Structural Conditions, Social Networks, and the HIV Vulnerability among Indonesian Male Labour Migrants and Motorbike Taxi Drivers

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Article

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Abstract: In contrast to global AIDS data, which show a higher number of diagnosed HIV cases in women, the Indonesian National AIDS report reveals that the percentage of HIV cases in the country is significantly higher in men. Using a conceptual model of how social networks impact health, this paper describes how structural conditions, such as poverty, lack of job opportunities, and lack of income determined the engagement of Indonesian male labour migrants and motorbike taxi (also known as ojek) drivers in their respective professions and shaped their social networks. It also describes how these social networks created opportunities for various psychosocial mechanisms, including social influence, peer pressure, and intimate contact, that facilitated HIV infection through different behavioural pathways, such as unprotected sex with multiple partners and injecting drug use (IDU) practices. A qualitative design using face-to-face in-depth interviews was employed to collect data from participants in Yogyakarta municipality and Belu district, Indonesia. Participants were recruited using the snowball sampling technique, starting from two HIV clinics in the study settings. Data analysis was guided by a qualitative data analysis framework. The findings highlight the significance of structural conditions, such as poverty, poor family conditions, precarious employment, and lack of income, in determining the participants' engagement in labour migration and motorbike taxi driving. Involvement in these occupations allowed them to become acquainted with fellow labour migrants and ojek drivers, leading to cohabitation in the same shelters or areas and daily interactions, which fostered the development of social networks among them. These social networks then provided opportunities for various psychosocial mechanisms, including social influence through peer pressure and person-to-person contact. The influence and pressure experienced by the participants were reflected in their behaviours related to sex, condom use, and IDU, ultimately contributing to the transmission of HIV among them. The findings underscore the importance of public health interventions, such as HIV information and education, that take into account the dynamics of social networks in order to develop effective strategies for increasing understanding of HIV transmission and prevention, reducing vulnerability, and promoting safer behaviours among male labour migrants and ojek drivers.

Keywords: structural conditions; social networks; HIV transmission; labour migrants; motorbike taxi drivers; men living with HIV

Introduction

The 2023 UNAIDS report estimates that 85.6 million people globally have been infected with HIV since the beginning of the epidemic, of which 40.4 million have died [1]. The same report also estimates that 39.0 million people were living with HIV (PLHIV) worldwide in 2022, with 1.3 million newly infected and 630,000 dying during the year [1]. Although new HIV infections continue to be reported every year, the global trend shows a decline in the number of annual new HIV infections from a peak of 2.9 million in 1997 to 1.3 million in 2022, which is a decline of 31% since 2010 [1,2]. In contrast to the global trend, the number of HIV cases in Indonesia has increased significantly during the same period, from 55,848 cases in 2010 to 191,073 cases in 2015 and 526,841 cases in September 2022, and males represent 62% of total cases in the country [3].

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In this study, we captured the stories of risk factors for HIV transmission among women [4] and how HIV infection impacted women and men and their families [5–7], and barriers to their access to HIV care services [8]. In addition to these, our analysis showed that heterosexual men who share similar structural conditions (poverty, precarious employment, lack of income) had similar risk behaviours in terms of condom use, number of sexual partners, and IDU practices. Therefore, the purpose of this paper is to understand the links between the structural conditions and the risk behaviours, which are the social networks of these men. The narratives of structural conditions and social networks arose naturally from the interviews which indicated the significant influence of these factors on HIV transmission among them. In this paper, we used social network analysis based on the conceptual model of how social networks impact health or, in the case of our participants, contribute to HIV transmission [9,10]. Social network concepts and analysis have been applied in previous studies to understand how social network dynamics contribute to HIV transmission in some population groups. For example, several studies with men who have sex with men (MSM) have reported that individuals within the social and sexual networks of SMS experienced increased HIV vulnerability as they shared similar norms, attitudes, and HIV risk behaviours [11–13]. Some other studies further reported that social networks with more MSM members are strongly associated with increased unsafe sex among them [14–16]. Similarly, studies with people who inject drugs (PWID) have suggested that PWID in social networks with more members (e.g., >10 members) are more likely to have similar risky behaviour of sharing a needle that facilitates HIV transmission among them [17–20]. The association of social networks with HIV risk behaviours have also been reported in studies with teenagers and HIV-at-risk women [21–24]. The literature shows that larger networks provide more opportunities for exposure to risks, social influence through easily passed information and frequent meetings of members, and normalisation of risky behaviours [16,22,25].

Despite the association of social networks and HIV risk behaviours in those groups reported in the aforementioned studies, there is a paucity of literature and evidence on such association in heterosexual male labour migration and motorbike taxi driving, who are highly mobile due to the nature of their work. They may be a bridge group for HIV transmission to their partners, spouses, and the general population as they may get the transmission through their frequent engagement in unprotected sex with multiple partners, including with female sex workers (FSWs) and IDU practices [26–28]. A previous review reported on how a social network reinforces its members' behaviours in low- and middle-income countries but did not consider HIV risk behaviours, especially among heterosexual men [29]. In addition, most studies above mainly focused on examining the association of a specific characteristic of social network structure or ties with HIV transmission in MSM [11–14,16], PWID [17–20], and FSWs or HIV-at-risk women [21,23], therefore there is still a limited understanding of the complex interplay between various characteristics of social network structure and ties and HIV transmission. Moreover, there is a lack of evidence on the influence of structural conditions in shaping people's social networks and individual ties within the networks. In the context of Indonesia, previous HIV studies have mainly focused on MSM [12,15,30,31], even though HIV transmission through heterosexual contact has been reported to represent over 70% of HIV transmission in the country [32]. In addition, there is a limited qualitative in-depth understanding of how structural conditions, social networks, and various psychosocial mechanisms play a role in HIV transmission, especially among heterosexual men. This study aimed to fill in the knowledge and methodological gaps by exploring the views and lived experiences of Indonesian heterosexual males who engaged in labour migration and motorbike taxi driving on how structural conditions shape their social networks and individual ties, which provide opportunities for social influence and person-to-person contacts or interactions that facilitate HIV transmission among them through various behavioural pathways. They are the priority population groups in this analysis due to their highly mobile characteristics and the high global HIV prevalence among them, both labour migrants [33,34] and drivers, especially truck and bus drivers [35,36]. Labour migrants in this study were individuals who previously (before the study) migrated to other places in Indonesia or overseas for several years to work in oil palm plantations. Motorbike taxi (also known as ojek) drivers, were individuals who previously or currently (at the time of the study) engaged in motorbike taxi driving.

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Understanding the links between structural conditions and risk behaviours could be useful in addressing HIV risk factors and supporting future HIV prevention interventions among heterosexual men in Indonesia and beyond.

Methods

Conceptual Framework

The conceptual model of social networks [9] was employed as a heuristic tool to guide the conceptualisation and analysis of the findings of this exploratory study. Social network refers to a series of social connections that link individuals (actors) directly to each other and also to other people through them [9,37]. The individuals or actors are members of the network which could be based on kin, friendship, neighbourhood, work, etc [9]. In this study, the social networks among the participants were work-related or made up of individuals with the same work as labour migrants or ojek drivers. The network is supported by the network structure and ties among the network members as explained below [9,37]. The social network concept is applied in this paper as it informs how structural conditions (in the case of the participants in this study: poverty, poor family conditions, economic/financial hardships, precarious employment, lack of income) can play a role in shaping people's social networks (network characteristics and structure, and the characteristics of individual ties) [9]. These structural conditions can contribute to shaping people's social network structure, such as the number of labour migrants or ojek drivers in each network (range or size), the amount of social interaction these individuals have or to what extent they are connected to each other within their networks (density), and geographical closeness among them in their daily life (proximity) which facilitates ease of these individuals reaching each other (reachability) [9,38,39]. These structural conditions can also contribute to shaping characteristics of ties of labour migrants and ojek drivers in their social networks. The ties are reflected in the frequency of these individuals meeting each other in the networks (frequency of contact), the types of transactions (work-related or individual or social or intimacy matters) they have in those meetings/contacts (multiplexity), and the length of time they know each other or are the same network (duration) [9]. Such social networks provide opportunities for various psychosocial mechanisms that can occur among the members of a network. These may include social interactions and influence among labour migrants or ojek drivers in their networks (e.g., peer pressure, influence on health behaviours, connecting casual sex partners, etc.) and person-to-person contact (e.g., close personal contact, intimate contacts such as sexual, injecting drug use (IDU), etc.) [9,40,41]. The psychosocial mechanisms can negatively impact health through health-damaging behaviours such as, in the case of our participants, sex with multiple partners, sex without condoms, and engagement in IDU practices, hence increasing their vulnerability to HIV transmission or acquisition [9]. Therefore, social networks and dynamics are very important because they provide identity, social interaction and influence, and person-to-person contact that can have impacts on individuals' health outcomes [9].

Recruitment of the Participants and Data Collection

We provide a brief overview of the methods in this section, as the details have been previously reported elsewhere [6,42]. This paper presents part of the data from a large-scale qualitative study exploring the views and experiences of PLHIV about HIV risk factors and impacts and their access to HIV healthcare services in Yogyakarta and Belu, Indonesia. The use of qualitative design was considered appropriate and effective when exploring participants' perspectives and deep insight into their real-life experiences [43]. It enabled the researchers to explore the participants' stories, understandings, and interpretations of their structural conditions, social networks, individual ties within their networks and social influences and how these factors contributed to the transmission of HIV among them.

The recruitment of the study participants started with the field researcher (NKF) searching for assistance from the receptionists at HIV clinics in Yogyakarta and Belu to distribute the study information sheets containing the field researcher's contact details to potential participants or HIV

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patients who used their services. This was followed by the application of the snowball sampling technique. PLHIV who called and stated their interest to participate in this study were recruited and scheduled for an interview based on their preferred time and place. Initial participants interviewed were also asked to distribute the information sheets to their eligible friends and colleagues who might be willing to be interviewed about the topic being studied. To participate in this study, one had to be aged 18 years old or above, self-identified as living with HIV and willing to be interviewed voluntarily. Twenty-five participants (15 from Belu and 10 from Yogyakarta) whose narratives are included in this paper reported having the experience of being labour migrants in other places in Indonesia or overseas (n=16) and previously or currently (at the time of the study) working as motorbike taxi drivers (n=9). Sixteen participants became labour migrants in several places within Indonesia or overseas, with the majority migrating to Malaysia (n=7), Kalimantan (n=5), while the rest migrated to Papua (n=3), Bandung (n=1) and Hongkong (n=1). The majority engaged in labour migration for 1 to 5 years (n=12), while the rest worked as labour migrants for 6 to 10 years (n=5). The nine other participants engaged in motorbike taxi driving in their local areas in Belu (n=8) and Yogyakarta (n=1). These narratives are included as they provide an in-depth understanding of how structural conditions, such as poverty, poor family conditions, precarious employment, and lack of income, facing these men determined their engagement in labour migration and motorbike taxi driving and shaped their social networks, sexual networks, and social influences and interactions that facilitated HIV transmission among them. The participant's age ranged from 22 to 46 years old. The majority of the men were married (n=15) and the others were unmarried (divorced, widowed or single). The majority (n=15) were diagnosed with HIV within the past 5 years, while the rest had been diagnosed for a longer time, between 6 and 15 years. Most of them (n=17) graduated from high school and elementary school, while the rest graduated from university (n=4) and primary school (n=4).

Data collection was carried out from June to December 2019 by way of one-on-one and face-to-face in-depth interviews. Interviews were conducted in a private room at the HIV clinic in Belu and in a rented house close to the HIV clinic in Yogyakarta where the initial information about the study was distributed. Interviews with the participants were audio recorded using a digital recorder, and field notes were also undertaken by the researcher during each interview. The interview duration varied between 35 to 87 minutes. With regards to the topic presented in this paper, interviews covered several areas, including participants' views and experiences of their present and previous works as labour migrants or motorbike taxi drivers, factors that supported their decision to take those works, their views and experiences their social relationships and networks and how they were involved in those networks, views and experiences with social interaction and influences with their friends and colleagues, activities they engaged in together with friends and colleagues within their networks, and their perceptions about factors that facilitated HIV transmission among them. Recruitment and data collection ceased when the researchers felt that the information provided by the participants had been rich enough to answer the research questions and objectives or data saturation had been reached. Data saturation was reflected in the similarity of information or responses provided by the last few participants. Interviews were conducted in Bahasa, the primary language of the field researcher and the participants.

Data Analysis

Before the comprehensive analysis, the audio recordings were transcribed verbatim by the last author (NKF). Transcription was initiated alongside the data collection process, and notes taken during the interviews were integrated into each transcript during the transcription process. The analysis was guided by a framework analysis for qualitative data by Ritchie and Spencer, which suggests several steps of qualitative data analysis [44]. Data analysis was performed in Indonesian, which helped to keep the sociocultural meanings attached to the information provided by the participants [45]. Data analysis began during the transcription process and by reading the transcripts repeatedly which allowed the researchers to become familiar with the data, provide comments on data extracts, and break down the information into small chunks. During the process, key concepts and issues identified from the transcripts were listed and used to form a thematic framework. The

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identification of the thematic framework was an iterative process that involved changing and refining themes. Next, each transcript was indexed by providing open codes to data extracts, followed by close coding to identify and group similar or redundant codes into the same themes and sub-themes informed by the conceptual model of social networks. For instance, codes assigned to data extracts containing participants' accounts of precarious employment, poverty, poor family conditions, lack of income, financial hardships, difficulties in meeting family needs and children's education fees, and their involvement in labour migration and motorbike taxi driving were collated under the theme "Structural conditions: precarious employment, lack of income, and poverty," reflecting macro-level structural conditions [9]. For instance, codes assigned to data extracts containing participants' accounts of precarious employment, poverty, poor family conditions, lack of income, financial hardships, difficulties in meeting family needs and children's education fees, and their involvement in labour migration and motorbike taxi driving were collated under the theme "Structural conditions: precarious employment, lack of income, and poverty," reflecting macro-level structural conditions. Codes indicating how social networks among participants were formed were grouped under the theme "The development of social networks among labour migrants and ojek drivers." These codes included participants' experiences of meeting or connecting due to shared occupations, staying in the same shelters and locations, their level of connectedness, frequency of interaction, ease of reaching each other, the members and size of their networks, topics shared, activities conducted together, duration of knowing each other, and the development of their social networks. Lastly, codes illustrating how structural conditions and social networks facilitated risky behaviours (e.g., unprotected sex, sex with multiple partners, and engagement in IDU practices) were presented under the theme "Social influence, person-to-person contact, and HIV transmission." Comparison of the findings (codes and themes) within and across interviews was also repeatedly performed throughout data analysis. Finally, the entire data were mapped and interpreted as presented in this manuscript. The selected quotes for this publication were translated into English and then checked and rechecked by the author for clarity. The process of checking and rechecking quotes against the translated interpretations or examination of meaning in both languages was also performed to maintain the accuracy of the translation and credibility of the findings [46]. The authors discussed and provided comments, feedback and revisions during the analysis and writing process and agreed on the final themes and interpretations presented in this paper.

The ethics approvals for this study were obtained from the Social and Behavioural Research Ethics Committee, Flinders University (No. 8286) and the Health Research Ethics Committee, Duta Wacana Christian University (No. 1005/C.16/FK/2019). For de-identification purposes, all personal information was removed from each transcript. Each transcript was given a letter and number, such as PY, … (PY = participant from Yogyakarta) and PB, … (PB = participants from Belu).

Results

The findings illuminate how macro-level structural conditions, such as poverty, poor family conditions, precarious employment, and lack of income or financial hardships, influenced the social networks of labour migrants and ojek drivers. Their networks comprised individuals engaged in the same work, facilitating regular meetings or contacts and prolonged interactions. These networks provided opportunities for social influence, peer pressure, and person-to-person contact, which contributed to risky behaviours (e.g., unprotected sex, sex with multiple partners, and IDU practices) associated with HIV transmission. The findings were organised into three main themes: (i) Structural conditions: precarious employment, lack of income, and poverty; (ii) The development of social networks among labour migrants and ojek drivers; and (iii) Social influence, person-to-person contact, and HIV transmission. The details of each theme are elaborated below.

Structural Conditions: Precarious Employment, Lack of Income, and Poverty

Socioeconomic factors, such as precarious employment, lack of income, and poverty were some instances of structural conditions faced by both participants with labour migration backgrounds and the ojek drivers in this study. For example, limited employment opportunities in their respective

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settings created challenging conditions that exerted substantial pressure on them and their families. The challenge is that being unemployed and lacking income hindered their ability to meet daily basic needs for themselves and their families. These adverse conditions, coupled with the desire to improve their family conditions, were the main pushing factors for both groups of participants to undertake any available work, including labour migration to other places or countries and becoming ojek drivers to support their families and ensure their survival. This is reflected in the narratives of two participants, with one previously migrating to Malaysia for work for three and the other currently (at the time of the study) being an ojek driver:

> *"I once worked here (Yogyakarta) but I resigned because the salary was very small, after that, it was very difficult for me to find a new job, no other options for me. …. Initially, some of my friends in Papua told me about job opportunities in Papua. At that time, I was unemployed. So, I went to Papua for work. I was hoping to get more income to support my life and my family, but instead, I got sick there..." (PY, labour migrant).*

> *"Yes, you know it's very difficult to get a job here. The most likely choice for someone like me is to become a motorbike taxi driver or a construction builder. It's impossible for me to apply to become a civil servant because I only graduated from middle school. .... Yes, I have been doing this (motorbike taxi driving) because our (family) situation demands it and to be able to meet our daily needs"* (BP, ojek driver).

Poverty or poor family conditions were also significant structural conditions faced by both groups of participants in this study. For the ojek drivers in Belu who previously worked in the agricultural sector, these hardships were often exacerbated by suboptimal or failed agricultural products due to adverse weather conditions or natural disasters. Additionally, for some participants across both study settings, the financial burden of their children's education, including fixed school fees each semester and the costs for school supplies, compounded their precarious employment situations, placing them in even more difficult structural conditions. This necessitated seeking additional work, such as labour migration and ojek driving, to meet their families' needs. For instance, one participant, a father in rural Belu, became an ojek driver to support his family's basic needs and fund his children's education. Another participant, a young man from Yogyakarta, migrated to Kalimantan to work and support his parents and younger sisters' education. These narratives highlight the profound impact of poor family conditions and poverty on their lives and their decisions to take any available job opportunities:

> *"I do motorbike taxi driving because agriculture doesn't bring certain results every year and often fails due to sometimes prolonged heat or excessive rainfall in a year. Where I can get food and drink every day if I don't work as a motorbike taxi driver. We have nothing to rely on. Apart from that, the educational needs of my two children – primary school and high school. The possible option for me here is to become a motorbike taxi driver, although I think working as a motorbike driver is not easy because mobility is very high every day, driving from one place to another all day long. There are no other job options for me here"* (PB, ojek driver).

> *"At that time, the reason that prompted me to decide to become a migrant worker was that I wanted to help my parents and support my younger sister's education (high school). I felt concerned about the difficulties faced by my parents and the situation in our family, so I left…."* (PY, labour migrant).

Both labour migrants and motorbike taxi drivers are characterised by their constant movement, either on a seasonal or daily basis. Labour migrants were frequently required to move from one place to another as their work assignments were completed or as the demand for labour shifted across different areas or districts. For instance, in the oil palm plantations, they were employed for a specific period to carry out tasks such as planting, harvesting, or maintenance. Once these tasks were finished,

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they were expected to move on to the next plantation where their services were needed. On the other hand, ojek drivers exhibited high mobility on a daily basis as they shuttled between various locations to pick up and transport passengers. Unlike traditional taxi drivers who operate from fixed locations, motorbike taxi drivers are highly mobile and can be found at various pick-up points or can be hailed on the streets. They often move from one area to another, strategically positioning themselves in locations with high passenger demand, such as near transportation hubs, markets, or popular tourist destinations. This constant movement allows them to maximise their earnings by serving a larger number of customers:

> *"In oil palm plantations, we always moved from one location to another, depending on the boss. Usually, when the work was done in one location, we moved to another location"* (PY, labour migrant).

> *"As a motorbike taxi driver, yes, I drive to various places here (Belu) every day to look for passengers and pick up passengers. All of us (motorbike taxi drivers) do the same, always moving around"* (PB, ojek driver).

The Development of Social Networks among Male Labour Migrants and Motorbike Taxi Drivers

The structural conditions reflected in poverty, poor family conditions, precariousness of employment and lack of income or financial difficulties faced by the participants not only determined the work they were involved in but also further contributed to shaping their social networks. The labour migration and motorbike driving jobs determined the social environment, interactions, and connections among labour migrants or ojek drivers, that shaped their networks. For example, participants who worked as labour migrants were required to live together in shelters provided by employers around oil palm plantation locations or in areas around the plantations. Living together reflected the proximity or closeness of the labour migrants to each other, which was a strong element that contributed to shaping their network. This proximity not only facilitated more intense connections, interactions, and meetings among labour migrants compared to ojek drivers who mainly met each other at certain times at motorbike stands, but also made it easier for them to reach each other (reachability) which is another supporting element for their networks. Engagement in the same jobs as migrant workers or ojek drivers, living in the same shelters or locations during the migration, and meeting regularly each other at the motorbike stands also reflected the number of social interactions of these individuals or the extent to which they were connected to each other (density), which was another strong element that shaped their networks. These are reflected in the following narratives of two participants, illustrating how their social networks were established due to being engaged in the same jobs and living in the same shelters or locations, and regular meetings with other fellow migrant workers or ojek drivers:

> *"Tens of us, both men and women (migrant workers), lived in temporary accommodation around the plantation site provided by the boss (employer) so that coordination regarding work was fast and smooth. So, we lived together, close by and were always in contact with each other to coordinate the work that needed to be done every day. Over time we got to know each other well, had close friends and groups of friends from different places or countries. …. Usually, we went out together on weekends, shared food, and cigarettes, discussed work, etc. In my group, we are from various regions in Indonesia and other countries. Every time we moved from one location to another, there were always new people we met, both men and women..."* (PY, labour migrant).

> *"Every day I go here and there to pick up and drop off passengers (he was working as a motorbike taxi driver when the interview was conducted), so mobility is very high. But there is always time for a short rest at the motorbike taxi stand where we meet and get to know each other (motorbike taxi drivers). We do the work every day, so after a while we become close friends. …. We are up to 20 or 30 people at one motorbike taxi base. It is good to have these many friends, but every time we meet at*

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a motorbike taxi base, you can hear lots of different stories and jokes. I think that is why we kind of feel close to each other" (PB, ojek driver).

The narratives of the two participants above, not only illustrated the proximity and density of their social network structure but also reflected the number of individuals in the social networks (range or size). These aspects were represented in terms like "20 or 30 people" in a motorbike taxi station-based group or "tens of people" or "we are from various regions in Indonesia and other countries". The narratives were also self-explained regarding the boundedness of members as their group or social networks were defined based on the sameness of the work they engaged in as labour migrant workers or ojek drivers.

The above characteristics of the participants' social networks, especially the proximity to each other due to living in the same shelters or locations and the connectedness among them through tasks and work, also facilitated the formation of strong individual ties among them. The individual ties within their social networks were reflected in high frequencies of face-to-face contacts and interactions or meetings among them daily. Similarly, their engagement in the same job determined the length of time they knew each other and were in the same network (duration). The social contacts and connections among labour migrants or ojek drivers were not only in work-related matters but also in individual and social matters, such as exchanging information about personal and family issues, social and sexual relations, and casual sex partners. These claims are reflected in the following stories of a labour migrant for 3 years and an ojek driver for 6 years:

"We meet every day, either in temporary accommodation or on the oil palm plantation. I worked at oil palm plantations in Malaysia for 3 years, so I had many friends as we worked together during that time. We also lived together so we share lots of things and information regarding work, life, and so on, including intimate relations (sexual relations) with fellow female migrant workers or sex workers …." (PY, labour migrant).

"You know, we are all men so every day we meet there are always various stories and information that we discuss or share. Some talk about work, personal problems, family problems or difficulties, their naughty children, etc. There are also stories about infidelity, and their sexual relations with this or that woman around the town. The topics are varied. There are topics that make us laugh but there are also topics that make us sad" (PB, ojek driver).

The above narratives from both participants also represented the number of types of transactions or topics or information shared among them (multiplexity) and how those aspects were shared in a reciprocal way, reflecting the characteristics of individual ties among them with their social networks. The topic of intimacy illustrated in the terms "sexual relation" or "intimate relation" also characterised individual ties within the social networks of these men.

Social Influence, Person-to-Person Contact, and the HIV Transmission

Peer Influence on Sex and Condom Use Practices

The social network structure and the individual ties among the networks' members as described above also provided opportunities for various psychosocial mechanisms, such as social influence and person-to-person contact among the members. For example, the high number of contacts or meetings and interactions (density) the labour migrants or ojek drivers had with each other daily and the variety of information regarding sexual-related matters they exchanged (multiplexity), facilitated social influence and peer pressure among them. An area where peer influence and pressure within the participants' social networks occurred was sexual relations/contacts with multiple casual partners, including with fellow female migrant workers and female sex workers (FSWs), a practice that was later acknowledged to have transmitted HIV to them. Inviting and persuading each other to hang out and look for FSWs during weekends or after working hours in the evening were the mechanisms of social influence and peer pressure within the networks of the participants. These are

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illustrated in the following narratives of a married man who lived in various plantation areas together with other fellow migrant workers from different places or countries for several years and another married ojek driver who had been engaging in the job for many years:

> *"We (the man and his male friends) were from different countries and worked together (he worked in oil palm plantations in Malaysia). Initially, my friends asked me to hang out at the weekend and look for girls (either female migrant workers or FSWs) to have sex with. Finally, I felt like I was accustomed to it and then every weekend we regularly went out to have sex …. I got HIV in Malaysia. I was very sick and decided to come back here. I tested positive with HIV here"* (PY, labour migrant).

> *"Sometimes before returning home in the evening we (Ojek) talk and persuade each other to visit "hutan jati" (brothel location) and we definitely meet (have sex) the girls there every time we go there. Sometimes some friends don't want to go there but because we meet every day and often invite each other, over time they want to do it (have sex with FSWs) too. I got HIV because I often "jajan" (have sex with FSWs)"* (PB, ojek driver).

The above narratives of both labour migrant and ojek driver participants clearly show the social or peer influence and pressure among them, reflected in the following sentences, "*Finally, I felt like I was accustomed to it and ……regularly went out to have sex"* (PB, ojek driver) and *"Some friends don't want to there (brothel) but because we meet every day and often invite each other, over time they want to do it too"* (PY, labour migrant). The narratives illustrate the strong social influence the labour migrants and ojek drivers had within their social networks on each other's risk behaviours, which they recognised as the means of HIV transmission among them, *"I got HIV because I often "jajan" (have sex with FSWs)* (PB, ojek driver) and "*every weekend we regularly went out to have sex …. I got HIV in Malaysia"* (PY, labour migrant).

Social influence among peers within their social networks also played a significant role in shaping the characteristics of the participants' person-to-person contact (intimate contacts), such as condomless or unprotected sexual contacts, that ultimately facilitated the transmission of HIV among them. Participants reported that their peers would discourage the use of condoms by making negative remarks, such as claiming that condoms caused discomfort, pain, and reduced pleasure during sexual intercourse. These discouraging words were often enough to dissuade individuals from practising safe sex. To further illustrate this phenomenon, two narratives from individuals, one married and one non-married, who had prior knowledge of condoms before their HIV diagnosis, are presented. These narratives shed light on the detrimental effects of peer influence on condom use:

> *"I heard about condoms when I was working in Irian (Papua) but I never used them every time I visited those girls (had sex with FSWs) because my friends said that it hurts and makes you feel uncomfortable during the sex"* (PB, labour migrant).

> *"I know about condoms (before he was diagnosed with HIV), but I have not started using condoms because my friends said using condoms makes it (sexual intercourse) less pleasurable. I just believed in what they said and never tried to use a condom every time I had sex"* (YP, ojek driver).

In addition to the social influence, it is important to recognise that the structural conditions impacting the participants not only influenced their involvement in labour migration and ojek driving works but also shaped the surroundings they entered. The specific environments in which the participants operated, such as plantation sites for migrant workers and urban areas for ojek drivers, were characterised by the availability and accessibility of casual female partners, brothels, and FSWs. These environments played a significant role in facilitating the participants' engagement in sexual activities with multiple partners, FSWs, and frequent changes in sexual partners over time. Such influence is portrayed in the following narratives of these men:

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"There were many girls (FSWs) from around the world over there (Thailand. He worked in Thailand for several years). It (Thailand) is like the centre, they (FSWs) were from around the world. So, it was easy for me to find them and I just needed to choose the ones I liked" (PB, unmarried).

"I often had sex with different women at the workplace (he used to work at oil palm plantations in Malaysia) because there were many female workers, and many were widowed. …. I could meet women (female workers) from different countries, and we, both women and men, stayed together in the plantation area" (PY, unmarried).

"...There are many prostitutes in this town and at night they usually hang out in front of hotels or at certain points. So, it's not difficult to meet them. We (the man and his fellow Ojek) also go to their locations (brothels). It is not the same as my (remote) village where you can't find any woman (FSW) like them" (PB, married).

Peer Influence on Injecting Drug Use Practices

The social networks of the participants also provided opportunities for peer influence or pressure for their engagement in injecting drug use (IDU) practices. Yogyakarta participants who reported infection through IDU practices described that they were initially introduced to injecting drugs by their fellow labour migrants or ojek drivers, a factor which was not identified among participants in Belu. The introduction of injecting drugs by peers and peer invitation to use drugs together were some mechanisms through which social factors (e.g., peer influence and pressure) influenced the participants' HIV risk behaviours. Moreover, purchasing and using drugs together with co-workers was not only a mechanism through which peer influence and pressure supported the participants' engagement in IDU use that had facilitated HIV transmission among them but also reflected reciprocity characteristic of individual ties within their networks as it reflected equivalent action or exchange among them. Such reciprocity of individual ties also seemed to be a common strategy used to support their engagement in IDU practices. The following quotes from both labour migrants and motorbike taxi drivers illustrate peer influence and pressure within their social networks which IDU practices:

"I didn't use drugs before. I got to know about drugs for the first time through my friends (other labour migrants) in plantation areas in Malaysia. ….We took turns sharing the same needle. It was hard to find a new one in plantation sites" (PY, labour migrant).

"There are friends (fellow migrant workers) who used drugs at oil palm plantations. Initially, I got (drugs) from a friend from Myanmar. He and his two other friends from Myanmar used drugs. After I joined the group, I knew there were several more people, including from Indonesia. We all used drugs together. ....." (PY, labour migrant).

"…. My friends (other ojek drivers) and I contributed money to buy drugs and use them together. When we met at a motorbike taxi base and sometimes some friend approached each of us to buy it, we bought and used it together. We shared the drugs and needles every time we were together" (PY, ojek driver).

The engagement of these participants in IDU also seemed to be influenced by the environment where they moved into. Some participants described the availability and accessibility of illicit drugs as supporting factors for their engagement in IDU practices. The workplace environment which was far away from family was another supporting factor for their use of injecting drugs. This was due to the absence of supervision and restrictions from parents and other family members at the places where the participants worked and lived. Such absence was described as supporting their involvement in the use of illicit or injecting drugs, as they were not being watched by family members or other people around them. These were illustrated in the following quotes from participants who acknowledged acquiring HIV through IDU and living with HIV for more than ten years:

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"I would say, staying in plantation areas was supportive of drug use because nobody really cared about what you do. In addition, many friends (fellow labour migrants) used (drugs), so that's it. My parents or family were not there. I was not afraid of anybody. …. I'm sure I got HIV through the needle we shared once using drugs" (PY, labour migrant).

Discussion

This study employs the conceptual model of social networks as a heuristic tool to guide the analysis and discussion of how structural conditions contributed to shaping labour migrants and ojek drivers' social networks and how the networks provided opportunities for psychosocial mechanisms that led to HIV transmission among them through various behavioural pathways. The findings reveal a complex interplay between structural conditions, social networks, and risky behaviours that contribute to HIV transmission among both labour migrants and ojek drivers across the study settings, which have never been reported in previous social network studies involving different groups, including MSM, PWID, and FSWs [12,13,20,23,24].

This study has suggested that labour migrants and ojek drivers across the study settings faced similar structural conditions, including precarious employment, economic hardship or poor family conditions, and poverty. These structural conditions created significant pressure on the participants and led them into specific occupations that necessitated close living and working arrangements, thereby shaping their social networks [9,40]. It is, therefore, evident that the social environments where they worked, interacted, and lived significantly contributed to shaping their social networks and developing strong social ties among them. For example, labour migrant participants living in employer-provided shelters around oil palm plantation sites and ojek drivers frequently meeting at taxi stands developed dense, proximate social networks due to their shared work environments. These networks were characterised by high density, as the members were highly connected through their daily interactions, and boundedness, as their networks were defined by their occupational roles and living situations [9]. The current findings also report the high number of members of the participants' networks (range or size). The greater number of network members seemed to be an underlying reason for the intensified various psychosocial mechanisms among them, such as social influence on their health behaviours, which is in line with previous findings [9,16,25,41].

The structural conditions not only led to the development of both labour migrants' and ojek drivers' social networks but also contributed to shaping the characteristics of individual ties within their networks. Participants from both groups reported frequent face-to-face contact due to their work and living arrangements, leading to high levels of interaction and intimacy, which also facilitated social influence (concerning sexual behaviours and IDU practices among them within their social network members [9,23,41]. Such interaction and intimacy among the participants were supported by the duration of knowing each other which was prolonged by their continuous engagement in the same jobs and living in the same locations [9]. Multiplexity was evident in the various types of interactions and transactions among network members, including sharing information about work, social, and sexual matters [9,25]. These characteristics facilitated the development of strong individual ties among members of their social networks, which played a role in peer influence and risky behaviours. Therefore, it is plausible to argue that strong individual ties of social network members could lead to shared norms, attitudes, and normalised risky behaviours among labour migrants and ojek drivers, regardless of their marital status.

The findings of this study have also suggested that the social networks of participants played a crucial role in shaping their behaviours, particularly concerning sexual practices and IDU [19,21]. Consistent with the concept suggesting that social networks (through social influence) can influence health-damaging behaviours [9], our findings suggest that the social networks of labour migrants and ojek drivers provided a fertile ground for various psychosocial mechanisms, such as social influence and peer pressure, which significantly impacted their behaviours. Peer influence was particularly evident in encouraging risky sexual behaviours, such as unprotected sex with multiple partners, including FSWs and fellow female labour migrants. Similarly, peer pressure among friends within their social networks facilitated the initiation and continuation of IDU practices. These

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behaviours significantly facilitated the transmission of HIV among them. The findings support those of previous studies reporting that social networks provide opportunities for members' exposure to social influence and risks as they share similar norms, attitudes, and risky behaviours, hence enhancing HIV transmission among them [11–13,22,25]. Several studies involving different groups of men, such as clients of FSWs, motorbike taxi drivers and MSM in Indonesia have reported that peer influence through connecting each other to and sharing information about casual sex partners or FSWs increased the frequency of their engagement in HIV risk sexual behaviours, such as sex with multiple partners and inconsistent condom use practices [12,47,48].

Consistent with previous findings, this study has suggested that the environments in which participants worked and lived further exacerbated these risks [12,49]. For instance, the availability of and accessibility to casual sexual partners and illicit drugs in plantation sites and urban areas made it easier for both labour migrants and ojek drivers to engage in HIV risk behaviours, such as unprotected sex and IDU practices. The lack of family supervision in these work environments further exacerbated these risks or increased engagement in IDU, as participants felt less constrained by social norms and familial expectations or acted without fear of social repercussions. These environmental factors, combined with the social network dynamics, significantly contributed to the participants' vulnerability to HIV transmission, which are in line with the previous findings [12,49].

Limitations and Strengths of the Study

The findings of this study should be interpreted with caution due to several limitations. Firstly, the results reflect the views and experiences of the specific participants in the study settings, which may differ from those of labour migrants and ojek drivers in other contexts with varying characteristics and backgrounds. The use of snowball sampling for participant recruitment may have introduced bias, as it relied on participants referring others who may share similar characteristics. Additionally, the reliance on self-reported data from one-on-one interviews may have introduced social desirability bias, with some participants potentially providing responses they perceived as socially acceptable. Despite these limitations, the study's strengths include the application of a conceptual model that offers a theoretical framework for understanding the relationship between structural conditions, social networks, psychosocial mechanisms, and HIV infection among these participants. Furthermore, the in-depth interviews facilitated a thorough exploration of the participants' views and experiences. The findings underscore the need for targeted interventions for Indonesian male labour migrants and ojek drivers in the study settings.

Conclusions

This study highlights how structural conditions shaped the social network characteristics and individual ties of labour migrants and ojek drivers, and the social influence on their health-damaging behaviours and HIV transmission among them. Addressing the socioeconomic challenges and risky social environments to reduce risky behaviours is crucial for mitigating HIV transmission among these populations. Public health interventions such as HIV information and education should consider these network dynamics to develop effective strategies for increasing understanding of HIV transmission and prevention, reducing vulnerability, and promoting safer behaviours among male labour migrants and ojek drivers.

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