Vol. 37 / No. 2 / August 2025
Sinta 2 (Decree No: 200/M/KPT/2020)
Online ISSN : 2549-4082 ; Print ISSN : 1978-4279
Available online at https://e-journal.unair.ac.id/BIKK

Berkala Ilmu Kesehatan Kulit dan Kelamin

Original Article

Periodical of Dermatology and Venereology

# Sexually Transmitted Diseases Determinant among Online Sex Workers in Indonesia

**Gabriella Marchelita Ginting, Ermi Girsang, Sri Wahyuni Nasution**

*Magister of Public Health Program, Faculty of Medicine, Dentistry, and Health Science Prima Indonesia University, Medan – Indonesia*

**ABSTRACT**

**Background:** Since the beginning of Indonesia's Reformation era, hundreds of localizations have been closed to control prostitution and human trafficking. However, these efforts have not had much impact because sex workers have now become sporadic with transactions through social media, making it harder to monitor and control. **Purpose:** This study aims to determine the determinants of sexually transmitted diseases in online sex workers. **Methods:** This study is a quantitative study with a cross-sectional design, and it was conducted online. The population in this study was online sex workers; their population is unknown. The sample in this study was selected using the snowball sampling technique. Number of samples used in this study was 593. The data in this study were collected using valid and reliable questionnaires filled out online by respondents. Data were analyzed using the chi-square test. **Result:** This study found that the majority of online sex workers were female (79.8%) and heterosexual (81.1%). However, only 56% of respondents always wear a condom, and 3.2% of respondents never wear one during their service. In addition, the majority of respondents knew their HIV status as HIV negative (92.7%) and had experienced at least one type of sexually transmitted infection (99.3%). Of all variables that were measured on respondents, only sexual orientation ($p<0.001$) was significantly associated with sexually transmitted diseases in general. **Conclusion:** STIs remain prevalent among online sex workers in Indonesia. Risky sexual behaviors, particularly inconsistent condom use, continue to play a major role in sustaining infection rates in this population.

**Keywords:** Condom, online sex worker, STDs, telegram, x/twitter.

Correspondence: Gabriella Marchelita Ginting, Magister of Public Health Program, Faculty of Medicine, Dentistry, and Health Science Prima Indonesia University, Jl. Sampul No.3, Medan 20118, Indonesia, Phone: +6287780901300, Email: gabrielaginting99@gmail.com.

| Article info |
Submited: 26-12-2024, Accepted: 08-04-2025, Published: 31-07-2025


## BACKGROUND

Sex workers, or prostitutes, can be defined as individuals who earn money, goods, or other economic incentives by providing sexual services.[1,2] The basic principle of sex work is that there is an agreement between the sex worker and the client regarding the type of sexual activity and the compensation provided, thus emphasizing the concept of consent.[3] Commercial sex work is often referred to as the oldest profession in the world, believed to have existed since the Sumerian civilization to Ancient Rome.[4] The International Union of Sex Workers estimates that there are around 52 million commercial sex workers worldwide, of whom 80% are women.[5] In the late 1950s, the Indonesian government changed the paradigm of handling prostitution and sex workers by regulating and supervising brothels in various regions in Indonesia, often referred to as localization. These localizations made it easier for local governments and the Ministry of Social Affairs to supervise sex workers and prevent the spread of sexually transmitted diseases.[6] However, since Reformation Era, the Indonesian government and various local governments have attempted to close various localizations in Indonesia, such as Dolly in Surabaya, Kramat Tunggak in Jakarta, Saritem in Bandung, Tanjung Elmo in Jayapura, and hundreds of other localizations throughout Indonesia.[6,7] The closure of hundreds of localizations did not solve prostitution and sex work, which, with the support of technological developments and ease of communication, has moved into the realm of online sex work through various social media platforms.[8–11]


DOI : 10.20473/bikk.V37.2.2025.110-118

Unlike traditional sex workers who work in localization or brothels, online sex workers do not have a fixed place of operation but move from place to place.[12] In addition, online sex work generally involves direct communication and negotiation between sex workers and clients, often through social media (X/Twitter, Instagram, Facebook), dating apps (Tinder, Grindr), or online conversation apps (Line, MiChat, KakaoTalk).[13-16] Sex workers who offer their services via the Internet constitute a highly mobile population that is challenging for authorities to monitor and control.[13]

One of the occupational risks that sex workers have is the risk of contracting sexually transmitted diseases. The Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) categorize sex workers into a special interest group in the surveillance and treatment of sexually transmitted diseases.[2] This is undoubtedly because sex workers are constantly changing sexual partners, thus increasing the risk of contracting sexually transmitted diseases.[2] However, these risks can be mitigated as much as possible by implementing preventive measures and regular check-ups.[2] The closure of hundreds of localizations and the migration of sex workers to social media make surveillance of sexually transmitted diseases among commercial sex workers very difficult to conduct. Therefore, research on the determinants of sexually transmitted diseases in online sex workers is fundamental to understanding the actual condition of sexually transmitted diseases among sex workers.

## METHODS

This study is a descriptive quantitative study using a cross-sectional research design. The study focused on online sex workers, but the exact population size was unknown. The sample size in this study was calculated using the Lemeshow formula for an unknown population, and a minimum sample size of 384 was obtained. The actual sample in this study was 593 samples. Data was collected using a valid and reliable questionnaire adapted from Jaworski and Carey (2007) and Chanda *et al.* (2017).[14,15] The questionnaire was distributed for 14 days (3-17 August 2024) to social media groups of sex workers. The data in this study underwent chi-square analysis. The Prima Indonesia University Health Research Ethics Committee has reviewed and approved this research through letter No. 068/KEPK/UNPRI/VII/2024

## RESULT

The average age of the respondents in this study ranged from 26-30 years old (33.9%) to 21-25 years old (30.8%), with the majority being female (79.8%). Although sex work is synonymous with female sex work, 20.2% of respondents in this study were male online sex workers. The majority of respondents were domiciled in Denpasar (21.9%), and the fewest were domiciled in Batam City (4.6%) and Bogor (4.7%). In the context of Bogor, respondents did not expressly state their domicile location as the city of Bogor or the regency of Bogor (Table 1).

The majority of respondents in this study are individuals whose last formal education is senior high school (64.4%), while the rest are undergraduates (S1). As many as 37.8% of respondents in this study belong to the Javanese ethnic group, followed by the Balinese ethnic group (19.7%). However, in the context of the Javanese ethnic group, the respondents did not specifically mention the sub-ethnic group they belonged to. The majority of respondents in this study have never been married (82.8%) and have a monthly income of less than IDR 10,000,000 (ten million rupiah) per month (67.1%) (Table 1). More than half of the respondents in this study had their first sexual intercourse after the age of 21 (51.6%) and became sex workers after the age of 21 (66.3%). A total of 105 respondents (17.7%) stated that they had their first sexual intercourse and became sex workers at the same age. Respondents in this study were heterosexual (81.1%) and bisexual (10.6%), and only 8.3% of respondents were homosexual. Almost half of the respondents in this study have worked as sex workers for more than six years (45.2%), and only 19.6% of respondents have worked as sex workers for less than two years (Table 2).

The majority of respondents in this study used Telegram as the platform where they offered their services (46.9%), followed by X (formerly known as Twitter) (35.6%), and only 3% of the respondents used the dating app Tinder. Most respondents who participated in this study used hotels as a place to transact with clients (51.6%) (Table 2). In the type of sexual service offered by the respondents, all respondents offered handjobs. Meanwhile, 481 out of 593 respondents (81.1%) provided intercourse, and 492 out of 593 respondents (83.0%) also offered oral sex to their clients. A total of 23.6% of respondents also offered anal sex. Meanwhile, 8.8% of respondents accept group sex requests, defined as sex involving more than two people (Table 2).

Among all respondents, the majority charged IDR 500,000 (47.6%), IDR 750,000 (20.9%), and even IDR 1,500,000 (20.4%) per encounter. The majority of

respondents claimed always to use condoms during sexual intercourse (56.0%), but there were 19 respondents (3.2%) who never used them at all. The majority of respondents had a total number of sexual partners of more than 100 people, 168 respondents (28.3%) had around 300-399 people, and 161 respondents (27.2%) had 400-499 people. The number of respondents who had less than 100 sexual partners was only about 22.6% (Table 2).

**Table 1.** Respondents' sociodemographic characteristics

| Characteristic | Frequency | Percentage |
|---|---|---|
| Age | | |
| ≤20 Years | 61 | 10.3% |
| 21-25 Years | 183 | 30.8% |
| 26-30 Years | 201 | 33.9% |
| >31 Years | 148 | 25.0% |
| Sex | | |
| Male | 120 | 20.2% |
| Female | 473 | 79.8% |
| Domicile | | |
| Bandung | 64 | 10.8% |
| Batam | 27 | 4.6% |
| Bogor | 28 | 4.7% |
| Denpasar | 130 | 21.9% |
| Jakarta | 81 | 13.7% |
| Malang | 34 | 5.7% |
| Medan | 41 | 6.9% |
| Padang | 54 | 9.1% |
| Semarang | 38 | 6.4% |
| Surabaya | 54 | 9.1% |
| Yogyakarta | 42 | 7.1% |
| Education | | |
| Senior High School | 382 | 64.4% |
| Undergraduate | 211 | 35.6% |
| Ethnicity | | |
| Acehnese | 5 | 0.8% |
| Ambonese | 2 | 0.3% |
| Balinese | 117 | 19.7% |
| Batak | 49 | 8.3% |
| Betawi | 15 | 2.5% |
| Bugis | 7 | 1.2% |
| Javanese | 224 | 37.8% |
| Manado | 10 | 1.7% |
| Malay | 15 | 2.5% |
| Minangkabau | 59 | 9.9% |
| Nias | 16 | 2.7% |
| Sundanese | 74 | 12.5% |
| Marital Status | | |
| Not Married | 491 | 82.8% |
| Married | 65 | 11.0% |
| Divorced | 37 | 6.2% |
| Monthly income | | |
| Under IDR 10.000.000 | 398 | 67.1% |
| IDR 10.000.000- IDR 20.000.000 | 175 | 29.5% |
| Above IDR 20.000.000 | 20 | 3.4% |
| Total | 593 | 100.0% |

IDR: Indonesia Rupiah

**Table 2.** Respondents Sexual and Sex Working History

| Characteristic | Frequency | Percentage |
|---|---|---|
| Age of first sexual intercourse | | |
| < 21 Years Old | 287 | 48.4% |
| ≥ 21 Years Old | 306 | 51.6% |
| Age becomes a sex worker | | |
| < 21 Years Old | 200 | 33.7% |
| ≥ 21 Years Old | 393 | 66.3% |
| Sexual Orientation | | |
| Heterosexual | 481 | 81.1% |
| Homosexual | 49 | 8.3% |
| Bisexual | 63 | 10.6% |
| Length of time worked as a sex worker | | |
| Less than 2 Years | 116 | 19.6% |
| 3-5 Years | 209 | 35.2% |
| More than 6 Years | 268 | 45.2% |
| Transaction Platform | | |
| Telegram | 278 | 46.9% |
| Twitter/X | 211 | 35.6% |
| MiChat | 86 | 14.5% |
| Tinder | 18 | 3.0% |
| Place of service | | |
| Sex worker residence | 182 | 30.7% |
| Hotel | 306 | 51.6% |
| Client's residence | 105 | 17.7% |
| Type of service offered | | |
| Vaginal sex | 481 | 81.1% |
| Anal sex | 140 | 23.6% |
| Oral sex | 492 | 83.0% |
| Handjob | 593 | 100.0% |
| Group sex | 52 | 8.8% |
| Average fee per transaction | | |
| IDR 300.000 | 1 | 0.2% |
| IDR 400.000 | 35 | 5.9% |
| IDR 500.000 | 282 | 47.6% |
| IDR 750.000 | 124 | 20.9% |
| IDR 1.000.000 | 30 | 5.1% |
| IDR 1.500.000 | 121 | 20.4% |
| Condom Utilization | | |
| Always | 332 | 56.0% |
| Often | 180 | 30.4% |
| Sometimes | 62 | 10.5% |
| Never | 19 | 3.2% |
| Total clients | | |
| Less than 100 | 134 | 22.6% |
| 100-199 | 24 | 4.0% |
| 200-299 | 7 | 1.2% |
| 300-399 | 168 | 28.3% |
| 400-499 | 161 | 27.2% |
| More than 500 | 99 | 16.7% |
| Total | 593 | 100.0% |

IDR: Indonesia Rupiah

**Table 3.** History of screenings and STDs

| Characteristics | Frequency | Percentage |
|---|---|---|
| History of screening | | |
| Yes, I had been screened | 593 | 100.0% |
| HIV status | | |
| HIV negative | 550 | 92.7% |
| Do not know | 43 | 7.3% |
| History of STDs | | |
| Chlamydia | 393 | 66.3% |
| Gonorrhea | 382 | 64.4% |
| Syphilis | 379 | 63.9% |
| Fungal infection | 475 | 80.1% |
| Genital warts | 191 | 32.2% |
| Herpes | 464 | 78.2% |
| Hepatitis | 44 | 7.4% |
| History of treatment | | |
| Seeking treatment | 589 | 100.0% |
| Complete the treatment | 589 | 100.0% |
| History of using injection narcotics | | |
| Has injecting narcotics | 31 | 5.2% |
| Never injecting narcotics | 562 | 94.8% |
| History of using a shared needle | | |
| Never used shared needle | 31 | 100.0% |
| Total | 593 | 100.0% |

HIV = Human Immunodeficiency Virus; STD = Sexually Transmitted Disease

All respondents in this study had been screened for sexually transmitted diseases such as *Chlamydia* infection, gonorrhea, syphilis, fungal infections, genital warts, herpes, and hepatitis. However, 43 respondents did not know their HIV status (7.3%), indicating that these respondents had never been tested for HIV, while the rest (92.7%) knew their HIV status was HIV negative (Table 3).

experienced at least one type of sexually transmitted infection. Fungal infection was the most common type of sexually transmitted infection experienced by respondents in this study (80.1%), followed by herpes (78.2%), chlamydia (66.3%), gonorrhea (64.4%), and syphilis (63.9%). Of all the respondents in this study, 4 (0.7%) had never experienced a sexually transmitted infection. All respondents who had experienced sexually transmitted infections admitted to seeking treatment for their sexually transmitted diseases and completed their treatment (Table 3).

Of the 593 respondents who participated in this study, 31 respondents (5.2%) were users of injection narcotics, and none of the respondents used shared needles (Table 3).

**Table 4.** Relationship between respondents' sociodemographics, sex, sex work, and their drug use with history of STDs

| Characteristics | Ch | Go | Sy | FI | GW | Hps | Hpt | STD |
|---|---|---|---|---|---|---|---|---|
| Age | .011* | .005* | .154 | .213 | .000* | .553 | .546 | .395 |
| Sex | .585 | .882 | .482 | .212 | .607 | .335 | .669 | .312 |
| Domicile | .427 | .695 | .008* | .675 | .187 | .531 | .197 | .945 |
| Education | .833 | .847 | .070 | .832 | .587 | .546 | .588 | .657 |
| Ethnicity | .068 | .010* | .010* | .688 | .503 | .090 | .507 | .999 |
| Marital status | .949 | .054 | .444 | .583 | .136 | .750 | .265 | .605 |
| Monthly income | .273 | .609 | .500 | .061 | .869 | .035* | .068 | .904 |
| Age of first sexual intercourse | .076 | .747 | 0.541 | 0.697 | 0.784 | .268 | .472 | .052 |
| Age becomes a sex worker | .308 | .486 | 0.264 | 0.632 | 0.653 | .115 | .781 | .152 |
| Sexual orientation | .000* | .000* | .000* | 0.054 | .000* | .170 | .647 | .000* |
| Length of time worked as a sex worker | .000* | .000* | .000* | 0.635 | .000* | .728 | .885 | .589 |
| Transaction platform | .064 | .118 | .237 | 0.080 | .950 | .464 | .202 | .468 |
| Place of service | .835 | .139 | .697 | 0.393 | .448 | .879 | .310 | .554 |
| Vaginal sex | .200 | .852 | .040* | 0.548 | .490 | .355 | .782 | .333 |
| Anal sex | .650 | .659 | .056 | 0.303 | .397 | .045* | .609 | .265 |
| Oral sex | .003* | .001* | .919 | 0.286 | .564 | 0.591 | .530 | .363 |
| Group sex | .047* | .023* | .059 | 0.899 | .074 | 0.809 | .527 | .534 |
| Average fee per transaction | .439 | .740 | .633 | 0.807 | .202 | 0.133 | .815 | .484 |
| Condom utilization | .000* | .000* | .000* | 0.159 | .000* | 0.921 | .144 | .367 |
| Total clients | .000* | .000* | .000* | 0.595 | .007* | 0.362 | .933 | .148 |
| History of using injection narcotics | .178 | .000 | .221 | .589 | .048 | .145 | .833 | .637 |

Ch: Chlamydia; Go: Gonorrhea; Sy: Syphilis; FI: Fungal Infection; GW: Genital Warts; Hps: Herpes; Hpt: Hepatitis; STD: STD as whole. Asterix (*) represented a significant relationship.

The chi-square test showed that factors like gender, education level, and marital status did not relate to whether respondents had any sexually transmitted infections (p>0.05). However, age was linked to cases of chlamydia (p<0.05), gonorrhea (p<0.05), and genital warts (p<0.001). Domicile was associated with the incidence of syphilis in respondents (p<0.05). Ethnicity was associated with the incidence of gonorrhea (p<0.05) and syphilis (p<0.05), and income was associated with the incidence of herpes (p<0.05) (Table 4).

The chi-square test between sexual and prostitution history and the incidence of sexually transmitted infections found that age at first sexual intercourse, age at first prostitution, location of sexual transactions, and service rates were not associated with the incidence of sexually transmitted infections (p>0.05). In contrast, a handjob could not be determined because all respondents performed these services. Chlamydia incidence was associated with sexual orientation (p<0.001), length of time working as a sex worker (p<0.001), genital-oral services (p<0.005), group sex services (p<0.05), history of condom use (p<0.001), and number of sexual partners (p<0.001) (Table 4).

The incidence of gonorrhea among the respondents was associated with sexual orientation (p<0.001), length of time working as a sex worker (p<0.001), vaginal sex (p<0.005), group sex (p<0.05), utilization of condoms (p<0.001), and number of clients (p<0.001). The incidence of syphilis among respondents was associated with sexual orientation (p<0.001), length of time working as a sex worker (p<0.001), vaginal sex (p<0.05), utilization of condoms (p<0.001), and number of clients (p<0.001). The incidence of fungal infections was associated with transaction platforms (p<0.01) and anal sex (p<0.005) (Table 4).

The incidence of genital warts among respondents was associated with sexual orientation (p<0.001), length of time working as a sex worker (p<0.001), utilization of condoms (p<0.001), and number of clients (p<0.01). The incidence of herpes among respondents was only associated with anal sex (p<0.05). At the same time, the incidence of hepatitis in respondents was only associated with transaction platforms (p<0.005) (Table 4).

## DISCUSSION

This study aims to determine the determinants of the incidence of sexually transmitted infections in sex workers who work online and the relationship between these determinants and the incidence of sexually transmitted infections. This study found that Indonesian sex workers are not gendered, as some are male and some are female. However, women still make up the majority of sex workers. This study is the first to assess the determinants of the incidence of sexually transmitted diseases among online sex workers, without restricting it to a specific gender group or sexual orientation. Research on sex work and its health issues primarily focuses on women, who still make up the majority of sex workers worldwide. This is evident in a systematic review, which found that out of 19 studies reviewed between 2005 and 2016, 12 studies exclusively focused on female sex workers, three on male sex workers, and two on transgender sex workers.[16] A study conducted in 2023 found a similar pattern: among 20 studies on sex work published between 2005 and 2021, 17 focused solely on female sex workers. This trend is understandable, given that around 80% of sex workers worldwide are women (International Union of Sex Workers, 2024).

The majority of sex workers in this study belong to the young adult age group (20-40 years old). This finding is similar to Jung's 2019 study, which found that the majority of female sex workers were less than 40 years old.[17] The same study found that 72% of sex workers had a high school education, aligning with this study's finding that 64.4% were high school graduates and 35.6% were undergraduate graduates.[17]

In this study, more than 20% of online sex workers live and work in Denpasar, Bali, but the majority are Javanese (37.8%). The majority of domicile in Denpasar City is inseparable from the status of the island of Bali, which is the center of tourism in Indonesia. This condition causes the meeting of various cultures in Denpasar City, one of which is the sex tourism "sought after" by foreign tourists. The number of foreign tourists who come to Bali has resulted in an increase in prostitution on the island.[18] The majority of online sex workers who participated in this study were of Javanese ethnicity, but the finding does not indicate that Javanese have a higher propensity to become sex workers than other ethnic groups in Indonesia. This is because Indonesia is predominantly Javanese (40% of the national population).[19]

In this study, among all demographic factors that were studied, only age, domicile area, ethnicity, and income were associated with at least one incidence of sexually transmitted infections. This finding contradicts Jung's conclusion that age had no significant association with the incidence of sexually transmitted diseases among female sex workers.[17] However, Jung also found that education level was not associated with the incidence of sexually transmitted infections, similar to this study.[17]

This study found that the age of first sexual intercourse and the age of first becoming sex workers were not associated with the incidence of sexually transmitted disease. This finding again contradicts the findings of Jung, who found that age at first sex was associated with the incidence of sexually transmitted infections.[17] However, that study found that having sex before the age of 18 influenced the incidence of sexually transmitted infections. In contrast, in this study, the earliest age of respondents having sex was 19 years old. The results of this study are in line with the research of Sherman et al., which found that age was associated with the incidence of sexually transmitted infections in female sex workers ($p<0.005$).[20]

Sexual orientation in this study was found to be associated with the incidence of *Chlamydia*, gonorrhea, syphilis, and genital warts ($p<0.001$). This finding agrees with Saxton et al., who discovered that sexual orientation, especially among men, was linked to higher rates of sexually transmitted infections, showing that homosexual and bisexual men had much higher rates of syphilis (1231.1 per 100,000) compared to homosexual and bisexual women (5.0 per 100,000) and heterosexuals (7.0 per 100,000), as well as gonorrhea (6843.2 per 100,000 in homosexual and bisexual men, 225.1 per 100,000 in homosexual and bisexual women, and 56.6 per 100,000 in heterosexuals).[21] Another study by Martín-Sánchez also found that sexual orientation was associated with the incidence of sexually transmitted infections such as syphilis, gonorrhea, *Chlamydia*, and HIV.[22] However, the Martín-Sánchez study focused on the association of sexually transmitted infections among homosexual and bisexual men. Hence, the comparison with the risk of chlamydia in women is unknown. Sonawane et al. found that HPV (human papillomavirus) infection that causes genital warts poses a greater risk to homosexual men than to heterosexual men, affecting both oral and genital regions.[23] In general, homosexual men have a higher risk of sexually transmitted diseases compared to other sexes and sexual orientation groups. In homosexual men, the risk of sexually transmitted infections reaches 35%, while in heterosexual men, it ranges from 15% to 11% in heterosexual women and 25% in transgender women.[24]

Length of time as a sex worker in this study was also found to be associated with the incidence of several sexually transmitted infections, such as *Chlamydia*, gonorrhea, syphilis, and genital warts ($p<0.001$). This study is in line with the findings of Sherman et al. and Nasirian et al., who found that a history of working as a sex worker for more than a year was significantly associated with the incidence of sexually transmitted infections ($p<0.005$).[20,25] In addition to length of work as a sex worker, Sherman et al. also found that the number of sexual partners of more than six people in a week was also associated with the incidence of sexually transmitted infections ($p<0.005$), just like in this study which discovered that the number of partners was associated with the incidence of sexually transmitted infections in respondents, especially chlamydia ($p<0.001$), gonorrhea ($p<0.001$), syphilis ($p<0.001$), and genital warts ($p<0.05$).[20]

Of all the sexual services offered by online sex workers in this study, handjob was the only service type that cannot be determined to be associated with the incidence of sexually transmitted diseases. All respondents, regardless of their history of sexually transmitted diseases, received the service. Other than that, other forms of service were associated with at least one type of sexually transmitted infection. Researchers found a correlation between the incidence of syphilis infection among respondents and vaginal sex. This result is in line with other studies that found that vaginal and oral sex are factors that influence the incidence of syphilis.[26,27]

This study found an association between oral sex and group sex services and the incidence of *Chlamydia* and gonorrhea in respondents. Several studies have found that group sex has a higher risk of transmitting sexually transmitted infections, such as gonorrhea, than sex between two people.[28,29] Although in group sex, the likelihood of participants using condoms is much higher than in two-person sex. However, this study's finding that group sex is associated with chlamydia incidence is not in line with the findings of Rice et al., who found that group sex was not associated with the incidence of chlamydia. [28,29] The findings in this study are also in line with the research of Phillips et al., who found that oral sex without using a condom increases the risk of oropharyngeal gonorrhea ($p<0.001$).[30] The findings in this study are also in accordance with the findings with those of Ratnayake et al. and Khosropour et al., who found that oral sex is associated with the incidence of chlamydia, both in oral and anal infections.[31,32] *Chlamydia* transmission through oral sex occurs when oral sex is performed without using a condom, where *C. trachomatis* bacteria can be transmitted to the oral mucosa and result in oral *Chlamydia* infection or through the digestive tract and the anus, resulting in anal *Chlamydia* infection.[32] Condom use is often only considered necessary during vaginal or anal sex due to the perception that only these sexual activities can transmit sexually transmitted infections. This assumption indicates a lack of public

understanding about sexually transmitted infections and sexual intercourse in general.

This study found a correlation between the incidence of herpes and anal sex services. A study by Shi, Zhang, and Chen found that homosexual men have a high risk of herpes simplex virus 2 infections.[33] This risk is associated with the most common sexual activity among homosexual men, known as anal sex.

Condom utilization in this study was grouped into four categories: namely never, sometimes, often, and always, and based on the history of condom use, only four sexually transmitted infections had an association with the incidence of sexually transmitted infections, namely *Chlamydia*, gonorrhea, syphilis, and genital warts. A study by Wiyeh et al. found that condom use can reduce the risk of sexually transmitted diseases. Their study also found that the use of female condoms was much more effective in preventing sexually transmitted diseases than the use of male condoms. However, the use of female condoms and male condoms at the same time could reduce the risk of infections more significantly than using only one type of condom.[34]

The history of IDUs (injection drug users) in this study was not associated with any of the sexually transmitted infections. This conclusion is inconsistent with the findings of Haider et al., who found that drug use is strongly associated with the incidence of sexually transmitted infections, where individuals with a history of drug use are more at risk of sexual infections than individuals who have never used drugs.[35] However, it should be noted that the study by Haider et al. did not specify the types of sexually transmitted diseases that are more common in individuals who use drugs. The types of drugs in question are also more diverse and include forms apart from injection. Meanwhile, research by Brookmeyer et al. found that IDUs were associated with the incidence of *Chlamydia*, gonorrhea, syphilis, and herpes.[36] Meanwhile, Dumchev found that individuals who are PWID (people who inject drugs) have a higher risk of transmitting bloodborne diseases such as HIV, and 10% of new HIV cases are among PWID.[37] This contradictory result may be due to the small number of respondents who are IDUs, as well as the absence of individuals who are people living with HIV/AIDS (PLWHIV/PLWAIDS) who participated in this study. This is not a negative thing but rather a positive thing because it indicates that the number of PLWHIV participating in high-risk sexual behavior is still relatively low. In this study, all IDU respondents reported not sharing needles with others, but there was no known history of repeated needle use. Kpelly's study in Togo found that needle sharing did not affect the incidence of sexually transmitted infections or hepatitis C, but rather repeated needle use affected the incidence of sexually transmitted infections, but not hepatitis C infection.[38]

One of the positive findings in this study is that all respondents who are homosexual and bisexual always use condoms when having sex and know their HIV status (HIV negative). This may be due to the awareness of respondents with homosexual and bisexual orientations that they are a high-risk group or special interest group in the transmission of sexually transmitted diseases. However, there are no studies that show that individuals with homosexual or bisexual orientations have higher knowledge of sexually transmitted infections in the general population compared to heterosexual individuals. In addition, all respondents who had experienced sexually transmitted infections in this study also reported that they underwent treatment for their sexually transmitted infections and completed treatment. Complete treatment is beneficial, as it prevents further transmission of sexually transmitted infections.

There are several limitations in this study. First, the history of respondents' STDs relies solely on their admission without providing factual proof of diagnosis (e.g., physician's note or laboratory results). Second, the data used in this study did not reflect the respondent's recent sexual history. We define "recent sexual history" not as the respondent's sexual history in the last 1 or 6 months, but rather as the patient's overall sexual history. This likely explains why almost all respondents reported having a sexually transmitted infection, while only four respondents reported never having any. Third, although this study focused on respondents who offered their services online through social media, the researchers did not focus solely on the sexual history of the respondents since they started working as online sex workers, even though there is a possibility that the respondents were conventional on-street sex workers who later switched to social media. Fourth, it was not known whether the respondents continued to serve clients while on treatment for their sexually transmitted infections. Finally, as this is the first health study on online sex workers in Indonesia, the number of references available is limited.

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