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Great Indian Food Paradox: Trends and Patterns

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Abstract

According to Nutritional Intake survey series, conducted by the National Sample Survey Organization, there has been slow, but steady decline in consumption of calories and protein, but the fat consumption has been increasing in both rural and urban India. Unlike calorie and protein, the difference in fat intake in rural and urban India is pronounced. Across the states of the country, the states in north-east and eastern regions seem lagging in terms of nutrition — moving further away from the desirable levels and are much below the national average too. In terms of calorie intake, 68 per cent of country's population remains undernourished and between 2004-05 and 2009-10, there has been an increase of about 55 million people who have deficit intake of calories. With rise in food expenditure among rural and urban masses, there has been less than proportionate increase in calorie and protein intake. However, a propensity to consume more of fat has been witnessed with rise in food expenditure. The study has suggested to generate awareness among the masses about the 'smart' diet.

Key words: Food consumption, nutrients intake, calories, cost of energy

JEL Classification: Q18

Introduction

Even after witnessing substantial progress in most of our endeavours like technology, art, science, defence, industrialization, etc., the basic needs of vast majority of population of the country are yet to be fulfilled, i.e. availability and affordability of hygienic and nutritious food. According to the World Bank report (2011) – "South Asia still has the highest rates and the largest number of undernourished children in the world", and also "the high economic growth experienced by South Asian countries has not made an impact on the nutritional status of South Asian children".

Nevertheless, there has been some improvement in most of the indicators over the past few decades. Though the desired levels are yet to be achieved, there has been marked improvement in the quantity of food being consumed, not necessarily its quality.

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This paper highlights some of the insights from various reports published by the NSS under the series, 'Nutritional Intake in India'. The report mainly focuses on the quantity of energy, measured in kilo calories (kcal) being consumed, intake of nutrients like protein, fat and their sources among various socio-economic classes for India as a whole and also at the state level.

Given the vast geographical spread, altering topography and rich history, one thing the country has inherited is "diversity" which is ubiquitous in our nation, be it culture, taboos, tradition, life-style, etc. and the "diet" is no exception. This paper highlight this diversity in the Indian diets and more importantly, how far we are from the required diet or in other words, how close are we to malnutrition? It is important to understand the true meaning of malnutrition also, which is most commonly treated at par with under-nutrition. Malnutrition shows improper diet and can be either excess or deficiency of different nutrients.

International Conference on Nutrition (ICN, 1992) described six important determinants of mal-nutrition, these are: (i) production, mainly agricultural and food production, (ii) preservation of food from wastage and loss, including value addition through processing, (iii) population, which refers to both child spacing in a family and also to population density in a local area or a country, (iv) poverty, which suggests economic causes of malnutrition, (v) politics, as political ideology, political choices and political actions influence nutrition, and (vi) pathology, which is the medical term for disease, since disease, especially infection, adversely influences nutritional status.

Data Source

The National Sample Survey Organization releases series on 'Nutritional Intake in India' on quinquennial basis. The state-wise data for the years 2004-05 and 2009-10 have been used for the present analysis. However, wherever required, the data for the previous rounds were also referred for better understanding and analysis.

Apart from data, it is equally important to understand the theoretical background and basic concepts associated with nutrition. These are explained in Annexure I.

Per Capita vs Per Consumer Unit

The NSS report contains data in two units, viz. per capita and per consumer. In this paper, the consumer unit data have been used, the reason being a more appropriate representation of the dietary intake.

One consumer unit, as defined by NSS, is a normative rate of equivalence of a given age-sex specific person in relation to a 'standard' male person doing sedentary work in the age group 20-39 years. All other age and sex are adjusted according to the consumer unit. This gives a truer representation because the needs of an individual in terms of calories vary widely with their age, sex, height, weight and activity level. All this is not taken into account when one computes in term of per capita, in which each individual is treated as the same one unit.

MPCE Classes

The MPCE (monthly per capita consumer expenditure) is the expenditure done in one month by a household to which the person belongs. This reflects the standard of living of the household. Further, these MPCEs are grouped into decile classes. The first decile of the distribution of MPCE over the population of any region or domain is the level of MPCE below which 10 per cent of the population lie, the second decile, the level below which 20 per cent of the population lie, and so on.

Results and Discussion

Trend in Consumption of Nutrients

The economic poverty and lack of purchasing power are believed to be the two major factors responsible for the low dietary intake and chronic under-nutrition. India defined poverty line on the basis of energy intake of the population and initiated interventions aimed at improving the purchasing power, access to subsidized food, essential goods and services to people below poverty line. The government has undertaken various development measures like Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Food Security Bill, etc. to address this. The NSSO consumer expenditure data on energy intake of urban and rural areas on inter-temporal basis provide a useful platform for assessing the impact of these interventions on energy intake.

The observed trend in consumption of nutrients over the years is worth mentioning. Since 1993-94, there has been a steady decline, though slow, in the consumption of calories in the rural areas. It has reduced from 2683 kcal/consumer unit/day in 1993-94 to 2489 kcal/consumer unit/day in 2009-10. Similarly, in the urban areas, it has declined from 2542 to 2385 kcal/consumer unit/day. Ray and Lancaster (2005) and Ray (2007) have also noticed strong evidence of a decline in per capita calorie consumption in India over the past 20 years; which has resulted in an increase in the rate of undernourishment.

The declining trend has also been observed in the case of protein in both rural and urban areas. Protein intake has decreased from 75.0 to 67.8 grams/ consumer unit/ day and from 70.2 to 65.6 grams'/consumer unit/ day in rural and urban areas, respectively during 1993-94 to 2009-10. Interestingly, the absolute levels of calorie and protein intake per consumer unit are higher in the rural than urban areas. In terms of fat consumption, it shows a trend contrary to the calorie

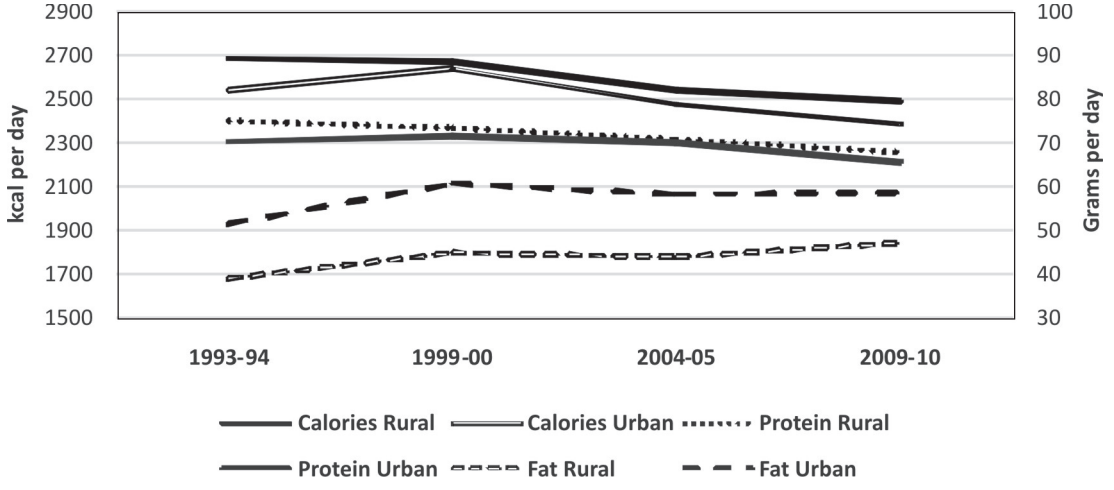


Figure 1. Consumption of daily energy and nutrients per consumer unit (All-India): 1993-94 to 2009-10

and protein intake over the years. The increase in fat consumption has been from 39.1 to 47.2grams/ consumer unit/ day and from 51.6 to 58.7 grams/ consumer unit/day in the rural and urban areas, respectively in a span of 16 years ending 2009-10. It is noteworthy that unlike calorie and protein intake, the fat consumption has been higher in the urban areas and the gap in fat intake between rural and urban people is also wider than that of calorie and protein intake.

Some researchers argue that the lower levels of energy intake are neither due to poor access to food as food supply has been adequate, nor due to economic constraints because prices of food in general and of cereals in particular, have been low. The decline in energy intake might be due to the reduction in energy expenditure attributable to the changes in lifestyle and reduction in physical activity (Ramachandran, 2008). The reduction in physical activity and therefore, optimum energy requirement may be the crucial factor in the on-going nutritional transition in India. Similar observations have also been made by Rao (2000), Mittal (2007), Deaton and Dreze (2009) and Li and Eli (2010). They indicated that people consume fewer calories because their energy needs have declined over time due to improvement in the epidemiological environment, changes in occupational structures and mechanization of agricultural work. While they do not offer any direct evidence in support of the hypothesis, they do indicate that anthropometric measures such as height-for-age, weight-for-height, and weight-for-age among children and adult body mass index (BMI) have shown improvement over time in India.

Under such views and counter-views, it is really a puzzle whether declining calorie levels are really a matter of concern. It is also to be noted that the requirements of energy and nutrients have a time dimension too, which means under the given socio-economic conditions in a particular period, the validity of the same was established. Given the changes over years in living style and improvement in standard of living, such parameters cannot be accepted in perpetuity and call for a re-assessment.

Improving dietary knowledge has the potential to prevent obesity and overweight in the country (Shimokawa, 2012). There is no doubt that fat is required for the body, however, beyond a level, the fat content in the body is counter-productive. The trend of increasing fat intake needs to be arrested by spreading awareness through suitable means about implications of mal-nutrition (obesity) and other health complications due to higher levels of fat intake, especially, by the urban population.

In addition to the national trends in terms of calorie, protein and fat intake, it would be of interest to understand its behavior across different states. The maps given below indicate the increase/ decrease in absolute intake of calorie, protein and fat during the year 2004-05 and 2009-10. Also, whether the absolute intake is above or below the national average has been provided. The rationale being – for instance, there may not be an increase in absolute intake in some state(s), but the intake of nutrient(s) for these states may be above national average. Therefore, increase or decrease

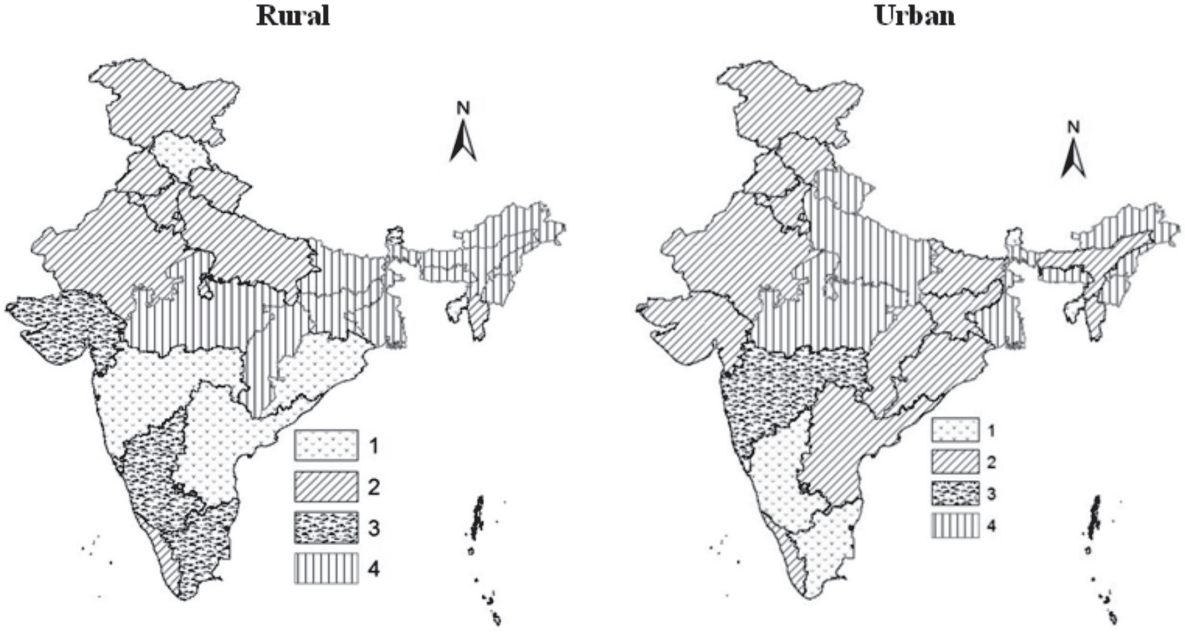
Table 1. Categories based on levels of nutrients intake and change during 2004-05 to 2009-10

Category	Description
1	Positive change (%) during 2004-05 to 2009-10 & level of intake above national average
2	Negative change (%) during 2004-05 to 2009-10 & level of intake above national average
3	Positive change (%) during 2004-05 to 2009-10 & level of intake below national average
4	Negative change (%) during 2004-05 to 2009-10 & level of intake below national average

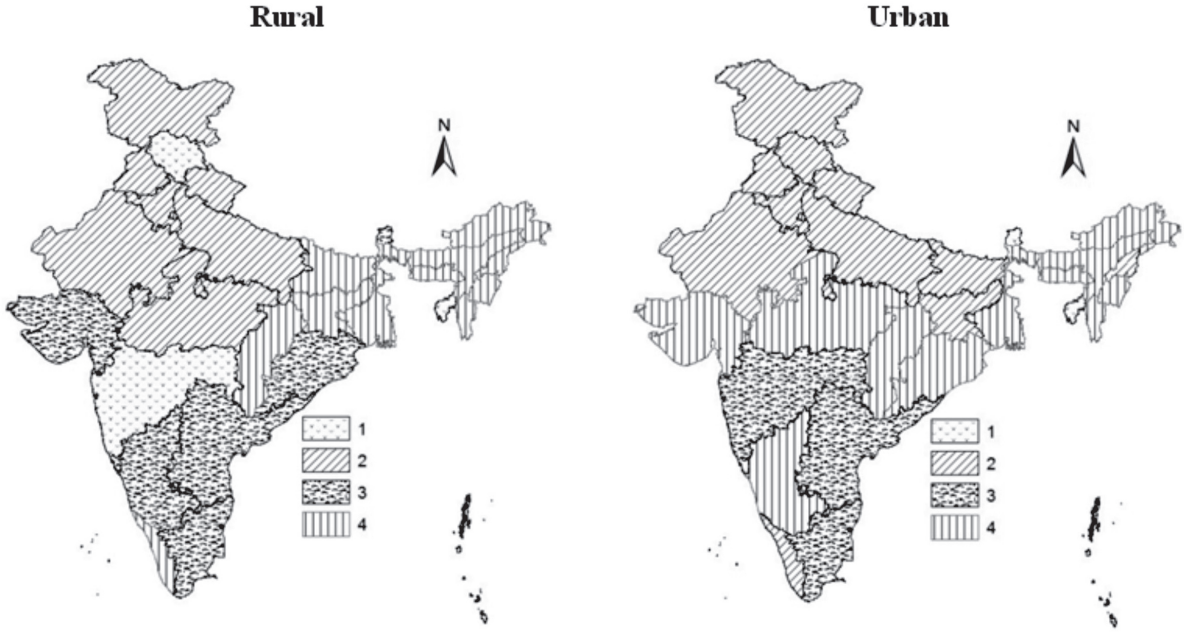
in intake has to be considered in conjunction with the present levels of nutrients intake. Accordingly, four categories, as mentioned in Table 1, were prepared to understand the present intake level of nutrients with respect to national average and the trend from 2004-05 to 2009-10.

In terms of calorie- and protein-intake, more states in urban areas are above the national average of intake than the states in rural areas; whereas in the case of fat-intake, more rural states are above national average than urban states. Amongst all the four categories, the states falling in category 4 are really a cause of concern, wherein the average intake is lower than the national average and there has also been a de-growth in absolute terms. In terms of calorie-intake, 11 states in rural areas and 9 states in urban areas fall into category 4; whereas in protein-intake, 12 states each in rural and urban areas belong to category 4. In terms of fat-intake, 8 states in rural India and 7 states in urban India fall under category 4. Among calorie, protein and fat intake, it is the protein where the least number of states in both rural and urban areas belong to either category 1 or 2. Ideally, protein-intake should be higher than fat-intake, but in reality, it does not happen so across the states. In nutshell, the states in the north-east and eastern regions depict a scenario which is not encouraging in terms of nutrient-intakes, especially in the rural areas.

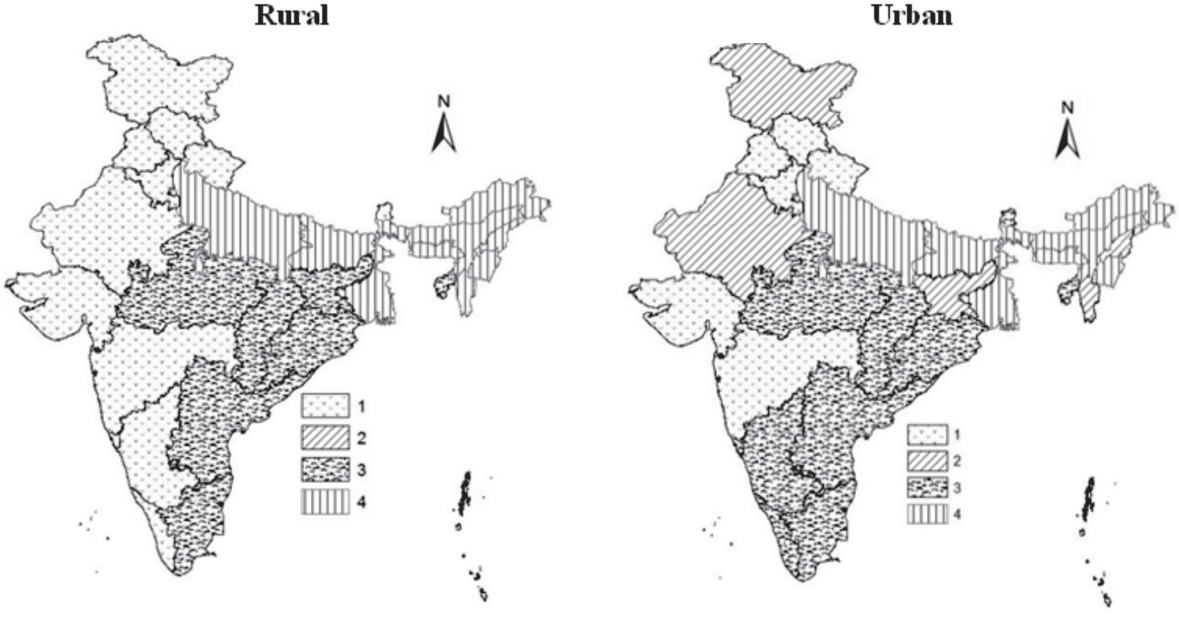
Cereals and pulses are relatively the cheaper source of calories and protein, while animal based products like milk, meat and fish are on the costlier side. Nevertheless, most dieticians recommend inclusion variety of foods in adequate quantity in the diet as each food has its own contribution to the body and each food type provides nourishment in a unique combination of different nutrients.



Map 1: Per consumer unit per day – Calorie intake*



Map 2: Per consumer unit per day – Protein intake*



Map 3: Per consumer unit per day – Fat intake*
*Maps built using ArcGIS 10.3.

Relative Cost of Energy and Nutrients across Major Food Groups

There is wide variety of foods from which one can make choice but most of the choices of lower and middle class households that form a large chunk of the population, are pre-empted on the basis of price. Hence, a comparison between the amount of energy and nutrients and their cost from different food groups like cereals, pulses, milk, meat, etc. is presented in Table 2.

Table 2: Relative cost of energy and nutrients across major food groups: 2009-10

Food group	Unit	Calorie (kcal)	Protein (g)	Fat (g)	Value* (₹)	₹/kcal of energy	₹/g of protein	₹/g of fat
Cereals	kg	2980	149	169	14	0.005	0.09	0.08
Pulses	kg	2980	149	169	56	0.019	0.38	0.33
Milk & milk products								
Liquid milk	litre	1000	40	70	20	0.020	0.49	0.28
Milk: condensed/powder	kg	4960	258	267	172	0.035	0.67	0.64
Meat, fish & eggs								
Eggs	No.	100	8	8	3	0.031	0.38	0.38
Goat meat/ mutton	kg	1180	214	36	191	0.162	0.89	5.31
Chicken	kg	1090	259	6	104	0.095	0.40	17.33
Fish	kg	1050	140	20	75	0.071	0.53	3.73
Fats & oils								
Ghee	kg	9000	—	1000	259	0.029	—	0.26
Butter	kg	7290	—	810	190	0.026	—	0.23
Edible oil	kg	9000	—	1000	62	0.007	—	0.06

*Based on weighted average of rural and urban expenditure on respective items
Source: National Sample Survey, 66th Round

Recommended Dietary Allowances (RDA) and Population Distribution by Calorie Intake across Regions

Various institutions and dieticians have come up with the recommended dietary allowances, referred to as RDA. Since, the required calorie intake depends upon a multitude of factors, such as genetic makeup, environment, lifestyle, ethnicity, height, weight, age, etc., It is very difficult to set a standard norm uniformly. Nevertheless, FAO prescribes a minimum of 1800 kcal a day throughout the globe. The ICMR-NIN norms suggest per capita per day calories intake of 2022 kcal for urban people and 2226 kcal for people belonging to rural India. Since we refer to 'consumer' units throughout this paper, this RDA when converted to consumer units works out to be 2488 kcal for urban and 2737 kcal for rural regions.

According to literature, nutritional deficiency is the calorie consumption of less than 90 per cent of the RDA. There are also suggestions of the prevalence of greater nutritional deficiency at less than 70 per cent of the consumer unit norm (Macroscan, 2003). In the present analysis, the bench-mark of 90 percent was considered. Based on RDA, three categories were formed, viz. (i) less than 90 per cent of RDA, i.e. deficient intake (ii) 90-100 per cent of RDA, i.e. adequate intake, and (iii) more than of 100 per cent of RDA i.e. excessive intake. These categories have been formed separately for rural and urban areas. The state-wise NSS data depicting distribution of persons by calorie-intake have been aggregated to regions as given in Table 3.

The analysis presented an interesting though somewhat discouraging picture by regions. Interesting in the sense that there is a wide variability across the regions and discouraging in the sense that almost more than half of the population falls well below the RDA.

At India level, 68 per cent of the rural population remains undernourished. Across the regions, same or higher proportions of rural masses remain undernourished, barring in the northern region, where it is about 52 per cent. In the urban areas, this percentage is relatively lower but still almost 55 per cent population remains in the calorie-deficit category.

These percentages translate into overwhelming numbers, almost 520 million people in rural areas fall in undernourished category in 2009-10, as compared to 486 million in 2004-05 — an increase of 34 million in a period 5 years. In the urban areas, these numbers stood at 154 million in 2009-10 and 133 million in

Table 3. Distribution of persons by level of calorie intake in rural and urban India

(in million numbers)

Region	2009-10			2004-05		
	Deficient intake	Adequate intake	Excess intake	Adequate intake	Excess intake	Deficient intake
			Rural India			
Rural India	520.4 (68)	96.0 (13)	144.8 (19)	485.8 (66)	91.7 (13)	155.6 (21)
Eastern	147.3 (73)	23.7 (12)	31.3 (15)	132.7 (67)	23.8 (12)	40.5 (21)
Northern	123.9 (52)	38.7 (16)	73.4 (31)	117.8 (53)	35.7 (16)	70 (31)
North-Eastern	25.5 (74)	4.2 (12)	4.7 (14)	22.5 (72)	4.0 (13)	4.6 (15)
Southern	106.3 (71)	17.3 (12)	25.3 (17)	108.2 (74)	14.2 (10)	24.1 (16)
Western	96.4 (70)	21.2 (15)	20.3 (15)	102.8 (77)	12.8 (10)	17.2 (13)
Union Territories	1.1 (68)	0.2 (12)	0.3 (20)	1.3 (72)	0.1 (07)	0.4 (21)
			Urban India			
Urban India	154.4 (55)	48 (17)	79.9 (28)	133.2 (54)	41.0 (17)	74.3 (30)
Eastern	21.2 (52)	7.0 (17)	12.9 (31)	17.1 (44)	6.4 (17)	15.0 (39)
Northern	35.5 (45)	13.0 (19)	25.3 (36)	24.9 (40)	11.3 (18)	25.9 (42)
North-Eastern	2.7 (50)	1.0 (19)	1.7 (31)	2.0 (47)	0.9 (20)	1.4 (32)
Southern	40.9 (53)	12.9 (17)	23.2 (30)	34.8 (56)	10.2 (16)	17.6 (28)
Western	42.1 (55)	13.1 (17)	21.1 (28)	42.3 (62)	10.1 (15)	15.6 (23)
Union Territories	6.1 (49)	2.5 (20)	4.0 (32)	6.4 (48)	2.6 (20)	4.2 (32)

Note: Figures within the parentheses indicate percentage of total

Regions of the country

Region	**States**
Eastern	Bihar, Odisha, West Bengal, Chhattisgarh, Jharkhand
Northern	Haryana, Punjab, Rajasthan, Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Uttarakhand
North Eastern	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura
Southern	Andhra Pradesh, Karnataka, Kerala, Tamil Nadu
Western	Gujarat, Madhya Pradesh, Maharashtra, Goa
Union Territories	Andaman & Nicobar Islands, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Delhi, Lakshadweep, Puducherry

2004-05, depicting a rise of 21 million. The change in percentage terms in rural and urban areas is hardly 1-2 per cent between 2004-05 and 2009-10, however, this translates into a huge increase of 55 million people in the deficient nutrient-intake category during this period.

Propensity to Consume

An interesting perspective could be drawn when the propensity towards consumption of calories, protein and fat vis-à-vis expenditure of food is analysed. The elasticity coefficients across the regions were estimated to examine the changes in the inclination of the consumers towards different nutrients with rise in consumer expenditure. The study has revealed that with rise in consumer expenditure, there was a higher propensity to spend on non-food commodities. According to Consumer Expenditure Survey reports of different NSS rounds, the shares of food expenditure in total spending have been estimated at 59.4 per cent, 55.0 per cent and 53.6 per cent in the years 1999-2000, 2004-05 and 2009-10, respectively in rural areas. These proportions were 48.1 per cent, 42.5 per cent and 40.7 per cent in urban areas for the same reference years. Therefore, with increase in the level of income and improvement in lifestyles, there has been a diversification in the consumption basket — from food-based items to non-food items. This phenomenon logically leads to a situation where increase in expenditure does not proportionately leads to the rise in expenditure on food items.

The elasticity coefficients have been found less than one for calorie and protein, and close to one for fat (Table 4). A similar trend has been observed across both the periods, viz. 2004-05 and 2009-10, *albeit* with

Table 4. Elasticity coefficients for calories, protein and fat in rural and urban India across different regions

Region	Rural				Urban			
	2009 – 10		2004 – 05		2009 – 10		2004 – 05	
	R^2	β-coeff.	R^2	β-coeff.	R^2	β-coeff.	R^2	β-coeff.
				Calorie & food				
All India	**0.999**	**0.408****	**0.997**	**0.482****	**0.998**	**0.307****	**0.995**	**0.391****
Eastern	0.793	0.397**	0.933	0.548**	0.694	0.272**	0.699	0.481**
Northern	0.812	0.395**	0.656	0.521**	0.882	0.410**	0.879	0.487**
North-Eastern	0.666	0.400**	0.693	0.534**	0.808	0.402**	0.656	0.865**
Southern	0.839	0.417**	0.901	0.561**	0.922	0.350**	0.956	0.466**
Western	0.511	0.286**	0.544	0.393**	0.763	0.313**	0.772	0.395**
Union Territories	0.750	0.473**	0.298	0.570**	0.769	0.436**	0.769	0.518**
				Protein & food				
All India	**0.999**	**0.462****	**0.996**	**0.512****	**0.998**	**0.315****	**0.971**	**0.364****
Eastern	0.831	0.489**	0.914	0.613**	0.725	0.357**	0.707	0.533**
Northern	0.715	0.384**	0.633	1.004**	0.898	0.392**	0.793	0.435**
North-Eastern	0.833	0.543**	0.700	0.684**	0.897	0.540**	0.680	1.012**
Southern	0.899	0.494**	0.905	0.614**	0.941	0.428**	0.937	0.521**
Western	0.272	0.247**	0.334	0.365**	0.600	0.290**	0.554	0.364**
Union Territories	0.752	0.571**	0.297	0.689**	0.817	0.483**	0.737	0.563**
				Fat & food				
All India	**0.995**	**0.958****	**0.995**	**1.083****	**0.981**	**0.731****	**0.991**	**0.921****
Eastern	0.899	0.891**	0.935	1.144**	0.903	0.848**	0.834	1.201**
Northern	0.839	0.816**	0.829	1.352**	0.944	0.831**	0.887	0.938**
North-Eastern	0.227	0.738**	0.527	1.212**	0.683	1.027**	0.774	1.170**
Southern	0.866	0.650**	0.935	0.898**	0.944	0.627**	0.966	0.859**
Western	0.682	0.656**	0.733	0.851**	0.829	0.643**	0.858	0.809**
Union Territories	0.686	0.812**	0.320	0.981**	0.759	0.631**	0.838	0.780**

**significant at 1per cent level

varying magnitude across the regions. It may be seen that between 2004-05 and 2009-10, there has been an almost uniform fall in elasticity coefficients across all the nutrients. The results of elasticity coefficients also indicate that the rise in food expenditure increases the propensity to consume more of fat than of calorie, or protein. It may be partly attributed to the increasing trend of consuming processed foods, which are generally high in fat-content. However, in-depth study is required to substantiate this argument.

The analysis by regions has revealed that elasticity coefficients are on the higher side in the North-Eastern, Southern regions and Union Territories for both calorie and protein intake. In fat-intake, the Eastern, Northern and North-Eastern regions indicate a higher propensity to spend in comparison to other regions. Interestingly, the coefficients for calorie, protein and fat intake have been found lower in the Western region.

Conclusions

There is a great Indian paradox that has been baffling the researchers and policymakers for quite sometime. The decline in calorie-intake levels over the years is hard to explain when most of the factors affecting the intake levels have shown a positive trend. The rising income, better productivity, availability and accessibility of food grains and government schemes and policies make it difficult to discern this oxymoron behaviour. There can be a multitude of views for this behaviour but it is difficult to pin point a single reason explaining the observed phenomenon. Most probably, it is due to the higher preference for spending on consumer durables and non-food items. It means when a basic level of food requirement is met, people attach less importance to food and start spending more on non-food items. Another reason could be the lack of awareness about balanced nutrition among most of the people. Nonetheless, people in the urban centres are becoming conscious about the importance of proper nutrition. It may take several years before it spreads evenly throughout the urban India and then finally trickles down to the rural areas. It requires active participation of people, governments, NGOs, health care providers and other stake holders.

The calorie-intake has waned down from 2683 kcal/consumer unit/day in 1993-94 to 2489 kcal/ consumer unit/day in 2009-10. Similarly, in the urban areas also it has declined from 2542 to 2385 kcal/ consumer unit/day. The protein-intake has also followed a similar suit in both rural as well as urban areas where it has dwindled from 75.0 to 67.8 grams/ consumer unit/ day and from 70.2 to 65.6 grams/ consumer unit/day in rural and urban areas, respectively over this period. The fat-intake, on the contrary, has been rising. This reflects the increase in consumption of fatty processed foods and increasing popularity of such foods across masses, especially among the youths. The increase in fat-intake has been from 39.1 to 47.2 grams/consumer unit/day and from 51.6 to 58.7 grams/ consumer unit/day in the rural and urban areas, respectively in the span of 16 years. These trends are taking the majority of population away from the quintessential diet, which is desirable for a healthy living.

At all-India level about 68 per cent of the rural and 55 per cent of the urban population has shown deficient intake of calories per day. In 2009-10, there has been an increase of 2 per cent in the number of persons having deficient intake in the urban areas, and of 1 per cent in rural India from 2004-05. Given the magnanimity of our country, even a small shift of 1 per cent, results in coercion of an overwhelming number of people (about 20 million) into the nutrient-deficient category.

Since India is a country full of diversity, the intake level of different foods also varies largely. The analysis of the intake level data of various regions namely, Northern, Eastern, Western, Southern, North-Eastern and Union Territories elicits interesting observations. In general, the eastern and north-eastern regions of the country seem lagging in having proper diet. It will be interesting to study whether this is due to lower income levels of people or the food habits. For instance, in the urban Gujarat, where people are comparatively better off economically, are found to have inadequate proteins in their diets.

The computation of propensity to consume different nutrients with rise in consumer expenditure has revealed that people are most affectionate and liberal towards fat than towards protein and calorie intake. It again partially reflects the unawareness among the society at large. The coefficient of elasticity shows that energy and nutrient intake do not increase in tandem with rise in consumer expenditure, but in terms of fat intake, the same is close to unity.

Therefore, making proper nutrition available and affordable to masses remains one of the leading challenges that the country faces today. With the rising incidences of lifestyle diseases, spreading awareness through active participation of all the stakeholders has to be given paramount importance. It is vital to inculcate appropriate food habits right from childhood and dissipating information through schools could be a welcome step. We, as a nation, do not have shortage of food today, but sadly people are not able to make the right choice. We have made our gadgets smart, without which also we can survive, but it's high time now that we make our diets also 'SMART'.

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Annexure I

Energy and nutrients

Energy: Everything that we consume is broken down by our digestive system and converted into energy. This energy is measured in terms of calories (cal) or kilo calories (kcal). A calorie is defined as the amount of heat required to raise the temperature of 1 gram of pure water by 1º centigrade (this is also equivalent to 4.19 joules). This energy is required to carry out various internal functions of human body and also physical activities that are done on daily basis.

Annexure Table 1. Recommended dietary allowances (RDA) for a normal person in India

Energy/Nutrients	Unit	Value
Calorie	kcal/day	2700
Protein	g/day	60
Fat	g/day	60-90

Source: NSS 66th round and 'A Report on Requirements and RDA for Indians 2009', National Institute of Nutrition, Hyderabad

Even the resting body of a living being needs some amount of energy which is popularly known as BMR (Basal Metabolic Rate). The excess energy is stored as fat and glycogen which are utilized when the body's energy needs are not fulfilled by the intake.

Nutrients: The nutrients are normally of two types, namely macro nutrients and micro nutrients. The macro nutrients include carbohydrates, proteins and fats which are required in larger quantities and are structural and energy giving components. Micronutrients are the vitamins, minerals, trace elements, phytochemicals and antioxidants that are required in very minute quantities but are essential for good health and proper functioning of vital systems in the body. This paper has primarily focussed on two macro nutrients — protein and fat.

Protein: Proteins are known as the building blocks of life. They are large biological molecules consisting of one or more chains of 20 different amino acids. These are present in each human cell and most of the body fluids. Proteins are required to make new cells and repair and maintain body cells. The breakdown of one gram of protein releases energy equivalent to four calories.

The major sources of protein include pulses, soybeans, legumes, nuts, grains (like wheat), meat, fish, eggs, milk, etc. The recommended daily intake of protein for a normal Indian adult is 1g per kg of body weight. Therefore, a 60-kg adult requires about 60 g of proteins everyday.

Fats: These belong to a larger category called lipids and are made up of three kinds of fatty acid (FA) chains, viz. saturated (SFA), mono-saturated (MUFA) and poly-unsaturated (PUFA). These perform many structural and metabolic functions in the body. The subcutaneous fat acts as an insulator and cushion. The monounsaturated and polyunsaturated fats are called "good fats" and saturated facts are known as the "bad fats".

Fat aids in absorbing fat-soluble vitamins. Fats are the major source of energy during stress. The breakdown of 1 gram of fat produces energy equivalent to 9 calories. Thus, it is concentrated source of energy and per unit weight it generates more than twice the energy released by carbohydrates and proteins. Among health-conscious people, mere mention of word "fat" evokes a cold shudder in them. Unfortunately, fat remains one of the most misunderstood components of our diets.

Fats are vital for many metabolic functions, especially in children where they play an important role in the development of neurological systems and also in the overall growth of the body. Dietary fats can be derived in

the form of visible fats such as vegetable oils, vanaspati, ghee, butter and invisible fats which are present as an integral component of various foods. The food from animal sources and processed foods are rich in invisible fats. The small amounts of invisible fats add up to a significant level in our daily diet – about 15 g in rural population and 30 g among urban middle and high income groups (NIN, 2011).

The recommended total fat (visible + invisible) intake should be around 20-30 per cent of the total calories. Therefore, for a healthy Indian adult of 60-kg body weight it works out to be 60-90 grams of fat every day.