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Letter to the Editor

Nonbiomedical factors affecting antibiotic use in the community: authors' response

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To the editor,

We appreciate the positive comments received [1] and the two resources provided to complement our current review [2]. Over the past 20 years, we have conducted a series of investigations providing a comprehensive sociocultural perspective for understanding regional disparities of antibiotic use. In our response to the comments, we expand our discussions on regional differences and sociocultural determinants of antibiotic use, as well as possible intervention strategies. In 2002, the emerging infectious diseases study by Harbarth et al. on outpatient antibiotic use in France and Germany compared the cultural patterns of antibiotic demand and prescription in these two countries [3]. They observed higher expectations for antibiotics from French patients with upper respiratory infection symptoms (e.g. cough and sputum production), pressuring physicians to prescribe antibiotics. On the contrary, German culture preferred promoting the human body's natural defence against such diseases by employing complementary medicine approaches; thus, antibiotics were consumed less.

In 2008, Harbarth and Monnet again summarized the sociocultural determinants on antibiotic use in Chapter 3 of *Antibiotic policies: Fighting resistance* [4]. Similarly, our 2020 BMJ *Global Health* systematic review on factors influencing antibiotic use in both outpatient and clinical settings adopted behavioural theories in identifying sociocultural determinants around antibiotic use in China [5]. We found that many Chinese patients had the misunderstanding that antibiotics were anti-inflammatory drugs, a misconception rooted in folk knowledge. The prevailing logic that common upper respiratory infection symptoms were caused by inflammation and thus anti-inflammatory drugs should be administered for treatment drove Chinese patients to consume antibiotics unnecessarily. In addition, health care consumers' preference for intravenous antibiotic administration further contributed to outpatient antibiotic misuse in China.

We echoed the opinion of Touboul-Lundgren et al. that culture is 'all around us' and could exert influences on antibiotic use [6]. Hofstede's cultural dimensions were commonly applied in their study to measure cultural disparities, of which power distance, uncertainty avoidance, and masculinity versus femininity were associated with antibiotic consumption. Other cultural determinants included patients' work ethos (e.g. whether to continue working when stricken by illnesses), drug perception (e.g. fear of toxicity, taking antibiotics to speed up recovery), and practitioners' practice context (e.g. perceiving patients' expectations, patient education strategies). Factors such as day-care attendance and practices, living conditions, vaccination coverage, and social pressure could influence antibiotic use. In summary, the evidence base demonstrates that antibiotic use is not merely a medical issue, but a topic that also calls for solutions from sociocultural aspects [7].

To address the gap, Dr Lin led an implementation science systematic review in 2020, identifying 25 public target intervention studies with behavioural change techniques aiming to reduce unnecessary antibiotic use [8]. Most conducted campaigns for public education and were in high-income settings. However, intervention assessments revealed that conveying knowledge to the public did not change people's attitudes and behaviours. Globally, similar education materials were used in different contexts, but many lacked culturally sensitive and theoretically grounded adaptations [9]. Dr Lin also identified the research gap that public target interventions were absent in low-to-middle-income settings [8]. According to our data (unpublished), most interventions that aimed

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to reduce inappropriate antibiotic use in China were implemented in primary care settings to reduce inappropriate antibiotic prescribing, largely ignoring demand-side factors, and sociocultural determinants were scarcely embedded in the intervention designs. Therefore, we very much agree with the correspondents that few interventions tailored the interventions to specific settings and individuals. Campaigns should convey information targeting multiple components, such as incorporating a theory-grounded framework in our recent publication (Health Belief Model and Socio-ecological Model) [2].

There is a need to share pilot and formative findings of intervention development in advancing implementation science to more effectively address regional differences and sociocultural determinants of antibiotic (mis)use. For example, a cost-effective point-of-care C-reactive protein testing intervention conducted in Myanmar and Thailand [10] could be consulted in regions with limited resources, including some regions in Western China where health care providers routinely prescribe antibiotics out of fear for severe complications when C-reactive protein and other diagnostic testing was unavailable [5].

In conclusion, grounded in work of the past 20 years, our recent publication [2] has again highlighted the critical challenge of reducing antibiotic use and combating antimicrobial resistance from multiple nonclinical aspects. We demonstrated the necessity to incorporate sociocultural perspectives, as well as evidence-based and theory-grounded framework for effective and appropriate interventions for prudent antibiotic use.

Transparency declaration

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