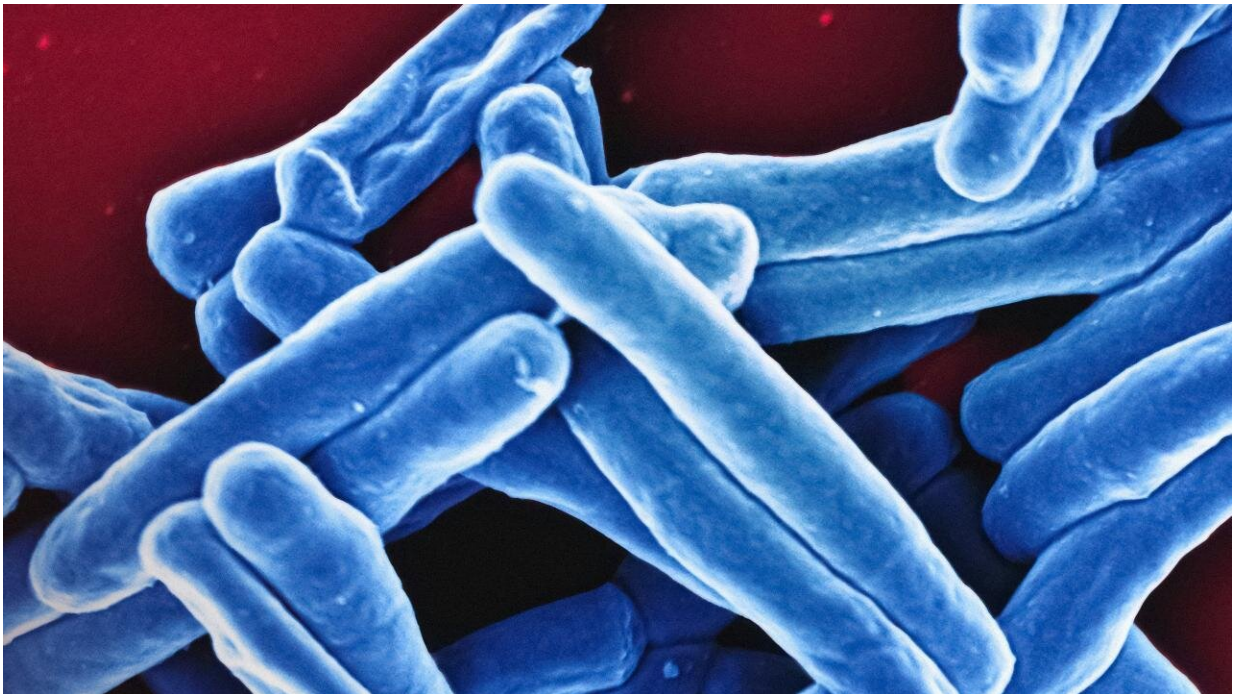


# Study highlights factors associated with higher tuberculosis risk in South Africa

August 2 2024, by Greg Watry

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Scanning electron micrograph of *Mycobacterium tuberculosis* particles (colorized blue), the bacterium which causes TB. Credit: National Institute of Allergy and Infectious Diseases

Tuberculosis is the world's top infectious killer. About 10 million people fall ill with the disease every year, and roughly 1.5 million people die because of it, according to the World Health Organization. Additionally, about one-quarter of the world's population is infected with the disease's

causative agent *Mycobacterium tuberculosis*.

Further, HIV is the largest known risk factor for progression to active TB due to its immense immunosuppressive effect, said Oshiomah Oyageshio, a doctoral student in the UC Davis Department of Anthropology and corresponding author of a new study [published](#) in the journal *PLOS Global Public Health*.

"It increases TB risk by about 20-fold," he said.

Despite this, HIV isn't the only risk factor associated with TB, researchers said.

"Recent national health surveys in South Africa have found that 82% of people with TB do not have HIV," Oyageshio said. "This motivates the understanding of what drives high TB incidence in situations without HIV 'masking' other susceptibility signals."

In the study, Oyageshio and colleagues investigated the epidemiological risk factors, outside of HIV, associated with TB in South Africa's Northern Cape Province. In this understudied area, most people are likely to be exposed to TB by the time they are young adults. It is estimated that 80 to 90% of the population is infected with latent TB, according to the researchers.

The study was conducted in collaboration with Marlo Möller, a professor at Stellenbosch University in South Africa, and Möller's lab.

The researchers found that male gender and, separately, residency in large towns were the strongest risk factors associated with active TB progression, expected findings based on previous TB studies.

They also found that a person's [socioeconomic status](#), their age and

whether or not they moved in their lifetime greatly impacted active TB risk. These findings surprised the researchers.

"We did not expect TB risk to increase at older ages for individuals with higher socioeconomic status, neither did we expect individuals living in urban areas who had migrated to rural areas to be just as protected from active TB as lifetime small-town dwellers," Oyageshio said. "Both trends warrant further study."

According to the researchers, these findings may reflect how pre- and post-Apartheid environments affected [social factors](#) and thus lifetime TB risk.

## **Socioeconomic status and residency**

In their study, the team generated a cohort of 774 individuals with suspected TB from 12 community health clinics in the Northern Cape Province. They then assessed important risk factors by analyzing the cohort with three statistical models.

"The Northern Cape has a complex sociodemographic history, so we wanted to design a set of models that represented that to the best of our ability," Oyageshio said.

"Our first model was informed by common risk factors from previous TB epidemiology studies, serving as a baseline comparison. The residence and socioeconomic models were formulated to include variables relevant to South African populations, involving the change in socioeconomic status over time, and migration between rural and urban areas."

The researchers found that higher socioeconomic status is a protective factor among 18- to 39-year-olds. Among older aged cohorts, the trend

reversed, with those of high socioeconomic status being more at risk for active TB. The finding runs counter to similar research conducted in the United States and Mexico.

"We expect a [positive relationship](#) where the more socioeconomic status you have, the more education you have, the better your well-being and access to health care tends to be," said Justin Myrick, a study co-author and field manager in the Henn Lab for Population Genetics. Brenna Henn is an associate professor in the Department of Anthropology and senior author of the study.

According to the researchers, these trends in the Northern Cape Province may be echoes of the societal and economic shifts that occurred pre- and post-Apartheid.

"You only really see the benefits of higher socioeconomic status in those individuals who were born—or young—right towards the end of Apartheid," Myrick said.

Researchers also found that residency impacted active TB risk. Town-living individuals had higher odds of active TB compared to lifetime rural dwellers and those who moved to rural areas from towns. Those who moved to rural areas from towns had the overall lowest risk of active TB.

The researchers hypothesized that this may be due to vaccinations being more common in [urban areas](#). Those born in towns may have a higher likelihood of being vaccinated at a young age. As they get older and move to more [rural areas](#), their chances of being exposed to the TB bacteria are lower.

**More information:** Oshiomah P. Oyageshio et al, Strong effect of demographic changes on Tuberculosis susceptibility in South Africa,

*PLOS Global Public Health* (2024). [DOI: 10.1371/journal.pgph.0002643](https://doi.org/10.1371/journal.pgph.0002643)

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