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## Developing an antimicrobial resistance reference laboratory and surveillance programme in Vietnam

The Fleming Fund was established by the UK Government in 2015 in response to recommendations of an independent review on antimicrobial resistance (AMR) led by economist Jim O'Neill and the Global Action Plan on AMR adopted by the World Health Assembly in 2015.<sup>1</sup> These recommendations were subsequently endorsed by the General Assembly of the Food and Agriculture Organisation (FAO) and World Organisation for Animal Health (OIE).

The Fleming Fund represents a £265 million investment from 2015 to 2022, aimed at improving laboratory capacity for diagnosis and surveillance of AMR and antibiotic use in low-income and middle-income countries where AMR has a disproportionate effect. The Fleming Fund is part of the UK Government's Official Development Assistance budget and is administered by the Department of Health. The Mott MacDonald Group was appointed in 2016 to manage the Fleming Fund's projects and a fellowship scheme that will provide support to create a sustainable community of practice within investment countries. Itad has been appointed as an independent evaluator.

Following existing early investment in Vietnam, the Fleming Fund will expand into over 20 countries across sub-Saharan Africa, and south and southeast Asia. Grants are also provided to multilateral organisations, including WHO, the FAO, and the OIE, to assist countries with the development of AMR national action plans.

AMR has been recognised as a major health threat in Vietnam over two decades. A situation analysis was completed in 2010 by the Global

Antibiotic Resistance Partnership (GARP) Vietnam National Working Group,<sup>2</sup> led by the National Hospital of Tropical Diseases (NHTD) and the Oxford University Clinical Research Unit (OUCRU), with representation from the Vietnamese Ministries of Health and of Agriculture and Rural Development. In 2013, the Vietnamese Ministry of Health developed a national action plan on AMR, and was the first country in the WHO Western Pacific region to do so. The plan is comprehensive and follows the priorities as outlined by WHO.<sup>3</sup> Surveillance of antibiotic use and antibiotic resistance, and an antibiotic stewardship programme are among its priorities. In 2015, the Ministries of Health, Agriculture and Rural Development, Industry and Trade, and Natural Resources and Environment in Vietnam, and WHO, the FAO, and the OUCRU signed an aide memoire committing to help coordinate and jointly implement the national action plans across different sectors.<sup>4</sup>

A Fleming Fund grant was awarded in 2015 to the NHTD, the OUCRU, the University of Oxford, and Public Health England, supported by WHO and the Vietnamese Minister of Health, to establish a nationwide hospital-surveillance network and reference laboratory at the newly built site of the NHTD.

The surveillance network was established in 2013, known as the Viet Nam Resistance project (VINARES), and consists of 16 central and provincial-level hospitals.<sup>5</sup> This network is now recognised by the Ministry of Health as the National AMR Surveillance Network.

Passive isolate-based surveillance with WHONET has started. Active and passive (case-based) surveillance of the results of antibiotic-susceptibility testing will be established on the basis of the WHO Global Antimicrobial Resistance Surveillance System (GLASS) and Fleming Fund guidelines.<sup>6</sup> Guidelines from the US Clinical and Laboratory Standards Institute have been translated and

provided to participating hospitals. All these hospitals are enrolled in the UK National External Quality Assessment Scheme (UKNEQAS) and monthly data on antibiotic usage are also collected. A parallel network of five dermatovenereology clinics was established to include surveillance of gonococci. Data are reported into a cloud-based server and in time will be shown on a public website. The investigators work together with the Ministry of Health, WHO, and Global Health Security funded partners (US Centers for Disease Control and Prevention and PATH) to support this network. Enrolment in GLASS is anticipated in 2018.

The newly established laboratory at NHTD (opening in 2017) will be a training and knowledge centre, in which confirmatory testing, molecular detection of resistance mechanisms, and whole genome sequencing will be done on isolates of interest from the surveillance sites (eg, all blood and cerebrospinal fluid isolates, *Salmonella* spp and *Shigella* spp isolates from stool, and Gram-negative organisms from patients with ventilator-associated pneumonia). Staff members are adapting and implementing protocols from the University of Oxford and Public Health England and three staff members have received training in Oxford on whole genome sequencing and bioinformatics. The Ministry of Health has yet to assign AMR reference functions to laboratories representing different regions of Vietnam.

The project in Vietnam is the first step in a substantial programme of support to countries bearing the heaviest burden of AMR infections. Lessons learned will be shared in regional meetings, engaging government and foreign development partners in Laos and Cambodia, and will help to shape the wider roll-out of the Fleming Fund in late 2017.

We declare no competing interests. We would like to thank Masaya Kato at the WHO country office, Vietnam, for their support.



This online publication has been corrected. The corrected version first appeared at [thelancet.com/lancetgh](http://thelancet.com/lancetgh) on November 20, 2017

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