Editorial

Climate Change: Impact on Vector borne diseases

Vector borne diseases (VPDs) are big threats for the world population, particularly for the poorest segments of society in developing and least-developed countries. Every year more than one billion people are infected and more than one million people die from VPDs including malaria, dengue, leishmaniasis, yellow fever, lymphatic filariasis and many others. Vector-borne diseases contribute to one sixth of the illness and disability suffered worldwide, with more than half the world's population currently estimated to be at risk of these diseases.[1]

VBDs are dynamic systems with complex ecology, which tend to adjust continually to environmental changes in multifaceted ways.[2] Although diverse factors such as seasonal weather variation, socioeconomic status, vector control programmes, environmental changes and drug resistance, impact the distribution of VBDs; climate change and variability are likely to influence more on current vector-borne disease epidemiology.[2, 3]Breeding of these vectors, its survival, capacity to bite, transmission of diseases, as well as survival of disease agent like parasite, bacteria or viruses, which these vector carry primarily depend on many environmental factors like rainfall, humidity, temperature etc.

As a result of natural processes like solar activities and large volcanic eruptions, as well as human activities like agricultural practices and excessive use of fossil fuel; greenhouse gases, such as carbon dioxide, methane, and nitrous oxide are increasing in concentration in atmosphere and results in warming of the atmosphere and the Earth's surface.[3,4]As per the 2001 IPCC report, it was likely that most of the warming since mid 20th century was attributable to humans; the 2007 report goes further mentioning more than 90% of global warming attributable to human activities.[4]It is estimated that average global temperatures will have risen by1.0–3.5 $^{\circ}$C by 2100 , increasing the likelihood of many vector-borne diseases. As vectors are critically dependent on temperature, precipitation and humidity for their survival and development, climate changes are expected to affect the biology and ecology of vectors and intermediate hosts, thus increasing the risk of disease transmission. [3]

If water temperature rises, the larvae take a shorter time to mature, thus increasing a greater capacity to produce more offspring during the transmission period. In warmer climates, adult female mosquitoes digest blood faster, feed more frequently, and cause more transmission of diseases. Moreover, malaria parasites and viruses have extrinsic incubation within the female mosquito in a shorter time, thereby increasing the proportion of infective vectors. All these will contribute to increased number of VPDs[3]

Effect of climate change on VPDs, shown in regional analysis, revealed thatincrease in rainfall, temperature variation etc. have shown impact on VPDs in different countries of different geographic regions. Effect of the ENSO cycle, both El Niño and La Niña, causes global changes of both temperatures and rainfall.El Niño with anunusually warm ocean water was reported to influence the world's weather in a number of ways and has caused epidemics of VPDs in different countries.A short-term increase in temperature and rainfall, as was seen in the 1997–98 El Niño — an example of inter-annual climate variability — caused Plasmodium falciparum malaria epidemics and Rift Valley fever in Kenya. Similar trend has been documented in Colombia, Venezuela, Paraguay and Argentina. Innorth-east Punjab, malaria epidemics increase five fold in the year following an El Niño event, while in Sri Lanka the risk of malaria epidemics increases fourfold as a consequence of similar event.[3]There is dearth of data on climate change and its effect on heath and diseases, including VPDs in India. Climate, process of urbanization, socio-economic condition and vector ecology varyfrom onecontinentto theother and therefore there is a need for a regional analysis.Enhanced vector surveillance and tracking of vector borne diseases are required to address this public health issue.

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