

OPINION EDITORIAL

Tackling Antimicrobial Resistance in Low-Resource Settings: The Global Development Crisis

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THE PROBLEM

With 700,000 annual deaths due to resistant infections today and 10 million lives at risk every year by 2050 [1], antimicrobial resistance (AMR) represents a tremendous global health challenge. Current alarming levels of AMR threaten developments of modern medicine by impeding the use of vital surgical procedures, substantially reducing the successful treatment of infections and diseases, and hindering the development of new medications [2]. Without considerable policy changes, the ever-increasing global antibiotic consumption, which is considered a primary factor boosting AMR, is only expected to continue [3]. Given the serious clinical and socio-economic implications of failing to curb AMR, it is crucial to recognize that these consequences are already affecting and will be more severe in low and middle-income countries (LMICs) (e.g., as demonstrated by numbers of deaths due to AMR (Figure 1) or deepening poverty rates) [4]. The aim of this paper is to outline the main reasons behind the problem of elevated AMR levels in LMICs and their outcomes. Therefore, an integrative literature review was employed to include available evidence of diverse methodologies, including scholarly (i.e., literature reviews, original research articles) and non-scholarly literature (i.e., reports, opinions, correspondence). Relevant sources were identified by searches from PubMed (with the following searched terms used in combination: “antimicrobial resistance”, “antibiotic resistance”, “developing countries”, “low income countries”, “middle income countries”), references from other articles of relevance, as well as based on previous research

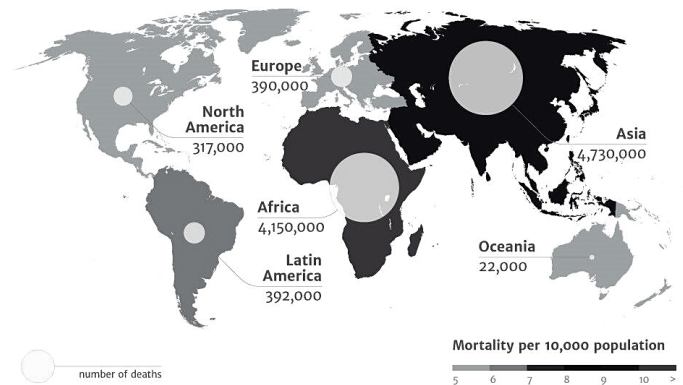


Figure 1. Deaths due to AMR every year by 2050 [5].

work of the author (particularly country-specific examples).

DRIVERS OF AMR IN LMICS

From the perspective of global disease incidence, the majority of both human and animal diseases in developing countries are of bacterial etiology, in which growing AMR poses the biggest issue [6]. In addition, the development of resistance to antimalarial drugs and HIV further aggravates the fight against these major health issues faced by nations in LMICs [7]. Considering systemic challenges, while the burden of AMR is difficult to assess, the lack of appropriate national surveillance mechanisms in many low-resource countries render them incapable of measuring its impacts, as well as establishing quantitative and qualitative targets and indicators to tackle it [8]. The use of antimicrobials, the single most important contributor to AMR, is growing rapidly in those countries and increased by 77% between 2000 and

2015 (compared with a modest decrease in high-income countries [HICs]) [3]. At the same time, antibiotic consumption of drugs that should constitute second-choice treatment (as characterized by higher resistance potential) reaches alarmingly high levels in countries, such as Pakistan or India [9-11]. Misuse of antimicrobials in developing countries is often the result of poor market regulations, that for instance allows high sales of fixed-dose combination products in South Asia [11] and substandard and falsified antimicrobials in sub-Saharan Africa [12]. Similar mechanisms apply with regard to the wide availability of antibiotics over the counter, as in the case of the Philippines [13], Syria [14], Egypt [15], Gambia, and Nigeria [16].

Economic constraints are also partly responsible, increasing the likelihood people will seek health care in informal settings and/or self-medicate [17]. On a bigger scale, limited spending on health at a national level typically fails to ensure sufficient coverage of preventive health interventions (e.g., diagnostics, sanitation, vaccinations) that contribute to AMR reduction [18]. Challenges related to limited resources also affect prescription practices. In low resource settings, there may be both low numbers of health professionals per population, and a lack of access to evidence-based information. Healthcare providers in these settings increasingly resort to administering broad-spectrum antibiotics, often without a definitive indication [19]. Antimicrobial use in food animals further contributes to the problem. Antibiotic consumption in animals is projected to increase as meat production, driven by increasing incomes, grows in Africa and Asia [20], and is expected to double in BRIC countries (Brazil, Russia, India, and China) in the next 10-year perspective [21]. At the same time, trends in AMR in animals are not well documented [22] and could be further aggravated by poorer regulations concerning veterinary drugs, lower biosecurity, and poorer-quality feed experienced more commonly in low-resource settings [23]. Another factor hindering the fight against AMR in those countries is the problem of pharmaceutical pollution. The production of most of the world's antibiotics takes place in China and India, where less restrictive environmental

regulations allow for the discharge of antibiotic waste into local waters [24]. Such practices, which have been well documented [25-29], have disastrous consequences for the communities with regard to their health status, depletion of natural resources through severe contamination of the environment, and loss of assets including fish stocks or water-intensive agricultural activities [29]. The recently published evaluation on the progress regarding the recommendations of the 2016 Review on Antimicrobial Resistance [30] further states that progress towards curbing AMR in LMICs countries has been unsatisfactory despite numerous initiatives. This is of particular relevance when it comes to reducing antibiotic use in agriculture, and calls for facilitating effective awareness-raising efforts that would result in real behavioural change, and reduction of antibiotic misuse.

CONCLUSIONS

In light of the above discussion, AMR represents one of the greatest public health challenges of our time, especially in LMICs. However, due to its complex character, it cannot be tackled in isolation from other HICs and the global economy. A collaborative, multi-sectoral, and international approach throughout the supply chain is needed as LMICs require substantial financial and technical assistance in addressing the issue. Reducing the threat of AMR demands the attention of the international community as it impacts the fulfillment of the global sustainable development agenda (from halting good health, to preventing sustainable food production, and increasing social inequalities). As such, addressing the AMR crisis requires reinforcing commitments towards some of the long-existing health and development problems, such as access to water, sanitation, and hygiene, as well as universal health care to reduce the need for antibiotics in the first place and ensure their quality, affordability, and appropriate use when needed. Failing to address this issue means failing to protect basic human rights.

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