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Multidimensional Poverty in India – a State Wise Analysis

P. Jagadeshwaran [a*#], K. R. Ashok [b†], A. Vidhyavathi [a‡], M. Nirmala Devi [c¥] and G. Patil Santosh [d┴]

[a] Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.
[b] Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.
[c] Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.
[d] Department of Physical Sciences and Information Technology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Poverty is a major challenge for economic growth and attaining sustainable development goals. This study aimed to estimate the multidimensional poverty index for states of India as well as districts of Tamil Nadu.
Study Design: Based on the secondary data of National Family Health Survey.
Place and Duration of Study: Sample: States of India and districts of Tamil Nadu has been studied by using the 2005, 2015 and 2019 NFHS survey data.
Methodology: Alkire Foster methodology was used to Multidimensional Poverty Index (MPI) of states. 10 indicators in three dimensions viz., health, education and standard of living are

[#] Research Scholar;
[†] Director (Retd.) CARDS;
[‡] Professor;
[¥] Associate Professor;
[┴] Assistant Professor;
**Corresponding author: E-mail: mailtojagadeshp@gmail.com;*

considered and all the indicators were given equal weightage and finally the contribution by each indicator is estimated.

Results: India ranks 62nd among 107 countries with an MPI of 0.12. States like Andhra Pradesh, Kerala and Tamil Nadu has drastically reduced the poverty level. Bihar, Assam and Odisha are the regions having highest poverty level. Nutritional deprivation indicator alone had a share of 28.55 per cent in the total poverty index of India. In case of Tamil Nadu the overall index was 0.03. Though the districts like Chennai, Kancheepuram and Vellore need to improve the nutritional aspects because the stunted children are higher in number than the other districts and the obesity was higher in districts like Sivagangai, Krishnagiri and Namakkal.

Conclusion: Overall the index of India has declined but there are higher variability across states and districts in many deprivation indicators. Region specific factors responsible for the deprivation should be identified and constant support related to the nutritional and schooling aspects should be provided in the districts of Tamil Nadu to reduce the poverty index.

Keywords: Poverty; multidimensional poverty; headcount ratio; vulnerability; deprivation.

1. INTRODUCTION

Poverty alleviation is the major challenges for policy makers and lies at the India development agenda to create equitable society. Each economic policy not only focuses on attaining economic growth but also to ensure that the benefits reach all sections of society. To ensure this measuring of poverty has very significant role in implementation of policy [1]. Understanding this poverty alleviation was the main agenda in Millennium Development Goals as well as in Sustainable Development Goals. Poverty is defined as the condition where the household or individual lacks financial resource to afford the basic standard of living. According to World Bank (2000) "poverty is pronounced deprivation in well-being". There are various approaches to measure poverty, it can be measured in monetary terms i.e., household consumption whereas the other approaches are measured using the indicators like education, health, mortality rate, societal well-being etc. Poverty is also measured in terms of number of people living below the poverty line (Head Count Ratio) which are static descriptors. Poverty line is the pre-determined baskets of goods presumed to be necessary for existence. Sen, 2009 developed the capability approach which aims to address the non-monetary aspects of poverty. Globally, countries use different parameters and approaches to measure poverty. In India, Poverty has been measured in monetary terms using the National Sample Survey (NSS) data [2]. Based on the poverty line, the household having lesser value is considered poor. Primarily, the estimation of poverty was based on Lakdawala poverty line, later it was altered by the Tendulkar committee in 2009. The methodology varied in focusing on the basket of goods consumed rather than considering the nutritional aspects in measuring poverty. Apart from this, world bank in 2011 had set a standard poverty line of $1.9 per person per day, below which the person is said to be poor. World Bank's poverty line is kept as a benchmark in Sustainable Development Goals to eradicate poverty [3]. However, there are several debates in the methodology used to estimate the poverty [4-6]. Cain et al. [7] had studied the impact of openness on poverty, Hnatkovska and Lahiri [8] found the reasons on narrowing wage inequality between the disadvantaged group and upper group. Many empirical studies also indicate that monetary deprivation alone cannot be proxy for other deprivations that are responsible for poverty. Thus, deprivation like education, health, nutrition and other indicators are required to measure poverty. Therefore, measuring poverty in multidimensional aspects is more important since it considers poverty both as capability deprivation and measure of deprivation measure of poverty [9]. Various researchers have contributed towards estimation and measuring multidimensional poverty [6,10,11]. Multidimensional Poverty Index was developed jointly by the oxford Poverty & Human Development Initiative (OPHI) and United Nations Development Programme in 2010. OPHI calculated MPI for 104 countries based on the methodology developed by Alkire and Santos [12]. Based on the 2020 Report, India ranks 62nd among the 107 countries. The Alkire and Foster [13] methodology was used to measure MPI as it was based on Foster-Greer-Thorbecke indices and another advantage is it can be used for decomposition of MPI not only for population but also for subgroups. Various studies have estimated the multidimensional poverty for states of India using various indicators like health,

education and household status [11]. Since, all the studies have estimated for country as a whole or for the states. Chaudhuri et al. [14] used NFHS data for the years 1992, 1998 and 2005 for India. The results indicate that there was a imbalance in the development across states. Bihar remained deprived across the NFHS survey data. However, some other studies have used the National Sample Survey data because the Government of India makes decision or policies based on the NSS data [15]. The main objective of this paper is to measure district wise multidimensional poverty for Tamil Nadu and also to decompose the deprivation indicator for each district. Since, the contribution of an indicator provides insights about the deprivation in each indicator and in particular to region specific. The limitation of the study was recent DHS data can be used to compare the recent findings. Hence, the contribution of each indicator to total deprivation is also estimated.

2. METHODOLOGY

To calculate the Multidimensional poverty for each district in Tamil Nadu, National Family Health Survey data conducted by International Institute of Population Sciences has been used. Many of the study [13,12,16,14] used the micro level data to measure Multidimensional poverty. To measure multidimensional poverty index 10 indicators in three dimensions viz., health, education and standard of living are considered. The weightage and dimension are similar to the Human Development Index and is given in Table 1. All the indicators are assigned a weightage and the maximum deprivation score is 100 per cent, with each dimension equally weighted. Each household member is assigned with a deprivation score according to his or her deprivation in each 10 indicators. Thus, maximum score in each deprivation is 33.33 per cent or 1/3. The health and education dimensions have two indicators each, so each indicator is given a weight of 1/6 and the standard of living dimension has six indicators and the weight assigned to each indicator is 1/18. The deprivation score obtained by household in each indicator is summed to obtain the household deprivation score. The household is considered to be poor based on the cut-off of 1/3. If the deprivation score is 1/3 or higher, the household is considered to be multidimensionally poor. If the deprivation score is 1/5 or higher and less than 1/3. For the current study, the National Family Health Survey (NFHS) data for the year 2005, 2010 and 2015 has been used. The survey data includes about 28,69,043 individuals across 6,28,892 households.

2.1 Head Count Ratio

The headcount ratio is the proportion of multidimensionally poor people in the population.

$$H=\frac{q}{n}$$

Where, q is the number of people who are multidimensionally poor and n is the total population.

2.2 Intensity of Poverty

The average proportion of the weighted component indicator in which multidimensionally poor people are deprived is the intensity of poverty. For multidimensionally poor people only those with a deprivation score greater than or equal to 33.3 percent, the deprivation score is summed and divided by the total number of multidimensionally poor people.

$$A=\frac{\sum_I^q s_i}{q}$$

where, s_i is the deprivation score of i^{th} multidimensionally poor person experience.

2.3 Multidimensional Poverty Index (MPI)

The multidimensional poverty index is the product of poverty headcount ratio and the intensity of poverty

$$MPI = H.A$$

The contribution of an indicator is derived using the sum of weighted censored headcount ratios for all indicators

$$\text{Contribution} = \frac{w_j h_j(k)}{MPI} \times 100$$

Table 1. Indicators, deprivation and weightage

Dimension	Indicator	Deprivation	Weight
Health	Nutrition	Any person under 70 years of age for whom there is nutritional information is undernourished	1/6
	Child mortality	A child under 18 has died in the household in the five-year period preceding the survey.	1/6
Education	Years of schooling	No eligible household member has completed six years of schooling.	1/6
	School attendance	Any school-aged child is not attending school up to the age at which he/she would complete class 8.	1/6
Standard of living	Electricity	The household has no electricity	1/18
	Sanitation	The household has unimproved or no sanitation facility or it is improved but shared with other households.	1/18
	Drinking water	The household's source of drinking water is not safe or safe drinking water is a 30-minute or longer walk from home, roundtrip.	1/18
	Housing	The household has inadequate housing materials in any of the three components: floor, roof, or walls.	1/18
	Cooking fuel	A household cooks using solid fuel, such as dung, agricultural crop, shrubs, wood, charcoal, or coal.	1/18
	Assets	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck.	1/18

3. RESULTS AND DISCUSSION

Multidimensional Poverty Index was calculated for the states of India as well as the districts of Tamil Nadu using the Alkire-Foster method. Three time period data was taken to compare the performance of states as well as districts of Tamil Nadu. The results indicates that the India ranks 62nd among 107 countries with an MPI (Multidimensional Poverty Index) score of 0.12. about 19.05 per cent of the population was vulnerable to poverty and about 8.59 per cent were already under severe poverty level. However, there was a decline in poverty level both in head count ratio and intensity of poverty when compared with the previous year data. Even the world bank report indicate that the headcount ratio had declined to 21.2 per cent. During 2015, all the indicators included in MPI had shown a significant decline when compared with 2005 which is shown in Fig 1. Though there is a decline in the poverty level but the rate of decline is lesser when compared with other south Asian countries. Another important fact is that India's Gross National Income has increased drastically at 6.6 per cent per year between 2000 and 2017 indicating that increase in national income determines the welfare and standard of living of the households. Even though there is a decline in the poverty level, there are region where poverty still exists. To further reduce the poverty level, focus should be on the nutritional aspects of the households because about 28.55 percentage of weightage to total poverty index is shared by nutritional indicator followed by years of schooling and cooking fuel facility which is given in Fig 2.

3.1 Poverty Estimates at State Level

State level analysis indicate that larger states like Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal had reduced poverty steeply among them West Bengal was the least poor which had the largest reduction of 9.6 per cent in MPI. States like Andhra Pradesh, Tamil Nadu, Andhra Pradesh and Kerala had significantly reduced their poverty level. Among all, the highest level of poverty was observed in Bihar, Odisha and Assam. The severity was also higher in those states about 19.03 per cent are under severe multidimensional poor in Bihar followed by 10.05 per cent in Assam and 8.59 per cent in Odisha. The uncensored headcount ratio of each indicator revealed that Bihar had the highest percentage of deprived households in all the indicators. The vulnerability of the multidimensional poverty was found higher in Punjab (23.93%), Dadra and Nagar (23.48%) and Meghalaya (22.65%). The poverty head

count ratio varies across states ranging from 5.6 per cent to 56.95 per cent. Among them Bihar has higher ratio of about 56.95 per cent, followed by Jharkhand (49.7%), Madhya Pradesh (43.45%) and Assam (41.22%). The deprivation indicators have changed when compared with 2005 data indicating that there was a decline in the poverty level irrespective of states in all deprivation indicators but there are some indicators which need a greater attention like nutrition of women and child and mortality rate. Other indicators like sanitation, drinking water, assets have decreased and their contribution towards poverty is negligible. The state wise multidimensional poverty index, vulnerability and severity were presented in Table 2. The districts like Bihar, Odisha and assam were the states having highest percentage of poor peoples. The major factor for multidimensional poor among those states were due to deprivation of indicators like nutrition, child mortality, years of schooling and cooking fuel.

Table 2. State wise Multidimensional Poverty Index

State	Headcount ratio (H%)	Intensity of poverty (A%)	Multidimensional Poverty Index	Severely multi-dimensionally poor (%)	Vulnerable to multidi-mensional poverty (%)
Tripura	24.73	43.5	0.11	4.00	18.63
Gujarat	24.74	42.9	0.11	4.12	19.54
West Bengal	31.32	42.9	0.13	5.04	20.58
Meghalaya	33.25	44.8	0.15	7.51	22.65
Rajasthan	33.50	41.2	0.14	4.00	18.77
Dadra and Nagar	34.19	44.5	0.15	6.88	23.48
Chhattisgarh	39.83	42.3	0.17	6.52	19.34
Odisha	40.21	44.2	0.18	8.59	17.73
Assam	41.22	45.2	0.19	10.05	18.72
Madhya Pradesh	43.45	44.6	0.19	10.71	18.74
Uttar Pradesh	43.66	44.7	0.2	10.15	19.24
Jharkhand	49.70	44.9	0.22	11.92	18.06
Bihar	56.95	47.2	0.27	19.03	17.17
Kerala	1.76	38.4	0.01	0.09	11.51
Lakshadweep	3.07	37	0.01	0.2	25.44
Puducherry	5.26	44.3	0.02	1.41	6.51
Sikkim	5.42	40.5	0.02	0.45	14.66
Delhi	5.60	40.4	0.02	0.38	18.96
Chandigarh	5.67	38.5	0.02	0.04	12.37
Goa	6.68	38.1	0.03	0.3	11.69
Punjab	7.78	38.9	0.03	0.47	23.93
Himachal Pradesh	8.18	40.7	0.03	0.74	14.86
Andaman and Nicobar	8.21	41.2	0.03	0.81	14.76
Tamil Nadu	8.85	39.2	0.03	0.78	13.52
Daman and Diu	9.29	39	0.04	0.47	19.48
Mizoram	10.41	42.5	0.04	1.53	14.49
Haryana	13.26	42.5	0.06	1.94	20.38
Karnataka	15.87	41.3	0.07	2.1	17.67
Andhra Pradesh	16.81	41.3	0.07	1.7	21.25
Jammu and Kashmir	18.23	41.8	0.08	2.06	23.43

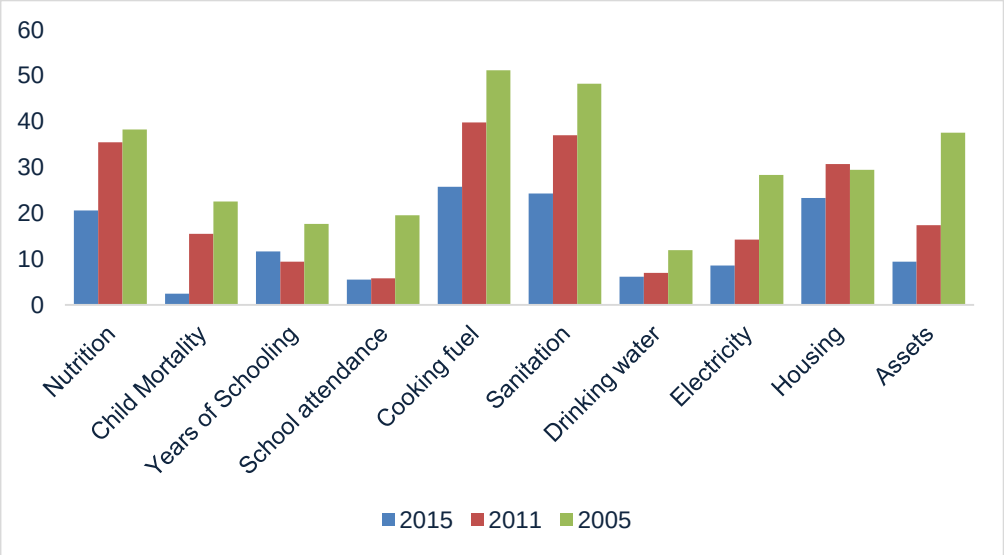


Fig. 1. Percentage of poor and deprived people in India

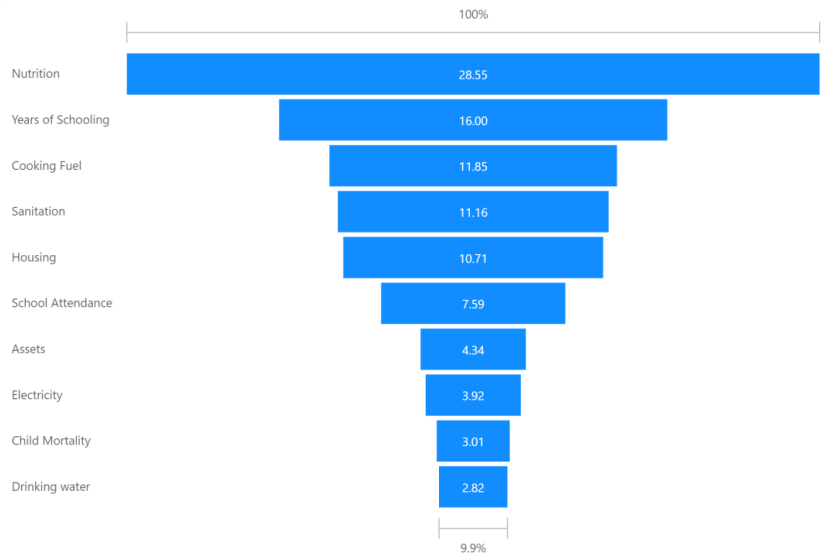


Fig. 2. Percentage contribution of indicators to MDPI of India

3.2 Poverty Estimates at District Level

The district level multidimensional index for India was estimated and the variation of MPI was show in Map 1. However, districts of Tamil Nadu were specifically studied to understand the poverty level and the indicators or factors which influence the poverty in Tamil Nadu. The overall MPI of Tamil Nadu was 0.03. Among the ten indicators, deprivation of cooking fuel, nutrition contributes more to the overall poverty. Other indicators like years of schooling, mortality rate, sanitation and drinking water are the least contributors to the poverty. The district wise estimates of Tamil Nadu were presented in Table 3.

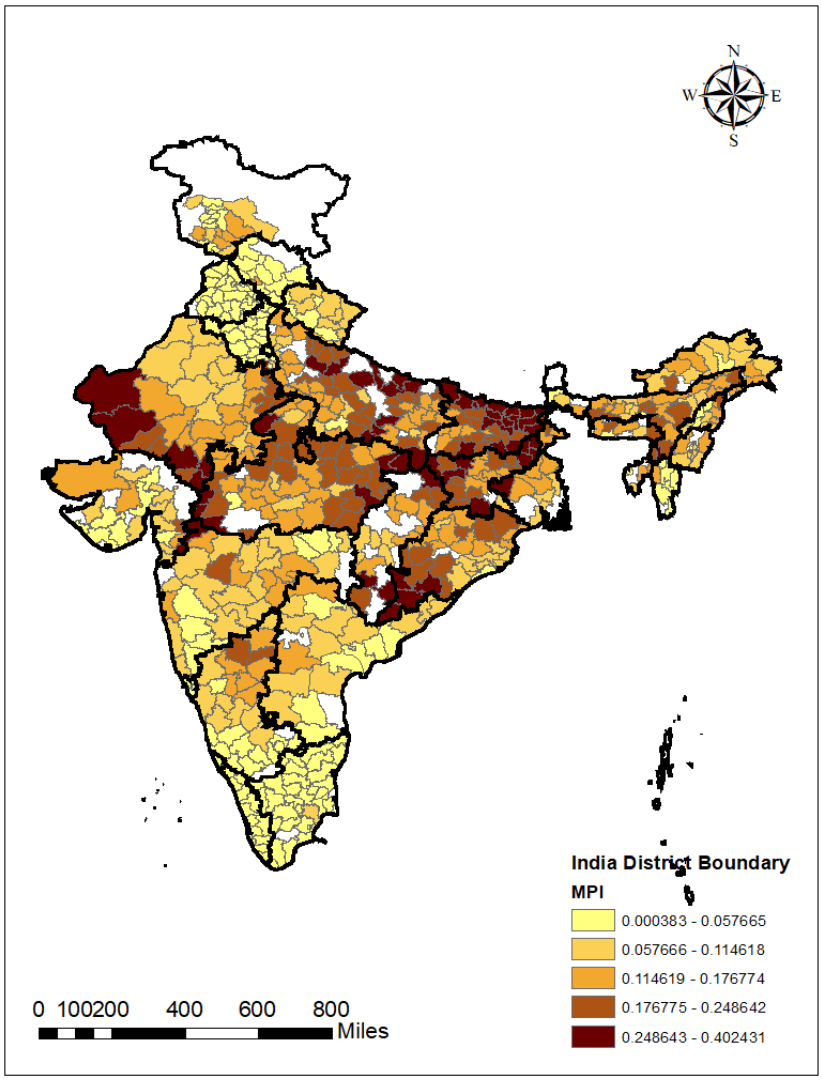
District like Chennai, Kanyakumari, The Nilgiris, Coimbatore, Erode, Namakkal, Tiruvallur, Kancheepuram and Tirupur has lesser poverty which is less than 0.02. Whereas, the districts having higher poverty are Virudhunagar, Cuddalore, Thanjavur and Pudukkottai whose MPI was found to range between 0.04-0.06. The deprivation indicators which had highest contribution towards poverty among those districts were mortality rate, nutrition and years of schooling of children. Nutrition indicator

includes the obesity among the children below 5 years, women and men. Districts like Sivagangai and Krishnagiri has highest obesity rate among children below 5 years of age. Whereas the women (15-49 years) are concerned obesity was found higher in districts like Namakkal and Tirupur. The headcount ratio was found higher in Pudukkottai (11.71%), followed by Villupuram (9.35%), Virudhunagar (9.18%). The district which had the least headcount ratio was found in Chennai (0.96%), Kanniyakumari (1.52%), The Nilgiris (2.03%) and Coimbatore (2.29%).

The results indicate that districts which are metropolitan and developed like Chennai, Kancheepuram, Madurai and Vellore had reduced the poverty to a greater extent. However, the deprivation indicator of stunting is still higher in those districts. The highest number of children who are stunted is recorded in Vellore which accounts for 92,093 followed by Madurai (72,818) and Chennai (67,179). Similarly, the districts with highest poverty level may be due to the regions are prone to natural calamities and are present in the coastal areas.

Table 3. District wise Multidimensional Poverty Index of Tamil Nadu

District	Multidimensional Poverty Index	Headcount ratio	Intensity of poverty
Tiruvallur	0.02	4.12	37.28
Chennai	0.00	0.99	40.86
Kancheepuram	0.02	4.17	37.59
Vellore	0.02	5.69	36.47
Tiruvannamalai	0.03	8.78	37.07
Villupuram	0.04	11.72	38.30
Salem	0.03	7.83	41.96
Namakkal	0.01	3.64	39.15
Erode	0.01	3.57	40.67
Nilgiris	0.01	3.04	37.23
Dindgul	0.02	6.80	36.41
Karur	0.03	7.76	36.75
Trichy	0.02	6.90	35.76
Perambalur	0.05	12.26	36.88
Ariyalur	0.05	15.03	36.12
Cuddalore	0.05	13.51	36.52
Nagapattinam	0.05	13.55	36.85
Thiruvarur	0.06	15.50	36.20
Thanjavur	0.05	14.75	36.42
Pudukkottai	0.06	17.68	36.44
Sivagangai	0.05	14.64	37.03
Madurai	0.03	6.72	38.00
Theni	0.02	6.46	38.08
Virudhunagar	0.04	11.80	37.12
Ramanathapuram	0.04	10.33	37.49
Thoothukudi	0.04	9.07	38.62
Tirunelveli	0.03	7.73	38.46
Kanniyakumari	0.01	1.52	34.67
Dharmapuri	0.02	6.31	37.91
Krishnagiri	0.03	9.00	37.90
Coimbatore	0.01	3.17	37.10
Tirupur	0.02	4.85	37.96



Map 1. District wise Multidimensional Poverty Index

4. CONCLUSION

This study estimated the multidimensional poverty of India as a whole and districts of Tamil Nadu by using demographic household survey data of 2005 and 2015. The findings indicate that there was an overall significant reduction in poverty level across states in India. But there are some states which need specific attention on deprivation indicators like nutrition, schooling and cooking fuel. Apart from these, some of the states needs to promote the higher education since the enrolment ratio are lesser. The poverty index of Tamil Nadu had also declined which may be due to implementation of nutrition specific programmes and other schemes to reduce the dropout children and also various development measures taken by Government of Tamil Nadu in providing sanitation facility through establishment of common toilet facilities in rural areas and drinking water facility. The rate of decline in all the deprivation indicators had reduced but with higher variability among the districts. However, the districts like Pudukkottai, Ariyalur, Thiruvarur, Nagapattinam and Cuddalore are having highest poverty level when compared with other districts of Tamil Nadu and the important factor which might be the cause is those regions are prone to sudden natural calamities etc. another finding is that metropolitan and developed districts like Chennai, Kancheepuram are having highest number of stunting and wasting among the children. There is a need to focus on the vulnerable groups and identify the factors responsible for those nutritional deprivations and provide constant support to reduce the poverty level among those households.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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