

An inclusive approach to refugee and migrant health that leaves no one behind during the COVID-19 pandemic should guide our public health efforts. As governments tighten border controls and implement other measures in response to COVID-19, they need to consider the impacts on refugees and migrants and ensure that such actions do not prevent people from accessing safety, health-care services, and information.

There must be no forced returns and refoulement justified by or based on fears or suspicion of COVID-19 transmission, especially because there is estimated to be low risk of transmitting communicable disease from refugee and migrant populations to host populations in the WHO European region.⁴ Yet migrants and refugees are often stigmatised and unjustly discriminated against for spreading disease and such unacceptable attitudes further risk wider public health outcomes, including for host populations, since refugees and migrants could be fearful to seek treatment or disclose symptoms.⁶

Refugees and migrants must be included in national public health systems, with no risk of financial or legal consequences for them. This approach is of the utmost

importance, as there can be no public health without refugee and migrant health.

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French research strategy to tackle antimicrobial resistance



In response to the global challenge of antimicrobial resistance (AMR), many countries have launched priority initiatives. The UK established a national action plan against AMR in 2000, followed by the USA and Germany in 2015.¹⁻³ A crucial development in these initiatives, as well as AMR strategies in most Nordic and some southern EU countries such as Spain,⁴ is a focus on a One Health perspective that includes priorities such as developing prevention strategies, breaking transmission chains, enhancing surveillance, improving treatment and diagnostics, and raising awareness nationally and internationally. The UK and the USA AMR plans also share a strong focus on developing stewardship strategies and improving international collaboration and capacities. The Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria has issued recommendations for the next US plan for 2020 to 2025 to incorporate surveillance systems as a broader One Health AMR surveillance system,

develop an integrated federal One Health research strategy, and develop a national, interagency effort to address global AMR.⁵ Importantly, the UK plan places a focus on reducing the burden of infection, improving supply of and access to antimicrobials, and reducing unintentional exposure to antimicrobials,³ and sets out the first steps towards its broader 20-year vision to contain and control AMR by 2040.⁶ All these initiatives refer to WHO's 2015 global action plan on AMR⁷ that stimulated the deployment of national research strategies to combat AMR.

In France action is needed because the burden of AMR infections in people is one of the highest in EU countries. AMR infections in France accounted for about 221 disability-adjusted life-years per 100 000 population in 2015⁸ and antibiotic use in outpatient settings in France was ranked the fourth highest in Europe in 2018,⁹ despite having national strategic plans for human health in place for almost 20 years.¹⁰ The Ecoantibio

national action plans in the veterinary sector¹¹ have reduced overall animal exposure to antibiotics in France by 48% between 2007 and 2017. The 2016 One Health interministerial roadmap¹² prompted the French Government to dedicate one of its strategic research instruments, Programme Prioritaire de Recherche (PPR), to tackle AMR. This national research agenda is supported by five key areas of expertise: molecular and cellular mechanisms; genome and genetics; bacterial strains including resistant strains recommended for study by WHO; care management in all settings; and research on pharmacokinetics and treatment. The French national AMR PPR began in 2019, under the coordination of Inserm, the French National Institute for Health and Medical Research, supported by the French Government, and aims to bring together the strengths of all relevant public research forces to reduce AMR over 10 years.¹³

A major feature of the PPR is the call for inclusive strategies that integrate humans, animals, and the environment.¹⁴ Indeed, the exchange of antibiotic-resistant bacteria and genes across ecosystems is fuelling the spread of AMR. In response, the French research plan combines One Health principles with digital technology, data mining, and artificial intelligence. The four main interconnected aims of the AMR PPR are shown in the panel.

To pool skills, expertise, and research methods, new platforms and networks are being established and expected to be in place by 2022, preparing the ground for activities designed to integrate disciplines into a cross-sectorial approach. This approach will include a microbiology and multiomics database platform to facilitate the interconnection and exploitation of

epidemiological data; the development of software and tools to integrate AMR databases into France's existing Health Data Hub and eventually link up with environmental databases; a professional network, including medical, veterinary, and environmental specialists, to connect major national players to foster collaboration; and an observational social sciences network for the analysis of socioeconomic contexts, practices, and behaviours. In parallel, workforce capacity will be reinforced by new dual-disciplinary junior-senior national professorships across any public institution.

No single country has the capacity to control the AMR crisis alone. The challenge of AMR is even greater in low-income and middle-income countries (LMICs) with an inverse relationship reported between national income and prevalence of drug-resistant infections.¹⁵ These complex and multifaceted challenges require a holistic and multisectoral response. In agreement with the French Government, Inserm has, since 2019, committed to coordinate an international research network in partnership with national scientists to structure responses and consolidate local research expertise. The aim is to develop prevention and control strategies that are tailored to the local situation in LMICs, in line with national strategic AMR plans.

Research shortfalls and political priorities for France have also been identified. Like in the UK, a particular emphasis is placed on social sciences to identify underlying drivers for antibiotic misuse, raise awareness of AMR, and encourage behavioural change by health-care workers, patients, veterinarians, farmers, and the general population. This approach is to be complemented with antibiotic stewardship and infection prevention and control measures. In accord with the French national plan on artificial intelligence,¹⁶ digital capacities and artificial intelligence are integral components of the French AMR plan. In parallel, research collaboration is being established within the European Joint Programming Initiative on AMR and the European Innovative Medicines Initiative, notably through its accelerator programme. Moreover, public education is being supported through collaborations with the EU Joint Action Against Antimicrobial Resistance and Healthcare-Associated Infections, in which France is well invested as a coordinator.

Alongside this French investment into AMR research to identify solutions to a worldwide public health

Panel: The four main aims of the French AMR research strategy

- 1 Mapping the biodiversity of AMR, transmission routes, and escape mechanisms
- 2 Understanding the sociocultural context of AMR and developing effective infection prevention and control and antibiotic stewardship strategies
- 3 Optimising AMR therapeutic and preventive strategies
- 4 Developing new therapeutic strategies that target the resistance gene reservoir and reinforce the host's immune response

AMR=antibiotic resistance.

problem, it will be crucial to raise additional funds to improve research, strengthen infrastructures, and build synergies with the private sector to fuel innovation. Furthermore, it will be essential to increase bilateral collaborations—eg, through the French–German AMR research calls supported by both governments—and foster international cooperation to address the AMR crisis from a global perspective.

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