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DATA-DRIVEN INSIGHTS INTO SEX AND GENDER DISPARITIES IN TUBERCULOSIS

INSIGHTS FROM THE LIGHT RESEARCH PROGRAMME

MAY 2026

THE CHALLENGE

Tuberculosis (TB) remains one of the world's deadliest infectious diseases despite being preventable and curable. Its burden is not evenly distributed across populations, with a growing body of evidence highlighting persistent sex and gender disparities across the TB care continuum. Addressing these inequities is essential to improving health outcomes and accelerating progress towards ending TB.

Engaging with TB-affected communities in Nigeria

Across many low- and middle-income countries, TB prevalence is substantially higher among men than women. Men often face longer delays in accessing care and are less likely to be diagnosed or start treatment in a timely manner[1,2]. As a result, they frequently present with more advanced disease and have worse treatment outcomes, including higher mortality and higher sputum culture and smear positivity, than women[3,4]. Adolescents and young adults face distinct but often overlooked challenges within TB programmes, including increased risk of TB infection and disease progression, and the need for age-responsive TB care [5,6].

These inequities are not simply biological. Men's TB burden and poor healthcare access are shaped by complex social, cultural and structural determinants, where health systems are often not designed around the realities of people's lives. Men may delay care and services can be difficult to access because of livelihood pressures, care costs, stigma, gendered expectations and health services that are not sufficiently responsive to their needs. This points to the need for structural and multidimensional interventions, rather than approaches that focus only on individual behaviour[7].

Despite growing recognition of gender disparities in TB, many TB programmes still lack sufficiently disaggregated data and the capacity to analyse and use these data to identify where inequities occur across the care cascade. As a result, programme responses often remain gender-blind, focusing on aggregate notification and treatment targets without adequately examining who is being missed, why they are being missed, and what service adaptations are needed. There is therefore a need for integrated, context-specific evidence that links epidemiology, social determinants, health-system barriers and policy action to better inform service design, resource allocation, and monitoring of progress on age and gender equity in TB.

LEAVING NO-ONE BEHIND: TRANSFORMING GENDERED PATHWAYS TO HEALTH FOR TB

Partners:

AFIDEP African Institute for Development Policy

Malawi Liverpool Wellcome Research Programme

mli

ReSOK Respiratory Society of Kenya

Zankli Research Center

London School of Hygiene & Tropical Medicine

LSTM Liverpool School of Tropical Medicine

Funder:

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WHAT LIGHT DID

The LIGHT Research Programme contributed to the growing body of evidence on gender and TB by applying a gender-responsive and equity-focused lens across its research, analysis and policy engagement. Through a combination of primary and secondary data analysis, participatory research, and mathematical modelling, LIGHT generated evidence across epidemiological, behavioural, and policy domains to better understand TB disparities and inform more effective responses.

By doing so, LIGHT helped bridge important evidence and action gaps by connecting data on TB burden, infection risk and transmission with research insights on gender norms, health-seeking behaviour, structural barriers and health-system responses across Kenya, Malawi, Nigeria and Uganda. LIGHT positioned gender as central to understanding who is most affected by TB, who is missed by services, and what type of responses are needed to improve equity and accelerate progress towards ending TB. LIGHT's contribution included three areas of evidence generation.

UNDERSTANDING GENDER AND SOCIOECONOMIC DETERMINANTS

LIGHT generated evidence on how TB burden is shaped by gender, age, poverty, education, social position and wider structural determinants. Secondary analyses of national TB prevalence survey data in Kenya and Nigeria identified persistent socio-economic and gender disparities in TB burden. These analyses demonstrated the value of leveraging existing datasets to generate equity-focused insights without additional primary data collection[8].

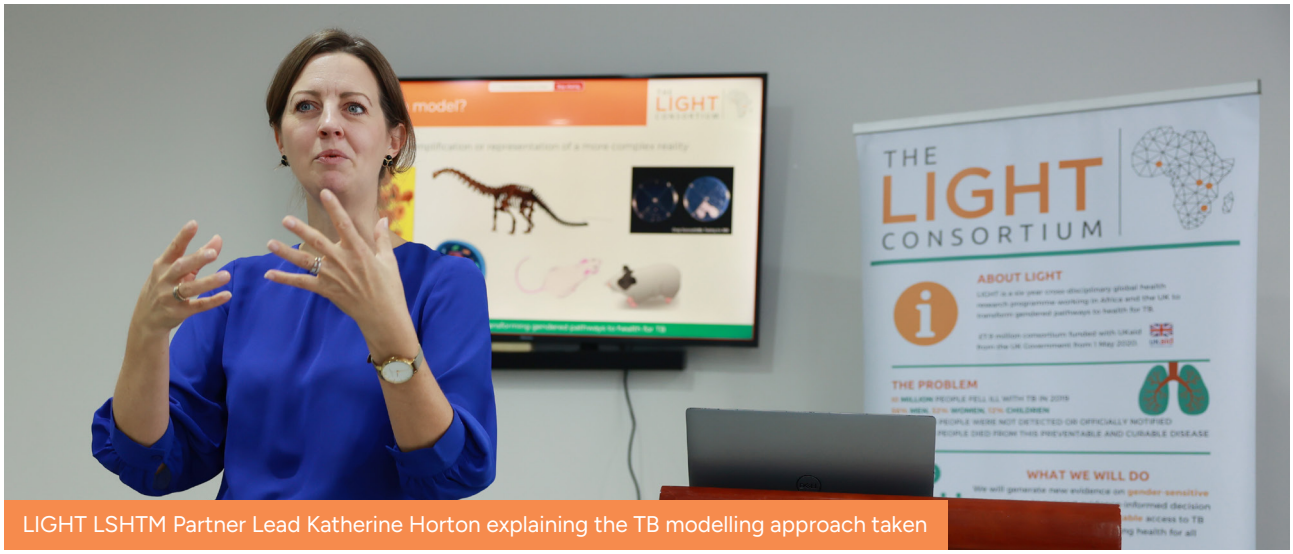
LIGHT also contributed to broader analyses showing that TB prevalence remains higher among men across low- and middle-income countries, a disparity that has persisted for decades[9]. This helped situate LIGHT's country-level findings within the wider global pattern of sex and gender disparities in TB burden.

Further meta-analyses of national survey data and conceptual frameworks have helped clarify how poverty, education, and other structural determinants interact to shape gender disparities in TB risk[10,11]. These approaches strengthen the evidence base for understanding TB as a socially patterned disease. LIGHT's population-based evidence from Blantyre, Malawi, showed that divergence in TB infection risk begins in adolescence and persists into adulthood and confirmed that adult men have higher Mycobacterium tuberculosis immunoreactivity than women, likely reflecting greater exposure and social mixing patterns[12,13].

Together, these findings highlighted the importance of using sex- and age-disaggregated data to identify inequities earlier and inform more targeted TB responses.

Vibol Lem, LIGHT early career researcher, sharing the approach taken to secondary analyses on socio-economic and gender disparities in Kenya and Nigeria

GENDER NORMS AND HEALTH-SEEKING BEHAVIOUR



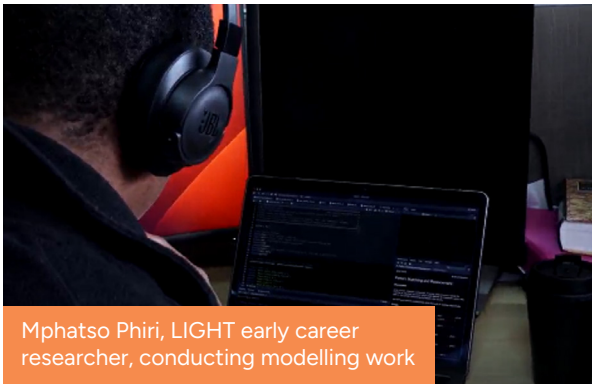
LIGHT LSHTM Partner Lead Katherine Horton explaining the TB modelling approach taken

LIGHT also examined how intersecting social, cultural and structural determinants shape TB inequities and people's experiences of TB prevention and care. As demographic shifts and broader structural forces drive an increasing TB burden in urban settings[14], LIGHT research shows that TB disparities are shaped by factors such as gender and masculine norms that discourage care-seeking, economic pressures, occupational exposure, stigma and health systems that are insufficiently designed to meet men's needs [15,16,17].

Evidence from Malawi suggests that attitudes towards gender-equitable norms among men are associated with TB testing behaviours, highlighting the importance of social and behavioural dimensions in TB care[16].

LIGHT's gender-disaggregated analysis of routine TB programme data in Nigeria showed differences between men and women across the TB care cascade, from health facility attendance and TB screening to presumptive TB identification, testing, diagnosis, treatment initiation and treatment outcomes. Men had a higher screening gap, while women had a higher testing gap, with variations in treatment outcomes across both genders[18].

LIGHT's qualitative study in Nigeria helped further explain these gaps across the cascade by showing that men's barriers to TB care are not simply the result of individual behaviour or lack of awareness. They are shaped by masculine norms and expectations, precarious informal work, economic insecurity, TB-related stigma, inaccessible TB information, inflexible public facility hours, fragmented care pathways, and wider health-system constraints[17]. While masculine norms and health-seeking behaviours are often foregrounded as key drivers of men's disproportionate TB burden, LIGHT evidence shows that health systems and policies are also frequently gender-blind or misaligned with men's working lives and care pathways. As a result, services may fail to engage men effectively, reinforcing observed inequities[17,19]. Understanding TB through a gender and social determinants lens is therefore critical to addressing the underlying drivers of transmission, delayed diagnosis and inequitable outcomes.



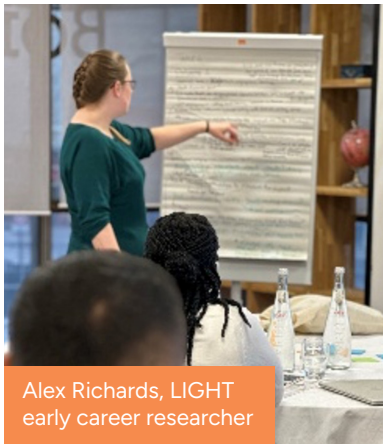
Mphatso Phiri, LIGHT early career researcher, conducting modelling work

These findings underscore that improving access alone is insufficient; interventions must also engage with norms, expectations, and power relations that shape health-seeking behaviour, particularly among men.

MODELLING THE IMPACT OF GENDER-RESPONSIVE STRATEGIES

LIGHT's analysis of TB burden and social mixing patterns showed that the majority of TB transmission to both children and adults is attributable to contact with adult men[20]. This demonstrates that men's disproportionate TB burden has population-wide implications.

LIGHT modelling studies across Kenya, Malawi, Nigeria, and Uganda suggest that gender-responsive strategies, particularly those that improve TB treatment coverage among men and address structural risk factors, could reduce TB incidence by 13 to 35% by 2035[21].



Alex Richards, LIGHT early career researcher

Together, these findings demonstrate that reaching men more effectively can generate wider benefits for women, children and communities by reducing ongoing transmission. The relative contribution of different gender-responsive strategies varies by context, reinforcing the need for country-specific approaches to prioritisation. This strengthens the case for gender-responsive TB responses that are informed by local epidemiology, social determinants and health-system realities.

LIGHT IMPACT

CONCEPTUAL IMPACT

LIGHT contributed to reframing TB as not only a biomedical condition but also a disease shaped by gender norms, social determinants, and health system design. This has strengthened global and national recognition that men are disproportionately affected across the TB care cascade due to structural and behavioural factors, and that gender-responsive, data-driven approaches are essential to improving equity and accelerating progress towards ending TB.

This shift in framing is reflected in global policy discourse, including the inclusion of a featured topic on TB and gender in the WHO Global Tuberculosis Report 2025, which summarises evidence on how gender norms, structural factors, and health system barriers influence TB risk, access to care, and outcomes.

INSTRUMENTAL IMPACT

LIGHT evidence has informed concrete changes in TB policy, guidelines, and programming. In Nigeria, collaboration with the National Tuberculosis, Leprosy and Buruli Ulcer Control Programme supported the redesign of TB data collection tools and the integration of sex-disaggregated indicators across the TB care cascade, improving the ability to identify and address gender gaps[18].

By demonstrating the value of robust analytical and modelling approaches, LIGHT inspired the Kenya National TB Programme to establish a multidisciplinary Modelling and Analytics Coordination Working Group, helping to ensure that programmatic decisions, resource allocation and national strategic planning, including the National TB Strategic Plan 2023/24–2027/28, are anchored in scientific rigour.

At the global level, LIGHT identified gaps in sex-disaggregated reporting of treatment outcomes, contributing to WHO's decision to report TB treatment outcomes separately for men and women in Global TB Reports from 2024 onwards, strengthening global monitoring of gender disparities.

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CAPACITY STRENGTHENING

LIGHT strengthened national and institutional capacity to analyse, interpret, and use gender-disaggregated TB data for decision-making. This included strengthening the capacity of staff within the Kenya National Tuberculosis Programme and partner institutions to redesign data systems, apply analytical approaches to identify inequities, and integrate gender considerations into routine monitoring and evaluation.

LIGHT also contributed to strengthening modelling and analytics capacity within National TB Programmes, enabling more robust use of evidence in strategic planning and prioritisation.

Capacity strengthening of Kenya's National Tuberculosis, Leprosy and Lung Disease Programme staff for understanding TB modelling for enhanced policy discussions

ENDURING CONNECTIVITY (NETWORKS AND PARTNERSHIPS)

Through sustained engagement with national TB programmes, ministries of health, research institutions, WHO, and civil society, LIGHT helped build and reinforce multi-stakeholder networks at national, regional, and global levels. These relationships facilitated the translation of evidence into policy discussions, guideline development, and global reporting processes, and supported ongoing collaboration across research, policy, and implementation communities.

LONG-TERM CULTURAL IMPACT

LIGHT contributed to a broader cultural shift in how TB is understood and addressed, elevating the importance of gender, equity, and social determinants within TB responses. By generating and disseminating evidence on gender disparities and engaging policymakers, practitioners, and communities, the programme helped normalise the inclusion of gender-responsive and person-centred approaches in TB discourse and programming.

This has supported a gradual transition toward more inclusive, data-driven, and equity-focused TB systems, where disaggregated data, community engagement, and gender considerations are increasingly recognised as integral to effective TB prevention and care.

Strengthening Capacity for Understanding Concepts and Research Methods for Enhanced Policy Discussions and Decision-Making

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RECOMMENDATIONS

- **Maximise existing data for equity insights** through secondary analyses of routine and survey datasets
- **Adopt gender-responsive analytical frameworks** that incorporate sex, gender, and socio-economic variables
- **Strengthen data systems and analytical capacity** to support disaggregated and actionable insights
- **Integrate evidence into policy and programme design** to inform resource allocation and service delivery
- **Link research, modelling, and implementation** to generate practical, scalable solutions

CONCLUSION

LIGHT demonstrates how applying a gender-responsive and equity-focused lens to TB research can generate actionable insights across epidemiology, behaviour, and policy. By combining primary and secondary data analysis, participatory approaches, and modelling, the programme has strengthened understanding of how socio-economic and structural determinants shape TB burden and outcomes.

This body of work contributes to a growing evidence base showing that addressing gender disparities is not only a matter of equity but also a strategic imperative for TB prevention and care. Aligning with the WHO End TB Strategy, LIGHT illustrates how data-driven, gender-responsive, and context-specific approaches can support more inclusive, effective, and sustainable TB responses.

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