



Tuberculosis elimination: a dream or a reality? The case of Oman

To the Editors:

Until recently, the fight against tuberculosis (TB) was designed to pursue control of the disease, *e.g.* ensuring that infectious cases are rapidly diagnosed and effectively treated, thus breaking the chain of transmission [1–5].

To accelerate the decline of the TB pandemic, in 2014 the World Health Organization (WHO) launched the End TB Strategy aiming at global TB elimination [6–11].

In the same year, under the joint efforts of the WHO and the European Respiratory Society (ERS), a framework for TB elimination in low incidence countries was developed. The framework anticipates that to reach pre-elimination and elimination phases (defined, respectively, as <10 and one TB case per million population), countries should ensure that eight core areas are properly covered [8–10]. These include 1) political commitment; 2) attention to vulnerable groups and 3) migrants; management of 4) latent TB infection (LTBI), 5) multidrug-resistant TB and HIV co-infection; 6) quality monitoring and evaluation of the programme on top of 7) improved research and 8) international collaboration. Cyprus, through the implementation of adequate TB control interventions and focus on the eight core areas for elimination mentioned above demonstrated that approaching the pre-elimination threshold, at least among nationals, is feasible [12]. However, no published experience is presently available on national TB elimination efforts except from Cyprus.

A recent survey jointly conducted by the ERS and WHO [9] showed that most low-incidence countries in Europe fail to consistently implement all these eight core interventions. A regional plan for TB elimination was recently developed in Latin America [10], but data on implementation are unavailable at this time.

Model countries to demonstrate that TB elimination is attainable are needed [12]. Under this perspective, the Arabian Gulf Countries present an interesting scenario, as TB epidemiology is characterised by low incidence rates, with a significant proportion of cases occurring among foreign-born people. Effective TB control programmes are in place, complemented by some of the eight core elimination activities.

Oman allocated USD 1.6 billion (OMR 627.6 million) to health expenditure, which accounts for 13.6% of the total state budget and developed a draft plan for TB elimination.

We describe here the progress achieved by Oman towards TB elimination, as demonstrated by national surveillance data provided by the Ministry of Health from 2010 to 2016. We also analyse the progress achieved by the country in the eight core areas for TB elimination.

Census data in 2016 showed a population of 4414051 in Oman, including 1986226 (45%) foreign-born individuals. The gross national product was USD 66,2 billion, mainly sustained by oil production [13].

The Oman TB programme is committed to provide quality surveillance data and free-cost quality clinical management in the country. Universal access and social protection mechanisms are in place.

Overall, in 2016 Oman notified 344 cases of TB, 190 among natives and 154 among foreign-born people. The majority of the 154 foreign-born TB cases occurred in people from India (49), Bangladesh (38), Pakistan (10), Philippines (10), Uganda (nine), Yemen (eight) and Nepal (eight).

Among TB cases in Omani patients, 99 (52.1%) were pulmonary cases, including five relapses. Of the pulmonary cases, 69 were sputum positive (70%), 28 were smear negative (28.3%) and two were diagnosed clinically (2%). Among 154 TB cases in foreign-born people, 121 (78.6%) were pulmonary cases, 99 were sputum smear positive (81.8%), 20 sputum smear negative (16.5%) and two clinical diagnosed (1.7%).



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Tuberculosis pre-elimination approached in native population in Oman <http://ow.ly/mwQs30h4z4L>

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In 2016, the distribution of TB cases was higher among males than females (63% *versus* 37%); out of 300 TB samples cultured, 241 (80%) were culture positive, 152 (63%) being from smear-positive patients.

The TB notification rate (all cases and sputum smear-positive cases) declined from 2010 to 2016 among those born in Oman, while the decline among foreign-born sputum smear-positive patients started in 2014 (figure 1). The decline of sputum smear-negative cases (overall and among foreign-born patients) and of extrapulmonary cases (overall and among Oman-born patients) are of statistically or borderline significance (Mann–Kendall statistic for trends; figure 1), the average decline being –2% per year.

As reported in figure 1, in 2016 the incidence of notified sputum smear-positive cases was 38.1 per million population and that of all forms was 77.9 per million; for Oman-born individuals, the incidence was 28.4 and 78.2 per million, respectively and among foreign-born people, 49.8 and 77.5, respectively.

The diagnostic delay is systematically measured: in 2016, 41.4% of Oman-born and 49.2% of foreign-born patients were diagnosed within 30 days since the onset of symptoms.

Treatment outcomes are quite successful with 88% success in the 2015 cohort, 7% death rate, 3% being lost to follow-up and 2% not evaluated.

Mortality was only apparently high (9%) in 2016, as it affected the elderly with comorbidities and TB was not the primary cause of death in most of the cases.

TB/HIV co-infection was very low (12 cases, 3.5%, antiretroviral drugs being available for all cases) and MDR-TB was limited to six cases in 2016 (22 cases between 2012 and 2016, on average 4.4 cases per year).

Management of LTBI is considered core to the pursuit of TB elimination [14] and contacts of any TB case are systematically screened using IGRAs (interferon gamma release assays) or the Mantoux test. Out of 1473 registered contacts among Omani-born persons in 2016, 1028 (70%) were screened, 142 (13.8%) had a positive LTBI and none were diagnosed with active TB. Among the 455 registered foreign-born contacts, 410 (90%) were screened and 80 (19.5%) were found to have LTBI.

LTBI treatment standards for contacts included isoniazid monotherapy and since 2017 the 12-dose combination regimen of rifapentine and isoniazid was given in order to improve adherence and the treatment completion rate. In 2017, the national TB programme introduced the LTBI treatment outcome registry at the national level, using electronic forms.

Complete data are available from the South Batina region, which piloted the registry: 186 individuals were screened, 41 found to be Mantoux or IGRA positive, 55 started LTBI treatment (including children under 5 years who were close contacts of sputum positive pulmonary cases) and 48 (87.3%) completed their treatment.

Among other TB risk factors identified among TB cases in 2016 were diabetes mellitus (13%), recent family history of TB (9%), smoking habits (9%), HIV co-infection (3.5%) and alcohol abuse (3%).

Looking at the progress towards TB elimination (figure 1), in 2011 the incidence among foreign-born patients started exceeding that of natives; both foreign-born and nationals' incidence rates are presently facing stagnation.

To move forward towards TB elimination, the Oman Ministry of Health is currently considering implementing the following actions.

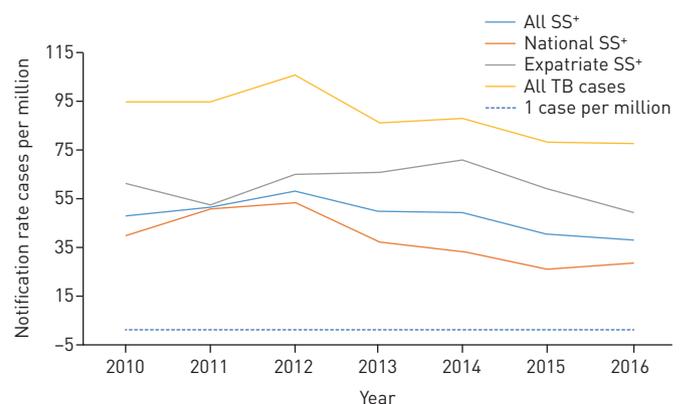


FIGURE 1 Decline of the case notification rate of tuberculosis (TB) towards the elimination threshold (one case per million population) in Oman. SS+: sputum smear positive.

1) To fine-tune the existing TB elimination plan, and then to distribute, advocate and implement it within politicians and administrators, health staff in the public and private sector, patients and other stakeholders in Oman.

2) To strengthen the LTBI management component of the plan by: ensuring quality data management of national LTBI register and evaluating treatment completion rates; defining priority groups for LTBI diagnosis and treatment (*e.g.* foreign-born beyond contacts); increasing awareness in priority groups to prevent stigma; and monitoring the trajectory towards TB pre-elimination and elimination.

To our knowledge this is the first experience of a country approaching TB elimination in the Gulf Area, and the second published experience of the national progress against TB elimination [12, 15].

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References

- 1 Sotgiu G, Spanevello A, Migliori GB. History of tuberculosis and drug resistance. *N Engl J Med* 2013; 368: 88–89.
- 2 Raviglione M, Marais B, Floyd K, *et al.* Scaling up interventions to achieve global tuberculosis control: progress and new developments. *Lancet* 2012; 379: 1902–1913.
- 3 Migliori GB, Zellweger JP, Abubakar I, *et al.* European Union standards for tuberculosis care. *Eur Respir J* 2012; 39: 807–819.
- 4 Sotgiu G, Beer N, Aliberti S, *et al.* Fighting tuberculosis in the EU/EEA: towards the new European Union standards on tuberculosis care. *Eur Respir J* 2016; 48: 1278–1281.
- 5 Clancy L, Rieder HL, Enarson DA, *et al.* Tuberculosis elimination in the countries of Europe and other industrialized countries. *Eur Respir J* 1991; 4: 1288–1295.
- 6 Broekmans JF, Migliori GB, Rieder HL, *et al.* European framework for tuberculosis control and elimination in countries with a low incidence. Recommendations of the World Health Organization (WHO), International Union Against Tuberculosis and Lung Disease (IUATLD) and Royal Netherlands Tuberculosis Association (KNCV) Working Group. *Eur Respir J* 2002; 19: 765–775.
- 7 Veen J, Migliori GB, Raviglione M, *et al.* Harmonisation of TB control in the WHO European region: the history of the Wolfheze Workshops. *Eur Respir J* 2011; 37: 950–959.
- 8 Lönnroth K, Migliori GB, Abubakar I, *et al.* Towards tuberculosis elimination: an action framework for low-incidence countries. *Eur Respir J* 2015; 45: 928–952.
- 9 D'Ambrosio L, Dara M, Tadolini M, *et al.* TB elimination: theory and practice in Europe. *Eur Respir J* 2014; 43: 1410–1420.
- 10 Rendon A, Fuentes Z, Torres-Duque CA, *et al.* Roadmap for tuberculosis elimination in Latin American and Caribbean countries: a strategic alliance. *Eur Respir J* 2016; 48: 1282–1287.
- 11 European Centre for Disease Prevention and Control. Framework action plan to fight tuberculosis in the European Union. Stockholm, European Centre for Disease Prevention and Control, 2008. Available from: http://ecdc.europa.eu/en/publications/publications/0803_spr_tb_action_plan.pdf
- 12 Voniatis C, Migliori GB, Voniatis M, *et al.* Tuberculosis elimination: dream or reality? The case of Cyprus. *Eur Respir J* 2014; 44: 543–546.
- 13 Annual Health Report 2016. *Department of health information and statistics*. Directorate General of Planning, Ministry of Health, Sultanate of Oman, 2017.
- 14 Getahun H, Matteelli A, Abubakar I, *et al.* Management of latent *Mycobacterium tuberculosis* infection: WHO guidelines for low tuberculosis burden countries. *Eur Respir J* 2015; 46: 1563–1576.
- 15 Blasi F, Matteelli A, Sotgiu G, *et al.* Moving towards tuberculosis elimination: a call for action from Italy and a possible model for other low tuberculosis incidence countries. *Eur Respir J* 2017; 49: 1602242.

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