

NEWS RELEASE

Addressing undernutrition in children may improve vaccine efficacy, UP-US study finds



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Pretoria - A new [study](#) by researchers at the University of Pretoria (UP), McGill University and the University of California's Berkeley School of Public Health in the US has found that undernutrition may play an important role in measles outbreaks in low- and middle-income countries, even among children who have been fully vaccinated.

In November 2024, the World Health Organisation and the US Centres for Disease Control and Prevention reported that worldwide about 10.3 million cases of measles had occurred in the previous year. According to [Professor Riana Bornman](#) of UP's [School of Health Systems and Public Health](#), and the South African principal investigator on the study, most vaccine assessments are conducted in well-nourished populations with a higher socio-economic status, yet the vaccines are often used in populations where there are high incidences of malnutrition. While under-vaccination is undoubtedly a driver of these outbreaks, the possible role of undernutrition in low- and middle-income countries has not been clear.

This study, which was published in medical journal *Vaccine*, has offered more clarity.

"Our findings emphasise that addressing child undernutrition may improve vaccine efficacy and reduce the burden of vaccine-preventable diseases," Prof Bornman explained. "The findings of this study could also apply to other countries with similar food insecurity and nutrition shortcomings."

“The results show that child undernutrition could have a negative impact on the efficacy of vaccines by compromising the immune system’s ability to mount an effective response to certain types of vaccines,” explained lead author of the paper Prof [Brenda Eskenazi](#), director of the [Centre for Environmental Research and Community Health](#) at the Berkeley School of Public Health.

The study followed 621 fully vaccinated children up to age five, all of whom were part of the [Venda Health Examination of Mothers, Babies and the Environment](#) (VHEMBE) birth cohort in South Africa, an existing research programme. The researchers examined the relationship between undernutrition – as measured by stunting and other growth measures – and the vaccine-specific serum antibody level of three different vaccine types: measles, tetanus and Haemophilus influenzae type (Hib). Children who were stunted or had any indicator of diminished growth at three and a half years old showed a 24.1% or 27.2% lower level of antibodies for measles, respectively, compared to the children with normal growth.

“For certain vaccines, such as the tetanus vaccine, our data suggests that some of the negative impacts of undernutrition may be sex-specific, with girls being less likely to be protected than boys,” Prof Eskenazi said.

“In 2022, about 22.3% or 148 million children under five years of age worldwide were stunted, with the highest burden in Asia and sub-Saharan Africa,” added [Jonathan Chevrier](#), Associate Professor of Epidemiology at McGill University and US principal investigator of the study. “Undernutrition is associated with deficiencies in energy and essential nutrients that may impair the development of an adequate immune response to vaccines.”

Furthermore, even if a sufficient response had initially developed, an undernourished child may not maintain long-term protection.

“It is imperative that we vaccinate children against infectious diseases to prevent unnecessary disease and deaths,” Prof Eskenazi said. “Given our data, which suggests that children who are undernourished may not be protected adequately even when fully vaccinated, we must also address worldwide undernutrition in children. This is especially important with climate change and the future possibility of new infectious diseases.”

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Read the full paper here:

<https://www.sciencedirect.com/science/article/abs/pii/S0264410X24012465?dgcid=author>

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Additional study authors: Stephen Rauch of UC Berkeley; Riana Bornman and Muvhulawa Obida of UP; Basant Elsiwi, Angela Brewer, Brian J Ward and Jonathan Chevrier of McGill University.

Media enquiries can be directed to Mr Sashlin Girraj - Public Relations & Events Manager

Email: sashlin.girraj@up.ac.za | Cell: +27(0)72 447 3784

ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on its Hatfield Campus in Pretoria. This 115-year-old institution is also one of the largest producers of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the [Gordon Institute of Business Science](#) (GIBS). It is the only university in the country with a [Faculty of Veterinary Science](#), which is ranked the best in Africa. UP has 120 academic departments and 92 centres and institutes, accommodating more than 56 000 students and offering about 1 100 study programmes. It has the most academic staff with PhDs (70%), NRF-rated researchers (613).

The 2025 Times Higher Education subject rankings placed UP first in South Africa in the fields of [Accounting](#) and [Finance](#); [Architecture](#); [Electrical and Electronic Engineering](#); Law; Sport Science; and Veterinary Science. UP's Faculty of Law has been ranked as the top law school in Africa for a remarkable eighth consecutive year.

Quacquarelli Symonds (QS) ranked the University among the top five in Africa, as part of their [2024 World University Rankings \(WUR\)](#). UP was the only South African university featured in the [2023 World University Rankings for Innovation \(WURI\)](#), falling within in the 101-200 range of innovative universities.

For more information, please go to www.up.ac.za