

Ireland and TB Elimination - World Tuberculosis Day 2021

Globally, an estimated 10 million people fell ill with tuberculosis (TB) and 1.4 million people died with TB in 2019. Addressing this burden of TB disease is a global priority according to the United Nation's Sustainable Development Goals and the World Health Organisation's End TB Strategy. Two-thirds of those people who fell ill with TB in 2019 were from just eight countries (India, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa). Elsewhere, TB is seen as a disease of poverty, or of the past, and it is indeed far from people's awareness in modern Ireland. There is good reason for this. During the latter half of the 20th century the State successfully brought the longstanding TB epidemic under control by improving housing conditions, reducing malnutrition, introducing an effective Bacillus Calmette-Guérin (BCG) vaccination program, making available effective therapies, and building new hospitals and sanatoria on a scale not previously seen here. Today, Ireland has one of the lowest incidences of TB in the world, and very few deaths related to TB annually. Why then should we in Ireland concern ourselves with TB and global aims to eliminate it? Because in the current era of increasing globalization, high-income nations such as Ireland should take a lead role in addressing global health problems.

Additionally, TB remains a concern because infectious diseases unless eliminated have a tendency to re-emerge.

The case of New York City is a prime example of how failure to eliminate TB can undo decades of progress. In 1968, New York City was aiming for TB elimination. Socioeconomic conditions were thought to be stable, and the risk of TB disease to the general population was low. Due to fewer TB patients requiring hospital care, the cost of TB to the city was in decline, so rather than reinvesting funds back into prevention and control services, TB funding was cut. In tandem, during the 1970s, a planned shrinkage of public services led to the loss of fire departments and community public health departments. Large tracts of housing were destroyed by fires resulting in urban decay. This compounded overcrowding in the remaining dwellings of New York City's poorest areas. Those who lost their homes migrated internally within the city, weakening social networks. Those who could not find housing elsewhere became homeless and dependent on large, often crowded homeless shelters. The concurrent HIV epidemic presented a vulnerable immunocompromised population whom Mycobacterium tuberculosis could infect with ease. Atypical chest radiograph appearances and a tendency to

pauci-bacillary disease meant TB in these patients was difficult to diagnose, remaining undetected and untreated for longer. Income inequality was a significant factor also because it contributed to the development of social conditions that were favourable for TB transmission. From 1980 to 1990, neighbourhoods with a declining median household income had a high incidence of TB, while neighbourhoods where median household income increased had a relatively lower incidence. The association between low income and TB was thought to be mediated by household overcrowding and malnutrition, both known to arise due to poverty. Ultimately, a failure to address income inequality and its effects on living standards, the dismantling of health, public safety, and social service infrastructures, a breakdown of social networks and the emergence of large populations of vulnerable hosts in the form of homeless people and people living with HIV led to the re-emergence of TB in New York City. From 1979 to 1991, the incidence of TB more than doubled from 23 cases per 100,000 to 50 cases per 100,000. By the late 1980s, TB was once again being seen in the wider population in New York City. The incidence of childhood TB also increased dramatically. In total it was estimated that the cost of managing and reversing this

resurgence of TB in New York City was between \$900 million and \$2.4 billion, significantly more than the \$600 million saving achieved in the city budgets from 1975 to 1978 through reductions in spending on health, public safety and social services infrastructure.

Many believe such a scenario could never arise in Ireland, because it is hard to imagine such numerous failures to address the social determinants of health evolving over decades. Therefore, we should be asking ourselves what social determinants in Ireland could contribute to a resurgence of TB in the future? In my opinion, there are many. Despite the general population here having one of the lowest rates of housing overcrowding in Europe, worsening overcrowding has been reported among subsections of the population. Immigrants to Ireland often come from countries with a high incidence of TB and due to the high cost of rental accommodation more are finding themselves living in overcrowded housing, particularly in Dublin. Overcrowding has been reported in our prisons, direct provision centres and emergency departments, all areas where TB transmission is known to occur from the experiences of other



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countries. The number of homeless people has increased markedly in Ireland over the last decade and in particular the number of people utilising emergency homeless accommodation (currently over 8,000). The national response to COVID-19 has improved overcrowding in some settings such as prisons, but it is unclear how lasting the effects of this will be. How these social determinants evolve will be influenced by health and social policy in the coming decade. Apart from trends in social determinants that are favourable for TB resurgence, the prevalence of certain risk factors for TB disease in Ireland are changing as well. There is a growing number of people living with HIV in Ireland and although most are on effective treatment, it is estimated that 13% of all people living with HIV in Ireland are undiagnosed according to the Continuum of HIV Care, Ireland 2017 report. Effective anti-retroviral treatment can reduce the risk of TB disease in people living with HIV, therefore reducing the number of people with HIV who remain undiagnosed will be important for TB elimination in Ireland. Addressing both the social determinants of TB and risk factors for TB in the population is important for TB elimination and the lesson from New York City suggests that when the incidence of TB declines to low levels, efforts to eliminate it should be intensified rather than simply sustained.

The tools that doctors have to manage TB are improving, and this will aid elimination efforts. Shorter treatment regimens may be preferable for patients and improve adherence. Results from a randomized trial (Study 31/A5349) presented at the 51st virtual Union World Conference on Lung Health last year suggested that a 4-month treatment regimen containing high dose rifampine and moxifloxacin is non-inferior to the current standard 6-month regimen for drug-susceptible TB. These results are encouraging signs that shorter treatment regimens will be available for TB patients in the future. For latent TB infection, short course (3 or 4 months) rifamycin containing regimens are now recommended as the preferred treatment options over 6 or 9 months of isoniazid monotherapy because they have lower toxicity risk and higher treatment completion rates. Shorter regimens for both active and latent TB infection should require fewer healthcare visits, reduce the financial burden of TB for both health systems and patients. In low TB incidence countries, addressing the burden

of latent TB infection is key to achieve elimination. However, this is challenging because current screening tools for latent TB, the tuberculin skin test and interferon-gamma release assay, have poor positive-predictive-values for progression to active TB disease. Newer tests that can predict those patients most likely to progress from latent to active TB are needed. There is hope that blood transcription signature tests may be able to do this, but more work is needed before these will have a performance profile sufficient for clinical use. These diagnostic and treatment advances will improve clinical care for TB patients, but these improvements must occur in parallel with improvements to our programmatic management of TB if it is to be eliminated.

The WHO Framework Towards TB Elimination in Low Incidence Countries highlights the necessary actions for effective programmatic management of TB. A key action is ensuring high-level commitment to the goal of TB elimination. National TB elimination strategies have contributed to an accelerated decline in TB incidence in England and the Netherlands. This typically takes the form of a national target-driven five-year plan involving all national stakeholders in TB control such as healthcare workers, patient representatives, politicians and representation from at-risk groups. As the incidence of TB declines it tends to be seen most frequently in what have been called the “hard-to-reach” groups in society, that is homeless people, people who use drugs, prisoners and vulnerable migrants. The WHO Framework suggests several key elements of a TB strategy to address TB among these people (Table 1)

Table 1 Elements of a strategy to address tuberculosis in hard-to-reach groups

1. Addressing underlying social determinants
2. Analysing and addressing barriers to access and adherence
3. Social support and protection
4. Mapping of TB-risk groups, including all groups with elevated TB incidence and hard-to-reach groups

To address the social determinants of TB, local authorities must be included because many of the necessary actions related to housing, homelessness and overcrowding are under their remit. Therefore, as part of a national TB

strategy, there should be a plan as to how public health teams can broaden their role and work with local authorities to address these issues together. Advancing national strategic planning to address wider healthcare related issues would maximize the impact of a national TB strategy as well, particularly when it comes to addressing TB in hard-to-reach groups. For example, having a national strategy to reduce health inequalities or a national community health worker program. Sláintecare should allow for better integration of primary and secondary care services, improve community level care and enhance the surveillance role of regional public health departments. Existing strategic ehealth programmes will make health information more accessible when needed through electronic health records and unique patient identifiers. Enhanced surveillance data collection to identify those most at risk of TB could be done as it has been in other low incidence countries using national TB registers to allow healthcare workers provide additional selected data beyond case notification, such as the duration of symptoms or the number of years since immigration. Financing the actions within a TB strategy is necessary also. In 2015, the Health Information and Quality Authority (HIQA) recommended against continuing universal BCG vaccination of all newborns in Ireland, resulting in an estimated annual saving of up to €2.39 million. Based on our cost of illness study of TB in Ireland, we estimate over €9 million was spent in 2019 on direct clinical TB care for the 267 cases notified. Evidently, there is financial justification for investing in specific interventions to eliminate TB and due to the significant cost of treating TB disease they are likely to be cost effective.

Case based surveillance to assess the effectiveness of national programmatic latent tuberculosis infection management should also be performed according to the WHO Framework Towards TB Elimination in Low Incidence Countries. At a minimum, national data on the number of patients treated for latent TB infection annually, their risk for factors for TB disease and the outcome of treatment should be collected. By doing so, we can establish how effectively we are programmatically managing latent TB infection, a key action to reduce TB disease in low incidence countries. Defining who should be programmatically screened for latent TB infection

should also be a priority. For certain risk cohorts, whether programmatic screening for latent TB infection should be performed depends on the country-specific latent TB infection epidemiology and the resources available. These cohorts include people who are homeless, people who use drugs, prison inmates, immigrants from high TB incidence countries and healthcare workers. In both the Netherlands and England, recognition of specific migrant groups with a high incidence of TB disease led to research examining the prevalence of latent TB infection and the longitudinal risk of TB reactivation in these cohorts. Their findings supported the establishment of national latent TB screening programs among specific migrant groups from countries with a high incidence of TB. If wider programmatic screening for latent TB infection is to be implemented in Ireland, more research on the epidemiology of latent TB and the acceptability of screening and treatment to at-risk cohorts is needed.

It is thought social distancing and lockdown measures due to COVID-19 may reduce TB transmission. However, disruption to clinical services may result in TB remaining undetected for longer. In Europe, TB reference laboratories experienced a sharp reduction of workload related to the COVID-19 pandemic during the first epidemic wave, but this recovered later in 2020. How this will affect TB prevention and control in Europe is presently unclear. A modelling analysis of the potential impact of the COVID-19 pandemic on the tuberculosis epidemic in three high-burden countries suggests that it could result in a substantial accumulation of undetected TB cases, but this could be mitigated through supplementary “catch-up” TB case detection and treatment when restrictions allow.

Globally, the COVID-19 pandemic demonstrates that the responsibility of governments to prevent and control infectious diseases is significant. In the post-pandemic era there may be a renewed focus on eliminating other communicable diseases such as TB. Ireland, in addition to contributing to global efforts in this regard, should intensify national efforts to eliminate TB. This should start with a collaborative national strategy, including addressing the social determinants of TB among those most at risk, improved surveillance, and a focus on improving the programmatic management of latent TB infection.