An exploratory analysis of spatial mobility of injection drug users in the northeast region of India

Vasna Joshua¹, Ramesh S. Paranjape², Rajatshurva Adhikary³, J. Mahanta⁴, Prabuddhagopal Goswami³, Mandar K. Manikar², G.K. Medhi⁴, S. Brogen Akijam⁵ & Bernice Dzuvichu⁶

¹National Institute of Epidemiology (ICMR), Chennai, ²National AIDS Research Institute (ICMR), Pune ³Family Health International, New Delhi, ⁴Regional Medical Research Centre (ICMR), Dibrugarh ⁵Regional Institute of Medical Science, Imphal & ⁶Kripa Foundation, Kohima, India

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Background & objectives: Injection drug users (IDUs) are generally a mobile group who engage in risky behaviour not only in their locale but also outside areas. The IDUs of the northeast region of India form the major victims of HIV/AIDS infections. Hence an attempt was made to explore their mobility pattern of networking and risky behaviour.

Methods: A large cross-sectional Integrated Behavioural and Biological Assessment survey (IBBA) was conducted among 1699 IDUs in four districts (Bishnupur and Churachandpur of Manipur; Phek and Wokha of Nagaland) in the northeast region of India by India AIDS initiative, the Avahan during January and May 2006. The mobility patterns of the IDUs were viewed as two different types, mobility of networking and frequent mobility. The networking mobility has been portrayed using exploratory spatial analysis. The frequently mobile IDUs profile, risky behaviour, HIV and other infections are discussed based on the RDSAT estimates. The volume of mobility and their average movement were also studied.

Results: More than 48 per cent of the IDUs had networked far and wide outside their places of residence. One fourth or more of the mobile IDUs were young, more than 35 per cent were literate, more than one fourth were unemployed and nearly 31 per cent or more were living alone. The frequently mobile IDUs risky behaviour was two times higher compared to the non-mobile IDUs (except in Phek district). The average movements of IDUs who had at least one movement inside and outside the district were higher in Wokha district.

Interpretation & conclusions: The pattern of networking and the mobile IDUs risky behaviour showed an alarming signal. Mobility being a general phenomenon, the attention towards their surrogate risky factors had to be focussed to control the spatial epidemic wave.

Key words Exploratory analysis - injection drug users - northeast - spatial mobility

Human mobility is one of the key social factors contributing to the spread of HIV and other blood-borne or sexually transmitted infections (STI). However, migrants suffering from infectious agents in their original place may carry them to the place of their destination. HIV thrives on mobile populations, not just
because it has human carriers but also because mobile populations are often in situations that make them more vulnerable to HIV. Injection drug users (IDU) are a relatively mobile group, often moving between cities, smaller communities, across the national and the international boundaries for reasons of work, economic opportunities, security, or access to narcotics. This mobility serves as the potential for IDU who engage in risky behaviour not only in their localities but also outside areas to transmit HIV infection to other IDUs, their sex partners, and hence to the general population. In the northeast region of India it is stated that IDUs constitute predominant risk behaviour group for acquiring HIV infection. Drug transit, drug use, drug addiction and also drug abuse favourably led to an increased amount of HIV/AIDS infections in Manipur and Nagaland. IDUs lifestyle and movements add fire to the fuel in spreading and increasing the HIV infection. The main objectives of the present study were to explore the spatial pattern of networking of the IDUs of the northeast India, and to examine the frequently mobile IDUs risky behavioural characteristics.

Material & Methods

Study type: A large cross-sectional Integrated Behavioural and Biological Assessment (IBBA) survey was conducted among injection drug users (IDUs) in four districts in the northeast by Avahan India AIDS initiative.

Study population: The survey collected information from 1699 IDUs from Bishnupur and Churachandpur of Manipur State, Phek and Wokha of Nagaland state (n = 420; 419; 440; and 420, respectively) during January and May 2006. IDUs were males aged 18 yr or older, who had injected drugs for non-medical reasons at least once in the last six months. Mobile persons were broadly defined as persons who moved from one place to another temporarily, seasonally or permanently for a host of voluntary and/or involuntary reasons. Two types of mobility were studied: (i) Mobility of networking: Any IDU, who had moved from his place of residence, linked in the social network and participated in the survey in a district from outside the residential village/district/State. (ii) Frequent mobility: Any IDU was defined to be mobile if he commuted to one or more particular places frequently from his place of stay (i.e. repeated visits at short intervals).

Sampling strategy: As activities of IDUs are highly hidden, respondent driven sampling (RDS), a social network-based sampling technique was used. RDS draws samples from personal networks and assumes that these personal networks are linked to each other. The networking could be far and wide and also could be outside the place of their residence. In IBBA survey, the eligibility of IDUs for participating in the survey was not restricted within any geographical boundary (until required sample size achieved). In other words, the IDUs residing even outside the survey district were eligible to take part in the RDS survey.

A handful of eligible respondents from diverse background are engaged as initial recruiters (called ‘seeds’) who recruit a limited number of others from their core personal network. The subsequent recruitments are made in the same way till the sample size is achieved. A sample size of 400 was estimated for each of the survey district. RDS employs a dual system of structured compensation; a compensation for travelling expense and wages lost and incentive for successful recruitment of respondents. The recruitment process is administered through RDS coupons. Data collection was done in the RDS data collection centre.

After written informed consent, participants were administered a questionnaire to collect information on the following domains: demographic profile, injection practices, sexual behaviour; self reporting of STI, knowledge of HIV-related services, perception of HIV risk, mobility and exposure to Avahan interventions.

The methodology of the survey, the laboratory process, the weighting procedures, ethical issues, consent process, etc. have been discussed in detail elsewhere.

Data analysis: All the estimates presented in the Tables are weighted measures obtained using RDSAT (v5.6.1). There were two RDS centres in each of Bishnupur (Moirang and Bishnupur), Phek (Phek and Pfitsero) and Wokha district (Wokha and Bhandri) and one in Churachandpur (Churachandpur) district.

Exploratory analyses of spatial mobility in networking of the IDUs of the northeast and their HIV status for each of the four districts surveyed are portrayed as cartograms using ArcGIS software. Cartograms show the statistical data by means of a shape or a symbol. The magnitude of a variable’s value (number of IDUs and HIV cases) corresponds to the size of the shape in the cartogram. Each shape or symbol is linked to the centroid location of the associated place of residence. The location of the domicile of the IDUs and their extent of networking together with their
HIV status are portrayed in the map. The networking distance was measured by Google distance calculator (refers to a distance as the “crow flies” and travelling in real life would normally involve larger distance). Apart from the cartograms numerical percentages of the network movers and prevalence of HIV are shown in the Table.

The profile of the frequent mobile IDUs are presented to show an overall view of their characteristics. The characteristics of the IDUs who commuted frequently, their unsafe injection practices in the past month of the survey, sharing practice of the last injecting incident, IDUs’ sexual behaviour with the paid / unpaid female partners and their prevalence of HIV/STI and other infections were discussed. The average movements of the IDUs in and out of the districts were studied.

Results

Of the 1699 IDUs studied, 1100 IDUSs had networked far and wide outside their places of residence (Bishnupur 329; Churachandpur 300; Phek 267 and Wokha 204). Their prevalence of HIV infection was strikingly on the higher side except in the district of Phek (Table I).

Nearly 88 per cent of the IDUs sampled at Bishnupur were from outside the district. The location of the IDUs domicile and the location of RDS centre are shown in the Fig. 1a. The HIV carriers were spread in and out the district (shown by the yellow stars in Fig. 1a) indicating that the mobility due to networking would enhance the HIV infection rapidly. The maximum distance of networking of the IDUs who took part in the survey at Bishnupur was of 460 km (Guwahati) from the RDS centre.

Only 22 per cent of the IDUs sampled at Churachandpur came from the same district and majority of them were from outside the district. Fig. 1b shows that HIV carriers among the IDUs surveyed at Churachandpur were spread in and out the survey district and even to the extent of other State. The IDUs networking were mainly from the northeastern direction towards the RDS centre and to a maximum distance of 956 kilometres (Darjeeling).

Fifty eight per cent of the IDUs sampled at Phek belonged to different place of residence and the maximum networking distance was 137 km (Dimapur), which was much less compared to other districts. The HIV cases were confined within the district boundaries (Fig. 2a).

Fifty two per cent of the IDUs sampled at Wokha belonged to the same place and the maximum distance of networking was 1323 km in the southwest (Kolkata of West Bengal). The patterns of mobility was extremely dispersed and to the greatest extent compared to the other three districts (Fig. 2b) but the HIV cases were confined within the district at the time of survey.

Among the frequent mobile IDUs, who did at least one move to places within the district, across the districts and across the State were much higher in Wokha district (81, 84 and 53%, respectively). The Bishnupur district had the lower percentage for at least one move within the district (37%) and across the State (1%) (Fig. 3).

IDUs who had moved at least once made an average of 4 moves in Wokha district, the highest compared to the lowest in Bishnupur district (1.4). The same trend or pattern was observed within and outside the districts (Table III).

Table I. Mobility of networking and HIV infection of IDUs of northeast region of India

<table>
<thead>
<tr>
<th>Variables</th>
<th>Place of locale and place of survey different/same</th>
<th>Bishnupur</th>
<th>Churachandpur</th>
<th>Phek</th>
<th>Wokha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Different (N=329)</td>
<td>Same (N=91)</td>
<td>Different (N=300)</td>
<td>Same (N=119)</td>
<td>Different (N=267)</td>
</tr>
<tr>
<td>Mobility, %</td>
<td>87.5</td>
<td>12.4</td>
<td>77.9</td>
<td>22.1</td>
<td>57.7</td>
</tr>
<tr>
<td>HIV, %</td>
<td>15.5</td>
<td>5.7</td>
<td>25.9</td>
<td>6.2</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Table II. Profile of the frequently mobile injection drug users, northeast region of India

<table>
<thead>
<tr>
<th>Characteristics of frequently mobile IDUs (yes)</th>
<th>Bishnupur (N = 420)</th>
<th>Churachandpur (N = 419)</th>
<th>Phek (N = 440)</th>
<th>Wokha (N = 420)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (&lt;25 yr)</td>
<td>25.7</td>
<td>28.9</td>
<td>25.8</td>
<td>47.8</td>
</tr>
<tr>
<td>Literate</td>
<td>65.4</td>
<td>65.6</td>
<td>35.2</td>
<td>82.3</td>
</tr>
<tr>
<td>Occupation (unemployed)</td>
<td>32.4</td>
<td>33.4</td>
<td>26.5</td>
<td>71.8</td>
</tr>
<tr>
<td>Current living status (living alone)</td>
<td>43.9</td>
<td>38.8</td>
<td>30.9</td>
<td>70.9</td>
</tr>
</tbody>
</table>

Figures are in percentages

Spatial mobility of injection drug users of Bishnupur and their HIV status

Fig. 1. Manipur IDUs mobility of networking.
The behavioural characteristics and HIV prevalence of those IDUs who had frequent movements are shown in Table IV. The number of frequent movers in Wokha district was very high (97%). In general, the mobile IDUs risky behaviour was comparatively on the higher side except in the Phek district wherein the mobility itself was much less (44%). The risky pattern of the injecting drugs, sharing practices of needle, syringe and solution used for injecting and injecting equipments (cotton, cleaning agent, dropper, cooker/vial) were more than two times higher in the mobile group except in Phek district where the pattern was not uniform. Similar pattern was also found in their sexual practices among commercial sex and casual sex (paid and non paid) female partners, knowledge about HIV, ever undergone HIV testing, HIV and other infections.

The number of IDUs in Wokha district with risky behaviour was much higher compared to other districts. The commercial sex among them was less but they had more non paid female partners. Though majority of them were aware of HIV/AIDS, only 7.5 per cent had ever undergone HIV testing. Two per cent of them were HIV positive but hepatitis B infection and syphilis were much higher (6.9 and 19.2%, respectively).

Table III. Average movements of the injection drug users, northeast region of India

<table>
<thead>
<tr>
<th>Name of the districts</th>
<th>Average no. of frequent movements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inside the district</td>
<td>Outside the district</td>
</tr>
<tr>
<td>Bishnupur</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Churachandpur</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Phek</td>
<td>2.1</td>
<td>1.7</td>
</tr>
<tr>
<td>Wokha</td>
<td>3.1</td>
<td>2.1</td>
</tr>
</tbody>
</table>
In Churachandpur district, 70 per cent of IDUs were aware of HIV/AIDS and 19 per cent of them had ever undergone HIV testing. The highest proportion (21.3%) of the mobile IDUs were affected with HIV and hepatitis C infection (5.5%).

**Discussion**

The ideal location of the RDS centres was based on safe accessibility and also in consultation with the local NGOs and the target community. The geographical boundary of the IDUs for participating in the survey were not restricted to gain the natural flow of the social networking. In manipur district, the networking mobility and HIV carriers were wide spread in all directions even to the extent of outside the State. In Nagaland, the HIV carriers were confined within the geographical boundary of the districts during the survey period, whereas the IDUs locales were widely dispersed outside the districts and State. Though the networking mobility for Wokha district was less, the frequent movers within the districts were very high. The unsafe injecting practices, risky behaviour, commercial and non commercial sexual partners and HIV and other infections among the mobile IDUs were on the higher side. A minimum of 89 per cent (Phek) to a maximum of 97 per cent (Wokha) of the IDUs surveyed have taken part in one or more mobility discussed above (results not shown). This alarming phenomenon of mobility reveals the risky and unsafe practices, leading to spread of HIV cases rapidly.

In a study in China it was observed that the growing transient population was the key contributing factor in the increase and diffusion of socially deviant and epidemiologically high-risk behaviour for the spread of AIDS\textsuperscript{11}. In an adult Ugandan population it was observed that both long and short-term migration processes acted as conveyor belts for the transmission of HIV from one area to the other\textsuperscript{12}. In a study in four highly endemic States of India (Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra) migration/mobility has been viewed as a strong cofactor in accelerating HIV infection\textsuperscript{13}. In a rural West African study, the factor mobility had been considered as an independent risk factor for HIV infection. The reasons reported for high mobility were due to new drug trends and risky behaviours\textsuperscript{14}. 

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**Spatial mobility of injection drug users of Phek and their HIV status**

![Diagram of Phek and its HIV status](image)

- Dimapur
- Kohima
- Cheduba
- Chedeb
- Sekruzu
- Choruba
- Tizum
- Phek Village
- Zanhebota
- Ketsapo
- Poruba
- Meluri
- Phokhungri
- Khezhakeuma
- No. of IDUs
  - 1 - 5
  - 6 - 17
  - 18 - 36
  - 37 - 82
  - 83 - 173

**Legend**
- HIV cases
  - 1 case

**Map not to scale**

Fig. 2. Nagaland IDUs mobility of networking.
Fig. 3. Volume of mobility of injection drug users, northeast region of India, 2006.
### Table IV. Unsafe injecting practices in the past 1 month

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Unsafe injecting practices in the past month –</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily once or more times</td>
<td>29.1</td>
<td>2.9</td>
<td>29.2</td>
<td>9.5</td>
<td>9.0</td>
<td>27.8</td>
<td>39.2</td>
<td>3.6</td>
</tr>
<tr>
<td>One or more injecting partners</td>
<td>32.8</td>
<td>5.0</td>
<td>16.3</td>
<td>7.7</td>
<td>22.4</td>
<td>37.0</td>
<td>57.9</td>
<td>2.8</td>
</tr>
<tr>
<td>Sharing needle and syringe - every time</td>
<td>27.1</td>
<td>11.8</td>
<td>20.7</td>
<td>9.4</td>
<td>10.5</td>
<td>25.7</td>
<td>21.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Ever receptive shared needle and syringe</td>
<td>38.5</td>
<td>8.5</td>
<td>49.4</td>
<td>20.6</td>
<td>26.8</td>
<td>37.0</td>
<td>74.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Last injecting incident</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passed needle and syringe after injecting</td>
<td>9.0</td>
<td>3.9</td>
<td>10.1</td>
<td>5.3</td>
<td>16.2</td>
<td>11.9</td>
<td>39.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Received needle and syringe after injecting</td>
<td>4.7</td>
<td>2.2</td>
<td>9.8</td>
<td>4.5</td>
<td>10.2</td>
<td>8.7</td>
<td>17.8</td>
<td>2.0</td>
</tr>
<tr>
<td>Drew up drug solution from a common container</td>
<td>28.5</td>
<td>13.1</td>
<td>35.0</td>
<td>16.7</td>
<td>25.2</td>
<td>31.1</td>
<td>53.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Shared any other injecting equipment</td>
<td>28.9</td>
<td>6.2</td>
<td>41.9</td>
<td>18.4</td>
<td>24.4</td>
<td>20.5</td>
<td>43.4</td>
<td>3.5</td>
</tr>
<tr>
<td>Injected from a pre-filled syringe</td>
<td>9.8</td>
<td>4.8</td>
<td>15.3</td>
<td>5.3</td>
<td>15.0</td>
<td>14.4</td>
<td>26.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Sexual behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Have paid to a female for sex in the past 12 months</td>
<td>12.1</td>
<td>1.9</td>
<td>3.6</td>
<td>1.9</td>
<td>0.8</td>
<td>0.9</td>
<td>3.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Have a non paid regular female partner</td>
<td>26.8</td>
<td>7.9</td>
<td>26.0</td>
<td>5.9</td>
<td>26.5</td>
<td>30.4</td>
<td>71.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Have other non paid regular female partner</td>
<td>5.5</td>
<td>0.6</td>
<td>24.1</td>
<td>10.1</td>
<td>19.8</td>
<td>30.7</td>
<td>47.8</td>
<td>2.1</td>
</tr>
<tr>
<td>HIV / STIs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have heard of HIV/ AIDS</td>
<td>68.9</td>
<td>30.7</td>
<td>70.1</td>
<td>29.9</td>
<td>34.9</td>
<td>61.3</td>
<td>86.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Ever taken HIV test</td>
<td>13.2</td>
<td>4.5</td>
<td>18.6</td>
<td>7.2</td>
<td>2.0</td>
<td>3.4</td>
<td>7.5</td>
<td>0.5</td>
</tr>
<tr>
<td>HIV</td>
<td>19.8</td>
<td>5.2</td>
<td>21.3</td>
<td>10.8</td>
<td>0.4</td>
<td>1.1</td>
<td>1.8</td>
<td>0.0</td>
</tr>
<tr>
<td>HEP B</td>
<td>4.8</td>
<td>1.6</td>
<td>3.4</td>
<td>2.4</td>
<td>1.5</td>
<td>3.0</td>
<td>6.9</td>
<td>0.0</td>
</tr>
<tr>
<td>HEP C</td>
<td>4.0</td>
<td>1.4</td>
<td>5.5</td>
<td>2.2</td>
<td>0.0</td>
<td>0.0</td>
<td>1.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Syphilis</td>
<td>2.9</td>
<td>2.5</td>
<td>0.7</td>
<td>0.2</td>
<td>3.1</td>
<td>4.4</td>
<td>19.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Figures are in percentages
In the present study, the risky behaviours among the mobile IDUs were on the higher side in Bishnupur, Churachandpur and Wokha districts. It was also evident from literature that the northeast region of India facilitates drug trade and transport of the narcotics trade in a significant manner. The above fact has been discussed extensively in the AIDS Security and Conflict Initiative (ASCI) report and also about the impact of HIV/AIDS on governance in Manipur and Nagaland. Moreover, geographically the State of Manipur shares the long international boundary with Myanmar in the east. Nagaland’s economy encounters a considerable number of challenges such as isolation, inhospitable terrain, and inaccessibility to the rest of the world, hence favouring the mobility and risky behaviours in IDUs.

In Wokha district nearly one half of the mobile IDUs were young, majority of them were literate, unemployed and living alone. Hence their job seeking mobility behaviour would indirectly enhance the HIV positive cases. The above fact also agreed with the Report stating that some of the reasons why drug use was so rampant were “a large youth population, a lot of them with westernised values, tradition liberal attitudes to relationships and free lifestyle, widespread unemployment, and lack of future prospects in insurgency-ridden regions of northeast India”.

In the Nedan report it was also mentioned that “there were no organized brothels in the northeast and yet the infection is increasingly passed through the sexual route; and casual sex were easily available despite the absence of organized red light areas”. In the study area the above fact was confirmed as one third or more of the IDUs were living alone and also had paid and non-paid sex with female partners.

In an Indian study migration/mobility of at-risk individuals, particularly the relocation of individuals or frequent visits to other areas for economic opportunity has been viewed as a strong co-factor in raising HIV prevalence. The present study showed that the IDUs of the northeast had frequent commutation and wide mobility networking coupled with their unsafe injection practices and risky sexual practices. The proportion of HIV, hepatitis and syphilis infections were also high among the mobile IDUs. The IBBA study survey reflects that the risk of acquiring and disseminating the HIV transmission in IDUs depends not only because of their unsafe and risky behaviours but also on account of their mobility in and out. The mobility revealed that it could dynamically influence the concentration and geographical spread of the infection to a greater extent.

Mobility has been viewed as ‘push’ and ‘pull’ from families but placed to hardship of adverse effects at their destination. The event of mobility creates channel where culture, mannerism and infection travel from one place to another. The mobility acts as bridge connecting a link between the low and high prevalence places. Mobility being a general phenomenon of occurrence; the attention to their surrogate risky factors for dynamic spread of the HIV/AIDS infection has to be focussed, to reduce the intensity of the spatial epidemic wave.

Acknowledgment

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References


*Reprint requests:* Dr Vasna Joshua, National Institute of Epidemiology (ICMR), R127, 3rd Avenue, Tamil Nadu Housing Board, Ayapakkam, Chennai 600 077, India e-mail: vasnajoshua@yahoo.com