HIV Prevalence and Associated Factors Among High Risk Individuals Recruited Through Social Network Strategy in Oromia Region, Ethiopia: A Retrospective Study

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To cite this article:
Teka Haile, Amanuel Lamessa, Yonas Mekonnen, Meseret Ifa. HIV Prevalence and Associated Factors Among High Risk Individuals Recruited Through Social Network Strategy in Oromia Region, Ethiopia: A Retrospective Study. *International Journal of HIV/AIDS Prevention, Education and Behavioural Science*. Vol. 8, No. 1, 2022, pp. 1-7. doi: 10.11648/j.ijhpebs.20220801.11

Abstract: *Background*: Ethiopia adopted UNAIDS goal to end AIDS by 2030 and implementing different innovative approaches to attain this goal. Oromia region has been using social network strategy as an innovative HIV testing approach since 2018. Therefore, this study was conducted to identify HIV prevalence and associated factors among high risk individuals recruited through social network strategy in two towns of Oromia region, Ethiopia. *Methods*: Retrospective study was conducted in two towns of Oromia region; Woliso and Nekemte including 1,486 records of high risk individuals recruited through Social Network Strategy from October, 2018 to September, 2020. Data extraction form was used to collect data from the Social Network Strategy registers. The collected data entered into Epi Info version 7.2.3.1 and exported to SPSS 21.0 for analysis. The significance of association was determined with 95% CI and $p < 0.05$ measured using multivariate logistic regression analysis. *Results*: All 1,486 records of clients recruited through Social Network Strategy in the selected health facilities between October 2018 and September 2020 were included in the study. The median age of the study participants was 22 years (IQR of 22) and majority, 88.3% were female, 591 (39.8%) were seeds, while 60.2% were non-seeds. Among the 1,486 individuals tested for HIV, 105 (7.1%) were new HIV positive of whom 96 (91.4%) were linked to HIV chronic care and 89 (84.8%) started ART. Among the 1,381 participants who were HIV negative, 1,374 (99.5%) were provided condom, 1,377 (99.7%) were given risk reduction counselling, 1,379 (99.9%) were screened for STI and TB, and 104 (7.5%) received HIV pre-exposure prophylaxis. From multivariate logistic regression analysis, age 10-19 years (AOR=21.39, 95% CI: 5.90, 77.52), age 20-29 years (AOR=16.78, 95% CI: 5.16, 54.58), age 30-39 years (AOR=5.35, 95% CI: 1.61, 17.84), male sex (AOR=5.48, 95% CI: 2.11, 14.25), and recruiter's HIV status (AOR=1.54, 95% CI: 1.02, 2.32) were significantly associated with HIV infection. *Conclusion*: This study showed that the prevalence of HIV infection among HIV high risk individuals recruited through social network strategy in the study area was high. Age, male sex and recruiter's HIV status were significantly associated with HIV infection. The risk of HIV infection was higher among younger age group. Male clients recruited through social network strategy had higher risk of HIV infection. Similarly, clients whose recruiters were high risk HIV negative status had higher risk of HIV infection.

Keywords: HIV, AIDS, Social, Network, Strategy, Oromia, Ethiopia

1. Introduction

Social network strategy (SNS) is an innovative approach of using social networks to generate social influence, accelerate behavioural change and achieve desirable outcomes among high risk individuals or communities and has been increasingly used for HIV preventions [1, 2]. Ethiopia has a concentrated HIV epidemic in certain places and among some

population categories [3]. The country has defined its key and priority population groups as female sex workers and prisoners who have high risk of HIV infection having limited access to HIV testing services due to stigma and discrimination [3]. These key populations need accessible HIV testing and counselling service, different HIV prevention packages and linkage to chronic care [4]. In Ethiopia the epidemic is heterogeneous with sex, geographic areas and population groups. Women are more infected with HIV compared with men (women 1.2%, men 0.6%). Key population are disproportionately infected compared with the general population. The prevalence of HIV is indicated to be 23% among Female sex workers (FSWs), 4.9% among long distance truck drivers and 4.2% among prisoners while it is said to be 0.86% for the general population according to the National HIV Spectrum of 2021 [3, 5].

In order to reach the 95-95-95 UNAIDS goal to end HIV/AIDS by 2030 in achieving goal of diagnosing 95% of all people living with HIV, putting 95% of the diagnosed people on antiretroviral therapy (ART), and attaining viral suppression for 95% of people on ART that requires use of different innovative approaches [6]. In order to achieve this global target, national strategies have included a focus on key and priority populations, including FSWs and their sexual networks, and these realities highlight the need for continued efforts to expand access to effective HIV combination prevention interventions for these groups of individuals, while at the same time continuing the scale-up of access to HIV treatment programs for all individuals living with HIV [4, 5, 7].

Ethiopia started to implement SNS for reaching and providing HIV counselling, testing and referral for persons with undiagnosed HIV infection through use of social networks. The social network approach has proven to be a viable recruitment strategy for reaching people beyond current partners in many countries [7]. The social network strategy ascertained HIV status among a high-risk population in a heavily burdened region [8]. Social network-based interventions are important analytical tools for harnessing peer and family influences that are critical for HIV prevention and treatment among people sharing similar characteristics and having common risky behaviours [1]. These individuals with high risk of HIV can be reached through selected recruiters in the social networks. The recruiters in the SNS can be either HIV Positive or High risk HIV negative people sharing risky behaviours for HIV [9].

Study shows that there was improved HIV testing uptake and promoted participant retention in HIV care among key populations with the implementation of social network strategy [2]. More or less, understanding the determinants of individuals' risk of becoming infected with HIV and their perceptions on acceptable strategies of HIV prevention is an essential step toward mitigating the spread of HIV [10]. This study therefore aimed to identify HIV prevalence and its associated factors among high risk individuals recruited through social network strategy in Woliso and Nekemte towns of Oromia region, Ethiopia.

2. Methods

2.1. Study Design, Period, and Setting

A facility based retrospective study was conducted from October 01, 2020 to November 30, 2020 in selected health facilities in Woliso and Nekemte towns of Oromia region, Ethiopia. Oromia region has hot spot towns for HIV transmission with emerging developmental corridors like industrial zones and cross country roads. Woliso and Nekemte towns are among these identified HIV hot spot towns. Three public health facilities providing Social Network Strategy services in the two towns; one in Woliso town and two in Nekemte town were included in the study.

Routine HIV programme data of three public health facilities in the two towns providing Social Network Strategy services under the support of Centers for Disease Control and Prevention in collaboration with Oromia Health Bureau during the period from October 2018 to September 2020 were used. Total records of 1,486 individuals who were recruited and tested for HIV through Social Network Strategy were included in this study.

2.2. Source and Study Population

2.2.1. Source Population

The source population was all records of individuals recruited through Social Network Strategy in the three health facilities of two towns.

2.2.2. Study Population

The study population was all complete records of individuals recruited through the Social Network Strategy in these two towns and received Social Network Strategy services.

2.3. Inclusion and Exclusion Criteria

All records of clients who were recruited and tested through Social Network Strategy and those who got HIV test result were included in the study. Those who were recruited through Social Network Strategy, but not tested for HIV and had no HIV test result were excluded from the study.

2.4. Data Collection Procedure

Data were collected by using data extraction form that was developed after reviewing Social Network Strategy registers and other similar literatures. The data extraction form included independent variables such as socio-demographic characteristics (e.g age, sex, and residence), client type and recruiters' HIV status. The dependent variable was HIV test result of the participants. The data extraction also included HIV programme related issues such as HIV preventive packages like provision of condom, HIV risk reduction counselling, STI screening and treatment, TB screening, provision of other family planning methods, HIV Pre Exposure Prophylaxis (PrEP), linkage to treatment and care, and ART initiation.

2.5. Operational Definitions

Operational definitions are as follows:
1) Social network strategy: is an innovative approach to use social networks to generate social influence, accelerate behavioural change and achieve desirable outcomes among high risk individuals or communities and have been increasingly used for HIV prevention [7].
2) Seed: an individual who recruits any HIV high risk group or person(s) for HIV testing services [7].
3) Recruiter: a person who engages and enrols HIV high risk group or people for HIV testing services [7].
4) HIV test result: is being HIV positive or HIV negative

2.6. Data Quality Assurance

Before the data collection, the data collectors were trained for half day and practiced on how to fill the data extraction form. Data collectors were closely supervised during data collection. Collected data were checked for consistency and completeness of the response. Double data entry was conducted to ensure the quality of data. During the data analysis the normality of the data set was checked by histogram and normal probability plots.

2.7. Data Analysis Procedures

The collected data were entered into Epi Info version 7.2.3.1 and were exported to Statistical Package for Social Sciences (SPSS) version 21.0 software for analysis. Data were quantitatively analysed by running frequencies and percentages in the univariate analysis. Bivariate analysis was used to examine association between selected independent variables and dependent variable. All variables with $p < 0.2$, in bivariate analysis were entered into multivariate logistic regression model to identify factors independently associated with positive HIV test result. The significance of association was determined with 95% CI and $p < 0.05$.

2.8. Ethics Approval and Informed Consent

Ethical approval was obtained from the Public Health Emergency Management and Rapid Response Committee of Oromia Health Bureau. Official permission letter to use the data was obtained from Oromia Health Bureau and submitted to Woliso town health office, Nekemte town health office and respective health facilities. Confidentiality of the client information was ensured by excluding the name and other personal identifiers of clients. Informed consent was waived from the committee.

3. Results

3.1. Socio-demographic Characteristics

A total of 1,486 records of clients were included in this study. The median age of the clients was 22 years with IQR of 22. All participants were from the urban residential area and majority (88.3%) of them were female. Regarding the types of client, 591 (39.8%) were recruited as seeds while 895 (60.2%) were non seeds. The majority, 1,268 (85.3%), of clients recruited to the social network strategy were female sex workers (FSWs) while 126 (8.5%) were partners of female sex workers and 92 (6.2%) were other peers who participated in high risk behaviour (Table 1).

Table 1. Socio-demographic characteristics of clients recruited through Social Network Strategy in the study area from October 2018 – September 2020, Oromia, Ethiopia.

Variables		Frequency	Percentage
Age category	10-19	264	17.8
	20-29	977	65.7
	30-39	231	15.5
	40-49	14	0.9
Sex	Female	1,312	88.3
	Male	174	11.7
Client type	Seed	591	39.8
	Non seed	895	60.2
Target group	Female Sex Workers	1,268	85.3
	Sexual partner	126	8.5
	Other peers who participated in high risk behaviour	92	6.2

3.2. HIV Status and Related Chronic Care Among the Recruiters and the Study Participants

Among the 1,486 clients recruited and tested for HIV through social network strategy, 1,381 (92.9%) were found to be negative for HIV while 105 (7.1%) were new HIV positive. Among the 105 newly diagnosed HIV positive clients 96 (91.4%) were linked to HIV treatment and care and 89 (84.8%) started ART (Table 2).

3.3. Level of HIV Preventive Packages Provided to High Risk HIV Negative Individual Recruited and Tested Through the Social Network Strategy

Among 1,381 clients who were tested negative for HIV, 1,374 (99.5%) were provided condom and 1,377 (99.7%) of them were given HIV risk reduction counselling. Likewise, 1,379 (99.9%) of them were screened for Sexually Transmitted Infections and Tuberculosis (TB), 801 (58%) of them were provided Family Planning methods other than

condom, 104 (7.5%) HIV negative clients recruited through the social network strategy received Pre-Exposure Prophylaxis (Table 3).

Table 2. HIV status and related chronic care among the recruiters and the study participants recruited through Social Network Strategy in the study area from October 2018 – September 2020, Oromia, Ethiopia.

Variables		Frequency	Percentage
Recruiter's HIV status	HIV Positive	532	35.8
	High risk HIV Negative	954	64.2
Previously HIV positive recruiters' ART status	Positive on ART	529	99.4
	Positive not on ART	3	0.6
HIV test result of the study participants	Negative	1,381	92.9
	New Positive	105	7.1
Linked to care	No	9	8.6
	Yes	96	91.4
ART initiated	No	16	15.2
	Yes	89	84.8

Table 3. HIV Preventive packages provided for high risk HIV negative clients recruited and tested through Social Network Strategy in the study area from October 2018 – September 2020, Oromia, Ethiopia.

Variables	Frequency	Percentage
Condom Provision		
No	7	0.5
Yes	1,374	99.5
Risk reduction counselling		
No	4	0.3
Yes	1,377	99.7
STI screening		
No	2	0.1
Yes	1,379	99.9
TB screening		
No	2	0.1
Yes	1,379	99.9
Other Family planning methods provided		
No	580	42
Yes	801	58
Pre-Exposure Prophylaxis		
No	1,277	92.5
Yes	104	7.5

3.4. Factors Determining HIV Infection Among Clients Recruited Through Social Network Strategy

Bivariate analysis was used to examine association between independent variables and dependent variable. Client type, age category, sex and recruiter's HIV status were found to have $p < 0.2$ in bivariate analysis and entered into multivariate logistic regression model to identify factors independently associated with new positive HIV test result. The multivariate logistic regression analysis showed that independent variables like age, sex and recruiters HIV status are significantly associated with HIV infection. Age 10-19 years (AOR=21.39, 95% CI: 5.90, 77.52), age 20-29 years (AOR=16.78, 95% CI: 5.16, 54.58), age 30-39 years (AOR=5.35, 95% CI: 1.61, 17.84), Male sex (AOR=5.48, 95% CI: 2.11, 14.25), and recruiter with high risk HIV negative (AOR=1.54, 95% CI: 1.02, 2.32) were significantly associated with HIV infection among clients recruited and tested through the social network strategy (Table 4).

Table 4. Multivariate analysis of factors determining HIV infection among clients tested through social network strategy in the study area from October 2018 – September 2020, Oromia, Ethiopia.

Variables		HIV test result			COR	P-Value	AOR	P-Value
		New Positive n (%)	Negative n (%)	Total n (%)				
Client type	Seed	31 (2.1%)	560 (37.7%)	591 (39.8%)	1		1	
	Non seed	74 (5.0%)	821 (55.2%)	895 (60.2%)	0.61 (0.40, 0.95)	p=0.027	0.68 (0.43, 1.06)	p=0.087
Age category	10-19	12 (0.8%)	252 (17.0%)	264 (17.8%)	15.8 (4.71, 52.64)	p<0.001	21.39 (5.90, 77.52)	p<0.001
	20-29	57 (3.8%)	920 (61.9%)	977 (65.7%)	12.12 (4.06, 36.07)	p<0.001	16.78 (5.16, 54.58)	p<0.001
	30-39	30 (2.0%)	201 (13.5%)	231 (15.5%)	5.03 (1.63, 15.49)	p=0.005	5.35 (1.61, 17.84)	p=0.006
	40-49	6 (0.4%)	8 (0.5%)	14 (0.9%)	1		1	
Sex	Female	100 (6.7%)	1,212 (81.6%)	1,312 (88.3%)	1		1	
	Male	5 (0.3%)	169 (11.4%)	174 (11.7%)	2.79 (1.12, 6.95)	p=0.028	5.48 (2.11, 14.25)	p<0.001
Recruiter's HIV status	HIV Positive	48 (3.2%)	484 (32.6%)	532 (35.8%)	1		1	
	High risk HIV Negative	57 (3.8%)	897 (60.4%)	954 (64.2%)	1.56 (1.05, 2.33)	p=0.035	1.54 (1.02, 2.32)	p=0.041

4. Discussion

This study was conducted to identify HIV prevalence and associated factors among HIV high risk individuals recruited through social network strategy. The finding of this study revealed that the prevalence of HIV infection among HIV high risk individuals recruited through social network strategy was 7.1% with (95% CI: 5.7-8.4). This finding is lower than study conducted in USA (9.0%), Canada (13.0%), Kenya (16.6%),

Malawi (22.1%), Uganda (33%), South Africa (31.7%) and Ghana (32.9%) [8, 11-14]. However it is found to be higher than other studies conducted in USA (0.26%), Wisconsin (0.49%), and Tajikistan (1.5%) [15-17]. These variations in HIV prevalence may due to the difference in methods of the study as we have used health facility records. Similarly, there is variation in the size of the study participants when compared to all the above studies. Evidences from study conducted in Western African countries indicated that there were variations in HIV prevalence from place to place due to variations in socio-demographic characteristics like age of study participants [18].

The finding of this study also showed that of 105 new HIV positive clients, 96 (91.4%) were linked to HIV care which is found to be higher when compared to the finding of study conducted in USA (55.0%) [8]. The higher level of linkage to chronic care among HIV positive individuals is in line with finding the finding that social networks testing is proved to be successful at reaching high risk individuals and linking to chronic HIV care who may not otherwise be engaged in HIV testing [16]. Almost all who were found to be negative for HIV, 99.5% were provided condom, 99.7% of them were given HIV risk reduction counselling, 99.9% were screened for Sexually Transmitted Infections. Evidences from other studies showed that there is improved condom provision and risk reduction counselling aligned with social network strategy [16, 19]. However, only 104 (7.5%) individuals recruited through social network strategy who were found to be HIV negative received HIV Pre-Exposure Prophylaxis. This could be due to the fact that HIV Pre-Exposure Prophylaxis service implementation was initiated after the implementation of social network strategy in Oromia region.

The measure of association indicated that age, sex and the recruiter's HIV status were found to be associated with HIV infection. This study revealed that the likelihood of HIV infection was 21.39 times higher among clients aged 10-19 years (AOR=21.39, 95% CI: 5.90, 77.52), 16.78 times higher among clients aged 20-29 years (AOR=16.78, 95% CI: 5.16, 54.58), and 5.35 times higher among clients aged 30-39 years (AOR=5.35, 95% CI: 1.61, 17.84) when compared to clients aged 40-49 years. This finding is consistent with studies conducted in USA [20, 21]. This could be due to similarities in the common risky behaviours among key populations and younger individuals across the key populations are more at risk for HIV infection [18].

The finding of this study showed that the likelihood of getting HIV positive result among male clients was 5.48 times higher (AOR=5.48, 95% CI: 2.11, 14.25) when compared to female. This is inconsistent with the finding of study conducted in South Africa which showed that females were 1.38 times higher to be HIV positive [22]. Similarly, from study conducted in West Africa, HIV prevalence is higher in females than males [18]. Other studies in Ethiopia showed that females were risky to acquire HIV than male clients [3-5, 7]. This variation might be due to the fact that individuals recruited through the social network strategy were selected based up on common HIV risk behaviours that they share together. These network members may not be directly linked together with unprotected sexual intercourse and share other HIV risky behaviours that increase their risk of acquiring HIV infection in their networks like being female sex worker in the past 12 months, being HIV-positive or high-risk HIV-negative [7].

Clients whose recruiters were high risk HIV negative were 1.54 times higher to be HIV positive (AOR=1.54, 95% CI: 1.02, 2.32) when compared to clients whose recruiters were HIV positive. However, this finding was not as expected in the networks of individuals who share common risk behaviours. Study conducted in Mexico indicated that 10% of individuals recruited by HIV-positive recruiters were infected with HIV as compared to 4.1% of individuals recruited by HIV-negative recruiters [9]. This variation might be due to the fact that improvement of the social support, care and medical environment of HIV-positive clients is more likely to reduce the transmission of HIV to the general population [23]. In addition to this, improved condom provision and utilization due to on-going HIV preventive counselling in HIV treatment and care clinics might have contributed in reducing the chance of being infected from the recruiters. Hence, this finding indicates that there should be other contact members to be recruited in order to get individuals with HIV infection.

The concentrated HIV epidemic among key populations in Ethiopia suggests that the goal of 95%-95%-95% targets to end AIDS by 2030 needs special emphasis and using innovative approaches. Additionally, improved access to HIV testing services, insuring condom utilization and promotion, STI screening and treatment, provision of pre exposure prophylaxis and continuous adherence counselling, other HIV prevention and treatment services, health education, peer group discussion, and un interrupted awareness creation activities can help to break the chain of HIV transmission from key populations to general populations [3, 7, 13]. In order to achieve this, all stake holders working on key populations need to be involved in averting HIV risky behaviours among female sex workers and their partners as well as among social network members [4, 6]. Finally, HIV prevention and control interventions through social network strategy needs regular monitoring of individuals attitude towards other routine HIV testing services as it is based on incentives for the recruited individuals.

Limitations of the study

This study finding should be interpreted within the following limitations. The finding of this study cannot be generalized as it used data from facility records which may lack some important independent variables due to the nature of a secondary data.

5. Conclusion

This study showed that the prevalence of HIV infection among HIV high risk individuals recruited through social network strategy in the study area was high. Age, male sex and recruiter's HIV status were significantly associated with HIV

infection. The risk of HIV infection was higher among younger age group. Male clients recruited through social network strategy had higher risk of HIV infection. Similarly, clients whose recruiters were high risk HIV negative status had higher risk of HIV infection.

List of Abbreviations

AIDS: Acquired Immunodeficiency Syndrome, AOR: Adjusted Odds Ratio, ART: Anti-Retroviral Therapy, CI: Confidence Interval, COR: Crude Odds Ratio, FMOH: Federal Ministry of Health, FSWs: Female Sex Workers, HIV: Human Immuno deficiency Virus, IQR: Inter Quartile Range, PrEP: Pre-Exposure Prophylaxis, STI: Sexually Transmitted Infection, SNS: Social network strategy, TB: Tuberculosis, UNAIDS: The Joint United Nations Program on HIV/AIDS

Acknowledgements

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