IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 21, Issue 3, Ser. III (May - June 2019), PP 64-67
www.iosrjournals.org

Why do Northeastern states have lower women's malnutrition?

Prisiclla C. Ngaihte, Vanya Mehta
Public Health Foundation of India
Corresponding Author: Prisiclla C. Ngaihte

Abstract: *This paper explores the potential determinants behind women's malnutrition, or lackthereof, in the Northeastern states of Sikkim, Mizoram, Arunachal Pradesh and Manipur. The lowest rates of women's malnutrition in India, measured by the National Family Health Survey as percentage of women with low body mass index (BMI), are in these Northeastern states. States with lower percentages of women with low BMI typically have higher female literacy rates, high female work participation rates and better access to sanitation at the household level. These findings suggest that states with greater levels of gender equality may be more likely to also have better nutritional outcomes among women. This paper also suggests that there is an important connection between the condition of sanitation at the household level and improvements in women's nutrition, a very important finding for states governments in India.*

Date of Submission: 22-05-2019 Date of acceptance: 08-06-2019

I. Introduction

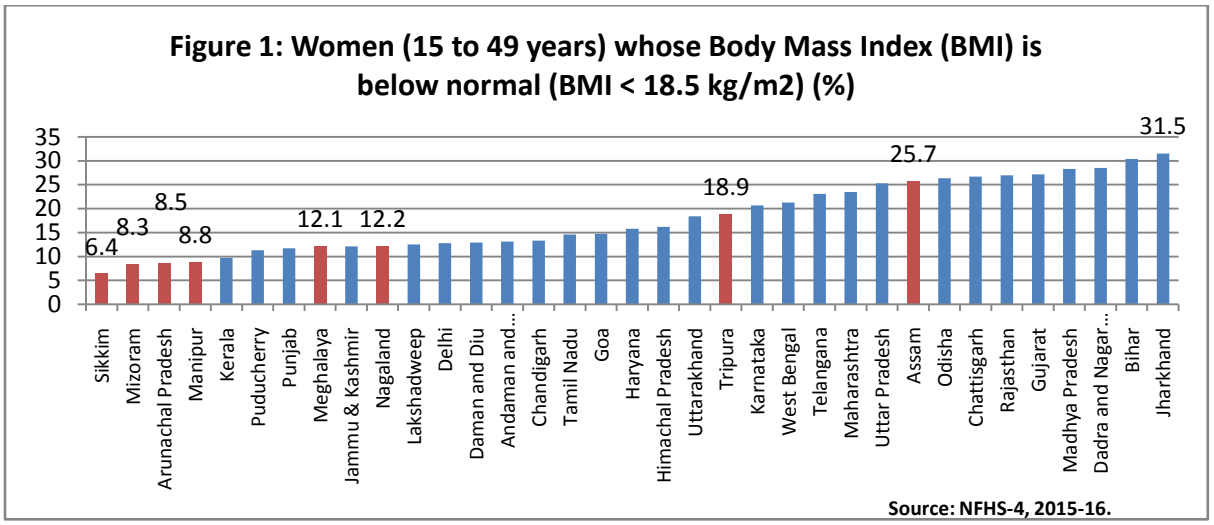
The existence of malnutrition, whether among men, women, or children, is a failure on the part of governments to meet the basic needs of their population. While it is important to reduce malnutrition overall, women's nutrition remains an important priority, given the central role that women play in the household.It is well known and proven that improving women's nutritionleads to improved household and child nutrition. Thus, it is a priority of all state governments to reduce the malnutrition rate among women.

The Northeastern states of Sikkim, Mizoram, Arunachal Pradesh and Manipur have the lowest rates of malnutritionamong women compared to allother Indian states (Figure 1).Even states with high tribal populations, such as Mizoram, Meghalaya and Nagaland, still have comparatively low malnutritionrates to the rest of India. Anemia among women is also lower in the Northeastern states of Sikkim, Manipur, Mizoram and Nagaland, compared to other states in India, although it still remains prevalent among at least 20-30 percent of women. This paper will explore the determinants behind low malnutrition among women in the Northeast.

II. Literature Review

Women's malnutrition is a priority for major development organizations and state governments, particularlygiven the impactthat poor maternal health has on child health. Women's health becomes, therefore, not just a problem of the importance of the wellbeing of all individuals, but also the wellbeing of future generations.In the context of this paper, we focus on women's malnutrition, not only in its role as a determinant for child and household nutrition, but also as a problem in its own right.

In the National Family Health Survey, malnutrition is calculated through a measurement of body mass index (BMI), the weight to squared height (w/h2), which, if below 18.5, is referred to as chronic energy deficiency (CED). Through these measurements gathered by the NFHS, researchers analyze the prevalence of under nutrition and anemia among women and men in all states of India. As per the fourth wave of the NFHS, 2015-16, 23 percent of Indian women and 20 percent of Indian men suffer from malnutrition. The lowest percentages of women with low BMI are in Sikkim (6.4), Mizoram (8.3), Arunachal Pradesh (8.5) and Manipur (8.8), followed by Kerala (9.7) (NFHS-4, 2015-16). Among men, the lowest rates of low BMI are in Sikkim (2.4), Mizoram (7.2), Lakshadweep (7.4) and Arunachal Pradesh (8.3), followed by Kerala (8.5) (Ibid). Figure 1 below indicates the percentage of women with low BMI across all Indian states.



Factors that influence women's malnutrition typically include literacy, years of education, the number of years gap between children, marriage age, fertility rate, presence of a drinking water source, sanitation facility and electricity at the household level. It is also found that consumption expenditure, agricultural land holding, access to markets, education and information all resulted in a positive improvement in the consumption of a diverse diet (Das 2014). Rises in prices of nutritious foods also led to a decline in dietary diversity (Ibid), indicating the importance of the affordability of diverse food. There are also other factors that can be related to women's malnutrition such as age, household standard of living, diversity in cropping patterns, workload, income,and consumption expenditure, to name a few.Researchers also connect women's empowerment to women's malnutrition, finding that an increase in women's equality relative to men's hasa positive impact on women's health (Haddad 1999). More recent research finds a relationship between increases in agricultural income and increases in women's BMI, as well as a relationship between women's BMI and increase in the consumption of own-produced cereals and market purchase of nutritious food items (Pingali and Rao 2018). These findings help understand what areas a state government can focus on in order to reduce malnutrition among women.

Although there is far more literature on child nutrition in the Northeast than women's nutrition, there are some studies that look into the determinants behind nutrition in Northeastern women. Some connect it to alower gender literacy gap, a higher proportion of working and self-employed women and the possession of sanitation facilities at the household level (Bharati et al 2007). Others also highlight the importance of collective land ownership among tribes in Northeast India (Bahadur 2017) as a source of food security, however, it is also noted that in some states, particularly Meghalaya, Mizoram and Sikkim, the requirement for food grains such as rice far exceed the production (Roy et al 2015). Another important contributing factor to lower malnutrition is dietary patterns. In the Northeastern states,access to wild edible green leafy vegetables is abundant (Dhotong et al 2014, Ayam 2011) and meat contributes significantly to income and diets (Devi et al 2014).Some parts of Northeast India also consume an even greater variety of meats as well as insects (SethuramanSivakumar et al 2015).

III. Findings

Not only do the Northeastern states have a comparatively low malnutrition rate among women, many Northeastern states have considerably reduced this rate over the past decade. The rate of women's malnutritionin Tripura, Arunachal Pradesh, Mizoram, Manipur, Nagaland and Assam reduced by between 30 to 50 percentfrom 2005 to 2015 (Table 1). Meghalaya, on the other hand, did not significantly reduce its malnutrition rate, though it remains fairly low at around 12 percent of all women.

Table 1: State-wise percentage of low Body Mass Index (BMI) among women from 2005-06 to 2015-16

Row Labels	NFHS-3 (2005-06)	NFHS-4 (2015-16)	% change NFHS-3 to NFHS-4
Jammu & Kashmir	24.6	12.1	-51%
Haryana	31.4	15.8	-50%
Tripura	36.9	18.9	-49%
Tamil Nadu	28.4	14.6	-49%
Arunachal Pradesh	16.4	8.5	-48%
Goa	27.9	14.7	-47%

Kerala	18	9.7	-46%
Himachal Pradesh	29.9	16.2	-46%
West Bengal	39.1	21.3	-46%
Sikkim	11.2	6.4	-43%
Mizoram	14.4	8.3	-42%
Karnataka	35.4	20.7	-42%
Manipur	14.8	8.8	-41%
Uttarakhand	30	18.4	-39%
Chattisgarh	43.4	26.7	-38%
Punjab	18.9	11.7	-38%
Odisha	41.4	26.4	-36%
India	35.5	22.9	-35%
Maharashtra	36.2	23.5	-35%
Bihar	45	30.4	-32%
Madhya Pradesh	41.7	28.3	-32%
Nagaland	17.4	12.2	-30%
Uttar Pradesh	36	25.3	-30%
Assam	36.5	25.7	-30%
Jharkhand	42.9	31.5	-27%
Rajasthan	36.7	27	-26%
Gujarat	36.3	27.2	-25%
Meghalaya	14.6	12.1	-17%
Delhi	14.8	12.8	-14%

Reduction of women's malnutrition is a commendable feat and may have to do with the coverage of nutrition and health programs led by their respective state governments. In Mizoram, from 2006 to 2016, nutrition interventions have improved the nutritional status of children and women (IFPRI Report). The coverage of iron and folic acid consumption increased from 17.8 to 53.8 percent and the proportion of women receiving at least four antenatal care visits increased from 45.6 to 61.7 percent (NFHS-3 and 4). In Meghalaya, iron folic acid consumption increased from 5.9 to 36.2 percent and in Manipur, from 6.8 to 39.2 percent. In Meghalaya, antenatal care coverage increased from 42.8 to 50, while in Manipur, antenatal care coverage increased from 54.1 to 49 percent. The percentage of women utilizing institutional births has also increased in all three states.

In order to further understand the relationship between malnutrition and other important factors, we calculated a simple correlation coefficient (Table 2) for all Indian states and Union Territories with data available from the NFHS-4. It is found that low malnutrition among womenis associated with lower infant and under-five mortality rates. In addition to this, more populous states have higher women's malnutrition rates.In the Northeastern states, along with low malnutrition among women, there are also higher rates of access to sanitation facilities, particularly in Sikkim, Mizoram and Nagaland (NFHS-4) and higher rates of female literacy(Ibid). On a national level, it also holds true that factors that are correlated with decreasing women's malnutrition include increased access to improved sanitation at the household level, women's literacy, rural monthly per capita expenditure (MPCE), male literacy and percentage of women with 10+ years of education.

Table 2: Correlation coefficients for percent of low BMI by state with other factors from NFHS-4 and NSS 68th Round

Variable	Correlation Coefficient
Women age 20-24 years married before age 18 years (%)	0.73
Men age 25-29 years married before age 21 years (%)	0.65
Under-five mortality rate (U5MR)	0.63
Infant mortality rate (IMR)	0.62
Population (Census 2011)	0.61
% Share in Consumer Expenditure of Food-Rural	0.48
Women age 15-19 years who were already mothers or pregnant at the time of the survey (%)	0.44
Total fertility rate (children per woman)	0.43
GSDP (constant)	0.40
% Share in Consumer Expenditure of Cereals - Rural	0.29
% Share in Consumer Expenditure of Food- Urban	0.07
% Share in Consumer Expenditure of Cereals-Urban	0.01
Households with an improved drinking-water source (%)	0.01
% Tribal Population	-0.26
Households using iodized salt (%)	-0.34
Monthly per capita expenditure (MPCE)-Urban	-0.40
Households using clean fuel for cooking (%)	-0.52
Households with electricity (%)	-0.57
Men who are literate (%)	-0.62

Women with 10 or more years of schooling (%)	-0.62
Monthly per capita expenditure (MPCE)-Rural	-0.65
Women who are literate (%)	-0.77
Households using improved sanitation facility (%)	-0.79

Monthly per capita expenditure (MPCE), in rural and urban India, is negatively correlated with malnutrition, although more strongly in the case of rural India. Thus, it can be concluded that overall increases in household expenditure, often used as a proxy for income, results in better nutrition in women, especially in rural India.It is curious to see malnutrition increase among women, however, as expenditure on non-cereal foods increases in rural India, while other food and cereal expenditure statistics are not correlated with malnutrition. MPCE on specific goods, such as dairy, meat, vegetables, fruits and pulses, cannot be properly understood without stabilizing according to the relative prices of these goods in each state and is excluded from this analysis.

Dietary diversity results in better nutritional outcomes. In the NFHS-4, data on consumption of food shows that in the Northeastern states, women between the ages of 15 to 39 are eating more meat than any other state in India, alongside states like West Bengal, Kerala and Goa. In Assam, 80 percent of women are consuming fish or chicken or meat, 79 percent in Tripura, 77 percent in Manipur, 75 percent in Meghalaya, 67 percent in Sikkim and Arunachal Pradesh, and 60-61 percent in Mizoram and Nagaland. In Sikkim, 96 percent of women consume milk or curd, 70 percent in Nagaland and 50 percent in Meghalaya, Assam and Tripura. Other states like Arunachal Pradesh and Mizoram, still having low women's malnutrition, do not have high percentages of women consuming milk due to the difference in typical diets in these regions. All Northeastern states report high consumption of green, leafy vegetables, between 90 to 98 percent of women. Consumption of pulses is increasingly common in the Northeast; yet, it is still less common in the case of Mizoram (55%) and Nagaland (64%). Meghalaya has quite a high percentage of women reporting consumption of eggs (72%), alongside Tamil Nadu and Andhra Pradesh. Interestingly, fried food is reportedly consumed by 95 percent of women in Mizoram as per the NFHS-4.

While these factors may explain, in part, the malnutrition rates in India and the lower malnutrition rates in the Northeast, it is still a curious point that needs further exploration. It can be seen that women's education and access to a better standard of living, such as sanitation facilities, are correlated with lower malnutrition rates among women. Consumption of meat, fish or chicken is higher in the Northeast.The rate of malnutrition has decreased monumentally in the Northeastern states over time. Antenatal care coverage has increased in Northeastern states. In addition to all this, states with high percentages of scheduled tribes (ST) in their populations, like Mizoram and Nagaland, also have lower malnutrition rates among women than other states in India, indicating an important distinction in the tribal lifestyles and nutritional patterns.

Works Cited

[1]. Argrahar-Murugkar, D and P.P. Pal. 2004.Intake of Nutrients and Food Sources of Nutrients Among the Khasi Tribal Women of India.*Nutrition*, 20(3): 268-273.

[2]. Bahadur, Devika. 2017. Interface between customary and formal land management systems: Mizoram, India. *World Bank*, Paper presented at conference on March 20-24, 2017.

[3]. Bharati,S., Pal, M., Bhattacharya, B.N. and P. Bharati. 2007. Prevalence and Causes of Chronic Energy Deficiency and Obesity in Indian Women. *Human Biology*, 79(4): 395-412.

[4]. Das, Mousumi, Measures, Spatial Profile and Determinants of Dietary Diversity: Evidence from India (July 5, 2014). Available at SSRN: https://ssrn.com/abstract=2511823.

[5]. Devi, S.M., V. Balachandar, S.I. Lee and I.H. Kim. 2014. An Otuline of Meat Consumption in the Indian Population – A Pilot Review. *Korean Journal for Food Science of Animal Resources,* 34(4): 507-515.

[6]. Dhotong, J., A. Nath, Bydut C. Deka and R.P. Mishra. 2014. Quality Characteristics of Twelve Lesser Known Edible Leafy Vegetables of Wokha District of Nagaland, India.*Bioscience, Bioengineering and Biotechnology*, 1: 16-21.

[7]. Haddad, Lawrence. 1999. Women's Status: Levels, Determinants and Consequences for Malnutrition, Interventions, and Policy. *Asian Development Review,* 17(1,2): 96-131.

[8]. International Institute for Population Sciences. 2007. *National Family Health Survey (NFHS-3), 2005-06: India*. Mumbai, India: International Institute for Population Sciences.

[9]. International Institute for Population Sciences. 2016. *National Family Health Survey (NFHS-4), 2015-16: India.* Mumbai, India: International Institute for Population Sciences.

[10]. Mani, S., P.H. Nguyen, R. Avula, and P.Menon. 2017. Improving Nutrition in Mizoram: Insights from Examining Trends in Outcomes, Determinants and Interventions between 2006 and 2016. POSHAN Policy Note 23. New Delhi: International Food Policy Research Institute.

[11]. Rao, T, Pingali P. 2018. The role of agriculture in women's nutrition: Empirical evidence from India. PLoS ONE 13 (8): e0201115.https://doi.org/10.1371/journal.pone.0201115

[12]. Roy, A., N.U. Singh, D.S. Dkhar, A.K. Mohanty, S.B. Singh and A.K. Tripathi. 2015. Food Security in North-East Region of India—A state-wise Analysis. *Agricultural Economics Research Review*, 28: 259-266.

[13]. Sivakumar, P. S. 2015.Food Consumption Patterns of North Eastern Communities.*Tamil Nadu Agritech Portal.* http://agritech.tnau.ac.in/itk/indi_farm_food_consumption.html