



# Evidence-based, agreed-upon health priorities to remedy the tuberculosis patient's economic disaster

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New literature review of patient costs in tuberculosis reveals the financial burden of the disease  
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Recently, numerous countries have suffered the impact of the worldwide financial crisis [1]. Major economic problems have been faced by low and middle income countries; however, even some European Union nations (such as Greece, Spain and Italy) are experiencing the effects of the global crisis [2].

Several experts have noted the limited economic resources focused by governments, and international governmental and non-governmental organisations on health systems: dramatic funding reductions for numerous acute and chronic diseases, inability to improve healthcare organisations, incapability to replace personnel leaving their jobs (e.g. migration to a richer country or retirement), and inability to transfer new diagnostic, therapeutic and preventive approaches to daily routine clinical and public health activities. The most relevant outcome of this scenario is the increased burden of some diseases (inaccurate diagnosis and/or therapy and/or prevention) [3–5]. The highest risk of a difficult-to-recover picture is associated with increased probability of transmission of infectious diseases.

At this point in time it is crucial to develop a strategy of health priorities based on accurately evaluated epidemiological and financial burdens of the most important diseases.

Tuberculosis (TB), one of the main global health priorities with about 9 million estimated new cases and 2 million deaths, together with HIV/AIDS and malaria, creates major economic problems in high burden countries and among affected communities [6]. Several studies, as well as systematic reviews and meta-analyses, have been carried out on the healthcare burden of TB, including more severe forms of TB such as multidrug-resistant TB (MDR-TB) [7–12].

The World Health Organization (WHO) and its partners are finalising the latest version of the new post-2015 TB control and elimination strategy, which will be discussed at the World Health Assembly in May 2014 [13, 14]. With the vision of leaving a TB-free world to future generations (zero deaths, diseases and TB-related suffering) and the goal of putting an end to the global TB epidemic, the new WHO strategy has ambitious targets for 2035 (fig. 1): 1) a 95% reduction in TB deaths (compared with 2015); 2) a 90%

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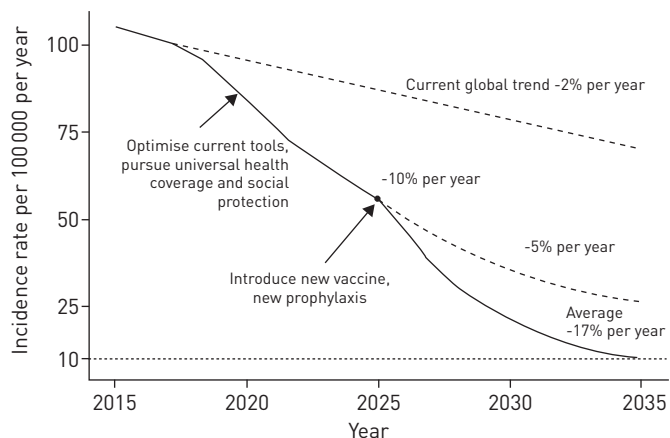


FIGURE 1 Estimated decrease of worldwide tuberculosis incidence. Reproduced with the permission of the publisher [14].

reduction in TB incidence rate (<10 TB cases per 100 000 population); and 3) that no affected families face catastrophic costs due to TB.

The new strategy is built around three core pillars, represented by: 1) integrated, patient-centred care and prevention, 2) bold policies and supportive systems, and 3) intensified research and innovation (table 1) [14].

While the first pillar will capture the core technical principles described in the DOTS and Stop TB Strategy (rapid diagnosis, screening of populations at risk, treatment and patient support including MDR-TB, TB/HIV and comorbidities, diagnosis and treatment of latently infected individuals, vaccination), the second pillar will capture the necessary policies supporting these principles (political commitment and adequate funding, engagement of communities, civil society organisations, and all healthcare providers with integration of health services; universal health coverage; regulatory frameworks for case notification and improved vital statistics, infection control and rationale use of quality anti-TB drugs; social protection, poverty alleviation and fight against social determinants). The third pillar, finally, will further stimulate research and rational use of new diagnostics, drugs and vaccines.

However, until now, studies investigating the impact of TB from the patients’ perspectives are rare and no systematic review on medical and non-medical costs, as well as income loss (and its drivers) for TB patients and affected households in different settings is available in the scientific literature.

TABLE 1 The three pillars of the new post-2015 World Health Organization Strategy

|   |   |
|---|---|
| <b>1) Integrated, patient-centred care and prevention</b> | Early diagnosis of tuberculosis, including universal drug susceptibility testing; systematic screening of contacts and high-risk groups<br>Treatment of all individuals with tuberculosis, including those with drug-resistant tuberculosis; patient support<br>Collaborative tuberculosis/HIV activities; management of comorbidities<br>Preventive treatment of persons at high tuberculosis risk; vaccination against <i>Mycobacterium tuberculosis</i> infection                              |
| <b>2) Bold policies and supportive systems</b>            | Political commitment accompanied by adequate resources for tuberculosis care and prevention<br>Engagement of communities, civil society organisations, and public and private care providers<br>Universal health coverage policy, and regulatory frameworks for case notification, vital registration, quality and rationale use of drugs; implementation and scale-up of infection control activities<br>Social protection, poverty alleviation and action on other determinants of tuberculosis |
| <b>3) Intensified research and innovation</b>             | Discovery, development, and rapid uptake of new tools, interventions and strategies<br>Research to optimise implementation and impact, and promote innovations  |

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In this issue of the *European Respiratory Journal*, TANIMURA *et al.* [15] systematically review studies focused on the direct (out of pocket) and indirect (opportunity) costs of TB, including income loss incurred by TB patients, and their coping strategies [15]. As the authors state in their introduction, universal health coverage (“universal access to needed health services without financial hardship in paying for them”) and social protection for “income replacement and social support in the event of illness” are the key principles supporting the rationale of that study.

This study is a first step in providing information that can be used in trying to meet the tentative global targets for the WHO strategy that no TB-affected family will face “catastrophic costs due to TB”, globally, by 2020 [16].

These principles have been present in previous documents of the global TB control agenda since 2011 [17–21]. Unfortunately they were more focused on ensuring free TB diagnosis and treatment (and providing incentives/enablers in local projects) rather than on implementing systems covering the expenses beyond direct medical costs (*e.g.* compensation of lost income *via* sickness insurance, disability grants, other conditional or unconditional cash transfers, food assistance, travel vouchers, and other support packages). The ongoing global crisis is, of course, not facilitating the implementation of these principles [3–5, 22].

TANIMURA *et al.* [15] implemented a search strategy which was comprehensive from a temporal criterion, but was focused only on low- and middle-income countries, *i.e.* on the countries mainly suffering the epidemiological burden of this infectious disease. They selected 49 original studies.

Out of 25 studies investigated, the key economic proportional loss (best estimate 60%, range 16–94%) was related to missing income, followed by medical costs (best estimate 20%, range 0–62%) and non-medical costs (best estimate 20%, range 0–84%). Eight studies presented here demonstrate that indirect costs are an important driver before and during treatment with anti-TB drugs. As 50% of the overall expenses for the patient occur before the treatment starts, early diagnosis and immediate start of a sound anti-TB regimen allows immediate saving of resources.

Drug costs form a substantial part of the direct medical costs (34% on average), followed, in order of importance, by tests prescribed at diagnosis and during follow-up (27% on average) and by hospitalisation costs (24%).

Unexpectedly, findings from 16 studies presenting disaggregated data for direct and indirect costs highlighted the relevance of food and transportation to the nearest TB service on indirect costs (50% and 37%, respectively).

One of the most striking results of the study analysis is the average “price” the patient pays for his/her TB disease: 847 and 379 US dollars represent the unweighted total mean and median cost of TB, respectively.

The total costs represent approximately 44% and 23% of the individual and household income, respectively (the authors included median values because of skewed data distributions). No differences were detected stratifying by gender, with only a few exceptions. An important finding of the study is that “minimising costs during treatment does not guarantee financial risk protection [as discussed above], because a large part of the cost is often incurred before treatment starts.” The time of diagnosis and treatment initiation seems to be a point where costs peak.

Alleviating patients of costs incurred during this time, for example through more affordable health services and social protection schemes as the authors suggest, may be a powerful intervention that, at the same time, would reduce delays in diagnosis and improve access to TB care.

The main costs affect the poorest disproportionately. All in all, the most frequent coping activities were: using savings, taking out a loan, and selling personal and household items.

Only a few studies (*i.e.* three) evaluated the financial consequences of MDR-TB: MDR-TB is, in fact, economically disastrous for the total and indirect costs generated when compared with drug-susceptible TB.

The authors suggest that both groups of patients, namely the poor and MDR-TB sufferers, require special attention from healthcare and social protection systems.

The study results could be affected by some methodological shortcomings, as the authors correctly underlined: 1) publication and selection biases, as the analysis was performed mostly on studies dealing with diagnosed patients and managed in the public sector; 2) great heterogeneity in design and methods of the studies analysed, as well as in the presentation of their results; and 3) limited information on the context of the study, such as on details of the local health system.

However, the main strength of this study is its originality: for the first time a systematic literature review on TB patient costs was performed.

The study underlines the importance of several economic drivers, including indirect costs, particularly those before treatment starts, as well as hospitalisation of (contagious) patients. More stratification, for example on gender and types of TB, including MDR-TB, would be useful in future studies.

More studies on TB patient costs are needed as soon as possible: they will provide relevant advice to politicians and to other stakeholders on the best allocation of resources, on critical gaps of health and social protection systems, and on potential savings that patients and healthcare providers might benefit from. Basing policy decisions on research like this will facilitate the rational allocation of financial resources in an era of insufficient funds.

In conclusion, this study presents the necessary background evidence to support the new WHO post-2015 strategy which is focused on TB elimination [13, 22]. To reach TB elimination we need all described interventions in place with particular attention to vulnerable populations and the capacity to tackle the social determinants of health [23, 24].

## References

- 1 World Economic Outlook, April 2012. Washington, International Monetary Fund, 2012.
- 2 Clemens T, Michelsen K, Brand H. Supporting health systems in Europe: added value of EU actions? *Health Econ Policy Law* 2014; 9: 49–69.
- 3 Karanikolos M, Mladovsky P, Cylus J, et al. Financial crisis, austerity, and health in Europe. *Lancet* 2013; 381: 1323–1331.
- 4 Kondilis E, Giannakopoulos S, Gavana M, et al. Economic crisis, restrictive policies, and the population's health and health care: the Greek case. *Am J Public Health* 2013; 103: 973–979.
- 5 Simou E, Koutsogeorgou E. Effects of the economic crisis on health and healthcare in Greece in the literature from 2009 to 2013: a systematic review. *Health Policy* 2014; 115: 111–119.
- 6 United Nations. Millennium Development Goals Report, June 2011. Available from: [www.refworld.org/cgi-bin/texis/vtx/rwmain?docid=4e42118b2](http://www.refworld.org/cgi-bin/texis/vtx/rwmain?docid=4e42118b2)
- 7 Diel R, Rutz S, Castell S, et al. Tuberculosis: cost of illness in Germany. *Eur Respir J* 2012; 40: 143–151.
- 8 Diel R, Vandeputte J, de Vries G, et al. Costs of tuberculosis disease in the European Union: a systematic analysis and cost calculation. *Eur Respir J* 2014; 43: 554–565.
- 9 Fitzpatrick C, Floyd K. A systematic review of the cost and cost effectiveness of treatment for multidrug-resistant tuberculosis. *Pharmacoeconomics* 2012; 30: 63–80.
- 10 Resch SC, Salomon JA, Murray M, et al. Cost-effectiveness of treating multidrug-resistant tuberculosis. *PLoS Med* 2006; 3: e241.
- 11 Loddenkemper R, Sotgiu G, Mitnick CD. Cost of tuberculosis in the era of multidrug resistance: will it become unaffordable? *Eur Respir J* 2012; 40: 9–11.
- 12 Floyd K, Hutubessy R, Kliiman K, et al. Cost and cost-effectiveness of multidrug-resistant tuberculosis treatment in Estonia and Russia. *Eur Respir J* 2012; 40: 133–142.
- 13 Diel R, Loddenkemper R, Zellweger JP, et al. European Forum for TB Innovation. Old ideas to innovate tuberculosis control: preventive treatment to achieve elimination. *Eur Respir J* 2013; 42: 785–801.
- 14 World Health Organization Executive Board. Global Strategy and Targets for Tuberculosis Prevention, Care and Control after 2015. Report by the Secretariat. [http://apps.who.int/gb/ebwha/pdf\\_files/EB134/B134\\_12-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/EB134/B134_12-en.pdf) November 29, 2013. Date last accessed: April 6, 2014.
- 15 Tanimura T, Jaramillo E, Weil D, et al. Financial burden for tuberculosis patients in low- and middle-income countries: a systematic review. *Eur Respir J* 2014; 43: 1763–1775.
- 16 Eliminating the Catastrophic Economic Burden of TB: Universal Health Coverage and Social Protection Opportunities. Meeting Report from a World Health Organization Consultation to Inform the post-2015 Global TB Strategy. Geneva, WHO, 2013.
- 17 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.
- 18 Hopewell PC, Fair EL, Uplekar M. Updating the international standards for tuberculosis care. Entering the era of molecular diagnostics. *Ann Am Thorac Soc* 2014; 11: 277–285.
- 19 Hopewell PC. Updating the international standards for tuberculosis care. *Int J Tuberc Lung Dis* 2014; 18: 253.
- 20 Migliori GB, Zellweger JP, Abubakar I, et al. European Union standards for tuberculosis care. *Eur Respir J* 2012; 39: 807–819.
- 21 Migliori GB, Sotgiu G, Blasi F, et al. Towards the development of EU/EEA Standards for Tuberculosis Care (ESTC). *Eur Respir J* 2011; 38: 493–495.
- 22 D'Ambrosio L, Dara M, Tadolini M, et al. Tuberculosis elimination: theory and practice in Europe. *Eur Respir J* 2014; 43: 1410–1420.
- 23 Voniatis C, Migliori GB, Voniatis M, et al. Tuberculosis elimination: dream or reality? The case of Cyprus. *Eur Respir J* 2014 [In press; DOI: 10.1183/09031936.00044314].
- 24 Creswell J, Raviglione M, Ottmani S, et al. Tuberculosis and noncommunicable diseases: neglected links and missed opportunities. *Eur Respir J* 2011; 37: 1269–1282.