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Perspective

# Tackling TB in low-incidence countries: improving diagnosis and management in vulnerable populations

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ABSTRACT

In low tuberculosis incidence regions, tuberculosis is mainly concentrated among hard-to-reach populations like migrants, homeless people, drug or alcohol abusers, prisoners and people living with HIV. To be able to eliminate tuberculosis from these low incidence regions tuberculosis screening and treatment programs should focus on these hard-to-reach populations. Here we discuss the barriers and facilitators of health care-seeking, interventions improving tuberculosis screening uptake and interventions improving treatment adherence in these hard-to-reach populations.


Tuberculosis (TB) remains a major public health issue worldwide. In low-incidence regions (<10 TB cases per 100,000 population) such as the European Union (EU), the United States (US), Australia, and Canada,[1] TB is mainly concentrated in vulnerable populations, such as migrants or foreign-born individuals,[2–5] homeless people, drug or alcohol abusers, prisoners and people living with human immunodeficiency virus (HIV)[2,3]; and TB is often clustered in big cities.[6]

Only limited surveillance data is available, as detection and reporting of TB cases is challenging in these vulnerable populations. In 2014, the 29 EU/EEA countries reported 58,008 TB cases, a notification rate of 11.9 cases per 100,000 population. Twenty-seven per cent of these TB cases were among migrants. In Cyprus, Iceland, Luxembourg, Malta, Norway and Sweden, more than 80% of the TB cases were reported among migrants, and in eight more countries migrants represented more than 50% of the TB cases.[2]

In the same year, the US reported a case-rate of 1.2 per 100,000 in US-born persons, compared to 15.4 per 100,000 for foreign-born persons, with the latter encompassing 66% of all cases.[3] In Australia, incidence rates were highest among foreign-born individuals as well (18.4 vs. 5.5 per 100,000 in 2013).[4] In Canada, 69% of cases occurred in the foreign-born population with an incidence rate of 13.7 per 100,000 population, compared to 0.6 and 4.4 per 100,000 in Canadian-born non-Aboriginal people and nationwide, respectively.[5] Transmission of TB from the migrant population to the native population seems to be low.[7]

As reported in 2014, of all the new TB cases in Europe, 2% were among prisoners, who had a relative risk of 9.6 to develop TB disease compared to the general population, as well as a higher risk of getting drug resistant TB.[2] In the US, 4.2% of the cases were among prisoners.[3] Of all reported TB cases in the EU/EEA, the HIV status was known in 65%, of which 4.9% were co-infected with HIV.[2] In the US, 88.5% knew their HIV status, with 6.0% having been co-infected with HIV.[3]

The European Center of Disease Control and Prevention (ECDC) does not provide any TB data on homeless people nor on drug or alcohol abusers. The World Health Organization (WHO) reports TB rates among homeless people in industrialised countries to be up to 20 times higher compared to the general population; and that the TB risk among intravenous drug users increases with age, the number of years of drug use, and HIV status.[8] In the US, 10.8% of cases reported excess alcohol use, 7.5% non-injecting drug use, 1.5% injecting drug use, and 5.6% of cases were reported as being homeless.[3]

Multidrug resistant TB (MDR-TB) is a growing problem worldwide, including in low incidence countries. In 2014, 4.0% of the EU/EEA TB cases with drug susceptibility testing (DST)

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results were MDR-TB (2.2% of all notified TB cases), with the highest percentages in the Baltic states (12-26% of the TB cases tested).[2] In the US 1.2%,[3] in Canada 1.3%,[9] and in Australia 2.0% of the TB cases undergoing DST were MDR-TB.[4]

The majority of the MDR-TB cases in low incidence countries are being diagnosed in the migrant population, mainly due to reactivation of latent TB. In the US and Australia around 85% of the MDR-TB cases were diagnosed among migrants.[3,4] In the EU/EEA, 2.9% of migrant cases undergoing DST were diagnosed with MDR-TB.[10]

Against the backdrop of those data, the WHO and the European Respiratory Society developed an action framework to eliminate TB from low-incidence countries, with one of the priority actions to pre-eliminate TB being to address the most vulnerable populations described above.[11] ECDC published a guidance document on the control of TB in vulnerable and hard-to-reach populations,[12] based on three systematic reviews and expert opinion, discussing the barriers and facilitators for the uptake of TB care,[13] as well as interventions to improve TB diagnosis and treatment among these populations.[14]

As TB is mainly clustered around vulnerable populations in low-incidence countries, it ought to be understood why TB care in these populations is so difficult, and what barriers and facilitators for the uptake of TB care exist.[13] Misconceptions regarding susceptibility of TB are common, mainly among migrants,[15–27] which is a factor delaying health care-seeking. In addition, stigma around TB is a major obstacle for initial health care-seeking, and subsequently for treatment adherence.[15–17,19–21,23,26,28–33] Poor TB awareness among health care workers in low-incidence countries, lack of specialist services,[15,17,29,34–37] and language/cultural barriers[15,17,29,31,32,34,36,38] are reasons mentioned by the health-care providers for delayed diagnosis and impaired treatment adherence.

Secondly, it has been demonstrated that TB screening uptake improves once vulnerable populations are specifically accommodated.[14] For example, it has been shown that the use of incentives increased screening uptake among homeless people[39,40] and drug users.[41] A mobile X-ray unit is also an effective tool to improve TB screening uptake among different vulnerable populations.[42–44] Active referral to a TB clinic by providing a phone number, making an appointment, organising transport and sending reminders, improves screening uptake among migrants[45,46] and drug users.[47,48] Promoting TB screening and providing TB education by community health workers improves screening uptake and contact tracing among several vulnerable populations.[49–51] Improved cooperation between several service providers, like street teams, drug services and health services, improves screening uptake among drug users.[48]

Thirdly, effective screening methods to detect pulmonary TB among several vulnerable populations have to be determined.[14] Screening by chest X-ray (CXR) is an effective and cost-effective intervention among all vulnerable populations.[52–62] Adding sputum culture to CXR screening as a pre-migration screening tool for migrants from high-incidence countries increases the number of TB diagnoses in the home country and reduces the importation of TB into the host country.[63–66] As spearheaded by non-affluent countries with a high burden of co-infections, collaborative TB/HIV prevention and treatment frameworks need to be further developed in order to reduce the burden of TB in people living with HIV, and to reduce the burden of HIV in people diagnosed with TB.[67]

Last but not least, effective ways to improve treatment outcome and adherence need to be identified.[14] Improved cooperation between key facilitators such as drug services and TB care providers enhances adherence to treatment among drug users.[43,48,49,51] Enhanced case management increases treatment adherence in several vulnerable populations.[48,49,51] Directly observed therapy (DOT) improves treatment adherence and outcome in several vulnerable populations.[68–71] Partial DOT, providing DOT during the first two months of treatment, could be as effective as full DOT.[72] In low incidence countries, DOT provided at a convenient location did not yield any difference in treatment adherence compared to DOT provided at a TB clinic or hospital,[73] and again, the use of incentives improves treatment adherence among homeless people and drug users.[71,74]

Studies evaluating integrated TB/HIV care are limited, even though the WHO recommends integrated TB/HIV care.[67] Simultaneous administration of TB treatment and antiretroviral therapy (ART) reduces mortality.[67] Knowledge of the HIV status of TB patients is essential, but in the EU/EEA, only 65% of the TB patients know their HIV status,[2] in the US 88.5%,[3] and no figures have been published for Australia and Canada.[4,5]

With the above-listed interventions, not all people living in the mentioned vulnerable populations are reached. A group of people that is not covered by these interventions are rough sleepers, as most homeless interventions are focused around shelters. A French study showed that screening and treating shelter users had a positive impact on rough sleepers as well.[44] Studies evaluating interventions to reach rough sleepers for TB screening should be conducted. The same accounts for intravenous drug users that do not use needle exchange programs or other drug services, but these two populations might have an overlap.

In countries where the focus of migrant screening is on pre-migration screening, refugees and illegal migrants could be missed. In light of the recent high influx of refugees from high TB incidence countries from the Middle East, Asia and Africa into Europe, this can prove to be problematic. The screening methods in refugee camps should be evaluated, and good collaboration between countries is essential to reduce the number of refugees not screened for TB. As most refugees do not stay in one place and may move to different locations frequently, the screening procedure should generate a rapid, reliable result. Therefore, sputum culture might not be the most effective intervention for this population. Whilst the GeneXpert MTB/RIF probably provides the quickest sputum result (less than 2 hours), has a better sensitivity than microscopy and can test for rifampicin susceptibility, the cost-effectiveness needs to be evaluated in the low incidence setting. Therefore, the WHO recommends the use of GeneXpert for patients with a high probability of MDR-TB (for example migrants from countries with high rates of MDR-TB, people previously treated for TB and contacts of MDR-TB cases) and HIV-associated TB.[75] Alternatively, sputum microscopy in addition to CXR screening might be the best option with DST for the detected TB cases.

Furthermore, TB treatment adherence and outcome and TB prevention are essential topics in these settings. Refugee camps and centers are overcrowded, increasing the risk of transmission. Tailored TB programs are needed,[76] taking TB knowledge, conceptions and the considerable burden of stigma into account.

Finally, with MDR-TB remaining a problem worldwide with a focus on migrants in low incidence countries,[2,77] it is important to minimise the transmission of MDR-TB. A South African human-to-guinea pig transmission study showed that effective MDR-TB treatment reduces infectiousness rapidly[78]; however, active case finding, sensitive screening methods, DST, screening contacts, starting effective treatment promptly, isolation of infectious patients, comprehensive TB infection control (see WHO guidelines[79]), evaluation of co-morbidities (HIV, diabetes mellitus, viral hepatitis) and alcohol, drug and cigarette use, psychological care, and well organised continuation of care after hospital discharge[80] are important components for optimal patient management and