

Measuring antibiotic use in children: piecing together the puzzle



In *The Lancet Global Health*, Emily White Johansson and colleagues present new estimates of the trends in reported antibiotic use for sick children under the age of 5 years in 73 low-income and middle-income countries (LMICs).¹ Using data from Demographic and Health Surveys and Multiple Indicator Cluster Surveys, the group identifies an increasing reported antibiotic use between 2005 and 2017 in LMICs overall. The observed increase appears to be driven by low-income countries moving to from a 36·8% (uncertainty interval [UI] 28·8–44·7) reported antibiotic use among sick children under the age of 5 years in 2005 to 43·1% (33·2–50·5) in 2017. Disaggregating the model outputs by WHO regions, estimates for the African region and South-east Asia have the greatest precision since most of the countries regularly participate in Demographic and Health Surveys and Multiple Indicator Cluster Surveys. In both WHO regions, antibiotic use continues to be below the overall LMIC average, despite the increases observed.

Generating reliable estimates of antibiotic use in children remains a major struggle, particularly for LMICs. In general, three main data sources have been used to provide insights into the use of antibiotics in this population: hospital-based assessments, in particular point-prevalence surveys; sales data; and cross-sectional survey data, including the Demographic and Health Surveys and Multiple Indicator Cluster Surveys.^{2–4} Hospital-based assessments have limitations for describing population-level antibiotic use, since most antibiotics are prescribed, obtained, and used outside of major hospitals. Sales data can provide insights into the volume of use, but are difficult to collect and interpret, generally not publicly available, and cannot support inferences about individual exposure.³

Cross-sectional surveys appear to provide the most reliable data on average exposure at the population level. Nevertheless, such surveys are subject to a number of important biases, in particular when relying on data recall of surveyed participants. Recall of antibiotic receipt has been shown to be reasonable in France, with 73% of actually dispensed antibiotics reported as such by surveyed adults when matched to electronic

dispensing records.⁵ However, that study took place in a high-income country with relatively low expected rates of over-the-counter antibiotic dispensing. Even in this setting, only about 40% of participating adults could recall the type of antibiotic obtained. Considering much higher exposure to antibiotics in many LMICs, and also that most caregivers have to report on multiple children and illness episodes, substantial recall biases in Demographic and Health Surveys and Multiple Indicator Cluster Surveys seem likely.

In a prospective birth cohort study that took place in eight LMICs, an average use of 4·9 antibiotic courses per child per year was found.⁶ Wide variation was observed between settings, but with the exception of the Brazilian and South African subcohorts, half of the children had been prescribed at least one antibiotic course by half a year of age. Cumulative exposure in the first 2 years ranged between less than 1 dose in Brazil and South Africa to more than 10 doses per child-year in Bangladesh and Pakistan.⁶ The overall heterogeneity in antibiotic consumption across countries documented in the literature is remarkable^{4,6} and should be kept in mind when interpreting global or regional estimates.

There are ongoing discussions about the best approach towards balancing access to antibiotics and excess use in LMICs.⁷ What is becoming clearer is that more antibiotic use for sick children under the age of 5 years in LMICs is not simply better, but that instead use should be as targeted as possible. Characterising 40% antibiotic use in LMICs as low could therefore be misleading. In many LMIC population surveys such as Demographic and Health Surveys and Multiple Indicator Cluster Surveys, morbidity episodes involving fever, diarrhoea, or cough are reported for one third or more of all children under the age of 5 years over a 2-week recall period.⁴ Based on these estimates, children will have had about 40 illness episodes on average by their fifth birthday, resulting in 16 antibiotic courses if 40% of these episodes are treated with antibiotics. Given that a large share of antibiotic prescriptions has been found unnecessary in a recent LMIC-based study,⁸ 40% antibiotic use is likely much more than what is

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really needed for the treatment of most fever, diarrhoea, and respiratory infections.

So how do we go about evaluating the quality of antibiotic use for young children in LMICs? One approach could be to investigate the relative proportions of antibiotic prescriptions or use based on antibiotic stewardship groups defined by WHO (Access, Watch, Reserve [AWaRe] classification) for the Essential Medicines List.⁹ Although quality of antibiotic use is difficult to assess, monitoring is essential to complement more quantitative measurements. Increasing access to antibiotics, as reported by Johansson and colleagues¹ and others,⁴ could result in excessive and ultimately inequitable use, which excludes children most at need of antibiotic treatment. Strengthening granular, linked-up, and high-quality surveillance of antibiotic consumption by young children through improvement of current tools and through use of innovative methods of data collection will inform approaches to safeguard this limited resource for those who most need it in the future.

We declare no competing interests.

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