REPORT ON IMPLEMENTATION OF ARTICLE X OF THE BIOLOGICAL AND TOXIN WEAPONS CONVENTION (BTWC)

Submitted by the United Kingdom of Great Britain and Northern Ireland

I. INTRODUCTION

1. This paper provides an illustrative 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 is designed to meet 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.

II. GOVERNMENT DEPARTMENTS, AGENCIES AND FUNDED PROGRAMMES

A. Antimicrobial Resistance (AMR)

2. Global AMR Innovation Fund (GAMRIF) is a UK Aid fund that supports research and development around the world to reduce the threat of antimicrobial resistance in low and middle-income countries (LMIC)\(^1\). The fund supports early-stage innovative research in underfunded areas of AMR research and development and works with research organisations, governments and industry to:

- establish international research partnerships and support research that funds innovation and development of new technologies to tackle AMR
- leverage investment from partners to support sustainable financing for AMR
- establish partnerships using a ‘One Health’ approach
- fund projects that will develop solutions specifically for LMICs

3. The use of antimicrobials in livestock production is a primary contributor to the development and spread of AMR. Drug-resistant microbes can be transmitted from animals to humans via direct contact or through the food chain and the environment. This poses a potential significant threat to human health. This research will benefit LMICs, which are disproportionately impacted by AMR. The programme will be delivered on behalf of GAMRIF by the Biotechnology and Biological Sciences Research Council (BBSRC) and the Natural Environment Research Council (NERC) in the UK and by Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) in Argentina. Some examples of GAMIF collaborations are listed below:

\(^{1}\) https://www.gov.uk/government/groups/the-global-amr-innovation-fund
A UK-China research competition to support innovations to address antimicrobial infections in both humans and animals\(^2\). These collaborative projects enabled novel research to be conducted that neither country could carry out alone. Fourteen projects were selected to run over three years and include a diverse range of innovations. Examples include novel diagnostics, therapeutics, and animal feed. The results of this research will have global implications including in China and across emerging and developing countries. Among these projects, are a collaboration between The Vaccine Group, based in Plymouth, UK and the Shanghai Veterinary Research Institute (SHVRI), Chinese Academy of Agricultural Science (CAAS), which plans to use a bovine virus as a safe, inexpensive, single dose vaccine to control *Streptococcus suis* infection in domestic pigs.

In October 2019 British and Argentinian researchers launched the ‘Tools to tackle AMR in the environment’ programme in Buenos Aires, an AMR research partnerships between UK and Argentina\(^3\). Partnerships include, University of Exeter and Nacional de Laboratorios e Institutos de Salud who have started to develop a conceptual framework to improve understanding of AMR in livestock systems for translation into policy and practice\(^4\).

The UK Government’s Global AMR Innovation Fund, managed by the Department of Health and Social Care (DHSC) and Canada’s International Development Research Centre (IDRC) are collaborating on a new initiative, aimed at reducing the emerging risk to global health and food security posed by antimicrobial resistance in animals\(^5\).

Innovative Veterinary Solutions for Antimicrobial Resistance (InnoVet-AMR) funds research to develop new animal vaccines and other alternative innovations to fight AMR in livestock and aquaculture production in low- and middle-income countries (LMICs). Through InnoVet-AMR, IDRC and DHSC aim to achieve two main objectives:
- Support research that will identify innovative veterinary solutions, including vaccines and alternative solutions, to reduce the use of antimicrobials in livestock and aquaculture operations in LMICs;
- Build effective partnerships to coordinate discovery, development and sustainable delivery of affordable innovative veterinary solutions to reduce the use of antimicrobials in livestock and aquaculture operations in LMICs.


\(^3\)https://www.gov.uk/government/news/5-million-given-to-amr-research-partnerships-between-uk-and-argentina

\(^4\)https://gtr.ukri.org/projects?ref=BB%2FT004452%2F1

B. Fleming fund

6. The Fleming Fund is a UK aid programme supporting up to 25 countries across Africa and Asia to tackle antimicrobial resistance\(^6\). The Fund is managed by the Department of Health and Social Care and invests in strengthening surveillance systems through a portfolio of country and regional grants, global projects and fellowship schemes. The UK Government established the programme in 2015 in response to the UK AMR Review and the WHO Global Action Plan on AMR, which called for funding to improve AMR surveillance, public awareness and responsible drug use. The programme focuses on LMIC because they are expected to bear the heaviest consequences of the spread of AMR. The UK AMR Review estimated that by 2050, up to 90% of all deaths related to AMR would come from Africa and Asia.

7. In 2019 funding for projects to help tackle the threat of AMR and help scientists achieve global universal health coverage was announced by the UK Chief Medical Officer at the UN General Assembly. More than £6 million will be invested to strengthen existing surveillance systems tracking AMR trends across Africa and Asia, while a further £12 million was announced to improve collaborations on health systems research between low and middle income countries, for example in sub-Saharan Africa, and the UK\(^7\). Some examples of Fleming Fund projects include:

- In May 2022 in Seoul, the International Vaccine Institute (IVI), Ministry of Health and Family Welfare (MOHFW) of Bangladesh shared key findings from the Capturing data on Antimicrobial resistance Patterns and Trends in Use in Regions of Asia (CAPTURA) project\(^\text{Error! Bookmark not defined.}\). CAPTURA is an IVI-led initiative to increase the volume and quality of data on antimicrobial resistance (AMR), consumption (AMC), and use (AMU) in South and Southeast Asia. The research findings will help the government of Bangladesh form evidence-based policies and practices to contain AMR, which is a critical and growing threat to global public health.

- In June 2022, the UK’s Fleming Fund refurbished the microbiology laboratory at the Islamabad National Institute of Health (NIH) as part of the joint effort to enhance Pakistan’s capacity to manage and mitigate the threat of AMR\(^\text{Error! Bookmark not defined.}\). The refurbishment includes ten new laboratories and seven offices, as well as new equipment, training and technical assistance. This is one of two labs, along with the National Reference Laboratory for Poultry Diseases, which has recently been upgraded to effectively carry out AMR surveillance. The Fleming Fund country grant represents one part of a longstanding bilateral health partnership with Pakistan. The Fund also supports five regional grants and a professional fellowship scheme, while funding the South Centre’s research to tackle AMR and coordinate

\(^6\) https://www.flemingfund.org/

\(^7\) https://www.flemingfund.org/publications/uk-to-invest-in-new-research-to-tackle-evolving-health-threats-across-the-globe/
activities between countries. Together, these are helping to manage and mitigate the threat of AMR in Pakistan, contributing towards a healthier world.

- In March 2021, the UK and Vietnam signed a new Memorandum of Understanding further strengthening a partnership between the two countries to tackle antimicrobial resistance (AMR). The agreement supports the existing work of UK aid’s Fleming Fund in Vietnam, a programme aimed at equipping laboratories and strengthening AMR surveillance systems in LMIC. The Fleming Fund has been working in Vietnam since 2015 but invested nearly £9 million in the country in 2019 to improve One Health information sharing and support a joint One Health surveillance system. This activity will complement Vietnam’s existing One Health Strategy which focuses on long-term capacity building, preparedness and prevention across human health, animal health and the environment. Reducing the threat of drug resistance in Vietnam is critical, as research suggests the country has one of the highest rates of antimicrobial drug use in Asia.

- The UK and Sierra Leone launched a £1.5m partnership to tackle drug resistance. The partnership aims to tackle drug resistance by improving public health surveillance systems, upgrading laboratory equipment and training scientists. In Sierra Leone, the Fleming Fund has appointed the World Health Organization (WHO) to support the country to develop AMR surveillance. The WHO will also be responsible for improving laboratory diagnostics, establishing AMR technical working groups within the national government and building capacity of scientists and laboratory staff.

- The UK and Nigeria launched a £10m partnership to tackle drug resistance through improving public health surveillance systems, upgrading laboratory equipment, and training technicians and scientists. In Nigeria, the Fleming Fund has appointed DAI to support Nigeria’s surveillance system, in partnership with the Nigerian AMR coordination committee and other key partners. Investments and activities in Nigeria to date include the appointment of ten professional fellows who are receiving training on specific skills including data management, microbiology, epidemiology and biosafety to help tackling AMR as well as investment in 18 laboratories across the country.

- Uganda has received three pioneering laboratory machines that can cut bacteriology diagnostics time in half as part of a UK/Uganda partnership.

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aimed at tackling drug resistance. The machines automate part of the laboratory tests that identify the bacteria causing a patient’s infection and can deliver results to doctors up to 18 hours quicker, saving critical time in the diagnosis of life-threatening conditions. One of the machines, a mass spectrometer MALDI-TOF, is the first of its kind in Uganda and can identify bacteria in just two minutes, compared with 18-48 hours for conventional testing. The machines have been provided as a part of the Fleming Fund and the programme is managed by the UK Department of Health and Social Care. The Infectious Disease Institute (IDI), the Fleming Fund’s implementing partner in Uganda, is helping to facilitate the training, in collaboration with medical equipment supplier BD. IDI is also supporting the development of a national AMR surveillance strategy, a One Health national governance structure and equipment delivery in animal health laboratories.

- In 2020, The Fleming Fund awarded two new grants in partnership with the governments of Zimbabwe and Malawi to tackle growing threat of drug resistance. The grants support public and animal health surveillance systems, improve laboratory infrastructure and train technicians and scientists. These initiatives will improve how we understand drug resistance and drugs usage around the world, which will support the fundamental changes that are needed to the way antibiotics are consumed and manufactured to mitigate this growing threat.

8. The Fleming Fund programme has played a significant role in the COVID-19 pandemic response. The COVID-19 pandemic continues to put health systems and economies under pressure across the globe. Despite the many challenges to the response, support from the Fleming Fund is helping governments respond more quickly and efficiently to the pandemic. Some country programmes have taken a flexible approach to activities to address the evolving needs, such as repurposing biosafety equipment or supporting specific training. Additionally, the programme’s inherent design and funding of activities have contributed to national pandemic responses. Funding recipients and governments have renovated and enhanced laboratories, trained staff and supported cross-governmental collaboration. Some examples of Fleming fund activities related to the COVID-19 pandemic include:

- In Zambia, laboratory buildings were in disrepair with limited safety or testing equipment prior to support from the Fleming Fund. However, investments through a Country Grant have supported building renovations and equipment procurement, allowing the country to leverage its public laboratories much more effectively in the pandemic.


In Timor-Leste, grantees highlighted that their team provided immediate COVID-19 support to government stakeholders as a result of ongoing relationships and activities from the Fund. Strengthening the National Health Laboratory, provided vital support to the Ministry of Health in their efforts to protect the Timorese people.

- In Uganda, the Infectious Disease Institute highlighted that their training on biosafety, sample management and collection was hugely valuable to the COVID-19 response.

- The COVID-19 pandemic has encouraged government investment in laboratory strengthening in Papua New Guinea. Major gaps in tracking coronavirus through the laboratory referral system were hampering the response. The National Department of Health and the WHO highlighted an urgent need to install a laboratory information system (LIMS) capable of filling these gaps. The Fleming Fund helped identify and fast-track installation of the LIMS in all public laboratories nationwide.

9. Although all countries’ health services are strained, the Fleming Fund’s focus on laboratory strengthening, capacity building and surveillance has furthered the pandemic response. In Pakistan, regional authorities have become more aware of the need for coordinated national surveillance and are now working to incorporate the private sector in surveillance activities. Government responses in Papua New Guinea, Pakistan and Bhutan suggest that in future, COVID-19 may act as a catalyst for continued action on AMR and help governments recognise the importance of surveillance.

10. The Fleming fund has contributed significantly to improving genomics capabilities to aid the response to the COVID-19 pandemic. As cases of COVID-19 surged across the globe, businesses, innovators and academics were looking for new ways to combat the virus through science and technology. Since 2019, the Fleming Fund has partnered with sequencing facilities in Denmark, Nigeria, Tanzania and South Africa to build technical genomics and AMR surveillance capacity in Africa. Scientists in South Africa are now using support from the Fleming Fund to sequence samples of COVID-19. As part of the response, the Fleming Fund is supporting the sequencing of additional COVID-19 isolates in South Africa and other Sub-Saharan countries. Sequencing is particularly useful to monitor the diseases’ mutations and track outbreaks and has helped identify gaps in infection prevention within hospitals and identify clusters of the disease.

11. In June 2020, the UK and Indonesia signed a Memorandum of Understanding on Health Cooperation on Antimicrobial Resistance Surveillance. The two countries have also signed a Grant Agreement for the Fleming Fund partnership on antimicrobial resistance (AMR) surveillance in

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Indonesia. The agreement between the UK Department of Health and Social Care (DHSC) and The Ministry of Health of the Republic of Indonesia (MoH) establishes a cooperation framework between the UK and Indonesia to share knowledge and expertise on the development of the health sector in both countries. The MoU focuses on areas of cooperation such as healthcare services, disease prevention and control, health technology and medical devices, human resources for health development, and health research and development. Agreed activities for collaboration under this MoU include digital health services and community-based telemedicine cooperation, plus information sharing on infectious diseases in hospitals (such as COVID-19). The Ministry of Health of the Republic of Indonesia will work together across all ministerial stakeholders, such as the Ministry of Agriculture, the Ministry of Maritime Affairs and Fisheries, the Ministry of Environment, Forest, and Climate Change, the Indonesia Food and Drug Administration, and the National Antimicrobial Resistance Control Committee, to implement all the project activities agreed in the work plan of the Fleming Fund programme on AMR.

C. Vaccines and Official Development Assistance

12. Official development assistance (ODA) funding, provided by the Department of Health and Social Care’s (DHSC) UK Vaccines network (UKVN), and delivered by Innovate UK, has been awarded to 22 research projects. The projects will support development of vaccines for diseases that have the potential to become epidemics. This includes: Ebola, Lassa Fever, Zika, Crimean-Congo Haemorrhagic Fever, Chikungunya virus. Some of the projects are also looking at ways to tackle ‘Disease X’, a hypothetical future pathogen, to ensure the world is equipped for future epidemics or pandemics.

13. The UKVN has already funded 78 projects with over £115 million worth of UK aid funding, as part of the UK government’s commitment to defeat poverty, tackle instability and create prosperity in developing countries. For example, earlier work on a Middle Eastern Respiratory Syndrome vaccine by the University of Oxford allowed them to develop the Oxford AstraZeneca COVID-19 vaccine more quickly. The vaccine has since protected tens of millions of people across the world. The project was funded in part by the UKVN.

14. Protecting against COVID-19 and future diseases: The UK is committed to supporting the rest of the world in protecting people from COVID-19 and future diseases. The UK has invested more than £88 million to support the development of the Oxford AstraZeneca vaccine and, to date, has donated 32.2 million COVID-19 vaccine doses. 26.7 million doses have gone to COVAX, a global scheme to get vaccines to developing countries. This builds on the £1.3 billion in UK aid committed to the international health response early in the pandemic, supporting vaccines, health systems and economic recovery in developing countries.
15. In February 2022, the UK pledged £160 million to Coalition for Epidemic Preparedness Innovations (CEPI) to speed up vaccine development. COVID-19 has shown vaccines are the way out of pandemics, saving millions of lives and restoring cherished freedoms. The funding announced by the UK will support CEPI’s drive to accelerate the development of vaccines for the deadliest infectious diseases, like COVID-19, and enable equitable access to these vaccines globally. This announcement came ahead of the UK government hosting the Global Pandemic Preparedness Summit in March 2022 in London. The event raised funds for CEPI’s goal and was backed by the UK during the UK’s G7 presidency in 2021, to cut the time it takes to develop new vaccines to 100 days, including ‘variant-proof’ vaccines that will work against multiple future COVID-19 variants.

16. In 2021, AstraZeneca advanced its global rollout of COVID-19 vaccine through COVAX. COVAX is a global mechanism co-founded by CEPI and Gavi, the Vaccine Alliance working with WHO, UNICEF, civil society organisations and industry groups to accelerate the development, production and equitable access to new COVID-19 tools across the world for all participating countries, regardless of income level. In 2021, the first of many millions of doses of AstraZeneca’s COVID-19 vaccine, Vaxzevria, started arriving in LMIC across the world through the multilateral COVAX initiative, the first steps in fulfilling the Company’s efforts to provide broad and equitable access to the vaccine. In February 2022, the UK pledged £160 million to boost global vaccine development. Some examples of global rollout of Vaxzevria include:

- More than 15 million doses were delivered to Thailand’s Ministry of Public Health in December 2021, to complete an initial commitment of 61 million. Another 60 million doses will be supplied to Thailand across 2022, based on an agreement made between AstraZeneca and the Thai government in September 2021.

- AstraZeneca delivers its largest shipment of over two million COVID-19 vaccine doses to Malaysia. In January 2022 a further 2,017,500 doses of Vaxzevria were delivered to Malaysia in support of the country’s booster vaccination programme. This is in addition to 324,000 doses delivered previously, bringing January’s total supply to over 2.3 million doses.


17. AstraZeneca are working with partner countries to bridge the vaccine gap threatening Africa. AstraZeneca were the first vaccine manufacturer to commit to COVAX, supplying more than 90% of the vaccine to more than 127 participating countries, including 38 African countries at the end of June 2021. Countries such as Ghana, Côte d'Ivoire, Kenya, Rwanda and Ethiopia have all participated in this approach. Developing, producing and supplying a vaccine for the world is an extraordinarily complicated challenge and we have all learned many lessons on the way. These are lessons that should not merely be carried into future pandemic preparedness, they must be addressed right now. Entire communities and economies are depending on it. In 2021, just over 1% of people in Africa had been fully vaccinated. There is still a long way to go but this approach could bring much-needed relief to the world’s most vulnerable communities. This will only be possible if we work together, apply our lessons learned and do what is necessary to vaccinate the whole world, not just portions of it.

18. The UK are collaborating with the Institut Pasteur, Madagascar researching vaccination approaches to break plague transmission in Madagascar. Although an ancient disease, plague is still an unwelcome presence in certain regions of the world, where it exists in animal reservoirs and outbreaks form time to time. The most serious outbreak of plague in modern times occurred in Madagascar in 2018, with more than 2600 cases and an estimated case fatality rate of 8.9%. In Madagascar as well as in other parts of the world, plague causes seasonal outbreaks, with risk of epidemic potential and transmission to new regions. These seasonal outbreaks are caused by flea-vector transmission from wildlife reservoirs (principally rats). There is no approved vaccine for plague and antibiotic therapy needs to be given early after exposure to infection to be fully effective. In a collaboration between UK’s MHRA, Defence Science and Technology Laboratory (Dstl), University of Strathclyde and the Institut Pasteur Madagascar, a sub-unit vaccine in a novel formulation was tested against a Malagasy strain of the causative bacterium, Yersinia pestis. This sub-unit vaccine had already been shown to be efficacious in animal models of infection and was also shown to be safe and immunogenic in a Phase 1 clinical trial. In this recent study, the vaccine was reformulated for distribution to a LMIC, as a stable, dry powder. The vaccine was then tested under laboratory conditions at the Institute Pasteur in Madagascar and was found to induce immunity in rats, and therefore showed promise for preventing

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22. Plague outbreak in Madagascar; external situation report 14, 4 Dec 2017, WHOafro.who.int/health-topics/plague/plague-outbreak-situation-reports.
transmission to humans. Production of a plague vaccine will also mitigate development of AMR resistant strains of plague.

19. ODA is funding provided by official agencies around the world, including the UK government, to promote the economic development and welfare of developing countries. The Newton Fund and Global Challenges Research Fund are managed by the UK’s Department for Business, Energy and Industrial Strategy (BEIS). The funds are delivered through UK partners who offer tailored research and innovation programmes in collaboration with governments and organisations in each partner country.

20. The Newton Fund builds research and innovation partnerships with countries in Africa, Asia and Latin America to support economic development and social welfare, tackle global challenges and develop talent and careers. Partner countries include: Colombia, Egypt, India, Malaysia, Jordan, Kenya, Peru, Philippines, Türkiye, Vietnam. The Newton Fund does this through:
   - Equitable partnerships with middle-income countries
   - Multidisciplinary research based on agreed national strategies
   - Nurturing talent and careers with capacity development

21. The Global Challenges Research Fund (GCRF) supports UK and international researchers and innovators to take on key issues affecting developing countries through:
   - challenge-led multidisciplinary research
   - strengthening capability for research, innovation and knowledge exchange
   - providing an agile response to emergencies

D. Disaster Response

22. The UK Public Health Rapid Support Team (UK-PHRST) was created after the Ebola outbreak in West Africa in 2014-16 to support LMICs to prepare for and respond to public health outbreaks. In the six years of operation of the UK-PHRST, the team has led 23 deployments in response to disease outbreaks and over 40 research projects. The onset of the COVID-19 pandemic radically changed the world we live in and brought outbreak preparedness to the forefront of public health and public consciousness. COVID-19 has challenged the world and the UK-PHRST. However, UK-PHRST has adapted quickly to ensure the team continues to provide multidisciplinary support, in-person and remote, to aid many nations such as;
   - providing infection prevention, control programmes and sero-surveillance guidance at Africa CDC
   - multidisciplinary support to the Rohingya camps in Bangladesh
   - supporting the Partnership for Evidence-based Response to COVID-19 across continents

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24 https://www.newton-gcrf.org/newton-fund/
25 https://ukhsa.blog.gov.uk/2021/12/03/five-years-of-the-uk-public-health-rapid-support-team/
running a Multiple Open Online Course in COVID-19 at the beginning of the pandemic
- supporting SARS-CoV-2 diagnostics inside labs

23. UK-PHRST research and projects have flexed to the needs and concerns of LMICs and the unique challenges COVID-19 has presented to these nations. The team has carried out rapid research to address knowledge gaps when studying outbreaks, including questions about the barriers to vaccine rollouts and the importance of addressing mental health and psychosocial support during outbreaks. The team have continued to develop and strengthen partnerships so the team can act when and where required. Working with the UK government, the World Health Organization (WHO) and the Global Outbreak Alert and Response Network (GOARN), UK-PHRST has created a global network that shapes policy and frames the outbreak responses of the future. The partnerships within LMICs are the most critical, tackling disease at the frontline and enabling progress in preparing for the next epidemic and working together to ask key questions to allow us to respond better in the future.

E. Pandemic Preparedness

24. In June 2022, the UK announced support for a new international drive to prevent and prepare for future pandemics\(^2\). The UK will give £25 million to found a new World Bank fund to prevent, prepare for and respond to future devastating pandemics. The investment aims to prevent future pandemics and stop the devastating human and economic impact of COVID-19 from happening again. The ‘Financial Intermediary Fund’ for pandemic prevention, preparedness and response will provide funding to countries whose healthcare systems are dangerously unprepared for the challenges caused by large outbreaks of infectious diseases. It will ensure they can quickly respond to, and as far as possible contain, outbreaks before they spread across borders. The COVID-19 pandemic has led to at least 6.2 million deaths across the world and caused far-reaching economic devastation. Stopping a pandemic like this ever happening again will require a concerted and coordinated international effort. The new fund will help fill some of the financing gaps exposed by COVID-19, particularly insufficient financing for preparedness in national health systems and disease surveillance at country, regional and global levels. Crucially, the fund can help catalyse countries’ own financing, so the world is as equipped as possible whenever and wherever a new public health risk emerges.

III. ACADEMIC AND RESEARCH COUNCILS

A. UK Research and Innovation (UKRI)

25. In February 2022, UKRI announced a £10 million to combat potential epidemics in developing countries comprising of 22 research projects which were selected by the government’s UK Vaccine Network (UKVN) and will help tackle viruses such as Ebola, Lassa Fever and Zika. The projects will conduct research into vaccines and innovative new vaccine platforms to tackle some of the world’s deadliest diseases in LMIC.

B. Biotechnology and Biological Sciences Research Council (BBSRC)

26. BBSRC launched the Global coronavirus research and innovation network in September 2021 to bring together researchers from animal and human coronavirus communities. The network was funded by the BBSRC and the UK’s Department of Environment, Food and Rural Affairs (Defra). The network is to enhance our knowledge of this important virus family to inform preparedness and response strategies for future outbreaks. The UK International Coronavirus Network (UK-ICN) will provide and support global coordination for the delivery of collaborative scientific research and a sustained long-term One Health approach. This will enhance investigation and understanding of coronaviruses. The COVID-19 pandemic has stressed the urgency to advance the knowledge and understanding of the biology of coronaviruses that infect both animals and humans, embracing the need for a One Health approach.

27. The network is a joint partnership between: University of Liverpool, Animal and Plant Health Agency, The Roslin Institute, University of Edinburgh, The Pirbright Institute, University of Cambridge and it will bring together researchers and partners from all over the world, including: China, India, North America, Europe, Southeast Asia, Africa. The network will draw on major global research and industry players, who are working on veterinary and human coronaviruses, and will facilitate research collaborations to further the understanding of coronaviruses in the fields of virology, pathogenesis, genotypic markers of phenotype, transmission and immunity. According to current global and UK funding data, there is a major gap in understanding the transmission of coronaviruses from animals to humans and between animal species. To bridge this gap, the network will bring together experts to analyse gaps and identify research priorities to better understand interactions amongst animals, humans and the environment in order to prevent future outbreaks of zoonotic diseases. Embracing the One Health approach, the UK-ICN will draw on a range of expertise from different sectors, such as public health, animal health, and the environment. This is to comparatively assess animal and human coronavirus biology and streamline data integration of animal and human coronaviruses to further the understanding of pathogen biology to include, for example, seasonality, transmission, ecology and evolution, host

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response, effective intervention strategies. The decades of research on diagnostics and vaccines to animal coronaviruses has lots to teach in terms of dealing with severe coronavirus pandemics both in the present day and preparing for Disease X in the future.

C. Neglected Tropical Diseases

28. In March 2021, UK scientists informed a roadmap to eliminate disease of poverty\(^2\). The World Health Organization is advocating a One Health approach to tackle parasitic blood flukes in Africa following successful UKRI-funded research. This renews hope that a major disease of poverty can be eliminated by 2030. The new strategy has been informed by the findings of UKRI-funded multidisciplinary research which shows how the parasitic flukes causing schistosomiasis to transmit between animals and people in Africa.

29. UK-West Africa collaboration. Schistosomiasis is a major neglected tropical disease (NTD) of both people and animals, with over 220 million people and untold millions of livestock infected worldwide. While over 200,000 people die from schistosomiasis each year, its major effects are disabling. In children it causes, among other things, anaemia and stunting. The disease also has profound economic and wellbeing impacts for poor livestock-keeping communities. In Africa, despite almost 20 years of mass administration of an anti-parasite medication targeting, predominantly, school-aged children, schistosomiasis remains extremely high in some regions. The research was led by a team at the Royal Veterinary College (RVC) in partnership with teams from Senegal and Niger in West Africa and was jointly funded by UKRI, Foreign Commonwealth and Development Office and Dstl under the Zoonoses and Emerging Livestock Systems (BBSRC) programme. Scientists combined parasitological, epidemiological, molecular, clinical and environmental data to determine the occurrence and distribution of the different fluke species that lead to disease. Findings showed the widespread nature of the disease. Up to 88% of children and adults were infected with the flukes in the study areas and up to 94% of livestock. More than half of the wildlife sampled by the team were also infected. The research results highlighted the need for all potential host species of the parasite to be included in future schistosomiasis control efforts within Africa and beyond. They have informed the new WHO NTD 2021 to 2030 roadmap and the WHO control and elimination of schistosomiasis guidelines. These stress that an approach involving both animal health and human health experts must inform interventions to achieve disease elimination.

IV. INDUSTRY

30. In June 2022, GlaxoSmithKline (GSK) announced an investment of £1 billion over ten years to accelerate research and development (R&D) dedicated to infectious diseases that disproportionately affect LMICs. This research will focus on new and disruptive vaccines and medicines to prevent and treat malaria, tuberculosis, HIV, neglected tropical diseases and AMR, which continue to have a devastating toll on the most vulnerable, accounting for more than 60% of the disease burden in many LMICs. Specifically, the investment will support:

- Delivery of next-generation vaccines and medicines for malaria and tuberculosis, offering shorter, simpler, safer treatment options for patients, including R&D on long-acting injectable countermeasures to protect against \( P. \textit{falciparum} \) malaria
- Work in partnership towards the goal of ending HIV/AIDS by developing and enabling access to innovative treatment and prevention options for people affected by HIV
- Reduce antibiotic resistance by advancing our industry-leading pipeline for vaccines, including first-in-class vaccines against invasive non-typhoidal salmonellosis and shigellosis
- Catalyse external funding for R&D for high-burden infectious diseases through multi-sectoral collaborations and alliances

31. Over the next decade, this work will build on the long-term commitment and investment made by GSK in global health innovation. To date, this has delivered significant new interventions, including the first-ever malaria vaccine (and first-ever human vaccine against a parasite), the first radical cure of vivax malaria, as well as a promising tuberculosis vaccine candidate. These investments in global health form part of GSK’s ambition to positively affect the lives of more than 2.5 billion people over the next ten years. 

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