

A DISEASE SURVEILLANCE SYSTEM, FOR THE FUTURE

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

A defining moment in the history of epidemiology was the removal of the handle of a water pump. This is a spectacular story. In 1854, when a deadly outbreak of cholera affected Soho area of London, John Snow (1813-1858), a British doctor and epidemiologist, used the health statistics and death registration data from the General Registrar Office (GRO) in London, to plot on a map of the area, the distribution of cholera cases and deaths. He observed that a majority of cases and deaths were in the Broad Street area, which received supply from a common water pump, supporting his theory that cholera was a waterborne, contagious disease.

The collection of health data and vital statistics by the GRO had improved over the previous decade-and-a-half due to untiring efforts put in by another medical doctor, William Farr (1807-1883). Based upon the data on the time, place and person distribution of cholera cases and deaths, supplemented by a map, Snow, on September 7, 1854, could convince the local authorities in London to remove the handle of the water pump, which they reluctantly did. The cholera outbreak was controlled in a few weeks. It started the beginning of a new era in epidemiology. John Snow is often referred to as the father of modern epidemiology and William Farr as founder of the modern concept of disease surveillance system.

A year on, mind the gaps in the pandemic response

In the years to follow, epidemiology became a key discipline to prevent and control infectious diseases (and in present context for non communicable diseases as well). The application of principles of epidemiology is possible through systematic collection and timely analysis, and dissemination of data on the diseases. This is to initiate action to either prevent or stop further spread, a process termed as disease surveillance.

However, in the late 19th century, with the emergence of understanding that germs cause the diseases, and then in the early 20th century, with the discovery of antibiotics and advances in modern medicine, attention from epidemiology somewhat shifted. The high-income countries invested in disease surveillance systems but low- and middle-income countries used limited resources for medical care. Then, in the second half of Twentieth century, as part of the global efforts for smallpox eradication and then to tackle many emerging and re-emerging diseases, many countries recognised the importance and started to invest in and strengthen the diseases surveillance system. These efforts received further boost with the emergence of Avian flu in 1997 and the Severe Acute Respiratory Syndrome (SARS) outbreak in 2002-04.

A major cholera outbreak in Delhi in 1988 and the Surat plague outbreak of 1994, nudged the Government of India to launch the National Surveillance Programme for Communicable Diseases in 1997. However, this initiative remained rudimentary till, in wake of the SARS outbreak, in 2004, India launched the Integrated Disease Surveillance Project (IDSP). The focus under the IDSP was to increase government funding for disease surveillance, strengthen laboratory capacity, train the health workforce and have at least one trained epidemiologist in every district of India. With that, between 2004 and 2019, nearly every passing year, more outbreaks were detected and investigated than the previous year. It was on this foundation of the IDSP (which now has become a full fledged programme) that when COVID-19 pandemic struck, India could rapidly deploy the teams of epidemiologists and public health experts to respond to and guide the response, coordinate the contact tracing and rapidly scale up testing

capacity.

India's disease surveillance system needs a reboot

The disease surveillance system and health data recording and reporting systems are key tools in epidemiology; however, these have performed variably in Indian States, as we know now from available analyses, be it seroprevalence-survey findings or the analysis of [excess COVID-19 deaths](#). As per data from the fourth round of sero-survey, Kerala and Maharashtra States could identify one in every six and 12 infections, respectively; while in States such as Madhya Pradesh, Uttar Pradesh and Bihar, only one in every 100 COVID-19 infections could be detected, pointing towards a weak disease surveillance system. The estimated excess deaths are also higher in those States which have weak disease surveillance systems and the civil registration and vital statistics (CRVS) systems.

In a well-functioning disease surveillance system, an increase in cases of any illness would be identified very quickly. An example is Kerala, arguably the best performing disease surveillance system amongst the India States, as it is picking the maximum COVID-19 cases; it could pick the first case of the Nipah virus in early September 2021. On the contrary, cases of dengue, malaria, leptospirosis and scrub typhus received attention only when more than three dozen deaths were reported and health facilities in multiple districts of Uttar Pradesh, began to be overwhelmed. The situation is not very different in States such as Madhya Pradesh and Haryana, where viral illnesses, most likely dengue, are causing hospitalisation but not being correctly identified or are being reported as mystery fever. This is a bit concerning as 18 months into the COVID-19 pandemic and a lot of political promises of strengthening disease surveillance and health systems, one would have expected a better performance. It raises the question: if the pandemic could not nudge the governments to strengthen the disease surveillance system, then what will? Or is it that difficult to strengthen the disease surveillance system?

Can a digital ID aid India's primary health ecosystem?

A review of the IDSP by joint monitoring mission in 2015, conducted jointly by the Ministry of Health and Family Welfare, the Government of India and World Health Organization India had made a few concrete recommendations to strengthen disease surveillance systems. These included increasing financial resource allocation, ensuring adequate number of trained human resources, strengthening laboratories, and zoonosis, influenza and vaccine-preventable diseases surveillance. Clearly, it is time all these recommendations are re-looked and acted upon. At a more specific level, the following should be considered by health policy makers.

First, the government resources allocated to preventive and promotive health services and disease surveillance need to be increased by the Union and State governments. Second, the workforce in the primary health-care system in both rural and urban areas needs to be retrained in disease surveillance and public health actions. The vacancies of surveillance staff at all levels need to be urgently filled in. Third, the laboratory capacity for COVID-19, developed in the last 18 months, needs to be planned and repurposed to increase the ability to conduct testing for other public health challenges and infections. This should be linked to create a system in which samples collected are quickly transported and tested and the reports are available in real time. Fourth, the emerging outbreaks of zoonotic diseases, be it the Nipah virus in Kerala or avian flu in other States as well as scrub typhus in Uttar Pradesh, are a reminder of the interconnectedness of human and animal health. The 'One Health' approach has to be promoted beyond policy discourses and made functional on the ground. Fifth, there has to be a dedicated focus on strengthening the civil registration and vital statistics (CRVS) systems and medical certification of cause of deaths (MCCD). These are complementary to disease surveillance systems and often where one is weak, the other is also functioning sub-optimally. Sixth, it is also

time to ensure coordinated actions between the State government and municipal corporation to develop joint action plans and assume responsibility for public health and disease surveillance. The allocation made by the 15th Finance Commission to corporations for health should be used to activate this process.

Majority of the 'mysterious' diseases are 'missed' diagnosis: experts

The emergence and re-emergence of new and old diseases and an increase in cases of endemic diseases are partly unavoidable. We cannot prevent every single outbreak but with a well-functioning disease surveillance system and with application of principles of epidemiology, we can reduce their impact. Sometimes, the control of a deadly disease could be as easy as the removal of a handle of a water pump. However, which handle it is to be can only be guided by coordinated actions between a disease surveillance system, a civil registration system and experts in medical statistics, and, finally, informed by the application of principles of epidemiology. Indian States urgently need to do everything to start detecting diseases, which will prepare the country for all future outbreaks, epidemics and pandemics. This is amongst the first things, which Indian health policy makers should pay attention to.

Dr. Chandrakant Lahariya, a physician-epidemiologist, is a public policy and health systems expert and co-author of the book, Till We Win: India's Fight Against The COVID-19 Pandemic

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