority of the women had a low misconception about HIV transmission through a supernatural power and HIV person cannot be recognised through behaviour change. In addition, one to two in every four women believed that HIV could be transmitted by sharing food with HIV- positive persons from the same plate and they could identify someone as HIV positive from the person's physical appearance or health conditions (Table 2). Interestingly, about 70% of them believed that HIV could be transmitted through mosquito bites (Table 2). After controlling for the urban-rural residence and age, education level were the major social determinants associated with the women's HIV misconceptions (Table 5).

19. Knowledge of mother-to-child transmission of HIV (MTCT)
Up to 85% of the respondents knew that HIV can be transmitted during pregnancy, delivery/labour and breastfeeding (Table 4). Women with a higher education level and living in an urban area (AOR 3.2, 95 % CI 1.8-5.5) had a higher degree of knowledge related to MTCT compared to those with a lower education level and living in a rural area after controlling their marital and employment status (Table 5).

20. Knowledge of HIV testing
Few women knew that HIV can be detected by doing a blood test. Less than 10% of them knew that free HIV testing was available through the Voluntary Counselling Testing (VCT) services (Table 3). Women who had higher education levels and those who were older (AOR 1.03, 95% CI 1.01-1.05) were more likely to know about HIV test and counselling (Table 5).

DISCUSSION

Women of childbearing age are considered as a 'bridge' in the HIV epidemic from low-risk to high-risk groups such as injecting drug users, men having sex with men, female sex workers, and transgender in Indonesia[4]. Hence, the enhancement of HIV knowledge related to HIV prevention, transmission and testing is urgently needed among women of childbearing age in Indonesia. Compared with two previous national surveys in Indonesia[15, 22], this study showed a significant increase of HIV comprehensive knowledge in women of childbearing age by about fivefold. The last two surveys in 2007 and 2013 respectively, showed only 9% and 11% of women respectively had HIV comprehensive knowledge. In this study more than 50% women had acquired HIV comprehensive knowledge. Of note however, different cut-off points of categorisation of a comprehensive level of knowledge might lead to these differences.

Although an increased knowledge of MTCT was found in this study compared with the previous surveys [15, 22], only one in nine women knew about free HIV testing and counselling services. Health services need to be made more accessible to women, particularly rural women. Half of the women knew about condom use to prevent HIV, but this finding may suggest inadequate condom use in childbearing age women in South Sumatra. An absence of a government intervention to halt MTCT would increase the transmission of HIV by as much as 15-50% [23]. In addition, a newly HIV-infected women is more likely to transmit HIV to her baby during pregnancy or post-partum [24, 25]. Therefore, quick implementation of Indonesia's Ministry of Health Regulation Number 43 (2016) that recommends that people with at least one of the risk factors of HIV become involved in relevant treatments like VCT and Prevention of Mother-to-Child of HIV Transmission (PMTCT) services, including HIV screening among pregnant women in all provinces in Indonesia, either with low- or high- prevalence provinces [26]. We have to stop assuming that women, particularly married women-mothers and wives- or *Ibu rumah tangga* are a low-risk [4-6, 27-30].

Of concern, women's misconception of HIV is still rampant. For instance, more than half of the women still believe that HIV can be transmitted by mosquito's bites and sharing foods in the same plate with HIV-positive persons. While we have not discussed this in the analysis, we note here that one of nine women believe that HIV can be transmitted through supernatural power. Further research is warranted on this topic. Similar findings were reported in IDHS 2012 in 33 provinces, three out of 10 women think that someone can get HIV from witchcraft [14]. A similar finding was also recently reported in similar national surveys conducted in Bangladesh and Cambodia [19, 31]. A study by Yaya and colleagues (2016) also found that about one fifth women in Bangladesh believed that HIV could be caused by witchcraft or supernatural powers and about half of them believed that HIV can be transmitted by mosquito bites or sharing food from the same plate with HIV-positive persons[19]. A Cambodian Demographic and Health Survey in 2005 found that compared to their peers in Bangladesh, Cambodian women have a slightly better understanding about HIV misconceptions [19, 31]. Nevertheless, this study found that women in South Sumatra have better understanding on HIV knowledge that every healthy people can be affected HIV and physical changes cannot help to recognise HIV-positive person in wider population, similar to national level, Indonesia [14].

Table 4 Bivariate analysis of determinants of knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		OR (95% CI)	OR (95 % CI)	MD (SE)	MD (SE)	MD (SE)	MD (SE)
Education level (Primary as ref)	Secondary	5.6 (4.2-7.4)***	1.5 (1.1-2.2)***	0.7 (0.2)***	0.7 (0.1)***	0.2 (0.1)*	0.1 (0.02)**
	Higher	97.8 (23.4-409)***	3.8 (2.3-6.2)***	1.3 (0.1)***	1.6 (0.2)***	0.9 (0.1)***	0.3 (0.1)***
Working status (Unemployed as ref)	Yes	(0.7-1.3)*	1.5 (1.1-2.1)***	0.3 (0.1)**	0.3 (0.1)**	0.2 (0.1)*	0.05(0.03)*
Residence (Rural as ref)	Urban	5.1 (3.2-8.1)***	1.7 (1.2-2.4)***	0.7 (0.1)***	0.8 (0.1)***	0.6 (0.1)***	0.1 (0.03)**
Marital status (ever married/living together as ref)	Not married	2.9 (1.3-6.5)**	0.7 (0.3-1.9)*	0.01(0.1)*	0.2 (0.1)*	-0.5 (0.1)*	-0.1 (0.03)*
	Married	1.5 (0.7-3.0)*	0.9 (0.3-2.3)*	0.1 (0.1)*	-0.2 (0.1)*	-0.2 (0.1)*	-0.1 (0.02)*
Wealth index (Richest as ref)	Poorest	12.9 (7.9-21.0)***	1.5 (0.9-2.5)*	0.2(0.1)*	0.4 (0.1)*	0.1 (0.1)*	0.1 (0.03)*
	Poorer	3.6 (2.5-5.0) ***	1.4 (0.8-2.4)*	-0.003(0.1)*	0.2(0.2)*	0.1 (0.2)*	0.03(0.04)*
	Middle	3.7 (2.6-5.3) ***	1.2 (0.7-1.9)*	0.041 (0.1)*	0.2 (0.1)*	0.4 (0.1) *	0.05 (0.04)*
	Richer	1.8 (1.2-2.5) ***	1.2 (0.7-2.1)*	0.08 (0.2)*	0.1 (0.2)*	0.2 (0.2) *	0.08 (0.04) *
Age of reproductive women (mean difference, SE)		-0.02 (-0.03,0.005)***	0.01 (-0.01, 0.02)*	0.001 (-0.01)-0.01)*	-0.003 (-0.02)-0.01))*	0.01 (0.001-0.03)**	0.003 (-0.001)-0.007))*

Source: IDHS, 2012

*Note: significance=***p value < 0.001 (strong evidence against the null hypothesis [H0]); ** p value > 0.001 and< 0.05 (increasing evidence against H0); *p value > 0.05 (weak evidence against H0)[21]; MD=mean difference; OR=odds ratio*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

Table 5 Logistic Regression Model for social determinants of HIV knowledge among women of childbearing age in South Sumatra, Indonesia

Category Variables (n=922)		Knowledge about HIV/AIDS					
		Ever heard about HIV	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Education level (Primary as ref)	Secondary	*4.8 (3.4-6.7)****	*1.6(1.1-2.3)***	*2.5 (1.3-4.8)****	1.7 (0.9-3.4)*	*1.4 (0.9-2.3)**	*1.9 (1.0-3.8)**
	Higher	*72.6 (17.3-304.6)****	*3.7(2.2-6.2)****	*16.6(1.8-153.9)***	5.1(1.1-23.1)**	*11.1(3.3-36.9)****	*5.7(2.8-11.4)****
Working status (Unemployed as ref)	Yes	-	1.5(1-2.1)*	-	-	1.4 (0.9-2.1)*	-
Residence (Rural as ref)	Urban	*3.2 (2.1-5.1)****	-	*3.36 (1.8-6.2)****	1.4 (0.7-2.8)*	*3.2 (1.8-5.5)****	*1.6 (1.0-2.5)**
Marital status (ever married/living together as ref)	Not married	0.8 (0.2-2.4)*	0.5(0.2-1.5)*	0.9 (0.2-4.1)*	-	0.4 (0.1-1.8)*	-
	Married	1.3 (0.5-3.7)*	0.8(0.3- 2.3)*	1.9 (0.5-7.7)*	-	0.7 (0.1-3.)*	-
Wealth index (Richest as ref)	Poorest	*12.5 (7.6-20.6)****	-	-	-	-	-
	Poorer	*3.7 (2.5-5.4)****	-	-	-	-	-
	Middle	*3.7 (2.5-5.3)****	-	-	-	-	-
	Richer	*1.7 (1.1-2.7)****	-	-	-	-	-
Age of reproductive women (mean difference, SE)		0.99 (0.97-1.01)*	*0.9(0.9-1)**	-	0.98 (0.94-1.02)*	-	*1.03 (1.01-1.05)***

Source: IDHS, 2012

*Note:***p value < 0.001; ** p value > 0.001 and< 0.05; *p value >= 0.05; AOR=Adjusted Odds Ratio; ; CI=Confidence Interval*

Indicator 1: Comprehensive knowledge related to HIV; Indicator 2: Knowledge related to HIV prevention and transmission; Indicator 3: Knowledge related to misconceptions of HIV; Indicator 4: Knowledge related to MTCT; Indicator 5: Knowledge related to HIV services/testing

Our findings strongly suggest that, after controlling for possible confounders, education and urban-rural residence are associated with having comprehensive HIV knowledge (Table 5). This finding concurs with other findings reported by Angkasawati (2007)([12], Yaya et al. (2016)[19] and Hong et al.[31]. Unlike that reported by Yaya and colleagues, whereby being married was associated with having increased knowledge, our study did not support such association. In Iswanto's study (2011)[13], the education level of both women and their husbands were related to the level of HIV knowledge. Men tend to have better HIV related knowledge compared to women [32, 33]. However, Yaya (2016)[19] found that women's status within the household also plays a significant role in HIV knowledge acquisition. Female heads of households in Bangladesh had a better understanding of HIV compared to male heads of households)[19] . The interplay of a woman's education, marital status, and being the head of a household in explaining HIV knowledge acquisition, warrant further studies.

Our findings concur other studies conducted with Indonesian, Palestinian, Tajik, and Cambodian women [14, 18, 20, 31], that women who had a higher education were more likely to have good HIV related knowledge. Women living in urban area had a better understanding on HIV prevention and MTCT. Interestingly, while other studies, such as those of Husseini A and Abu Rehileh (2007) who worked with Palestinian women and Zainiddinov and Habibov (2016) who worked with Tajik women, found age was an important determinant in understanding HIV prevention and transmission[18, 20], in our study, age tended to be a confounding factor for HIV knowledge acquisition. In our study older women were more likely to know about HIV testing (see Table 5). Lack of controlling for confounders might contribute to differences in results found between others' and our analysis.

CONCLUSION

This article has shown that of 922 respondents who have ever heard about HIV, 55.22% (n=514) have HIV comprehensive knowledge in South Sumatra with low-prevalence province in Indonesia. Of the women who have comprehensive knowledge, majority of the women do not know that they can get free HIV tests. We show that education and type of residence were positively associated with comprehensive HIV knowledge. After stratifying knowledge related to HIV, higher education levels were shown to be a dominant determinant associated with all types of HIV knowledge. Type of residence did not correlate with HIV knowledge.

To reach more women in rural areas, as well as low-educated women, health services for mothers and children should be comprehensively integrated with HIV information services (prevention, transmission, and services) aimed at women of childbearing age and pregnant women in an early stage in order to mitigate the HIV transmission. Promoting detailed information related to HIV, including HIV testing, is urgently needed in formal education for women in rural areas and low-prevalence provinces in Indonesia. Finally, *ibu rumah tangga* and employed and unemployed women need to stop assuming that they are low risk of contracting HIV and need to enhance their HIV literacy from offline or online platforms.

LIMITATIONS

This study presented data from South Sumatra, one province of Indonesia. Further study is needed to obtain a comprehensive understanding of general versus specific social determinants of women's HIV vulnerability within high- versus low-prevalence provinces in Indonesia. Furthermore, determinants of this study are dependent on the availability of variables in the IDHS-2012, therefore there are limits. Potential limitations of secondary data bases are selection and measurement bias, confounding by indication, unmeasured or residual confounding and outcome misclassification, which may result in

erroneous conclusion (34). Further research on the impact of supernatural beliefs and qualitative approach on understanding women's knowledge and perception about HIV is also needed.

Declaration

Consent to publish

None declared

Availability of data and materials

None declared

Competing interests

The authors declare that they have no competing interests

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Authors' Contributions

The idea of developing idea of research and wrote the first draft of the manuscript by NA, IPS and TNK. IPS extracted, coded, and interpreted data. SA and SGD assisted with the manuscript and provided quantitative and English writing expertise.

All authors read and approved the final manuscript.

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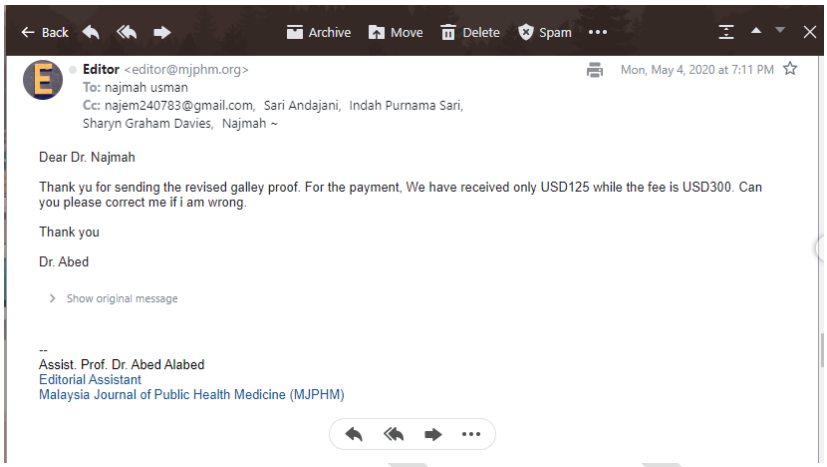
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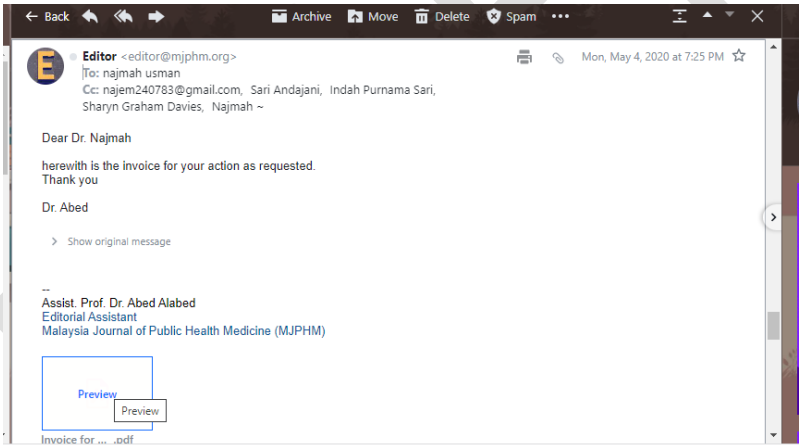
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