

# Beyond tuberculosis: a person-centred and rights-based approach to screening for household contacts

Claire J Calderwood, Collins Timire, Constanca Mavodza, Fungai Kavenga, Mxolisi Ngwenya, Karlos Madziva, Katherine Fielding, Justin Dixon, Rashida A Ferrand, Katharina Kranzer



Households affected by tuberculosis have syndemic vulnerability, reflecting a concentration of and interactions between multiple biomedical, psychosocial, and structural determinants of health. Traditional approaches to tuberculosis screening do not address pre-existing risks, such as undernutrition and other chronic conditions, or the indirect effects of tuberculosis, such as loss of livelihood. These pre-existing risks and consequences not only perpetuate the global tuberculosis epidemic but, for those affected, lead to poor health and deepen poverty. We propose reimagining tuberculosis screening as an opportunity to deliver a contextually relevant package of services that address the needs of households affected by tuberculosis. This approach puts people and their rights at the centre of efforts to end tuberculosis, and has equity at the core. This approach could support progress towards universal health coverage, benefiting communities and health systems. Leadership, flexibility in funding allocation, and innovative care models will be required to realise this approach at scale.

## Introduction

Disease-specific health programmes have resulted in important successes for global public health. These programmes do not, however, reflect the complexity and multiplicity of individuals' experience of illness, which arises from, and is shaped by, multiple biomedical, psychosocial, and structural factors.<sup>1</sup> Disease-specific programmes emphasise treating diseases, rather than prioritising the more holistic goal of promoting health and wellbeing.<sup>2</sup> A rights-based approach to health, encapsulated in the concept of person-centred care, demands that people's experience is given primacy and that individuals are empowered to make decisions about their health. These principles of human rights, equity, and services allocated according to needs are core to universal health coverage, a global priority included in the Sustainable Development Goals.<sup>3</sup> Delivering universal health coverage by 2030 is a massive challenge for global health policy makers, programmes, and national governments, demanding a shift from disease-specific to person-centred care, and adequate resourcing and reorganisation of services.<sup>4</sup>

Disease-specific programmes, often driven by external funding, benefit from a clear focus, with measurable outcomes and dedicated human and financial resources.<sup>2</sup> These programmes usually focus on a single or small number of conditions, sometimes resulting in parallel structures, to the detriment of the wider health system. The potential for disease-specific programmes that contribute to broader-based health system strengthening was recognised over a decade ago.<sup>5</sup> This potential has mostly not been realised, and there remains a stark disparity in access to diagnostics and treatment for conditions that are prioritised compared with those that are given lower priority.<sup>6</sup>

There is a need for new approaches to facilitate earlier diagnosis and prevention of conditions that cause death and impact wellbeing, with a particular emphasis on low-income or marginalised communities who can least

afford the consequences of illness.<sup>2</sup> Conditions targeted by current vertical programmes, for example tuberculosis and HIV, often cluster as syndemics.<sup>1</sup> These conditions disproportionately affect the most vulnerable—people who also encounter the highest barriers when accessing health care and are especially affected by the consequences of ill health, including poor treatment outcomes and social and economic hardship. Integrating additional activities within disease-specific programmes therefore represents an opportunity to reach people at particular risk, who might not otherwise access care, and uses every health-care encounter as an opportunity to provide health promotion and services.

## Tuberculosis in a syndemic framework

On a global scale, poverty, undernutrition, alcohol use disorder, and chronic conditions (such as HIV and diabetes) drive the tuberculosis epidemic.<sup>7-9</sup> These risk factors cluster and interact syndemically at the community, household, and individual level (figure 1).<sup>2</sup>

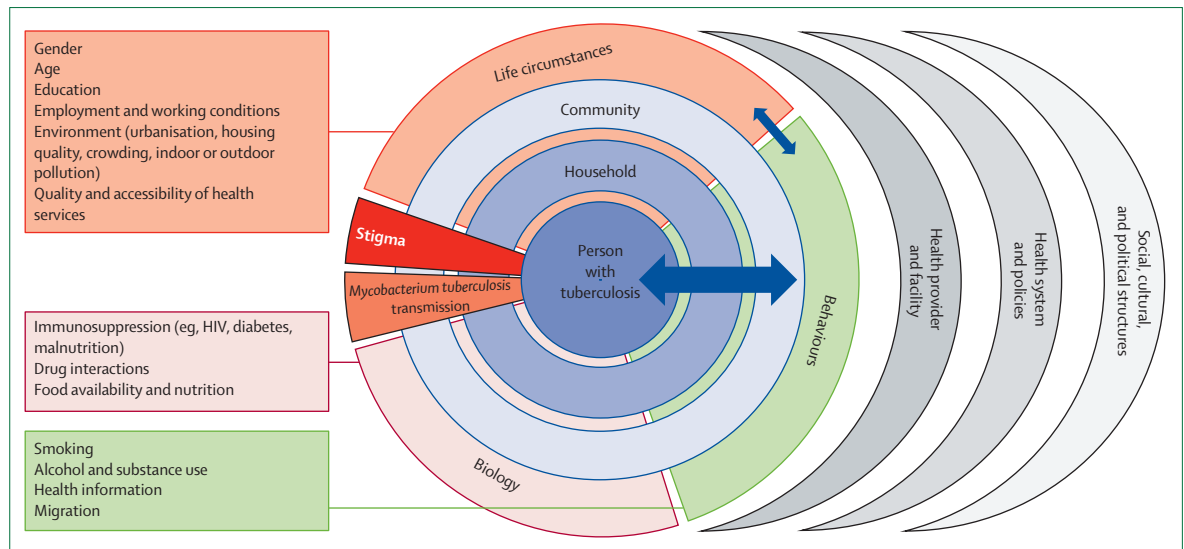
In addition, communities affected by tuberculosis are especially vulnerable to the effects of global, regional, or local events that adversely affect their livelihoods.<sup>10</sup> Households affected by tuberculosis have excess morbidity, both because of pre-existing risks and the direct and indirect effects of tuberculosis (eg, loss of income, increased food insecurity, and decreased educational opportunities).

Low-income or marginalised communities, who are at highest risk of tuberculosis, also often have poor access to health care.<sup>11</sup> Socioeconomic issues can also impede adherence to tuberculosis treatment, the availability of and participation in tuberculosis screening, and uptake and completion of tuberculosis preventive therapy (TPT) by household members;<sup>12</sup> the resultant repeated episodes of tuberculosis have long-term adverse effects on a household's socioeconomic position. Together, these factors perpetuate an intergenerational cycle of poverty. Traditional approaches to systematic screening of

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Faculty of Infectious and Tropical Diseases (C J Calderwood MSc, C Timire MPH, Prof R A Ferrand PhD, Prof K Kranzer PhD), Faculty of Epidemiology and Population Health (Prof K Fielding PhD), and Faculty of Public Health and Policy (J Dixon PhD), London School of Hygiene & Tropical Medicine, London, UK; The Health Research Unit Zimbabwe, Biomedical Research and Training Institute, Harare, Zimbabwe (C J Calderwood, C Timire, C Mavodza PhD, K Madziva MSc, J Dixon, Prof R A Ferrand, Prof K Kranzer); AIDS & TB Control Programme, Ministry of Health and Child Care, Harare, Zimbabwe (C Timire, F Kavenga MSc, M Ngwenya MSc); Division of Infectious Diseases and Tropical Medicine, Medical Center of the University of Munich, Munich, Germany (Prof K Kranzer)

Correspondence to: Claire Calderwood, Faculty of Infectious and Tropical Diseases, London School of Hygiene & Tropical Medicine, London WC1E 4HT, UK [claire.calderwood2@lshtm.ac.uk](mailto:claire.calderwood2@lshtm.ac.uk)



**Figure 1: Tuberculosis as a syndemic, representing a concentration of risk factors that act at individual, household, community, and wider contextual levels** Tuberculosis is caused by *Mycobacterium tuberculosis*, which is transmitted by close contact through droplet spread. In high tuberculosis burden settings, *M tuberculosis* infection is common; however, only a small fraction of people with infection develop tuberculosis. For an individual, the risk of developing tuberculosis (including the risk of being infected with *M tuberculosis* and risk of progression to tuberculosis) is related to multiple interacting risk factors, including those related to biology, life circumstances, and behaviours. These risk factors also influence tuberculosis treatment outcomes. Although some of these risk factors act at an individual level (eg, age and sex), the majority are shared between members of a household or community, perhaps at a lower intensity, due to household transmission, shared diet or genetics, or shared structural and social determinants of health.

tuberculosis household contacts focus only on detection of tuberculosis and provision of TPT, without addressing other modifiable tuberculosis risk factors or the direct and indirect effects of tuberculosis.<sup>13</sup>

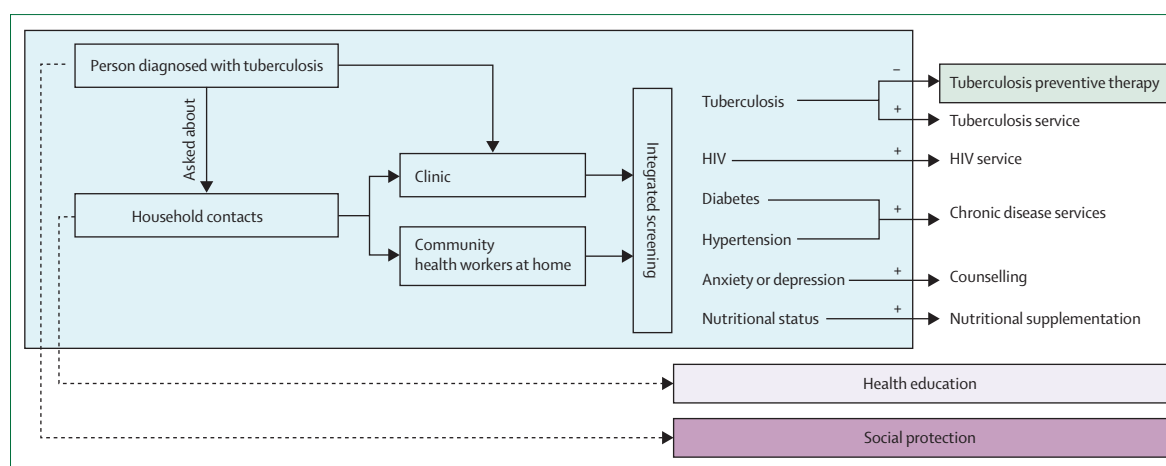
### A novel approach to tuberculosis household contact screening

We propose reimagining tuberculosis household contact screening as an opportunity to provide health services for vulnerable communities, acknowledging syndemicity, and putting people and their rights at the centre of our efforts to end tuberculosis.<sup>14</sup> Such an approach could not only reduce tuberculosis incidence and mortality through multiple pathways, but also improve the health of communities affected by tuberculosis across the life course. Such a model is illustrated in figure 2, with four core domains: integrated health screening, provision of TPT, health education, and linkage to social protection. Within these core domains, it is crucial that interventions are contextually relevant and developed in collaboration with communities affected by tuberculosis, local health providers, and policy makers. A case study demonstrating the rationale and potential for such an approach in Zimbabwe is described in the panel.

Current international guidelines recommend integrated screening and care for HIV, diabetes, and undernutrition among people with tuberculosis.<sup>9,15</sup> Social protection schemes aimed at people with tuberculosis, for example conditional cash transfers, improve treatment outcomes.<sup>16</sup> These programmes might be tuberculosis-specific, tuberculosis-sensitive, or tuberculosis-inclusive, and will

vary across contexts. These initiatives recognise the potential of integrated care and social protection for people affected by tuberculosis; however, relatively little attention has been paid to the impact of chronic conditions (including mental health) on other members of households affected by tuberculosis. Some studies have included HIV or diabetes screening, a socioeconomic intervention (including social support and conditional cash transfers) improved uptake of TPT in Peru, and a clinical trial has shown that nutritional support reduces tuberculosis incidence in India.<sup>12,17–19</sup> To our knowledge, no studies have sought to integrate components to deliver a holistic intervention, nor are there data on how such integration affects uptake of tuberculosis screening or influences acceptability, stigma, or cost-effectiveness.

In this novel approach, context will need to be considered from several perspectives. First, the epidemiological context, including interactions between tuberculosis and other conditions or risk behaviours, will inform which conditions are of public health importance. In southern Africa for instance, HIV testing should be offered; however, this testing might also be included in low HIV prevalence settings given the high risk of tuberculosis among people with untreated HIV.<sup>13</sup> The prevalence of diabetes is rapidly increasing globally.<sup>20</sup> Diabetes is associated with both an increased risk of tuberculosis and poor tuberculosis treatment outcomes, whereas achieving diabetes control reduces the risk of developing tuberculosis and improves outcomes.<sup>8,21</sup> This association justified the inclusion of diabetes screening as part of an integrated approach to tuberculosis



**Figure 2: An illustrative model of an integrated approach to systematic screening of tuberculosis household contacts**

Core components of an integrated health intervention include screening (blue), provision of tuberculosis preventive therapy (green), health education (light purple), and linkage to social protection (dark purple). All people who screen positive for health conditions (+) should be able to access appropriate services, and tuberculosis preventive therapy should be provided for all people who screen negative (-) for tuberculosis.

screening. Silicosis is associated with a high risk of tuberculosis and poor tuberculosis treatment outcomes. Particularly in settings where many people are employed in at-risk occupations and occupational health controls are weak, screening for silicosis could be considered. Food insecurity is common in many high tuberculosis-burden settings, exacerbated by the economic consequences of tuberculosis for a household.<sup>9</sup> Screening for undernutrition and provision of nutritional support might support uptake and adherence to TPT.<sup>12</sup> Mental health conditions, such as anxiety and depression, are common among people with tuberculosis, both because of contextual factors and the multiple and far-reaching impacts of tuberculosis.<sup>22</sup> Similarly-exposed household members are likely to also have poor mental health. Other conditions that are associated with an increased risk of tuberculosis and poor tuberculosis treatment outcomes, such as chronic lung disease, and conditions that are not associated with tuberculosis but might be prevalent but often undiagnosed, such as hypertension, could also be included as part of an integrated approach to tuberculosis screening.<sup>23</sup> Health education should address important drivers of poor health, including behaviour change, to reduce future risk of tuberculosis (eg, smoking cessation or recommended limits on alcohol intake). Given the high risk of comorbidities among people with tuberculosis, services should be made available to the person with tuberculosis and their contacts.

Second, the community context into which an intervention is delivered is crucial, and any specific approach should be developed in collaboration with communities and other stakeholders.<sup>2</sup> For example, HIV testing during a household-based intervention might be unacceptable due to potential loss of confidentiality, despite high prevalence. Stigma is a well-recognised deterrent to participation in tuberculosis or

HIV screening;<sup>11,24</sup> inclusion of interventions that are desirable or less stigmatised in a specific community could serve to reframe tuberculosis screening as a holistic health check.<sup>25</sup> Interviews with participants of household-based tuberculosis screening in South Africa suggested that they valued this opportunity to access health education.<sup>26</sup> In the context of HIV, diabetes and hypertension screening or provision of condoms and menstrual hygiene products have been shown to increase engagement.<sup>23,25</sup> Such contextualisation should also consider the various locations in which services could be provided, and any strategies that are already in place. Services could be facility-based, delivered in people's homes, or offer a combination of both, tailored to the preferences of individual households. A facility-based approach could be advantageous for urban populations, where distances (eg, between a facility and the home) are shorter and travel is easier. A facility-based approach could support the use of diagnostic equipment that is more expensive, requires more technical expertise, or cannot be easily transported. This approach might, however, be associated with lower participant uptake due to stigma or other negative associations with health facilities.<sup>11,25</sup> Home-based services could be more convenient for participants and build on existing relationships with community health workers; however, such an approach could be cost-prohibitive. Risk stratification tools, with referral of individuals at high risk to a health facility for further assessment, might be needed if particular diagnostic tests are not feasible in the tuberculosis screening location.

The third important context is that of the health system. In many high HIV-burden or high tuberculosis-burden settings, tuberculosis screening and care has been decentralised to primary care clinics, improving accessibility. The same is not true for many other

**Panel: Case study—rationale and potential for service integration into tuberculosis screening in Zimbabwe**

In Zimbabwe, severe HIV and tuberculosis epidemics, alongside a sustained economic crisis, have severely impacted the health system. In 2021, tuberculosis incidence was 190 per 100 000 population, and adult HIV prevalence was 12.3%.<sup>27,28</sup> 40% of Zimbabweans live in poverty, and 32% live with severe food insecurity. Undernourishment is the second-leading risk factor for tuberculosis, after HIV. At the same time, southern Africa is experiencing a rapidly expanding non-communicable disease epidemic: in Zimbabwe, adult diabetes prevalence is estimated at 10%, and adult hypertension at 25%.<sup>29</sup> Up to 37% of people have symptoms of common mental disorders.<sup>30</sup> There is increasing concern about hazardous alcohol and substance use in Zimbabwe, particularly among young men. Although the Zimbabwean tuberculosis and HIV programmes are strong, services for non-communicable diseases are scarce, and out-of-pocket costs for health care are high, with 7% of households (and 80% of households affected by tuberculosis) experiencing catastrophic health spending (more than 20% of the household's annual expenditure) in 2017.<sup>31</sup> Most health funding is dependent on external sources. In public perception, tuberculosis is tightly related to HIV, exacerbating stigma and acting as a deterrent to participation in tuberculosis screening.

Tuberculosis diagnostic and treatment services are available at all government primary care clinics with support including integrated tuberculosis and HIV centres, adherence support, and social protection and nutritional support for people with drug-resistant tuberculosis. Increasing coverage of tuberculosis screening among household contacts and uptake of tuberculosis preventive therapy is a key priority.<sup>32</sup> Additional services could be layered onto these existing structures, developing a basket of integrated services for people with tuberculosis and their families. These integrated services could include routine screening for other comorbidities (such as diabetes, silicosis and other chronic lung diseases, COVID-19, cancer, and hypertension) and provision of desirable health interventions, such as menstrual hygiene and family planning services. Treatment support for comorbidities

and chronic illnesses (such as hypertension, diabetes, and chronic lung disease) could be integrated into that for tuberculosis and HIV. These services could be delivered at primary health clinics or by community health workers at people's homes, embedded within existing activities.

Other opportunities for integration include leveraging outreach services that conduct screening for tuberculosis in communities at high risk. Existing outreach programmes offer HIV testing and diagnosis of silicosis—which is particularly important among artisanal and small-scale miners—and diabetes screening for people diagnosed with tuberculosis. Services such as those for hypertension, malaria, mental health, and sexual and reproductive health could be added, with research suggesting these would be highly valued by intended participants. Integration of nutrition screening into existing tuberculosis screening programmes at maternal and child health clinics would specifically target groups at high risk of both undernutrition and tuberculosis (ie, children younger than 5 years, pregnant women, and mothers).

At a health facility level, sharing of resources, for example by multiplexing tuberculosis testing platforms to support GeneXpert-based testing for tuberculosis, HIV, hepatitis C, and SARS-CoV-2 infection, would lead to further integration and support decentralisation of a range of diagnostic testing.

Such activities are feasible through building on established partnership forums, including those for tuberculosis and HIV, non-communicable diseases, nutrition, and maternal and child health, through which the agenda for integrated services for tuberculosis and comorbidities can be advanced. Ongoing engagement between the National Tuberculosis and Leprosy Programme and other government departments, in both planning and execution, will be needed, as well as development of guidelines and clear referral pathways. Strategies to reduce the impact of user fees on access to services among under-resourced communities affected by tuberculosis need to be considered.

chronic conditions, for which services are based at secondary-level facilities or are not available at all.<sup>6</sup> When considering screening for chronic conditions, it is necessary to have not only a suitable screening tool, but also onward accessible and responsive care; as an example, spirometry—the only well-established screening tool for chronic obstructive pulmonary disease—is time consuming, complex, and expensive, and not suitable for such an application. Alcohol use disorders are associated with a three-times increased risk of tuberculosis, and validated, easy-to-use screening tools exist.<sup>7</sup> However, treatment services for alcohol use disorders are rarely available in high tuberculosis-burden settings. Ensuring that people can effectively navigate the health system is key to person-centred

care: mapping or development of referral pathways to higher-level facilities (eg, hospitals) or support for decentralisation is necessary for an effective integrated screening intervention.<sup>2</sup> Health outcomes and patient satisfaction from integrated health screening are best where there are clear pathways to care or, ideally, co-location of services.<sup>6</sup>

**Opportunities and challenges**

Existing models of household contact screening for tuberculosis focus solely on tuberculosis and have changed little in decades. Providing a package of contextually relevant services that individuals consider desirable, and which address important drivers of morbidity and mortality, could deliver benefit in

	Solution
<b>Leadership and governance</b>	
Siloed governance structures: health systems orientated around and funded through disease-specific programmes prevent resource sharing and collaboration	Structures to promote collaboration and cross-cutting programmes at local, national, and international level
Omission from tuberculosis policy and guidelines: the high disease burden and need for additional services among tuberculosis household contacts is not recognised in current tuberculosis policies	Evidence generation, including on feasibility, acceptability, and cost-effectiveness, to support inclusion in guidelines
<b>Health financing</b>	
Insufficient funding: integrated services are likely to be associated with additional cost that could be unaffordable; as a result of siloed programming mechanisms to share such costs do not exist	Advocacy to raise awareness of, and funding for, action on upstream determinants of tuberculosis, supported by evidence; an innovative financing mechanism supporting contributions from multiple stakeholders to common programmes
<b>Service delivery</b>	
Stigma and confidentiality: screening risks exposing an individual's health status; if screened conditions are stigmatised, they might act as a deterrent to participation in tuberculosis screening itself; home visits might present a particular risk to confidentiality	Consideration of stigma in programme design and location, including community views; include conditions for which screening is desirable; integration might de-emphasise tuberculosis, countering stigma
Linkage to care: often people diagnosed through screening do not start treatment, eg, due to competing priorities or not having access	Immediate counselling and on-site treatment where possible, or clear, simple pathways to ongoing care
<b>Health workforce</b>	
Insufficient staff capacity: additional services represents an additional workload for an already overstretched workforce, jeopardising tuberculosis-specific goals	Additional service demands must be accompanied by sufficient resources, requiring ingredients-based costing evaluations
Lack of expertise: staff might not have awareness of, or the skills for, non-tuberculosis health conditions (eg, NCDs)	Learning curriculums including NCDs and social determinants of health for health-care workers
<b>Health information systems</b>	
Tuberculosis-specific outcome measures: tuberculosis programme success is assessed through a few highly targeted measures, which do not capture the broader needs and impacts of tuberculosis	High-level agreement on indicators for successful holistic care, integrated into monitoring and evaluation systems
<b>Access to essential diagnostics and medicines</b>	
Siloed procurement of commodities and weak supply chains for NCDs: there is little funding for testing and treatment for NCDs, such as diabetes, resulting in high individually incurred costs that families affected by tuberculosis are least able to afford	Support from funding agencies for non tuberculosis-specific costs in programmes delivering holistic care, paired with greater dedicated NCD or primary care funding
Lack of availability of diagnostics: some conditions that might be desirable require expensive or laboratory-based tests; they are not suitable for inclusion without development of rapid and cheap diagnostics	Programmes must consider feasibility (eg, validated point-of-care tools and digital technologies, such as mobile phone-based questionnaires)
Access to treatment: in many settings, NCD medications, mental health counselling, management of alcohol use disorders, or other chronic disease services, are not available, or access is scarce	Contextually relevant treatment services must be developed alongside screening, with a view to scalability
NCD=non-communicable disease.	

**Table: Current barriers to an integrated approach to tuberculosis screening and proposed solutions, mapped to the health system building blocks**

multiple ways. As a result of intersecting risk factors and clustering of health conditions, packages of care can be synergistic,<sup>2</sup> and can also more effectively deliver health system efficiency gains through aligned governance, infrastructure, and service provision, compared with disease-specific programmes.

Compared with global targets for provision of TPT (4 million children younger than 5 years, and 20 million adults and children older than 5 years) to be achieved by 2022, only 40% (1.6 million) of children aged 5 years or younger and 3% (0.6 million) of children older than 5 years were started on TPT.<sup>27</sup> This gap probably reflects incomplete roll-out of screening as well as suboptimal uptake (particularly among men).<sup>24</sup> When participating in any health intervention, individuals weigh up the potential benefits against other priorities. It is reasonable that people invited for tuberculosis screening are sceptical, either because they do not consider themselves to be at high risk of tuberculosis (and with a three in 100 chance of tuberculosis among household contacts,<sup>13</sup> this is a reasonable interpretation of risk) or because of an impression that tuberculosis

screening does not address their health concerns.<sup>33</sup> Coexisting conditions, such as undernutrition, could also serve as a barrier to TPT.<sup>12</sup> Integration of tuberculosis screening with other health-promoting interventions might make the intervention not only acceptable, but desirable, outcompeting or fitting alongside other urgent and fundamental priorities for individuals.

Improved recognition of chronic conditions and other tuberculosis risk factors enables these chronic conditions and risk factors to be addressed, improving health outcomes and averting the wider adverse consequences of late diagnosis.<sup>2</sup> Doing so in the context of tuberculosis screening maximises an opportunity to engage with the most vulnerable communities who might otherwise be considered hard to reach.<sup>2</sup> Identification of people with tuberculosis risk factors (such as HIV, diabetes, undernutrition, or silicosis) could facilitate prioritisation of TPT; effective treatment for chronic conditions could reduce tuberculosis incidence.<sup>8</sup> More broadly, establishing person-centred care might contribute to longer-term gains, including improved infrastructure for non-communicable disease

diagnosis and management, and foster a health-promoting environment.<sup>2</sup>

Although integrated services leveraged on an existing programme are appealing, there are likely to be substantial challenges (table). The current hard won gains of tuberculosis programmes and progress towards tuberculosis-specific targets could be destabilised by broadening the scope of tuberculosis programme activities. In some settings, screening of tuberculosis household contacts is well embedded; in other settings, however, the provision of tuberculosis screening is poor. Implementation of integrated services would, therefore, need to occur alongside the strengthening and expansion of tuberculosis screening. This need to strengthen tuberculosis screening programmes is aligned with high-level targets within which expansion of tuberculosis screening and roll-out of shorter TPT regimens is a priority.<sup>27</sup> Furthermore, an integrated approach might distract from the programme's core message of finding and treating tuberculosis, adding complexity and increasing demands on health-care workers if not met by additional funding and human resource support.<sup>6</sup> The current structure of global public health programmes is intimately tied to the way in which they are funded, with a focus on highly targeted, outcome-driven interventions.<sup>2</sup> Person-centred care challenges many of these core structures and blurs the boundaries between programmes. For example, if diabetes screening is integrated into tuberculosis-related activities, are consumables and additional nurse capacity paid for by the tuberculosis or the non-communicable disease programme? The use of diagnostic testing platforms, such as GeneXpert (Cepheid; Sunnyvale, CA, USA), for additional assays might increase turnaround times; how should this be balanced against the less easily measurable benefits of integrated care? Similar challenges were proposed as barriers to integrated care for tuberculosis and HIV;<sup>34</sup> for tuberculosis–HIV integration, these challenges have been overcome through adaptation of funding and monitoring and evaluation structures.<sup>27</sup>

A screening programme requires an accurate, feasible, and acceptable screening test. In the context of tuberculosis screening, tests should be low cost, point of care, and have a rapid turnaround time, to support implementation at scale. However, for many chronic conditions, such a test does not exist. Diagnosing chronic conditions through screening alone will be insufficient to improve health outcomes. Previous integrated screening interventions have described low linkage to care and a minority of people achieving disease control.<sup>23,35</sup> Currently, in many resource-constrained settings, non-communicable disease treatment is inaccessible because of clinic fees, restricted clinic capacity, centralised services, costs of medications, and disrupted medication supply.<sup>6</sup> There is an urgent need for investment to strengthen non-communicable disease services and

improve primary care more broadly, together with increased prioritisation of disease prevention and creation of an enabling environment for good health.

Addressing these challenges will require leadership to create structures that facilitate cross-programme collaboration, flexibility in funding allocation, and innovative service delivery models, developed with communities at the centre. At the clinic level, this approach requires health-care providers to broaden their scope of practice; providing appropriate training and empowering them to do so will be an important component.<sup>6</sup> Crucially, implementation must be supported by evidence on feasibility, acceptability, and cost-effectiveness. Key questions to be addressed through future research across diverse settings include: what is the unmet need for non-tuberculosis services among members of households affected by tuberculosis; what intervention-related and contextual and environmental factors influence delivery of screening and the potential for scalability; how much does it cost to deliver an integrated package of screening for members of households affected by tuberculosis; and what is the impact of an integrated approach, compared with standard of care, on tuberculosis-specific (eg, treatment success among people with tuberculosis, coverage of tuberculosis screening, and uptake and completion of TPT among tuberculosis household contacts) and other (eg, loss of livelihood and health-related quality of life) important health outcomes?

#### Contributors

CJC, RAF, and KK conceptualised the Viewpoint, building on ideas developed through discussion with CM, CT, FK, JD, KF, KM, and MN. CJC conducted the literature review, wrote the first draft, and developed the figures, with input from CM, CT, FK, JD, KF, KM, and MN. The case study was drafted by CT, FK, and MN. All authors contributed to subsequent drafts and approved the final manuscript.

#### Declaration of interests

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