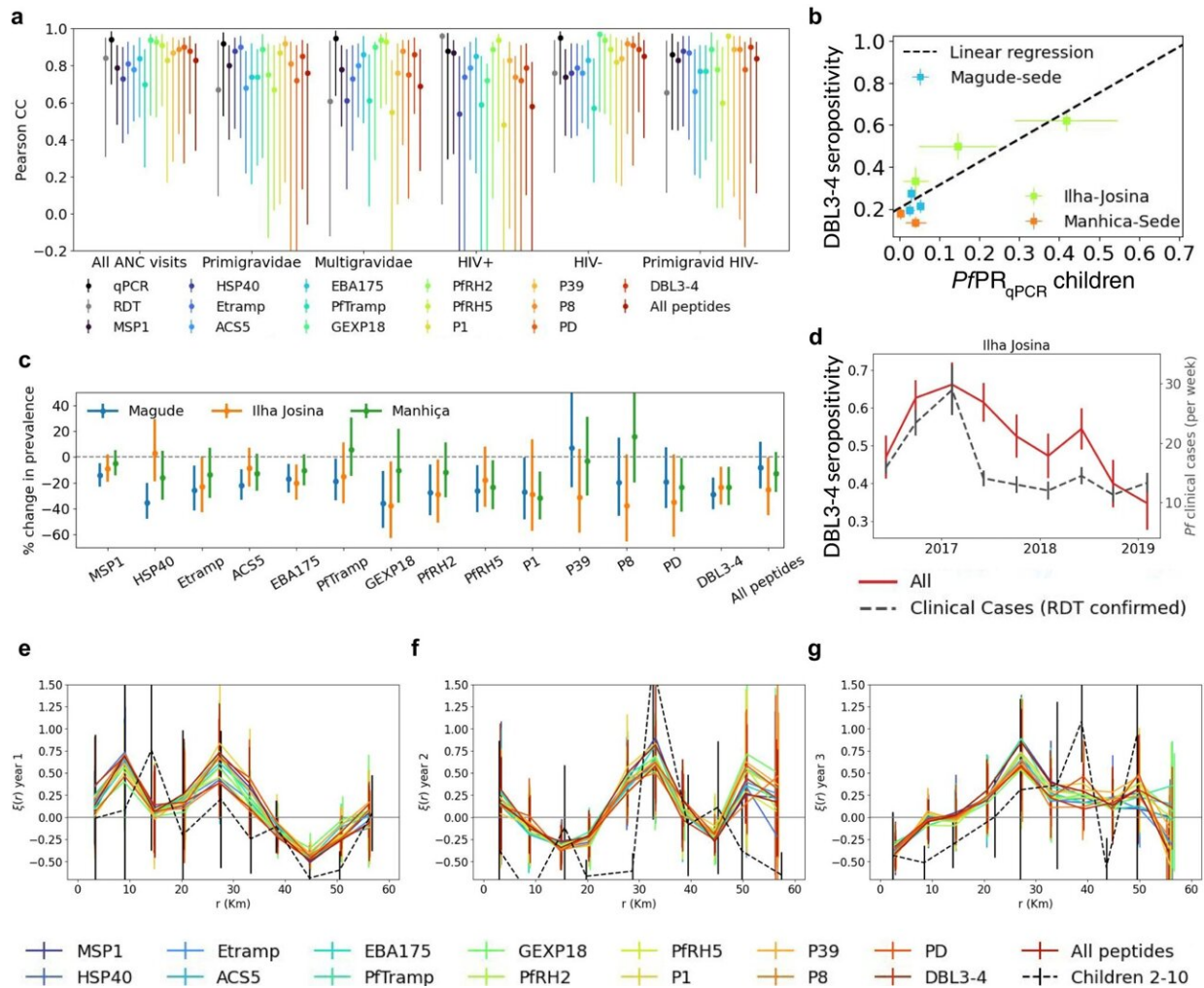


Pregnant women can contribute to malaria surveillance in sub-Saharan Africa

July 7 2023



Comparison of spatial and temporal trends in seropositive women at first antenatal care visit and *Plasmodium falciparum* infection in children. **a** Pearson correlation coefficients between $PfPR_{qPCR}$ in children 2–10 years old ($n = 3933$) from cross-sectional surveys and seroprevalence in pregnant women at first ANC

visits ($n = 5990$). Results are shown for different gravidity and HIV status groups from pregnant women (from left to right), and each color represents a different antigen. Gray and black data points show the Pearson correlation coefficients between children and pregnant women for $PfPR_{RDT}$ and $PfPR_{qPCR}$, respectively. **b** Scatter comparison between $PfPR_{qPCR}$ in children (x-axis) and $VAR2CSA_{DBL3-4}$ seropositivity from all pregnant women at first ANC visit. Black dashed line shows the linear regression. **c** Declines in seroprevalence between year 1 and year 3 for each antigen expressed as percentage of change. P-values were obtained from a Z-test of proportions. **d** Comparison of the temporal trends of $VAR2CSA_{DBL3-4}$ seroprevalence (red line) and weekly number of *Plasmodium falciparum* RDT passively detected cases from children (dashed black line) in Ilha Josina ($n = 8985$). **e–g** 2-point cross-correlation functions between seropositive cases of different antigens (represented by the different colors) (n by year = 1971, 1613, 1,465) using all first ANC visits and qPCR positivity in children 2–10 years old (n by year = 1900, 1565, 468) from cross-sectional surveys for the three years of study (**e–g**). Black dashed lines show the 2-point correlation function of qPCR positivity in children. Data are presented as mean values, with errors representing the 95%CI in **a** and **c**, and the SD in **b**, **d–g**. Credit: *Nature Communications* (2023). DOI: 10.1038/s41467-023-39662-4

P. falciparum infection rates in pregnant women attending their first antenatal care visit can be used to estimate the burden of malaria in children living in the community, according to a study led by the Barcelona Institute of Health (ISGlobal) and the Centre for Health Research in Manhica (CISM). The study, published in *Nature Communications*, confirms that pregnant women are an optimal population to monitor changes in infection prevalence and to adapt control measures.

Close monitoring of malaria trends in a community or region (i.e. whether it is increasing or decreasing) is essential to adjust interventions aimed at controlling or eliminating the disease. However, relying on clinical cases that arrive at health centers is not ideal, as there are many

patients who do not seek care or are asymptomatic. On the other hand, cross-sectional studies (i.e. collecting data from many people at the same time) are expensive and can only be carried out every two to three years.

For Alfredo Mayor, researcher at ISGlobal and CISM, pregnant women attending antenatal care visits are an optimal group to monitor the prevalence of malaria and other infectious diseases. "In sub-Saharan Africa, 79% of pregnant women attend at least one antenatal care visit, which is a good representation of the total population," notes Mayor. "In addition, antenatal visits have the advantage of capturing asymptomatic infections because they are independent of whether the person feels unwell."

In this study, Mayor and his team measured malaria prevalence in 6,471 pregnant women attending antenatal care visits in three areas of southern Mozambique with different levels of transmission (Manhiça, Magude and Ilha Josina) and compared it with the prevalence estimated from clinical cases or from cross-sectional studies in children, in the same areas and over the same time period (2016-2019).

Good temporal and spatial correlation

The analysis shows that [infection rates](#) in pregnant women closely reflect the rates in children from cross-sectional studies, especially when the parasite is detected by [molecular tests](#) (PCR). With [rapid diagnostic tests](#), the correlation holds in low-transmission areas (Manhiça or Magude), but is lost in high-transmission areas (Ilha Josina) when multigravid women (who have had more than one pregnancy) are included. Multigravid women had a lower prevalence than the children in the community.

"This is because the immunity acquired during previous pregnancies allows them to maintain low parasite densities and evade detection by

rapid tests, which are less sensitive than PCR," explains Arnau Pujol, co-first author of the study with Gloria Matambisso.

The results also show a good correlation over time between the declining [infection](#) rates in pregnant women and that of clinical cases, albeit with a lag of about three months (i.e. infection rates in pregnant women followed the same pattern as those in clinical cases, but with a delay of 2-3 months). This correlation was observed in all three sites, regardless of whether the woman was primigravida, multigravida or HIV-positive.

Finally, 60% of the infection hotspots identified with the clinical cases were also found with the [pregnant women](#), thanks to a software that identifies cases that are geographically close.

"Our study shows that screening for *P. falciparum* at the first antenatal care visit can be used to estimate disease burden in children," says Matambisso. However, the authors warn that it is important to consider the delay of about three months compared to clinical cases, as well as the need to exclude multigravid women in high-transmission areas or to use more sensitive tests.

More information: Arnau Pujol et al, Detecting temporal and spatial malaria patterns from first antenatal care visits, *Nature Communications* (2023). [DOI: 10.1038/s41467-023-39662-4](https://doi.org/10.1038/s41467-023-39662-4)

Provided by Barcelona Institute for Global Health

Citation: Pregnant women can contribute to malaria surveillance in sub-Saharan Africa (2023, July 7) retrieved 28 April 2024 from <https://medicalxpress.com/news/2023-07-pregnant-women-contribute-malaria-surveillance.html>

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