सत्यमेव जयते

Ministry of Health & Family Welfare
Government of India

Climate Change and Health: Driving Local Action

A Collection of Case Studies on
Adaptation and Mitigation Measures Implemented in
Public Health Sector in India

November 2023

National Health Mission
राष्ट्रीय स्वास्थ्य मिशन

National Programme on Climate Change and Human Health

National Centre for Disease Control
Government of India

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Millets: A Step Towards a Sustainable Future

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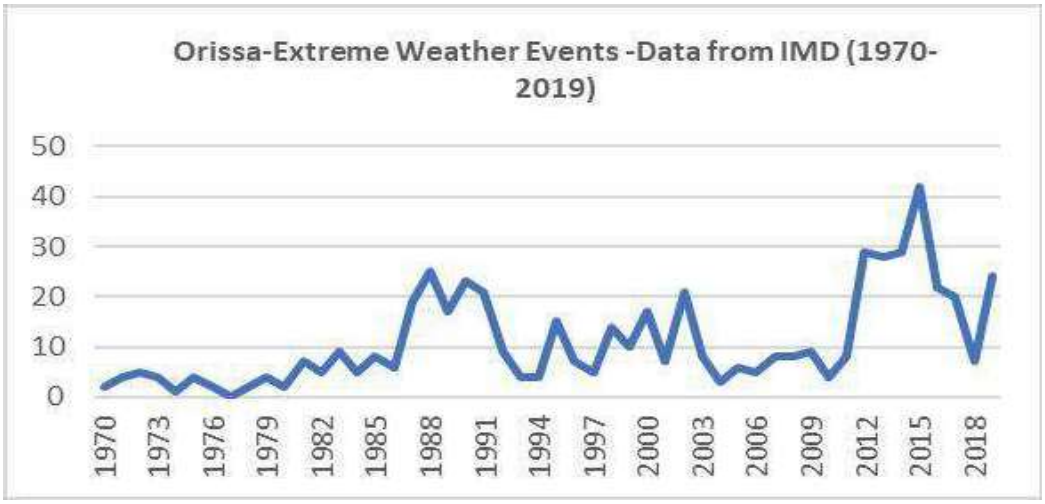
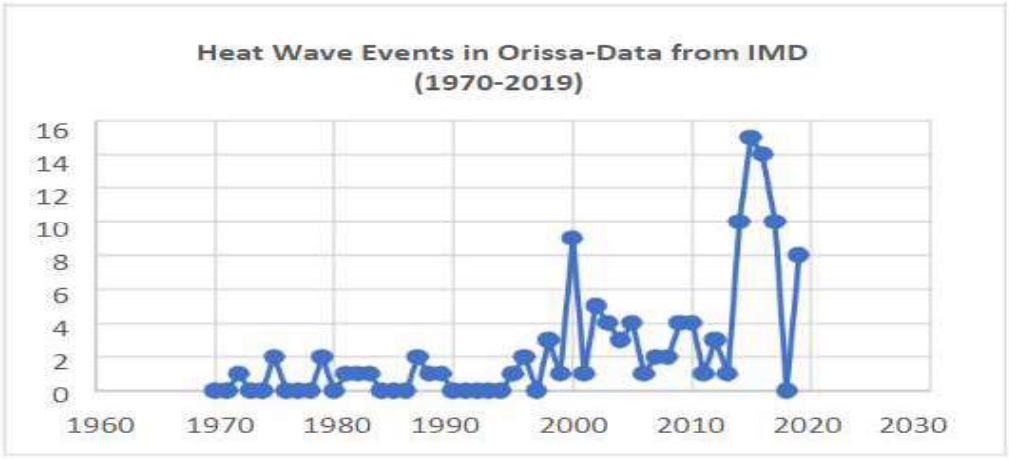
Background

Climate change is a reality. There is no denying that the climate is changing – and that too at a very rapid pace. The most obvious evidence towards this is the surge in the frequency of extreme events. According to IMD data, India experienced an exponential increase in extreme events during the period 1970–2019, with a marked acceleration in 2000–2019. Over the years, increase in temperatures, changing monsoon and more frequent extreme climatic events have affected cultivation, forestry, aquaculture, etc, thereby posing a threat to India's food security, causing severe socio-economic consequences like the disruption of trade, livelihood distress, and adverse health effects. According to a report released by the Intergovernmental Panel on Climate Change (IPCC) 2021, India would experience more weather extremities, such as heat waves, floods, cyclones, drought, etc in the future (IPCC 2021). This foreshadows food security crisis in India.

According to a report by International Food Policy Research Institute, by 2030 climate change may force many Indians into famine owing to a reduction in agricultural productivity and disruption in the food supply chain (Global Food Policy Report 2022). Moreover, several studies have predicted that intense and early-onset heatwaves, along with unpredictable rainfall patterns could jeopardize India's rice and wheat output, thus leading to severe shortages. According to Indian Council of Agricultural Research, 9 million hectares out of the 30 million hectares of wheat have been categorized as being prone to sudden heat stress. This is also evident by the fact that the year 2020 saw a late surge in rainfall, led to a 4% deficit in rice sowing.

The Indian state of Orissa has been one of the most vulnerable states with regards to extreme weather events. According to the IMD data, a significant increase in extreme events during the period 1970–2019 has been observed.





Odisha, which lies in the sub-tropical India is vulnerable to different types of natural calamities like droughts, floods, and cyclones. Frequent occurrence of extreme climatic events has been detrimental to the livelihood resilience of the poor and marginalized people.

According to the Council on Energy, Environment and Water analysis, apart from cyclones and floods, the state of Odisha also witnessed a four-fold increase in droughts in the last ten years. The analysis of the IMD data showcases an increase in the overall heat wave events in the state from 1970-2019. According to an analysis of the state's heat wave days, out of the 525 that have occurred between 1970 and 2019 (50 years), 52% (or 272 heat wave days) have occurred in the last 15 years. This has had a profound affect on crop production both in terms of quantity and quality.

Over the years, Kharif crops have been more impacted than Rabi crops owing to variability in rainfall associated with Heat Waves. Since Kharif crops are sown in May to June and harvested in September to October, any extreme change in temperature

affects its productivity. Within Kharif, rice production has been particularly affected with decreased grain yield which is a matter of concern as rice is a staple diet of Odisha (NDMA, 2019).

In order to mitigate the decline in rice production in Odisha due to climatic events, Millets that were traditionally grown and were lost in translation due to modern agriculture have now made a comeback. The present case study tries to showcase how the state of Odisha combated climate change and its impact on food production by reviving traditional farming and cultivation of traditional crops i.e Millets. This was undertaken by conducting multiple consultations among the State Government, Civil Society, and tribal population of Odisha to secure nutrition and mitigate drought. Millets require less water than rice and wheat. They are very tolerant of heat, drought, and flood, and this makes millets an ideal choice for farmers in an era of climate change.

Moreover, millets are nutritionally analogous to leading cereals and serve as an excellent source of protein and other micro-nutrients.

Details of Intervention

Odisha Millets Mission (OMM) & awareness by tribal volunteers and local non-government organizations

In the past, millets used to be the staple food for tribals in Odisha. However, tribals began regarding millets as a subsistence crop that they had earlier farmed to use or eat themselves rather than to sell when paddy and other foods reached their doorstep through the public distribution system and the consumer market. This led to further decline in millet production by the tribals.

With the changes in climatic conditions, heavy rainfall brought destruction to crops like paddy, lands became more infertile owing to chemical pesticides and hybrid seeds failed to withstand weather extremities and heat stresses. This paved a grim situation for hundreds of farmers struggling to cultivate amidst extreme weather changes. Thus arose a need to cultivate millets that are resilient to droughts, extreme heat, diseases, pests, require less water than paddy and are richer in nutrition.

Millet Network of India and other civil organizations began raising awareness about millets with the aid of tribal volunteers, highlighting its nutritive value and climatically robust nature. The traditional wisdom of tribals, who grew interdependent crops in a single field and harvest them one after another, was the major reason that helped millets and other crops survive. Realizing the importance of

highly nutritious and climate resilient millets, the Government of Odisha launched Millet Mission in the year 2017.

Odisha Millets Mission (OMM) is the flagship programme of Department of Agriculture and Farmers Empowerment, Government of Odisha. This program was designed to promote Millets in tribal areas of Odisha (Odisha Millets Mission) and was launched by Government of Odisha to revive millets in farms and on plates. **Odisha Millets Mission** provided institutional impetus such as guaranteed purchase and higher prices, which led to an increase in awareness about millets cultivation using improved farming techniques to address nutritional and climatic challenges.

According to a study conducted by Niti Aayog in 2020, Odisha recorded a 215% increase in gross value of millet produced per farmer household from Rs 3,957 in 2016-17 to Rs 12,486 in 2018-19.

In the same period, area under millet cultivation has increased from 2,949 hectares to 5,182 hectares and the yield rate has increased by 120%.

Details of Process

- Decline in food production of mainstream crops like rice due to climate change
- Production of Millets that is resilient to heat, drought and flood, and required less water than rice and wheat
- The tribal population of Odisha were traditional cultivators of millets.
- Consultation between State Government, Civil Society and tribal population to increase millets cultivation and production.
- The establishment of OMM based on the traditional farming of millets was set with the objective to promote household consumption, conservation, and promotion of millets.
- Indian Institute of Millet Research has acted as a key player in cultivation of millet varieties.
- Inclusion of Millets in Integrated Child Development Scheme (ICDS), Mid Day Meal (MDM), and Public Distribution System (PDS).
- OMM has incentivized and helped in supporting farmers particularly tribal population through the value chain from growing the crop to selling the products.

Health Impact

- In India, there exists a complex challenge characterized by a triple burden encompassing malnutrition, obesity, and deficiencies in essential micronutrients.

As per the State of Food Security and Nutrition in the World 2022 report published by the UN Agencies, the nation houses a staggering 224.3 million individuals between 2019 and 2021 who suffer from undernourishment. At this juncture, it has become imperative to adopt a nutrient-dense diet. In this regard, the public distribution system (PDS) has a crucial role to play in procuring and distributing a wider variety of traditional and nutritious grains.

- First and foremost, millets are a rich source of dietary fiber. Fiber is essential for maintaining a healthy digestive system and preventing constipation. It also helps regulate blood sugar levels and promotes satiety, making it an excellent choice for individuals looking to manage their weight or control diabetes. The high fiber content in millets can contribute to improved gut health and reduce the risk of developing various gastrointestinal disorders.

- Additionally, millets are packed with important vitamins and minerals. They are particularly rich in magnesium, phosphorus, and iron. Magnesium plays a crucial role in maintaining healthy bones and teeth, regulating blood pressure, and supporting proper muscle function. Phosphorus is essential for energy production and the formation of healthy cells and tissues. Iron is vital for red blood cell production and preventing iron-deficiency anemia. Incorporating millets into your diet can help meet your daily nutrient requirements and promote overall health.

- Moreover, millets have a low glycemic index (GI), which means they are digested and absorbed more slowly by the body, resulting in a slower and steadier release of glucose into the bloodstream. This property is particularly beneficial for individuals with diabetes or those looking to manage their blood sugar levels. By opting for millets instead of refined grains with a high GI, individuals can better control their blood sugar and reduce the risk of developing chronic conditions such as type 2 diabetes.

- Another notable health benefit of millets is their antioxidant content. Antioxidants help protect the body against oxidative stress and reduce the risk of chronic diseases, including heart disease, cancer, and certain neurological disorders. Millets contain various antioxidants, including phenolic compounds, which have been associated with anti-inflammatory and anti-cancer properties. Including millets in your diet can contribute to overall well-being and support a healthy immune system.

- Furthermore, millets are gluten-free grains, making them an excellent alternative for individuals with gluten intolerance or celiac disease. These grains can be substituted for wheat, barley, or rye in various recipes, offering a wider range of options for individuals on a gluten-free diet. Millets can be ground into flour for

baking or used as whole grains in salads, porridge, and pilafs, providing a versatile and nutritious base for many dishes.

- Lastly, millets are environmentally friendly crops. They are highly resilient to drought and require less water compared to other staple grains, making them suitable for cultivation in arid regions. Millets also have a shorter growing season and are less susceptible to pests, reducing the need for pesticides and fertilizers. Embracing millets as a staple crop can contribute to sustainable agriculture and help mitigate the impact of climate change.

- Consistently including millets in the diet can have a substantial positive impact on essential nutritional aspects for children and women. Millets have the potential to enhance hemoglobin levels and alleviate iron deficiencies. Consumers are increasingly becoming aware of the nutritional potency of millets, recognizing their benefits for conditions like diabetes and obesity, as well as their potential to lower the risk of heart and cardiovascular diseases (Nithiyanantham et al, 2019). The grains of these millet varieties are extensively consumed both as traditional remedies and as essential dietary components for maintaining good health.

- Many Indian states have introduced millets in their food security program such as Karnataka, Odisha, Telangana, etc. Moreover, OMM has introduced ragi in various social safety net programs such as PDS, Supplementary Nutrition program under ICDS, Mid-day meal scheme and tribal hostel. Efforts by the state have been taken up to promote and increase procurement of millets. Including millets in PDS would be a game changer for combating malnutrition and mitigating climate change.

- However, the challenge remains that only around 25% of households consume millets distributed under PDS since there is a strong preference for rice. Thus, shifting consumer preference becomes key. Behavioral change campaigns, enabling policies and investments are needed to bring millet back to people's diets. A comprehensive design framework is imperative instead of piecemeal approaches. The comprehensive model of OMM to improve nutrition in tribal districts has been recognized by World Food Programme. Promoting agronomic practices, accessibility to quality seed and locally suitable varieties would help in boosting production to balance demand and supply. Government of India has recommended that the OMM operational framework should be adopted by other states. Through such comprehensive and innovative approaches, PDS can be reformed to include millets. And, with the inclusion of millets in public diets, India may well improve its ranking in the Global Hunger Index.

Outcomes

- Increased cultivation of native millet varieties - finger (ragi), foxtail (kakum or kangni), barnyard (sanwa), proso (chena) and pearl (bajra) millets--which are climate-resilient and ensure the food and nutritional security for tribals.
- In the year 2022, almost two lakh farmers in 19 districts are involved in millet cultivation.
- About 3.23 lakh quintals of millets have been procured, since the formation of OMM
- The Odisha government has also started celebrating *Mandia Dibas* (Millet Day) on November 10 annually to popularize the crop.
- Odisha Millet Mission (OMM) made an impact on the millet value chain leading to an increase in its demand and supply.
- Orissa became the first state to include Ragi Laddu in ICDS through the support of District Mineral Foundation.
- After the introduction of the OMM and its growing impact, the Government of India has asked all states to adopt Odisha Millets Mission model for promotion of millets, pulses and oilseeds.
- In this 'International Year of Millets 2023', the Central Government is focusing on millet promotion in tribal areas and creating livelihood opportunities for tribal communities through millet processing and value addition.
- Government of India is set to document tribal recipes that are prepared by various PVTG (Particularly Vulnerable Tribal Groups), which will help in scaling up nutritional security of tribal population.

Key Learning Points

- Documenting traditional cultivation of crops and indigenous farming practices and drawing out narratives from tribals that are climate resilient and nutritious is the key and one giant leap towards sustainability.
- Dissemination of this information about millet production, adopting and scaling up of such practices is the need of the hour to ensure food and nutritional security.

Resources and Publications

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