



Enhancing Nutritional security and Sustainable health through Millets in India: a Policy Perspective

BACKGROUND

“We are what we eat”- is a well-known concept of the fact that our health is directly proportional to the food what we intake. People should be made aware that the costly and tasty ones may not provide the same nutrition value as the ones that are regionally grown food for locals. It is important to exploit millets and make aware the people about its value.

According to the latest National Family Health Survey (NFHS Report 5, 2019-2020), anaemia in children and women has gotten worse in most states and union territories during the last half-decade. The global nutrition crisis is being intensified by the Covid-19 pandemic, which stresses on the significance of proper nutrition for human health. Getting adequate food and eradicating hunger has become much more difficult than before, especially for the most vulnerable groups, such as the poor, women and children¹.

Poor diets and resulting malnutrition in all its forms are unacceptably high across India, creating one of the nation's greatest societal challenges. Even though the rate of drop in India's nutritional problems has accelerated since 2006, it is still far below the rates of improvement required to meet the global nutrition targets set by the World Health Assembly (WHA), to which India is a signatory. India trails behind several impoverished countries in Africa; if current trends continue; India will catch up to Ghana or Togo in terms of stunting rates by 2030, and China by 2055².

India has one of the highest rates of life years lost due to micronutrient deficiencies³. This secondary study investigates at whether dietary changes might eliminate micronutrients and macronutrients deficiencies in the population of India. Current dietetics and food culture must be re-examined considering the human body's ecological and physiological cycles. From modern dietetics to holistic comprehensive dietetics, a fundamental shift is suggested. While efforts are being made around the world to achieve food self-sufficiency and solve health concerns, millets have garnered recognition as vital crops to overcome food insecurity⁴.

Millets are well-suited crops to diversify cropping systems for climate resilient agriculture due to its unique nutritional profile, excellent health benefits, and C_4 photosynthetic pathway. Millets have been framed by resource-poor farmers in the dry lands and tribal populations who live in less productive and unstable habitats for millennia. Millets have seen a revival as people become more aware of their possible health benefits and industrial use. The biggest concern related with millet production is the shrinking worldwide cropping area⁵.

The present study has been focused on Nutritional Security and sustainable health through millets in India

¹Global Nutrition Report Foreword, (2021).

²Global Nutrition Report , 29-30 (2016).

³Rao.N. et al., *Global Environmental Change* 49 154-165 (2018)

⁴Balasubramanian S. et al., *Agricultural Engineering Today* 31(2) (18-23), (2007)

⁵Meena R et al. *Global Scenario of Millets Cultivation* 33-45 (2021)

Major Millet Producing States

Millets	Top millet producing states and their value ('000 Tonnes)				
Sorghum	Maharashtra (1807.51)	Karnataka (986.98)	Tamil Nadu (520.07)	Rajasthan (455.77)	Andhra Pradesh (389.11)
Pearl Millet	Rajasthan (4685.88)	Uttar Pradesh (1939.46)	Haryana (1019.11)	Gujarat (913.15)	Madhya Pradesh (656.58)
Finger Millet	Karnataka (1164.06)	Tamil Nadu (274.50)	Uttarakhand (120.12)	Maharashtra (87.24)	Andhra Pradesh (44.88)
Small Millets	Madhya Pradesh (74.00)	Uttarakhand (70.97)	Karnataka (37.49)	Tamil Nadu (37.34)	Arunachal Pradesh (27.43)

Table 1. Major states that are producing different millets from Highest to lowest production in 2019-2020.

Reference: Agriculture Statistics at a Glance 2021, Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India

• Nutri-facts of millets⁶

- Millet contains magnesium, which helps to alleviate the effects of migraines and cardiovascular disease.
- Millet contains niacin, which helps to decrease cholesterol.
- Millet contains phosphorus, which aids in fat metabolism and body tissue regeneration.
- Millet can help prevent diabetes and reduce the risk of breast cancer due to its high fibre content.

Nutritive Value of coarse & fine cereals (Per 100g)

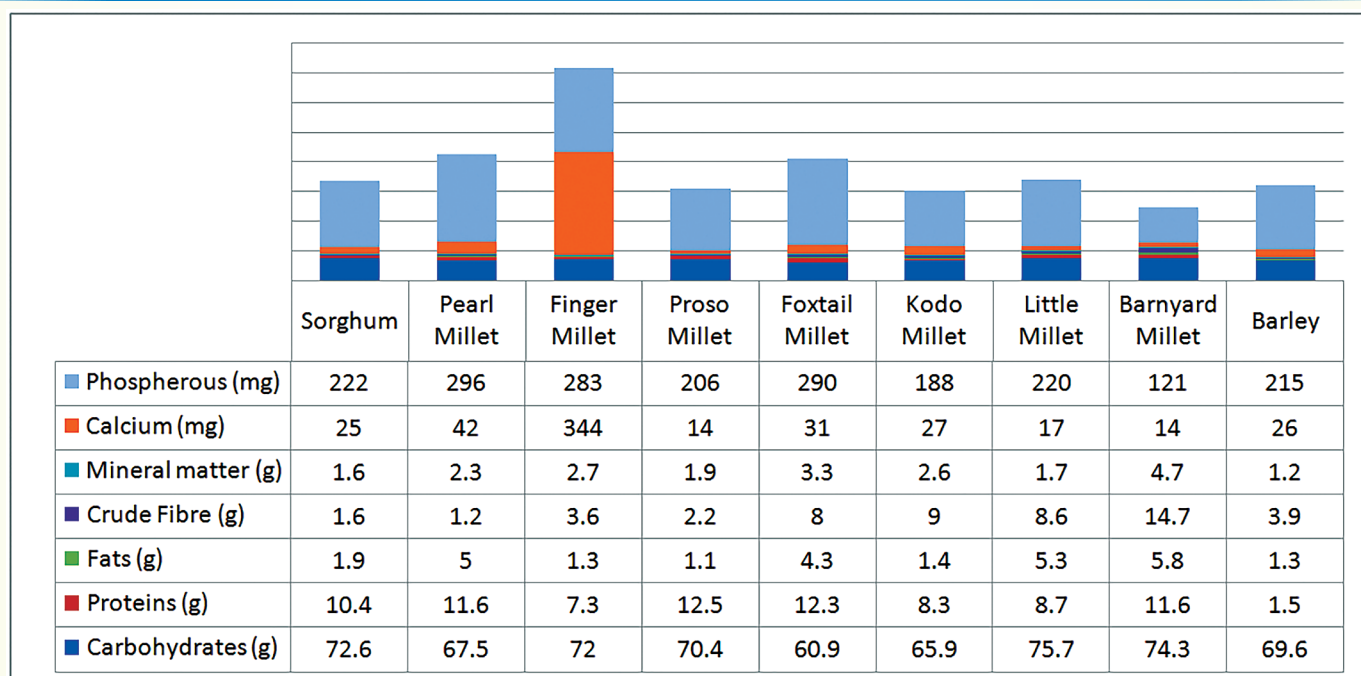


Figure 1. Nutritive Value of coarse and fine cereals

Source: Anunbukkani et al., 2017

Millets play a crucial role in the global food and nutrition sector. Millets have unique characteristics, such as rapid maturation, which allows them to be used in intensive cropping systems⁶. They can be stored for a long time and provide nourishment during a dry season or food shortages. Millets have a high nutritional value when compared to other crops in terms of macro and micro nutrients (Figure 1).

Millets are packed with micronutrients like Mg, Ca, Mn, tryptophan, phosphorus, fibre, B vitamins and millets are also high in antioxidants, which are important for our health (Figure 1).

⁶Science Tech Entrepreneur, Value Addition of Millets (May 2020).

State-wise Disease Trend in 2015-16 and 2019-2020 in India

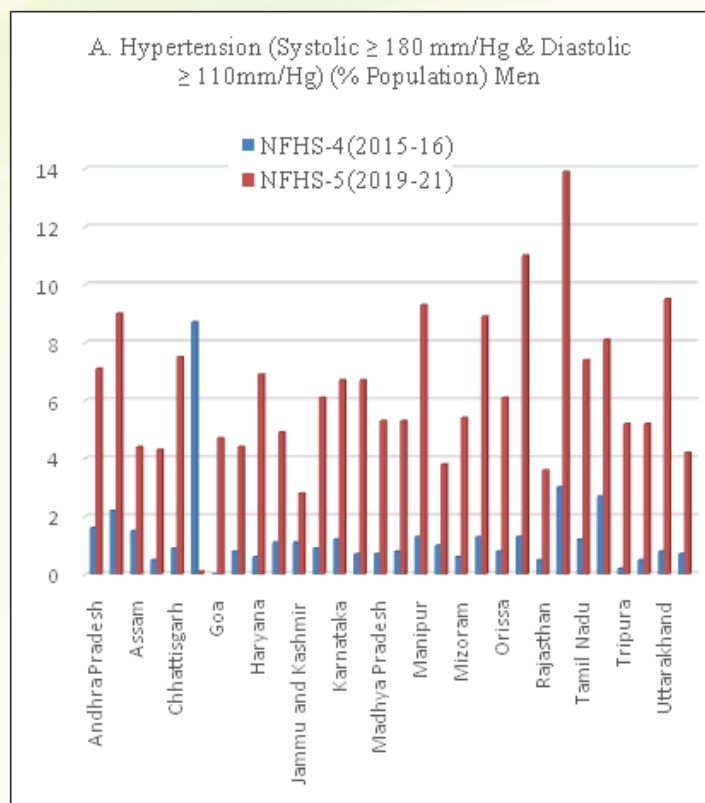


Figure 2A. State-wise hypertension prevalence in 2019-2020.

Source: National Family Health Survey 4 (2015-16)

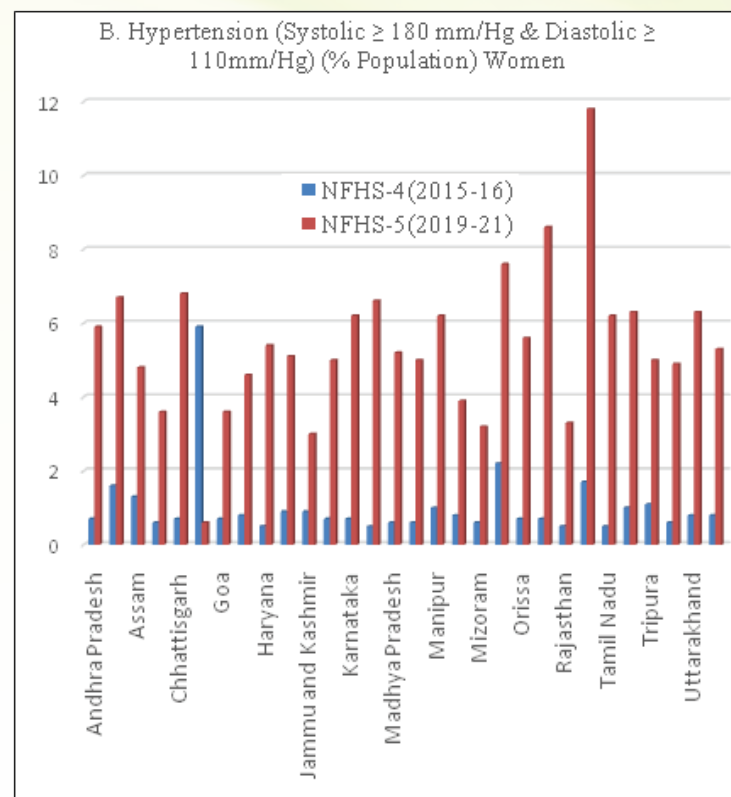


Figure 2B. State-wise hypertension prevalence in 2019-2020

Source: National Family Health Survey 4 (2019-2020)

Nutritional well-being is a long-term force for human health, development, and genetic potential optimization. As a result, a community's nutritional health has been identified as a key indication of national progress. To put it another way, malnutrition is a roadblock to national growth, and as a result, it has been designated as a national issue⁸. Dietary quality must be considered while addressing the problem of deep-seated food poverty and malnutrition. One of the potential beneficial techniques for improving household food security is to grow millets⁷.

Figure 2 depicts that there is an increase in hypertension (% population) in 2019-2021 and regular intake of cereals might reduce the risk of cardiovascular diseases such as hypertension, disturbed blood pressure, stroke, heart attack etc⁸.

Hypertension (% population) has increased from 2015-16 to 2019-2020 as suggested by the National Family Health Survey (NFHS) reports 4 (2015-16) & 5 (2019-2021).

Millets contain some hypertensive effects which might have the potential of regulating and reducing hypertension⁹.

Nutritional deficiency in terms of micro and macro nutrients has been detrimental to health and lifestyle related diseases¹⁰. Incorporating millet-based foods into national and state-level feeding programmes will aid in the alleviation of protein, calcium, and iron deficits¹⁰.

⁷Rao B.D, et al., Nutritional and Health benefits of Millets. ICAR Indian Institute of Millets Research (IIMR), 48-54 (2017)

⁸Michael Raj P and Shanmugam A, International Journal of Marketing, Financial Services & Mgt. Research, 2, 49-56 (2013)

⁹Park SY et al., Finger millet ethanol extracts prevents hypertension by inhibiting the angiotensin-converting enzyme level and enhancing the antioxidant capacity in spontaneous hypertensive rats (2021).

¹⁰Gowri M. & Shiuakumar KM, Millet Scenario in India. n (2020)

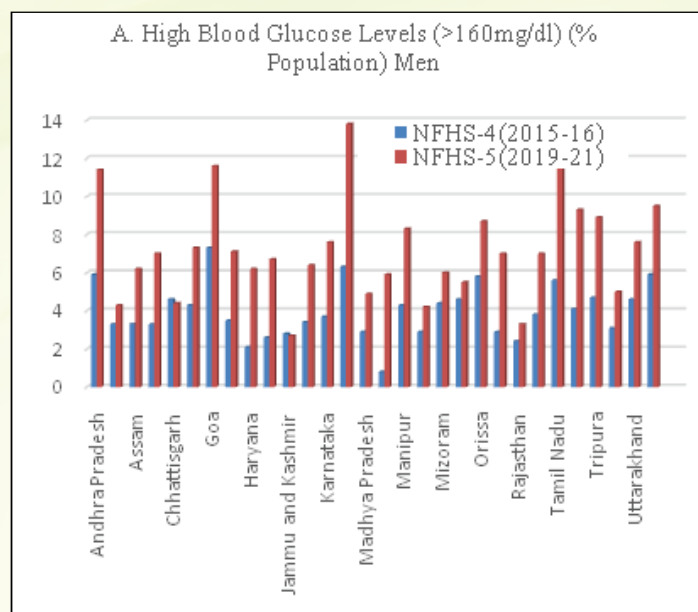


Figure 3A. State-wise High Blood Glucose Levels Data in 2015-16.
Source: National Family Health Survey 4 (2015-16)

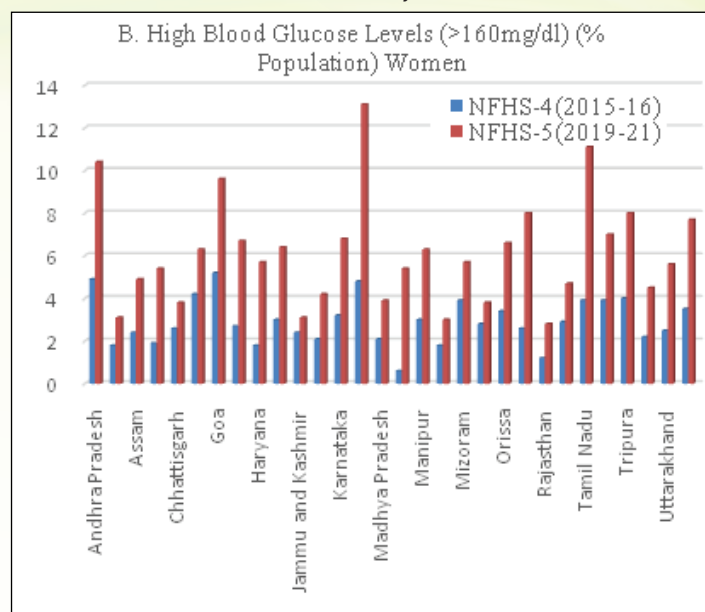


Figure 3B. State-wise High Blood Glucose Levels Data in 2019-2020.
Source: National Family Health Survey 5 (2019-2020)

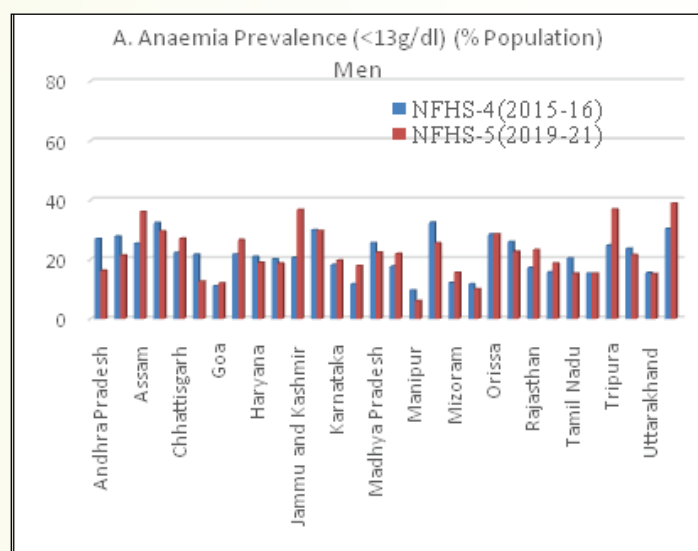


Figure 4A. State-wise anaemia prevalence in 2015-16.
Source: National Family Health Survey 4 (2015-16)

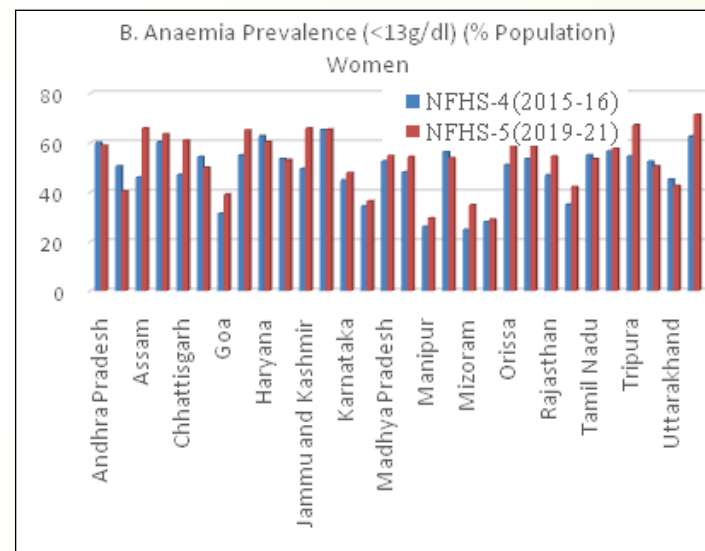


Figure 4B. State-wise anaemia prevalence in 2019-2020.
Source: National Family Health Survey 5 (2019-2020)

The prevalence of diabetes is on the rise in 2019-2020 as compared to 2015-16 (Figure 3) across the country at an alarming rate and necessary measures are suggested for the promotion of the healthy dietary pattern and life style which involves balanced diet and physical activity. It is a fact that people who consume whole grains and cereals at least thrice in a day are less likely to develop insulin resistance⁶.

A significant finding is that the prevalence of anaemia, high blood glucose levels and hypertension are much higher over time in the population (Figure 4) as the production of millets, this offers possible avenues for increasing production and consumption of millets in order to naturally fulfill the nutritional demands of India for accomplishing the nutritional security, minimizing the lifestyle related health risks and for the improvement of the sustainability in India.

Intake of Iron rich diet can significantly help in conditions of anaemia because anaemia cases have increased in every state especially in the case of women. So, millets being iron-rich may help in reducing the prevalence of anaemic cases in different states⁹.

Nutrition is often undervalued as a cornerstone for foundation of healthy development. People nowadays are very concerned of their healthy living habits in order to avoid metabolic disorders and lifestyle diseases⁹. The state-wise scenario of hypertension, anaemia and high blood glucose levels clearly depicts that the disease prevalence in 2019-2020 has increased from 2015-16 (Figure 2, 3 & 4).

Major Millet producing States and their disease prevalence

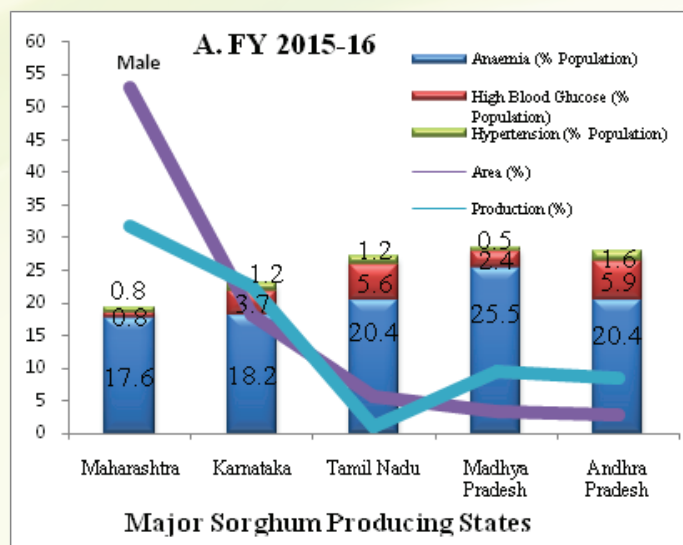


Figure 5A. Area, Production & Disease Prevalence in major Sorghum producing states in 2015-16 (Males).

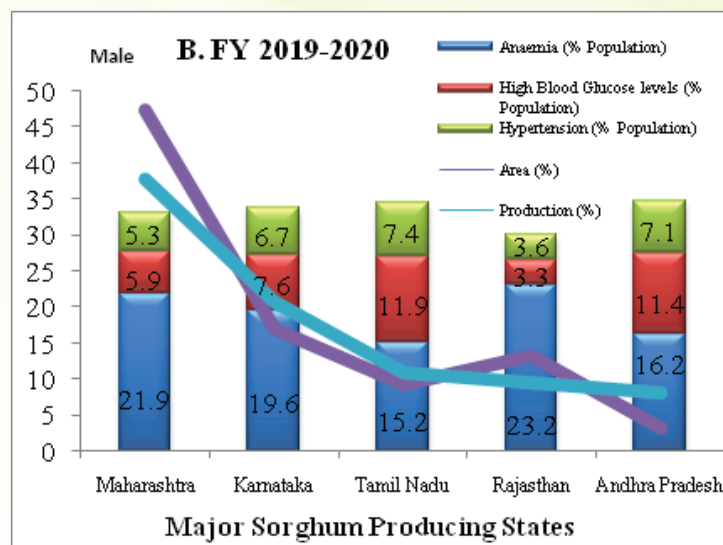


Figure 5B. Area, Production & Disease Prevalence in major Sorghum producing states

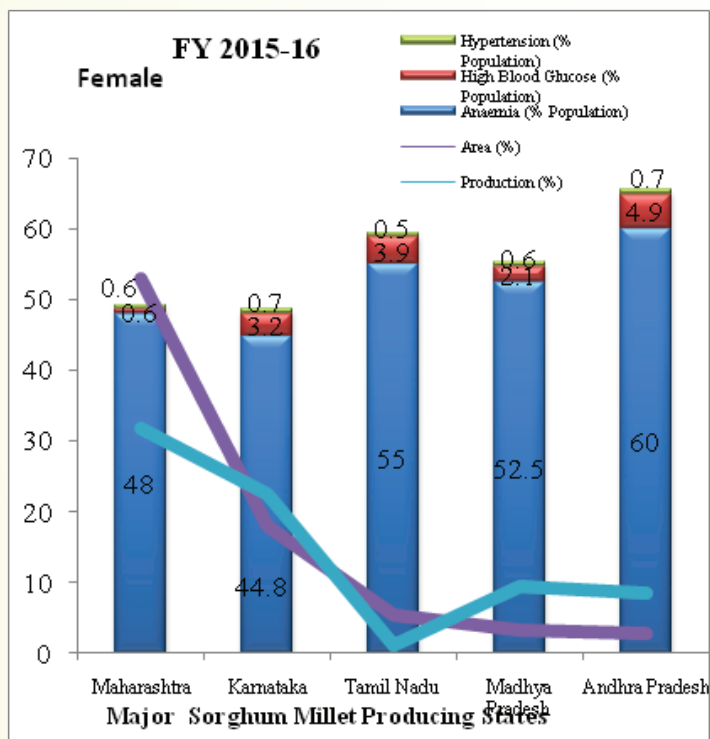


Figure 5C. Area, Production & Disease Prevalence in major Sorghum producing states in 2015-16 (Females)

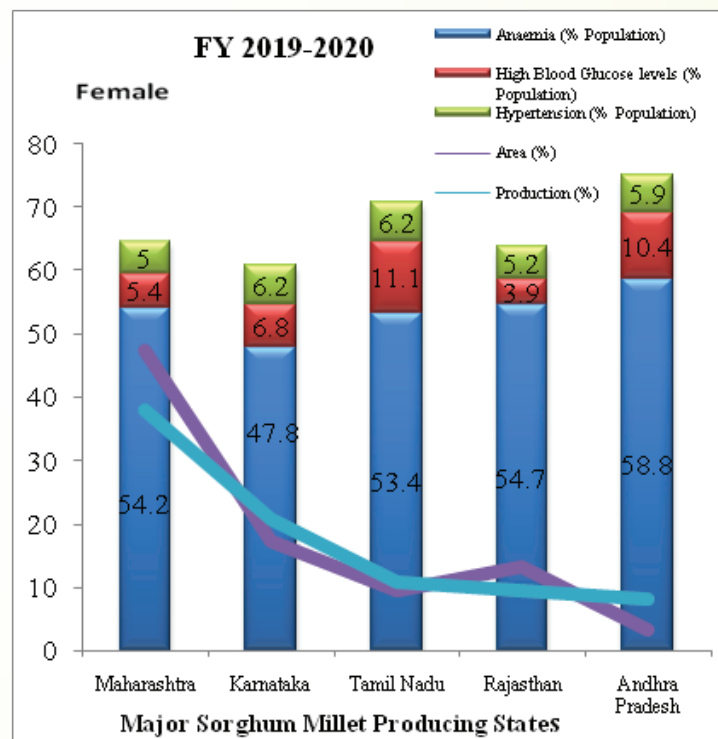


Figure 5D. Area, Production & Disease Prevalence in major Sorghum producing states in 2019-2020 (Females)

Millet grains and flours have limited use due to poor quality characteristics such as dark, dull color, rough and grainy texture, unpleasant flavor, high fibre content, prolonged cooking time, and so on. Also, the shift to modern crops has resulted in decline in the area and production of the millets⁸.

This secondary survey report has drawn a correlation between the production which is directly related to the consumption and the disease prevalence in the major five millet producing states. Maharashtra, Karnataka, Tamil Nadu, Rajasthan, and Andhra Pradesh are the major five Sorghum producing states (Figure 5). This is clearly visible that as the production has decreased the percentage of hypertension, high blood glucose levels and anaemia in the population has increased non-uniformly which further needs extensive study or investigation.

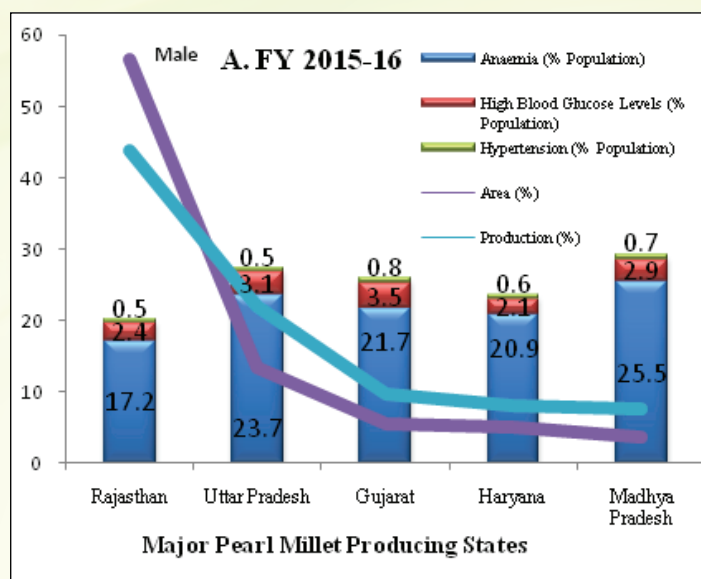


Figure 6A. Area, Production & Disease Prevalence in major Pearl Millet Producing states in 2015-16 (Males).

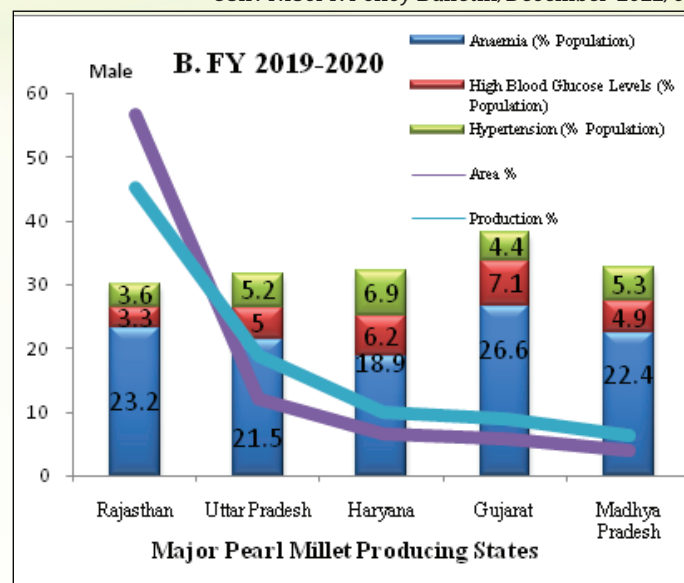


Figure 6B. Area, Production & Disease Prevalence in major Pearl Millet Producing states in 2019-2020 (Males)

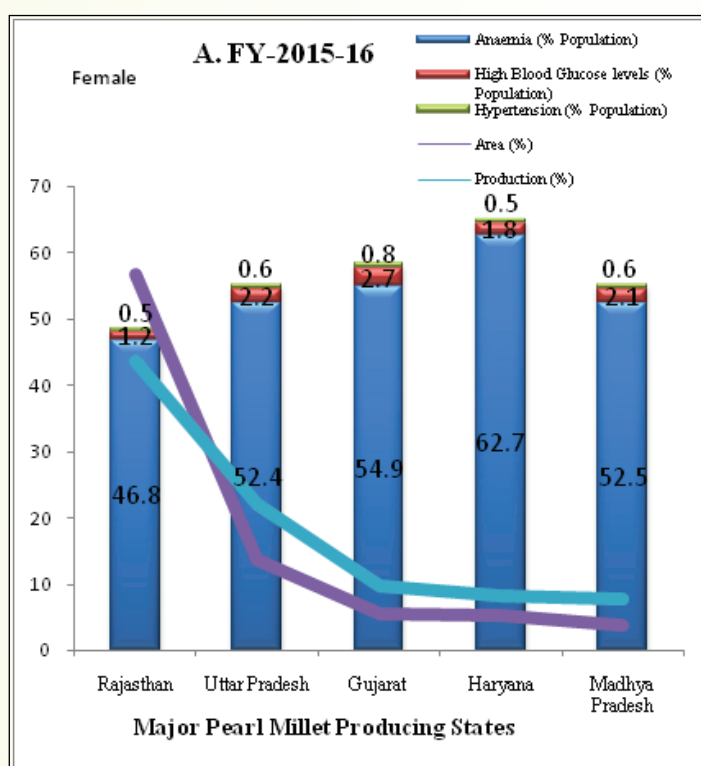


Figure 6C. Area, Production & Disease Prevalence in major Pearl Millet Producing states in 2015-16 (Females).

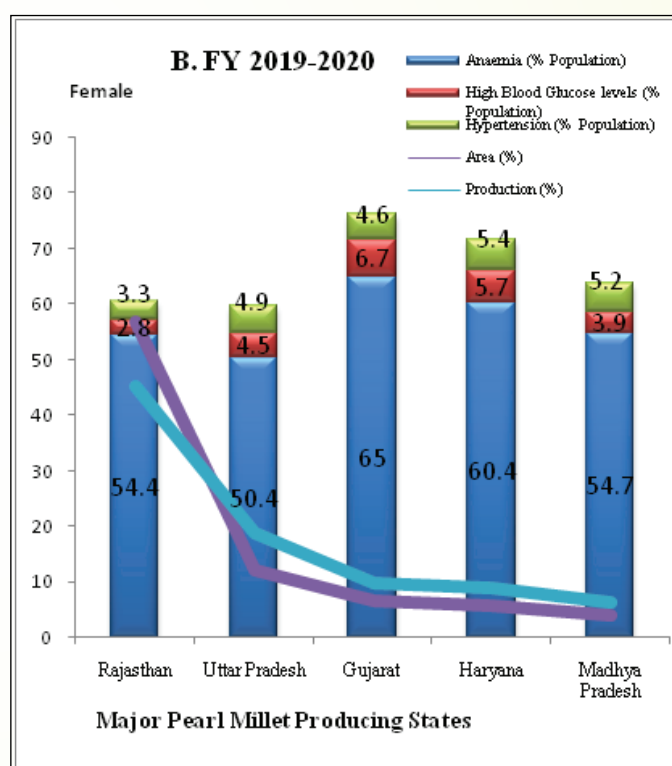


Figure 6D. Area, Production & Disease Prevalence in major Pearl Millet Producing states in 2019-2020 (Females)

Similarly, there is a huge increase in the hypertension, high blood glucose and anaemia in the major Pearl millet producing states i.e., Rajasthan, Uttar Pradesh, Gujarat, Haryana and Madhya Pradesh (Figure 6) and there is a non-uniform decrease in the production and the area of the pearl millet in these states. Figure 6 demonstrates that the anaemia prevalence has drastically increased in female population of Rajasthan, Gujarat, and Madhya Pradesh. All the data has been collected from the National Family Health Survey (NFHS) Report 4 (2015-16) and 5 (2019-2021) and then analysed with the area and production of the Sorghum and Pearl Millet producing states (data from Pocket Book of Agricultural Statistics 2019, Directorate of Economics and Statistics). This analysis showed that the area and production has declined from 2015-16 to 2019-2020 but on the other hand the diseases percentages has gone up. This needs to be brought into attention of the policy makers to focus upon this retarding situation of health in India.

Case Study: All India Production Status of Sorghum and Pearl Millet in 2015-16 & 2019-2020

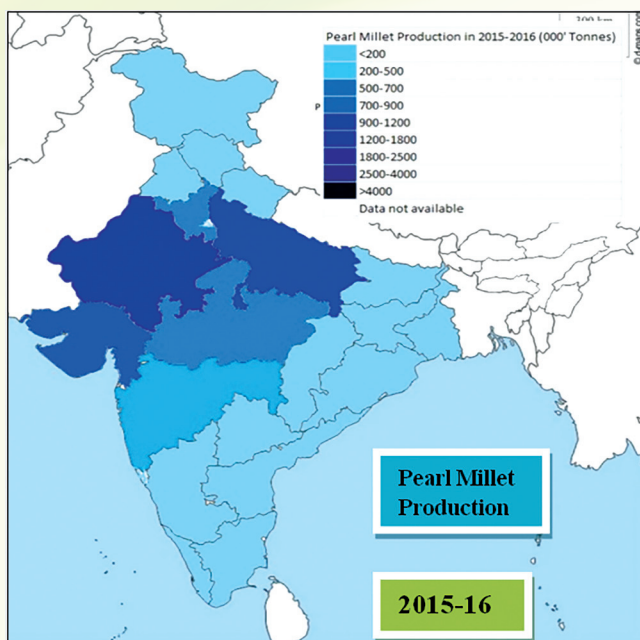


Fig.7A. Map showing Production of Pearl Millet in 2015-16

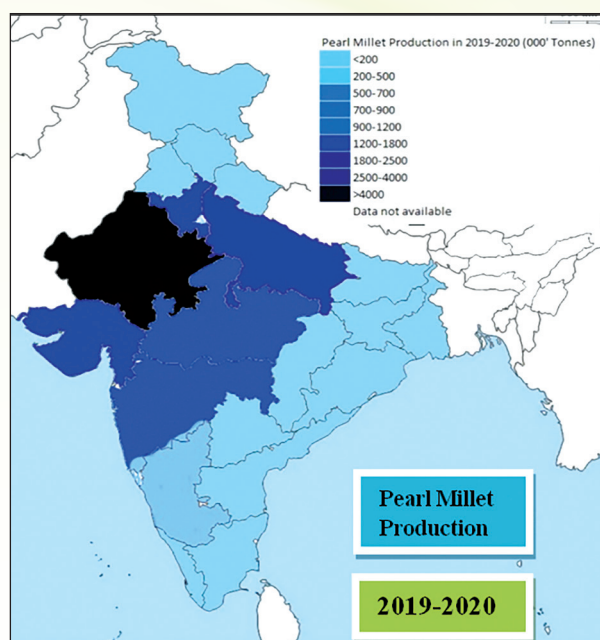


Fig.7B. Map showing Production of Pearl millet in 2019-2020

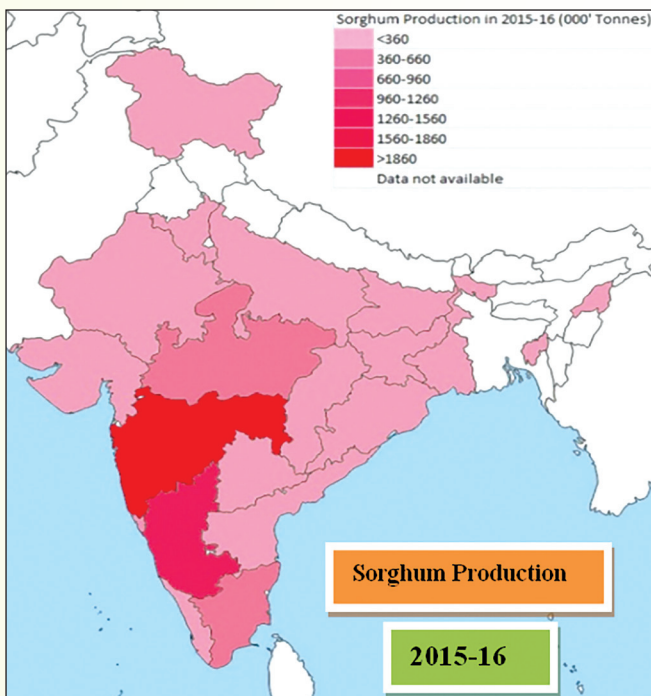


Fig.8A. Map showing Production of Sorghum in 2015-16

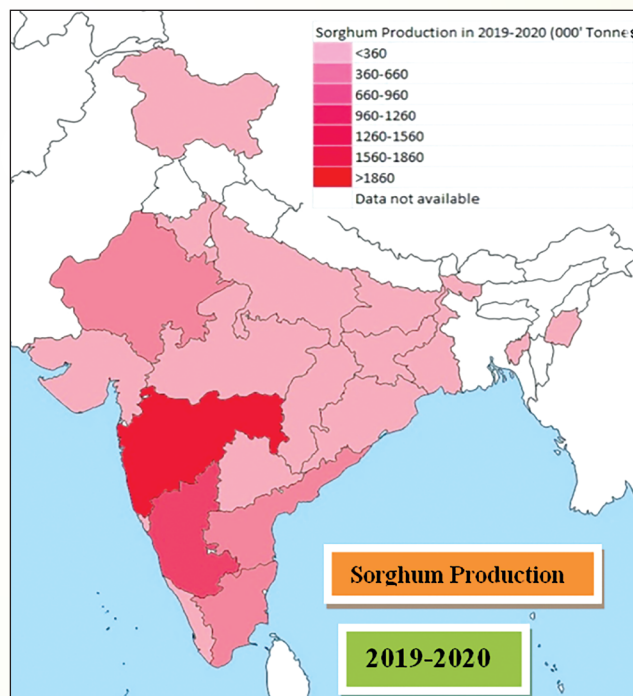


Fig.8B. Map showing Production of Sorghum in 2019-2020

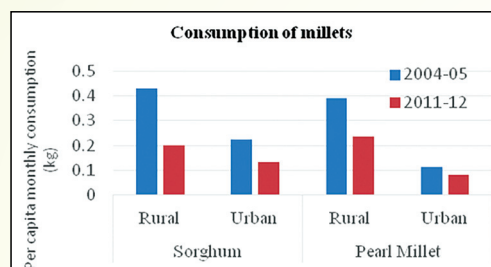
Source: Agriculture Statistics at a Glance 2021, Directorate of Economics and Statistics, DAC F&W, Ministry of Agriculture and Farmers Welfare, Government of India

Some of the states of India have shown increase in the production pattern (Figure 7A & B) of Pearl Millet in 2019-2020 while others have been stable with their production figures. For example: the production of Pearl millet in Rajasthan, Haryana, Punjab, Madhya Pradesh, Maharashtra, Gujarat & Uttar Pradesh has increased in 2019-2020 in comparison with 2015-16. But the production pattern of Sorghum has shown a non-uniformity as some of the states has increased their production but others have shown a decline in production. The production of Sorghum has significantly decreased (Figure 8A & B) in Maharashtra & Madhya Pradesh while it has shown an incline in Karnataka, Andhra Pradesh & Rajasthan. This geographical representation suggests that there is a need to increase the production capacity of coarse cereals in order to decrease the substantial negative effects of nutritional deficiency in populations.

Agriculture, Millets and Nutrition Security: A Primary Survey (Online Google Form)

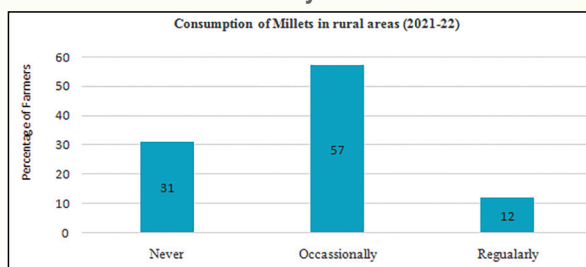
A pilot study on Agriculture, Millets and Nutritional Security, a primary survey study has been initiated in the year 2022 in February to get the responses from farmers on the agricultural statistics, traditional food systems and the nutritional capacity of India. (n = 50)

Secondary Data



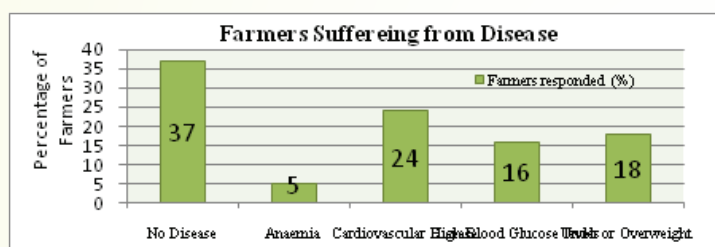
Source: National Sample Survey 61ST and 68TH Round (2004-05 & 2011-12 respectively)

Primary Data



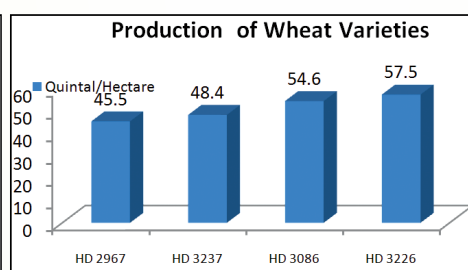
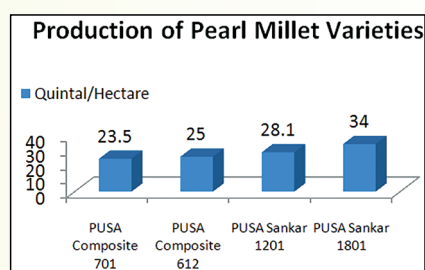
Source: Online Google Form Survey of 50 Farmers (Survey done in 2021-2022)

Graphs depict the reduced consumption of millets as supported by secondary analysis and primary data analysis.



Issues reported by farmers:

Rice and Wheat are more financially profitable crops in comparison to millets. Per hectare production rate of millets is less than per hectare production rate of wheat and rice. Per kilo market purchase rate of rice and wheat is twice the rate of millets that's why millets production is not preferred by farmers.



Based on the primary survey done at "KISAN MELA" (09th-11th March, 2022) organised by IARI (PUSA Campus), the quintal per hectare production of different varieties of Pearl Millet is lower as compared to the varieties of Wheat.

Policy Recommendations

- The evidence on agriculture–gender linkages to nutrition is relatively weak, and sizeable knowledge gaps remain. The reason for this gap includes an interdisciplinary disconnect between nutrition and economics/agriculture, inadequate survey data, and limited policy-driven experimentation.
- It is critical to develop a richer and more rigorous knowledge of the complex mechanisms underlying the formation and transformation of traditional crops and their convergent outcomes from all of agriculture, nutrition, and economic perspectives.
- Innovative and virtuous "holistic" model of food production and distribution need to be taken into consideration. Successful implementation of this model may contribute to increase sustainability and health promotion strategies nationwide.

Acknowledgement

The project team is extremely grateful to Prof. Ranjana Aggarwal, Director of the CSIR-NIScPR, for her unwavering support, invaluable advice, and assistance in developing and completing the project. The advice provided by Prof. Aggarwal was always helpful in making the report more focused and thorough. The great encouragement and sustained guidance and support by Director of CSIR-NIScPR, provided much needed motivation and crucial support.

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