

## Commentary Article

### Implications of antibiotic exposure among children in LMICs

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Fink and co-authors are to be congratulated on their analysis of current antibiotic exposures among children under five in low- and middle income countries (LMICs) across a range of common illnesses including coughs, fevers, diarrhoea and malaria (1). The authors believe this is the first study to comprehensively quantify children's cumulative exposure to antibiotics in LMICs using a robust methodology obtaining nationally representative data at the household level as well as from all formal-sector facilities. This is important with previous surveys having only limited coverage in low income settings particularly sub-Saharan African countries with the greatest incidence of infectious diseases globally (2, 3). In addition, there is appreciable self-purchasing of antibiotics in LMICs with issues of affordability and access, which can account for up to 93% of all dispensed antibiotics in some LMICs (4, 5), alongside considerable use of antibiotics in ambulatory versus hospital care (2). Antimicrobial resistance (AMR) is a growing public health problem threatening health and incomes, driven by high inappropriate prescribing and dispensing of antibiotics (1, 6-8). Antibiotic prescribing in children is particularly problematic with typically the highest rates seen in children under five years (1, 2). This is despite many infections such as upper respiratory tract infections (URTIs) including coughs being viral in origin and therefore not requiring an antibiotic, and antibiotics not recommended in children with malaria in the absence of other infections (1, 9, 10). However, pressure from parents enhances prescribing and dispensing of antibiotics for URTIs especially if there are long waiting times and expense to see a physician (11, 12). Antibiotics are also not typically needed for children with diarrhoea unless this is chronic in nature and dysentery is suspected with oral rehydration recommended first line treatment, with published studies suggesting that antibiotics are only typically required in 1 to 7% of cases (1).

In the eight countries surveyed, i.e. Haiti, Kenya, Malawi, Namibia, Nepal, Senegal, Tanzania and Uganda, Fink et al found that 33% of children under five in these countries were reported to have experienced either a cough or fever in the past few weeks, highest in Haiti and lowest in Senegal, reflecting the high rate of infectious diseases in these countries (1). Encouragingly, 45.5% of children were taken to a health facility for treatment with only a fraction (15.5%) taken for treatment outside of a health facility. This is seen to reflect considerable educational and other efforts in previous years to encourage parents to seek professional care for infections as early as possible in order to minimize the risk of severe disease and potential mortality (1). However, this in turn has enhanced the prescribing of unnecessary antibiotics. The average number of prescriptions per visit was 0.67, highest for respiratory infections at 0.856 prescriptions per diagnosis and lowest for children with

malaria at 0.296 (1). Prescription rates were lowest for medical doctors (0.48) and highest for clinical officers (0.71) and nurses (0.70), with amoxicillin and cotrimoxazole accounting for 75% of all antibiotic prescriptions (1). Utilisation and overall exposure rates are likely to be higher when actual self-purchasing rates for antibiotics in both formal and informal sectors are taken into consideration (1, 4, 5). This is a concern suggesting that current antibiotic exposure among children in LMICs is extremely high, which needs to be urgently addressed to reduce future AMR rates.

Potential strategies to address this mentioned by Fink et al and others include ensuring up-to-date guidelines are readily accessible in primary healthcare centres as this can be an issue along with potentially electronic clinical decision support tools and other educational interventions, enhancing the use of point-of-care diagnostic testing when this becomes affordable in routine care in LMICs, educational initiatives among pharmacists where this is a concern along with greater enforcement of regulations to limit self-purchasing. In addition, behavioural and communication programmes among parents as they can appreciably enhance prescribing and dispensing of antibiotics (1, 5, 9, 11, 13). Typically multiple initiatives have greater success than single initiatives (5). Among ambulatory care centres, a combination of prescribing metrics based on the AWARe group of antibiotics could improve their appropriate use along with stewardship programmes (2). Published studies involving the co-authors have demonstrated that adherence to guidelines is a better marker of the quality of antibiotic prescribing than measuring consumption figures in isolation (3, 14).

In conclusion, Fink et al have provided robust data demonstrating high levels of antibiotic utilization in the under fives in LMICs. This needs to be urgently addressed to reduce current levels of AMR and should be part of country's national action plans to reduce AMR rates.

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