



Rural India Food Plate

About the Study

Variation in an individual's diet is associated with the intake of adequate energy and essential nutrients; increasing variety in one's diet is recommended in most dietary guidelines globally. Dietary diversity is especially important among populations with diets based on starchy staples where micronutrient deficiency is more likely. The most common method of measuring dietary diversity for a household or individual consists of assessing the variety of different food groups consumed in a specific recall period; information on the quantity of foods consumed is not gathered. Indicators of dietary diversity are considered to be useful as measures of impact for programs designed to address nutrition through agricultural pathways. However, most countries lack routine, current, comparable data on what people eat. Unlike most other public health

priorities, there is no global monitoring system for diets.

To fill this gap, TRI and Sambodhipanel, have undertaken this study on Rural Food-plate Mapping aka How does Rural India Eat. The study aims to understand the diet quality, accessibility, and diversity of rural households in India, along with nutrition sufficiency.

The assessment interviewed 7332 rural individuals across 20 states, covering all six geographic zones of India. Globally accepted tools (i.e., FAO, United Nations) were used to collect data for a 24-hour recall period and then this data was used to generate an Individual Dietary Diversity Score (IDDS).

National trends on nutrition and food production

The challenge of improving nutrition in India is an uphill battle. On one side, we see slow reductions in childhood stunting. Annual reduction in stunting between 2015-16 and 2019-20 stood at 0.7 percentage point (pp), much lesser than a required rate of nearly 1.5pp to achieve Sustainable Development Goal targets. On the other hand, obesity among households has more than doubled (from 10% in the early 2000s to 24% in 2019-20). At the same time, India continues to produce more food every year. Per capita monthly availability of food grains (rice, wheat, nutria-cereals) has increased by 8%, pulses by 40%, oilseeds by 10.9 %, and milk by 46% between 2011 and 2021.

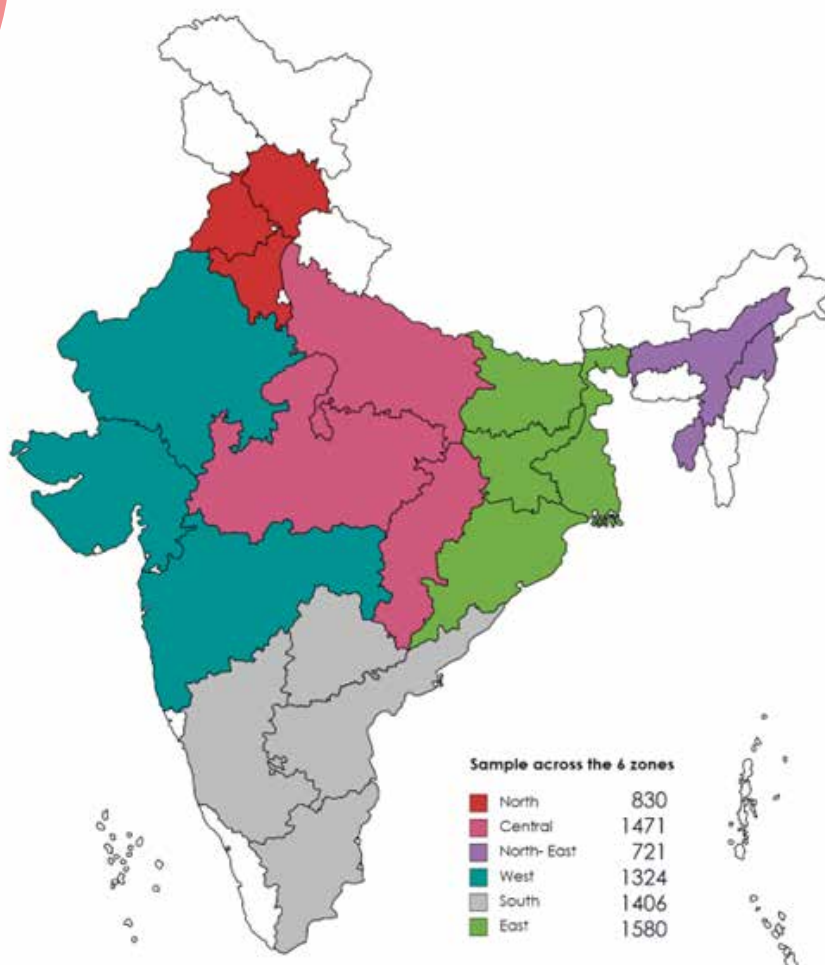
This TRIF-Sambodhi survey contributes to explaining these macro-level contradictions as well.

Sample coverage

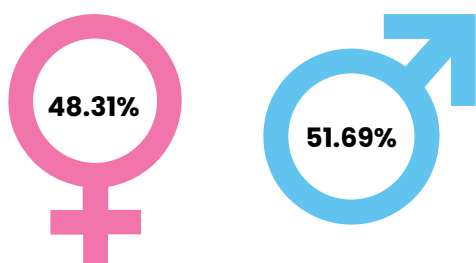
Sample was a healthy mix of population from all the 6 geographical zones, male - female, and all age groups.

7332

Total individuals surveyed in Rural India



Gender of head of household



Age of respondents

Less than 25 years	8%
25 to 34 years	24%
35 to 50 years	47%
51 to 65 years	16%
Above 65 years	4%

Methodology

The Nutrition and Consumer Protection Division of the Food and Agriculture Organization of the United Nations lays down guidelines for measuring

household and individual dietary diversity. FAO classifies all the food items under 14 major food groups.



Cereals



Dark green leafy vegetables



White roots and tubers



Other vegetables



Meat and poultry



Eggs



Fish and seafood



Pulses, legumes and nuts



Milk and milk products



Oils/ fats



Sugar/ honey/ sweets



Spices and condiments



Vitamin A fruits



Other fruits

In order to assess dietary diversity, FAO tool was used to collect data on the food groups consumed in the last 24 hours by respondents. This data was then used to generate an Individual Dietary Diversity

Score (IDDS). This score tells us about the dietary profile of the individual and if it is a micronutrient rich diet.

Analytical approach

The study comments on 3 areas–

Nutritional Security across zones and gender

- Composition of food groups being consumed across zones
- Individual Dietary Diversity Score (IDDS) across zones and gender
- Micronutrient security across zones and gender

Heterogeneity in Nutritional Security

- Heterogeneity in Nutritional security based on Dietary diversity score and Wealth status

Food accessibility and availability

- Sources of food procurement across zone

Nutritional Security across zones and gender

Individual Dietary Diversity Score is calculated by summing the number of food groups consumed by the individual respondents over the 24-hour recall period. In addition, Micronutrient consumption are also calculated based on specific food group consumption.

IDDS calculated based on 8 food groups being consumed in the last 24hr by adult males and females

Food Group	Grouped Food Items
Starchy Staples	Cereals, White roots and Tubers
Dark Green Leafy vegetables	Dark green, leafy vegetables(palak, sarson ka saag, methi ka saag)
Other Vitamin A rich fruits and vegetables	Fruits rich in Vitamin A, and Vitamin rich vegetables
Other fruits and Vegetables	Non leafy Vegetables, Other common fruits such as apples berries etc.
Meat and Fish	Organ meat, Flesh meat, Fish, and other Seafood
Eggs	Eggs
Legumes	Pulses, Nuts, Legumes, and other seeds
Milk and Milk Products	Milk, Cheese, Curd, Lassi, etc.

Vit A consumption in last 24 hrs

Plant Based Food groups: Or	Fruits rich in Vitamin A, Vitamin rich vegetables, and Dark green leafy vegetables
Animal Based food group	Organ meat, Eggs, Milk and Milk Products

Iron Consumption in the last 24hr (as per FAO computation)

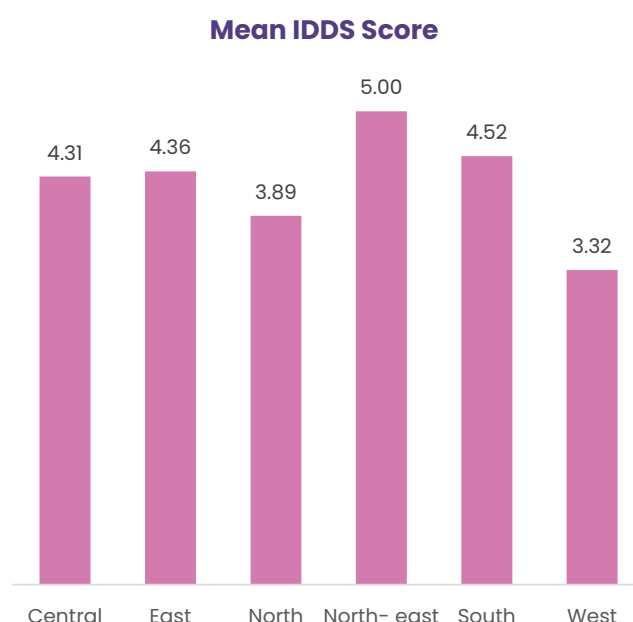
Meat Or	Organ Meat and Flesh meat
Fish	Fish and seafood

Iron Consumption in the last 24hr (as per FAO computation)

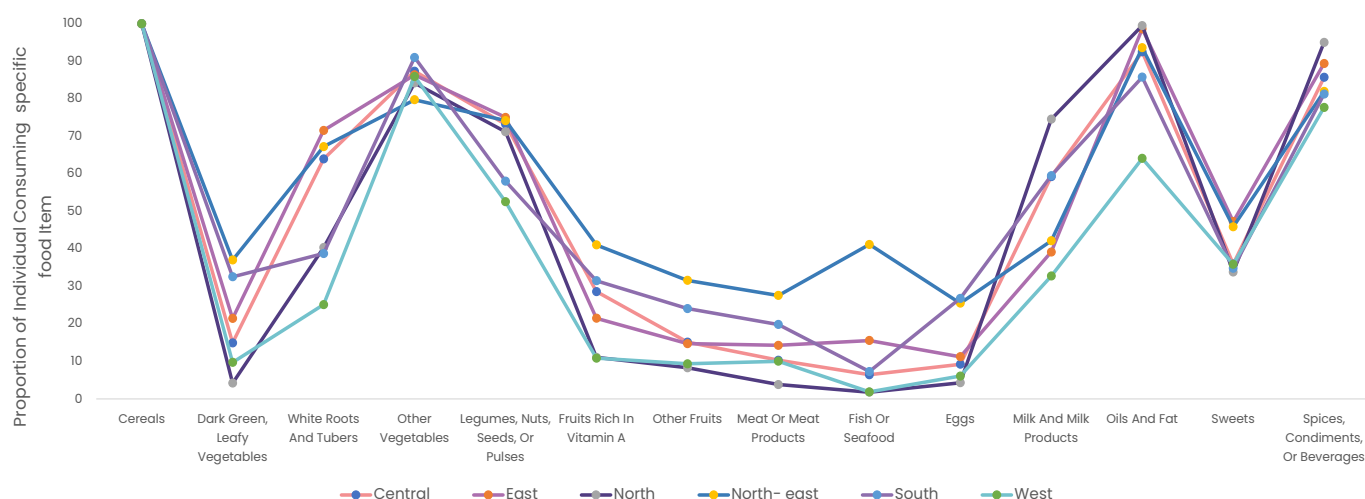
Meat or Fish Or	Organ Meat, Flesh meat, Fish and seafood
Plant based food groups	Dark green leafy vegetables Legumes, and other seed-based vegetables

Food plate composition diversity

The average Individual Dietary Diversity Score (IDDS) was 4.20 out of a total possible score of 8. This means an average rural household could only consume 4-5 out of the 8 food groups for a balanced diet in the last 24 hours. The global threshold for “poor” dietary diversity is 3.0. North-eastern and Southern states reported a better score (5.0, 4.52), compared to Western and Northern India which recorded the lowest (3.32, 3.89). Hence, a significant number of households on the brink of this dietary threshold face the risk of food insecurity in events of crisis like COVID-19 pandemic. An overall observation is that states with higher economic outputs does not mean they also have a diversified diet and a higher IDDS.



Food items across Zones



Some key highlights from the above figure are–

Similarity in food plate composition with variation in specific food items across zones

Lower consumption proportions across the economically developed Western states as to all other zones, especially North-East

Dietary Diversity appears to be highest in North-East given their animal protein-rich diet and consumption of dried fish

Consumption of milk and milk products highest in the northern states

Fish consumption (on the previous day) was higher than 30% in West Bengal and Odisha, but the zonal average gets pulled down by low consumption figures from Bihar and Jharkhand

Overall, lack of plant-based food groups in the diet as well as meat and fish across most zones reflects on the possibility of Vit A and Iron deficiency at the national level, but consumption of milk and milk products can be a substitute source for Vit. A

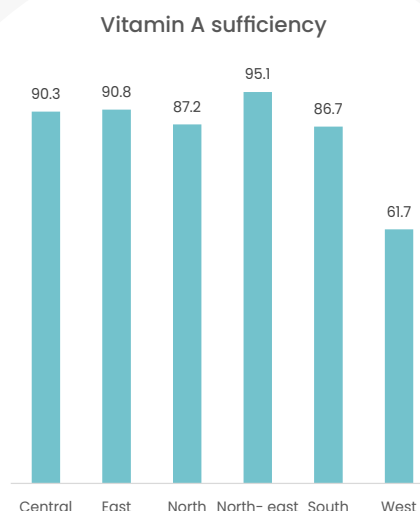
Nutritional sufficiency across zones

A rural household food plate meets the requirement for cereals and pulses, vegetables, milk, and spice condiments. What is noteworthy is the low intake of green leafy vegetables (i.e., spinach), fruits rich in Vitamin A (i.e., papaya, carrot), and meat and eggs, as well as a significant consumption of oils, fat, and sweets in an everyday diet. The result –

while today's rural diet addresses the energy needs for an individual, it is imbalanced with increasing risks of micronutrient deficiencies in the form Iron and Vitamin A deficiencies. Overconsumption of oil, fat, and sugar are also likely contributors to the increasing burden of non-communicable diseases and obesity.

Vitamin A sufficiency

Different zones showed higher levels of Vitamin A consumption. People are sourcing Vit A either through fruits, specific vegetables like carrots, pumpkin, spinach, etc., or through eggs and milk and milk products. As compared to rest of India, the diet in the Western states lack intake of Vit A.



Adequacy of iron

A rural household food plate meets the requirement for cereals and pulses, vegetables, milk, and spice condiments. What is noteworthy is the low intake of green leafy vegetables (i.e., spinach), fruits rich in Vitamin A (i.e., papaya, carrot), and meat and eggs, as well as a significant consumption of oils, fat, and sweets in an everyday diet. The result – while today's rural diet addresses the energy needs for an individual, it is imbalanced with increasing risks of micronutrient deficiencies in the form Iron and Vitamin A deficiencies. Overconsumption of oil, fat, and sugar are also likely contributors to the increasing burden of non-communicable diseases and obesity.

Iron consumption is considered adequate when either of the following condition is met–

Condition 1: An individual has consumed meat or/ and fish the previous day

Condition 2: An individual has not consumed meat or fish but consumed both green leafy vegetables as well as any legumes, nuts, seeds, or pulses the previous day

Based on the above conditions, the SLI* (Standard of Living) based computation of iron adequacy (potentially consumed adequate iron in their diet the previous day) is as follows–

Standard of Living (SLI)	Tercile ranges	Base N	Proportion of respondents who potentially consumed adequate iron the previous day
Tercile 1: Relatively low income	1– 6 assets	2323	24.5%
Tercile 2: Relatively middle income	7–12 assets	4610	34.8%
Tercile 3: Relatively high income	13–19 assets	399	45.1%

*SLI was calculated based on ownership of assets out of a total of 19 assets and the SLI-based tercile scores are computed by taking $(Max - Min)/3$.

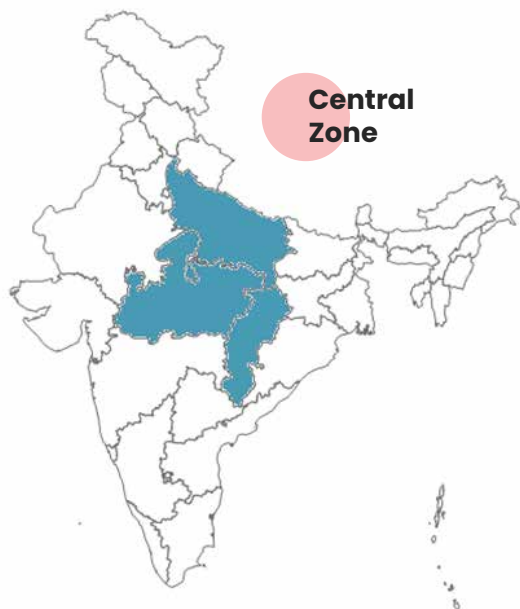
Overall, only 32.1% of Indian adults (overall sample size = 7332) in rural India had potentially consumed adequate iron the previous day. When we look at

these results from the gender lens, the results are as follows–

Gender	Base n	Proportion of respondents who potentially consumed adequate iron the previous day
Male	3790	34%
Female	3542	30.2%



- NFHS V estimates that 58.5% of women aged 15–49 in rural India are anaemic.
- An overall observation is that states with higher economic outputs do not mean they also have a diversified diet and a higher IDDS
- Income has a direct bearing on the risk of being anaemic, as does gender but to a lesser extent.
- People in the lowest rural economic strata had the lowest dietary diversity score and therefore are much more exposed to micronutrient deficiencies. These become more exacerbated even among better performing states in the north-east, emerging as a pattern of hidden- hunger.



	Overall	Female	Male
Individual Dietary Diversity Score	4.30	4.31	4.29
Vitamin A. Sufficient Diet	90.3%	90.8%	89.8%
Iron Sufficient Diet (only meat and fish)	14.3%	90.8%	14.6%
Iron Sufficient Diet (4 food categories)	83.7%	83.9%	81.4%



	Overall	Female	Male
Individual Dietary Diversity Score	4.36	4.29	4.42
Vitamin A. Sufficient Diet	90.8%	90.1%	91.4%
Iron Sufficient Diet (only meat and fish)	26.7%	26.5%	27%
Iron Sufficient Diet (4 food categories)	88.2%	84.1%	88.1%



	Overall	Female	Male
Individual Dietary Diversity Score	3.89	3.85	3.92
Vitamin A. Sufficient Diet	87.2%	87.3%	87.2%
Iron Sufficient Diet (only meat and fish)	4.2%	3.2%	5.3%
Iron Sufficient Diet (4 food categories)	73.7%	75.0%	73.6%



North- East Zone

	Overall	Female	Male
Individual Dietary Diversity Score	4.99	5.09	4.91
Vitamin A. Sufficient Diet	4.99	97.2%	93.4%
Iron Sufficient Diet (only meat and fish)	4.99	61.1%	56.9%
Iron Sufficient Diet (4 food categories)	94.0%	96.0%	92.4%



South Zone

	Overall	Female	Male
Individual Dietary Diversity Score	4.52	4.49	4.55
Vitamin A. Sufficient Diet	86.7%	4.49	88.1%
Iron Sufficient Diet (only meat and fish)	26.7%	4.49	30.8%
Iron Sufficient Diet (4 food categories)	71.8%	4.49	72.0%



South Zone

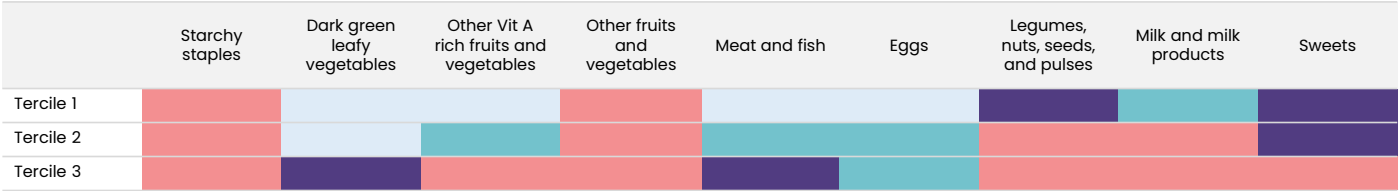
	Overall	Female	Male
Individual Dietary Diversity Score	3.32	3.29	3.34
Vitamin A. Sufficient Diet	61.7%	61.4%	61.9%
Iron Sufficient Diet (only meat and fish)	11.8%	61.4%	12.7%
Iron Sufficient Diet (4 food categories)	64.2%	63.8%	64.4%

Heterogeneity in Nutritional Security

Understanding heterogeneity in nutritional outcomes based on IDDS

We also did an IDDS- tercile based analysis by dividing the population of into 3 equal parts using IDDS scores. The mean IDDS for Tercile 1, i.e. lowest dietary diversity group was 2.577, for Tercile 2, i.e.

medium dietary diversity group was 3.728 and the mean IDDS for the group with highest dietary diversity, or Tercile 3, was 5.574.



Legend

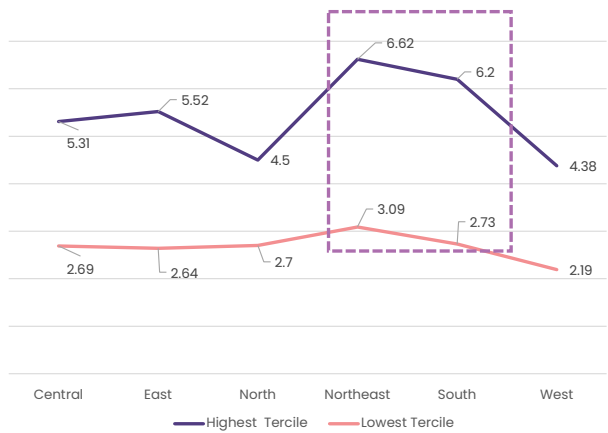
> 50%	30-50%	10-30%	< 10%
Red	Dark Blue	Teal	Light Blue

We see that the differences in diversity among population in different terciles is contributed primarily by the consumption (or non) of Vit A rich fruits and vegetables, meat and fish, and milk and milk products. 50% of the Individuals at the highest dietary diversity consume at least 4 food groups more than those at the lowest dietary diversity score. If we do the same IDDS tercile analysis by

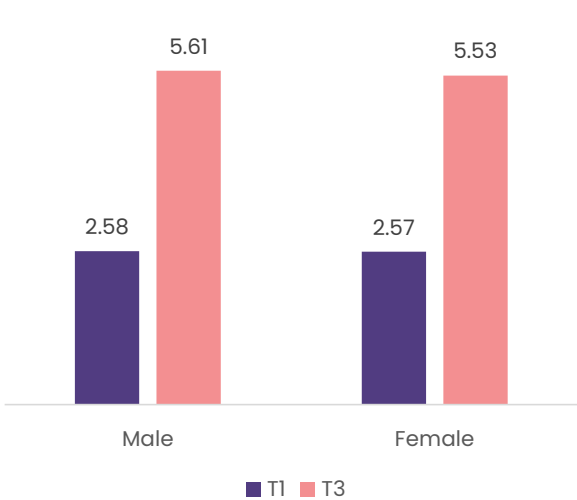
zone, we see the largest difference in the North-Eastern zone followed by South zone.

However, we do not see a huge difference in consumption patterns between male and female adults when it comes to comparing mean dietary diversity scores among tercile 1 and tercile 3 for the two genders.

Difference in tercile-based IDDS by zone

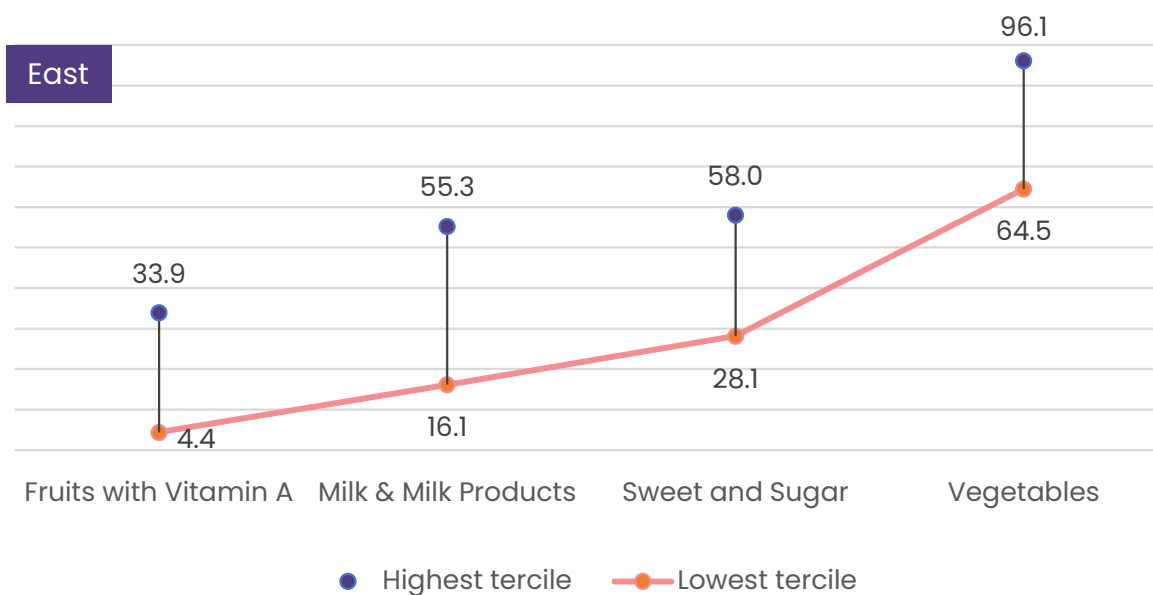
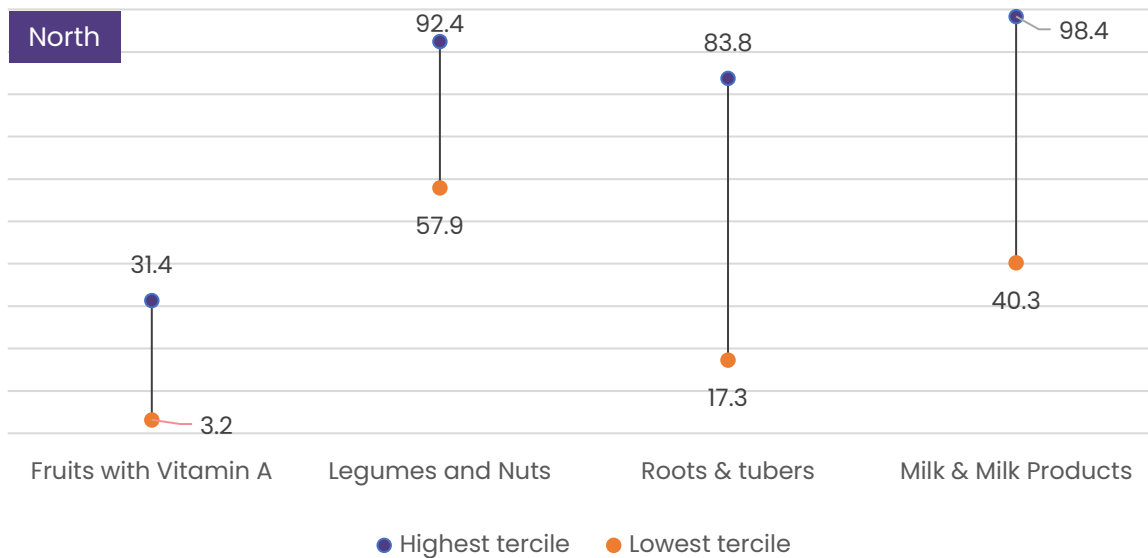
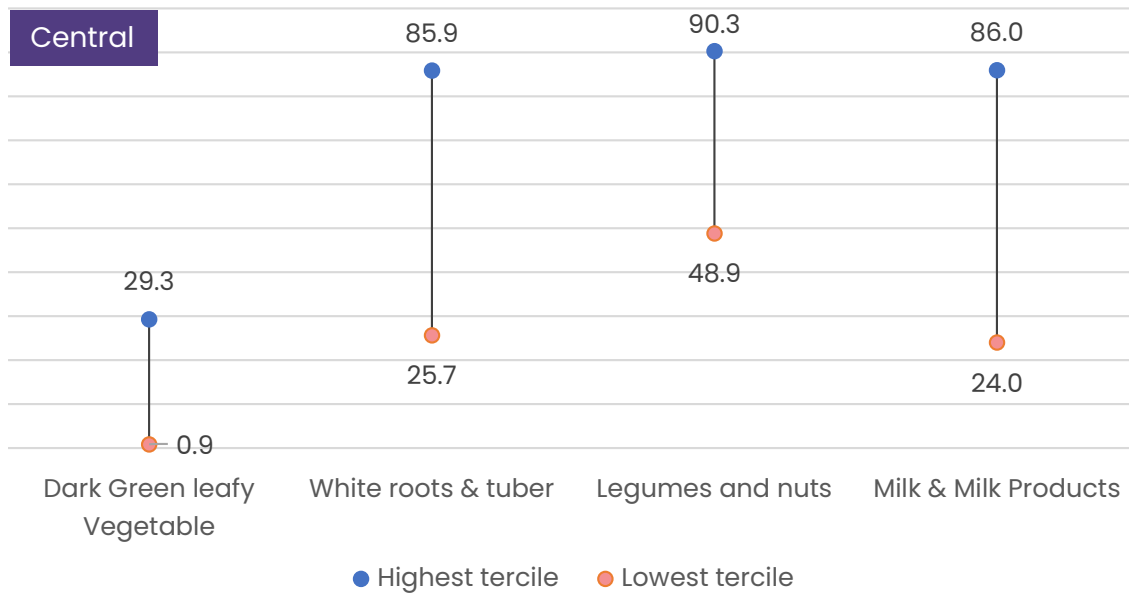


Difference in tercile-based IDDS by Gender



When we try to look at the food groups that are causing this difference, we find that consumption levels of certain food groups between the 1st and 3rd tercile group is the issue. The common food group responsible for the huge differentials milk, and milk products. In Central, plant-based diet making difference between the most diet diverse and least

diet diverse populations suggesting availability and behavioral issues. In the East, sweets, fruits, and milk products are the key determinants of heterogeneity suggesting affordability issues. In North, dark green leafy vegetables, though being consumed almost equally by different groups, the overall consumption remains very low.



Across NE and South, dark green, leafy vegetables and meat consumption are the common differentiators between consumption in T3 and T1. In northeast, individual in highest tercile are pulling the group average, masking the heterogeneity. In south, the largest differential exists across 4 specific categories, 2 of which are common with the north-

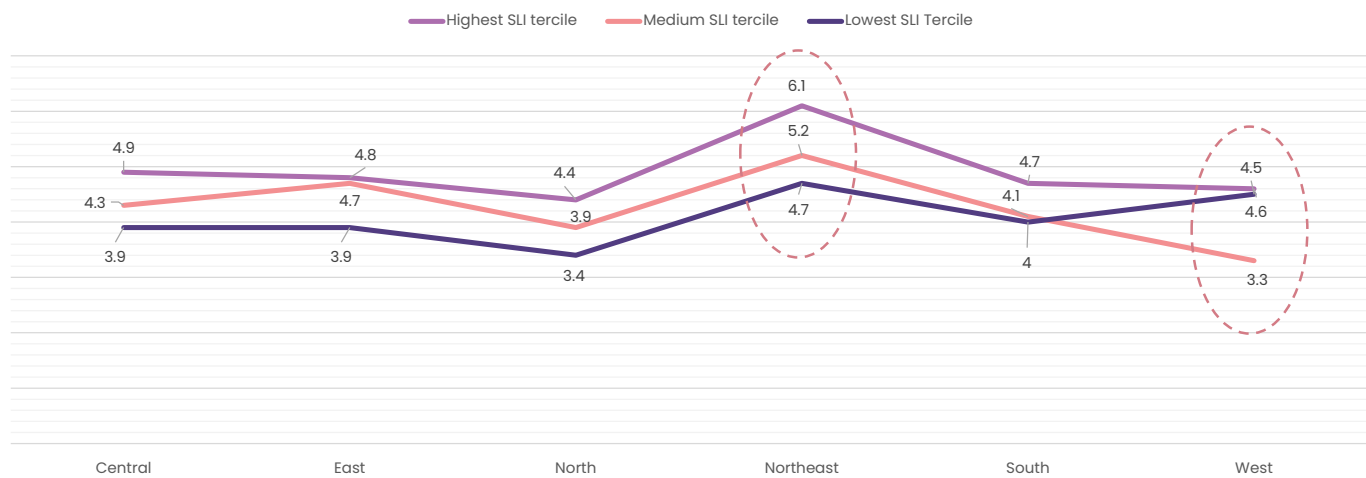
east. In south, large proportion of individuals are consuming other vegetables, other fruits, cereals, and sweet almost equally. The west, the population in the lowest tercile shows signs of extremely low consumption of plant-based and animal-based diet, as well as milk and milk products.



The labels in above graphs represent proportion of population consuming specific food items in last 24 hours.

Understanding heterogeneity in nutritional outcomes based on wealth status

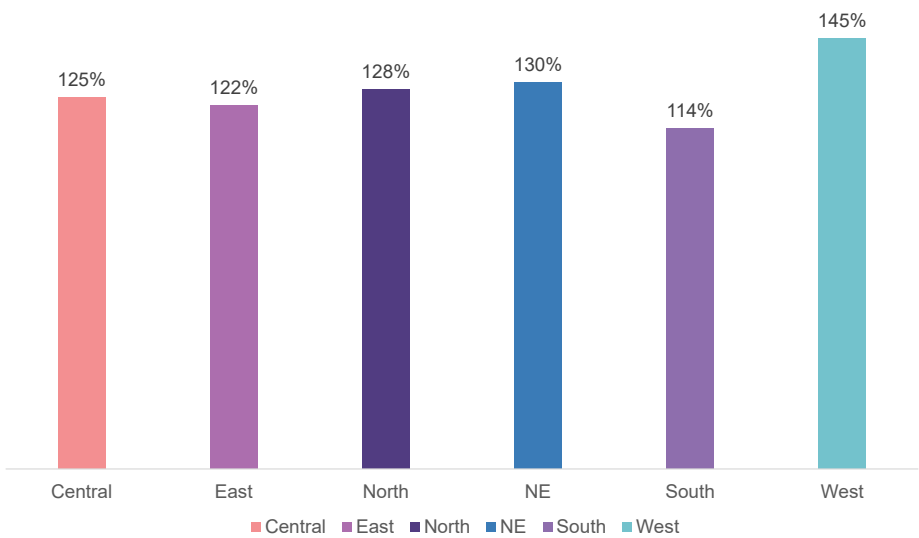
Standard of Living Index (SLI) has been created based on the asset ownership information collected from each respondent. Further, the mean IDD score has been calculated across the tercile of the population based on the SLI score.



The interesting fact is that while the relatively affluent have a more diversified diet than the relatively low-income households in the economically developed states of the western zone, this is also true for the relatively less developed states in the North– Eastern part of the country. For other zones, SLI does not seem to be a major differentiator of consumption of food.

However, when we project the differences in consumption patterns among those in the SLI-based upper and lower terciles (expressed as a percentage), we see that wealth does have an influence on consumption diversity. This is perhaps indicative that dietary diversity is as much a function of habit and availability, as it is of affordability.

IDDs of Tercile 3 population over IDDS of Tercile 1 population expressed as a percentage



Sources of Food Items

Majority of rural households consumed cereals from their own production or purchased subsidized rice/wheat through the public fair price shops. Vegetables, including green and leafy vegetables and Vitamin-A rich foods purchased from the local retail shop or self-produced, or in some

cases bought from markets in the nearby town. A shortage in availability of food items in the local markets, especially for vegetables, can impact their prices, quality, and consumption preferences of households.

	Central		East		North		Northeast		South		West	
	Primary source	Secondary source	Primary source	Secondary source	Primary source	Secondary source	Primary source	Secondary source	Primary source	Secondary source	Primary source	Secondary source
Cereals												
Dark Green, Leafy Vegetables												
White Roots And Tubers												
Other Vegetables												
Legumes, Nuts, Seeds, or Pulses												
Fruits Rich In Vitamin A												
Other Fruits												
Meat Or Meat Products												
Fish Or Seafood												
Eggs												
Milk And Milk Products												
Oils And Fat												
Sweets												
Spices, Condiments, Or Beverages												

Legend

Proportion of respondents citing a source

	30-50%	51-70%	> 70%
Own farm production			
Bought locally from the village retail outlet/local grower/village haat			
Bought from the weekly/permanent market/ haat outside of the village			
Bought from nearby town market but not district town			
Got from ration shop/Fair Price Shop			



Some key highlights from the above figure are-

- Higher dependency on Local market and Weekly market for procurement of almost every food item with evidence of strong local market except central zone with higher dependency on weekly market.
- Evidence of PDS as a key source of food procurement in the south zone. South also has least dependency on 'own farm' produce
- East has the least diversification when it comes to number of sources

Key takeaways for Nutrition Policy

Vegetables, fruits, and milk are perishable commodities. In absence of affordable storage facilities at the block level, supply chain disruptions are known to have inflationary effects which makes a rural household choose to forego nutrition. From a production perspective, items like green and leafy vegetables are winter crops and are often in short supply for a large portion of a year. Remote areas and poor households are the hardest hit. Public schemes like Targeted Public Distribution System (TPDS) do little to plug any nutritional deficiencies, except for some implicit savings for poor households. Nutrition-specific schemes like the Integrated Child Development Services (ICDS) and Mid-Day-Meal (MDM) are supplementary efforts, with limited effects on an already imbalanced individual diet.

We suggest that national nutrition initiatives can be more human-centric and engage in redesigning the food supply chains to improve last mile – an average household food plate. Behavior change communication for rural households, along with its focus on reducing undernutrition and anemia, can also highlight aspects of a diverse and quality diet.



