

## The rural-to-urban migrant population in China: Gloomy prospects for tuberculosis control

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### Summary

The migrant population is a population with a high risk of tuberculosis (TB) infection and transmission. Globally, migration is likely to have a significant impact on TB epidemiology, particularly in countries that receive substantial numbers of migrants from countries with a high infection burden. China, a country with the world's second highest TB burden, faces a considerable increase in the number of rural-to-urban migrants. This population has a significant impact on urban TB epidemics and is specifically targeted by national guidelines for TB control. TB control among the migrant population has had relatively poor outcomes. Barriers to detection and treatment have both financial and non-financial aspects, such as the "migratory" nature of the migrant population, their marginalized working and living environment, poor financial status, little awareness of TB, inadequate referral to TB dispensaries, and potential social stigma in the workplace. Currently, the free TB treatment policy has limited ability to relieve the financial burden on most migrant TB patients as would allow optimal outcomes of TB detection and treatment. Universal health insurance coverage and fostering of personnel in community-based primary health care for the rural-to-urban migrant population represent two pillars of successful TB control.

**Keywords:** Migrant population, directly-observed treatment strategy (DOTS), tuberculosis control, China

### 1. Migrant population: High risk of TB epidemics

The migrant population is a population with a high risk of tuberculosis (TB) infection and transmission (1-3) and often faces barriers to access to appropriate health care for diagnosis and treatment (4-6). In low-incidence countries with large numbers of immigrants from countries with a high infection burden, migration is likely to have a significant impact on TB epidemiology as they receive substantial numbers of migrants from countries with a high burden of infection (7). In the United Kingdom, the increase in the rate of TB seems to be due to the fact that a high proportion of cases in the UK occur in the foreign-born, coupled with a large

number of foreign nationals from countries with a very high incidence of TB (8). In the United States, the relative yield in finding and treating latent TB infection is particularly high among individuals from most countries of sub-Saharan Africa and Southeast Asia (9). In Spain, Garcia-Garcia *et al.* reported much worse treatment follow-up and outcomes among the immigrant population compared to the native population (10). Similar epidemiological characteristics are also reported in France, where the incidence rate among people born abroad was about seven times higher than that observed in people born in France; the incidence was also highest in districts with a high proportion of socioeconomically vulnerable individuals (11). Moreover, epidemics of multidrug-resistant tuberculosis (MDR-TB) hamper TB control, and the migrant population in particular has a high risk of developing multidrug-resistance (3,12).

In low-incidence countries, contact tracing in primary care, and particularly within ethnic communities, is reported to be much more effective and cost-effective at TB detection and control among

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the immigrant population than simple screening at entry (13). Truong *et al.* examined Tibetan immigrants undergoing medical screening in Minnesota in the US and they suggested that persons with a history of active TB require particularly close follow-up even in the face of negative *Mycobacterium tuberculosis* (*M. tuberculosis*) cultures (14). Specific strategies to manage TB within such a vulnerable population, including the improvement of social and work conditions, are crucial policy issues that must be considered in light of the increasing TB burden with immigration.

## 2. Epidemiological characteristics of TB in the Chinese migrant population

Second to India, China has one of the world's largest TB disease burdens. China has 1.3 million patients with TB annually, and TB cases in China account for approximately one quarter of cases worldwide (15). The Chinese government has a political commitment to TB control and had increased financing investment in recent years. As a result, from 2000 to 2009 the prevalence of TB declined from 466 cases per 100,000 population to 459 per 100,000, and active cases decreased from 169 per 100,000 to 66 per 100,000 (16). A strategy of a short course of directly observed treatment (directly observed treatment, short-course or DOTS) has been implemented in all counties nationwide since 2005. Active TB cases are cured by DOTS at a rate of over 90%, the global target for TB control (17). That said, major challenges lay ahead for the TB control program and related personnel, such as epidemics of MDR-TB and TB treatment and case management for the migrant population, given their propensity to change residences in the search for work.

In China, most migrants come from rural areas. The "hukou", or civil registration, system had kept people from moving from their permanent residences until the 1980s. After economic reforms, the hukou system no longer played an important role in dictating domestic residence and relatively large numbers of rural residents have moved to urban areas for more job opportunities. The size of the rural-to-urban migrant population has increased rapidly with economic development and urbanization. According to a national report released by the Chinese Academy of Social Sciences, the migrant population in China has reached 211 million (18). The national report indicated that the migrant population has an average monthly income of around 300 US dollars, and most migrants are engaged in high-risk industries and are not fully covered by social security and public services. Most migrant workers tend to be exposed to a higher risk of TB infection due to a poor living and working environment and poor nutritional status while their access to health care has often been seriously restricted by their registered residence, lack

of knowledge about health care, and poor financial conditions (19).

Most of the migrant population in China comes from rural areas, where the number of TB patients accounts for approximately 80% of such patients nationwide and the prevalence of TB is almost twice that in urban areas (15). Since the 1990s when the TB registration system was extended to include migrants, the proportion of migrant TB patients has subsequently increased among TB patients nationwide (20). Similar to the epidemiological characteristics of TB in low-incidence countries with large numbers of immigrants, as mentioned earlier, the rural-to-urban migrant population has a higher TB incidence, a higher rate of newly registered cases of positive smears, and a higher rate of diagnosis and detection than permanent residents have (20,21). These trends have significantly affected TB epidemiology in urban China (20,22,23). In Beijing, the country's metropolitan capital, for example, a spatial analysis by Jia *et al.* suggested that TB tended to cluster in the migrant population and reemerged as the migrant population swarmed into Beijing; their analysis also indicated that the geographical differences in TB epidemics were mainly due to economic inequalities in districts (22).

## 3. Barriers to TB detection and treatment for the migrant population

Naturally, the migrant population's "migratory" nature hampers their ability to receive regular TB health care, which is particularly true for rural-to-urban migrants. A previous study by the current authors in rural Shandong Province, China suggested that rural-to-urban migrant workers tended to be one factor causing a low rate of DOTS success in rural areas and consequently led to a relatively high risk to spreading the disease (24). Moreover, the marginalized working and living environment of the migrant workers in urban areas further hampered their access to TB detection and treatment. In China, most rural-to-urban migrants undertake manual labor and personal services, which typically lack stability and security. These migrants are often paid little and are frequently laid off. Because they lack an urban residence, these migrants are not covered by the medical insurance scheme and are not entitled to the many other social benefits and services accorded to most urban residents. Although rural-to-urban migrants have increased health risks and are a vulnerable population in urban China, they tend to have less access to health care services than urban residents, resulting in unsatisfactory health outcomes (25-27).

Barriers to TB detection and treatment among the migrant population continue to have both financial and non-financial aspects. China recently implemented a free TB treatment policy that covered the migrant population as well. The free service package includes

diagnostic and treatment services, such as a free sputum smear test, a free X-ray examination upon one's initial visit, and free TB drugs in accordance with the standard protocol (6 months for new patients and 8 months for re-treated patients). That said, TB patients incur high medical costs when receiving prolonged treatment other than the standard protocol or undergoing repeated X-rays and blood tests, hospitalization, and receiving additional and sometimes unnecessary drugs to protect the liver and ancillary drugs (28). Revenue-driven practices in health facilities profoundly affect this free policy: given a financial incentive, health facilities often tend to keep patients longer than necessary or are reluctant to refer patients to TB dispensaries and they tend to prescribe unnecessary drugs or tests (29). Such practices can seriously increase the risk of MDR-TB. In a qualitative study in Shanghai, the current free TB treatment policy did not relieve the financial burden on migrant TB patients and cost was the major reason patients failed to complete treatment (30). Low-income patients are estimated to pay large amounts for medical treatment of TB, approximately equal to 42% to 119% of their annual household income (31). Without health insurance coverage, most migrant patients still pay huge amounts for TB diagnosis and treatment out-of-pocket.

In addition to economic status, several quantitative studies in China have reported that other barriers to access to TB care among migrant patients are lack of awareness and lack of knowledge in a marginalized population and inadequate and complicated referral to TB dispensaries (23,32). A large proportion of migrant TB patients tend to first visit a non-hospital facility for treatment of their symptoms, where doctors are more likely to delay due to a lack of skill and experience in identifying potential TB and where the facility has a financial incentive to keep patients at the facility (33). Although a quantitative approach has difficulty identifying these aspects, the qualitative study revealed that the migrant population enjoys weak protection of its rights in the workplace, and social stigma have an impact on the accessibility of TB care. According to Wei *et al.*, many interviewees reported being laid off from work, being avoided by colleagues, and being fearful of revealing their TB status; the law was often too weak to protect the employment rights of migrants while they were ill (30).

#### 4. Efforts needed to make a difference

Various issues in health policy need to be addressed to reduce the burden of TB among the rural-to-urban migrant population in China. For instance, in terms of detection, is screening effective and feasible in China? How can delays in diagnosis be avoided both by the patient and doctor? In terms of TB treatment and implementation of DOTS, how can the financial burden on migrant TB patients be reduced and how can

better treatment outcomes be achieved with the current free treatment policy? How can the case management of migrant TB patients be improved? Evidence on the effectiveness of interventions is urgently needed.

TB screening has recently been implemented in certain populations and facilities in China. While low-incidence countries have large numbers of immigrants from countries with a high infection burden, countries with a high incidence have difficulty regularly screening the migrant population. The reasons for this are similar to various barriers to access to health care as mentioned earlier, including the migrant population's "migratory" nature, their marginalized working and living environment, poor financial status, little awareness of TB, inadequate referral to TB dispensaries, and potential social stigma in the workplace. That said, most of the migrant population comes from rural areas, where the prevalence and burden of TB is much higher. A tuberculin skin test during registration and active case identification could potentially enhance the case detection rate and reduce delays in diagnosis (33). Successfully eliminating these barriers, and especially the financial burden for the low-income population, will lead to significant changes in the risk of TB infection and burden of the disease on such a vulnerable population.

The financial burden represents one of the most significant constraints to the access of TB-related health care, both for detection and treatment. Although the current policy of free diagnosis and treatment has been implemented to remove the financial burden on TB patients, it seems to have a limited effect on improving the accessibility of detection and treatment, as the financial burden cannot be relieved due to the revenue-driven practices of health care facilities and out-of-pocket payment for a relatively large amount of drugs and tests not covered by insurance. Modification of the current package of free TB diagnosis and treatment services requires comprehensive evaluation of initial conditions, expected clinical and socioeconomic outcomes, and the cost-effectiveness of different options specifically targeting the migrant population in order to identify the types of additional health care that should be introduced, *e.g.* screening at registration, TB drugs or additional second-line drugs, and outpatient care *vs.* hospitalization. The question of whether the current package should be expanded should be based on an answer grounded in scientific evidence.

Several crucial policy issues with the health system and the social welfare system underlie the barriers to TB detection and treatment for the migrant population. Based on recent health policies in China, universal health insurance coverage and fostering of personnel in community-based health care for the rural-to-urban migrant population represent two pillars of successful TB control. Without universal health insurance coverage, the financial burden on migrant

patients cannot be relieved. Robust community-based health care, in terms of human resources, clinical proficiency, and sufficient financial investment to discourage revenue-driven practices, must be open to migrant patients. Without these two facets, TB cases in the migrant population cannot be promptly detected and properly managed. The Chinese government has a strong political commitment to fundamental strategies of TB control, but this effort also requires intensive study as well as determination of the effectiveness of different interventions to make a difference.

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