Written evidence submitted by University College London on 1st December 2020
Foreign Affairs Committee (GHS0005)

Inquiry: Global health security

The following submission represents the collated views of academic experts from a range of disciplines from across University College London (UCL). As a multi-faculty, comprehensive university, UCL colleagues are well placed to respond to this inquiry to scrutinise the FCDO's role in delivering a global approach to health security and offer recommendations.

A. Executive summary

A.1. Collaborations across boundaries – both nations and sectors – are key to developing non-pharmaceutical innovations in the context of a pandemic.

A.2. Countries in Asia that were first affected by the pandemic would have provided valuable lessons in how to combat the pandemic, had there been a more centralised and coordinated effort to collect best practice.

A.3. There needs to be greater coordination and sharing of data and coordinating local services as the current siloed and monetised approach amongst research teams is ineffective and unsustainable for addressing current and future threats to global health security.

A.4. Long-term strategic investment in the UK's infrastructure, core technologies and talent base, as well as in its existing foreign development investments is needed to not only develop efficacious vaccines for this current pandemic, but to also prepare for future disease outbreaks.

A.5. The FCDO could assist in implementing wider-scale interdisciplinary funding structures of this kind to facilitate research mobilisation for future disasters and pandemics.

A.6. A key challenge with the distribution of a COVID-19 vaccine is the cold storage supply chain. The ultralow cold storage requirements of the Pfizer vaccine could also pose a major challenge for countries with warmer climates, such as those in Asia, Africa and Latin America.

A.7. The FCDO play a leading role in persuading countries to remove tariffs on COVID-critical products by encouraging WTO members to remove barriers, such as intellectual property rights and furthering international high-level dialogue to recognise to renew political will towards global cooperation.

A.8. A global pandemic early warning system should incorporate insights and expertise from public health organisations, ecologists and conservationists. It should also include a dashboard that would consolidate research into potential disease outbreak risks and ensure that public health officials and policymakers were alerted to potential threats.

B. What lessons has the COVID-19 pandemic taught us about the importance of international collaboration in securing global preparedness and resilience against biosecurity threats? Has the UK effectively used its position in multilateral organisations to promote international collaboration in response to COVID-19 and the global health security agenda?

B.1.
Collaborations across boundaries – both nations and sectors – are key to developing non-pharmaceutical innovations in the context of a pandemic. A clear example is the success of the UCL-Ventura CPAP devices.[1] At the start of the COVID-19 pandemic in the UK, national guidance called for early intubation and ventilation of patients, a demand that hospitals could not meet due to lack of resources. **Professor Mervyn Singer** (Division of Medicine) worked with colleagues in China to learn from their experiences of how to create more ventilator capacity. A consortium spanning UCLH clinicians, UCL engineers and Mercedes AMG High Performance Powertrains came together to focus their combined expertise on the large-scale manufacture of non-invasive respiratory support technology. The UCL-Ventura CPAPs were rapidly manufactured at scale and have been delivered to over 60 hospitals. The designs for these devices have also been made freely available online and over 1,900 organisations from 105 countries have requested the designs.[2]

Recommendation: The Government and FCDO should provide funding for collaborative interdisciplinary research across international and sectoral boundaries to find solutions to challenges in the context of a pandemic.

B.2.
Respiratory disease specialists, Intensivists and Infectious Diseases specialists, such as **Professor David Lomas** (Office of the Vice-Provost [Health]) have noted the importance of learning from other countries. Failing to consult with Asian countries and Italy when they were in the midst of managing the first wave of their COVID-19 pandemics meant that the UK missed valuable opportunities to learn how to best prepare for the virus when it eventually struck. A blind spot in the UK's national pandemic simulations (discussed further in Section D.2.) was the focus on pandemic influenza, instead of also considering pandemic coronaviruses, such as SARS or MERS.

Recommendation: The UK needs to place greater emphasis on collaborating with and learning from other countries, especially those with past experience in managing infectious disease outbreaks.

B.3.
Repurposing and leveraging existing funding and networks to address the pandemic has enabled universities, such as UCL, to promote international collaboration in response to COVID-19.

- The NIHR Mucosal Pathogens Research Unit at UCL, led by **Professor Robert Heyderman** (Division of Infection & Immunity), has successfully repurposed NIHR Official Development Assistance (ODA) funding to undertake surveillance, modelling and genome sequencing work to inform the COVID-19 response in Malawi, Kenya[3,4] and South Africa. Researchers in the Institute of Global Health are also collaborating with numerous LMICs[5] to support their response to the pandemic.

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[1] Singer at al. (2020). https://doi.org/10.1016/S2213-2600(20)30422-7
[2] https://www.raeng.org.uk/grants-prizes/prizes/prizes-and-medals/awards/presidents-special-awards-pandemic-service/cpap-breathing-aids
[3] Ojal et al. (2020). https://doi.org/10.1101/2020.09.02.20186817
[4] Uyoga et al. (2020). https://doi.org/10.1126/science.abe1916
[5] https://www.ucl.ac.uk/global-health/covid-19

- **Professor Sir Alimuddin Zumla** (Division of Infection & Immunity) has led several international, multidisciplinary and collaborative projects in research and capacity building and has also advised governments in LMICs on infection control measures.[6]
- **Professor Patty Kostkova** (UCL Centre for Digital Public Health in Emergencies) leveraged research partnerships previously established while investigating the Zika virus in Northeast Brazil to develop a machine learning prediction model for COVID-19. They also deployed thermal drones to assess mass gatherings to enable early warning for the authorities in Northeast Brazil.[7,8]

Recommendation: International collaboration is crucial to combat the spread of the virus, existing global collaborations must be leveraged and better supported through continued and additional funding rather than no-cost extensions

C. Which countries have provided good lessons in how to combat COVID-19? What have embassies been asked to do to collect best practice?

C.1.
China has provided good lessons in how to combat COVID-19, for example:

- The speed at which Chinese authorities have acted to stop the spread of virus, for example, quickly implementing lockdowns in affected areas.
- Increasing test centres and test capacity, which has enabled regions to rapidly mobilise to combat local outbreaks.
- Using neighbourhood health committees to go to people's homes to ensure that they are complying with notifications to self-isolate.

C.2.
South Korea was able to flatten their curve without implementing the restrictive lockdowns that were seen in many other countries, such as the UK. Their strengths in combatting the COVID-19 pandemic can be attributed to:

- National infectious disease management plans that are updated every five years and have integrated capacity-building and performance measures.[9] Having since incorporated lessons learned from the Middle East Respiratory Syndrome (MERS) outbreaks in 2015 and 2018 into their disease management plans, the work of local governments to respond to emerging needs within their regions is strengthened by the national stockpile of PPE.
- Early and mass testing facilitated by public-private partnerships.[7]
- Rigorous and extensive contact tracing, using manual and app-based contact tracing.
- The use of large suburban residential buildings to provide short-term accommodation for people who have tested positive to reduce the risk of household transmission.[10]

C.3.
Thailand is one of the first countries in the world to review how its health system has so far responded to COVID-19 via the Joint Intra-Action Review (IAR) process.[11]

Lessons to be learned from Thailand:

- Adoption of a 'whole of government' and 'whole of society' approach including active engagement with academia and the private sector.

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[6] https://www.uclhospitals.brc.nihr.ac.uk/news/uclh-consultant-leads-international-efforts-tackle-covid-19
[7] Lima et al. (2020). https://doi.org/10.3389/fpubh.2020.580815
[8] https://www.ucl.ac.uk/news/2020/jul/helping-track-and-reduce-covid-19-infections-northeast-brazil
[9] You (2020). https://doi.org/10.1177/0275074020943708
[10] Kwon (2020). https://healthsystemsglobal.org/news/covid-19-lessons-from-south-korea/
[11] https://www.who.int/thailand/news/detail/14-10-2020-Thailand-IAR-COVID19

- Establishing consistent, accurate and transparent communication that helped build trust and increased public confidence and compliance.
- A strong, well-resourced and inclusive medical and public health system that covered the cost of care for migrants with confirmed cases.
- Effective implementation of quarantine procedures and triage and isolation systems for suspected patients due to their experience with SARS, pandemic influenza, and MERS.
- Sustaining the national COVID-19 lab network to remain ready for future waves and other emerging infectious diseases.

C.4.
Vietnam demonstrated one of the world's most successful responses to the COVID-19 pandemic between January and April 16, after which there were no cases of local transmission recorded for 99 consecutive days.[12]

Lessons to be learned from Vietnam:
- Acting early and decisively to implement precautionary measures.
- Intergovernmental and central-local governmental coordination, alongside collaboration with the WHO leading to the development of successful COVID-19 policies.
- Implementation of an integrated, local approach that allowed for a four-tier approach to contact tracing and isolation.

C.5.
In Europe, as Italy was the first country to be hit by the pandemic, the UK should have looked to how they were managing the pandemic to inform their own strategies.

Recommendation: Countries in Asia that were first affected by the pandemic, such as China, South Korea, Thailand and Vietnam and Italy in Europe, would have provided valuable lessons in how to combat the pandemic, had there been a more concerted effort to collect best practice. Central coordination is needed so that the UK can leverage existing expertise within universities, as well as their technical capacities (i.e. in conducting PCR tests).

D. How effective is the UK's current approach to global health security?

D.1.
The current regulatory and legislative environment around NHS data hampers the UK's ability to monitor threats to global health security. It was also due to the gaps in the available data that **Dr Megdie Zhuang** and **Professor Ed Manley** (Centre for Advanced Spatial Analysis), **Professor Rachel McKendry** (Division of Medicine) and **Professor Deenan Pillay** (Division of Infection & Immunity) led the rapid adaptation of existing i-sense tools and technologies to create the i-sense COVID Response Evaluation Dashboard (COVID RED).[13] COVID RED collates and presents data from the ONS, Public Health England and NHS and is currently the only dashboard that explores the entire COVID response system as a whole.

Professor Mahdad Noursadeghi (Division of Infection and Immunity) is part of the team leading the COVID-19 Consortium[14] that is working across UCL, UCLH, Queen Mary

[12] Huynh et al. (2020). https://doi.org/10.1002/pad.1893
[13] https://www.i-sense.org.uk/covid-19/covid-19-response
[14] https://covid-consortium.com/

University of London, Barts Health NHS Trust, and Royal Free London. The Consortium is testing correlates of protective immunity in healthcare workers to better understand why some people develop severe disease and others remain asymptomatic. Notably, the data is also being shared with researchers who successfully apply for access.

Recommendation: There needs to be greater coordination and sharing of data and coordinating local services as the current siloed and monetised approach amongst research teams is ineffective and unsustainable for addressing current and future threats to global health security.

D.2.
Nationwide simulations of a flu pandemic took place in 2007 (Winter Willow) and in 2016 (Exercise Cygnus).[15] However, approaches and strategies to date suggest that there has been little recognition of the plans and procedures developed previously. These rehearsals showed that in the event of pandemic influenza, there would be a shortage of personal protective equipment (PPE) and ventilators, but strategies for addressing these identified risks were not actioned. Additionally, no recommendations from Dame Deirdre Hines' independent review[16] of the UK Government's preparedness and management of the H1N1 pandemic have been implemented.

Recommendation: Risk and Disaster reduction experts, such as **Professor David Alexander** (Institute for Risk and Disaster Reduction), recommend that future exercises should account for a broader range of possible diseases (i.e. not focusing solely on pandemic influenza). To prepare for future outbreaks, the Government must ensure that there are appropriate emergency plans in place, which can be rapidly implemented when necessary.

D.3.
The ability to develop a COVID-19 vaccine at speed has only been possible due to the years of investment into the technologies being employed. The team developing the Oxford COVID-19 vaccine had already used ChAdOx1 vaccine technology to produce candidate vaccines against a number of pathogens including flu, Zika and MERS.[17] Before the outbreak of the current pandemic, they had already begun work on pandemic preparedness with the technology behind ChAdOx, in preparation for 'Disease X' and were able to rapidly mobilise when COVID-19 emerged in China. **Dr Stephen Morris** and **Professor Daniel Bracewell** (Dept of Biochemical Engineering) highlight that the success of the Oxford COVID-19 vaccine trials demonstrates the importance of preparation in the form of consistent, long-term funding for the development of basic technologies and manufacturing processes, as well as training for talented staff. The Imperial COVID-19 Trial[18] has also demonstrated the importance of a national team effort in establishing recruitment sites (including UCLH) across the UK and the world.

Recommendation: Long-term strategic investment in the UK's infrastructure, core technologies and talent base is needed to not only develop efficacious vaccines for this current pandemic, but to also prepare for future disease outbreaks.

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[15] https://www.theguardian.com/world/2020/may/21/did-the-uk-government-prepare-for-the-wrong-kind-of-pandemic
[16] https://www.gov.uk/government/publications/independent-review-into-the-response-to-the-2009-swine-flu-pandemic
[17] https://www.research.ox.ac.uk/Article/2020-07-19-the-oxford-covid-19-vaccine
[18] https://www.imperial.ac.uk/covid-19-vaccine-trial/

E. What should the FCDO be doing to support research and distribution of a COVID-19 vaccine?

E.1.
An example of effective international collaboration and data-sharing is the Covid-19 Mass Spectrometry Coalition (Covid19-MSC),[19] of which **Professor Konstantinos Thalassinos** (UCL Department of Structural and Molecular Biology) is a founding member. To date, more than 500 scientists from 18 countries have joined the coalition and are working to use mass spectrometry to reduce the harm caused by the SARS-Cov2 virus. Those involved with the coalition are sharing sample collection and processing protocols. All data that is obtained will be shared to maximise the benefit for all. The UK arm of the coalition will soon be analysing blood samples from patients to identify molecular markers indicative of disease severity.

Recommendation: The FCDO can work with existing UK investments, such as the Africa Health Research Unit (AHRI), NIHR Mucosal Pathogens Research Unit (MPRU) and new initiatives, such as the Covid19-MSC to evaluate vaccines and establish post-introduction surveillance. Coordination at an international level is needed in order to facilitate access to patient meta-data that will enable countries to develop more effective diagnostic tools.

E.2.
The ability to rapidly mobilise research teams is crucial in meeting the research and development demands associated with developing a vaccine to combat a novel pandemic. The key element of the NIHR's Themed call: Pandemic Flu (2011)[20] was that the research itself would not start until a pandemic occurred that was affecting the UK. It was through this funding call that **Professor Susan Michie** (Division of Psychology and Language Studies) and **Professor Henry Potts** (Institute of Health Informatics) have been leading the 'COVID-19 Rapid Survey of Adherence to Interventions and Responses' (CORSAIR) study with Kings College London using national survey data provided by the Department of Health and Social Care.[21] While the scale of the pandemic has revealed that the amount of funding offered has been insufficient and with a narrow remit, the NIHR's funding structure (i.e. researchers did not need to complete an additional funding bid) meant that they could rapidly mobilise to implement the study.

Repurposing components from other projects enabled Professor Patty Kostkova's (UCL Centre for Digital Public Health in Emergencies) team to rapidly launch an award winning digital app supporting users in the lockdown. Clinically focused COVID-19 research funding streams were not able to support the intervention to rapidly scale up.[22]

Recommendation: The FCDO could assist in implementing wider-scale interdisciplinary funding structures of this kind to facilitate research mobilisation for future disasters and pandemics.

E.3.
While the UK has struggled with testing and tracing, its strengths in viral genomics have led to the UK contributing nearly 45% of all COVID-19 genomic sequences.[23] The COVID-19 Genomics UK (COG-UK) Consortium is delivering large scale, rapid sequencing of the whole

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[19] https://covid19-msc.org/
[20] https://www.nihr.ac.uk/documents/pandemic-flu/20138
[21] https://www.medrxiv.org/content/10.1101/2020.09.15.20191957v1
[22] https://www.ucl.ac.uk/news/2020/jun/how-are-our-behaviours-changing-lockdown
[23] https://www.cogconsortium.uk/news_item/commentary-cog-uk-report-12-15th-october-2020/

virus genome in people with confirmed COVID-19.[24] **Professor Judith Breuer** (Division of Infection and Immunity) is leading the UCL Pathogen Genomics Unit (UCL-PGU)[25] in sequencing the genomes of viruses in London and to date has sequenced over 1000 viruses from London.

Recommendation: Countries must have the ability to monitor changes in the virus at a national scale in order to facilitate the planning of effective public health interventions. The FCDO could play a role in leveraging the UK's expertise in viral genomics to assist other countries with sequencing viruses in their own countries.

F. How can the FCDO ensure that COVAX is successful? What are likely to be the main challenges associated with worldwide distribution of a vaccine?

F.1.

The COVAX fund has struggled to meet its $35 billion target and only obtained sufficient support to sign formal agreements with COVID-19 vaccine manufacturers in September 2020,[26] being outstripped by bilateral deals between countries and vaccine manufacturers signed over the course of the pandemic.[27] However, following the successful trials for the Oxford-AstraZeneca vaccine, the UK is in a unique position to take a lead in supporting global access to vaccines at no profit. Driven by Universities and public sector funding, global equity has been prioritised in the UK, leading to an effective vaccine candidate appropriate for global distribution. At the same time, these commitments to broad and equitable distribution are supported by cutting-edge innovations in bioengineering, which enable flexible and low-cost approaches decentralised, flexible and low-cost models of vaccine manufacturing that leverage and extend local competencies to ensure access is upstreamed from the point of distribution into the process of design. **Professor Andrew Barry** (UCL Dept of Geography) and Dr Ann Kelly (KCL Global Health and Social Medicine) are working with **Professor Martina Micheletti** (Dept of Biochemical Engineering; Vax-Hub) to develop strategies that can embed equitable access concerns in vaccine manufacturing and R&D in the future.

Recommendation: The FCDO should a) promote the model of vaccine development embodied in the Oxford-AstraZeneca vaccine internationally; and b) support actions that explicitly and deliberately embed equitable access concerns in vaccine design and the manufacturing process.

F.2.

There are fears of vaccines being monopolised by wealthier nations, leading to the most longterm and severe effects of COVID-19 being felt in low-and-middle-income countries (LMICs).[28] To respond to the need to design vaccine manufacturing processes with LMICs in mind, in 2018, the Department of Health and Social Care funded two Future Vaccine Manufacturing Research (FVMR) Hubs. **Professor Martina Micheletti** (UCL Dept of Biochemical Engineering) and Professor Sarah Gilbert (Jenner Institute, University of Oxford) are co-leading the UCL-Oxford Vax-Hub. This UCL-Oxford FVMR collaboration is working directly with LMIC partners to develop manufacturing processes suitable for local needs.[25]

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[24] https://www.cogconsortium.uk/ ; https://www.ucl.ac.uk/news/2020/mar/leading-ucl-scientist-joins-major-new-alliance-map-spread-coronavirus

[25] https://www.ucl.ac.uk/infection-immunity/pathogen-genomics-unit

[26] https://www.who.int/news-room/detail/21-09-2020-boost-for-global-response-to-covid-19-as-economies-worldwide-formally-sign-up-to-covax-facility

[27] https://www.ucl.ac.uk/steapp/sites/steapp/files/vax-hub_vaccine_explainer_part_2_manufacturing_new_vaccines_for_pandemics_oct_2020.pdf

[28] Hotez et al. (2020). https://doi.org/10.1371/journal.pntd.0008271

Recommendation: It is vital that vaccine manufacturers in LMICs are enabled to establish a robust COVID-19 vaccine supply with global investment and knowledge and technology transfer initiatives.[29] The FCDO can play a role in assisting LMICs to develop manufacturing processes. To ensure the success of technology transfer initiatives, robust governance structures are required, including strong relationships with centres of scientific and bioprocessing excellence.[30]

F.3.
A key challenge with the distribution of a COVID-19 vaccine is the cold storage supply chain. At the time of writing, the Moderna vaccine and Pfizer vaccines are the most promising candidates with both showing efficacy greater than 90%.[31] A benefit of the Moderna vaccine is that it only needs to be shipped at -20 degrees Celsius, and once thawed, can be kept in standard refrigerators (ranging from two to eight degrees Celsius) for up to 30 days. Conversely, Pfizer's vaccine must be shipped at -70 degrees Celsius and once transferred to a refrigerator, must be used within five days. The Pfizer vaccine's requirement for the 'ultralow' (-70 degrees Celsius and below) chain poses a major challenge to distribution due to only a limited number of facilities, such as large universities or hospitals, having deep freeze storage capacity.

Recommendations: Distribution of the Pfizer vaccine must incorporate careful and detailed coordination of the ultracold supply chain to avoid spoilage. Areas that do not have the resources to purchase sub-80 freezers may wish to consider using large hospitals or other facilities with freezers as distribution points and ask people to drive to these locations or use local vans with refrigeration to ship vials to other locations.

F.4.
The ultralow cold storage requirements of the Pfizer vaccine could also pose a major challenge for countries with warmer climates, such as those in Asia, Africa and Latin America, where high temperatures are often compounded by lack of infrastructure to maintain the cold supply chain (with end-to-end refrigeration), especially during delivery to rural areas and islands.[32]

Recommendation:
There are several potential strategies to overcome the challenges posed by cold supply chains. Firstly, Vax-Hub is investigating new thermostabilisation technologies to make novel vaccines 'cold-chain free by default.'[14] Enabling integration of thermostabilisation from the earliest stages of vaccine manufacturing by developing methods that can be carried out in any manufacturing facility at low-cost will ensure a more resilient supply of vaccines in countries where cold chains are not well developed. Vax-Hub researchers are currently investigating methods to extend the shelf-life of the Oxford ChAdOx viral vector system to develop a product suitable for distribution into geographical regions lacking a cold chain.[14]

Secondly, COVAX and its partner countries should aim to learn from the innovations,[33] adaptations[34] and successes involved with the cold supply chain delivery of the Ebola

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[29] https://news.un.org/en/story/2020/05/1064442
[30] Grohmann et al. (2016). https://doi.org/10.1016/j.vaccine.2016.07.047
[31] https://www.pharmaceutical-technology.com/special-focus/covid-19/how-storage-temperature-could-give-modernas-covid-vaccine-the-edge/
[32] https://www.reuters.com/article/health-coronavirus-vaccines-pfizer-asia-idUSKBN27Q1FO
[33] https://www.telegraph.co.uk/global-health/science-and-disease/deep-frozen-vaccine-reached-400000-people-

vaccine. Like the Pfizer vaccine, the Ebola vaccine also requires sub -70 degree Celsius storage, and has reached over 290,000 people in the WHO Africa Region.[35]

F.5.
Though most trials are experimenting with intramuscular delivery, a nasal spray delivery may eventually prove more effective. Researchers led by Dr Chris Chiu at Imperial College London are working with the Vax-Hub and the Imperial-based FVMR Hub to conduct a small clinical study to explore the effects of delivering the Oxford and Imperial vaccines to the airways.[36] The hope is that directly targeting the cells lining the airways – the typical point of infection for respiratory viruses – may induce a more effective immune response against the SARS-CoV-2 virus. Additionally, the success of nasal vaccines would address some of the logistical challenges posed by traditional intramuscular vaccines where people must receive two doses of a vaccine by a trained health professional. Conversely, a nasal spray could instead be self-administered.[37]

Recommendation: At the time of writing, there were only six vaccines in development with intra-nasal routes of administration.[38] Greater investment must be made into the infrastructure and equipment needed to develop complex delivery routes for vaccines. This could potentially accelerate the development of effective vaccines against COVID-19 by exploring additional delivery methods and targets.

I. What role can the FCDO play in persuading countries to remove tariffs on COVID-critical products and how can the FCDO encourage further information sharing between countries?

I.1.
Throughout the pandemic, global shortages of COVID-19 PPE and related products have put the lives of health and other essential workers at risk. It is also threatening to prolong the COVID-19 pandemic, which will result in greater socio-economic consequences. It is imperative that countries collaborate internationally to contain the outbreak. Forty World Trade Organization members have temporarily removed or deferred duties, taxes and charges on COVID-19 essential medical products.[39] However, more members must remove tariffs to reduce the cost of critical goods, including vaccines.

Recommendations:
The FCDO could engage in the following actions:

- Request for the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Council to waive the implementation, application and enforcement of Sections 1, 4, 5, and 7 of Part II of the TRIPS Agreement in relation to prevention, containment or treatment of COVID-19.
- Lead further international high-level dialogue to recognise and share successful COVID-19 policies and lessons learnt to renew political will towards global cooperation.

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helped-stop-ebola/
[34] Jusu et al. (2018). https://academic.oup.com/jid/article/217/suppl_1/S48/4999139
[35] https://www.who.int/news/item/14-02-2020-four-countries-in-the-african-region-license-vaccine-in-milestone-for-ebola-prevention
[36] https://www.imperial.ac.uk/news/203653/landmark-coronavirus-study-trial-inhaled-imperial/
[37] https://www.biospace.com/article/why-an-intranasal-covid-19-vaccine-could-be-more-efficient-and-effective/
[38] https://www.clinicaltrialsarena.com/comment/nasal-spray-vaccine-covid-19/
[39] https://www.wto.org/english/tratop_e/covid19_e/services_report_16092020_e.pdf

- Support and encourage WTO Members to remove barriers such as intellectual property rights e.g. patents, copyright and protection of undisclosed information.

J. What role can the FCDO play in ensuring cooperation in vaccine distribution?

J.1.
Multi-lateral efforts through Governments and United Nations agencies will bring the pandemic to an end sooner. Vaccine nationalism will prolong the pandemic and lead to a larger economic cost worldwide. The global nature of the pandemic in turn requires a global solution and solidarity.

Recommendations:
The FCDO can consider the following actions for ensuring cooperation in vaccine distribution:

- Employ existing financing systems e.g. Coalition for Epidemic Preparedness Innovations (CEPI).[40]
- Reduce the COVID-19 global resource gap by increasing funding for the WHO's Access to COVID-19 Tools Accelerator (of which COVAX is one pillar) to facilitate sharing amongst countries.
- Galvanise wider private sector donations (particularly from industries that profited from the pandemic e.g. the technology sector and online distributors) to enable advanced market commitments to vaccine manufacturers agreed at affordable prices for LMICs.

K. What should a 'global pandemic early warning system' look like? What role should the UK Government play in its creation?

K.1.
It is possible to predict infectious disease outbreaks with a high degree of accuracy. **Professor Kate Jones** (Division of Biosciences) and the Centre for Biodiversity and Environment Research[41] has conducted extensive research into the relationship between infectious disease and habitat loss, biodiversity, bats and live wildlife markets. Her work has focused on predicting and modelling other infectious diseases, such as Ebola[42] and Lassa fever[43]. Before the emergence of the COVID-19 pandemic, Professor Jones and her colleagues had repeatedly warned that environmental degradation around the world was increasing the likelihood of 'spillover' events and pandemics. Additionally, at least three papers[44] published in 2019 identified a risk of bat coronavirus spillover potential in Southern China.

Recommendation: To prevent devastating disease outbreaks[45] becoming more common, a 'global pandemic early warning system' should incorporate insights and expertise from public health organisations, ecologists and conservationists. A vital component of this system would be to work with these experts to examine the ultimate causes of disease (i.e. spillover from wildlife) as opposed to solely focusing on proximate causes (i.e. human-to-human

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[40] https://cepi.net/
[41] https://www.ucl.ac.uk/biosciences/departments/genetics-evolution-and-environment/research/centre-biodiversity-and-environment-research-cber
[42] Redding et al. (2019). https://doi.org/10.1038/s41467-019-12499-6
[43] Gibb et al. (2019). https://doi.org/10.1080/20477724.2017.1369643
[44] Wang & Anderson (2019). https://doi.org/10.1016/j.coviro.2018.12.007
[45] https://thebiologist.rsb.org.uk/biologist/158-biologist/features/2404-there-were-at-least-three-papers-in-2019-that-said-coronaviruses-might-be-a-real-problem-in-south-china-3

spreading). Developing a dashboard, similar to the i-sense dashboard (described in Section D.1.), but on an international scale, would consolidate research into potential disease outbreak risks and ensure that public health officials and policymakers are alerted to potential threats.

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- **Division of Biosciences** (Professor Kate Jones; Professor Konstantinos Thalassinos);
- **Division of Infection and Immunity** (Professor Judith Breuer; Professor Robert Heyderman; Professor Mahdad Noursadeghi; Professor Deenan Pillay)
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- **UCL School of Pharmacy** (Ms Oksana Pyzik).

We would be pleased to speak further about our response. Please contact Audrey Tan (audrey.tan@ucl.ac.uk).

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[46] https://www.ucl.ac.uk/public-policy/
[47] https://www.ucl.ac.uk/steapp/collaborate/policy-impact-unit-1