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## **Factors associated with high-risk behaviors of People newly diagnosed with HIV/AIDS: results from a cross-sectional study in Vietnam**

**Abstract:** Towards the elimination of this global epidemic, understanding the high-risk behaviors of people newly diagnosed with HIV/AIDS (PNDWH) is essential. This study aimed to describe the general characteristics and high-risk behaviors of PNDWH and identify associated factors for adopting high-risk behaviors. A cross-sectional survey was conducted in Vietnam to explore the high-risk behaviors of 506 PNDWH. Associated factors were identified using multivariable logistic regressions. 83.2% of participants had sex without using a condom, and 27.9% had more than two sex partners. Among injected drug users, 44% had shared needles with an average number of 2.1 shared partners. Male, Kinh ethnicity (Vietnamese), high income, and high educational level were risk factors for high-risk behaviors. Our findings revealed the first time a comprehensive picture of PNDWH and emphasized the high prevalence of STIs, including untreated STIs and the long delay since the early HIV diagnosis. Also, our model found much higher risk behaviors among participants who were non-adherent to ART and those currently enrolled in ART. By better managing newly-diagnosed cases, better integrating STI management services and prevention consultants, as well as improving ART adherence programs, Vietnam can make better progress towards the complete control of HIV for its most vulnerable populations.

**Keywords:** Associated factors; High-risk behaviors; Newly diagnosed; HIV/AIDS; Vietnam

### **1. Introduction**

HIV/AIDS still remains of a great concern in Vietnam with no significant change in the incidence since 2005 (Wang et al., 2016). With an estimated 260,000 people living with HIV (PLWH), 7000 new infections and 6,000 deaths in 2018 (UNAIDS, 2019), the country is experiencing a HIV concentrated epidemic, which focuses on people who inject drugs (PWID) (Bach Xuan Tran, Fleming, et al., 2019), female sex workers (FSW), men who have sex with men (MSM), and sex partners of those people (USAID, 2017). Prevention efforts are thus spread among activities to reduce drug injection-related risk behaviors and sexual risk behaviors (Lam, 2008; Thao, Lindan, Brickley, & Giang, 2006; World Health Organization (WHO), 2014), and greater efforts are required before the epidemic can be controlled in this country.

Since 2014, the Joint United Nations Programme on HIV/AIDS (UNAIDS) announced the global 90-90-90 targets (UNAIDS, 2014), which aim to increase the proportion of PLWH who know their status, who are on treatment and who have viral suppression, ultimately to improve quality of life in PLWH (T. Vu et al., 2020) and progress towards health for all (Gilmour et al., 2020). Despite the efforts of the government and support from international organizations, Vietnam is still far lagging behind the world in progress to these targets. In 2018, only 65% of PLWH in Vietnam are on treatment, comparing with 79% globally (UNAIDS, 2018), and the country remains a long way from achieving the global targets and the goal of zero new infections. Nevertheless, the general knowledge and attitude on HIV/AIDS of Vietnamese were relatively good (Hoang et al., 2019) and there was high level of satisfaction among ART patients towards HIV care and treatment services (Bach Xuan Tran, Dang, et al., 2019). Like other low and middle income countries, Vietnam has followed the WHO revised guidelines on ART strategies (WHO, 2016), but more effort is needed to properly conform with these strategies. Differences in HIV

epidemic and general characteristics and high-risk behaviors among PLWH could also influence the effectiveness and success of HIV strategies and programs.

As PLWH now live longer in the era of highly active antiretroviral therapy (HAART), the number of PLWH is increasing. HIV prevention programs now therefore have begun to target “prevention with positives”, which focus on reducing HIV transmission risks among PLWH (Gilmour, Li, & Shibuya, 2012; Li, Gilmour, Zhang, Koyanagi, & Shibuya, 2012; Millett et al., 2010). In Vietnam it is estimated that nearly 100,000 PLWH are still not on treatment, and may have been engaging in high risk behaviors for a long time while positive (UNAIDS, 2018). Thus, it is important for intervention and prevention policy makers, designers and practitioners to understand risk behaviors and treatment experience of PLWH. However, undiagnosed PLWH are the most hard-to-reach population and are usually hidden in the community. People who are newly diagnosed with HIV/AIDS (PNDWH) have a risk profile that may reflect high-risk behaviors of the undiagnosed PLWH. Understanding the characteristics of PNDWH and their sexual risk behaviors thus becomes an important part of HIV prevention and provides supportive evidence for developing effective policy and strategy (Gardner et al., 2008), in addition with boosting up more researches in culturally relevant and/or contextualized evidence of effective interventions (Baich X. Tran, Wong, et al., 2019). Previous studies described common high-risk behaviors such as unprotected sex and polysubstance use among people without HIV (Le et al., 2019; Ngoc Do et al., 2020), and unsafe sexual behaviors, multiple sexual partners, needle sharing behavior and multiple needle-sharing partners among PLWH (Chaudhry et al., 2011; Golin et al., 2009). These studies provided important evidence of HIV transmission risks; however, they did not typically study among newly-diagnosed people. Even previous studies were performed regarding the pattern of high-risk behaviors among PLWH in Vietnam (Thanh et al., 2009; T. M. T. Vu et al., 2018),

and showed the suboptimal adherence to ART (Mai et al., 2018), but the data precedes recent ART strategies and may not reflect the current situation. We conducted this study with the aims of describing the general characteristics and high-risk behaviors of people who are newly diagnosed with HIV/AIDS, and identifying associated factors for adopting high-risk behaviors.

## 2. Methods

**Study design:** This study was conducted using dataset from a cross-sectional survey of people newly diagnosed with HIV/AIDS that has been conducted since 2017 by the Center for Community Health Research and Development (CCRD) in Hanoi – the capital city and Nghe An - the biggest province in the middle of Vietnam

**Participant recruitment:** In Vietnam, the majority of HIV screening tests are conducted in Voluntary Counseling and Testing (VCT) centers and hospital systems, and a small number of cases are conducted in private settings. No matter where the screening tests are performed, provincial HIV/AIDS prevention and control centers (PACs) are the place for HIV confirmation tests. PACs then summarize the total number of HIV-positive results from the confirmatory tests and submit the results to the Vietnam Administration for HIV/AIDS control (VAAC) as provincial reports. Recruitment for this study was undertaken as part of this process. Based on new case reports in the provinces of Hanoi and Nghe An, the research team selected facilities (VCT or hospitals) which have more than 15 new confirmed HIV cases per month during June to November 2017 for conducting the interviews. Healthcare workers at selected health facilities then contacted the clients and invited them to the interview. All clients who had HIV-positive results from the confirmatory test, were older than 15 years old and agreed to participate in the survey were approached for this study.

**Measured information:** We collected demographic information of participants, including age, gender, ethnicity, education level, marital status, monthly income and the transmission mode. For sexual risk behaviors, we asked clients to report their number of sexual partners in the previous 12 months (including regular partners, casual partners, and sex workers), whether or not they had sex without using condoms, had sex for money, and had ever been forced to have sex by their sex partners, and whether participants know that their sex partners received an HIV test in the past six months, and the test result if they knew. For drug injection related behaviors, we asked the clients whether or not they had ever used drugs or stimulants during their lifetime, the age of the first time they used drug/stimulants, and whether they had injected any drug over the last six months, whether they had shared used needles and number of sharing partners. For clinical and health service characteristics, we also asked clients for their experiences of sexually transmitted infections (STIs) over the last six months and whether the condition was successfully treated, when they received their HIV positive result for the first time, and the context of that test. Finally, we asked whether the clients were currently participating in ART, and if yes, their current treatment regimen and CD4 cell count test results were collected.

**Statistical analysis:** R Version 3.5.3 was used to analyze data. General characteristics, high-risk behaviors and clinical information of participants were described. Multiple logistic regression models were used to examine the risk factors for high-risk behaviors. Dependent variables included having sex without using a condom, having multiple sex partners, sharing needles, and having multiple needle sharing partners. Adjusted odd ratios (aOR) and their 95% Confidence Interval (95% CI) were computed to measure the associations. Stepwise strategies with backward selection were applied for developing the reduced multivariable models based on the smallest Akaike Information Criterion (AIC).

**Ethics Statement:** This study was performed using a dataset gathered by CCRD, a local NGO under a USAID project with institutional ethics approval from USAID (IRB approval number IRB00006556).

### **3. Results**

A total of 506 individuals were recruited for this study. Table 1 shows their demographic characteristics. The majority were male (73.3%), completed secondary or high school education (43.9%), were living with a spouse (46.6%) and quite young (average age 33.9 years old). Most of them (87.0%) were Kinh ethnicity (Vietnamese), which is the majority ethnicity accounting for 86% of the total population (UNFPA, 2011). The most commonly reported transmission mode was heterosexual sexual activity (45.3%), followed by drug injection (32.6%) and same sex sexual activity (17.6%). Average monthly income of the participants was 4.1 million dong (approximately 200 US dollars).

Table 2 indicates the high-risk behavior of participants, including sexual behaviors and drug injection-related behaviors. For sexual risk behaviors, only 54 (10.7%) of 506 participants had no sex partner in the last 12 months, 61.5% had 1 sex partner, and 27.9% had two sex partners or more. Among those sexually active, 83.2% reported that they had unsafe sexual intercourse, nine participants (2.0%) were forced by their sex partners to have sex that they did not want, and 26 people (5.1%) had sex for money in the last six months. Among sexually active subjects, 39.4% had a sex partner who took an HIV test in the last six months. Among those 178 people, 28.7% reported that their sex partners received an HIV positive result, while the remainder (71.3%) reported an HIV negative result. For drug injection behaviors, 198 (39.1%) participants had ever used drugs or stimulants, starting on average at the age of 21.9 years. Among those, 100 people (50.5%) injected drugs in the last six months. Nearly half of these injectors (44.0%) reported that

they had shared needles with their partners, with an average of 2.1 sharing partners in the last six months.

Table 3 shows the clinical and health service characteristics of participants. Among 452 people with recent sex partners, 70 (15.5%) had ever had sexually transmitted infections (STIs), and until the time of interview, only 63 of these (90%) reported that their STI had been cured, four (5.7%) said their illness was not cured yet, and three (4.3%) did not respond. Most participants (45.1%) received the first time HIV positive result from 3 to 12 months ago and voluntary HIV testing covered 77.9% of these results. Among all 506 participants, 427 (84.4%) had ever taken ART treatment and 11.5% had ever dropped out of ART. Currently, only 405 (80.0%) of all participants were taking ART with 100% of them using the first-line regimen. Almost all respondents commenced ART within one month since receiving their last HIV positive test results. The average initial CD4 count was 345.4 cells/mm<sup>3</sup>.

Table 4 describes the factors associated with high risk behaviors including having sex without a condom, having multiple sex partners, having shared a needle, and having multiple needle-sharing partners. Subjects of Kinh ethnicity and people who have a regular sex partner were less likely to have sex without using a condom than other ethnicities and those do not have a regular sex partner, with aORs of 0.28 and 0.23 respectively. Subjects who had dropped out from ART were 9.21 times more likely to have sex without a condom than those who had never dropped out (P-value < 0.05). People reporting homosexual or heterosexual transmission modes were more likely to have multiple sex partners than other modes such as blood transfusion, occupational accidents, etc., with aORs (95% CIs) of 9.63 (4.68, 19.81) and 4.02 (2.00, 8.08) respectively. In addition, people who currently participated in ART and who had ever dropped out from ART were at high risk of having multiple sex partners than those did not participate or drop out from ART.



For needle sharing behaviors, people who received their HIV positive result more than three months ago were less likely to share needles than those received more than 1 year. Again, those who took HIV testing voluntarily and currently participated in ART had a higher risk of sharing needles than those who did not do so.

#### **4. Discussion**

This study described the general characteristics of people newly diagnosed with HIV in Vietnam and emphasized the high risk of HIV transmission among this population. Compared with previous studies among PLWH in Vietnam, our participants had similar demographics, especially in age (T. M. T. Vu et al., 2018), educational level and gender distribution (Thanh et al., 2009), and their monthly income was similar to the Vietnamese GNI per capita in 2018 (World Bank, 2018). The distribution of risk groups of participants in this study closely matches the current HIV transmission pattern in Vietnam, with a reduction in drug injection mode and increase in sexual modes of transmission. This suggests that risk behaviors and risk factors identified in this study more closely reflect the current risk profile of newly diagnosed PLWH in Vietnam, imply the risk of transmission among their undiagnosed counterparts as well as highlight the need for intervention among these groups.

Our results detected the association between some social-demographic and clinical factors and high-risk behaviors of PWNDH, which included both sexual risk behaviors and drug injection-related behaviors. Multivariable analysis result showed that Kinh ethnicity may be less likely to be involved in sex without a condom, but more likely to have multiple sex partners and needle-sharing partners. These results suggested that differences in traditional culture and social networks could be hidden barriers for HIV interventions even among those of the same social economic status. In addition, that participants who had regular sex partners may be less likely to engage with

unsafe sexual behaviors is similar to a previous study in sexual risk behaviors in US and Vietnam (Sawada et al., 2015; van der Straten, Gómez, Saul, Quan, & Padian, 2000). Higher monthly income was reported as being associated with unsafe sexual behaviors in our models, in contradiction with other studies (Reilly & Woo, 2001). Our study found that undergraduate and higher education was associated with higher risk of unsafe sex, similar to other studies that found high-risk behavior remained common even among well-educated groups. This may be due to overconfidence and insufficient knowledge of HIV/STIs (MacDonald et al., 1990), and shows again the importance of properly integrating HIV/STI education into schools at even the high school level. Other strategies that were used in Vietnam such as health education, informal conversations, education campaigns through the Internet and social networks should be considered (S. H. Nguyen et al., 2019). Our findings on multiple sex partner risk were consistent with other studies in MSM populations in Vietnam (García, Duong, Meyer, & Ward, 2014) and China (Chow et al., 2013), and could be used to select the primary target for effective HIV interventions.

Major research topics in economic evaluation studies consisted of ART and drug use prevention interventions (Bach Xuan Tran, Nguyen, et al., 2019). Voluntary Counselling and Testing (VCT) is recommended as being cost-effective in reducing sexual transmission of HIV and harm reduction in Vietnam and less-developed settings (Sweat et al., 2000). However, its risk compensation in reducing the effectiveness of test and treat strategies in Vietnam, particularly needle sharing behaviors, has not been recognized. In our study, we found that people who took voluntary HIV testing were positively associated with having needle-sharing behaviors. Previous study found that PWNDH with low income and low education level were positively associated with willingness to pay to test for HIV viral loads (Q. L. T. Nguyen et al., 2017). Among this sample of PWNDH in Vietnam, sex without a condom was reported in 83.2% of recently sexually

active PWNDH, which is much higher than prevalence of unsafe sexual behavior in a meta-analysis that found 71% prevalence in other regions (Ssewanyana, Mwangala, Van Baar, Newton, & Abubakar, 2018). With 71.3% of those knowing their sex partner's HIV status in HIV serodiscordant couples, this study raises concerns about transmission risks among PWNDH and the effectiveness of VCT in reducing sexual transmission of HIV in Vietnam. In addition, 15.5% had experienced an STI in the past six months, which was much higher than the prevalence among PLWH in another study (Singa et al., 2013) and indicative of a pattern of high-risk behavior in a sizable minority of the sample. As untreated STIs are recognized as an important risk for heightening HIV transmission (Cohen, 1998), WHO has recommended STI screening for all PWNDH (WHO, 2009). With 5.7% of our participants reporting potentially untreated STI, this suggests that many HIV programs in Vietnam do not implement STI screening, or that PWNDH have barriers to accessing STI care. Our results suggest a need for further investigation and integration of STI programs in HIV testing programs, as well as improving the effectiveness of VCT in Vietnam.

Although this study was targeted at PWNDH with sampling methods based on the provincial HIV new cases reports at most one month before the interview, most of the subjects (61.1%) had received an HIV positive result for the first time more than 3 months ago. This indicated that even though the test and treat strategy was recommended and applied in Vietnam, large numbers of PLWH were still unmanaged and lost to follow up for immediate participation in treatment programs, requiring multiple tests and repeated visits to testing centers before finally entering treatment. Reported delays to entering treatment were consistent with the low measured average initial CD4 count of participants at 345 cell/mm<sup>3</sup>, suggesting that some of these PWNDH may have been unmanaged in the community with high viral load for some time. Moreover, our model

showed that those who had ever dropped out of ART were significantly more likely to engage in high risk behaviors such as having sex without a condom and having multiple sex partners. Understanding ART adherence requires a system thinking of the life-long factors, individual-environment interactions and contextualized dynamics (Bach Xuan Tran, Hoang, et al., 2019). Thus, adherence to ART, which has been recommended by WHO as central to achieving the Treatment as Prevention strategy (WHO, 2013), should be enhanced with more investigations and interventions in Vietnam. Our model also showed higher risks of having multiple sex partners and sharing used needles among those currently participating in ART programs, which may be due to overconfidence and misperceptions in HIV/AIDS. The public should be educated on pre-exposure prophylaxis that has been shown to be an effective approach to prevent HIV infection (Bach X. Tran et al., 2020). This raises questions about the effectiveness of VCT and outpatient centers (OPC) in counselling in HIV prevention and harm reduction in Vietnam, and the role of risk compensation in reducing the effectiveness of test and treat strategies in Vietnam.

This study has potential limitations. Firstly, the results were analyzed from self-reports of high-risk behaviors and practices, which may be susceptible to recall bias and deliberate concealment. Secondly, purposive sampling methods in our study would potentially lead to bias and the reduced generalizability of the results. Thirdly, due to the design of a cross-sectional study, the causal conclusions about the relations between high-risk behaviors and other general characteristics and clinical factors may not be made. Fourthly, this study did not explore other important factors that might affect behavior of PWNDH such as quality of life (Bach X Tran et al., 2020), stigma (Bach Xuan Tran, Phan, et al., 2019) and depression (Bach Xuan Tran, Ho, et al., 2019). Further research is required to understand how epidemiological, social, and behavioral transitions change new infection routes of PWNDH (Bach Xuan Tran, Do, et al., 2019).

## 5. Conclusion

This study revealed for the first time an overview of people newly diagnosed with HIV in Vietnam and summarized their general characteristics and high-risk behaviors. Our findings emphasized the high prevalence of having sex without using a condom and STIs, including untreated STIs, among PNDWH in Vietnam and suggested the need for improving harm reduction activities as well as better integration of STI programs in HIV testing programs. The low level of initial CD4 and long time since the first HIV diagnosis among our participants raise the risk that VCT programs in Vietnam will not be effective in referral and follow up of PNDWH, and show the need to update current policy and process for enhancing management and referral of new cases. In addition, the much higher risk behaviors among participants who were not adhering to ART, and even among those currently in ART suggest the need to enhance ART adherence support efforts and counseling for prevention through all HIV programs in Vietnam. By better managing newly-diagnosed cases, better integrating STI management services and prevention consultants within testing and treatment, and more aggressively targeting VCT at injecting drug users as well as improving ART adherence programs, the Vietnamese test and treat program can be enhanced and Vietnam can make better progress towards the complete control of HIV for its most vulnerable populations.



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7 **Conflict of interest:** This research has no conflict of interest.

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