Accelerating the Indian Efforts to Adapt to Health Impacts of Climate Change

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Climate change is recognised as a reality. It is associated with human development and its negative impacts on environment, all types of life including humans and other animals and it demands an appropriate public health response (Hellerstedt et al 2017). It is also accepted that climate change is a major contributor to increase in environmental disasters like droughts, floods, landslides, wildfires and storms (WHO 2023, Hellerstedt et al 2017). Climate change is also contributing to disruption of food systems, increases in zoonoses and food-, water- and vector-borne diseases, and mental health issues. Furthermore, climate change is undermining many of the social determinants for good health, such as livelihoods, equality and access to health care and social support structures (WHO 2023).

During the last 3-4 decades, global community has made many efforts to mitigate and adapt to the adverse impact of developmental processes and their resultant consequences. To address the challenges of climate change, the United Nations Framework Convention on Climate Change (UNFCCC) came into force on 21st March 1994 which was adopted out of three conventions identified at "Rio Earth Summit" in 1992. This convention known as "Convention of Parties" has 198 countries, it represents collective will and response of global community to this problem.

India has undertaken many initiatives in pursuance to the obligation implied by UNFCCC which include: a) Identification of Ministry of Environment, Forest & Climate Change (MOEF&CC) as nodal ministry for matters related to Climate Change; b) Formulation of National Environmental Policy 2006; c) Formulation of Prime Minister's Council on Climate Change to advice proactive measures, facilitate inter-ministerial coordination and guide policy in relevant areas. Our country initiated eight missions related to climate change in 2008. The reconstituted Prime Minister Council on Climate Change (PMCCC) approved four new missions on Climate Change including the Health Mission in January 2015. The proposed 'Health Mission' has been undertaken by Ministry of Health & Family Welfare, Government of India under the umbrella of 'National Action Plan on Climate Change' by MoEFCC. As a follow-up action, MoHFW constituted a National Expert Group on Climate Change & Health (NEGCCH) to prepare action plan, recommend strategies for adaptation and response plan for diseases occurring due to climate variability and change. This National Action Plan for Climate Change and Human Health (NAPCCHH) was developed with National Centre for Diseases Control (NCDC) as the nodal centre for 'Health Mission' by Ministry of Health & Family Welfare, Government of India with representation from various departments/ agencies / other stake holders. NAPCCHH aims at strengthening health care services against adverse impact of climate change on health (MoHFW, NAPCCHH, weblinks). It has five specific objectives: (i) To create awareness among general population (vulnerable community), health-care providers and policy makers regarding impacts of climate change on human health; (ii) To strengthen capacity of healthcare system to reduce illnesses/ diseases due to variability in climate; (iii) To strengthen health preparedness and

response by performing situational analysis at national/ state/ district/ below district levels; (iv) To develop partnerships and create synchrony/ synergy with other missions and ensure that health is adequately represented in the climate change agenda in the country; (v)To strengthen research capacity to fill the evidence gap on climate change impact on human health. This was fine-tuned, priorities identified and approved as a National Programme in February 2019 (NPCCHH weblink and Kumar et al 2019), thus it has completed five years of its journey. It is best time to reflect, plan for future and do course corrections if needed.

NAPCCHH had set/ suggested several activities to be undertaken during the first 2 years. These included, (i) Establishment of 'Environmental Health Cell' in State Health Departments,(ii) Identification of State Nodal Officer- Climate Change at State Health Departments , (iii) Notification of Task Forces with representation of other health programmes (vector-borne disease, infectious diseases, nutrition etc) multi-sectors/ departments such as Disaster Management Authority, Health Information System, district unit of departments of Meteorology, Pollution Control Board, Water and Sanitation, Public Works Departments and civil societies etc.(iv) Vulnerability Assessment for baseline rate for Climate Sensitive Illnesses in terms of (a) Geography (Plain/ Mountain/ Desert/ Coastal), identify worst affected areas (districts), (b) Risk mapping with extreme events (heat/ cold/ drought/ flood/ cyclone/other, (c) Affected Population (Total, density, Vulnerable, Occupation), (d) Contributing/ exaggerating factors for these Climate sensitive illnesses,(e) Healthcare Infrastructure/ facilities like PHC, CHC, District hospital, Tertiary care hospitals- Government as well as Private, (f) Identify areas for capacity building –human resource, technical and healthcare service delivery; (v) Preparation of State health adaptation plan for extreme events (heat related illness), Health effects of Air Pollution, Vector borne diseases and Water borne illnesses, (vi) Identification and strengthening of State health system- departments/ institutes/ organizations/ health care facilities/ other stakeholders for providing assistance for management of cases and for monitoring and surveillance for climate sensitive illnesses, (vii) Coordinate with premiere institute/ organisation like Centre of Excellence for developing training module/ guidelines and inclusion of mitigation and adaptation measures in Students' Curriculum and (viii) Develop, integrate and implement media communication plan for common CSDs involving health determining sectors and communities.

During the second phase- three (2 to 5) years, several milestones were to be achieved: (1) Formulate specific implementation framework for climate sensitive diseases; (2) Contingency plans for climate sensitive illnesses - appropriate and efficient health personnel, logistics & resource allocation, (3)Capacity building and training of health care personnel on guidelines and treatment modalities against climate sensitive illnesses at district level in each state, (4) Development of early detection tools for CSDs (rapid diagnostics, surveillance) or mathematical /prediction models for preparedness of population and health care system, (5) Periodic reviews for improvements or deterioration of indicators (vulnerability, response capacity, preparedness, and environmental determinants) identified for each CSD, (6) Awareness generation- integrate IEC, engage local leaders & community, yearly "Advocacy network meeting" and health talks, specific day celebration, health melas etc. (7) With projected climate risks, adapt new technologies, building design, energy, water and sanitation provisions for new constructions of healthcare facilities, but if already existing, modify as per permissible building norms, (8) Link data on data of climate sensitive diseases, environmental factors determining health, meteorological information, and outcomes as morbidity and mortality, (9) Risk mapping and seasonal trend for CSDs:

multi-sector management approach and (10) Research and epidemiological studies / surveys on vulnerable population for climate sensitive illnesses.

From the update provided by Centre for Environmental & Occupational Health, Climate Change & Health at NCDC, it heartening to note that good progress has been made. However, the achievements are modest in terms of milestones set. Nearly a third of states and UTs have been proactive, others took much longer time even for preparing state action plans and establishing the working mechanisms. Considering the competing priorities, this is understandable. Most have now established governance structure, state action plans and mechanisms suggested to strengthen the infrastructure and human resources to effectively tackle the direct effects related to climate change. Nodal centre at NCDC has played its part very well in terms of consultations, preparation of training material/ modules especially to deal with heat effects, air pollution effects and partnering in/ guiding the awareness campaigns etc. It is important that these mechanisms function efficiently especially in larger states with varying challenges. However, except for some work done in relation to awareness campaigns and capacity building other tasks set for second phase (2-5 years) do not seem to have progressed much. There would be success stories here and there, but a lot more needs to be done. It would be appropriate that there is in depth review of these targets to set fresh timelines and take commitments from all stakeholders. It is imperative that we make adequate progress on all these milestones for taking decisions that could guide the policy and emergency response in future.

Among the targets set for first two years of the programme, it was planned to carry out vulnerability assessment for baseline rate for Climate Sensitive Illnesses (CSDs). This assessment is essential for the health agencies to identify vulnerable communities and areas affected by these changes so that proactive steps can be taken to strengthen the capabilities timely and in an cost-effective manner as emergency response requires lot more money and is not effective to the desirable extent. Vulnerabilities have been assessed through a study carried out by TERI (information available from NCDC) using indicators which may help in determining the sensitivity and adaptive capacity. TERI project aims at National Level Health Vulnerability Assessment and developing a Framework for Monitoring and Evaluation of the National Action Plan for Climate Change and Human Health (NAPCCHH) (TERI Website). It has already generated some useful information - While district level maps of CSDs exhibit a strong association with occurrence of some specific CSDs, the projected prevalence does not correlate in some districts. There is thus, apparent need for further improving the tool, carry out follow-up studies to validate/improve the same. Further, while weather data is available for last several years from all parts of the country, getting good quality data about health is challenging from a large part of country that too focused on geographical areas which have the problem. Another study carried by Chaudhary & Mukhopadhaya (2023) has reported that nearly 56% of India's population in 344 districts is highly vulnerable to the health impact of climate change. While these and a few other studies on this aspect will be useful to move forward, lot more work is required to develop vulnerability assessment maps of entire country covering all geographical areas, eco-systems and population groups.

Fourth objective of this programme is to develop partnerships and create synchrony/ synergy with other missions and ensure that health is adequately represented in the climate change agenda in the country. The MoHFW seeks to coordinate & collaborate with other Ministries, departments, institutions, NGOs/CBOs. Partners identified are: Ministry of Environment, Forest & Climate

Change, Ministry of Information & Broadcasting, Ministry of Human Resource Development, Indian Council of Medical Research, Ministry of Agriculture, National Medical Commission, Ministry of Drinking Water and Sanitation, Min. of New & Renewable Energy, National Disaster Management Authority, Ministry of Women and Child Development, Indian Institute of Tropical Meteorology, Indian Institute of Tropical Meteorology, Department of Space, Department of Science & Technology, Council of Scientific & Industrial Research, Ministry of Home Affairs, Defence Research & Development Organization, Indian Council of Agricultural Research, National Institute of Malaria Research, Food Safety and Standards Authority of India, Department of Health Research and Indian Council of Medical Research, National Environmental Engineering Research Institute, Community Based Organizations, Public Health Foundation of India etc. Frame-work for their cooperation was largely decided in consultation with various stakeholders. It is seen that some mechanisms at level of officials have been established. Progress achieved in terms of this intersectoral collaboration and co-operation needs to be assessed, reviewed regularly to identify success stories, know the barriers/ solutions and define time bound agenda to jointly work and produce the desired results. We have huge capacity and capability to develop need-based strategies, technologies and generate new knowledge. Besides NCDC-MoHFW, National Institute for Disaster Management (NIDM-Ministry of Home Affairs) have also developed some manuals for training to deal with such effects (Health adaptation and resilience to climate risks -NIDM website). It would be important to transform the intersectoral collaboration into target based functional mechanisms rather than symbolic periodic events.

Fifth specific objective of this programme is to strengthen research capacity to fill the evidence gap on climate change impact on human health. This research capacity will also be strengthened by better synergy among various stakeholders/ partners identified to achieve the above 4th objective of our national programme. Various science agencies including DST, DBT, CSIR, ICMR have programmes related to climate change and health. International partnerships have been sought to deliberate on climate change related impacts on human health. Importance of improving the surveillance, monitoring, and integration of meteorological, environmental, geospatial, and health data while working in parallel to implement adaptation strategies have been identified as priorities for India (Bush et al 2011). These research programmes need to address priority aspects like health effects of extreme heat/ cold temperatures, air pollution, vector-borne diseases, zoonoses, nutrition, women and child, health of marginalized communities etc. While initial infrastructure and human resource strengthening in hospitals and states may not need major research inputs, in the medium and long run the policy initiatives and actions should be evidence led. Considering the huge infrastructure and human resource available India can be leader on all aspects related to climate change and health. So far, there are only a few Indian studies specifically addressing this aspect:

(i) Studies undertaken in India on malaria in the context of climate change impact reveal that transmission windows in Punjab, Haryana, Jammu and Kashmir and north-eastern states are likely to extend temporally by 2-3 months and in Orissa, Andhra Pradesh and Tamil Nadu there may be reduction in transmission windows (Dhiman et al 2010). What is really happening? Follow-up studies? Information about vector borne diseases like dengue and chikungunya shows (TERI study, other studies by Dhiman et al) that even today a lot more background work is yet to be done for progressing towards developing robust model(s).

(ii) A comprehensive modeling method developed by Limaye et al (2023) has been reported to be adaptable to estimate local air quality and health co-benefits in other settings by integrating climate, energy, cooling, land cover, air pollution, and health data.

(iii) There are studies on knowledge and perceptions of people and professionals. Perceptions of the people regarding climate change have been observed to be linked to their own experiences with their local weather conditions rather than the overall concept of climate change (Tripathi et al 2021). Another study by Sampath et al (2022) observed that the knowledge of health care professionals about climate change and immediate health effects like heat and VBD is good (80%), but basic knowledge regarding indirect effects like malnutrition is rather low (44%).

(iv) Using NFHS-5 data, Mahapatra et al (2023) reported that there is a macro-level association between climate change vulnerability and women and child health (WCH), as districts that had high levels of climate change vulnerability also performed poorly in WCH. Thus, there is a need for an integrated approach that considers geography-specific climate change threats to develop health programs (Mahapatra et al 2023).

(v) Three key barriers faced by public health professionals as key stakeholders were identified by Shrikhande et al (2023), namely: (1) political and institutional barriers; (2) education and awareness barriers; and (3) technical research barriers.

(vi) Under aegis of Indian Network of Climate change some climate change scenarios on human health have been predicted by the year 2030 (Bhukta 2019).

It is possible that a few reports might have been missed. Overall, not much original work has come-out from Indian studies so far which can guide the policy and further research. MoHFW has identified about 18 institutions as Centres of Excellence to become focal points for research and discussions on different aspects important for this area. Most of these have been funded also. While the initial budgetary allocations may appear small, it would be fair to argue that investments should be made when the plans are definitive, become acceptable and confidence about their out-put grows. It is important to emphasize that various science agencies should also work in synergy to support the studies on climate change and health adequately, these could be coordinated through this CoE's network or through other institutions who would work on these aspects.

To galvanize the research atmosphere focused on generating tools/ knowledge to guide policy we need to develop structured networks. Various science agencies, coordinating Centre for Environmental & Occupational Health, Climate Change & Health at NCDC, CoE at NIDM, various departments/ institutions should be part of this network. Example is Lancet countdown (Europe & China): Tracking progress on health and climate change (Watts et al 2015). Such network would be essential to accelerate all research cum intervention efforts.

To conclude, excellent beginning has been made to develop and initiate this national programme to address the health challenges linked to climate change. For achieving time bound progress on all milestones and to use the existing capability optimally the strengthening of coordination mechanisms by providing more human and financial resources appears essential. Working group approach to monitor each milestone individually could be considered as alternate or complementary strategy.

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