Meeting of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction

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Consideration of the reports of the States Parties on their full and comprehensive implementation of all provisions of Article X

Report on implementation of Article X of the Biological and Toxin Weapons Convention

Submitted by the United Kingdom of Great Britain and Northern Ireland

I. Introduction

1. This paper provides an indicative overview of the diverse range of programmes, projects and funding from UK public and private bodies that support the aims and objectives of Article X. The paper meets the requirement set out in the Seventh Review Conference Final Declaration (paragraph 61) on the submission of national reports, at least biannually, on the steps taken by States Parties to implement Article X. It follows a similar structure to previous UK Article X reports and provides an update on more recent UK initiatives.

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II. Government departments, agencies and funded programmes

A. The Newton Fund

2. As detailed in the UK Article X implementation report in 2017,[1] the Newton Fund is providing £150 million per year until 2021 to promote economic development and social welfare in partner countries. Some recent examples of Newton Fund activities include:[2]

- Informing a rapid response to Brazil's Zika outbreak: In 2016, the World Health Organization (WHO) declared the Zika virus outbreak in Brazil a Public Health Emergency of International Concern. A Newton-funded research collaboration between experts from Fundação Oswaldo Cruz Recife (Fiocruz) and the UK's Medical Research Council (MRC) University of Glasgow Centre for Virus Research played a major role in Brazil's response to the Zika outbreak. The project was the first in the world to focus on Zika virus epidemiology which resulted in deeper understanding of the virus, paving the way for more advanced research and went on to inform policy. Both institutions have now created new partnerships and received additional funding to investigate this previously neglected disease.[3]

- Development of a new mobile app to diagnose tuberculosis: Computer scientists at Anglia Ruskin University, UK and Universiti Putra in Malaysia have developed an affordable mobile phone testing system. The app has a high accuracy rate in diagnosing TB in just a matter of minutes. The technology could revolutionise treatment in low-income countries. The app can be used offline, so it works in remote areas, where laboratory facilities are hard to reach. The British Council and the Malaysian Industry-Government Group for High Technology (MIGHT) under the Newton-Ungku Omar Fund supported this research.[4]

- Single-cell genomics facility, Thailand: A team of Thai and UK scientists is attempting to improve resolution of high throughput techniques and expedite molecular biology research by implementing "single-cell genomics" for the first time at the Mahidol University in Thailand. The cutting-edge technique will enable scientists to show individual cells responding to environmental changes, thereby increasing their understanding of regulatory mechanisms. The first conference on single-cell genomics, organised by Mahidol University and the Wellcome Sanger Institute, took place in May 2018 in Bangkok. The Newton Advanced Fellowship funded these projects in collaboration with the UK Royal Society and Thailand Research Fund, and two Newton Mobility grants via the Royal Society and Office of Higher Education Commission.[5]

- Knowledge transfer and capacity building: The UK Medical Research Council (MRC), Uganda Virus Research Institute and the London School of Hygiene and Tropical Medicine (LSHTM) Research Unit in Entebbe work on cutting-edge research into HIV/AIDS and other infectious diseases including viral hemorrhagic

[1] BWC/MSP/2017/WP.7 - Report on Implementation of Article X of the Biological and Toxin Weapons Convention - Submitted by the United Kingdom of Great Britain and Northern Ireland.
[2] https://www.newtonfund.ac.uk/
[3] https://www.newtonfund.ac.uk/news/success-stories/informing-a-rapid-response-to-brazils-zika-outbreak/
[4] https://www.newtonfund.ac.uk/news/success-stories/new-mobile-app-to-diagnose-tb/
[5] https://www.gov.uk/government/news/newton-fund-supports-single-cell-genomics-in-thailand

fevers such as Ebola.[6] Following the signing of strategic transfer agreements between LSHTM and MRC, the MRC and the Uganda Virus Research Institute formally joined LSHTM on 1 February 2018. The new partnership will boost research into current and emerging health issues in Africa and globally. The partnership will also contribute to the translation of research findings into policy and practice and build capacity for research in Africa.[7]

- Tackling infectious diseases with genome technology - workshop and symposium in Thailand: These events focussed on how genomics can play a role in surveillance, management and control of infectious diseases, as well as practical skills to implement the technology locally. Infectious disease researchers and public health officials networked with genomics experts from the UK and Singapore who are using cutting-edge sequencing technology in their research and clinical practices. Several research collaborations resulted from the workshop addressing, for example, dengue, malaria, tuberculosis and Zika.[8]
- An award to Thailand for a project that established a UK-Thai network in shrimp health. This project focused on knowledge exchange and capacity building, and challenging disease control in aquaculture.[9]

B. The Fleming Fund

3. The Fleming Fund is a UK aid programme-funding route and primarily invests in country grants to support 24 priority countries as they build sustainable surveillance systems for anti-microbial resistance (AMR).[10] Types of investment include:

- infrastructure improvements and renovations to laboratories
- equipment and reagents for laboratories
- transport and logistics to link surveillance sites across the country
- training for staff which may include microbiology, IT support, equipment maintenance, One Health surveillance protocols
- data transfer and storage
- quality assurance of data and laboratory systems
- IT platforms for data sharing
- biosafety and security around the laboratory and the surveillance system.[11]

4. The Fleming Fund also supports The UN Food and Agriculture Organization (FAO) efforts to tackle AMR through a One Health approach alongside the World Health Organization (WHO) and the World Organisation for Animal Health (OIE). This activity is

[6] https://www.gov.uk/government/news/minister-for-africa-hails-uk-and-uganda-co-operation-in-fighting-infectious-diseases; https://www.mrcuganda.org/

[7] https://www.mrcuganda.org/

[8] https://www.newtonfund.ac.uk/newtonprize/projects/tackling-infectious-diseases-with-genome-technology/

[9] https://www.newtonfund.ac.uk/news/latest-news/171122/

[10] https://www.flemingfund.org/regions-countries/; see also BWC/MSP/2017/WP.7 for details of the fund

[11] https://www.flemingfund.org/about-us/investment-areas/

now in its second year and the focus has shifted from supporting countries in developing National Action Plans to assisting countries in implementing plans.[12]

5. The Fleming Fund supports Commonwealth Partnerships for Antimicrobial Stewardship (AMS) and has twelve projects across Uganda, Tanzania, Ghana and Zambia. In September 2018, the Fleming Fund committed £1.3m to support partnerships between UK National Health Service (NHS) Trusts, UK health institutions and their counterparts in these four countries. Multidisciplinary teams of NHS pharmacists, doctors and specialist nurses will link with teams in partnered institutions and undertake projects, which aim to improve AMS practices through raising awareness, improving protocols and developing tools that will reduce the spread of AMR.[13] These partnerships follow the UK government's 5-year action plan and 20-year vision for AMR published earlier this year, in which the role of stewardship and international engagement was highlighted as key to have AMR contained and controlled by 2040.[14]

C. Neglected Tropical Diseases

6. The UK government announced in February 2019 plans to host a major international conference in 2020 to raise funds for life-saving vaccinations for children around the world. The pledging conference will bring together political leaders, civil society, public and private donors, vaccine manufacturers and governments to support the global vaccination body Gavi, the Vaccine Alliance. The UK is Gavi's largest donor and is currently responsible for 25% of its budget.UK aid is helping to ensure children in developing countries receive the vaccines they need.[15] Since 2000, Gavi has protected 700 million children in countries like Malawi, Haiti and Cameroon from diseases like measles, whooping cough and pneumonia. Hosting this conference demonstrates the UK's ongoing commitment to global health security and creating equal access to vaccines for children, wherever they live. UK contributions will vaccinate 76 million children, saving 1.4 million lives from vaccine-preventable diseases by 2020.

7. The UK continues to support global efforts to combat malaria and in April 2018, ahead of a Malaria Summit with Commonwealth leaders, announced further support to save more than 120,000 lives. The UK's new commitment will distribute 26 million nets and will reach more than five million households in target areas with indoor spraying. The UK also remains committed to its five-year pledge, made in 2016, to spend £500m a year tackling malaria until March 2021.[16]

8. UK aid has helped Nigeria cut the estimated number of people who die from malaria in Nigeria every year by more than half - from 210,000 to 100,000 between 2000 and 2016. In 2018 the Department for International Development announced a new £50 million programme to push for further malaria control in Nigeria. The UK is also committing £9.2 million of research funding to develop two new safe and effective malaria treatments. Mahidol-Oxford Tropical Medicine Research Unit (MORU) will lead this programme.

[12] https://www.flemingfund.org/publications/moving-from-plans-to-action-updates-on-the-faos-fleming-fund-work/

[13] https://www.flemingfund.org/publications/commonwealth-health-partnerships-to-improve-antimicrobial-stewardship-announced/

[14] https://www.gov.uk/government/news/antimicrobial-resistance-uk-launches-5-year-action-plan-and-20-year-vision

[15] https://www.gov.uk/government/news/uk-to-host-gavi-pledging-conference-in-2020

[16] https://www.gov.uk/government/news/the-uk-announces-further-support-in-the-fight-against-malaria

MORU is a collaboration of the University of Oxford, the Wellcome Trust and Mahidol University, Thailand.

D. Biosafety, Biosecurity and Infectious Disease Surveillance, Detection and Diagnosis

9. The UK's International Biological Security Programme (IBSP) (managed by the Ministry of Defence) has funded projects that have continued to improve detection and identification of disease outbreaks and disease surveillance systems in partner countries. The IBSP has also improved the safety and security of work with dangerous pathogens and supported biosecurity education. Projects have included:

- Biosecurity and biosafety capacity building in the Middle East and North Africa. Joint funding with Canada and the US of a regional biorisk management and genomics training centre at the Jordan University of Science and Technology (JUST). The project was built on a long-standing collaboration with JUST, and continues to facilitate engagement with groups of scientists from a number of Middle East and North African countries, including Iraq, Yemen and Libya.
- Following on from the University of Bradford's guide to biological security "Preventing Biological Threats – What You Can Do?", the material has been translated into Russian, French, Arabic, Ukrainian, and Spanish. The Guide is freely available, including on the BTWC ISU website, and has been promoted in the BTWC and Global Partnership.
- Development of undergraduate level training modules and materials to aid education and awareness raising in biosecurity, biosafety and bioethics in Ukraine. The project drew upon the Bradford Guide and included the creation of a website to disseminate training materials and translation into Ukrainian. The project has helped to advance safe and responsible conduct of scientists, and provided a model for such a project on a national scale.
- Development of a Massive Open Online Course (MOOC) on "Next Generation Biosecurity – Responding to 21st Century Biorisks", aimed at undergraduate university students. The course went live in January 2019 and to date has attracted enrolments from over 400 participants in over 70 countries.
- Public Health England is implementing a two year training and development programme for laboratory staff at the Federal Teaching Hospital, Abakaliki, Nigeria, with the aim of improving Lassa Fever diagnostics. The project will improve diagnostic capability by introducing and providing training on a mobile Lassa Fever Virus sequencing platform. This will support molecular epidemiology and contact tracing work to help rapidly resolve Lassa Fever outbreaks locally.
- Contribution to a US Department of Defense-led biosecurity project in Iraq and a US Department of State-led biosecurity project in Libya. UK funding focusses on bioscience facilities in both countries, which hold pathogens of security concern and are in need of physical security upgrades. The project aims to reduce potential biological risks with potential international impact.

10. Other UK government initiatives that are contributing to global biosafety, biosecurity and infectious disease surveillance, detection and diagnosis include:

- Remote sensing data for dengue outbreak early warning: UK Space Agency funding announced in February 2018 will use UK expertise and earth observation data for a dengue fever outbreak early warning system in Vietnam. Early detection will enable

public health authorities to mobilise and provide forecasts for dengue fever under a range of climatic conditions. This will enable prediction of future dengue epidemics for the first time.[17]

- Safety monitoring for new medicines and vaccines: In December 2017 the UK Medicines & Healthcare products Regulatory Agency (MHRA) announced a new partnership with the Bill & Melinda Gates Foundation and the WHO that aims to improve the safety monitoring of medicines in low and middle-income countries (LMIC).[18]

- Peste des petits ruminants (PPR) vaccination campaign and awareness programme: In September 2018, scientists from The Pirbright Institute's Vaccine Differentiation group completed a mass peste des petits ruminants (PPR) vaccination campaign and awareness programme in India.[19] The project brought Pirbright together with four specialist organisations to coordinate PPR research and the vaccination campaign in India. The organisations were: Tamil Nadu Veterinary and Animal Sciences University, Indian Veterinary Research Institute, National Institute of Animal Biotechnology and National Institute of Veterinary Epidemiology and Disease Informatics. The group is applying for a patent for a new PPR vaccine developed during the research. The project also investigated PPR virus immunology in sheep and goats, including identifying disease resistant breeds. Improved laboratory and field-based diagnostics were also developed.[20]

- Project Smart Safety Surveillance (Project 3-S): In December 2017, MHRA announced a new partnership with the Bill & Melinda Gates Foundation and the WHO that aims to extensively improve the safety monitoring of medicines in low and middle-income countries (LMIC). New medicines and vaccines for diseases such as malaria and HIV may be introduced for the first time in LMICs where there may be weak or no regulatory systems for effective safety monitoring. If treatments have been fast track developed, it is important that information is gathered and analysed quickly to determine safety and efficacy. Whilst great progress has been made, and many LMICs are members of the WHO Program for International Drug Monitoring, experience in collecting and assessing data, and risk management planning can still be limited. Therefore, the WHO and the Gates Foundation have launched Project 3-S to help LMICs identify, assess, and manage risks associated with new products. The UK MHRA will be joining the initiative to bring in regulatory expertise and will run three exercises in different LMICs. This support will help national safety monitoring centres identify risks and benefits early and take appropriate regulatory action to support global heath.

- Ebola outbreak in the Democratic Republic of Congo (DRC): In mid-July 2019, the WHO declared this outbreak a Public Health Emergency of International Concern. In the same week the UK, which has been a major donor from the outset, announced up to £50 million of additional support to combat the outbreak in DRC. The UK is also committed to sending UK-funded experts, including data analysts, response

[17] https://www.gov.uk/government/news/new-projects-see-uk-space-firms-tackle-southeast-asian-challenges

[18] https://www.gov.uk/government/news/mhra-awarded-over-980000-for-collaboration-with-the-bill-and-melinda-gates-foundation-and-the-world-health-organisation

[19] https://bbsrc.ukri.org/news/food-security/2018/180913-n-pirbright-collaboration-provides-tools-for-peste-des-petits-ruminants-eradication/

[20] https://bbsrc.ukri.org/news/food-security/2018/180913-n-pirbright-collaboration-provides-tools-for-peste-des-petits-ruminants-eradication/

coordinators and managers, to the region to ensure a successful response. So far, UK aid has provided for technical experts, including senior epidemiologists, data scientists and a clinical trials specialist, and has previously funded the development of a vaccine that has helped to contain the outbreak. The UK will also continue to play a role as a major donor in regional preparedness.[21]

E. Vaccines and the new Vaccines Manufacturing Innovation Centre

11. In January 2019 the UK announced plans to donate £10 million of funding to the Coalition for Epidemic Preparedness Innovations (CEPI) to develop vaccines against emerging infectious diseases. The £10 million funding is in addition to the UK's investment of £120 million between 2016 and 2021 for the UK Vaccine Network, which develops vaccines for epidemic diseases.[22] However, outbreaks of some of the world's deadliest diseases only occur intermittently, meaning that there may not be a strong market incentive for pharmaceutical companies to develop relevant vaccines. The UK government is taking concerted and coordinated action to address this issue. The priority pathogens identified for investment in vaccine development are:

- Chikungunya virus
- Crimean Congo Haemorrhagic Fever (CCHF) virus
- Ebola virus
- Hantavirus
- Lassa Fever virus
- Marburg virus
- Middle Eastern Respiratory Syndrome (MERS) virus
- Nipah virus
- Plague (*Yersinia pestis*)
- Q fever (*Coxiella burnetii*)
- Rift Valley Fever virus
- Zika virus.[23]

F. Support to Disaster Response

12. When an outbreak strikes, speed is critical. Health workers must act quickly not only to contain and treat an emerging or re-emerging disease, but also to use this window to evaluate potential treatments and vaccines. The challenge becomes even greater when trying to develop new medical countermeasures amidst multiple emerging diseases in sub-Saharan Africa. The following are examples of support to address such challenges:

- University of Oxford ALERRT consortium: the European & Developing Countries Clinical Trials Partnership funds The African coaLition for Epidemic Research, Response and Training (ALERRT). This consortium, coordinated by the University

[21] https://www.theyworkforyou.com/wms/?id=2019-07-18.HCWS1756.h
[22] https://www.gov.uk/government/news/10-million-to-develop-vaccines-against-global-infectious-diseases
[23] https://www.gov.uk/government/groups/uk-vaccines-network

of Oxford, aims to reduce the impact of disease outbreaks in sub-Saharan African by quickly setting up high quality, large-scale, multi-site human studies to develop and test medical interventions. A network is being built comprising researchers, public health authorities in nine sub-Saharan African countries and international research organisations. Work focuses on well- and lesser-known diseases, including Lassa fever, yellow fever, monkeypox, chikungunya and Ebola. The consortium is currently working on 47 outbreaks of serious disease in Africa.[24]

- The WHO in partnership with ALERRT started human trials for four new experimental treatments for Ebola Virus Disease. Only one, ZMapp, has been previously tested in patients while the other three are showing promise in early-phase clinical trials. These trials are ongoing, and new clinical evidence that emerges will likely be of use in future outbreaks. In addition to new therapies, ALERRT is invaluable in strengthening the capacity to prepare for, and respond to, disease outbreaks.

- The European & Developing Countries Clinical Trials Partnership (EDCTP): The UK is a key donor in the EDCTP, which began in 2003 to advance the development of new or improved medical interventions for the three biggest diseases affecting sub-Saharan Africa: HIV, tuberculosis and malaria. Its second programme, launched in 2014, extended its scope to include other neglected infectious diseases, focusing on advanced human trials of treatments, vaccines and diagnostic tools. The partnership between European and sub-Saharan countries strives to support research into clinical development of medical interventions. The EU has committed up to €683 million between 2014 and 2024, which will be matched by contributions from European members. EDCTP comprises 17 African and 14 European countries: Angola, Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, The Gambia, Ghana, Mali, Mozambique, Niger, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia, Austria, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and the UK.[25]

- South Sudan Ebola Tabletop Exercise: In February 2019, South Sudan conducted an Ebola Tabletop Exercise (TTX) for its National Rapid Response Team (NRRT). The UK Government's Department for International Development (DFID), was a donor, amongst others, to this TTX.[26] The exercise aimed to enhance NRRT's operational readiness by familiarizing participants with Ebola Standard Operating Procedures, Rapid Response Team deployment and field investigation procedures. It also provided an opportunity to evaluate current capabilities and resources for deployment in response to a suspected Ebola case. A total of 70 participants comprising epidemiologists, clinicians, risk communication experts, laboratory technicians, and infection prevention and control experts were engaged in the one-day exercise. As the EVD outbreak in DRC evolves, the risk of cross border spread remains high for South Sudan. It is therefore important that the country attains and maintains operational readiness for prompt response to suspected Ebola cases.

- Ebola preparedness and prevention: In October 2018 the UK announced, in collaboration with Uganda's Ministry of Health, that it will support Uganda's National Task Force, committing up to £5.1 million to support Ebola preparedness and prevention efforts in Uganda. The funding will support surveillance in high-risk districts, particularly at the border with the Democratic Republic of Congo. Funding

[24] https://www.alerrt.global/

[25] http://www.edctp.org/

[26] https://www.afro.who.int/news/south-sudan-conducts-ebola-tabletop-exercise

will also contribute to risk reduction communication amongst communities, infection prevention and control measures and provide for improved case management processes.[27]

III. Academic and Research Councils

A. Global Challenges Research Fund

13. The Global Challenges Research Fund (GCRF) is a £1.5 billion fund announced by the UK Government in 2015 to support cutting-edge research that addresses challenges faced by developing countries. The GCRF partners are UK Research and Innovation (UKRI), the Scottish Funding Council, the Higher Education Funding Council for Wales, the Higher Education Division Northern Ireland, the Academy of Medical Sciences, the Royal Society, the British Academy, the Royal Academy of Engineering and the UK Space Agency. The GCRF aims for programmes that:

- promote challenge-led, innovative research.
- strengthen capacity for research, innovation and knowledge exchange in the UK and developing countries through excellent UK partnerships; and,
- provide an agile research response to emergencies.[28]

14. UKRI is also using the GCRF to pioneer an ambitious new approach to tackle some of the world's most pressing challenges through a £200M investment across 12 global research Hubs. Over the next five years the Hubs will work across 85 countries with governments, international agencies and NGOs to develop creative and sustainable solutions to help make the world safer, healthier and more prosperous. The Hubs will focus on a wide range of global challenges including improving human health, biodiversity and generating agricultural sustainability.[29] One example is the UKRI GCRF One Health Poultry Hub. Population growth is driving global demand for safe, low-cost poultry meat and eggs; however, intensive processes create conditions for diseases. This Hub explores how to meet rising demand while minimising the risk to public health. It will study how intensification increases risk of infectious disease, AMR and disease risk management and mitigation. Working with strong networks of local, regional and global stakeholders, findings will be put to immediate use. The UK's Royal Veterinary College provides support for the Hub, with an initial focus on the South Central Asia and South-East Asia regions.[30]

B. UK Research and Innovation (UKRI)

15. The UK is committed to spending 0.7% of Gross National Income on official development assistance (ODA). UKRI administers part of this assistance, which supports research that addresses the challenges faced by developing countries, and develops science and innovation partnerships that promote the economic development and welfare of collaborating countries.[31]

[27] https://www.gov.uk/government/news/minister-for-africa-hails-uk-and-uganda-co-operation-in-fighting-infectious-diseases

[28] https://www.ukri.org/research/global-challenges-research-fund/

[29] https://www.ukri.org/news/global-research-hubs/

[30] https://gtr.ukri.org/projects?ref=BB%2FS011269%2F1

[31] https://www.ukri.org/research/international/international-development/

16. Advanced crop breeding, tackling infectious disease and clean energy technologies are just three areas where the UK will establish partnerships with collaborators to push boundaries and meet 21st century challenges. These are part of a £79 million investment in international projects announced in January 2019. A £3.5 million project, which has been announced as part of this initiative aims to tackle antimicrobial resistance in India, a major producer of antibiotics in the global supply chain. This project, funded through the UK's Natural Environment Research Council, will focus on pharmaceutical, industrial and wastewater pathways and develop global wastewater and environmental regulations to tackle AMR.[32]

IV. Industry

17. As part of a commitment to fight global health challenges, GlaxoSmithKline was a founding member of WIPO Re:Search, a new open innovation platform, which aims to help accelerate the development of new and better treatments against neglected tropical diseases such as dengue, rabies and Chagas disease, as well as malaria and tuberculosis. WIPO Re:Search is a collaboration of private and public sector organisations sponsored by the World Intellectual Property Organization (WIPO) in collaboration with BIO Ventures for Global Health (BVGH). This collaboration builds on the Pool for Open Innovation against Neglected Tropical Diseases (established in February 2009) with patents from GlaxoSmithKline and Alnylam Pharmaceuticals.[33]

[32] https://bbsrc.ukri.org/news/food-security/2019/190122-pr-uk-at-forefront-of-global-r-d-collaboration-with-79m-investment/

[33] https://www.gsk.com/en-gb/research/our-approach/open-innovation/diseases-of-the-developing-world/