

## **Changing pattern of Pediatric Obesity in India: Association with Commercial Baby Food Consumption**

### **Background:**

After the Second World War period, there was a tremendous decline in the mortality rate worldwide. But high morbidity due to illness is still a significant concern. There has been an epidemiological transition where non-communicable diseases are now the leading cause of death rather than communicable diseases. Obesity and overweight have been strong predictors of several well-established risk factors for increased morbidity and mortality. Changing lifestyles, consumption of junk food, sedentary lifestyles are all directly or indirectly associated with a higher prevalence of non-communicable diseases. In the last few decades of the twentieth century, overweight and obesity have become a significant threat for the higher income countries. It has already reached the epidemic level in developed countries of America, Europe. Child's health status in the early days of their life has much impact on their growth and other functioning, which is affected due to childhood obesity.

For a country like India, the issue is more serious. Earlier developing countries had a higher prevalence of under-nutrition, but now there is a double burden of under-nutrition and over-nutrition. Having a population of more than a billion and a child population of around ten crores, the issue becomes very serious as a small proportion of obesity and overweight amongst children will also lead to a considerable number. The industrial revolution, globalization, and diffusion of western cultures have all contributed to the rising prevalence of overweight and obesity in early ages in the country. Obesity has shown an increasing pattern with time. Since 1975, obesity and over-weight has almost increased by three times, and more than 40 million children in the age group 0 to 5 are obese or over-weight. Nearly half of them belonged to the Asia continent itself (WHO 2016). Early feeding and weaning practices play a very crucial role in determining the nutritional status of the child.

With these backgrounds in mind, the current paper had an objective to highlight the problem of obesity and overweight in less than five years of age of children by showing its prevalence, trends, patterns, and association with various factors listed above.

### **Objectives:**

- To determine the trend, patterns of overweight or obesity among children under age five years.

- To assess the impact of baby food consumption on overweight or obesity among children in the age group 6 to 23 months.

### **Data source and Methodology:**

National Family Health Survey (NFHS) round 4 data is used in this study. Data for NFHS round 4 was collected in 2015-16 in all the 29 states and 7 union territories of India. Over the years, NFHS provides crucial information on women and children's health, socioeconomic characteristics, family planning, sanitation, nutrition, lifestyle, and various factors.

For estimating over-weight and obesity amongst under five years old children, individuals whose weight-for-height Z-score is more than 2 standard deviations (+2 SD) above the median of the reference (Children under five years) population were considered to be overweight or obese. Based on this cut-off, this study used a two-category variable of nutritional status of children, merging underweight and normal as 'not obese' and children whose Z-score is more than 2 SD above-median as 'obese.'

1. Descriptive statistics and bivariate analysis is done for estimating the level and trend of overweight and children.
2. Propensity Score Matching (PSM)

PSM is an innovative statistical method that evaluates the treatment effects when randomized clinical trials are not available. The paper's main aim was to compare overweight or obesity among those who consumed baby food and children who did not consume baby food. Propensity score matching helps by allowing matching to be based on a score function of observable characteristics.

Matching Variables: Many variables have a significant impact on overweight or obesity among children. Matching based on many variables ensures a better chance that propensity score checking assumptions hold. Socioeconomic and demographic variables like maternal education, maternal age, place of residence, and wealth quintile of the household were matched for both treatments and a control group.

### **Findings:**

### **Trends:**

The prevalence of overweight and obesity has risen for children from the first round of NFHS conducted in 1992-93 to the fourth round of NFHS undertaken in 2015-16. The

proportion of overweight and obesity in children was 1.56 during 2006, which increased to 2.07 in 2014. It rose almost 33 percent in less than a decade, which can be observed on seeing the change in proportion from the 3<sup>rd</sup> round of NFHS to the 4<sup>th</sup> round.

### **Baby-food Consumption:**

Developed states of Tamil Nadu, Goa, and Puducherry show the highest proportion of their children consuming baby food like ceralac. Less developed states of Uttar Pradesh, Rajasthan, and Chhattisgarh have a low percentage of children aged 6 to 23 months consuming baby food. For Gujarat and Tripura, Haryana, and Bihar, the portion was low, and for states/UTs of Sikkim, Odisha, Mizoram, and Delhi, the percentage was relatively high.

. Mothers who are overweight or obese have a higher proportion of their children consuming such food than children whose mothers are underweight. Media exposure of the mother can also be seen related to consumption of baby food or infant formula. The proportion of children who consume these food items is almost 1.9 times more if their mothers have access to radio, newspaper, and television compared to children whose mothers have none of this access. Surprisingly, the sex of the child is also seen to be associated with the consumption of baby food. Girl child has lesser odds of consuming these foods compared to boys. Also, that consumption of baby food is associated with overweight or obesity amongst children. For children who consume baby food, the odds of being overweight or obese is 1.3 times more than for children who don't consume it

### **Matching estimates show impact assessment of Baby food like ceralac on overweight/obesity in children in the age group 6 to 23 months**

The below table illustrates matching estimates. Propensity score matching eliminates most of the bias attributable to matching covariates. The difference in mean outcome in the matched samples can be used to estimate the average treatment effect of treated children. The unmatched sample estimate shows that children who had baby food were 1.3 percent more likely to be obese than children who did not take baby food. Average treatment effect on the treated (ATT), Average treatment effect on the untreated (ATU), and Average treatment effect (ATE) show the estimates after matching. The calculated ATT value in the treated group and control group were 0.038 and 0.008, respectively, which means that overweight or obesity increased by 3 percent because of baby food. Similarly, ATU clearly shows that amongst the children who did not consume baby food, the chance of becoming overweight or obese would've increased from 2.5% to 14%.

<b>Baby food V/s No baby food</b>	<b>Treated</b>	<b>Controls</b>	<b>Difference</b>	<b>S.E.</b>	<b>T-stat</b>
<b>Unmatched</b>	0.038	0.025	0.013	0.002	7.22
<b>ATT</b>	0.038	0.008	0.030	0.094	0.31
<b>ATU</b>	0.025	0.141	0.116		
<b>ATE</b>			0.103		

### **Propensity score matching estimator**

The below table shows a 10 percent more probability of being overweight or obese for children consuming baby food on an average. This finding supports that the increased intake of commercial baby food in childhood can lead to overweight or obesity amongst them.

	<b>Untreated</b>	<b>Treated</b>	<b>ATE</b>	<b>Standard Error</b>
<b>Obesity</b>	58,121	10,047	0.103	0.002

**Notes: Here treated group 1= consuming baby food and 0 = not consuming baby food; outcome variable 1 = overweight or obese; 0 = non overweight or obese.**

### **Summary and Conclusion:**

There is a constant rise in the proportion of overweight or obesity among the children over time with a varied rate all over the states. India is a country where nutrition deficiency and associated diseases are still a significant problem. Hence, with the increasing epidemic of obesity or overweight, the country will face a double burden of nutritional health problems in the coming years. There was an increase of more than 33% in less than a decade. Another crucial finding of the study was the association of commercial baby food like ceralac and its positive association with overweight and obesity among younger children. Gender differentials were observed in the consumption of baby food in children. Girls had lower odds of being fed baby food. The adjusted odds and propensity score matching test confirmed the increase in overweight or obesity in children who consumed this baby food.

**Policy Recommendation:**

- Regularization of the calorie as well as the sweetness content that manufacturers of baby-food are using the food.
- Awareness should be made among the parents about the ill effects of food habits that make the child obese and cause problems.
- The media should be discouraged from glorifying baby food as a substitute for nutritious food fed to the child.