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A strength of the study was its sample size because it was very large and therefore several analyses involving multiple endpoints and subgroups could be done. The natural setting of the trial in a national programme and the application of scalable procedures in the collection of mosquitoes were also strengths because the procedures can be easily replicated elsewhere.

It is difficult to read the results of this trial and not compare them with those of a trial done in Tanzania.<sup>4</sup> The results are similar in many ways, but the designs differ because the Tanzania trial was factorial and the LLINEUP trial was a parallel-group study. A factorial design would have provided additional evidence on the effectiveness of the combination of indoor residual spraying and the PBO LLINs. Although the Tanzanian trial<sup>4</sup> suggests that indoor residual spraying washes out the LLIN effect, more evidence would be beneficial.

Although this study presents compelling evidence for switching to PBO LLINs, some limitations in the conduct of the study and the interpretation of the results should not be ignored. First, it took almost 1 year to distribute the LLINs, which resulted in the study overlapping different malaria seasons. This overlap is a flaw because the evaluation period for LLIN efficacy was not uniform for the two groups and study regions, which could have introduced potential measurement bias.

This delay serves as a lesson to agencies responsible for LLIN distribution to make adequate planning for timely distribution. Second, although the study was not designed to compare the different brands of PBO LLINs used (PermaNet and Olyset), the differences in their performance cannot be ignored.

It is hard to explain why Olyset net and Olyset Plus showed no difference in malaria parasite prevalence at

6 months, although differences emerge at subsequent timepoints. Also, the trial raises concerns regarding the durability of the PBO concentration in LLINs long term. After 12 months of use, most LLINs had lower PBO concentrations than the manufacturers' declared minimum insecticide concentration. Of even more concern is the potential difference in the rate of decay of insecticide concentration by brand of LLIN. Standard manufacturing practices should ensure such differences are eliminated. These observations should serve as lessons for future programme implementation.

The trial has important policy implications at the highest level. There is now compelling evidence that it is time to rethink and repackage insecticides and retain the relevance of the most important tool available for malaria control. LLINEUP galvanises existing evidence to include PBO in LLINs and strengthens the WHO recommendation to increase the coverage of LLINs with PBO in areas of high resistance to pyrethroids.

I declare no competing interests.

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## Refugee and migrant health in the COVID-19 response

In a continued effort to curb the spread of coronavirus disease 2019 (COVID-19), countries have been tightening borders and putting travel restrictions in place. These actions have affected refugees and migrants worldwide. The International Organization for Migration and UNHCR announced on March 10, 2020, that resettlement travel for refugees

will be temporarily suspended, although the agencies have appealed to states to ensure emergency cases are exempted.<sup>1</sup> The COVID-19 pandemic has prompted some countries to take steps towards further reducing population movement that affects humanitarian corridors around the world. At the same time, there could be cases of refoulement with asylum seekers



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being returned to their countries of origin, where they are at risk of persecution and in an apparent breach of international law. As of March 29, 2020, WHO reported 146 countries and territories with cases of COVID-19 from local transmission of severe acute respiratory syndrome coronavirus 2, many of which have large refugee populations.<sup>2</sup>

Search and rescue operations in the central Mediterranean, where more than 16 000 migrants have died since 2015,<sup>3</sup> have been suspended due to logistical difficulties caused by COVID-19. The few search and rescue operations conducted before the COVID-19 nationwide lockdowns led to the immediate quarantine of migrants in reception centres. These measures were taken even though there was no confirmed case of COVID-19 in Africa at that time. In fact, some refugees and migrants are travelling from countries not yet substantially affected by COVID-19 and entering countries with increasing numbers of COVID-19 cases.

Measures to respond to the COVID-19 pandemic are a focus of communities in countries, but preparedness plans should consider refugees and migrants and their needs. Evidence shows that this vulnerable population has a low risk of transmitting communicable diseases to host populations in general.<sup>4</sup> However, refugees and migrants are potentially at increased risk of contracting diseases, including COVID-19, because they typically live in overcrowded conditions without access to basic sanitation. The ability to access health-care services in humanitarian settings is usually compromised and exacerbated by shortages of medicines and lack of

health-care facilities. Moreover, refugees typically face administrative, financial, legal, and language barriers to access the health system.<sup>4</sup>

Conditions in refugee camps are concerning. Many people who have been affected by humanitarian crises live in camps or camp-like settings in host countries. These camps usually provide inadequate and overcrowded living arrangements that present a severe health risk to inhabitants and host populations. The absence of basic amenities, such as clean running water and soap, insufficient medical personnel presence, and poor access to adequate health information are major problems in these settings.

Basic public health measures, such as social distancing, proper hand hygiene, and self-isolation are thus not possible or extremely difficult to implement in refugee camps. If no immediate measures to improve conditions are put in place, the concern about an outbreak of COVID-19 in the camps cannot be overstated. Site-specific epidemiological risk assessments must be done to determine the extent of the risk of COVID-19 introduction and transmission in such settlements, together with case management protocols and rapid deployment of outbreak response teams if needed.

Migrants and refugees are particularly vulnerable to the impact of COVID-19 in the wider community. They are over-represented among the homeless population in most member states—a growing trend in EU-15 and border and transit countries.<sup>5</sup> Living conditions for homeless refugees and migrants can undermine the ability to follow public health advice, including basic hygiene measures, quarantine, or self-isolation, because many people are in close contact and gather in large groups. Furthermore, international migrant workers and refugees can be affected by income loss, health-care insecurity, and the ramifications that come with postponement of decisions on their legal status or reduction of employment, legal, and administrative services. There is also scarce culturally and linguistically accessible information about COVID-19 and how to protect oneself and others, which further increases risks to refugees and migrants as well as host populations.

Additionally, states of emergency and lockdowns to deal with the pandemic have affected refugee and migrant volunteer community service provision for this population group.

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.<sup>4</sup> 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.<sup>6</sup>

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.

HHPK is Regional Director of the WHO Regional Office for Europe. ZJ is Deputy Director-General of WHO. SS is Special Advisor on Health and Migration and Acting Director of the Division of Health Systems and Public Health at the WHO Regional Office for Europe. We declare no other competing interests.

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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.<sup>1-3</sup> A crucial development in these initiatives, as well as AMR strategies in most Nordic and some southern EU countries such as Spain,<sup>4</sup> 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.<sup>5</sup> 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,<sup>3</sup> and sets out the first steps towards its broader 20-year vision to contain and control AMR by 2040.<sup>6</sup> All these initiatives refer to WHO's 2015 global action plan on AMR<sup>7</sup> 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 2015<sup>8</sup> and antibiotic use in outpatient settings in France was ranked the fourth highest in Europe in 2018,<sup>9</sup> despite having national strategic plans for human health in place for almost 20 years.<sup>10</sup> The Ecoantibio