Gender gaps in tuberculosis disease duration in Kenya, Malawi, Nigeria, and Uganda

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Gender has a substantial impact on risk of exposure to tuberculosis, transmission, and access to and delivery of TB services. Large differences exist between different genders of people with tuberculosis. Of those diagnosed and reported as having tuberculosis, 56% are men.[1] An even higher proportion (72%) of people not yet diagnosed occurs in men.[2] This suggests that there is a greater gap in diagnosing and notifying tuberculosis amongst men than amongst women. This is a problem as the longer someone with tuberculosis remains undiagnosed, the longer their period of illness, the higher impact their household economics their risk of catastrophic costs, and the greater the opportunity for onward transmission.

Prevalence surveys in Kenya (2016), Malawi (2013-14), Nigeria (2012), and Uganda (2014-15) reflect this global data, with men accounting for 67-82% of infectious tuberculosis in each country.[3-6] Prevalence-to-notification ratios, which indicate the size of the gap between developing tuberculosis disease and having that disease detected and reported, are also higher among men than women in each of these countries **(Figure 1).**

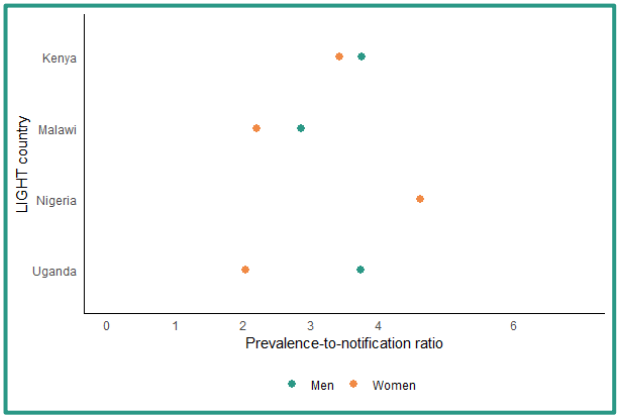

***Figure 1**: Prevalence-to-notification ratios in men and women in Kenya, Malawi, Nigeria, and Uganda*

Objectives

As the LIGHT (**L**eaving no-one beh**I**nd: transforming **G**endered pathways to **H**ealth for **T**B) research programme prepares to evaluate gender-specific approaches to improve access to tuberculosis services in Kenya, Malawi, Nigeria, and Uganda, we first aimed to estimate duration of disease men and women have tuberculosis in these countries.

Partners AFIDEP African Institute for Development Policy · LSTM Liverpool School of Tropical Medicine · London School of Hygiene & Tropical Medicine · mli Makerere University Lung Institute · ReSOK Respiratory Society of Kenya · Zankli Research Center

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Methods

We estimated how long men and women are ill with tuberculosis in Kenya, Malawi, Nigeria, and Uganda using a simple model of disease incidence, treatment, self-cure, and mortality rates **(Figure 2)**, stratified by sex (male and female) for adult (age ≥ 15 years) smear-positive tuberculosis in each country.[7] Following a Bayesian approach, we input estimates of incidence,[8] self-cure,[7] and mortality rates[7] into the model and examined how sex-specific estimates of prevalence[3-6] and treatment numbers (**Table 1**) affected estimates of disease duration for each sex. Treatment numbers were based on case notification rates,[9] estimating smear-positive case notifications for the same year as each prevalence survey and adjusting for under-reporting based on inventory studies, where available.[10,11]

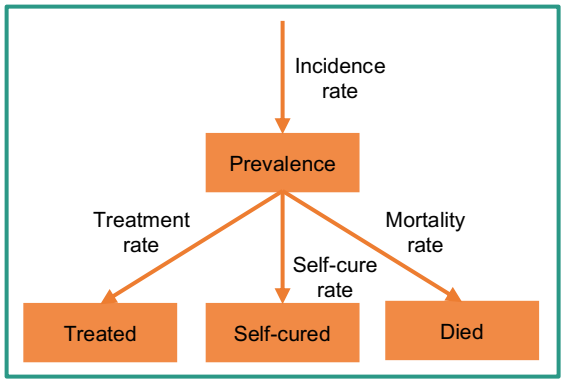

Figure 2: *Model structure showing progression from prevalence to treatment, self-cure, or death*

Table 1*: Empirical data on smear-positive prevalence and estimated case notification rates for men and women in Kenya, Malawi, Nigeria, and Uganda*

Country	Year	Sex	Smear-positive TB prevalence per 100,000	Smear-positive TB treatment numbers per 100,000 *
Kenya	2016	Men	346 (260-431)	138 (126-197)
		Women	138 (79-196)	74 (67-106)
Malawi	2013-14	Men	303 (176-431)	87 (79-96)
		Women	149 (85-213)	59 (53-65)
Nigeria	2012	Men	484 (333-635)	68 (62-136)
		Women	198 (108-289)	43 (39-86)
Uganda	2014-15	Men	314 (216-413)	171 (156-190)
		Women	70 (25-114)	80 (73-89)

** Estimated smear-positive case notification rate adjusted for under-reporting*

References

1. WHO. Global tuberculosis report 2021. **2.** Horton et al. PLoS Medicine 2016. **3.** Ministry of Health. Kenya Tuberculosis Prevalence Survey Final Survey Report. 2016. **4.** Banda et al. Findings from the First Malawi TB Prevalence Survey. 2015. **5.** Ministry of Health. Report: First national TB prevalence survey 2012, Nigeria. 2012. **6.** Ministry of Health. The Uganda National Tuberculosis Prevalence Survey 2014-2015. 2015. **7.** Horton et al. Am J Epidemiol 2018. **8.**

WHO. WHO TB burden estimates. 2020. 9. WHO. Case notifications. 2020. 10. Tollefson et al. IJTLD 2016. 11. Gidado M. Walden University; 2019.

Results

We first considered all disease outcomes, including treatment, self-cure, and death **(Figure 3)**. Among these individuals, tuberculosis disease duration was similar for men and women in Kenya and Malawi. There was some evidence that disease duration was slightly longer for men relative to women, in Nigeria and Uganda.

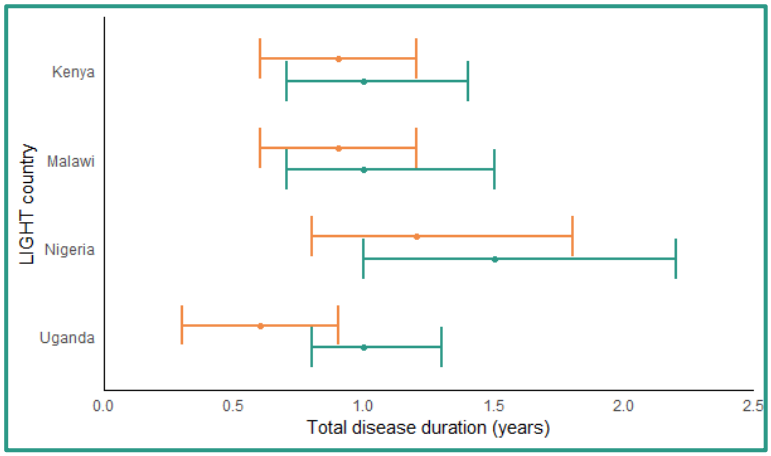

***Figure 3**: Total disease duration for men (green) and women (orange). Median and 95% credible interval, in years.*

We then examined tuberculosis disease duration among individuals who accessed care **(Figure 4)**. Disease duration was much longer than in those who self-cured or died. Median untreated disease duration was 6 months longer in men than women in Kenya, one year longer in Malawi and Uganda, and 1.5 years longer in Nigeria.

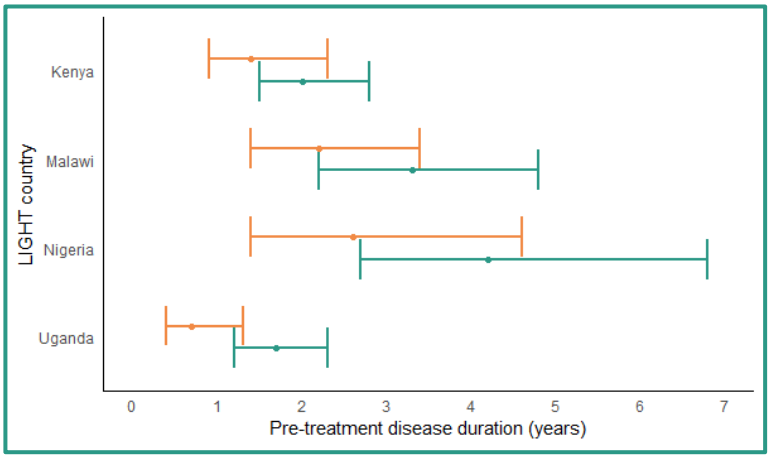

***Figure 4**: Pre-treatment disease duration for men (green) and women (orange) who access care. Median and 95% credible interval, in years.*

Key findings

- ➔ Long periods of illness with tuberculosis, especially in men before they start treatment, suggests there is a need for improved access to tuberculosis testing and treatment services. These improvements should include reaching men to get them onto treatment more quickly to prevent the spread of this disease to others, including to women and children.

- Modelling results likely provide a more accurate indication of gaps in detection and reporting than raw prevalence-to-notification ratios by (1) incorporating competing risks of self-cure and death, and (2) adjusting case notification rates to acknowledge underreporting.

- Understanding of gendered patterns of healthcare utilisation are needed to ensure accurate estimates. The length of tuberculosis disease varied with different assumptions about under-reporting in settings where people with tuberculosis often seek care from private healthcare facilities. This is particularly relevant in Kenya and Nigeria, where inventory studies indicate approximately 20%[1] and 40%[2] underreporting, respectively. Levels of private sector utilisation likely vary by sex, so our results may be biased by the lack of sex-specific underreporting estimates.

- This early look at the data also highlights the opportunities we have to use data that already exist, with approaches such as modelling, to answer new questions about the causes of health outcomes of tuberculosis and gender equity.

Suggested citation

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