

Prevalence of drug-resistant tuberculosis in West Africa higher than previously thought

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This photomicrograph reveals *Mycobacterium tuberculosis* bacteria using acid-fast Ziehl-Neelsen stain; Magnified 1000 X. The acid-fast stains depend on the ability of mycobacteria to retain dye when treated with mineral acid or an acid-alcohol solution such as the Ziehl-Neelsen, or the Kinyoun stains that are carbolfuchsin methods specific for *M. tuberculosis*. Credit: public domain

Multidrug-resistant tuberculosis (TB) could become a serious public health threat in West Africa unless effective surveillance and control measures are implemented, according to a study published in the open

access journal *BMC Medicine*. Researchers from the West-African Network of Excellence for TB, AIDS and Malaria (WANETAM) found the prevalence of multidrug-resistant tuberculosis (MDR-TB) to be unexpectedly high in eight West-African countries.

Professor Martin Antonio, Principal Investigator at the Medical Research Council Unit The Gambia (MRCG), who led WANETAM's TB-related activities, said: "To our surprise, we found that multidrug-resistant and pre-extensively drug-resistant tuberculosis strains are already widely circulating and that [drug resistance](#) is a much bigger problem in West Africa than previously anticipated. WHO estimates the prevalence of [multidrug resistance](#) in new and retreatment cases to be 2% and 17% respectively but we found that it is 6% and 35% respectively."

Professor Antonio added: "We recommend that efforts be put in place for containment of a potential West African TB epidemic at the earliest possible stage. This is especially important as West Africa with its 245 million inhabitants is one of the poorest regions globally, whose fragile health systems can easily be overwhelmed by infectious disease epidemics, as seen in the recent Ebola outbreak."

Analysis of 974 bacterial samples collected from patients with TB revealed that 39% were resistant to at least one first-line drug and 22% were multidrug-resistant. Pre-extensively drug-resistant TB isolates were found to be present at all study sites with Ghana showing the highest proportion, where 35% of MDR samples were pre-extensively drug-resistant.

Multidrug-resistant bacteria are resistant to two or more of the first-line drugs used for the treatment of a disease. Pre-extensively drug-resistant bacteria are on the verge of developing into extensively drug-resistant bacteria, which are resistant to the second-line drugs that are used if first-

line treatment fails. MDR-TB prevalence was highest among patients previously treated for TB in Bamako, Mali (59%) and in Ibadan (39%) and Lagos (66%), Nigeria. Bacteria isolated from these retreatment patients were four times more likely to be resistant to one or more first-line drugs when compared to bacteria isolated from new patients.

Dr Florian Gehre, a postdoctoral researcher and first author of the paper said: "In Lagos, 32% of new TB patients tested positive for the MDR-TB strains. Even when considering a potential sampling bias in the study, it is uncommon for new patients to acquire MDR-TB, except if patients with MDR-TB strains transmit these strains directly to new patients or new patients infect each other."

This study is the first to achieve a comprehensive overview of drug resistance in the region. Professor Antonio said: "Due to poor laboratory infrastructure and inadequate capacity, at the start of WANETAM, data on drug-resistant TB prevalence in West Africa were scarce so prevalence was assumed to be comparably low and not considered a major public health problem. Our data shows that this may not be the case."

In order to take steps to remedy the lack of laboratory infrastructure and to generate comprehensive data on drug resistance prevalence in West Africa, WANETAM - which was founded in 2008 and comprises nine study sites in Burkina Faso, The Gambia, Ghana, Guinea-Bissau, Mali, Nigeria, Senegal and Togo - trained local laboratory staff to perform routine diagnostics, such as standardized smear microscopy and mycobacterial culture.

Professor Souleymane Mboup, head of the Bacteriology Virology Department at the University Hospital Le Dantec, University of Dakar, Senegal and the overall principle investigator for the WANETAM project said: "This is the first time that leading scientists and research

institutes in West Africa joined forces to create a research network that provides research opportunities, fosters collaborations, builds capacity and trains members in basic and advanced laboratory techniques to independently conduct TB drug resistance surveys."

The infrastructure built by WANETAM will help countries in West Africa to respond effectively to emerging public health threats and to conduct trials to address local health needs and inform health policies. Although more data is needed to fully assess the risk of a drug-resistant TB epidemic in West Africa, the results from this study should prompt the implementation of continuous surveillance of all retreatment patients in participating countries, according to the researchers.

Professor Umberto D'Alessandro, MRCG Unit Director, said: "Besides building infrastructures and training local research teams, WANETAM has been able to produce highly relevant and high quality information for the control of TB in West Africa. I hope WANETAM will continue to provide a major contribution to the fight against diseases of public health importance in Africa."

More information: Florian Gehre et al, The emerging threat of pre-extensively drug-resistant tuberculosis in West Africa: preparing for large-scale tuberculosis research and drug resistance surveillance, *BMC Medicine* (2016). [DOI: 10.1186/s12916-016-0704-5](https://doi.org/10.1186/s12916-016-0704-5)

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