SHORT ARTICLE

New HIV Infection Estimation from Program Data of Key Populations

Richard L Chawngthu[1], Venkatesan Chakrapani[2], Padum Narayan[3], Vinita Verma[4], Shobini Rajan[5], Rajesh Kumar[6]

[1]State AIDS Control Society, Mizoram; [2]Center for Sexual & Health Research and Policy, Chennai; [3]National AIDS Control Organisation, Department of Health & Family Welfare, Govt. of India, New Delhi; [4]National AIDS Control Organisation, Department of Health & Family Welfare, Govt. of India, New Delhi; [5]National AIDS Control Organisation, Department of Health & Family Welfare, Govt. of India, New Delhi; [6]State Health Systems Resource Center, National Health Mission, Department of Health & Family Welfare, Govt. of Punjab; [6]Department of Communicable Diseases and Population Health, London School of Hygiene & Tropical Medicine, UK; [6]School of Public Health & Community Medicine, University of New South Wales, Sydney, Australia

Abstract	Introduction	Methodology	Results	Conclusion	References	Citation	Tables / Figures

Corresponding Author

Dr Rajesh Kumar, Executive Director, State Health Systems Resource Centre, National Health Mission, Department of Health & Family Welfare, Govt. of Punjab, Paryas Building, Sector 38, Chandigarh- 160036
E Mail ID: dr.rajeshkumar@gmail.com

Citation

Article Cycle

Abstract

In India, HIV sentinel surveillance is carried out to estimate the prevalence of HIV for calibrating the response. However, estimate of new HIV infections is also needed to monitor the effectiveness of prevention strategies. We used Targeted Intervention Program data of Injecting Drug Users (IDUs) and Female Sex Workers (FSWs) enrolled in Targeted Intervention (TI) programme in Aizawl district of Mizoram state to estimate the trend in new HIV infection rate. Those who had tested HIV positive in a particular year but were negative in the previous HIV test were considered to be newly infected. New HIV infections were found to have a rising trend from 2010 to 2019 (p<0.01). The new infection rate of HIV was 6.73% among IDUs and 1.94% among FSWs in 2019. This analysis, which requires minimal resources, may be undertaken at regular interval in all Targeted Intervention Programs to monitor the effect of preventive strategies at local level.

Keywords

Introduction

In India, HIV prevalence is monitored through HIV sentinel surveillance (1), and new infections are Estimated indirectly by Modeling (2). According to the modelling estimates carried out in 2017, there had been a decline of 85% in new HIV infections from the peak in 1995, but the momentum of decline had decreased from 2010 with only 27% decline in recent years (2). The estimation of new infections is done at state and national level, whereas estimates of new infection are also required at local level. Moreover, indirect estimation does not elicit characteristics of the newly HIV infected individuals to fine tune the preventive response at local level.

As 'Zero Transmission' target is to be achieved by 2030, it is necessary to develop methodology for estimation of incident (new) infection rate from program data. Understanding of the characteristics of the newly HIV infected individuals is also important to comprehend reasons for the observed transmission patterns (3). As highest prevalence of HIV has been reported in Mizoram state (2), therefore, this study was carried out in Aizawl District of Mizoram.

Aim & Objectives

1. To directly estimate new HIV infection rate among key populations enrolled in targeted HIV interventions using programme data
2. To describe the characteristics of persons who were detected to have new HIV infections.

Material & Methods

The new HIV infection rate among Injecting Drug Users (IDUs) and Female Sex Workers (FSWs) were calculated using National AIDS Control Organisation (NACO) Programme data, i.e., Master line-list (Form E) and Positive line-list of Targeted Interventions (TI) of enrolled IDUs and FSWs in the TI program from Aizawl district in Mizoram state from 2010 to 2019. New HIV infection rate was computed using following methods:

New HIV infection rate = [The number of people tested HIV positive in a particular year that were negative in the previous HIV test excluding those who are registered in the same year] / [Active/validated population (number enrolled minus drop-outs) who are HIV Negative in the TI program for that particular year]

Stata Statistical Software (Release 16) was used for statistical analysis. The trends of new HIV infection rate were depicted every year and statistical significance was tested using Cuzick's test with ranks. The characteristics of the newly HIV infected people were also examined using the Positive Line-list of TI.

Results

Significant increase in the new infection rate was observed among IDUs and FSWs in Aizawl District of Mizoram state (Table 1). The new HIV infection rate among IDU s enrolled in TI's of Aizawl was 6.73 per 100 HIV negative IDUs in 2019; there was rapid increase from 2016 to 2019. The new infection rate among FSW in 2019 was 1.94. The overall trend among FSW shows gradual increase.

Among the new HIV infections, IDUs had average age of 27.6 years at the time of HIV detection, and 60% of them were 25-year-old or more at the time of their HIV detection. Most of them did not wander beyond their districts. The average sexual activities in a month among newly infected IDUs were 2.2 times per month while more than one fourth of them did not use condom in the last month. Their average injection episodes in a month were around 18, however, almost all of them reported that they did not share syringe/needles. Only 31.7% of them had linkage with opioid substitution therapy (OST) services, but majority of them (82.3%) had linkage with antiretroviral therapy (ART). Alcohol use was higher in them (91.2%) compared to abstainers (71.6%). The comparative analysis of the characteristics of newly infected with rest of the key population can be used for taking appropriate preventive actions at the local level.

Discussion

It is possible to directly estimate New HIV Infection Rate in real time using the existing program data like Master Line-list and Positive Line-list of the Targeted Interventions (TI) as NACO has implemented twice a year HIV testing in the key population. The Master Line-lists are updated regularly by mapping of the key population. At the time of new registration HIV test is carried out and subsequently HIV negatives are tested every six months. Thus, TI program data has records of all newly detected HIV infections (numerator) and the number of HIV negatives enrolled and active in the program (denominator) to estimate the new HIV infection rate. Use of this method showed that there is rising trend of New HIV Infection Rate among IDUs and FSWs in Aizawl District of Mizoram.

Several methods for incidence measurement have been used in the past, including longitudinal studies, back calculation, p24 antigen, enzyme immunoassay (EIA), viral RNA testing and Avidity assays etc. These methods are either difficult to perform or are costly or may not give accurate estimate (4). Therefore, analysis of TI registers may be undertaken at regular intervals for all Targeted Interventions program under NACO to directly estimate new HIV infection and to understand the characteristics of newly HIV infected key populations. This analysis does not require additional resources except for a brief training or instruction to State AIDS Control Society and field staff.

Triangulation can be done with Integrated Biological and Behavioural Surveillance data (5), by estimating proxy for new infection rate among all key populations who are enrolled in TI and those who are not enrolled in TI using the age of onset of sexual debut/injections use and age at HIV test. In a sub-sample of HIV Sentinel Surveillance, incidence assay (6) can also be used to arrive at incidence rate of HIV among antenatal clinic attendees and Key populations. These estimates of incidence can be used to validate indirect estimate from modelling and direct estimated from TI program data.

Conclusion

New HIV Infection Rate can be estimated directly from program data for key population enrolled in Targeted Interventions as twice a year HIV testing is done in them. New HIV infections are rising in IDUs and FSWs of Aizawl in Manipur state.

Recommendation

Analysis of TI registers should be done annually to estimate trends of new HIV infections and to understand the characteristics of newly infected key populations.

Limitation of the study

Complete line-listing of key population and high uptake of bi-annual HIV testing is required for direct estimation of new HIV infections.

Relevance of the study

Direct estimates of new HIV infection at local level will be useful in refining of the preventive actions.

Authors Contribution

RLC, VC, PN, VV, RK designed the study, analyzed and interpreted the data; SR critically reviewed the data and

its interpretation and all authors prepared and approved the manuscript.

References

1. HIV Sentinel Surveillance 2016-17. Technical Brief. New Delhi: NACO, Ministry of Health and Family Welfare, Government of India, 2017. http://naco.gov.in/sites/default/files/HIV%20SENTINEL%20SURVEILLANCE_06_12_2017_0.pdf [Accessed on 25/06/21]
2. National AIDS Control Organization & ICMR-National Institute of Medical Statistics. HIV Estimations 2017: Technical Report. New Delhi: NACO, Ministry of Health and Family Welfare, Government of India, 2018. http://naco.gov.in/sites/default/files/HIV%20Estimations%202017%20Report_1.pdf [Accessed on 25/05/21]
3. Targeted Interventions under NACP III. Operational Guidelines. New Delhi: NACO, Ministry of Health and Family Welfare, Government of India, 2007 http://naco.gov.in/sites/default/files/NACP-III.pdf [Accessed on 25/06/21]
4. Behavioural Surveillance Survey-LITE. New Delhi: NACO, Ministry of Health and Family Welfare, Government of India, & All India Institute of Medical Sciences, 2020. http://naco.gov.in/sites/default/files/BSS%20Lite%20Report.pdf [Accessed on 25/06/21]
5. Rutherford GW, Schwarcz SK, McFarland W. Surveillance for incident HIV infection: new technology and new opportunities. J Acquir Immune Defic Syndr. 2000 Dec 15;25 Suppl 2:S115-9.
6. Chauhan CK, Lakshmi PVM, Sagar V, Sharma A, Arora SK, Kumar R. Immunological markers for identifying recent HIV infection in North-West India. Indian J Med Res 2020; 152(3): 227-233.

Tables

TABLE 1 NEW HIV INFECTION RATE PER 100 IDUS AND FSWS, AIZAWL DISTRICT, MIZORAM, INDIA

Year	Injecting Drug Users (IDUs)			Female Sex Workers (FSWs)		
	HIV Negative	New HIV Positive	New HIV Infections (%)	HIV Negative	New HIV Positive	New HIV Infections (%)
2010	1924	13	0.68	335	2	0.60
2011	2677	16	0.60	392	2	0.51
2012	2532	7	0.28	367	2	0.54
2013	2599	10	0.38	413	2	0.48
2014	2702	23	0.85	390	3	0.77
2015	2791	40	1.43	387	5	1.29
2016	3014	116	3.85	303	7	2.31
2017	3346	186	5.56	296	5	1.69
2018	3307	199	6.02	287	5	1.74
2019	3091	208	6.73	309	6	1.94