



The relationship between age and education on syphilis infection among commercial sex workers

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ABSTRACT

Sexually Transmitted Infections (STIs) remain a global public health issue, with syphilis being one of the most prevalent. Syphilis, caused by *Treponema pallidum*, is transmitted through sexual contact and from mother to fetus. It can spread to genital tissues, causing painful sores that impact mobility, daily activities, and income among commercial sex workers (CSWs). This study examines factors associated with syphilis incidence among CSWs. A quantitative study with an observational case-control design was conducted. A total of 129 respondents were selected through purposive sampling with a 1:2 ratio between the case group (43 CSWs diagnosed with syphilis) and the control group (86 CSWs without syphilis). Secondary data were obtained from medical records, while primary data were collected using questionnaires via Google Forms. Data analysis was performed using the Chi-Square test. The findings showed significant associations between age (OR: 7.479; $p = 0.034$) and education level (OR: 3.304; $p = 0.022$) with syphilis incidence. These results highlight the importance of age and education in syphilis occurrence. Targeted health interventions, including better education and improved healthcare access for CSWs, are essential in reducing syphilis cases.

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1. Introduction

Sexually Transmitted Infections (STIs) have long been a public health concern, with diseases such as syphilis and gonorrhea being among the most well-known in Indonesia. As medical science advances, the term has shifted from Sexually Transmitted Diseases (STDs) to STIs to include asymptomatic infections (Fentia et al., 2022). Syphilis, one of the most common STIs, is caused by the bacterium *Treponema pallidum* and can be transmitted through sexual contact as well as from mother to fetus during pregnancy (Gamasatri et al., 2024). The disease progresses through multiple stages, starting with primary syphilis, characterized by painless sores (chancres), followed by secondary syphilis, which causes skin rashes and lesions. If left untreated, the infection can develop into congenital syphilis, leading to severe complications in newborns, including premature birth and birth defects (Balich et al., 2024).

In West Jakarta, Clinic X plays a role in tackling STIs by providing healthcare services for commercial sex workers (CSWs) and other at-risk groups. According to Clinic X's report, from January 2023 to August 2024, a total of 2,540 patient visits were recorded, with CSWs being the largest patient

group, accounting for 1,552 visits (61.10% of all patients). Out of 78 detected syphilis cases, the majority occurred among CSWs, with 68 cases (87.18% of total syphilis cases), while the remaining cases were found in the general population. A preliminary study indicated that syphilis infections impact CSWs' ability to work, with some cases causing painful sores that hinder mobility (Aliwardani et al., 2021).

According to WHO (2020), the prevalence of syphilis among women is 1.7 per 1,000 people and 1.6 per 1,000 people among men in the 15-49 age group. Among Men Who Have Sex with Men (MSM), the prevalence rate is significantly higher, reaching 60 per 1,000 people. In Indonesia, data from Dinkes (2022) reported that out of 5,879 individuals tested for syphilis, 407 were positive, with CSWs being the most vulnerable group.

Social and economic factors significantly contribute to the high prevalence of syphilis among CSWs. Economically, many CSWs may come from lower-income backgrounds with limited access to education and healthcare, which affects their knowledge and ability to adopt preventive measures. The introduction mentions that lower education levels among younger CSWs are linked to limited STI knowledge and poor prevention practices. Socially, the criminalization and stigmatization of prostitution in Indonesia, as outlined in Article 296 of the Indonesian Penal Code and Jakarta Regional Regulation No. 8 of 2007, hinder the implementation of effective STI prevention programs. These legal and societal constraints prevent CSWs from accessing regular healthcare and education about STIs, thus increasing their vulnerability to infections like syphilis.

Age and education level are risk factors contributing to the spread of STIs, including syphilis, among CSWs. Age influences awareness and experience in STI prevention, while education plays a role in understanding risks and protective measures. Previous research indicates that younger CSWs with lower education levels tend to have limited knowledge about STIs and are more vulnerable to infection due to a lack of awareness and ineffective prevention practices (Guslia, 2018; Nari et al., 2015).

Cultural factors also play a considerable role in influencing the awareness and prevention behavior of CSWs regarding syphilis. In Indonesia, prostitution is viewed as a violation of social norms, leading to stigma and marginalization of CSWs. This cultural perception, reinforced by legal sanctions, limits open discussions about sexual health and reduces opportunities for CSWs to receive accurate information and education about STIs. Consequently, CSWs may not fully understand the risks of syphilis or the importance of consistent prevention methods. These cultural barriers complicate the delivery of preventive healthcare services, thereby affecting CSWs' awareness and behaviors related to STI prevention.

In Indonesia, legal regulations still consider prostitution a violation of social norms, posing challenges to STI prevention and management. Article 296 of the Indonesian Penal Code (KUHP) states that anyone facilitating prostitution can be imprisoned, while Jakarta Regional Regulation No. 8 of 2007 imposes sanctions on both CSWs and their clients. These legal constraints make it difficult to implement preventive healthcare programs for CSWs (KUHP, 1946; Jakarta Regional Regulation No. 8, 2007).

The high prevalence of syphilis among CSWs highlights the need for further research into the factors contributing to this infection. Beyond individual health risks, syphilis can cause severe complications in newborns of infected mothers. Therefore, this study aims to analyze the factors associated with syphilis infection among CSWs visiting Clinic X in West Jakarta from 2023 to 2024.

2. Methods

This study employs an analytical observational approach using a case-control design, comparing case and control groups based on exposure to syphilis (Masturoh & Nauri, 2018). The data consists of primary data collected through questionnaires administered to CSWs diagnosed with syphilis at Clinic X in West Jakarta in 2024, as well as secondary data from medical records of CSWs diagnosed with syphilis (Gamasatri et al., 2024). The research was conducted at Clinic X in West Jakarta between October 2024 and February 2025.

The study population comprises all CSWs who visited Clinic X in West Jakarta from January 2023 to August 2024, totaling 1,552 visits. Of these, 68 individuals were diagnosed with syphilis (case population), while the remaining 1,484 were not (control population). Initially, 68 individuals were

selected as case samples, but after reviewing medical records, only 43 met the criteria, as 25 lacked valid contact information.

The sample was selected using purposive sampling based on specific criteria, such as data completeness and willingness to be contacted. Although purposive sampling is a non-probability technique, this study applies it in a structured and criteria-based manner to improve representativeness. Individuals were selected based on confirmed syphilis status (case group) or absence thereof (control group), with demographic matching on key variables such as age and education. When eligible respondents were unreachable, they were replaced by others with similar characteristics, preserving consistency in the sample and enhancing internal validity. This ensures that the sample adequately reflects the CSW population served by Clinic X.

The control sample was drawn from the control population, ensuring similarity in characteristics such as age and education but without syphilis infection. After applying exclusion criteria, 971 individuals remained eligible as potential control samples. However, 12 were unreachable and were replaced by other individuals with similar characteristics. Ultimately, 86 individuals were selected as control samples, maintaining a 1:2 ratio with the case group.

Data collection was conducted through direct or online contact, with respondents providing informed consent before completing the questionnaire. To minimize bias in questionnaire responses, this study used both primary and secondary data. Primary data were collected via questionnaires, while secondary data from patient medical records were used to cross-verify responses, improving accuracy and reliability. Respondents were selected based on verified contact information and willingness to participate, which helped reduce self-selection bias. Additionally, informed consent and data confidentiality measures were implemented to reduce social desirability bias and encourage honest responses.

Secondary data was obtained from Clinic X's medical records to ensure information accuracy. Inclusion criteria for the control group required willingness to participate, while exclusion criteria included CSWs without recorded contact information or those who were unreachable.

Data collection involved distributing questionnaires via Google Forms to measure independent variables such as age and education. Additionally, observation sheets from patient medical records were used as secondary data. The data collection process began with obtaining approval from the responsible physician at Clinic X, followed by a review of patient records from January 2023 to August 2024 to identify respondents meeting inclusion and exclusion criteria. Once approval was obtained, the questionnaire link was sent to respondents while maintaining data confidentiality.

Data analysis aimed to understand the factors associated with syphilis infection among CSWs at Clinic X in West Jakarta. Univariate analysis was performed to describe the dependent variable (syphilis) and independent variables (age and education). Bivariate analysis was conducted to examine the relationship between education and syphilis infection using the Chi-Square test at a 95% confidence level ($\alpha = 0.05$). The p-value was calculated using two methods: Continuity Correction for 2x2 tables with $E > 5$ and Fisher's Exact Test for 2x2 tables with $E < 5$.

The results were considered significant if p-value < 0.05 , indicating a relationship between the independent and dependent variables. Conversely, if p-value ≥ 0.05 , no significant relationship was found. The Odds Ratio (OR) was used to assess the association between variables, where OR = 1 indicated no association, OR > 1 represented a risk factor, and OR < 1 suggested a protective factor.

3. Results and Discussion

Univariate Analysis Results

The univariate analysis was conducted to determine the frequency distribution of respondent characteristics in this study. This analysis includes age and education level variables, categorized according to predetermined risk groups. The obtained data are presented in Table 1 below.

Table 1.
Frequency Distribution of Characteristics of CSWs Visiting Clinic X, West Jakarta, 2023–2024

Variable	Frequency (F)	Percentage (%)
Age		
At-risk (≤ 29 years)	115	89,1
Not at-risk (> 29 years)	14	10,9
Education		
Primary & Secondary Education	93	72,1
Higher Education	36	27,9
Total	129	100,0

In the age variable, respondents were categorized into two groups: at-risk and not at-risk. Respondents aged ≤ 29 years were classified as at-risk, while those aged > 29 years were categorized as not at-risk. Based on Table 1, among the 129 respondents in this study, the at-risk age group (≤ 29 years) had the highest proportion, with 115 respondents (89.1%), consisting of commercial sex workers (CSWs) who underwent examinations at Clinic X, West Jakarta, between 2023 and 2024.

Additionally, respondents' education levels were analyzed to describe the distribution of syphilis infection cases. The education variable was categorized based on the respondents' last education level, namely Primary & Secondary Education and Higher Education. Based on Table 1, among the 129 respondents, the group with Primary & Secondary Education had the highest proportion, with 93 respondents (72.1%), consisting of CSWs who underwent examinations at Clinic X, West Jakarta, between 2023 and 2024.

Bivariate Analysis Results

Bivariate analysis was conducted to examine the relationship between the characteristics of commercial sex workers (CSWs) visiting Clinic X, West Jakarta, and the incidence of syphilis infection between 2023 and 2024. The analyzed characteristics include respondents' age and education level. The statistical test used in this analysis was adjusted based on the data distribution for each variable. The bivariate analysis results are presented in Table 2 below.

Table 2.
Relationship Between CSW Characteristics and Syphilis Incidence at Clinic X, West Jakarta, 2023–2024

Variable	Syphilis Infection				Total	p-value	OR 95% CI
	Yes		No				
	F	%	F	%			
Age							
At-risk (≤ 29 years)	42	97,7	73	84,9	115	0,034	7,479
Not at-risk (> 29 years)	1	2,3	13	15,1	14		(0,945-59,218)
Education							
Primary & Secondary Education	37	86	56	65,1	93	0,022	3,304
Higher Education	6	14	30	34,9	36		(1,252-8,714)

Based on Table 2, the highest proportion of syphilis infection cases was found in the at-risk group, with 42 respondents (97.7%). Meanwhile, among those who were not infected with syphilis, the highest proportion was also in the at-risk group, with 73 respondents (84.9%). Fisher's Exact Test was used in this analysis because one cell had an expected value > 5 . The test result showed a p-value of 0.034, which is smaller than $\alpha = 0.05$. Thus, it can be concluded that there is a significant relationship between respondents' age and the incidence of syphilis among CSWs visiting Clinic X, West Jakarta, between 2023 and 2024. The analysis also showed an Odds Ratio (OR) value of 7.479 with a 95% CI of 0.945–59.218. This indicates that CSWs in the at-risk age group are 7.479 times more likely to contract syphilis than those in the not-at-risk age group.

Based on Table 2, the highest proportion of syphilis infection cases was found among those with Primary & Secondary Education (\leq High School), with 37 respondents (86%). Meanwhile, among those who were not infected with syphilis, the highest proportion was also in the Primary & Secondary Education group, with 56 respondents (65.1%). The statistical test used was Continuity Correction, applied because there were no expected values <5 in the 2×2 table. The result showed a p-value of 0.022, which is smaller than $\alpha = 0.05$. Thus, it can be concluded that there is a significant relationship between respondents' education level and syphilis incidence among CSWs visiting Clinic X, West Jakarta, between 2023 and 2024. The analysis showed an Odds Ratio (OR) value of 3.304 with a 95% CI of 1.252–8.714. This indicates that CSWs with Primary & Secondary Education are 3.304 times more likely to contract syphilis than those with Higher Education.

Univariate Analysis Discussion

- a. Age profile of sex workers visiting clinic X in West Jakarta (2023-2024), a study conducted on commercial sex workers (CSWs) at Clinic X in West Jakarta during 2023-2024 revealed that the majority of respondents were under 29 years old, with 115 out of 129 respondents (89.1%) falling within this age group. This finding aligns with the study by Tampubolon et al. (2024), which found that most CSWs were under 29 years old (51.3%). Younger individuals are associated with a higher risk of sexually transmitted infections (STIs), as demonstrated by the study of Erawati et al. (2023), which revealed that younger individuals are more susceptible to STIs and HIV/AIDS due to easier access to clients.

The dominance of young CSWs in urban areas is influenced by various factors, including market demand for younger individuals deemed more attractive, economic pressure, and an active recruitment system that targets individuals aged 18-30 years. Interviews with recruitment agents revealed that this age restriction makes younger individuals more vulnerable to entering the industry, enticed by high earnings and perceived ease of work. Besides economic factors, cultural influences also play a role, as found in interviews with doctors working in nightlife settings. In certain regions with high human trafficking rates, parents even encourage their children to become CSWs for economic reasons.

The high number of young CSWs is also linked to risky sexual behavior patterns. Wu et al. (2019) found that the <25 -year-old age group had the highest proportion in the high-risk age category among adult CSWs (51.3%). Additionally, younger individuals tend to change partners more frequently and engage in unprotected sex, as stated by Agustini and Damayanti (2023). Therefore, economic, social, and cultural factors contribute to the high number of young CSWs, making it a complex issue that requires a comprehensive approach for resolution.

- b. Education profile of sex workers visiting clinic X in West Jakarta (2023-2024), a study on 129 CSWs visiting Clinic X in West Jakarta during 2023-2024 showed that the majority of respondents had primary and secondary education, with 93 individuals (72.1%) falling into this category. This finding is consistent with Aridawarni (2014), who found that STI incidence was higher among CSWs with elementary to junior high school education (26.03%) and senior high school education (7.53%). Similarly, Rusli et al. (2015) reported that CSW education levels varied across cities, with high school and tertiary education levels below 10%, while junior high school education ranged between 23.1%–42.8% and elementary school education between 20%–40%, with the highest proportion in Timika (40%).

Notoadmojo (2010) stated that higher education helps individuals absorb information and apply it in life, including in health matters, while lower education limits access to better job opportunities. Lestari (2010) also emphasized that health knowledge influences behavior, including STI risks. Interviews with respondents revealed that many CSWs dropped out of school due to financial constraints, forcing them to seek income at an early age.

Some continued their education but were eventually lured by the prospect of high earnings as CSWs. Economic hardship remains the primary driver behind this decision. Agustini and Damayanti (2023) highlighted that financial pressure can push individuals into sex work, ultimately increasing disease transmission risks in this population.

Bivariate Analysis Discussion

- a. Relationship between age and syphilis infection among sex workers visiting clinic X in West Jakarta (2023-2024). Analysis revealed a significant relationship between CSWs' age and syphilis incidence at Clinic X in West Jakarta (2023-2024), with high-risk age groups being more vulnerable to syphilis infection. A study by Huamaní-Chavez et al. (2024) also found that CSWs' age correlates with syphilis incidence, with an average age of 27.9 years, sexual activity starting at 16 years old, and 2.9 years of experience in sex work. Yuindartanto et al. (2022) stated that age is related to syphilis and HIV prevalence in Indonesia. Halatoko et al. (2017) reported a syphilis prevalence of 2.2% among CSWs, with an average age of 28.6 years, where openly working CSWs had a fourfold higher risk compared to those working discreetly.

According to García-Cisneros et al. (2021), young adults (20-35 years) are more susceptible to syphilis due to high sexual activity, risky behavior, and inconsistent condom use. While younger individuals have stronger immunity, their high exposure to sexual risks increases their likelihood of contracting syphilis. Globally, peak syphilis incidence occurs among men aged 25-29 years and women aged 20-24 years.

Barriers to healthcare access, particularly for CSWs in remote areas, exacerbate the situation as clinics are more centralized in major cities. Young CSWs often have limited STI knowledge and struggle to negotiate safe sex practices due to economic pressure. Therefore, age-based sexual education through social media, interactive seminars, and community campaigns is essential. Additionally, community-based healthcare services, such as mobile clinics, can facilitate routine screenings and treatment without stigma. This approach aims to improve young CSWs' awareness of syphilis prevention and reduce infection rates.

- b. Relationship between education and syphilis infection among sex workers visiting clinic X in West Jakarta (2023-2024). Analysis identified a significant relationship between respondents' education levels and syphilis infection among CSWs visiting Clinic X in West Jakarta during 2023-2024. CSWs with primary and secondary education faced a higher risk of syphilis infection compared to those with higher education. A study by Panonsih et al. (2020) showed that education level correlates with STI awareness in specific groups, while Astuti (2018) and Erawati et al. (2023) found that higher education levels were associated with better STI prevention knowledge and practices. CSWs with lower education levels were less consistent in condom use, with 65% of those with education below high school failing to use condoms regularly compared to 45% of those with higher education.

Most CSWs visiting Clinic X had a junior or senior high school education, reflecting the impact of low education and economic conditions on their lives. Vallen (2022) stated that financial constraints, family responsibilities, and social norms are the primary reasons for low education among CSWs. Many women are systematically recruited by agents from remote areas with false promises of high-paying jobs, only to end up trapped in prostitution due to financial limitations and limited formal job opportunities. Fajrin and Triwijaya (2019) confirmed that women are often victims of sexual exploitation in prostitution, as seen in widespread female trafficking under the guise of employment opportunities.

Organizations such as BP3A and NGOs have attempted to address human trafficking and sexual exploitation issues but still face resource constraints, with efforts more focused on mitigation than prevention. Prevention programs, such as skills training and economic empowerment, need to be expanded and better integrated with educational institutions to offer alternatives for women vulnerable to exploitation.

To mitigate the link between CSWs' education and syphilis infection, a holistic approach is needed, including continuous education using easy-to-understand visual media and group discussions to enhance STI awareness and safe sexual practices. Accessible healthcare services, such as mobile clinics, are also essential for routine screenings and counseling. Additionally, skills training and continued education programs can help CSWs find more stable job alternatives. This approach is expected to reduce syphilis infection rates and improve CSWs' quality of life.

4. Conclusion

Based on the study conducted on 129 commercial sex workers (CSWs) at Clinic X in West Jakarta during the 2023–2024 period, this research concludes that the majority of respondents (89.1%) were in an age group at risk of syphilis infection, while 10.9% were in a non-risk age group. Most respondents (72.1%) had primary and secondary education, whereas 27.9% had higher education. There is a significant relationship between age and syphilis infection (p -value = 0.034) as well as between education level and syphilis infection (p -value = 0.022). However, this study has limitations, as it only analyzes age and education, excluding other potential influencing factors such as sexual behavior, personal hygiene, and knowledge about sexually transmitted diseases. Additionally, the case-control design presents a risk of recall bias, which may impact the validity of the results. Despite these limitations, this study provides valuable insights for healthcare institutions to develop targeted interventions, raises public awareness about syphilis prevention, and serves as a reference for future researchers. To enhance syphilis prevention and treatment, educational programs should be tailored to respondents' understanding using simple media, and peer education can be implemented to improve awareness. Prevention efforts should focus on promoting safe behavior, increasing risk awareness, and implementing relevant interventions. Accessible healthcare services, such as free or low-cost syphilis testing and counseling, are essential to encourage CSWs to seek medical support. Additionally, empowerment initiatives through skill-based training, such as culinary arts or entrepreneurship, can offer safer job alternatives while promoting health awareness. Collaboration with NGOs is recommended to maximize the impact of these initiatives. The findings of this study can be utilized to develop a community-based intervention model by identifying risk groups—such as younger CSWs and those with lower education—and focusing on peer-led education and accessible health services. Integrating STI prevention into broader empowerment programs allows for sustainable behavioral change. Future research is encouraged to explore additional variables, such as condom use consistency, frequency of health checks, the role of regular partners, and levels of STI knowledge. Including these variables will deepen the understanding of behavioral factors contributing to syphilis risk and help design more effective, data-driven intervention strategies.

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