Transdisciplinary work against antimicrobial resistance

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In 2015, WHO issued a Global Action Plan emphasising One Health as an essential approach to tackle antimicrobial resistance (AMR).[1] One Health aims to bridge human, animal, and environmental sectors to address shared health concerns.[2] One of the gaps in knowledge articulated by the Global Action Plan is scant understanding of social science and behaviour. In that context, One Health offers a potential for transdisciplinary collaborations, including between social and biomedical disciplines. WHO states that the role of social sciences in the One Health approach to AMR is dedicated to support effective antimicrobial stewardship programmes in human and animal health and agriculture. Although this role is essential for the success of AMR control programmes, it limits the potential of social science studies to support such programmes rather than to co-develop them based on both biomedical and social knowledge.

Also in 2015, Smith[4] wrote that AMR is a social problem; social science research has to be taken seriously in addressing the issue of AMR. Cultures of prescription, sale, and use of antibiotics in human and animal sectors, and practices of antibiotic production and waste management, are essential for understanding drivers of emergence and dissemination of multidrug-resistant bacteria.[5–7] Study findings substantiate the claim that AMR is not only a biological problem but also a social problem. Research by Collignon and colleagues[8] shows that social and economic inequalities, poverty, and public health expenditures are major factors driving the global level of AMR.

If AMR can be considered a biosocial issue, solutions should neither lie exclusively within the biomedical disciplines nor fall into the social disciplines, but should reside on their intersections. In principle, the One Health approach offers an opportunity to develop a transdisciplinary and trans-sectoral agenda for AMR. However, findings of a study[3] suggest that the One Health governing framework has an anthropocentric focus, positioning animal and agricultural sectors under the dominance of human health governing organisations. Moreover, at the moment there are not enough conceptual, physical, and financial infrastructures to undertake transdisciplinary and trans-sectoral work. To create possibilities for transdisciplinary research, combining sociological and anthropological studies with microbiological research, funding needs to be organised; moreover, opportunities are needed to publish the results of transdisciplinary research, which combines very different types of data. It is important to think about concepts and approaches that go beyond One Health in capturing the multiple biosocial complexity of AMR, without prioritising one discipline over the other. Without a research infrastructure to build and sustain transdisciplinary collaborations, we are locked in disciplinary paradigms and will not understand AMR as a biosocial issue.

We declare no competing interests.

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Epidemic preparedness in urban settings: new challenges and opportunities

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In recent decades, many emerging infectious diseases have been occurring at an increasing scale and frequency—i.e. Ebola virus disease, severe acute respiratory syndrome (SARS), avian and pandemic influenza, Middle-East respiratory syndrome (MERS), and the recently emerged coronavirus disease 2019 (COVID-19). The outbreaks of these diseases resulted in wide ranging socioeconomic consequences, including loss of lives and disruption to trade and travel. Preparedness is a crucial investment because its cost is small compared with the unmitigated impact of a health emergency. The financing gap for preparedness, estimated at US$4·5 billion per year, is miniscule compared with estimated pandemic costs of $570 billion per year.[1,2]

Within urban settings, preparedness activities have the added challenge of navigating a host of disruptive determinants that demand innovative solutions, especially the way in which diseases and their human hosts behave.[3] Ensuring that urban settings are prepared for emerging infectious diseases is crucially important. In 2018, 55% of the world's population (4·2 billion people) resided in urban areas, and this proportion might increase to 68% by 2050.[4] Emerging infectious diseases also either originate in urban settings, such

	Challenges	Opportunities
High population density and high volume of public transportation	A larger population to be managed; ease of disease spread between humans in congested areas; difficulties in contact tracing, especially causal contact in public areas; inequalities resulting in poor housing environments that might hinder outbreak prevention and control efforts; closer encounters with wildlife via food markets or because of expansion into previously untouched ecosystems	Urban planners can consider epidemic preparedness in their designs and implementation; transport networks can be used to rapidly move supplies to outbreak epicentres; harnessing advancement in technologies for more effective contact tracing
Interface between animals and humans	Areas of poor sanitation with rodents and other animal vectors; live domestic and wild animal markets; animals raised in backyard farms or industrial agricultural facilities in close proximity to humans	Improved sanitation and rodent control around humans and animal communities; vaccination of domestic animals for common zoonotic infections; precautions at slaughter to prevent contact with blood; regulating live animal markets to phase out sale of live animals or to ensure that those for sale are raised on commercial farms and have been verified to be disease free
Governance by local authorities	Competing interests within a finite local budget; insufficient authority to institute response measures promptly; insufficient epidemic preparedness capabilities or capacities at a subnational and local level; difficulties in accessing national capacities	Leaders in cities would be better placed to develop and implement effective and contextually appropriate solutions; consolidated local surveillance data can improve sense-making at the national level; local leaders can be engaged to advocate for greater investments in local systems
Heterogeneous subpopulations	A wide range of cultural factors, including modes of social interactions and acceptable control measures; some subpopulations might be difficult to reach	Community leaders can be mobilised for targeted approaches to preparedness and response; innovative solutions can be shared and adapted across cultures
High connectivity to other urban centres (domestic and international)	High likelihood of multiple importation events; risk of rapid export of disease to other parts of the country or to other countries; fear might lead to restrictions on travel and trade	Evidence-based points of entry measures and exit screening measures can be implemented; trust can be built through strong diplomatic relations to allow for better collaboration
Centres of commerce	Greater disruption to economic activity, stability, and growth	Businesses and corporations can be engaged in business continuity plans that also prevent further spread, as part of a whole-of-society approach
Unconventional communications and interactions	Multiple information sources leading to misinformation; false information might spread quickly	Unconventional but reliable information channels and social media can be used for risk communication

Table: **Challenges, and opportunities for epidemic preparedness associated with characteristics of urban settings**