

INSIGHTS INTO THE DRIVERS OF VARIATIONS IN HIV EPIDEMIC PATTERNS AMONG PEOPLE WHO INJECT DRUGS IN PAKISTAN

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Background: Pakistan's explosive HIV epidemic among people who inject drugs (PWID) varies widely across cities. Using statistical and mathematical modelling, we evaluate possible drivers for these variations.

Methods: Mixed-effects multivariable regression was undertaken to determine associations between city-level HIV prevalence and population prevalences of different risk factors using data from five national bio-behavioural surveys (n=18,467) undertaken among PWID in Pakistan between 2005-2017. We developed a dynamic HIV transmission model to reflect these associations, calibrating to 25 cities included in surveys to estimate the increased HIV transmission risk associated with identified risk factors. We estimated population-attributable fractions (PAF) for each risk factor to new HIV infections over 10-years and the relative decrease in incidence resulting from reducing each risk factor to the lowest observed prevalence.

Results: Regression analyses suggest that city-level HIV prevalence increases by 2.5 (95% Confidence Interval [CI] 1.0-4.0), 1.9 (95%CI 1.1-2.6), and 4.7 (95%CI 2.3-7.1) percentage points for every 10-percentage point increase in the prevalences of using professional injectors at last injection ('ProfInjUse'), heroin use in last month ('HeroinUse', compared to using other drugs), and injecting 4+ times per day ('Inj4xpd'), respectively. Model projections estimated that ProfInjUse, HeroinUse, and Inj4xpd increase the relative risk of HIV infection by 2.3 (95% Uncertainty Interval [UI] 1.1-5.4), 1.9 (95%UI 1.1-3.8), and 2.9 (95%UI 1.2-6.7) times, respectively, with the 10-year PAFs over all cities being 45.3% (95%UI 4.3-79.7%), 45.9% (95%UI 8.1-78.4%), and 22.2% (95%UI 2.0-58.4%) respectively. Lowering the city-level prevalence of ProfInjUse, HeroinUse, and Inj4xpd to the lowest observed prevalence in 2020 (2.8% ProfInjUse, 0.9% HeroinUse, 0.1% Inj4xpd) reduced overall HIV incidence by 52.7% (95%UI 6.1-82.0%), 53.0% (95%UI 11.3-80.2%), and 28.1% (95%UI 2.7-66.6%) over 10-years, respectively.

Conclusion: Using professional injectors, heroin use, and frequent injecting are important risk factors contributing substantially to Pakistan's HIV epidemic, and so should be a focus for interventions.

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