

1. The Academy welcomes the opportunity to respond to the House of Lords Ad Hoc Committee on Intergovernmental Organisations following its call for evidence on 'Acting through Intergovernmental Organisations to Control the Spread of Communicable Diseases'. The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure these are translated as quickly as possible into benefits for society. The Academy has previously addressed issues relating to pandemic influenza in its joint report with the Royal Society '*Pandemic Influenza: Science to Policy*',¹ and recent follow-up symposium (a report of which will be published in Spring 2008). Our Fellows have a wealth of expertise in basic and clinical malaria, TB and HIV research. We have chosen to address specific questions, with reference to each communicable disease where possible. We would be pleased to expand on any other points made in this submission.
2. **A recent report on Communicable Diseases by the UK Department of Health stated that "post-war optimism that their conquest was near has proved dramatically unfounded". What is your assessment of the overall position? More specifically, is it simply that not enough progress is being made in reducing the spread of such diseases? Or is the global situation actually deteriorating? Is it exaggeration to talk of a crisis? (1)**

With regard to avian influenza, the Academy considers that greater effort is required at an international level to prevent spread of avian disease. A recent symposium, held by the Academy of Medical Sciences and Royal Society, identified the need for particular efforts in South East Asia and Africa, where poultry and humans live in close proximity and live poultry markets are thought to contribute to the maintenance and dissemination of avian influenza viruses. With avian influenza endemic in poultry in three continents, management and control of this reservoir is key to managing pandemic potential. Thus, we recommend investment in avian vaccines, particularly standardisation of antigen content, in combination with greater research into new vaccines. Consistent use of the chosen vaccine must also be ensured. In addition, it may be necessary to improve surveillance and monitoring systems in African countries, where levels of infection in animals and birds are unknown. To date, surveillance via detection of H5N1 in dead birds has proved to be useful; support is needed for monitoring efforts in all countries.

3. The Academy is aware that progress has been made in reducing TB infection in some regions (Asia, Latin America and the Caribbean)² through the implementation of highly effective 'Directly Observed Treatment Short Course' (DOTS).³ This has been supported by the World Health Organisation (WHO) and the International Union Against Tuberculosis and Lung Disease (IUATLD), together with strong commitment, dedicated funding and co-ordinated action of global networks and organisations including the 'Stop TB Partnership' and the 'Global Fund to fight AIDS, TB and Malaria'. However, successes in certain areas are offset by the increase in TB infections in Sub-Saharan Africa.⁴ Predisposition to TB by HIV is a key determinant of global spread and progress has been held back by the marked global rise in HIV infection. It is clear that greater progress in control of HIV is a

¹ Academy of Medical Sciences and Royal Society (2006). *Pandemic Influenza, Science to Policy*. www.acmedsci.ac.uk/p99puid89.html

² DFID (2007). Tuberculosis (TB). <http://www.dfid.gov.uk/Pubs/files/mdg-factsheets/tuberculosisfactsheet.pdf>

³ WHO and Stop TB Partnership (2006). *The Stop TB Strategy. Building on and enhancing DOTS to meet the TB-related Millennium Development Goals*. http://www.who.int/tb/publications/2006/who_htm_tb_2006_368.pdf

⁴ <http://www.dfid.gov.uk/Pubs/files/mdg-factsheets/tuberculosisfactsheet.pdf>

crucial step in limiting the spread of TB infection. Moreover, the rise in the spread of the multi-drug resistant TB strains, MDR and XDR, should be urgently addressed. The development and spread of TB strains resistant to all antibiotics would lead to a public health crisis. Efforts to stem this rise, through improved monitoring of infection, expansion of DOTS and the development of more potent drugs that would reduce the duration of treatment and thus improve adherence, are imperative.

4. Significant funds and efforts are being directed towards a reduction in HIV infection and data indicate downwards trends in prevalence in some countries.⁵ However, sustained and co-ordinated support will be crucial to prevent further rises in infection. The roll out of effective antiretroviral therapy (ART) has made an impact on mortality and morbidity in developed countries and progress in reducing/stabilising mortality is beginning to become evident in resource poor countries where the programmes are effective.⁶ However, the major disadvantage of ART is that treatment must be continued for life, thus development of resistance is a serious risk if adherence to treatment is poor. Additionally, in the absence of improvements in infrastructure necessary to ensure accessibility of HIV treatments, HIV and TB infection rates in developing countries will increase.
5. In contrast to TB and HIV, progress in reducing malaria-related mortality and morbidity is evident in a number of countries, such as Vietnam and South Africa^{7,8} and use of insecticide-treated bednets has increased in many African countries.⁹ Continued provision of effective prevention and control measures, including combination antimalarial chemotherapies and insect control, will be essential to continue this trend and to reduce the disease burden where transmission rates and infection levels remain high.
- 6. What reliable data exist regarding the numbers of people infected globally with the four diseases on which the Committee is focusing particular attention? What trends are discernible in both the numbers infected and the patterns of infection? And what are the main underlying causes of infection and of any changes in its incidence and pattern? (2)**

Where communications are good, WHO data regarding cases of human influenza infection are reliable, although infection data are difficult to obtain from more remote rural areas of some Asian and African countries. Extensive surveillance efforts and early reporting of confirmed cases is needed to ensure full reliability of data. As mentioned above, there is little information regarding prevalence of influenza infection in mammals, such as pigs, and greater efforts are required to assess infection levels in birds and animals in Africa.

7. In well-resourced countries, data for TB, malaria and HIV infection are reasonably reliable. For instance, data have demonstrated an increase in TB infection rates in the UK over recent years.¹⁰ Yet, latent TB infection may be carried for many years before visible disease occurs and skin tests designed to detect latent infection lack

⁵ UNAIDS and WHO (2007). AIDS Epidemic Update.
http://data.unaids.org/pub/EPISlides/2007/2007_epiupdate_en.pdf

⁶ *Ibid.*

⁷ http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/Browsable/DH_4985739

⁸ Sharp, Kleinschmidt, Streat et al., (2007). Seven Years of Regional Malaria Control Collaboration – Mozambique, South Africa and Swaziland. *Am J Trop Med Hyg* 76(1): 42-47.

⁹ UNICEF (2000). Malaria and Children. Progress in Intervention Coverage.
http://www.unicef.org/health/files/MalariaOct6forweb_final.pdf

¹⁰ HPA (2006). Tuberculosis Update
http://www.hpa.org.uk/infections/topics_az/tb/pdf/newsletter_2006.pdf; Euro Surveill (2006). Epidemiology and response to the growing problem of tuberculosis in London.
<http://www.eurosurveillance.org/em/v11n03/1103-228.asp>

specificity and sensitivity. Infection figures could thus be far higher than currently thought. Full validation and development of new diagnostic tests are essential to ensure improved accuracy of data.

8. Additionally, reliable data are lacking where fewer resources are dedicated to TB surveillance. The accuracy of infection data and temporal patterns will only be increased if diagnostic methodologies for malaria and TB improve and are taken up more widely. Similar reliability problems compound data collection for HIV infection, given its latency in earlier stages of infection, such that most data are based on cases of HIV-related disease, rather than initial latent infection. In the absence of improved surveillance, testing and adherence to treatment in many developing countries, it is likely that infection will increase.

9. What intergovernmental surveillance systems exist to give early warning of outbreaks? Are these systems adequate? And what improvements might be made? (3)

What intergovernmental action is planned or in hand for early detection of avian flu transmission from birds to humans and from human to human in potential source countries – is this sufficiently effective to prevent a pandemic? What more could be done? (11)

WHO is responsible for oversight of global influenza surveillance systems (through the WHO Collaborating Centres and the Global Outbreak Alert and Response Network [GOARN]), setting international recommendations for surveillance and investigating and responding to clusters of disease. We consider this to be an effective system.¹¹ GOARN provides the response arm for global outbreaks and has responded to a number of events in over 20 countries.¹² We are aware that steps are being taken to improve surveillance and welcome such activity.

10. The Academy notes that the Global Early Warning and Response System for Major Animal Diseases, including Zoonoses (GLEWS) surveillance system, operated through the Food and Agriculture Organisation of the United Nations (FAO), World Organisation for Animal Health (OIE) and WHO, plays a key role in worldwide avian influenza monitoring. However, although information is received through National Influenza Centres, there is an urgent need to support improvements in the capacity of infrastructure of national surveillance systems around the world.
11. Improvements could also be made to ensure that surveillance is carried out in healthy animals including pigs, wild birds and poultry, in farms, back yards and live poultry markets. The latter are of particular importance since they are thought to maintain, amplify and disseminate avian influenza viruses and the FAO could focus more heavily on this issue. The Academy considers it important to strengthen worldwide surveillance structures for cluster and syndromal detection and we welcome the steps taken by WHO to address this. By inclusion of a requirement for member countries to develop their core capacity, the International Health Regulations may help to develop these systems where required.¹³ However, we consider that improvements in multilateral funding may be required for such developments in capacity and infrastructure.
12. Further to cluster detection, an additional sentinel system could be useful to join farming communities or areas where pigs, poultry and people live in high density so that outbreaks can be identified before they spread to other areas.

¹¹ Royal Society and Academy of Medical Sciences (2006). Pandemic Influenza: Science to Policy. www.acmedsci.ac.uk/p99puid89.html

¹² Merianos A and Peiris M (2005). International Health Regulations (2005). Lancet 366:1249-1251

¹³ <http://www.who.int/csr/ihr/capacity/en/index.html>

13. Within the UK, the Academy considers that the Department of Health (DH) and Department for Environment, Food and Rural Affairs (DEFRA) must continue to work closely with WHO to enable effective surveillance and diagnosis of cases of influenza. In the long-term, this capacity might be relevant to other infectious diseases. In the event of outbreaks and/or a possible pandemic, we recommend that collection and sharing of data in real time is co-ordinated through intergovernmental organisations at the EU, EU-G8 and WHO/UN level.

14. Given the continuance of current or planned intergovernmental programmes to prevent or control the four diseases, what predictions can be made of their likely spread and pattern over the next ten years? (4)

Whilst mathematical modelling is able to give quantitative estimates of the pattern and speed of spread of a pandemic strain of avian influenza once it has emerged, spread will depend largely on the extent to which surveillance networks and control measures are implemented and/or developed around the world. Whilst the UK and many EU member states may have well-developed pandemic response frameworks, outbreaks in rural African or South East-Asian countries could spread extensively prior to detection or treatment. Variation in monitoring and preparedness make predictions of likely spread difficult.

15. Through the influence of national and international programmes to control the spread of malaria through interventions such as insecticide-treated bednets, indoor spraying and Artemisinin-based combination therapy, it could be predicted that spread of malaria may decrease over the next ten years. However, a key determinant of the likely pattern of malaria spread will be the drug resistance profile of the parasites in different parts of the world. Areas that have seen significant reductions in disease through national and international programmes could see a re-emergence of infection if Artemisinin-resistance becomes established. Similarly, drug resistance significantly affects control of TB and HIV infection. Although new HIV drugs are in development, there is concern that strains that have become resistant to current ART drugs may transmit widely in the population.

16. Within the UK, the likely pattern of spread of TB will depend to a large extent on the political commitment to focus on issues such as diagnosis, control programmes, treatment regimens and poverty. The frequency of migration of individuals from areas of high endemicity to low endemicity may also affect further spread.

17. What do you consider to be the principal blockages to achieving progress in the prevention or control of the four diseases? And how might these blockages be removed by more, or better targeted or better co-ordinated intergovernmental action? (5)

One blockage to progress in control of influenza is the lack of a unified and standardised approach to influenza virus vaccination timings and doses. This is, in part, through a lack of opportunities for comparing one formulation directly with another, which prevents awareness of the benefits of particular approaches. We recommend that WHO leads an initiative to ensure that samples are shared and that comparative experiments are carried out to encourage development of a standardised approach.

18. The overall intensity of effort in preparing for an influenza outbreak serves as a model to demonstrate how preparedness can be heightened in both resource-rich and poor countries. Thus giving similar priority to infectious diseases such as TB and malaria could be of significant benefit. Establishing a panel, similar to the

inter-governmental panel on climate change, would enable similar approaches to be used to manage threats from communicable diseases.

19. In TB infection, the main blockages are the difficulty in diagnosis, the lack of a universally effective vaccine and the need to treat for six months or longer for resistant strains. There is a critical need to encourage medical research to develop new treatments to counter the rise in multi-drug resistance and simultaneously to utilise currently available diagnostic and treatment tools as effectively as possible. Continued funding is required, combined with technical expertise and implementation of diagnostic and control measures. Whilst collaboration between TB and HIV services has not been successful in the past, owing to concerns that the stigma surrounding HIV infection would prevent people from attending a clinic for TB treatment, the Academy considers that improvements in collaborative activity between these services could be strengthened.
20. It will also be necessary to address the stigma surrounding HIV to improve attendance at TB treatment centres, but also to encourage a greater proportion of individuals to be tested specifically for HIV - the main blockage to better control of HIV infection. Further blockages in developing countries that should be addressed urgently include the implementation of prevention techniques that have the acceptance of the relevant populations and meeting the cost of sustaining effective ART programmes (both in terms of providing drugs and human resources for dispensing and monitoring of patients).
21. Many of the same factors are also blockages to progress in malaria control. Widespread access to effective treatment, monitoring and diagnosis, adequate funding and sustained efforts are required. Co-ordinated efforts to monitor the development of parasite resistance (through WHO) and to support research into the next generation of antimalarial treatments are urgent priorities.
22. In all cases, intergovernmental action can encourage co-ordinated and continued funding and efforts on the part of governments in developing and developed countries. It can also encourage best use of scientific advances in policy and the provision of policy guidance. Furthermore, intergovernmental action can encourage the development of internationally agreed targets, implementation of prevention and control strategies in health programmes, data collection and monitoring of disease and management of drug supplies. Moreover, intergovernmental organisations can effectively bring together non-governmental organisations (NGOs), technical experts, governments and other stakeholders to manage any blockages and make the best use of resources.
- 23. What are the main non-health causes (e.g. global warming, poverty, changes in land use, international travel, lifestyle, population) of the spread of the four diseases? To what extent can intergovernmental action in non-health fields contribute to alleviation of their spread? What action is taking place or planned in these areas? What more needs to be done? Do you consider that there is sufficient joined-up thinking in approaching the problem? (7)**

The link between climate change and human health is being increasingly recognised. Vectors of disease, including the *Plasmodium* parasite responsible for transmission of malaria, are increasingly able to invade previously void areas with a steady alteration of temperature and/or meteorological conditions. Moreover, global trade is increasing the volume and speed of movement of people and animals, thereby increasing the likelihood of rapid spread. The SARS outbreak of 2003 was limited by quarantine measures but an outbreak of pandemic influenza, if

it was only detected after it had become established, could have dire consequences.

24. Lifestyle and cultural factors are also critical in affecting the spread of these diseases. For instance, whilst education may be a key component of control measures, it remains difficult to change behaviour about the risks of influenza transmission from proximity to farm animals, when risks are not perceived as related to exposure. Overcrowding and poor nutrition increase the risk of TB infection and progression to disease and the stigma of HIV can prevent people presenting for treatment of their TB. Good leadership, education and engagement with technical experts are necessary, in combination with sufficient funding. Multi-disciplinary approaches to containment are essential and depend on co-ordinated efforts.

25. Cases of TB fell progressively in the UK until the mid-1980s but started to rise again in the early 1990s. Around 6,500 cases are now reported each year, an increase of about a quarter since the early 1990s. What are the main factors of the revival of TB infections in Britain? And how could intergovernmental action help to reverse the trend? (8)

Within the UK, immigration and international travel strongly influence TB infection rates. For instance, rates of infection between 2000 and 2004 increased in the non-UK born population but remained stable in the UK-born population. The majority of cases were reported in individuals from South Asia or sub-Saharan Africa.¹⁴ As described above, inadequate adherence to treatment and the difficulty of diagnosing a latent infection, which does not present with symptoms for many years, have also played a role in encouraging a rise in infection. In particular, poor adherence to treatment encourages the transmission of multi-drug resistant strains.

26. What interchange exists between states in regard to knowledge of and training in the diagnosis and treatment of the four diseases or regarding preparations for dealing with outbreaks? What improvements might be made through intergovernmental action? (15)

The main source of education and co-ordination of knowledge regarding TB has been through WHO and the IUATLD, whilst the International AIDS Society, Global Fund to Fight AIDS, TB and Malaria, WHO, the United States President's Emergency Plan for AIDS Relief (PEPFAR) and the Joint United Nations Programme of HIV/AIDS (UNAIDS) are all actively involved in training in the diagnosis and treatment of HIV. We consider that the link between training in TB and HIV could be strengthened in order to address the growing burden of these increasingly linked diseases. Crucial to these efforts will be sustained, consistent activity by all organisations involved and a focus on surveillance, for cases to be detected at all.

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The Academy of Medical Sciences

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¹⁴ HPA (2006). Migrant Health. Infectious Diseases in non-UK born populations in England, Wales and Northern Ireland. A baseline report. http://www.hpa.org.uk/publications/2006/migrant_health/default.htm; French CE, Antoine D, Gelb D et al., (2007). Tuberculosis in non-UK-born persons, England and Wales, 2001-2003. *Int J Tuberc Lung Dis* 11(5): 577-84.

medical scientists from hospitals and general practice, academia, industry and the public service.

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