

# Call for Evidence

## Emerging diseases and learnings from Covid-19

The House of Commons Science and Technology Committee has launched an [inquiry](#) to examine how the Government is applying lessons learned from the Covid-19 pandemic, and which of these could be applied to prevent the emergence and spread of new emerging diseases with pandemic potential. The Committee is also seeking to examine the UK's biosecurity framework and involvement in international biosecurity initiatives.

The Committee is seeking written submissions addressing any or all of the following topics:

- **The causes of zoonotic disease emergence and 'spillover events', the types of zoonotic disease most likely to emerge; and the potential global implications of a future zoonotic disease outbreak;**

### Causes:

- Habitat loss forces more interactions between wildlife and humans, which can lead to a spillover event<sup>1</sup>. This is of particular concern in developing countries where rainforests or similar environments are being encroached into. Additionally, an increasing issue is being found with urban green spaces, which present an increasing risk for potential infections, for example through tick-borne diseases<sup>2,3</sup>.
- Overuse of antimicrobials across all sectors and environmental pollution are likely to contribute to the emergence of antimicrobial resistance from the environment. Unlike COVID-19 which was caused by a single virus (SARS-Cov2 and its variants), antimicrobial resistance could emerge in numerous species, in numerous different organisms (e.g., bacteria, fungi, viruses and parasites) and be conferred by numerous different resistant mechanisms. Antimicrobial resistance is sometimes labelled a 'silent pandemic' but given it has already been associated with ~5 million deaths globally (in 2019)<sup>4</sup>, and is estimated to cause 10 million deaths annually by 2050 (costing US\$100 trillion), arguably it is not so silent since mortality rates and projected costs to the economy are predicted to increase significantly<sup>5</sup>.
- Climate change is a cause of disease emergence; milder winters have caused spread of the bluetongue virus, which is spread by midges.

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<sup>1</sup> <https://doi.org/10.1098/rsif.2018.0403>

<sup>2</sup> <https://doi.org/10.1111/zph.12913>

<sup>3</sup> <https://doi.org/10.1016/j.ttbdis.2016.12.009>

<sup>4</sup> [https://doi.org/10.1016/s0140-6736\(21\)02724-0](https://doi.org/10.1016/s0140-6736(21)02724-0)

<sup>5</sup> <https://dx.doi.org/10.1136%2Fejhpharm-2022-003241>

Milder winters have resulted in less midges dying off; increased midge populations have consequently spread across the Channel, resulting in cases in England<sup>6</sup>. Although this disease isn't technically a zoonotic disease, it highlights the impact climate change has on disease spread which could be applicable to other vector-borne diseases.

Types of disease likely to emerge / potential global implications:

- Viral pathogens can often emerge more rapidly than other pathogens. Recently, there has been both vector-borne (West Nile and Zika virus), and respiratory (SARS CoV-2) viral outbreaks. Both routes have been challenging to control. Early warning of rising levels of infection requires surveillance, which together with machine learning and modelling can help inform interventions prior to outbreaks becoming problematic. This is costly and the disasters prevented not easily quantified.
- Avian influenza has impacted poultry farming globally, but unchecked spread provides more opportunities for mutations that could enable transmission to humans, and therefore lead to pandemic flu strains. It has been noted that changes in avian migration patterns due to climate change will most likely affect the spread of avian influenza<sup>7</sup>.
- **The extent of UK preparedness for an emerging disease outbreak with pandemic potential, and how this could be enhanced, including an assessment of recent policy announcements such as the refresh of the UK Biological Security Strategy;**
  - Only looking at the extent of UK preparedness for emerging disease outbreaks with 'pandemic potential' may pose to narrow a view, and risk ignoring diseases which are still of concern to public / wider health. For example, increases of invasive group A Streptococci, polio and syphilis (which are not zoonotic and would not be considered pandemic) and monkey pox (zoonotic but not pandemic) are still of concern, and should still be prepared for. Therefore it needs to be decided in advance at what level of disease incidence should action be taken. Adopting a hierarchy of responses could be helpful, to ensure that responses and plans are in place for all risks, but with a focus on those with pandemic potential at the top.
  - From the Covid-19 pandemic, it is clear that a rapid, harmonised response is essential to reduce transmission. Therefore having effective surveillance and monitoring systems in place for diseases of concern ensures that a rapid-enough response can take place to

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<sup>6</sup> <https://doi.org/10.1098/rsif.2016.0481>

<sup>7</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2709837/>

reduce initial spread, and overall mortality. Capacity is another major consideration; if a new threat arises, developing novel lateral flow tests takes time and requires clinical samples to screen antibodies. PCR-based tests can be established much faster, and also provide key epidemiological data to identify how patterns of disease are changing. The dismantling of this large scale capacity for PCR testing post-pandemic means that lockdowns are more likely to be required again as it takes time to scale up and staff these testing facilities. Closing down these units - which could have been repurposed towards providing more capacity for routine PCR-based testing rather than being closed - does not suggest that lessons have been learned, nor that there is any longer term plan for having this capacity available should another pandemic occur<sup>8</sup>.

- **Whether the threat from animal and other diseases receives sufficient cross-government priority;**
  - Defra's Weybridge laboratory was rated "not fit for purpose" and needs additional funding to ensure capacity in the event of a disease outbreak. Recently, £200m has been allocated, in addition to £1.4bn allocated in 2020, but the expected cost to bring the laboratory up to standard is £2.8bn. Weybridge is the main zoonotic disease testing laboratory in the UK<sup>9</sup>.
- **Additional policy initiatives and solutions needed in the UK and internationally to reduce the risk of the future spread of emerging diseases with pandemic potential.**
  - Resurging as well as emerging diseases should be considered / have preparedness plans put in place.
  - Reinforcement of the One Health Joint Plan of Action 2022 – 2026<sup>10</sup> will contribute to reducing the risk at local, regional and worldwide level. This implies working to reduce "silos of knowledge" as well as collaboration with world regions where the risk of emerging diseases (hot tropical spots<sup>11,12</sup>) is higher than in other regions of the world.

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<sup>8</sup> <https://www.theguardian.com/world/2022/apr/17/lessons-learned-from-covid-can-start-a-health-revolution-lighthouse-labs-chris-molloy>

<sup>9</sup> <https://www.nao.org.uk/reports/improving-the-uks-science-capability-for-managing-animal-diseases/>

<sup>10</sup> <https://www.who.int/news/item/17-10-2022-one-health-joint-plan-of-action-launched-to-address-health-threats-to-humans--animals--plants-and-environment>

<sup>11</sup> Allen, T., Murray, K.A., Zambrana-Torrel, C. *et al.* Global hotspots and correlates of emerging zoonotic diseases. *Nat Commun* **8**, 1124 (2017). <https://doi.org/10.1038/s41467-017-00923-8>

<sup>12</sup> Halliday, J. E. B., Allan, K. J., Ekwem, D., Cleaveland, S., Kazwala, R. R., & Crump, J. A. (2015). Endemic zoonoses in the tropics: A public health problem hiding in plain sight. *The Veterinary Record*, **176**(9), 220–225. <https://doi.org/10.1136/vr.h798>.

- Antimicrobial resistance (AMR) has often been referred to as the 'silent pandemic' and therefore needs to be considered in any pandemic preparedness plans. Not only should there be preparedness plans to an AMR-linked outbreak; reducing the incidence of AMR in the first place through long-term policy initiatives is also necessary e.g., reducing inappropriate and overuse of antimicrobials across all sectors, reducing raw sewage release into the environment and pushing for initiatives relating to prevention.
- More stringent regulations and promotion of better understanding of what constitutes appropriate antibiotic use in relation to emerging diseases – during the pandemic antibiotic prescriptions were very relaxed, despite the lack of evidence for a positive outcome. For example, it was estimated that over 70% of Covid-19 patients have been prescribed antibiotics despite the prevalence of bacterial co-infections among patients being around 7%, which undermines previous antimicrobial stewardship efforts<sup>13</sup>.
- Better prioritisation of surveillance initiatives, alongside machine learning and modelling is necessary to help inform what interventions are appropriate. These models can be adapted to incorporate changing climatic conditions, land use etc. which is essential for analysing potential pandemic risks in our rapidly changing world.

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<sup>13</sup> <https://doi.org/10.1016%2Fj.cmi.2020.07.016>