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Post-tuberculosis sequelae and their socioeconomic consequences: worth investigating



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Tuberculosis continues to represent an important clinical and public health priority even during the COVID-19 pandemic.^{1,2} The death toll from tuberculosis remains unacceptably high despite the availability of a rich therapeutic and preventative armamentarium. Several vulnerable population groups are still facing diagnostic and treatment delays, raising equity issues, as recently addressed by national and international organisations.^{3,4}

Historically, research efforts have been mainly focused on the acute phase of tuberculosis as well as on the prevention of its occurrence; the suffering of patients and their families, and the direct, indirect, and intangible costs for household members, health systems, and socioeconomic systems, have been also investigated. However, much less attention has been devoted to the consequences of the post-acute phase. Tuberculosis is a chronic disease, and its treatment is long, particularly for drug-resistant tuberculosis. Post-tuberculosis sequelae are present in up to 60–90% of patients, who experience exercise limitations and have a hampered quality of life.^{4,5} This post-acute phase was recently defined as post-tuberculosis lung disease.^{4,5}

Recent evidence suggests that at least some patients with severe post-tuberculosis lung disease might benefit from clinical evaluation and, eventually, rehabilitation.^{6–7} Therefore, there is an urgent need for quality studies that help to understand the burden of post-tuberculosis lung disease, as well as its clinical pathway, and the best approach to prevent and manage it in high-income, middle-income, and low-income countries. Considering that there were estimated to be over 155 million tuberculosis survivors in 2020,⁸ important research questions emerge, including the burden of disability-adjusted life-years (DALYs) and the related economic consequences.

In *The Lancet Global Health*, Nicolas Menzies and colleagues⁹ estimated the health losses (including the post-tuberculosis phase) caused by global incident cases of tuberculosis in 2019 (ie, 10 million patients) for each of the 186 countries reporting a minimum of ten cases. The cohort the investigators analysed included patients with pulmonary and extrapulmonary tuberculosis, and

the horizon simulation included lifetime outcomes as well as those of the acute phase.

The findings were striking: the total DALYs attributable to tuberculosis disease (and to its consequences) were 122 million, with 58 million attributed to post-tuberculosis lung disease, with important variations across countries and regions. The DALYs related to post-tuberculosis increase the total burden of tuberculosis disease by 91% compared with the acute-phase alone. However, the higher weight of the post-tuberculosis phase ranges from 60% in African Region to 267% in Western Pacific.

Differences in survival affects the DALYs associated with post-tuberculosis lung disease: some countries with high tuberculosis burden showed post-tuberculosis DALYs higher than 20 DALYs per 1000 individuals compared with the global average of 7.5 DALYs per 1000 individuals. Each tuberculosis patient contributed about 12.1 DALYs, of which 5.8 were related to post-tuberculosis lung disease. Young age, HIV-infection, living in a high-incidence country, and missing exposure to tuberculosis treatment seemed to be associated with higher DALYs per incident case.

Although the DALYs accrue over the patients' remaining lifetime, almost a third of total DALYs were estimated to occur 15 or more years after an individual first develops tuberculosis. Importantly, the investigators estimated that life expectancy decreased on average by 1.87 years during the post-tuberculosis phase.

The results of this study are important to evaluate the real impact of post-tuberculosis lung disease and to inform guidelines in the coming future. As reported by Menzies and colleagues, the study findings might underestimate the real social and health-care burden related to post-tuberculosis lung disease for several reasons. Among others, post-tuberculosis lung disease can be inadequately diagnosed or reported, since surveillance systems do not follow up patients after tuberculosis is declared cured in most countries.^{4,5}

The disease burden caused by tuberculosis (in particular because of the contribution of post-tuberculosis lung disease) seems to be substantially greater than what is reported in current tuberculosis

burden estimates.⁹ This study contributes to a call for more attention on what happens when national tuberculosis programmes traditionally end their work, while patients (often) continue to experience post-tuberculosis lung disease, with limitations in their daily activities, hampered quality of life, stigma, and reduced household income.⁹

We want to underline two important messages from this study. First, traditional tuberculosis control activities (prevention, diagnosis, treatment) need to be fine-tuned to prevent post-tuberculosis lung disease, and whenever possible to diagnose and manage it as early as possible.^{4,5} Second, a clear direction for future research priorities has emerged. These include, among others, the understanding of the biological mechanisms leading to post-tuberculosis lung disease, the different aspects of this condition, the ideal strategies to diagnose post-tuberculosis lung disease at the completion of tuberculosis treatment, the potential role of rehabilitation, and the impact on patients' quality of life and on their survival.^{4,5}

We declare no competing interests.

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