Important Vocab for the Editorial

1. pillar (noun) – mainstay, strength, tower of strength, bastion; backbone, support.
2. resurgence (noun) – reoccurrence/recurrence, reappearance, reemergence.
3. coronavirus (CoV) (noun) – a large family of viruses that cause illness ranging from the common cold to more severe diseases. common signs of infection include respiratory symptoms, fever, cough, shortness of breath, and breathing difficulties. In more severe cases, the infection can cause pneumonia, severe acute respiratory syndrome, kidney failure, and even death. (Courtesy: ~~WHO~~)
4. optimism (noun) – hopefulness, hope, confidence, positive attitude, buoyancy.
5. pandemic (noun) – the worldwide spread of a new disease; The illness spreads around the world and typically affects a large number of people across a wide area.
6. give way to (phrase) – yield, give in; be replaced by, be succeeded by, be superseded by.
7. pessimism (noun) – distrust, doubt, hopelessness.
8. epidemiology (noun) – the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems (Courtesy: WHO).
9. enable (verb) – permit, allow, facilitate.
10. science-driven (adjective) – determined by science.
11. variant (noun) – different or form or version or mutant of something (virus).
12. surge (noun) – sudden increase or rise of something.
13. probably (adverb) – most likely, in all likelihood, all things considered, perhaps.
14. resumption (noun) – restart, restarting, recommencement, reopening.
15. inevitable (adjective) – unavoidable, unpreventable, certain.
16. Evolutionary theory or theory of Evolution (noun) – it is based on the idea that all species are related and gradually change over time.
17. novel coronavirus (nCoV) (SARS-CoV-2) (noun) – a new strain (type/variety) coronavirus that has not been previously identified in humans. (Courtesy: WHO)
18. mutate (verb) – undergo (genetic change).
19. after all (phrase) – most importantly, basically/essentially.
20. concomitant (noun) – end result, consequence, outcome, repercussion, ramification, aftermath.
21. lethality (noun) – the capacity to cause death/harm/damage.
22. anecdotal (adjective) – not based on factual, scientific reports and observations done carefully; unscientific, informal, unreliable, untrustworthy.
23. accompany (verb) – occur with, co-occur with, coincide with, coexist with.
24. sequence (verb) – determine the complete order of compounds/building blocks (nucleotides) of nucleic acids, such as RNA or DNA.
25. sequence (noun) – the complete order of compounds/building blocks (nucleotides) of nucleic acids, such as RNA or DNA.
26. genome (noun) – the genetic material (a complete set of DNA, including all of its genes) of an organism. The sum total of the genetic material of a cell or an organism.
27. genome sequence (noun) – a process that determines the order, or sequence, of the DNA (nucleotides i.e., A, C, G and U) in each of the genes present in the virus's genome.
28. wishful (adjective) – based on impractical desires instead of facts.
29. wishful thinking (noun) – utopianism, idealism, daydreaming, mistaken belief, illusion, fantasy, chimera.
30. herd immunity (noun) – also known as "population immunity"; it refers to a means (ways) of protecting a whole community from disease by immunizing a critical mass of its populace (population). It is also defined as a form of indirect protection from infectious disease that occurs when a large percentage of a population is immune to an infection, thereby providing a measure of protection for individuals who are not immune.
31. serosurvey (noun) – collection and testing of serum (or proxy such as an oral fluid) specimens from a sample of a defined population over a specified period of time to estimate the prevalence of antibodies against a given specific infectious pathogen as an indicator of immunity.

32. **consistently** (adverb) – always, each time, invariably.
33. **antibody** (noun) – it is also called 'immunoglobulin'; a protective protein produced mainly by plasma (blood) cells in the immune system in response to the presence of antigens (disease-causing organisms (bacteria & viruses) and other harmful/toxic foreign substances like insect venom).
34. **markedly** (adverb) – clearly, noticeably, considerably, strikingly.
35. **notion** (noun) – idea, belief, opinion, view.
36. **cyclical** (adjective) – recurrent, recurring, happening at regular intervals, repeated.
37. **affluent** (adjective) – wealthy, well off, rich.
38. in contrast to (phrase) – in opposition to.
39. **forthcoming** (adjective) – impending, coming, approaching, nearing.
40. **mortality** (noun) – (in a particular time/for a cause) the rate/number of death.
41. **reflect** (verb) – indicate, show, demonstrate, exhibit.
42. **subtle** (adjective) – delicate, indistinct, low-key.
43. community transmission (noun) – community spread/transmission means spread of an illness/disease for which the source of infection is unknown. An infected person has no travel history to an affected area and no known contact with a person previously diagnosed with a particular disease. It is possible the patient is exposed to a returning traveler who is infected.
44. local transmission (cluster) (noun) – local spread/transmission means spread of an illness/disease for which the source of infection is known. An infected person has a travel history to an affected area. We could able to identify and trace individual cases, and ring-fence a cluster (of them) to prevent the spread of infection.
45. **ebb and flow** (phrase) – used to explain something that changes regularly; decline and then growth, decrease and increase, fall and rise, come in and go out.
46. **vaccine** (noun) – a biological preparation that improves immunity to a particular disease.
47. far more (phrase) – a lot more, much more.
48. **durable** (adjective) – long-lasting, strong, substantial.
49. **immune** (adjective) – resistant (from the effects of something).
50. **induce** (verb) – produce, effect.
51. **vaccination** (noun) – treatment with a vaccine to protect against a particular disease; immunization.
52. **asymptomatic** (adjective) – relating to a condition/person with no symptoms.
53. **symptomatic** (adjective) – relating to a condition/person with symptoms.
54. pre-symptomatic (adjective) – relating to a condition/person with mild illness/symptoms.
55. **seropositive** (noun) – testing positive for a given pathogen (virus/bacteria) in a test of blood serum.
56. **correlate** (verb) – connect, associate, relate.
57. **paradox** (noun) – contradiction, mystery, conundrum, anomaly.
58. **epidemic** (noun) – eruption, outbreak, outburst (of an infectious disease).
59. **anonymised** (adjective) – relating to the process of removing personally identifiable information from data sets, especially in the medical test results.
60. **demographic** (adjective) – the statistical study/structure of populations, especially human beings.
61. **chronic** (adjective) – persistent, long-standing, long-term, constantly recurring.
62. **spike** (noun) – a sharp rise/increase of something.
63. **presumed** (adjective) – assumed, supposed, believed.
64. **autopsy** (noun) – post-mortem.
65. Indian Council of Medical Research (ICMR) (noun) – the apex body in India for the formulation, coordination and promotion of biomedical research, is one of the oldest medical research bodies in the world. As early as in 1911, the Government of India set up the Indian Research Fund Association (IRFA) with the specific objective of sponsoring and coordinating medical research in the country. It was redesignated in 1949 as the Indian Council of Medical Research (ICMR). The ICMR is funded by the Government of India through the Ministry of Health & Family Welfare.
66. **prevalence** (noun) – it refers to the number of cases of a disease that are present in a particular population at a given time whereas "incidence" refers to the number of new cases that develop in a given period of time.
67. (contact) tracing (noun) – it is defined as the identification and follow-up of persons who may have come into contact with a person infected with the virus.

68. **perhaps** (adverb) – maybe, possibly.
69. **exposure** (noun) – In medicine, the condition of being subjected to something (infectious agents & others).
70. **inequity** (noun) – unfairness, unjustness, one-sidedness, partisanship, bias, prejudice, discrimination.
71. **complementary** (adjective) – supportive, supporting, reciprocal, interdependent, interrelated.
72. **dose** (noun) – an amount/quantity of something.
73. **elite** (noun) – high society people; the group of most powerful people in a society.
74. **vaccinate** (verb) – inoculate, administer, introduce (with a vaccine to provide immunity against a disease).
75. **leave behind** (phrasal verb) – abandon.
76. **campaign** (noun) – an organized effort that seeks to influence the decision-making progress within a specific group.
77. **in the dark** (phrase) – unaware of, ignorant of, uninformed about.
78. leave in the dark (phrase) – to keep someone uninformed about or unaware of something.
79. **universal** (adjective) – all-embracing, all-inclusive, all-round; general, ubiquitous, common, widespread, rampant.
80. Disease Control Priorities Project (noun) – Disease Control Priorities Network (DCPN), funded in 2010 by the Bill & Melinda Gates Foundation, was a multi-year project managed by the University of Washington's Department of Global and the Institute for Health Metrics and Evaluation. It provides a periodic review of the most up-to-date evidence on cost-effective interventions to address the burden of disease in low-resource settings.
81. **pneumococcal vaccine** (noun) – pneumonia vaccine; vaccines against the bacterium Streptococcus pneumoniae. Their use can prevent some cases of pneumonia, meningitis, and sepsis.
82. **tetanus** (noun) – a serious disease caused by a bacteria that affects your nervous system, leading to painful muscle contractions/spasms/cramps.
83. **expectant** (adjective) – pregnant.
84. **influenza** (noun) – it is commonly known as "the flu", is an infectious disease caused by an influenza virus.
85. **indeed** (adverb) – in fact, actually, undeniably.
86. **zoonotic** (adjective) – used to refer to a disease transmitted from (vertebrate) animals to humans". Zoonosis (noun) is a disease transmitted from (vertebrate) animals to humans. It is based on the Greek words for "(zoo) animal" and "(nosos) sickness.
87. **decade** (noun) – a period of ten years.
88. **draconian** (adjective) – (of laws or punishments) extremely harsh, severe, strict, stringent, tough.
89. **lockdown** (noun) – an emergency protocol implemented by the authorities that prevents people from leaving from a place; An extended state of confinement/encirclement/isolation of a person by the authority.
90. **incur** (verb) – induce, cause, give rise to, bring on.
91. **toll** (noun) – loss.
92. **stunt** (verb) – prevent, inhibit, impede, hamper, hinder.
93. **comply** (verb) – observe, obey, adhere to, conform to, follow, abide by.
94. **epidemiological** (adjective) – relating to the study and analysis of the distribution, patterns and determinants of health and disease conditions in defined populations.

A missing science pillar in the COVID response

India's fight against the resurgence of the coronavirus is a challenge requiring strengthened data and better science

The optimism that India might have beaten the COVID-19 pandemic has given way to pessimism from a sharp increase in new cases and deaths from the disease. Maharashtra seems to be particularly affected, but nearly all States are reporting increases. The epidemiology of COVID-19 is poorly understood, but some early understanding of the transmission of the virus can enable a more effective science-driven response.

Spread of variants

First, the surge is probably driven by variants from the original, as variants worldwide comprise much of the current wave. A resumption of global travel meant that spread of variants into India was inevitable, with the only question being when. Evolutionary theory would expect SARS-CoV-2, the virus that causes COVID-19, to mutate to become more transmissible. After all, the only task of a virus is to reproduce. However, the expected concomitant decrease in lethality has not yet been documented. Anecdotal reports that the current surge is occurring more in younger adults and accompanied by unusual symptoms also support the idea that variants are responsible. Direct evidence is needed from genetic sequencing of the virus.

Second, it was, and remains, wishful thinking that India had achieved "herd immunity". The patterns of infection in India clearly suggest multi-generational transmission, with younger adults the engine of transmission into the elderly. Various serosurveys have consistently found that half or more of tested urban populations have antibodies to the virus. However, this high level of infection is not the same as a markedly reduced level of transmission, which is what is required for herd immunity.

Notions of herd immunity do not fully capture the fact that for largely unknown reasons, viral transmission is cyclical. Delhi had two major peaks, in 2020, of death rates and case rates, one in June and another in November, and now is entering a third major wave. Within Mumbai, the current wave appears to be affecting more affluent areas and private hospitals, in contrast to last year where the highest infection levels were in the slums and poorer areas. Our forthcoming mortality-based analyses (https://bit.ly/3sY0KYZ) suggest several sub-waves exist within major viral peaks, reflecting subtle changes in community transmission. The ebbs and flow of vaccine transmission are far more variable than we assume.

As well, much of infection in India might well be mild, with less durable immune protection than induced by vaccination. 'Asymptomatic infection is more commonly reported in Indian serosurveys, exceeding 90% in some, in contrast to high-income countries, where about one-third of infections report as asymptomatic'. Recent findings from Wuhan, China show most seropositive infections were asymptomatic and among these, the important protective antibodies were low during follow-up periods. Milder infection might well also correlate with lower severity of clinical illness, helping to explain the Indian paradox of widespread transmission but with low mortality rates.

Data must guide decisions

India needs to increase the quantity, quality and public availability of actual data to guide decision-making. Theories or mathematical models are hugely uncertain, particularly early on in the epidemic. Better understanding of the unique patterns of Indian viral transmission has a few pillars, which can be achieved quickly. First, collection of anonymised demographic and risk details (age, sex, travel, contact with other COVID-19 patients, existing chronic conditions, current smoking) on all positive cases on a central website in each State remains a priority.

Second, greatly expanded sequencing of the viral genome is needed from many parts of India, which can be achieved by re-programming sequencing capacity in Indian academic and commercial laboratories. Third, far better reporting of COVID-19 deaths is needed. Daily or weekly reporting of the total death counts by age and sex by each municipality would help track if there is a spike in presumed COVID-19 deaths. The Registrar General of India's verbal autopsy studies are invaluable, but must be reactivated to review deaths occurring in 2020, given that the last available results are from 2013.

Third, the Indian Council of Medical Research's national serosurvey had design limitations such that it probably underestimated the true national prevalence. A far larger and better set of serial surveys is required. Finally, we need to understand better why some populations are not affected. For example, COVID-19 infection and death levels in Thailand and Vietnam are remarkably low, and cannot be assigned to their stronger testing and tracing programmes. Widespread existing immunity, perhaps from direct exposure to bat coronaviruses might be one explanation. Rapidly assembled comparative studies across parts of India and Asia are a priority.

Counter growing inequity

The science pillar of a response is complementary to action. The central and State governments have already pushed for a rapid expansion of COVID-19 vaccination. India can learn from Chile, which has successfully provided at least one dose to over half of its population. Affluent and connected urban elites of India are vaccinating quickly, but the

poorer and less educated Indians are being left behind. Vaccination campaigns need to reach the poor adults over age 45, without having to prove anything other than approximate age. Follow-up studies among the vaccinated can establish the durability of protection, and, ideally, reduction in transmission.

Similarly, India must capture and report data on who is vaccinated, including by education or wealth levels. The poor cannot be left in the dark.

Adult vaccination plan

COVID-19 could well turn into a seasonal challenge and thus, the central government should actively consider launching a national adult vaccination programme that matches India's commitment and success in expanding universal childhood vaccination. The Disease Control Priorities Project estimates an adult national programme would cost about ₹250 per Indian per year to cover routine annual flu vaccination, five-yearly pneumococcal vaccines, HPV vaccines for adolescent girls and tetanus for expectant mothers. Per year, vaccines for one billion adults might save about 200,000 lives from the targeted diseases. Annual flu vaccination reduces the risk of influenza pandemics and perhaps even COVID-19 infection. Indeed, we might already be in the era where major zoonotic diseases are not once-a-century events, but once a decade. Thus, adult and child vaccination programmes are essential to prepare for future pandemics.

More draconian steps, such as another full national lockdown should be considered carefully, as they incur a huge toll on the poor and stunt education of Indian children. It also remains unclear if the population would comply. The resurgence of COVID-19 presents a major challenge for governments, yet the best hope is to rapidly expand epidemiological evidence, share it with the public and build confidence that the vaccination programme will benefit all Indians.

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