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Editorial

Drug resistant tuberculosis: Challenges of urbanization

The latest Global tuberculosis (TB) report indicates a sombre 8.6 million (range, 8.3–9.0 million) incident cases of TB in 2012. It further reports 1.3 million (range, 1.0–1.4 million) deaths from TB during the course of 2012. While these figures are extremely concerning, there is room for optimism. The absolute number of TB cases worldwide is coming down. TB prevalence has dropped from over 250/100,000 in 1990 to 169/100,000 in 2012, and TB mortality rates decreased by 45% since 1990 [1].

Despite these successes, TB control programs continue to face major challenges. Significant threat has been posed by *Mycobacterium tuberculosis* (*M.tb*) strains resistant to more than one drug; in particular, multidrug resistant TB (MDR-TB) and extensively drug resistant TB (XDR-TB). In 2012, there were an estimated 450,000 incident cases of MDR-TB. The overall proportion of MDR-TB cases with XDR-TB is estimated to be 9.6%, although a rate of more than 10% is documented in some regions [1].

MDR-TB resistant to at least isoniazid (INH) and rifampicin (RIF), the most effective anti-TB drugs, does not respond to the standard six-month treatment with first-line anti-TB drugs and requires a combination therapy, including second-line drugs that are less potent, more toxic and much more expensive. Current guidelines advocate treatment duration of at least 20 months in patients without previous MDR-TB treatment, and longer (28 to 30 months) in patients who have previously been treated for MDR-TB. Despite second-line treatment, the relative risk of dying from MDR-TB as compared with TB cases without MDR-TB is estimated at 2.36 (range 1.67–3.05). It is estimated that globally in 2012 there were 170,000 deaths (range 100,000–240,000) from MDR-TB, and only 48% of MDR-TB patients in the 2010 cohort were successfully treated [1].

Treatment of XDR-TB caused by strains that are resistant to isoniazid and rifampicin (i.e. MDR-TB) as well as to fluoroquinolone and to any of the second-line anti-TB injectable drugs (amikacin, kanamycin or capreomycin) is even more difficult, complicated and associated with poor treatment success rate [2,3]. Recently published outcome data on XDR-TB from South Africa reports only 16% favourable outcome (treatment cure or completion) and a mortality rate of 46% at 2 years. The study further reports that by 5 years the percentage of patients showing a favourable outcome had dropped to 11% and the mortality rate increased to 73% [4].

In addition to M/XDR-TB tuberculosis control is further threatened by strains with additional resistance; Totally Drug–Resistant Tuberculosis (TDR-TB) caused by strains showing in-vitro resistance to all first and second line drugs tested (isoniazid, rifampicin, streptomycin, ethambutol, pyrazinamide, ethionamide, para-aminosalicylic acid, cycloserine, ofloxacin, amikacin, ciprofloxacin, capreomycin, kanamycin) [5–8]. To date these strains are reported as being virtually untreatable [8].

As part of the effort to reduce generation and spread of DR-TB (drug resistant-tuberculosis) early recognition and supervised treatment of all TB patients is advocated. Additional areas emphasised for control of DR-TB include: strengthening diagnostic capacity for detection of drug resistant strains, increasing access for treatment of DR-TB, and a greater focus on HIV patients who are at a high risk of DR-TB. Control of DR-TB however is difficult without emphasis on steps aimed at reducing transmission of MDR-TB and XDR-TB strains [9,10]. Hence infection-control practices in both community and health care facilities are key elements of such a program. Although introducing infection control measures may prove a challenge in many high burden regions. Mathematical and experimental models suggest that in health care settings facial masks and improved ventilation could significantly reduce transmission of DR-TB cases [11–13]. Similarly poor living environment including poor ventilation in the homes of DR-TB patients is also likely to contribute to disease transmission.

As a consequence of increasing globalization, there is increasing urbanization. By 2010 urban outnumbered rural populations. It is expected that by 2025 more than half of the world's citizens will be living in urban settings, with dozens of megacities characterized by populations of over 10 million persons. It is estimated that by the middle of the century, out of every 10 people, 7 will be living in urban areas [14,15]. Moreover, it is estimated that, between 2010 and 2015, on average 200,000 people will be added to the world's urban population every day. Of this daily increase, 91% (183,000) is expected to take place in developing countries [15]. The urban population in Africa is likely to triple, and in Asia to more than double by 2050 [16].

In low-income countries, economic growth does not keep up with urbanization, and governments lack resources to manage rapid urban expansion or to cope with increasing influx of migrants [16]. In 2001, 924 million urban residents lived in slums and informal settlements. This number is expected to double to almost 2 billion by 2030 [17]. Such slums and informal settlements arising as a result of rapid and unplanned urbanization provide ideal conditions for transmission of infectious diseases, including TB and drug-resistant TB. Densification and substandard housing with little sunlight and poor ventilation that characterize slum dwelling [18] are well-recognised to contribute to transmission of TB [19,20]. High prevalence of TB has been shown in urban slums of Karachi and Dhaka [21,22]. Urban and peri-urban dwelling has also been associated with higher risk MDR-TB [23–25]. In view of such evidence, development and implementation of national policies directed at controlling the spread of TB and M/XDR-TB within the community become essential.

Organizations and agencies involved in control of the diseases must adapt to trends in population, growth and urbanization and the changing global landscape [26]. As such, efforts of TB control programs and the TB community currently focused on diagnosis and treatment needs to be expanded to include advocacy and regulations for safe housing aimed at reducing transmission risk at a community level.

Conflict of interest

None declared.

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