

## EDITORIAL

### The multisectoral approach to prevent next pandemic

**The outbreak** of SARS, in early 2003, the first severe and readily transmissible novel disease to emerge in the 21st century, and subsequently the spread of highly pathogenic avian influenza (H5N1) led to the realisation that (a) a previously unknown pathogen could emerge from a wildlife source at any time and in any place and without warning, threaten the health, well-being, and economies of all societies; (b) there was a clear need for countries to have the capability and capacity to maintain an effective alert and response system to detect and quickly react to outbreaks of international concern, and (c) responding to large multi-country outbreaks or pandemics requires global cooperation and global participation using the basic principles combined in One Health.<sup>1</sup> The activity of the Ebola virus in Africa, Nipah virus in South Asia, and the ongoing COVID-19 pandemic caused by a novel coronavirus have been a wake-up call for the Governments of various countries and International agencies responsible for combating infectious diseases.<sup>2</sup>

According to World Health Organization- '**One Health**' is an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes.<sup>3</sup> In May 2021, in preparation of the World Health Assembly, leaders of the EU, the G7, and the G20 emphasized the need for future preparedness. One Health consists of the triad of human health, animal health, and the environment, but the latter is often neglected. However, the environment is the most dynamic and therefore the most confounding sector of the One Health triad as evident from the examples of antibiotic resistance and climate change.

The US Centers for Disease Control and Prevention and the One Health Commission shared a common view. "It is a collaborative, multisectoral, and transdisciplinary approach- working at the local, regional, national, and global levels with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment". Recent health problems are frequently complex, transboundary, multifactorial, and across species, and approach from a purely medical, veterinary, or ecological standpoint is unable to produce sustainable solution.

In 2015, Lancet Commission published a report- "Human activities have degraded the earth's **ecosystems** to such an extent that basic life support services have become threatened. Among the threats are production of greenhouse gases, ozone depletion, loss of nitrogen-phosphorus cycle, deforestation, desertification, ocean acidification, chemical pollution, zoonotic disease outbreaks, biodiversity loss and particulate air pollution.<sup>4</sup> All living beings in nature have natural predators. Within a landscape, diverse communities coexist and the prey-predator relationship keeps a check on populations. The food chain has evolved in a way that no species can dominate the chain. It is thus critical to conserve and retain the physical and biological diversity

in its natural composition. Human interventions in landscapes alter the species composition and population sizes, resulting in reduced ecosystem balance.

The stage was well set for the **pandemic**. An increase in the world population from 2.58 billion in 1951 to 6.1 billion in 2000, and further to 7.8 billion in 2020 has been accompanied by a rapidly growing urban segment which expanded from 46.7 per cent in 2000 to 56.2 per cent in 2020. With this increase in urbanization and a greater contact between humans and wildlife, there is a rise of new virus outbreaks globally. Deforestation blurred the boundaries between the forest dwelling microbes, captive bred or domesticated veterinary population and human habitat.<sup>1</sup>

The apparent dominance of the human species comes with a huge responsibility. Thus, in our quest to ensure the health and continued existence of humanity, consideration must be given to the complex interconnection and interdependence of all living species and the environment-the concept of One Health. The first dimension of 'The Lancet One Health Commission' is the shared environment to consider how animals, including livestock, wildlife, and companions, share a common environment with humans in both rural and urban settings. The second dimension is safe food and food systems to rely on animals both as food and to help produce food. The third dimension is shared medicines and interventions to recognize that several drugs used to treat human diseases originated from animal and agriculture and also some drugs are used simultaneously in animals and humans for treatment of infections thus contributing to AMR.<sup>1</sup>

**Climate Change** has distorted the threshold of Nature. For millions of years, the rivers originating from majestic Himalayan Mountain brought alluvial soil onto the flood plains. However, large dams built on the rivers has nearly stopped the flow of nutrients from the hills to the plains. Intensification of agriculture and the use of chemicals has stressed insect populations. Large barriers built to support intensive farming, have submerged forests and created new breeding grounds for various species of insects.<sup>2</sup>

It has been noted that approximately 75% of new emerging human infectious diseases are defined as zoonotic and are naturally transmitted from vertebrate animals to humans.<sup>3</sup> New and re-emerging zoonoses have evolved throughout the last three decades partly as a consequence of the increasing interdependence of humans on animals and their products and our close association with companion animals including changes in ecosystems and land use, intensification of agriculture, urbanisation, and international travel and trade. Diseases like rabies, salmonella, and West Nile virus infections are examples of zoonotic diseases and zoonoses should therefore be considered as a critical risk factor to human health and well-being regarding

infectious diseases.

"Our wits versus their genes" was the appropriate phrase used by Joshua Lederberg, while describing the challenge posed by microbes, in his innovative article on the history of infectious diseases published in 2000. As the winner of the 1958 Nobel Prize for Medicine, awarded for his pioneering work on microbial genetics, he was well positioned to advise on how best we can coexist in ecological harmony while keeping away dangerous infections.

The ongoing COVID-19 pandemic has highlighted how extremely vulnerable is our society when unforeseen infectious disease events happen. With the changing risks of global spread, the timeliness of early detection is becoming a serious factor in our ability to detect outbreaks at the stage when they still can be contained. The covid pandemic has clearly brought genomic surveillance to the center stage. The scale of sequencing of SARS-CoV-2 genomes has pushed aside all other surveillance systems. The next pandemic could be caused by a completely different pathogen and it would be logical to utilize a platform with a broad focus, targeting all potential infectious agents.<sup>4</sup>

Most novel diseases likely circulate for some time in animals and humans before they eventually are detected in clinical cases. There is thus a need to collect standardised samples that represent the human and animal microbiome (bacteriome and virome) in a comparable way over time and between countries. Sentinel surveillance of wild birds is already in place for avian flu in some countries; similarly, there are projects targeting mosquitos and ticks for surveillance of specific vector borne diseases.

As per the World Health "An effective platform is required for collaboration and facilitation among various stakeholders within a diverse society's complex health system. However, the challenges include: (i) shortage of trained personnel in the rural and urban areas, (ii) lack of health promotion, especially in rural areas, (iii) scarcity of interventions, innovations and technologies, (iv) absence of resource allocation, and (v) omission of One Health concept from national and State health policies".<sup>2</sup>

Bangladesh is at a **historical juncture** by graduating to DC status by the improvement across the five components of the human assets index: Reduction in the poverty rate, Cutting down infant and maternal mortality, Limiting undernourishment, Scaling up adult literacy and Significant improvement of Food Security led Bangladesh to exceed the threshold on this index for the first time in 2016.<sup>5</sup>

In contrast to rapid development, it is extremely likely that the high human and animal population densities, and the frequent interactions between animals and humans and the shift in food habit of Bangladeshi people will result in the emergence of other novel, potentially pandemic diseases in the future. In the recent past, panic among policy makers and general public were caused by the outbreak of - Nipah Encephalitis (2003-05); Avian Influenza in Bangladesh poultry (2007); Melamine contamination in baby milk (2008-09); Pesticide poisoning in Naogaon & Dhaka

(2008-09), and Anthrax (2009-10) throughout the country.

In December 2008, the national professional organization 'One Health Bangladesh' was inaugurated by the Institute of Epidemiology, Disease Control and Research (IEDCR) under the auspices of Ministry of Health and Family Welfare (MOHFW). In a second workshop in September 2012, the **strategic framework** for One Health approach to Infectious diseases targeted on three key goals in Bangladesh: 1) Establishing the necessary institutional arrangements to enable effective collaboration between sectors involved, 2) Developing necessary capacity and technical procedures to prevent and control targeted emerging infectious diseases, 3) Applying sound environmental principles when ecosystems with potential disease or health interfaces with humans and animals.

Thereafter an Inter-Ministerial Meeting was convened on 14 June, 2016 for institutionalization of One Health in Bangladesh.<sup>5</sup> Constraining factors identified were- Inadequate understanding, Economic crisis, Insufficient coordination and cooperation among partners and Ineffective execution of regulation. Integrated diseases surveillance of Government of Bangladesh (GOB) in One Health approach are: Avian influenza surveillance (FAO-DLS), Nipah encephalitis surveillance (ICDDR-B-IEDCR), Anthrax surveillance (IEDCR-DLS) and Japanese encephalitis surveillance (ICDDR-B-IEDCR).

Gradual **implementation** of One Health approach should be accomplished through initiatives taking advantage of existing resources. It will take time for the various agencies to develop the necessary collaboration with and trust in each other. Appropriate capacity-building activities intensified by GOB are- Institutional arrangement, Co-ordinated surveillance, Applied research, Networks and partnership. The general people and particularly the physicians should be aware of these national activities, so that they can undertake appropriate role at proper time to combat or minimize future pandemic.

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