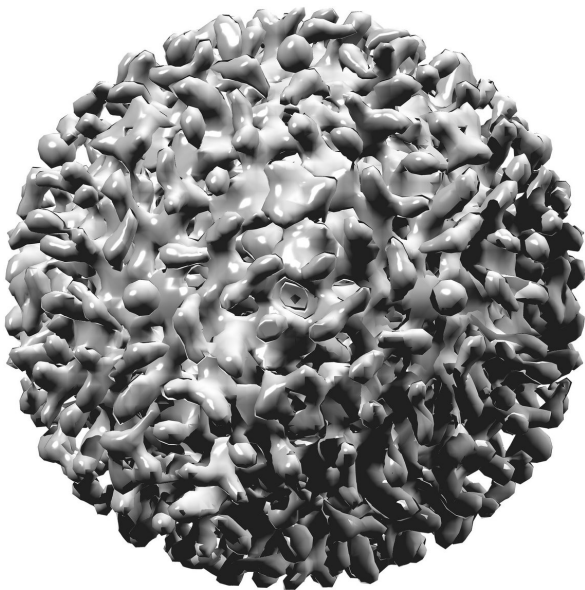


# Social and spatial networks influence HIV and hepatitis transmission in people who inject drugs

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The risk of HIV or hepatitis C in people who inject drugs is influenced as much by their social interactions and the venues where they inject as other risk factors, according to a study published today in *eLife*.

The findings could help direct public health efforts to locations where HIV and hepatitis is most frequently transmitted, allowing more efficient use of harm reduction services and more quickly interrupting disease transmission.

India has one of the highest burdens of HIV and hepatitis C resulting from [injection drug use](#). Efforts to stop the spread of these diseases are hindered by a suboptimal understanding of the role social

networks can play in the spread of infectious diseases, especially in a population which includes many people who are without homes and hard to reach.

Social interactions can be used to interrupt disease transmission and can be useful for combating epidemics among populations that are linked by a common behavior—in this case, injecting drugs—according to the authors. However, developing [network](#)-based interventions in this population is challenging because the network structure is often unknown or poorly understood, particularly indirect networks (as in "friend-of-a-friend" connections).

To address this, the authors set out to understand the structure of the social connections (injection partners) and spatial connections (places where people inject) of those who inject drugs in New Delhi, India. They started by recruiting an initial group of 10 people who inject drugs, who then provided the names of injecting partners. They were asked to recruit these contacts into the study. These recruits were, in turn, asked to do the same. The study was set up so that none of the contacts were duplicated, but if a person was referred by more than one contact, they were then interconnected to each of the named contacts. The result was a network of direct and indirect connections between 2,512 people who injected drugs, mostly men and aged 26 years on average, covering a total of 181 venues across a 20km radius.

The team then offered testing for HIV and hepatitis C to the participants, with appropriate referrals to care when applicable, and asked them to complete surveys to provide additional information on factors such as [education level](#), homelessness, injection frequency, type of [drug](#) injected, sexual activity and

syringe-sharing.

At the start of the study, 37% were HIV-positive and 65% had antibodies to hepatitis C, with 80% of these people having an active infection. Most were unaware they had hepatitis C. Of those living with HIV, 65% were directly connected with one other HIV-positive person. Of those with an active hepatitis C infection, 74% were directly connected with at least one other person who had an active infection.

The strongest determinant of testing positive for HIV or hepatitis C was injecting at the most popular injection venue—this increased the odds of infection by 50%. Even if an individual did not personally inject at that site, their odds of infection increased if one of their injection partners did. For each person separating a given individual with the most popular location, the likelihood of having HIV or hepatitis C reduced by 14%. Similarly, for each person separating a given individual from a person testing positive for HIV or hepatitis C, the likelihood of having HIV and hepatitis C decreased by 13%.

The findings show that HIV and [hepatitis C](#) infection is not only associated with individual [risk factors](#) such as age, education or injection frequency, but also direct and indirect social and spatial network connections—even after accounting for individual-level characteristics. The study has led to a better understanding of the network structure of people who inject drugs in New Delhi and highlighted the role of indirect connections and space on disease burden. The authors say it also urges a rethink of "networks" to incorporate indirect network connections and spaces when thinking about interventions to interrupt [disease transmission](#).

**More information:** Steven J Clipman et al, Role of direct and indirect social and spatial ties in the diffusion of HIV and HCV among people who inject drugs: A cross-sectional community-based network analysis in New Delhi, India, *eLife* (2021). [DOI: 10.7554/eLife.69174](#)

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