

Modelling the contribution of incarceration to TB transmission in Ukraine

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Background: People who inject drugs (PWID) experience high incarceration rates, with prior incarceration associated with HIV and TB infection. We evaluated the contribution of incarceration to TB transmission in Ukraine and the impact of reductions in incarceration since 2015.

Methods A dynamic model of incarceration, HIV and TB transmission was developed for PWID and the general population. The model was parameterized and calibrated using national TB data and 7 bio-behavioural surveys among PWID or incarcerated persons from 2011-2019. The model incorporates different HIV and TB transmission risks in prison than the community, increased injecting risk following prison release, increased TB activation and transmission among PWID, and greater TB activation with HIV infection which is reduced by ART. We projected the proportion of new TB infections averted over 10 years ('contribution') from 2005/2015/2025 if the forementioned effects of incarceration were removed. We also evaluated the impact of probation, which has substantially reduced the prison population size since 2015, on new HIV and TB infections.

Results: Model projections suggest TB incidence in 2024 was 15.4 (95% credibility interval: 11.6-20.3) and 42.9 (22.8-86.0) times higher among PWID and prisoners than national levels. Over 2025-2034, 3.9% (1.7-8.6) of all new TB infections can be attributed to incarceration, 15.1% (6.4-29.7) among PWID. Due to recent large reductions in incarceration, its contribution to new TB infections has reduced from 25.3% (15.0-36.6) of all new TB infections over 2005-2014 and 56.0% (38.9-64.1) among PWID. The introduction of probation is estimated to have averted 10.1% (5.4-17.0) and 10.0% (5.0-17.2) of all new TB and HIV infections, respectively, over 2015-2024; 29.9% (19.8-39.9) and 23.3% (17.1-29.8) among PWID.

Conclusion: Incarceration can contribute substantially to TB transmission, particularly amongst PWID. Findings emphasise the potential public health impact of decarceration policies such as probation.

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