

Nutritional Security in Tamil Nadu and India: A comparative analysis

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Abstract: *One of the major concerns of development in India, since independence, has been the status of food security of its people. This paper discusses the nutritional outcome indicators as well as the major non-food factors (safe drinking water and sanitation) that influence the status of food absorption of rural and urban population of Tamil Nadu and India over three decades using NFHS and Census data. The results clearly pointed out that vast majority of women and children in Tamil Nadu and India continue to suffer from problems of nutrition. As regards the non-food factors that have a bearing on nutritional outcome, while access to safe drinking water has improved in Tamil Nadu and India, access to toilets remain a huge problem. While food security is a function of availability, access and absorption of food, our analysis clearly highlights the need to enhance public investment in provisioning of toilets.*

Introduction

Food security is a highly complex phenomenon and is determined by a whole range of factors such as domestic production of food, import and export of food, purchasing power of people to access food as well as safe drinking water, sanitation and health care facilities. Different factors that influence food security can be classified into three broad dimensions, namely, food availability, food access and food absorption. In the 1974 World Food Summit, the concept of food security was considered to be more an issue of availability of food with emphasis on production and prices only (UN, 1975). Later in 1983, economic access to food was included in the definition of food security by the FAO (FAO, 1983). In 1986 World Bank Report on Poverty elaborated the concept of Food Security as “access of all people at all times to enough food for an active, healthy life”(World Bank. 1986). Globally, health and nutrition aspects became integral to the concept of food security since 1996 and availability, access and absorption of food are today recognized as the three major dimensions of food security.

Food absorption is defined as the ability of the body to biologically assimilate the consumed food. The food consumed serves as fuel to our body and provides essential nutrients and micronutrients that are broken down and absorbed during digestion. Level and nature of food absorption would have a bearing on nutritional status. Nutrient deficiencies among adults and children would result in malnourished population. Malnourished children tend to be stunted, underweight and wasted. Malnutrition starts in the womb and may extend throughout the life cycle. Nutritional deficiency and imbalance when it occurs during pregnancy and continues through childhood and adolescence would have a cumulative negative impact on birth weight of future babies. Nutritional deficiencies may also continue for generations. Good health is a requirement for the human body to absorb nutrients effectively, and hygienic food helps maintain

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a healthy body. Access to clean water becomes crucial in preparation of clean, healthy food and maintaining a healthy body. Availability of safe drinking water, health care, sanitation and environmental hygiene have a bearing on the biological absorption of food and health status.

Various infections, notably diarrheal and respiratory diseases, measles, malaria, intestinal parasites and infection with human immune deficiency virus (HIV)/AIDS have a major impact on nutritional status. Access to health services is vital, especially in rural areas, where the prevention, timely treatment and proper management of infectious diseases can make an important contribution towards improving nutritional levels. Immunization programmes to prevent disease, curative and antenatal services, oral rehydration, the effective promotion of breastfeeding and proper weaning practices, the feeding of sick children and nutrition education are important in minimizing the risk of under-nutrition. The food consumed would lead to poor assimilation in the body due to lack of access to clean drinking water, poor environmental hygiene and poor health infrastructure. Thus, to achieve nutrition security environmental hygiene, primary health care and clean drinking water become essential. Culinary habits also need careful evaluation as some methods of cooking may lead to the loss of vital nutrients. (Raghendra Jha, 2006).

This paper reviews the status of Tamil Nadu with respect to this major dimension of food security, namely, food absorption, over the last three decades. This paper discusses the major factors (safe drinking water and sanitation) that influence the status of food absorption of rural and urban population of Tamil Nadu and India over three decades. Pattern of changes pertaining to nutritional outcome indicators -anthropometric indicators of children, anaemia in children and women and CED in women- are analysed. The paper has three sections: the first section discusses the input factors; the second section discusses the outcome factors while the third provides the concluding observations.

Status of Food Absorption

Input factors

The role of safe drinking water² in the functioning of human body is crucial to understand its impact on health issues. Water makes up about two-thirds of the weight of a healthy body. Most of the chemical reactions that happen in our cells need water.. We also need water so that our blood can carry nutrients around the body, to get rid of waste and to control body temperature³. Around 2 litres of water consumption per day is the optimum level for our systems to function healthy. Water allows our body to effectively absorb the nutrients that we need from food and systematically flushes our kidneys of waste. Waterborne diseases are caused by viral or bacteriological contamination of water. The contamination can occur either due to unsanitary conditions or in homes where it is not stored and/or used properly (GoI, 2003b). Unavailability of safe drinking water and sanitary facilities result in: a). exposure to infections such as diarrhea and worm infestation; b) unnecessary loss of energy and time, particularly if access to water and sanitary facilities are located far away from homes; and c) problems of toxicity such as contamination of water with arsenic and fluoride (ibid.).

India has made progress in the supply of safe water to its people, but gross disparity in coverage exists across the country. Although access to drinking water has improved, as per 1999

² As per Census of India, if a household has access to drinking water supplied from a tap, hand-pump/tube well within or outside the premises, it is considered as having access to safe drinking water.

³ http://www.centralbedfordshire.gov.uk/Images/Aug13_tcm6-46010.pdf

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World Bank estimates, 21% of communicable diseases in India are related to unsafe water⁴ (Justin DeNormandie and Janette Sunita, 2002). Hygiene practices also continue to be a problem in India. Water-related diseases are the single largest cause of sickness and death in the world and disproportionately affect poor people (Chakravarty, 2004).

Safe drinking water is a fundamental human need. 'Poor sanitation' is one of the elements of poverty, which blights the nutrition of women and men significantly through infections and ill-health' (Hunt 2001). About 200,000 children under 4 years die in India annually because of diarrheal diseases caused by dirty water and lack of proper sanitation, according to a study published in the Lancet (Walker et.al., 2013). Waterborne diseases also hamper productivity, depriving India of 73 million working days each year (Wateraid, 2008). Latrine usage is extremely poor in India. Hand washing is also very low, increasing the spread of diseases. In order to decrease the amount of disease spread through drinking-water, latrine usage and hygiene must be improved simultaneously. Among the three major social infrastructure, access to toilet facilities and clean cooking fuels have relatively higher impact in enhancing women's nutrition than access to drinking water on premises (Sunny and Navaneetham, 2010). An empirical study in Uttar Pradesh suggests that access to water and toilet facilities tends to significantly reduce women's vulnerability to CED, and the incidence of CED (Kumar et al 2009).

The health burden of poor water quality is enormous. It is estimated that around 37.7 million Indians are affected by waterborne diseases annually, 1.5 million children are estimated to die of diarrhea alone and 73 million working days are lost due to waterborne disease each year. Water borne diseases are of most important concern when it comes to water quality. Improved water supply and excreta disposal facilities have also helped in controlling diarrheal diseases among children and has significantly improved the health status of the young (Esrey et al 1985).

Dean Spears (2013), study, shows that the height of children has a correlation with their, and their neighbours', access to toilets, and that open defecation accounts for much stunting in India. Open defecation, poor sanitation facilities and improper waste disposal contaminate food. Malnourished children also tend to come from families with least access to potable water, sanitation and healthcare services (NFHS, 2007). Higher incidence rates of infection in an undernourished child could well be accounted for by the poor hygienic environment that the child lives in (Sagar and Qadeer, 2004). Thus percentage of households without access to toilets is a plausible indicator, capturing an important aspect of food absorption.

The consequences of anemia for women include increased risk of low birth weight or prematurity, perinatal and neonatal mortality, inadequate iron stores for the newborn, increased risk of maternal morbidity and mortality, and lowered physical activity, mental concentration, and productivity (Gillespie & Johnston, 1998; Stolfus, 1997; Allen, 1997). Even with mild anemia women may experience fatigue and have reduced work capacity (Gillespie, 1998).

Percentage of households having access to safe drinking water in rural Tamil Nadu was 31% in 1981; 64% in 1991; 85% in 2001 and 92% in 2011. Percentage of households having access to safe drinking water in rural India was 26% in 1981; 55% in 1991; 73% in 2001 and 83% in 2011. The percentage increase was highest between 1981 and 1991 than in 1991 and 2001 or 2001 and 2011 in the rural areas of both Tamil Nadu and India. At all time points, the percentage of households having access to safe drinking water in Tamil Nadu were above the national average.

Table 1: Distribution of Households Having Safe Drinking Water Facilities in Tamil Nadu and India (1981, 1991, 2001 and 2011)
(Percentage)

States		Tamil Nadu	India
1981	Rural	30.97	26.5
	Urban	69.44	75.06
	R-U gap	38.47	48.56
1991	Rural	64.28	55.54
	Urban	74.17	81.38
	R-U gap	9.89	25.84
2001	Rural	85.3	73.2
	Urban	85.9	90
	R-U gap	0.6	16.8
2011	Rural	92.2	82.7
	Urban	92.9	91.4
	R-U gap	0.7	8.7

Source: Census of India.

While access to safe drinking water shows improvement over time, the data does not say anything about quality of the water.

Table 2 - Distribution of Households having access to Toilet facilities in India and TN (1981, 1991, 2001, 2011)
(in %)

States		Tamil Nadu	India
1981	Rural	NA	NA
	Urban	51.27	58.15
1991	Rural	7.17	9.48
	Urban	57.47	63.85
	R-U gap	50.3	54.37
2001	Rural	14.36	21.92
	Urban	64.33	73.72
	R-U gap	49.97	51.8
2011	Rural	23.2	30.7
	Urban	75.1	81.4
	R-U gap	51.9	50.7

Source: Census of India

Note: data on toilet facilities in the rural areas were not collected in the 1981 census.

As per data given in Table 2, in Tamil Nadu nearly half of the urban population did not have toilets in 1981 whereas it is come down to 25 per cent in 2011. In rural areas of Tamil Nadu percentage of households having access to toilet facilities is less than one-fourth in 2011. The position of urban and rural Tamil Nadu in this regard is much below the national average at all time points.

Thus, while the position of Tamil Nadu is better than India with regard to Safe Drinking Water, with regard to access to toilets the position is reverse.

Outcome Indicators

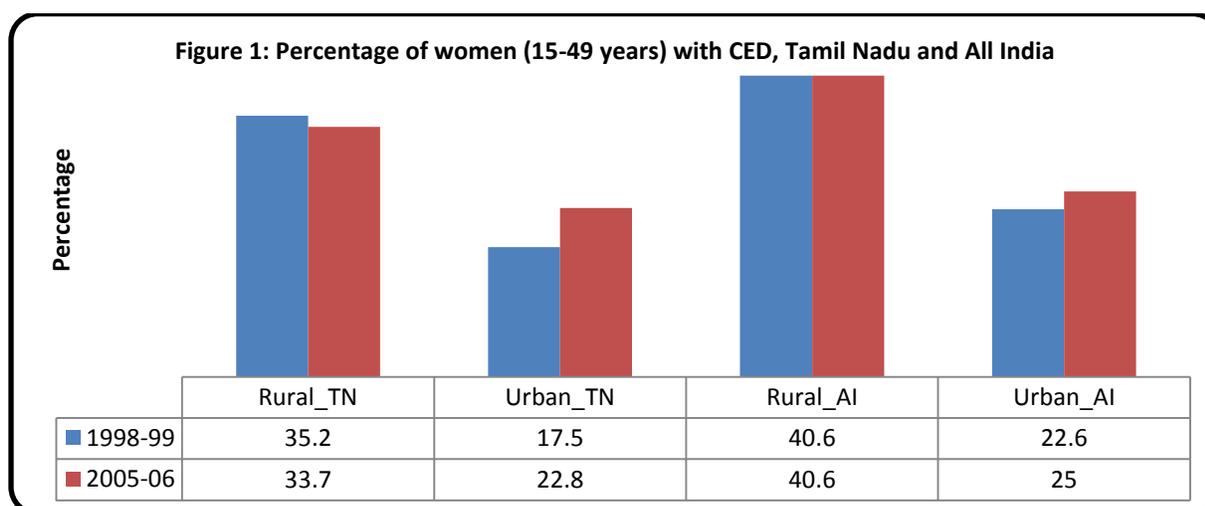
The nutritional outcome indicators that explain the status of women and children are analysed in detail in this section.

Nutrition status of Ever married women

Adequate nutrition, a fundamental cornerstone of any individuals' health, is especially critical for women because inadequate nutrition causes destruction not only on women's own health but also on the health of their children throughout the life-cycle. The most established anthropometric indicator used for assessment of adult nutritional status is the BMI (Lee and Nieman, 2003; WHO, 2004; Dash Sharma, 2004, Bose and Chakraborty, 2005; Khongsdier, 2005). Body Mass Index is defined as the ratio of weight to squared height (wt/h^2) and can be used to assess both thinness and obesity. BMI is known to be a good predictor of the risk of morbidity and mortality (Floud, 1992; Fogel, 1997).

However, views such as that of Arvind Panagriya (Panagariya, 2013) that child malnutrition in India is a 'myth', because Indian children are genetically shorter, so that international anthropometric standards are not applicable, are also expressed. Such views are yet to receive any sort of scientific support⁵.

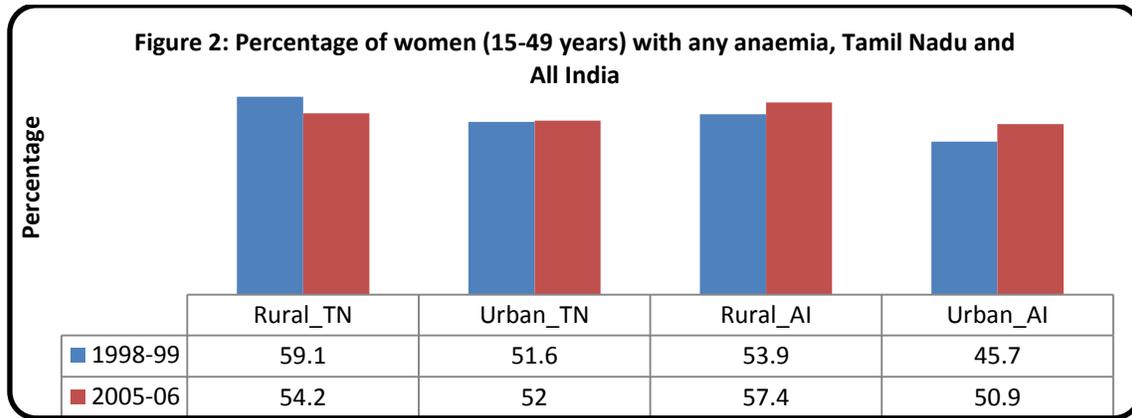
According to Sen, the ability to be well-nourished, or freedom from malnutrition, is one among a relatively small number of centrally important human freedoms (Sen 1992: 44). Figure 1 presents the levels of malnutrition among women (15-49 years) in India and Tamil Nadu during 1998-99 and 2005-06. .



- While the percentage of women suffering from CED is lower in rural and urban Tamil Nadu compared to all India, in Tamil Nadu a very high percentage, nearly one third of women in rural and one fifth in urban areas suffer from CED in 2005-06.
- There is a marginal improvement in rural areas and a marginal deterioration in urban areas in Tamil Nadu over the two time points;
- In all-India, the situation in 2005-06 is as grave as it was in 1998-99 in rural areas and has worsened in urban areas.

⁵ Multicentre Growth Reference Study completed by WHO, found no evidence of Indian Children being genetically shorter than other children (WHO, 2006).

Anaemia is characterized by a low level of hemoglobin in the blood. Iron deficiency anaemia, one of the most widespread forms of women’s malnutrition in developing countries, is indicated usually by 11.9 grams/decilitre of hemoglobin in the blood. Anaemia usually results from a nutritional deficiency of iron, folate, vitamin B12, or some other nutrients. Anaemia is a major health problem in India, especially among women and children (Figure 2).



Nearly half the women in the 15-49 years age group are anaemic in rural and urban areas of Tamil Nadu and India in 2005-06. In the case of Tamil Nadu, percentage of women with anaemia has shown a significant decline in the rural areas whereas in the country as a whole, the position has worsened over the years in rural and urban areas.

Nutritional Status of Children (6-35 months)

The nutritional status of children is usually assessed using the Anthropometry indices. Anthropometric indicators are typically based on age, height and weight. Three standard indicators are “height for age”, “weight for height”, and “weight for age”. Low height for-age is referred to as “stunting”, low weight-for-height as “wasting”, and low weight for-age as “underweight”. Stunting is a cumulative indicator of nutritional deprivation from birth (or rather, conception) onwards. It is relatively independent of immediate circumstances, since height does not change much in the short term. Wasting, by contrast, is usually taken to be an indicator of short-term nutritional status. From the measurement point of view, one advantage of wasting is that it does not require information on the age of the child, which is often hard to ascertain precisely. The distribution of heights and weights in the reference population is used to set “cut-offs” below which a child would be considered stunted, wasted or underweight. A standard cut-off is “median minus two standard deviations”, based on the reference population so that, for example, a child of a given age who is shorter than this cut-off would be considered stunted.

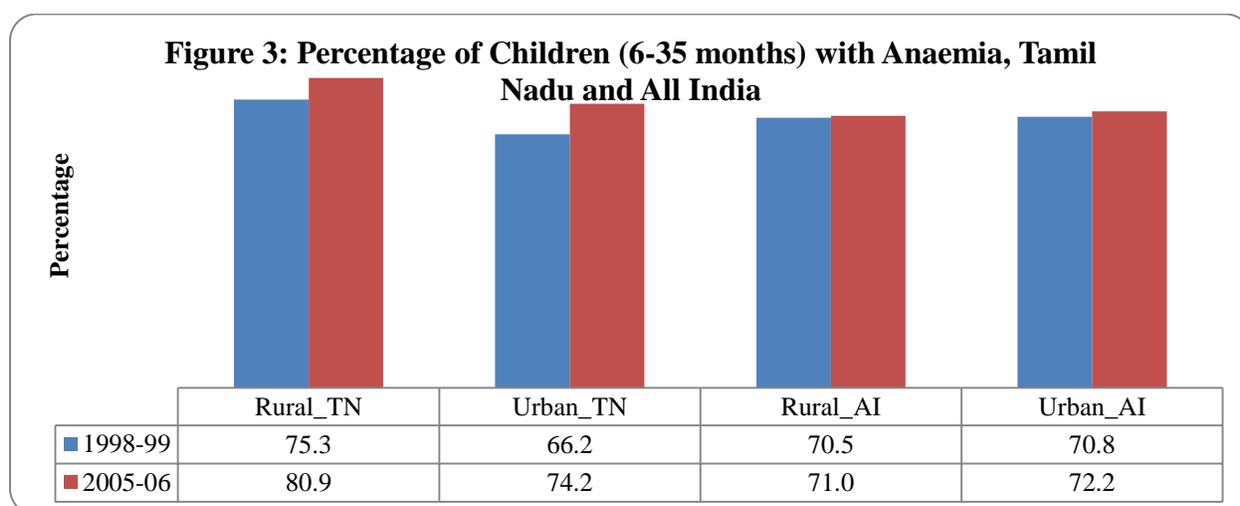
This procedure is based on the assumption that the anthropometric achievements of children in the focus population say, India would be much the same as in the reference population, if these children were well nourished. In other words, anthropometric standards are similar in both populations. Since this procedure tends to be applied all over the world, it amounts to saying that there are “universal” anthropometric standards for children. The status of these anthropometric indicators in rural and urban areas of Tamil Nadu over two time period is analysed in this section⁶.

⁶ To enable comparison between NHFS 2 and 3, Provisional Data from Fact Sheets were considered for NHFS 3

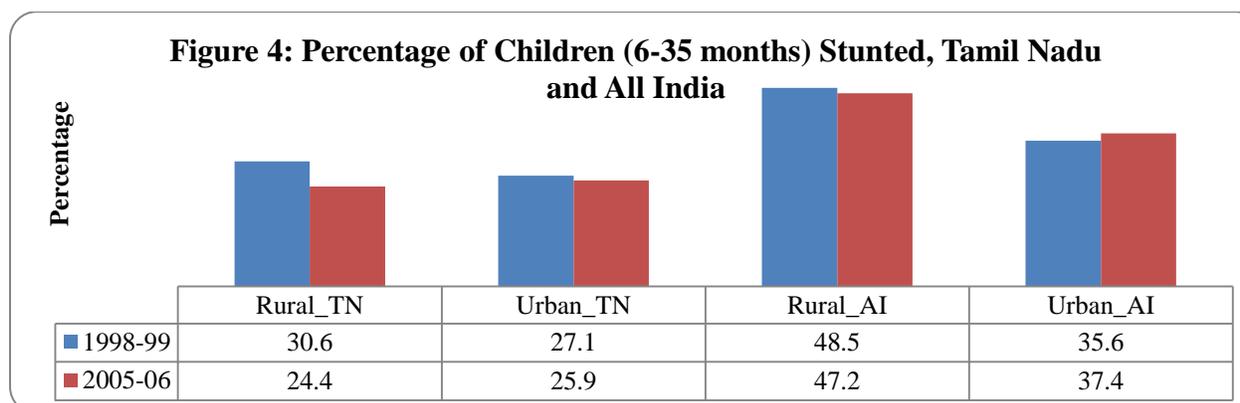
Table 3: Nutritional Indicators of Children (6-35 months) in Tamil Nadu and India, 1998-99 and 2005-06

Indicators	1998-99	2005-06	1998-99	2005-06
	Rural	Rural	Urban	Urban
Tamil Nadu				
Percentage of children with anaemia	75.3	80.9	66.2	74.2
Percentage of children stunted	30.6	24.4	27.1	25.9
Percentage of children underweight	38.3	34.8	33.5	31.3
Percentage of children wasting	16.2	22.1	20.6	20.6
All India				
Percentage of children (6 - 35 months) anaemia	70.5	71.0	70.8	72.2
Percentage of children stunted	48.5	47.2	35.6	37.4
Percentage of children underweight	49.6	43.7	38.4	30.1
Percentage of children wasting	19.5	24.1	13.1	19.0

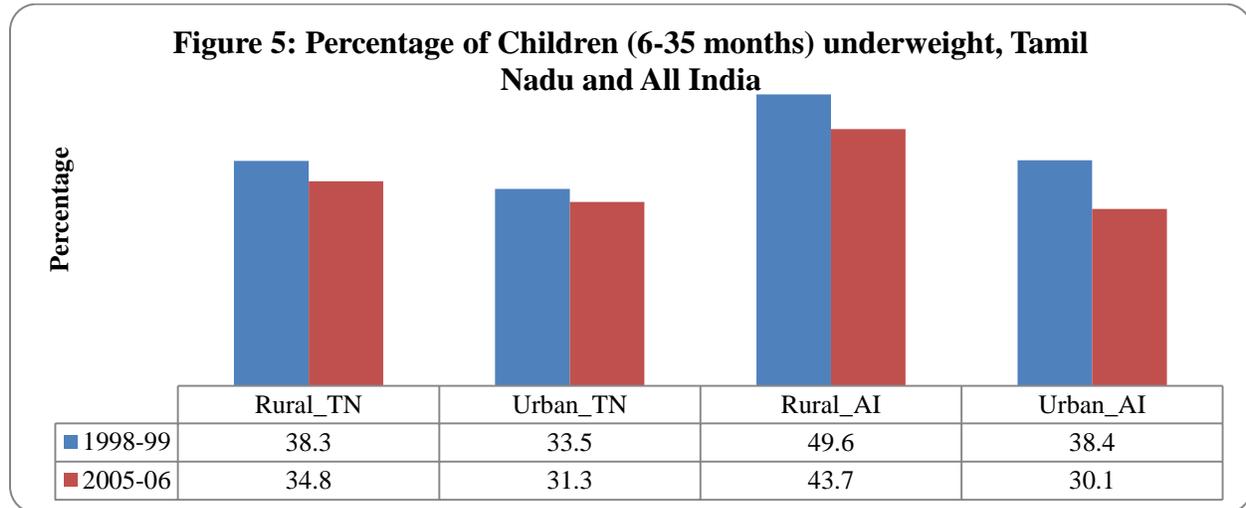
Source: National Family Health Survey (2000 & 2007)



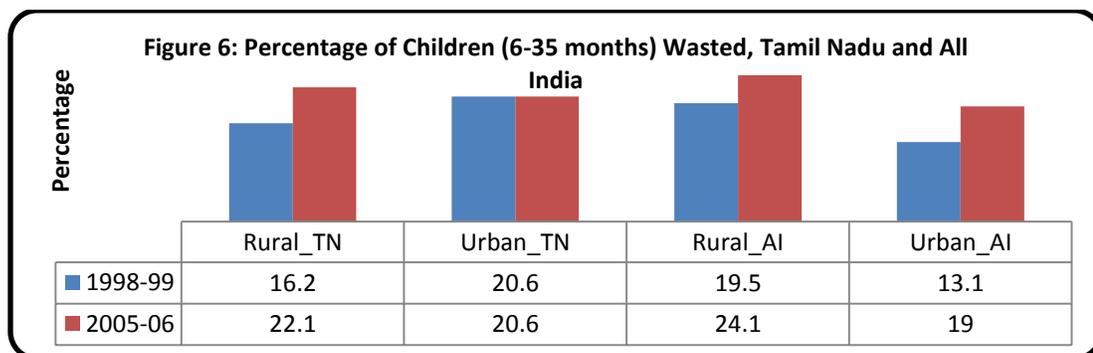
The nutritional indicators of children (6-35 months) are given in Table 3. The percentage of children in the age group 6-35 months who are anaemic has shown a sharp increase in rural and urban areas of Tamil Nadu between 1998-99 and 2005-06 while it has remained at a high level in India (Figure3).



Percentage of stunted children in rural and urban Tamil Nadu recorded a decline between 1998-99 and 2005-06 and the level of decline was significant in rural areas. Around one-fourth of the children (6-35 months) were stunted in urban and rural Tamil Nadu in 2005-06. The position of India with regard to stunting among children is worse than that of Tamil Nadu. Percentage of underweight children recorded marginal decline in both rural and urban Tamil Nadu as well as India during the seven year period (Figure 4 & 5).



The position with regard to wasting, among children in rural and urban areas of Tamil Nadu and India, have worsened over 1998-99 to 2005-06 (Figure 6).



Conclusion

The nutrition status of women and children clearly indicates that even in 2005-6, in Tamil Nadu and in India a vast majority continues to suffer from these problems. As regards the non-food factors that have a bearing on nutritional outcome, while access to safe drinking water has improved in Tamil Nadu and India, access to toilets remain a huge problem. While food security is a function of availability, access and absorption of food, our analysis clearly highlights the need to enhance public investment in provisioning of toilets.

Authors' Note

This manuscript is the authors' original work, has not been published and is not under consideration for publication elsewhere.

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