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Food Prices and Child Nutrition in Andhra Pradesh

S.Galab
P. Prudhvikar Reddy

CENTRE FOR ECONOMIC AND SOCIAL STUDIES
Begumpet, Hyderabad-500016

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ABSTRACT

This paper makes an attempt to assess the impact of food price rise on the nutritional status of children of five year old. Young lives panel data provides the nutritional status of the children when they were one year old and when they have grown five year old. This provides an opportunity to use the nutritional status of children when they were one year old as a control variable while assessing the determinants of the nutritional status of the same children when they grow five year old. Studies of this nature are conspicuously absent in Andhra Pradesh. Analysis indicates that rise in food prices had negatively contributed to the growth of children. The children who were in disadvantageous status with regard to nutrition at the age of one year had been hit severely when they have grown five years due to rise in food prices. These are mostly children belonging to scheduled caste and scheduled tribe households and children in rural areas. The then household income enhancement programmes of the government had enabled the households to cope with the below 15% rise in food prices by obtaining more income from those programmes. The potential of the income enhancement programmes of the government had tapered off at the food price rise beyond 15 % .The households started utilizing food-based and non-food based coping mechanisms that resulting in micronutrient deficiency in nutrition that resulting in stunted growth of children. Of course, the noon-meal scheme did arrest the stunted growth of children to some extent. The supply of non-staple food items from the Public Distribution System at cheaper prices may arrest the stunted growth of children by overcoming the onslaught of rise in food prices.

I. INTRODUCTION

The basic premise of this paper is to examine the impact of food prices on children's nutritional status. The issue of raise in food prices is very critical and assumed lot of importance in recent debates around food security .The recently introduced food security bill by Government of India is evidence to this. In the last few years, there has been a significant increase in global food prices. Higher food prices of international markets are expected to raise the levels of prices of national and local markets. The increased food prices have affected India also. The increase in food prices in India was much lower as compared to sharp increase in global prices. Indian inflation in food prices increased from 2005-06 to 2006-07 when global prices increased, the rate of increase was much lower in India. It declined in 2007-08 as compared to 2006-07, when global prices rose significantly. Further, it started increasing in recent months (third quarter of 2008), when global prices declined (Mahendra Dev.2009).The studies that had examined the relationship between the food prices and children's nutrition had brought out clearly the food prices have affected negatively the growth status of the children., especially the linear growth measured through height for age-stunting (Mahendra Dev, 2009: Sailesh Tiwari and Hassan Zaman, 2010; Julia Compton, Steve Wiggins and Sharada Keats,2010: Denis Cogneau and Remi Jedwab,2012).But there are very few studies which assessed the impact of food price rise on child nutrition in India, especially in Andhra Pradesh. This paper is an attempt to assess the impact of price rise during 2005-06 to 2006-07 on the nutritional status of children of five year old in 2006. We use panel data that provides the nutritional status of the children when they were one year old in 2002 and the nutritional status of the same children when they have grown five year old in 2006.This provides an opportunity to use the nutritional status of children when they were one year old as a control variable while assessing the determinants of the nutritional status of the same children when they grow five year old. Studies of this nature are conspicuously absent in Andhra Pradesh.

2. Conceptual Framework

The impact of raise in the food prices on the children's well-being has been traced through the impact on state, market, household and intra-household dynamics.

The higher international prices of food raise local food prices and as a result food becomes less affordable for consumers, especially for the net consumers in rural and urban areas.

This reduces the real incomes of households. This may in turn reduce other household expenditure such as on health and education. This eventually leads to increase of poverty, hunger and undernourishment.

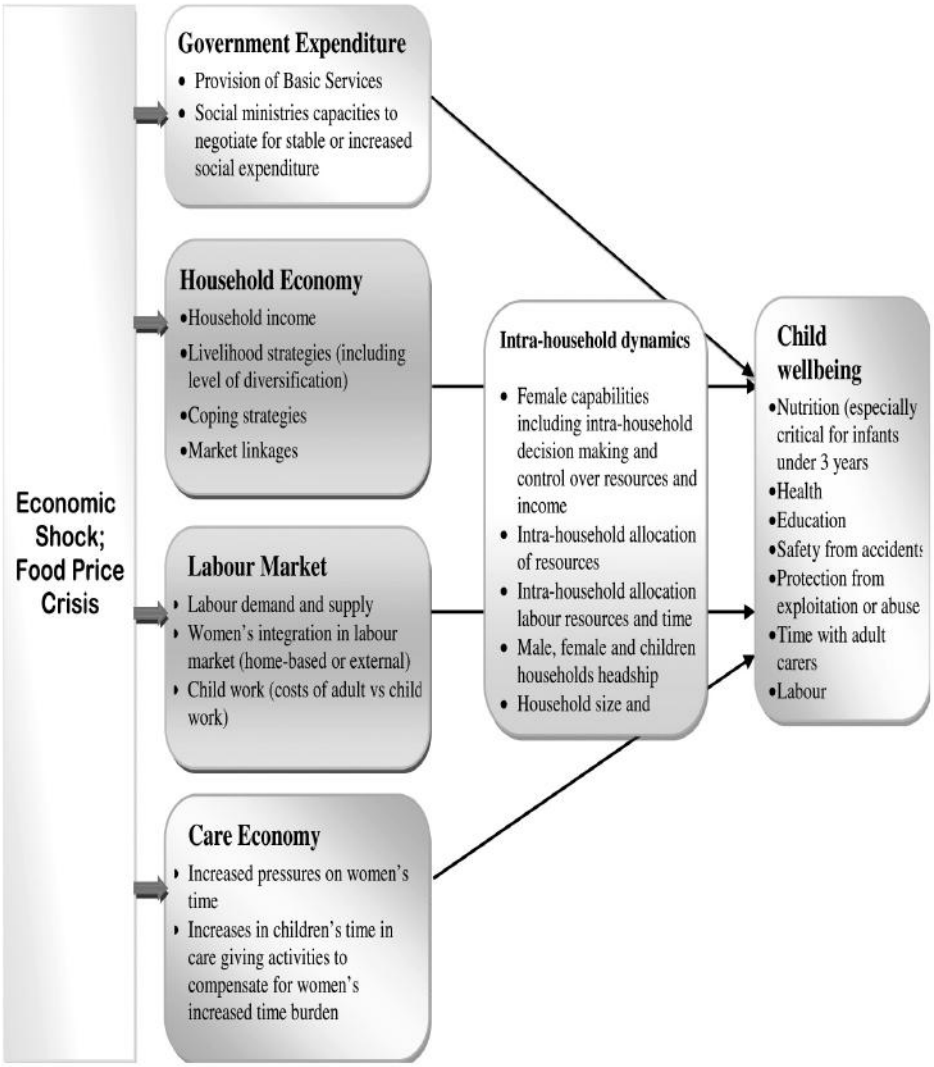
The households may resort to food and non-food based coping mechanisms to put up with the situation. The food-based coping mechanisms may be in the form of reductions in the quantum of consumption of more expensive food items, viz., fruit, vegetables, meat and dairy products; substitution of cheaper staple to costly staples to keep food consumption remains largely unchanged; and reduction of meal in size and frequency. The non-food based coping strategy may include taking loans, selling assets, decreasing expenditures on health, education and other non-food items. Then, who are the members of the households bear these onslaughts?. The social norms that are practiced in times of scarcity of food in regard to distribution of food among the members of the household come in to play. In times of scarcity, the dietary intake of women and children are likely to be the most adversely affected. Among children, boys are given preference to girls in distribution of food. The discrimination of girls in favour of boys in the distribution of food between boys and girls results in lower level of nourishment. The studies have indicated that the low level of nourishment among girls compared to boys may not be related directly to their food intake vis-à-vis boys, but may be indirectly related to the differences particularly arise from the neglect of health care of girls compared with what boys get.

The potential opportunities for increased agricultural production may increase demand for agricultural workers. The members of the households may be induced to work more for increasing income to cope with the increased household expenditure due to high food prices. But women's working for more hours has implications for the time required to child care.Women may work more or longer hours to make up additional household income to compensate for increased household expenditure on food due to higher food prices may affect women's time for child care. Increased employment opportunities are also likely to increase household incomes. Women may be increasingly employed which, through additional household income, may be beneficial for children, but time required for mother to provide care for children gets reduced as a result of women's participation in more work.

The children's malnutrition is determined by caring capacity of mothers. Caring capacity and caring practices are overwhelmingly influenced by the status of women in the household and society. The better status of women in the household has led to higher investment on the health, nutrition and schooling of children as well as reducing the disparities between boys and girls. This is the reason why women's status in the household plays greater role in the children's well-being.

The state equally affected by the hike international food prices. The higher cost of imported food leads to trade deficits that depress the level of activity in the economy. This leads to lower government revenues that might depress spending on public services. This may negatively affect children's access to health, education and other social services.(for details see plan and ODI,2008,and United Nations System (2008) but the framework is presented in Figure 1 below).

Figure 1: Linkages between Food Price Shocks and Children's Wellbeing



Source: Plan and ODI (2008)

We have utilized the household and intra-household dynamics depicted in this conceptual framework to trace the impact of food prices on the children's nutrition status. We have consider the household socio-economic status, household consumption pattern, women's empowerment status, children's characteristics, children's nutritional status, and local food prices are considered to capture the household and intra-household dynamics for analyzing the relationship between food prices and children's nutritional status.

3. Research Questions

In the above backdrop, this paper examines the following research questions:

1. Whether the food price raise affects the nutritional status of the children of five year old?

2. Whether the impact of food price raise on nutritional status varies across children belonging different socio-economic groups?

3. Whether the impact of food price raise on child nutritional status varies between children in rural and urban areas?

4 How far the nutritional status of children in infancy has impacted the nutritional status of the same children when they have grown five year old in the context of the food price rise?

5. What are the household and intra-household dynamics through which the food prices impacted the child nutritional status?

4. Theoretical Model

A household behaves as if maximizing a joint utility function:

$$U = U(H, L, F, Z). \qquad (1)$$

Given family members, H, L, F and Z are $I \times n$ vectors of the health status H', leisure L', food consumption F', and non-food consumption ZI for every family member i. Because good health is desirable in itself and food is consumed for reasons other than its nutrient value, both appear directly in the utility function.

Health is a household-produced commodity. The health production function for the ith child is:

$$H'I = H(F', 7^{i}, C', D', G', 1'), \qquad (2)$$

Where H' is the health of the ith child as indicated by weight and height measurements, F' is that child's food consumption is a vector of the child-care time inputs of other family members which affects the ith child's health, Ciis a vector of the ith child's

observable characteristics such as age and gender, D' is a vector of the observed personal characteristics of the child's parents, such as their age and education,, G' is a vector of observed household characteristics, such as household size and location, and Uiis a vector of unobserved attributes of the child, parents, household, and community which affect the ith child's health status. The maximization of (l)subject to (2) and the usual full-income constraint, which combines both the time and budget constraints for household members, leads to the following reduced-form equations for the ith child's health(height and weight) and food consumption (calorie adequacy ratio):

$$H', F = f(C, D, G, U, W, P. V), j = Hi, F' \qquad (3)$$

Where *C, D, G*, and *U* are previously defined, W is market wage rates for household members, P represents a vector of food and non-food prices, and V is the household's non labor income[1].

5. Study Population

Young Lives is designed as a panel study that is following the lives of 12,000 children in 4 countries over 15 years. The sample in each country consists of 2 cohorts: a younger cohort of 2,000 children who were aged between 6 and 18 months when the first survey round was carried out in 2002, and an older cohort of 1,000 children then aged between 7.5 and 8.5 years. The fact that our work spans 15 years in the lives of these children - covering all ages from early infancy into young adulthood - means that we are also able to examine how children change over time, whether growing up in rural or urban contexts, poor or not-so-poor areas, in large families or as migrants, and a variety of other factors. The first survey round took place in 2002 and the second in 2006. We completed the third round of household data collection in early 2010 the children were selected from 20 sentinel sites that were defined specifically in each country. The concept of a sentinel site comes from health surveillance studies and is a form of purposeful sampling where the site (or cluster, in sampling language) is deemed to represent a certain type of population or are, and is expected to show early signs of trends affecting those particular people or areas. For example, monitoring a typical slum of a given city may detect events and trends which will have an impact on most slums in that city.

Young Lives Study was set up in India in 2001, when the research team selected the study sites using a semi-purposive sampling strategy. First the districts and the 20 sentinel sites from within the chosen districts were selected following a development index consists of economic development, human development and infrastructure development. Andhra Pradesh has three distinct agro-climatic regions: Coastal Andhra, Rayalaseema and

[1] This model is adopted from Benjamin Senauer and Marito Garcia (1991).

Telangana. The sampling scheme adopted for Young Lives was designed to identify inter-regional variations with the following priorities:

- A uniform distribution of sample districts across the three regions to ensure full representation
- The selection of one poor and one non-poor district from each region, with district poverty classification based on development ranking
- When selecting poor districts and mandals, consideration was given to issues which might impact upon childhood poverty, including the presence or non-presence of the Andhra Pradesh District Poverty Initiative Programme (APDPIP).

Srikakulam was chosen as the poor district with the presence of APDPIP and West Godavari was selected as representative of the non-poor districts from Coastal Andhra. Anantapur was selected as the poor district with the presence of APDPIP and Cuddapah was chosen as being more representative of the non-poor of Rayalaseema region. The poor district, Mahbubnagar with the presence of APDPIP that resembles almost Anantapur and Karimnagar as the non-poor district from Telangana region were chosen for the survey. Hyderabad district is urban and metropolitan and therefore different selection criteria were applied.

The selection of 100 households with a child born in 2001-02 and 50 households with a child born in 1994-95 per sentinel site was random. The districts selected for sampling cover approximately 28 per cent of the state population and include around 318 of the 1,119 mandals (excluding Hyderabad). Before data collection began in selected communities, a door-to-door listing schedule was completed in order to identify eligible children. Here it is important to note that Young Lives data is not representative of the state as a whole, as indeed it cannot be because it only covers households with children born in 1994-95 and 2001-02. Among other things, these households are found at a particular stage of the lifecycle which affects labour-market participation, livelihood security, etc. Thus one should be cautious in drawing inferences from this as our sample cannot be used to speak of overall urban-rural trends or about Andhra Pradesh as a whole. Further, the different parts of the life-cycle explain for example why the households in the older cohort are richer than the households in the younger cohort. The data are broadly representative of the population of households which have children of a similar age to our cohort children while not suited for simple monitoring of child outcome indicators, the Young Lives sample will be an appropriate and valuable instrument for analyzing causal relations, modeling child welfare, and its longitudinal dynamics in Andhra Pradesh. We find that attrition rates are not only small in absolute terms, but are also very low when compared with attrition rates for other longitudinal studies in

less-developed countries. Moreover, the attrition is randomly distributed. Hence it doesn't affect the causal analysis. Through a large-scale household survey of all the children and their primary caregiver, interspersed with more in-depth interviews, group work and case studies with a sub-sample of the children, their parents, teachers and community representatives, we are collecting a wealth of information not only about their material and social circumstances, but also their perspectives. and aspirations, set against the environmental and social realities of their communities (for details see S.Galab, P. Prudhvikar Reddy, and Rozana Himaz (2008).

6. The Empirical Model

We have made three hypotheses to examine the linkage between food prices and children's nutrition. The first hypothesis is that the household per capita calorie consumption of the households may be determined by the food prices. The second hypothesis is that the household per capita calorie consumption of the households may determine the nutritional status of the children. The third hypothesis is that the stunting status of children at the age of four years may depend upon the stunting status at the age of one year. We have used panel data to examine these hypotheses.

We examine the relationship between the stunting status of children and food price. We also examine how far this relationship has been influenced by the other determinants of stunting. We treat the other determinants as control variables. The control variables include safe motherhood and safe childhood practices; biological production function characteristics of caregiver (age of mother) and child (gender and birth order); and socio economic status of the households. The per capita calorie consumption has to be included as an explanatory variable along with other control variables while estimating the relationship between the stunting and food price. The estimation of these relationships poses two problems. It is postulated that the food price determines the per capita calories consumption. The inclusion of food prices and per capita calories consumption may encounter the problem of multicollinearity. However, this can be resolved by including one of them as explanatory variables. The more serious problem is that the per capita calories consumption and stunting are determined by the socioeconomic status of the households. This is nothing but endogenity problem. The estimation of this relationship through OLS (Ordinary least Squares) method provides inconsistent estimates of the relationships. The estimation of these relationships through OLS has unfolded that the two crucial explanatory variables of stunting namely per capita calories consumption and food price index have turned out to be insignificant. This demands that we should go for 2 SLS (Two Stage Least Squares) Method to overcome the endogenity problem in estimating the contemplated relationships. We use per capita calories consumption of household as an instrumental variable to use 2SLS method for arriving at consistent

estimates of the relationship between stunting and food price. The outline of estimation strategy is in order.

In the first stage we have estimated the following relationship:

PCPMCC= a + b X + c y + Ω ---------- Model 1

PCPMCC = Per Capita per Month Calories Consumption of Households

X = Vector of prices, Food Price Index and Non-food Price Index of the households

y = Monthly Per capita consumption expenditure (in rupees) of Households

Ω = Error term

The monthly per capita consumption expenditure (food and non-food) of the households captures the adequacy/inadequacy of resources to feed the children .This also helps us to examine the relationship between household poverty and diversification of dietary basket of children. The children of the households who have less per capita consumption are more likely to have less diversified dietary basket.

In the second stage, the real values of *PCPMCC* have been replaced by the estimated values of *PCPMCC* i.e., *PCPMCC* hat, obtained through the model 1, in the nutrition model (this is called Model 2 hereafter) specified below:

N = α + β *PCPMCC* hat + p Z + € ---------- Model 2

N=Stunting status of children

PCPMCC hat = Estimated Per Capita per Month Calories Consumption of Households

Z = vector of Control Variables, viz., safe motherhood and safe childhood practices, characterstics of biological production function, and socio-economic status of the households

€ = Error term

The estimation of relationship between the child being stunted in round 2 and PCPMCC through the estimation of model 2 by keeping value 1 for N if the child was stunted in round 2 and 0 if the child is not stunted in round 2.

7. Description of the Variables

Stunting enables to capture chronic under-nutrition that reflects a failure to receive adequate nutrition over a long period of time. Stunted or short children, who are more than two standard deviations below the median of the reference population in terms of

height-for-age, is a measure of linear growth retardation, .The children of younger cohort, children were aged one to one and half year age in 2002(Round 1) and four and half - five and half in 2006 (Round 2) have been grouped into two categories, viz, not stunted and stunted children on the basis of the z-scores in the second round.

Household's food consumption has been converted in to household's consumption of calories to arrive at per capita calories consumption of household. The process followed to convert food consumption into calories consumption is in order. The level and composition of food items consumed is available for each household. We have only the value of each commodity consumed but we do not have the prices of each commodity consumed. We need the physical quantity of the each commodity to arrive at the calories consumed from each commodity by the households. Interestingly, we have data on prices for each community. But, we have data only on five food items across all the communities. We have used these prices of the five food items available at each community level for all the sample households in that community to arrive at the quantities of the five commodities consumed by each household.

We have used the calories provided per unit from the standard schedule of calories provided per each unit of different commodities to arrive at calories provided by each of the five commodities(rice, pulses, milk, edible oil, and sugar) consumed to each of the households. Thus we have arrived at the total calories consumed by each household from the five commodities. We have derived at the unit cost of calories consumed by each household by dividing the expenditure incurred on the five commodities with the total calories consumed through the five commodities. Then we have arrived at the total calories consumed by each household by dividing the total expenditure incurred on all the food items consumed with the unit cost of calories of each household. We have arrived at the per capita consumption of calories for each household by dividing the total calories consumed by the household with the household size.

In order to examine the relationship between per capita calories consumption and food prices, we need to derive these two variables, the former and later variables. We have generated food price index as well as non-food price index for each of the households. We have considered five food items, viz., rice, pulses, milk, edible oil, and sugar. We have considered the median price of each food item among the 98 communities. We have generated the ratio of each community price and the median price for each community in case of each food item. The proportions of expenditure out of the total household expenditure on each of the five food item have been worked for each

$$FPIi = \Sigma \frac{pjk}{Pk} \cdot wik$$

household. A food price index for each household in a community has been arrived at by aggregating over the five food items by adding the ratio of prices, as derived earlier, with the proportion of expenditure of the food items as a weight. This can be represented as follows:

Where FPIi= food price index for the i th household;

pjk=price of kth food item in the jth community;

Pk=median price of k th food item; and

wik= proportion of expenditure on k th food item by the i th household

We have constructed non-food price of the households in the same way by considering five non-food items, viz, books, shoes, uniform, clothes, and medicines.

The other indicator that also enables us to capture the adequacy/inadequacy of resources is per capita per month consumer expenditure (food and non-food) of the households. This also helps us to examine the relationship between household poverty and child nutrition. It is evident from the descriptive data that households of stunted children have fewer resources (per capita expenditure) at their disposal to spend on the children than the households of non-stunted children. The description of the control variable is in order.

Women are more likely to allocate resources at the margin to the interests of their children than are men (Galab and Prudhvikar, 2010).The lower the autonomy and control over resources relative to men's, the less able they are to do so. In short, lower status relative to men restricts women a capacity to act in their own and their children's best interests. The awareness levels of women, educational status of women and working status of women a have been assessed to capture the status of women from the available data of the two rounds of data. The mother's with higher educational status provide diversified dietary basket as they have more information on health and nutrition of children. Further, the households with working women invest more on the health and education of children. The higher score of awareness of women has contributed to the better the status of the child nutrition.

Dietary intake must be adequate in quantity and in quality, and nutrients must be consumed in appropriate combinations for the human body to be able to absorb them. We don't have the data on the quantity of the diet consumed by the children. But, we have the data on the different food items consumed by children in last 24 hours preceding the day of survey from the mothers in the round 2. As the combination of dietary

intake is equally important, a diet diversity score has been worked on the basis of the items consumed by the children. The descriptive data has unfolded that the stunted children consume less diversified diet and are more likely to suffer from illness than the non-stunted children A child with inadequate dietary intake is more susceptible to disease. In turn, disease depresses appetite, inhibits the absorption of nutrients in food for a child's energy.

The safe motherhood practices include antenatal care and safe deliveries for the mother and safe childhood practices include immunization, feeding and caring practices. These practices are assessed against the WHO contemplations. The mothers were asked in the round 1 data collected whether they have had their first antenatal care checkup within three months of pregnancy, whether they have had their delivery in the hospitals, whether they have had their children get the vaccinated that were due during one year in the round 1 and whether they have had their children the vaccinations due when the children have grown five year old in the round 2,how many months they have breastfed their children of one year old, and whether they have introduced supplementary nutrition when the children were of 6 months old. The responses to these questions from our data base to formulate safe motherhood and safe childhood practices. The positive response to these questions effect positively the nutritional status of children. The pooling of the data from both the rounds enabled us to construct a near complete picture of safe motherhood and childhood practices effectively (for the theoretical back up for this, see Cunha and Heckman (2007). Households of stunted children are less possible to practice safe motherhood (timely antenatal care, institutional delivery) and safe childhood practices (received complete cycle of immunization, breastfeeding, timely introduction of supplementary food).

Age of the mother (in years), gender of the child, and birth order of the child represent the inputs for the biological production function of the households. Mothers with lower age produce shorter children (children of malnutrition). Children of higher birth order, and relatively older children from boys are turned out to be children of mal nutrition. The stunted children are less likely to access formal schooling than the non-stunted children. The same type of relationship between stunting and the aforementioned control variables is evident in the literature (for details see Nair K.R.G (2007); Radhakrishna R and C. Ravi (2004); and Shiv Kumar A.K. (2007).

The caste affiliation of the households in the hierarchal social structure of the society has influence on the nutritional status. Across the caste groups, the percentage of children stunted is found to be the highest among Scheduled tribes (41) followed by Scheduled castes and backward castes (around 38) and other castes (24).The nutritional status of children belonging to Scheduled castes and Scheduled tribes is at low level than the

children belonging to other communities. The same pattern relationship is evident in the literature (for details see Throat and Sadana, 2009). The households with larger children do have fewer resources to feed the children. The percentage of stunted children is higher in rural areas (40) than in urban areas (21).It is higher among boys (38) than among girls (32).The evidence in the literature is in contra to this..

8. Descriptive Analysis

The non-stunted children, compared to the stunted, have higher z-scores (Table 1).It is interesting to note that the households whose children were not stunted had experienced higher food prices than the households whose children had stunted. How did the households manage their children being non-stunted despite experiencing higher food prices? The data provides the evidence that these households had managed to bring up their children being non-stunted by earning more income. Was the relatively higher household income due to the participation of the women in paid work? The data shows that surely this was not so. But the mothers of the non-stunted children, compared to mothers of stunted children of were relatively had higher levels of education and higher awareness and again the children of these households had relatively diversified diet basket. What does it mean? The women's status from the households whose children were non-stunted was better and as a result the unearned income of the women had invested on the children's food consumption to bring up their children being non-stunted. Moreovr, these women have more time to spend on children's care as they had not participated in paid work. On the other hand, the households whose children were stunted had experienced relatively low food price index and earned low household income come despite women's participation in paid work and women less time to spend on child care. Interestingly, the households per capita calories intake is more or less the for both the categories of households whose children were not-stunted and stunted children. What does it imply? The households of the stunted children, in contrast households of non-stunted children, have substituted low price food items to high price food items and provided low diversified diet to the children that might have resulted in micronutrient deficiency based malnutrition. The percentages of children who have eaten non-staple foods were high among stunted children. But, minerals and vitamins are concentrated in non-staple foods, while energy is concentrated in staple foods. This indicates that the consumption pattern results in high Prevalence rates of micronutrient deficiencies. This is also evident from household consumption pattern of the stunted children. These may be the consequences of the food prices on consumption patterns. Moreover the stunted children were more in the households of low per capita quartiles. This may be due to the impact of the food prices on the consumption levels of the households, resulting in the slipping of the households in to low per capita consumption quartiles from high consumption quartiles. This was more felt among the households in rural

areas and marginalised social groups, Scheduled Caste and Scheduled Tribe households (Table1).

The women from households whose children were stunted had not practiced safe motherhood (timely antenatal care, number of ante-natal care visits, institutional delivery) and safe childhood practices (received complete cycle of immunization, breastfeeding, timely introduction of supplementary food) due to less caring time because of their participation in paid work. The boys and girls constitute equal proportion of non-stunted children among the households whose children were non-stunted. This is due to the fact that women were in better status in these households. Interestingly the girls constitute less proportion of the stunted children among the households whose children were stunted. On the other hand, the stunted children had more siblings born before the index children. This unfolds that the index children were discriminated on the basis of the birth order rather than the gender of the children when the resources to invest on children had become scarce due to price rise (Table1).

The mothers with better status in the households had relatively less depression scores in the post-delivery phase. This has contributed to children for growing not-stunted. The children from 'other caste' (dominant castes) households and the children from urban areas could manage with low incidence of stunting of children despite rise in food prices due to the factors identified above. It is interesting to note that the children who had started going to formal school had low incidence of stunting. The school noon meals programme had helped the children avoid stunting (Table1).

Table 1: Description of the Correlates of Stunted and Non-stunted Children

Description of Correlates	Not Stunted Children	Stunted Children	t- test Significance
Calorie Intake per capita per month	74001	71613	
Proportion of SC Children	0.1795	0.2030	
Proportion of ST Children	0.1363	0.1727	**
Proportion of BC Children	0.4495	0.4939	*
Proportion of OC Children	0.2347	0.1303	***
Household Size(in number)	5.6092	5.4773	
Mother Education (in years of schooling)	4.0186	2.4207	***
Proportion of Female Children	0.4927	0.4258	***
Proportion of Rural Children	0.7161	0.8667	***
Prop of mothers who made First Antenatal Visit in <=3 months	0.6016	0.5161	***
Number of Antenatal Visits	5.0446	4.5567	***
Prop of index child who have taken all three doses in Round1	0.7265	0.7000	
Prop of Mothers hade safe delivery	0.6799	0.5773	***
Prop of index child who have taken all five doses in Round2	0.4185	0.3424	***

Prop of Mothers who had Started giving solids on right time (in round1)	0.8473	0.7803	***
Dietary diversification Score (Round 2)	5.9689	5.4606	***
Number of children born before Index child to same mother	0.9042	1.1303	***
Age of mother (in completed years)	23.7938	23.4656	
Mother's Depression score(in Round 1)	0.2721	0.3514	***
Prop of Children began formal schooling	0.4815	0.3939	***
Awareness score of mother	5.4202	5.2076	***
Prop of working mothers	0.4507	0.5859	***
Food price index of household(in Round 2)	102.4846	99.9676	***
Non food price index of Household (in Round 2)	105.6762	99.7718	***
Per capita consumption per month of Households(in Round 2)	817.4094	654.1133	***
Height for age Score of children(in Round 2)	-1.0617	-2.6893	***
Distribution of Children According to Consumption Quartiles(in Round 2)			
All Children			
Prop of children in consumption per cap first quartile	0.2114	0.3333	***
Prop of children in consumption per cap second quartile	0.2355	0.2939	***
Prop of children in consumption per cap third quartile	0.2632	0.2152	**
Prop of children in consumption per cap fourth quartile	0.2899	0.1576	***
Children in Urban Areas			
Prop of children in consumption per cap first quartile	0.0607903	0.1022727	
Prop of children in consumption per cap second quartile	0.1215805	0.2613636	***
Prop of children in consumption per cap third quartile	0.2857143	0.3068182	
Prop of children in consumption per cap fourth quartile	0.5319149	0.3295455	***
Children in Rural Areas			
Prop of children in consumption per cap first quartile	0.2710843	0.3688811	***
Prop of children in consumption per cap second quartile	0.2807229	0.298951	
Prop of children in consumption per cap third quartile	0.2542169	0.201049	**
Prop of children in consumption per cap fourth quartile	0.1939759	0.1311189	***
Children from Scheduled Caste Households			
Prop of children in consumption per cap first quartile	0.2115385	0.3731343	***
Prop of children in consumption per cap second quartile	0.2980769	0.2835821	
Prop of children in consumption per cap third quartile	0.2692308	0.2089552	
Prop of children in consumption per cap fourth quartile	0.2211538	0.1343284	**
Children from Scheduled Tribe Households			
Prop of children in consumption per cap first quartile	0.4177215	0.5614035	**
Prop of children in consumption per cap second quartile	0.1708861	0.2280702	
Prop of children in consumption per cap third quartile	0.2405063	0.1403509	**
Prop of children in consumption per cap fourth quartile	0.1708861	0.0701754	**
Children from Backward Caste Households			
Prop of children in consumption per cap first quartile	0.2053743	0.2822086	**

Prop of children in consumption per cap second quartile	0.2667946	0.3251534	*
Prop of children in consumption per cap third quartile	0.2571977	0.2300613	
Prop of children in consumption per cap fourth quartile	0.2706334	0.1625767	***
Children from Other Caste(Dominant Castes) Households			
Prop of children in consumption per cap first quartile	0.1029412	0.1627907	
Prop of children in consumption per cap second quartile	0.1654412	0.2790698	**
Prop of children in consumption per cap third quartile	0.2830882	0.2674419	
Prop of children in consumption per cap fourth quartile	0.4485294	0.2906977	***
Children's Consumption Pattern in the last 24 hours before the day of Survey (in Round 2)			
Proportion of children ate cereals	0.9939551	0.9939302	
Proportion of children ate roots and tubers	0.3318928	0.2518968	***
Proportion of children ate legume	0.4766839	0.4081942	***
Proportion of children ate milk and milk products	0.6828003	0.585736	***
Proportion of children ate eggs	0.1946134	0.1465649	***
Proportion of children ate meat	0.1158645	0.0809969	**
Proportion of children ate fish and seafood	0.0492832	0.0453125	
Proportion of children ate oil and fat	0.9602763	0.969651	
Proportion of children ate sugar & honey	0.7720207	0.707132	***
Proportion of children ate fruits	0.4645941	0.3444613	***
Proportion of children ate vegetables	0.9411765	0.939302	
Household's Consumption Pattern (in Round 2)			
Prop of expenditure spend on pulses	0.02205	0.02530	***
Prop of expenditure spend on cereals	0.11582	0.12800	***
Prop of expenditure spend on tubers/potatoes	0.00560	0.00602	
Prop of expenditure spend on non vegetarian	0.04486	0.04476	
Prop of expenditure spend on milk and milk procedure	0.02559	0.02143	***
Prop of expenditure spend on vegetables	0.03518	0.04203	***
Prop of expenditure spend on other food items	0.11153	0.12371	***
Prop of expenditure spend on other non food items	0.50611	0.47856	***
Prop of expenditure spend on education	0.05046	0.03304	***
Prop of expenditure spend on medical	0.08279	0.09716	***

Note : *** indicates 1%, ** indicates 5%, and * indicates 10% significant levels

9. Food Prices and Children's Stunting: Regression Analysis

The relationship between food prices and calorie intake of the households has been examined through specification simple demand function. We have included non-food prices and income in this demand model. We have imposed homogeneity condition that the consumption levels do not change if the prices and the income changes in the same proportion. These estimated results of the model are presented in Table 2.The results indicate that 10 % increase in prices leads to a decrease of around 2 calories intake per capita. Interestingly, they also unfolds that 10% increase in price leads to an increase of around 3 calories intake per capita.

Table 2: Estimation of Relationship Among Food Prices, Non-food Prices, Per capita Consumption and Per Capita Calories Intake

Dependent Variable / Independent Variables (1)	Log of Total Calories In take per capita OLS (2)		Log of Total Calories In take per capita 2SLS (3)		Log of Total Calories In take per capita 3SLS (4)		Log of Total Calories Intake per capita Bootstrap 3SLS (5)	
Difference of Log of Consumption per capita and Log of non food price index (δ)	0.312 (0.025)	***	0.318 (0.028)	***	0.321 (0.028)	***	0.321 (0.045)	***
Difference of Log of Food Index and Log of non food price index (β1)	-0.159 (0.048)	***	-0.188 (0.054)	***	-0.202 (0.053)	***	-0.202 (0.06)	***
_cons	10.473 (0.048)	***	10.445 (0.054)	***	10.442 (0.054)	***	10.442 (0.078)	***
Beeta2 = -Delta-Beeta1	-0.153		-0.130		-0.119		-0.119	
Sample	1807		1416		1416		1416	
R-Square	0.092		0.094		0.094		0.094	

Note : 1 *** indicates 1%, ** indicates 5%, * indicates 10% significant levels

2 Figures in parentheses are Standard Errors

Step 1 : Log of per capita calorie intake = α + δ Log of Per capita consumption + β1 Log of food price Index + β2 Log of Nonfood price index

Assume δ + β1 + β2 = 0 and β2 = - δ - β1 Put this value in place of β2 in step 1

Step 2 : Log of per capita calorie intake = α + δ Log of Per capita consumption + β1 Log of food price Index + (- δ - β1) Log of Nonfood price index

Step 3 : Log of per capita calorie intake = α + δ Log of Per capita consumption + β1 Log of food price Index + (- (- δ - β1) Log of Nonfood price index

Step 4 : Log of per capita calorie intake = α + δ (Log of Per capita consumption-Log of Nonfood price index) + β1 (Log of food price Index-Log of Nonfood price index)

The results of the estimated relationship between the calories intake per capita of the households and the z-scores of the children in the presence of control variables described above are presented in Table 3. It is evident from the results that the per capita consumption of calories and children's stunting were related significantly. The relationship is turned out to be positive. What does it mean? The higher consumption of calories had led to an increase in z-scores of height for age and thereby led to decrease in the possibility of being stunted. This means that the children from households with less per capita calorie consumption had the higher possibility of being stunted. The coefficient of the per capita consumption of calories indicates that an increase of 1 unit in per capita consumption of calories results in an increase of 2.5 units of Z score of height for age and thereby reduces the possibility of being stunted.

The Z scores at the age of one year did determine the Z scores at the age of four years. The Z scores at the age of one year can be included in this model 2 and we can produce more consistent estimates on the contribution of household per capita consumption as the households remain homogeneous with regard to observables as well as non-observables. But the inclusion of the determinants of Z scores at the age of one year brings heterogeneity among the households in regard to observables as well as non-observables and as a result of which, we cannot produce consistent estimates on the contribution of household per capita consumption, but we can throw more light on the policy analysis. Thus, there can be trade-off between consistent estimates and policy analysis.

The women's status in the household matters most in allocating the food among family members especially to children. The mothers' education had contributed positively to the Z-scores, but the mothers' working had contributed negatively to the Z-scores. The working mothers' might not have spent adequate time on childcare; as a result the relationship between the Z-scores of children and mother's working had turned out to be negative. The children's dietary diversity had positive impact on the Z-scores. The boys had lower Z score over girls, while birth order of the index children had contributed negatively to the Z score. The children from households belonging to scheduled castes, scheduled tribes and backward castes had lower Z scores over the children from other castes (dominant castes).The children from rural areas had lower Z scores.

We have included safe motherhood and safe childhood practices; and mothers' psychological status in post-delivery period. The children whose mothers had made late visit to the doctor for the first antenatal care; and children whose mothers had experienced psychological depression in post-delivery period; and children who had not received all five doses of immunization during the infancy of five years had lower Z scores and thus high possibility of being stunted when the children grow five year old. The age of mother had contributed positively to the Z score,

The above analysis has unfolded that children of working mothers of relatively young age, low level of education, late visit to the doctor for the first antenatal care and psychological depression in the post-delivery period; and children with non- receipt of the required doses of immunization, consumption of less diversified diet and not attending of formal school along with the price rise have contributed to the stunting of children. The variations in these factors had brought variations in the incidence of stunting of the children among SCs, STs, BCs and OCs; boys and girls, children from rural and urban areas; and children of higher birth order

10. Estimation of Relationship between the Food Prices and Child Stunting

We have estimated the relationship between the food prices and households per capita calories intake. We have also estimated the relationship between the household per capita calories intake and children's Z-scores of age for height. We have to estimate the relationship between the food prices and children's stunting, using these two relationships. We have estimated this relationship as follows:

$K = Ek.P$---------- (3)

Where

$K = \left(\frac{\Delta k}{k}\right)$ percentage of change in per capita calories intake of the household

Ekp=elasticity of per capita calories intake of the household with respect to food prices

$P = \left(\frac{\Delta p}{p}\right)$. %=percentage of change in per capita calories intake of the household

We estimate the E?p from the results presented in Table 2

$P = \dot{E}zk.k$ ---------- (4)

Where

$Z = \left(\frac{\Delta z}{z}\right)$. %= Percentage of change in z scores of height for age of the children

$\dot{E}zk$=elasticity of z scores of height for age of the children with respect to per capita calories intake of the household

$K = \left(\frac{\Delta k}{k}\right)$%=percentage of change in per capita calories intake of the household

Table 3. Estimation of Relationship Among Nutritional Status of Children, Per Capita Calories Intake Hat, and Other Correlates of Child Nutritional Status: Regression Analysis

Dependent Variable / Independent Variables	OLS		Derivative Probit		2SLS		3SLS		3SLS Bootstrap	
	Height for Age Z-Scores in Round 2		Stunted=1 / Normal=0		Height for Age Z-Scores in Round 2		Height for Age Z-Scores in Round 2		Height for Age Z-Scores in Round 2	
Log of Total Calorie Intake per capita per month	0.054 (0.048)		-0.035 (0.023)		0.405 (0.167)	**	0.438 (0.165)	***	0.438 (0.191)	**
SC=1/OC=0	-0.252 (0.094)	***	0.043 (0.047)		-0.258 (0.097)	***	-0.257 (0.094)	***	-0.257 (0.093)	***
ST=1/OC=0	-0.211 (0.105)	**	0.050 (0.052)		-0.184 (0.108)	*	-0.167 (0.105)		-0.167 (0.117)	
BC=1/OC=0	-0.237 (0.076)	***	0.053 (0.038)		-0.249 (0.078)	***	-0.235 (0.076)	***	-0.235 (0.103)	**
Household Size(in number)	0.019 (0.012)		-0.017 (0.006)	***	0.033 (0.014)	**	0.024 (0.013)	*	0.024 (0.012)	**
Mother Education(in years of schooling	0.016 (0.008)	**	-0.009 (0.004)	**	0.014 (0.008)	*	0.014 (0.008)	*	0.014 (0.009)	
Gender of the Index Child (Female=1/Male=0)	0.157 (0.055)	***	-0.043 (0.026)	*	0.176 (0.057)	***	0.159 (0.055)	***	0.159 (0.057)	***
Location of the Children's Residence (Rural=1/Urban=0)	-0.270 (0.077)	***	0.140 (0.034)	***	-0.295 (0.08)	***	-0.266 (0.078)	***	-0.266 (0.084)	***
Months Pregnant who had her First Antenatal Visit (<=3 months=1 otherwise=0)	0.093 (0.062)		-0.020 (0.029)		0.109 (0.063)	*	0.102 (0.061)	*	0.102 (0.049)	**
Number of Antenatal Visits	0.008 (0.015)		-0.006 (0.007)		0.011 (0.015)		0.007 (0.015)		0.007 (0.012)	
All three immunisation doses taken by the index child in Round1=1 otherwise=0	-0.007 (0.062)		0.025 (0.029)		-0.020 (0.064)		-0.009 (0.062)		-0.009 (0.058)	

Contd.... Table - 3

Mother had Safe Delivery Practice=1 otherwise=0	-0.012 (0.065)		0.017 (0.03)		0.005 (0.067)		-0.017 (0.065)		-0.017 -0.060	
All Five Immunisation doses taken by the index child in Round1=2 otherwise=0	0.172 (0.06)	***	-0.037 (0.028)		0.184 (0.061)	***	0.182 (0.06)	***	0.182 (0.067)	***
Mother tart giving solids to child on right time in round1=1 otherwise=0	0.025 0.075)		0.011 (0.035)		0.034 (0.076)		0.021 (0.074)		0.021 (0.071)	
Dietry diversification of children (Round 2)	0.057 (0.019)	***	-0.028 (0.009)	***	0.045 (0.02)	**	0.046 (0.02)	**	0.046 (0.018)	***
Number of children born before Index child to same mother	-0.104 (0.03)	***	0.039 (0.014)	***	-0.103 (0.031)	***	-0.099 (0.03)	***	-0.099 (0.033)	***
Age of Mother (in years)	0.095 (0.054)	*	-0.048 (0.025)	*	0.106 (0.056)	*	0.090 (0.054)	*	0.090 (0.046)	*
Square of Age of Mother in years	-0.001 (0.001)		0.001 (0)		-0.002 (0.001)		-0.001 (0.001)		-0.001 (0.001)	
Caregivers depression Score in Round1	-0.098 (0.063)		0.035 (0.03)		-0.108 (0.065)	*	-0.101 (0.063)		-0.101 (0.062)	
Child began formal schooling =1 Otherwise=0	0.295 (0.058)	***	-0.134 (0.027)	***	0.303 (0.06)	***	0.298 (0.058)	***	0.298 (0.059)	***
Awareness score of mother	0.035 (0.021)	*	-0.010 (0.01)		0.035 (0.022)		0.037 (0.021)	*	0.037 (0.024)	
Working Status of Mother (Worker=1/otherwise=0)	-0.114 (0.06)	*	0.043 (0.029)		-0.116 (0.061)	*	-0.127 (0.06)	**	-0.127 (0.065)	*
Constant	-4.144 (0.907)	***			-8.203 (2.048)	***	-8.297 (2.019)	***	-8.297 (2.255)	***
Sample	1426				1416		1416		1416	
R-Square	0.133				0.101		0.093		0.093	

Note : 1 *** indicates 1%, ** indicates 5%, * indicates 10% significant levels
2 Figures in parentheses are Standard Errors

We estimate the Ėzk from the results presented in Table 3

$Z = \dot{E}xp \cdot \dot{E}zk \cdot P$ ----------(5)

We have estimated Z for *P* at 1%, 5%, 10 %, 15%, and 20%.Instead of fitting a distribution, the new Z scores of children at these percentages of changes have been worked out. We have classified these children in to non-stunted and stunted. Further, we classified the stunted children in to moderately stunted children and severely stunted children as per the standard definitions of non-stunted, moderately stunted and severely stunted. Then we have arrived at absolute number of children as well as percentage of children non-stunted, stunted, moderately stunted and severely stunted at each percentage of changes in food prices. The results are presented in Table 4.

The results indicate that the percentage of children stunted increases as the food prices increase. The increase in percentage of children stunted turned out to be considerable when the increase in food prices is 15% and above. This unfolds that the households could absorb the food price rise below 15 percent through the increase in their incomes. The households could not absorb food price rise beyond 15 % only through the coping mechanisms-food as well as non-food based. This ultimately results in the increase of incidence of stunting. The non-stunted children have slipped into moderately stunted status and moderately stunted children have joined severely stunted children because of the increase in food prices. The food price impact is more felt by boys than the girls. Further; the urban children are more affected than those in the rural children. Among the social groups, the children from scheduled castes and scheduled tribes have relatively affected more than those from backward castes and 'other castes' (dominant castes) (Table 4).

Table 4. Children's Nutritional Status Under Different Situations of Rise in Food Prices

Children's nutritional status	Percentage of increase in food prices					
	Base	1%	5%	10%	15%	20%
All Children						
% of non stunted children	63.15	62.87	62.87	62.53	61.86	60.69
% of stunted (Severe & Moderate) children	36.85	37.13	37.13	37.47	38.14	39.31
% of Severely stunted children	8.21	8.21	8.21	8.49	8.83	9.22
% of Moderately stunted children	28.64	28.92	28.92	28.98	29.31	30.09
Total no of children	1819	1819	1819	1819	1819	1819
No. of non stunted children	1149	1144	1144	1137	1125	1104
No. of stunted (Severe & Moderate) children	670	675	675	682	694	715
No. of Severely stunted children	149	149	149	154	161	168
No. of Moderately stunted children	521	526	526	527	533	547
% Severely stunted to stunted	22.28	22.11	22.11	22.66	23.15	23.45
% moderately stunted to stunted	77.72	77.89	77.89	77.34	76.85	76.55
change in percentage of children over base						
percentage change in non stunted children		-0.44	-0.44	-0.98	-2.04	-3.90
percentage Change in stunted (Severe & Moderate) children		0.76	0.76	1.68	3.50	6.68
percentage change in Severely stunted children		0.00	0.00	3.41	7.55	12.30
percentage change in Moderately stunted children		0.98	0.98	1.19	2.34	5.06
Boys	**Percentage of increase in food prices**					
children nutritional status	**base**	**1**	**5**	**10**	**15**	**20**
% of non stunted children	60.19	59.77	59.77	59.35	58.4	57.04
% of stunted (Severe & Moderate) children	39.81	40.23	40.23	40.65	41.6	42.96
% of Severely stunted children	9.24	9.24	9.24	9.45	9.77	10.29
% of Moderately stunted children	30.57	30.99	30.99	31.2	31.83	32.67
Total no of children	967	967	967	967	967	967
No. of non stunted children	582	578	578	574	565	552
No. of stunted (Severe & Moderate) children	385	389	389	393	402	415
No. of Severely stunted children	89	89	89	91	94	100
No. of Moderately stunted children	296	300	300	302	308	316
% Severely stunted to stunted	23.21	22.97	22.97	23.25	23.49	23.95
% moderately stunted to stunted	76.79	77.03	77.03	76.75	76.51	76.05
change in percentage of children over base						
percentage change in non stunted children		-0.70	-0.70	-1.40	-2.97	-5.23
percentage Change in stunted (Severe & Moderate) children		1.06	1.06	2.11	4.50	7.91
percentage change in Severely stunted children		0.00	0.00	2.27	5.74	11.36
percentage change in Moderately stunted children		1.37	1.37	2.06	4.12	6.87
Girls	**Percentage of increase in food prices**					
children nutritional status	base	1	5	10	15	20
% of non stunted children	66.51	66.39	66.39	66.15	65.79	64.84
% of stunted (Severe & Moderate) children	33.49	33.61	33.61	33.85	34.21	35.16
% of Severely stunted children	7.03	7.03	7.03	7.39	7.75	7.98
% of Moderately stunted children	26.46	26.58	26.58	26.46	26.46	27.18

Total no of children	852	852	852	852	852	852
No. of non stunted children	567	566	566	564	561	552
No. of stunted (Severe & Moderate) children	285	286	286	288	291	300
No. of Severely stunted children	60	60	60	63	66	68
No. of Moderately stunted children	225	226	226	225	225	232
% Severely stunted to stunted	20.99	20.92	20.92	21.83	22.65	22.70
% moderately stunted to stunted	79.01	79.08	79.08	78.17	77.35	77.30
change in percentage of children over base						
percentage change in non stunted children		-0.18	-0.18	-0.54	-1.08	-2.51
percentage Change in stunted (Severe & Moderate) children		0.36	0.36	1.07	2.15	4.99
percentage change in Severely stunted children		0.00	0.00	5.12	10.24	13.51
percentage change in Moderately stunted children		0.45	0.45	0.00	0.00	2.72
Children in Urban Areas	**Percentage of increase in food prices**					
children nutritional status	base	1	5	10	15	20
% of non stunted children	78.80	78.31	78.31	78.07	77.59	75.90
% of stunted (Severe & Moderate) children	21.20	21.69	21.69	21.93	22.41	24.10
% of Severely stunted children	5.30	5.30	5.30	5.54	5.54	5.55
% of Moderately stunted children	15.90	16.39	16.39	16.39	16.87	18.55
Total no of children	417	417	417	417	417	417
No. of non stunted children	329	327	327	326	324	317
No. of stunted (Severe & Moderate) children	88	90	90	91	93	100
No. of Severely stunted children	22	22	22	23	23	23
No. of Moderately stunted children	66	68	68	68	70	77
% Severely stunted to stunted	25.00	24.44	24.44	25.26	24.72	23.03
% moderately stunted to stunted	75.00	75.56	75.56	74.74	75.28	76.97
change in percentage of children over base						
percentage change in non stunted children		-0.62	-0.62	-0.93	-1.54	-3.68
percentage Change in stunted (Severe & Moderate) children		2.31	2.31	3.44	5.71	13.68
percentage change in Severely stunted children		0.00	0.00	4.53	4.53	4.72
percentage change in Moderately stunted children		3.08	3.08	3.08	6.10	16.67
Children in Rural Areas	**Percentage of increase in food prices**					
children nutritional status	base	1	5	10	15	20
% of non stunted children	58.43	58.21	58.21	57.85	57.12	56.1
% of stunted (Severe & Moderate) children	41.57	41.79	41.79	42.15	42.88	43.9
% of Severely stunted children	9.08	9.09	9.09	9.37	9.81	10.32
% of Moderately stunted children	32.49	32.7	32.7	32.78	33.07	33.58
Total no of children	1402	1402	1402	1402	1402	1402
No. of non stunted children	819	816	816	811	801	787
No. of stunted (Severe & Moderate) children	583	586	586	591	601	615
No. of Severely stunted children	127	127	127	131	138	145
No. of Moderately stunted children	456	458	458	460	464	471
% Severely stunted to stunted	21.84	21.75	21.75	22.23	22.88	23.51
% moderately stunted to stunted	78.16	78.25	78.25	77.77	77.12	76.49
change in percentage of children over base						
percentage change in non stunted children		-0.38	-0.38	-0.99	-2.24	-3.99

percentage Change in stunted (Severe & Moderate) children		0.53	0.53	1.40	3.15	5.61
percentage change in Severely stunted children		0.11	0.11	3.19	8.04	13.66
percentage change in Moderately stunted children		0.65	0.65	0.89	1.79	3.35
Children from Scheduled Caste HouseholdsPercentage of increase in food prices						
children nutritional status	base	1	5	10	15	20
% of non stunted children	60.36	59.64	59.64	59.64	59.27	59.27
% of stunted (Severe & Moderate) children	39.64	40.36	40.36	40.36	40.73	40.73
% of Severely stunted children	10.91	10.91	10.91	10.91	11.27	11.27
% of Moderately stunted children	28.73	29.45	29.45	29.45	29.45	29.45
Total no of children	342	342	342	342	342	342
No. of non stunted children	206	204	204	204	203	203
No. of stunted (Severe & Moderate) children	136	138	138	138	139	139
No. of Severely stunted children	37	37	37	37	39	39
No. of Moderately stunted children	98	101	101	101	101	101
% Severely stunted to stunted	27.52	27.03	27.03	27.03	27.68	27.68
% moderately stunted to stunted	72.48	72.97	72.97	72.97	72.32	72.32
percentage change in non stunted children		-1.20	-1.20	-1.20	-1.81	-1.81
percentage Change in stunted (Severe & Moderate) children		1.83	1.83	1.83	2.75	2.75
percentage change in Severely stunted children		0.00	0.00	0.00	3.33	3.33
percentage change in Moderately stunted children		2.53	2.53	2.53	2.53	2.53
Children from Scheduled Tribe Households		**Percentage of increase in food prices**				
children nutritional status	base	1	5	10	15	20
% of non stunted children	56.52	56.52	56.52	56.52	55.56	55.56
% of stunted (Severe & Moderate) children	43.48	43.48	43.48	43.48	44.44	44.44
% of Severely stunted children	7.73	7.73	7.73	7.73	7.73	7.73
% of Moderately stunted children	35.75	35.75	35.75	35.75	36.71	36.71
Total no of children	272	272	272	272	272	272
No. of non stunted children	154	154	154	154	151	151
No. of stunted (Severe & Moderate) children	118	118	118	118	121	121
No. of Severely stunted children	21	21	21	21	21	21
No. of Moderately stunted children	97	97	97	97	100	100
% Severely stunted to stunted	17.78	17.78	17.78	17.78	17.39	17.39
% moderately stunted to stunted	82.22	82.22	82.22	82.22	82.61	82.61
change in percentage of children over base						
percentage change in non stunted children		0.00	0.00	0.00	-1.71	-1.71
percentage Change in stunted (Severe & Moderate) children		0.00	0.00	0.00	2.22	2.22
percentage change in Severely stunted children		0.00	0.00	0.00	0.00	0.00
percentage change in Moderately stunted children		0.00	0.00	0.00	2.70	2.70
Children from Backward Caste Households		**Percentage of increase in food prices**				
children nutritional status	base	1	5	10	15	20
% of non stunted children	62.23	62.10	62.10	62.10	61.83	61.83
% of stunted (Severe & Moderate) children	37.77	37.90	37.90	37.90	38.17	38.17
% of Severely stunted children	8.33	8.33	8.33	8.60	8.60	8.60
% of Moderately stunted children	29.44	29.57	29.57	29.30	29.57	29.57
Total no of children	847	847	847	847	847	847

No. of non stunted children	527	526	526	526	524	524
No. of stunted (Severe & Moderate) children	320	321	321	321	323	323
No. of Severely stunted children	71	71	71	73	73	73
No. of Moderately stunted children	249	250	250	248	250	250
% Severely stunted to stunted	22.06	21.99	21.99	22.70	22.54	22.54
% moderately stunted to stunted	77.94	78.01	78.01	77.30	77.46	77.46
change in percentage of children over base						
percentage change in non stunted children		-0.22	-0.22	-0.22	-0.65	-0.65
percentage Change in stunted (Severe & Moderate) children		0.36	0.36	0.36	1.07	1.07
percentage change in Severely stunted children		0.00	0.00	3.23	3.23	3.23
percentage change in Moderately stunted children		0.46	0.46	-0.46	0.46	0.46
Children from Other Caste(Dominant Caste) Households	**Percentage of increase in food prices**					
children nutritional status	base	1	5	10	15	20
% of non stunted children	75.17	74.83	74.83	74.83	74.50	74.50
% of stunted (Severe & Moderate) children	24.83	25.17	25.17	25.17	25.50	25.50
% of Severely stunted children	5.30	5.30	5.30	5.30	5.30	5.30
% of Moderately stunted children	19.54	19.87	19.87	19.87	20.20	20.20
Total no of children	358	358	358	358	358	358
No. of non stunted children	269	268	268	268	267	267
No. of stunted (Severe & Moderate) children	89	90	90	90	91	91
No. of Severely stunted children	19	19	19	19	19	19
No. of Moderately stunted children	70	71	71	71	72	72
% Severely stunted to stunted	21.33	21.05	21.05	21.05	20.78	20.78
% moderately stunted to stunted	78.67	78.95	78.95	78.95	79.22	79.22
change in percentage of children over base						
percentage change in non stunted children		-0.44	-0.44	-0.44	-0.88	-0.88
percentage Change in stunted (Severe & Moderate) children		1.33	1.33	1.33	2.67	2.67
percentage change in Severely stunted children		0.00	0.00	0.00	0.00	0.00
percentage change in Moderately stunted children		1.69	1.69	1.69	3.39	3.39

11. Conclusions

The rise in food prices had contributed negatively to the linear growth of children. The children who were in disadvantageous status with regard to nutrition at the age of one year had been hit severely when they have grown five years due to rise in food prices. These are mostly children belonging to scheduled caste and Scheduled households and children in rural areas. The then existing household income enhancement programmes of the government had enabled the households to cope with the below 15% rise in food prices by obtaining more income from those programmes. The potential of the income enhancement programmes of the government had tapered off at the food price rise beyond 15 % .The households started utilizing food-based and non-food based coping mechanisms that resulting in micronutrient deficiency in nutrition that resulting in stunted growth of children. Of, course, the noon-meal scheme did arrest the stunted growth of children to some extent. The supply of non-staple food items from the Public Distribution System at cheaper prices may arrest the stunted growth of children by overcoming the onslaught of rise in food prices.

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