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Guest Editorial

Climate change vis-a-vis climate and change: the military public health paradigm

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In 2008, as its theme for the World Health Day, the World Health Organization (WHO) had focused on the need to protect health from the adverse effects of climate change. This theme would have been selected in acknowledgement of the undeniable fact that climate change is posing ever-growing threats to global public health security.

'Climate change' is a term commonly bandied about during pseudo intellectual soirees, raised heatedly by 'Anti-establishment' belligerent activists and discussed with excited animation by concerned scientists. However, the crux is, how does it affect the common man directly? Are the rising global temperatures and sea levels, unusual and extreme weather patterns seen across the world,¹ something that we need to be concerned about? Or is it someone else's problem? Is this an abstract concept or is it 'real'? Do our military leaders perceive climate change to be a threat to operational readiness? Do our medical planners appreciate this to be a clear and present danger to 'Force Health Protection'?

Categorically stated, 'climate change' affects the social and environmental determinants of health – clean air, safe drinking water, sufficient food and secure shelter (WHO).² Populations across the world will be adversely impacted by climate change; however, this vulnerability is variable. Across populations, the elderly, and children in particular at the lowest end of the socioeconomic spectrum, will be amongst the most vulnerable ones to the health risks and consequences of climate change. Those regions with underdeveloped public health infrastructure, i.e., most of the developing world, will be the least able to prepare, adapt and respond without assistance. Summers are getting hotter every year, with weather emergencies being declared in many countries. High ambient temperatures also raise the levels of aero-allergens, ozone and other pollutants in the air and have been directly linked with exacerbation of asthma and cardiovascular and respiratory diseases. The number of weather-

related natural disasters has increased exponentially over the years. Melting polar ice caps, rising sea levels and floods will lead to a loss of livelihood and will trigger mass internal migrations.

Increasingly disrupted rainfall patterns will also impact availability of safe drinking water. It has been forecast that there will be 'water wars' in an uncertain future with rising conflict over scarce resources.³ Deficient water supplies will perpetuate unhygienic conditions and will increase the risk of diarrhoeal disease. In stark contrast, increased flooding and extreme precipitation are being reported regularly in certain regions. Excessive and unpredictable rainfall heightens the risk of water-borne diseases and creates conducive breeding grounds for insect vectors such as mankind's age-old nemesis, the ubiquitous mosquito. Dengue and chikungunya are no longer illnesses among 'others' and are now occurring with increasing regularity, equally in chaotic urban conglomerations and in sylvan rural settlements across the globe, in seasons which were earlier considered 'safe'. A resurgence of malaria at a time when the global community is looking to variously 'eliminate' or 'control' the disease is being bolstered by 'favourable' conditions created by a changing climate. These changes will lengthen the transmission seasons of vector-borne diseases and alter their geographic spread, posing a threat to larger swathes of people across the globe. A Bayesian transmission modelling study has forecast climate change and rising global temperatures leading to increased and new exposures of diseases carried by mosquito vectors to humans. The most extreme instances of transmission have been predicted to occur at intermediate climate change scenarios.⁴

With the changes in temperature and rainfall related to climate change, the decrease in the yield of crops will threaten the already unstable food security of developing countries. Droughts and famines will lead to increased malnutrition and undernutrition which will impact the growth and

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development of children and even affect the survival of vulnerable individuals in a community.

The linkages with health are glaringly obvious even to a cynical interlocutor; however, the action(s) to be taken at the individual, community, national and global levels to mitigate the impact and address the root cause(s) are vague, ill-defined, multipronged and trans-sectoral and yet have intangible outcomes. To obtain an insight into what is the needed situational response, we need to become familiar with two closely related terms in relation to climate change (i.e., 'adaptation' and 'adaptive capacity'), as defined by the Intergovernmental Panel on Climate Change (IPCC).⁵

The United Nations Framework Convention on Climate Change (UNFCCC) and subsequently the Kyoto Protocol and then the Paris Agreement represent concrete steps taken by the global community to address climate change.⁶ It is an inescapable reality that climate change now presents the single biggest threat to sustainable development everywhere and its widespread, unprecedented impacts disproportionately burden the poorest and most vulnerable ones. Governments have incorporated the realization that urgent action is needed to halt climate change and to deal with its impacts, these actions being integral to successfully achieving all Sustainable Development Goals (SDGs). "We in India don't see development and climate change as competing objectives."⁷ India has its own evolving policy, the National Action Plan on Climate Change (NAPCC) which encompasses a range of measures.⁸ Only time will tell whether our actions (or reactions) are adequate!

People everywhere, students, teachers, doctors, leaders need to be more aware about climate change and its impact on our health and our lives and the actions they need to take individually and collectively; ignorance and a lack of concern can no longer be an excuse.^{9,10}

Militaries across the world are often deployed in hostile terrain, with opposing forces and at times the climate and the geography colluding against a peaceful tenure. Climate is the long-term pattern of weather in a region, while weather refers to short-term changes in the atmospheric conditions in a specific area. Weather is a major part of the environmental deployment paradigm of militaries and is invariably included in operational planning and readiness. Environmental medicine, although not a widely recognized medical specialty, can be viewed to be a multidisciplinary specialty within the realm of public health which responds to the threats posed to health by the environment. Every medical doctor in military service realizes early in his career that not taking into account the environment adversely impacts the health of his troops. Thus, military medicine and environmental medicine are intertwined and virtually inseparable.

It is to be kept in mind that the Armed Forces do not exist in isolation; instead, they mirror the very society they serve to protect. Thus, climate change will have an impact on operational readiness in myriad ways, and the emergent threats will have to be countered by proactive response and multi-sectoral cross-cutting preparedness.

We, as people, definitely have different priorities in contrast with the Armed Forces. We can think of causes and

argue about them, we can evaluate measures to mitigate the impacts and not implement them and we can weigh longterm responses as intellectual affectations, when dealing with the concept of climate change as a threat to our survival. However, the military has no choice but to deal with the emergent situation the only way it can, by assessing the impacts proactively, by evolving strategies to cope, and above all, to implement measures to maintain 'fighting fitness', irrespective of climate change, i.e., to change before the climate does! The paradigm of operational combat readiness in an essentially volatile, uncertain, complex, ambiguous (VUCA) environment, as created by 'climate change', is best dealt with by a dynamic and evidence-based response by the future-ready military.¹¹

In this issue of the journal, we have an interesting selection of articles from the field of military/environmental medicine which deal variously with responding to the influence of the environment where the military is deployed. First, to deal with the challenges that climate change will undoubtedly toss up in the future, can we select 'super' soldiers for combat, based on genetic polymorphisms which are believed to be associated with athletic performance?¹²

Soldiers deployed in high-altitude (HA) areas (>2700m) have a definite risk of developing various HA-related illnesses, irrespective of acclimatization procedures. With decades of experience in deployment at these altitudes, the doctors of the Indian Armed Forces have developed a remarkable body of knowledge on matters related to health at altitude. A case series on imaging modalities for cerebrovascular thrombosis is being published in this issue; Sikri et al.¹³ have reported on a nuanced study of a variation of the time-tested acclimatization schedule followed in inducting troops to the higher altitudes in mountainous regions, and Dua et al.¹⁴ have compared acclimatized lowlanders with natives of the Himalayan heights.

Going by current health intelligence inputs applicable to forecasting disease outbreaks and prevailing health impacting conditions, the military need to be on the guard against vector-borne diseases. Tandel et al.¹⁵ believe that the forecasting of future chikungunya outbreaks may be better done by actively searching for potential epidemic causing mutations, while Sharma et al.¹⁶ have evaluated bioactivity of various promising plant extracts against immature forms of *Aedes aegypti*. Population-based seroprevalence surveys provide evidence for public health policy decisions, especially where mass vaccination and health-care worker protection are indicated, which need to be taken pragmatically, after due cost-effectiveness and cost-benefit analyses. In this issue of the journal, Kushwaha et al.¹⁷ and Gupta et al.¹⁸ have separately reported upon H1N1 seroprevalence and hepatitis A virus (HAV), respectively, and commented on vaccination. With climate change happening since our yesterday, we have to accept that we will increasingly see the resurgence and emergence of diseases, with some vaccine protectable, most not.

The time to ponder is past. It is the time for action, to combat the threat to human survival. Are we getting ready to tackle climate change? Will humankind change before it becomes fait accompli?¹⁹

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