

A New Model of How Risk Factors Affects Sexually Transmitted Disease Incidences among MSM Population in Surakarta, Indonesia using Structural Equation Modelling

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Abstract: Risk factors affecting Sexually Transmitted Diseases (STD) are complex, covering from sociodemographic factor, sexual risk behavior factor and risky health behaviour factor to name a few. Structural Equation Modelling (SEM) with path analysis can be used to illustrate the complex and correlated roles of each factors. This cross sectional study was done in Surakarta. Population in this study was MSM population who visited monthly mobile clinic for Voluntary Consultation Testing (VCT) testing and MSM patients who visited VCT clinic of Dr Moewardi General Hospital between March 2017 to August 2017. A total 190 subjects were asked to answer questionnaires about the risk factors and to provide biological samples (blood, urethral and anal swab) to detect STD including syphilis, urethral and rectal gonorrhoea, and non specific urethral and rectal infection. Physical examination was used to diagnose genital warts. There were 67 (35,3 %) STD cases, comprising of syphilis 39 subjects (58.2%), genital warts 25 subjects (37.3%), non specific proctitis 14 subjects (20.9%) and gonorrhoea 1 subject (1.5%). The SEM model indicated that sociodemographic factor has a direct effect to sexual behavior strongly by 0.86 point, and sexual behavior itself has a direct effect to STD prevalence by 0.28 point. Sociodemographic factor however has a negative direct effect to STD prevalence by -0.54 point. The model shows that by controlling sociodemographic factors especially single and low educated individuals may enable us to reduce STD prevalence through control of sexual behavior.

1 INTRODUCTION

Sexually transmitted Diseases (STD) includes many diseases caused by various pathogens, transmitted mainly through sexual intercourse. STD and its complications are one of five main problems of health cares in developing countries (Diez, 2011). New cases of STD each year globally reached 340 million, especially among men and women aged 15-49 years old, with South East Asia in the lead (Newman, 2015).

Men who have sex with men (MSM) are high risk population for acquiring STD. In South East Asia, it is estimated that the number of MSM reached 4-5 million men (WHO, 2010). In Indonesia, there are approximately 0,9-1,2 million MSM, while in Central Java, the number of MSM population is predicted to about 190 – 240 thousand people (Kementrian

Kesehatan Republik Indonesia, 2014). Data from Health Department of Surakarta only stated 6 STD cases in MSM population within April – June 2016 (Kementrian Kesehatan RI, 2016). This shows that STD prevalence in MSM is still an iceberg phenomenon.

Incidence, prevalence and distribution of STD is largely determined by complex role of various risk factors such as demographic factors, economy, social, sexual behaviour and risky health behavior (Aral, 2008). Some factors that may be associated with increasing STD in MSM are loss of fear of HIV transmission and an increase in oral sex role in STD transmission (Illa, 2008). MSM in Indonesia is a minority group and is therefore rarely included in surveillance program by the National Health Department, especially for STD screening. MSM may play a significant role in HIV transmission in the

future, hence it is important for the government authorities to understand the problem and to take appropriate action.

Structural Equation Modelling (SEM) is a multivariate statistical modeling technique widely used in behavioral sciences to describe relationships among observed variables. Path analysis is considered a version of SEM. SEM has a very similar function to multiple regression, however, SEM is considered to be a stronger analysis technique because it involves interaction modelling, nonlinearity, correlated independent variables and multiple latent independent variables measured through many indicators (Schumacker, 2010).

The purpose of this study is to describe a model of how risk factors affect the incidence of STD among MSM population in Surakarta, Indonesia, using SEM. By understanding the model, it may be easier to combat STD among MSM population and to reduce HIV risk transmission.

2 METHODS AND RESULTS

This cross-sectional study was conducted in Surakarta, Indonesia, starting from March 2017 until August 2017. Target population was MSM population in Surakarta. In co-operation with the Health Department of Surakarta, 190 MSM who visited the mobile clinic for HIV screening or the Voluntary Consultation Testing (VCT) Clinic of dr Moewardi General Hospital, were asked to provide biological samples for the screening of syphilis, urethral and rectal gonorrhoeae and non specific urethral and rectal infections. A dermatologist also examined the study subjects physically for the presence of anogenital warts. All MSM who supplied biological samples were asked to voluntarily participate in the behavioral survey using a structured questionnaire. The ethics committee of dr. Moewardi General Hospital has approved this study.

Syphilis infection was examined using a rapid immunochromatographic assay that detects antibodies against *T. pallidum*, SD Bioline Syphilis 3.0® (SD Biostandard Diagnostics Private Limited, Gurgaon, Haryana, India). Screening for anogenital warts was done through physical examination only. Urethral and rectal swabs were taken to screen for urethral and rectal gonorrhoea and non-specific urethral and rectal infections. The survey consists of 19 questions covering the sociodemographic, sexual risk behavior and risky health behavior factors.

The data from the questionnaire were collected and measured statistically using structural equation

modelling (SEM) path analysis type to see which variables predominantly affect the dependent variable, which were STD infection. Statistical analysis were considered significant if p value < 0.05 , with a 95% confidence interval. The statistical analysis was done using AMOS® for Windows.

From 190 subjects, there were 67 (35.3%) cases of STD, comprising of syphilis 39 subjects (58.2%), genital warts 25 subjects (37.3%), non specific proctitis 14 subjects (20.9%) and gonorrhoea 1 subject (1.5%) (Table 1). Data for sociodemographic factor, sexual risk behavior and risky health behavior factor can be seen in Table 2.

Model specification with SEM using path analysis consist of 19 independent variables categorized into three risk factors, the sociodemographic, sexual behaviour risk and risky health behaviour factor. Our model indicated $p = 0.160$, $p > 0.05$, $CMIN = 1,114 < 2$; $GFI = 0,920 > 0,90$; $RMSEA = 0,025 < 0,05$; $RMR = 0,043 < 0,05$ which resembled that the model fits the empirical data well. The model indicated that sociodemographic factor has a direct effect to sexual behaviour strongly by 0.86 point, and sexual behaviour itself has a direct effect to STD prevalence by 0.28 point. Sociodemographic factor however has a negative direct effect to STD prevalence by -0.54 point. Marital status (-0.84) and education level (-0.33) has a negative effect on sociodemographic factor. The number of sexual partner within 1 year also has a negative effect on sexual behaviour (-1.65). Sexual orientation (0.56) and previous HIV examination (0.42) had a strong positive effect on sexual behaviour. There was correlation between the number of sexual partner within 1 year and sociodemographic factor (0.20), and also the correlation between place to meet partner and STD prevalence (0.17). In this study, no significant correlation between risky health behaviour and STD prevalence were found (Figure 1).

3 DISCUSSION

This study showed that the prevalence of STD in Surakarta is comparable to a study done by Rumana et al (2013) in cities such as Tangerang, Jogjakarta and Makassar in 2009, which were 32% of 599

Table 1: Subjects Description of the study.

	N (%)
Sexually Transmitted Disease cases	67 (35.3)
Syphilis	39 (58.2)
Genital Warts	25 (37.3)
Non Specific Proctitis	14 (20.9)
Gonorrhea	1 (1.5)

Table 2: Risk factors for Sexually Transmitted Diseases.

Variable	Frequency (N)	%	Variable	Frequency (N)	%
Sociodemographic factor			Sexual behaviour		
Age			Age at first sex		
< 25 years	32	16,8	< 20 years	105	55,3
25 – 34 years	77	40,5	≥ 20 years	85	44,7
≥ 35 years	81	42,6			

Education			Number of sexual partner until now		
None	1	0,5	1 - 10 people	100	52,6
Primary School	18	9,5	11-49 people	51	26,8
Junior High School	32	16,8	≥ 50 people	39	20,5
Senior High School	104	54,7			
University	35	18,4			
Employment			Number of sexual partner within the past year		
Civil Servant	3	1,6	None	36	18,9
Private	105	55,3	< 5 people	118	62,1
Employee	42	22,1	≥ 5 people	36	18,9
Student	9	4,7			
Manual labor	19	10,0			
Farmer	1	0,5			
Not working	9	4,7			
Retired	2	1,1			
Marital status			Sexual orientation		
Single	143	75,3	Homosexual	81	42,6
Married	27	14,2	Bisexual	109	57,4
Divorced	11	5,8			
Widow	9	4,7			
Risky Health Behaviour Factor			Condom use consistency		
			Yes	58	30,5
			No	132	69,5
Smoking			Use of sex toys		
Yes	96	50,5	Yes	2	1,1
No	94	49,5	No	188	98,9
Drinks Alcohol			Previous STI history		
Always	3	1,6	Yes	22	11,6
Sometimes	40	21,1	None	168	88,4
Rarely	13	6,8	Previous HIV examination		
Never	134	70,5	Yes	78	41,1
			None	112	58,9
History of drugs abuse			Sexual abuse		
Yes	17	8,9	Yes	51	26,8
No	173	91,1	No	139	73,2
			Paid to do sexual intercourse		
			Yes	66	34,7
			No	124	65,3

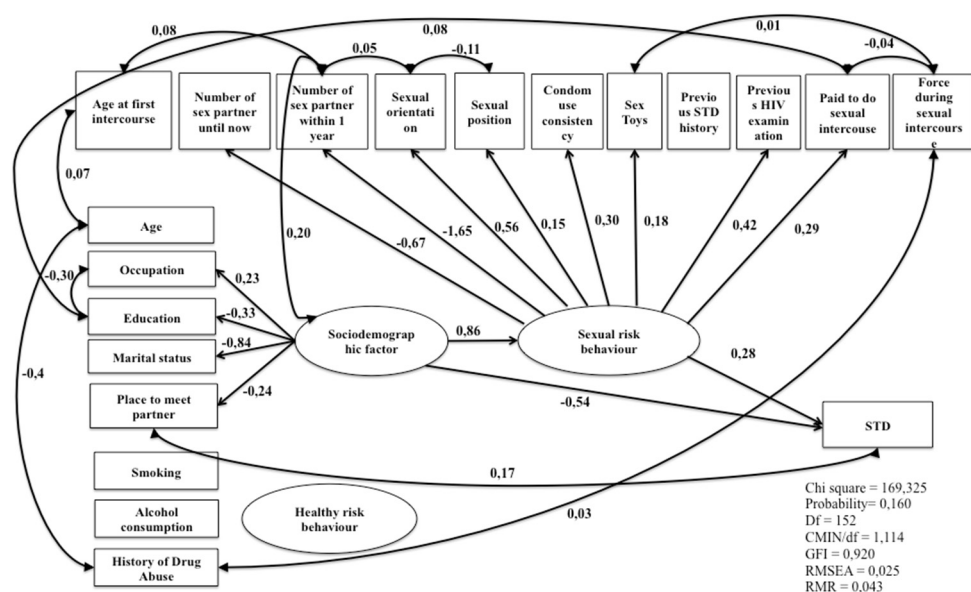


Figure 1. Path analysis of risk factors for STD.

MSM subjects (Rumana, 2013). However, the number of syphilis cases in this study is much higher than a study done by Morineau et al (2011) with 4.3% of 749 MSM in Bandung (Morineau, 2011).

The high number of syphilis cases in Surakarta demonstrated that syphilis may be a hidden disease, with a lot of MSM population unaware of having this disease. The low number of non specific proctitis in this study may be due to a difference in examination technique, where this study only used simple laboratory examination using gram examination from penile and rectal swab, while study such as Morineau et al (2011) indicated a high prevalence of rectal chlamydia and rectal gonorrhoea using PCR examination which is more accurate in detecting *C. trachomatis* and *N. gonorrhoea* (Morineau, 2011).

The data from Health of Department of Surakarta indicates only 6 cases of STD within April – June 2016 (Kementrian Kesehatan RI, 2006), while our study shows quite a lot of STD cases. This shows the importance of creating a program to screen STD regularly especially in high risk population such as MSM so that any STD detected can be intervened as early as possible to cut the transmission of HIV.

The SEM model indicated that risk factors for STD are dependent to each other, hence to fight STD, one must consider these risk factors as a whole, instead of just handling one risk factor only. For example, path analysis indicates that the most influential sociodemographic factors are marital

status and education, especially those who are single and low educated. The most influential sexual behaviour factor is number of sexual partner within 1 year, sexual orientation and previous HIV examination. By looking at this model, we can conclude that by controlling sociodemographic factor such as the low educated and single MSM, may reduce STD prevalence through control of sexual behaviour.

Some limitation of this study includes a small number of samples and the simple physical and laboratory examination used to diagnose STD. There is also a chance of recall bias when the subjects were asked to answer questionnaires, for example when they were asked about the number of sex partner until now and age at first sexual intercourse. Variables chosen to describe the model may not cover the complexity of factors affecting STD, for example we have not included variables such as knowledge and perception about STD in this study.

We hoped that this study may be used by the Health Department of Surakarta and Indonesia in generating a regular STD screening program in MSM population. We recommend that non profit organization of MSM population can improve the role of field facilitator in educating clients about the importance of regular STD screening to detect STD as early as possible, so as to reduce HIV transmission.

4 CONCLUSION

The prevalence of STD, especially syphilis is still high in Surakarta, compared to other cities such as Bandung in 2011. Controlling sociodemographic factors especially single and low educated individuals may enable us to reduce STD prevalence through control of sexual behaviour.

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