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RESULTS & DISCUSSION

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NUTRITIONAL DEFICIENCY AND WELFARE COMPARISONS ACROSS AGRICULTURAL AND NON-AGRICULTURAL HOUSEHOLDS IN RURAL INDIA

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ABSTRACT

This paper aims to look into the nutritional deprivation of rural households in accordance with demand and supply aspects and to assess the impact of food price changes on household welfare in rural India. The findings showed that agricultural households were better off from the nutritional perspective. The results from multiple regression model confirmed that education, land ownership and consumption diversity has positively contributed to the welfare of agricultural households.

KEYWORDS

IHDS, welfare, nutrition, poverty.

JEL CODES

Q18, E31, I32.

INTRODUCTION

It is widely acknowledged that agriculture not only ensures food security of the nation, but it also provides income and adequate nutrition to the masses. Since the period of Green Revolution, the agriculture sector in India has been catered to the demands of hiking population by increasing the availability of food grains. Apart from ensuring food security, agriculture sector can contribute to income and profits for net producers (Mukhopadhyay, 2012). However, a recent study based on IHDS data articulated the fact that both stunting and wasting were seemingly higher in agricultural households relative to nonagricultural households (Bhagowalia et al, 2012). In rural India, more than 20 per cent of farm households were living below the poverty line (Chand, 2017). Given the agrarian distress and the resultant farmers' suicides in many parts of the country, policy-makers have now turned attention to doubling the income of farmers by 2022. Against this backdrop, it would be interesting to look at the nutritional deprivation of agricultural households and to compare with that of non-agricultural households and to draw policy interventions suitable to them.

This paper aims to look into the nutritional deprivation of rural households in accordance with demand and supply aspects and to assess the impact of food price changes on household welfare in rural India. To satisfy the objectives, FGT Indices, Net Benefit Ratio and Multiple Regression method will be used here.

The introductory section deals with food price situation in India. The conceptualization of household welfare has been presented in the next section. The third section compares net benefit ratios across the agricultural and non-agricultural households. The fourth section looks at the factors that contributed to the welfare gains of agricultural households. The concluding remarks are made in the last section.

OBJECTIVES OF THE STUDY

1. To look into the nutritional deprivation ofl agricultural and non-agricultural households in rural India.
2. To assess the impact of food price changes on household welfare in rural India.

DATA SOURCES AND METHODOLOGY

The present study makes use of the NSS Unit Record data on Household consumption expenditure limited to the 61st (2004-05) and 68th rounds (2011-12). The two NSS rounds accomodate a sample of 79,298 households and 59,695 households in rural areas. Besides the tables relating to the Summary of RDA for Indians provided by Indian Council of Medical Research (2010) have been used which stands as a reference point for recommended dietary allowance for Indians. This enables us to elicit any shortfall in macro-nutrients. Lastly the IHDS datasets I and II have been used. The IHDS data takes a sample of 27,010 rural households in 2004-05 and 27,579 rural households in 2011-12. Around 84% of households in IHDS-I were re-contacted in IHDS-II.

The main tools analyzed in the work are FGT Index, Net Benefit Ratios and Ordinary Least Square Method. The FGT Index for the ith sub-group (agricultural versus non-agricultural households) is specified as follows:

$P^{\propto}_i = (1/n_i)[RDA - CALIN_i / RDA]^{\propto}$

When $\propto$ is larger, the index puts more weight on the position of the undernourished. When $\propto = 0$, the formula shows the Head count index, which represents the proportion of households not consuming the required nutrients. For measuring the depth of undernutrition, the Proportionate Gap Index will be calculated. When $\propto = 1$, the average distance from the minimum requirement can be measured. When $\propto = 2$, the severity of undernutrition can be measured by assigning greater weights to those households who are far from the minimum required calories. The Ordinary Least Square Method and Net Benefit Ratios will be explained in the subsequent sections.

FOOD INFLATION - INDIAN EVIDENCE

Food inflation has been surged in 2008 all over the world. Since then, a number of studies have come out for providing an insight to the global food inflation and how global food prices have been transmitted to their domestic economies. Many Sub-Saharan African countries have insulated their economies from global inflation as these economies have not integrated with the global economy. The open economies like India also resisted to food inflation due to the timely policy response of the government. These policy responses include export ban on cereals and suppression of fertilizer prices (Pons, 2011; Ganguly and Gulati, 2013).

In the wake of drought that the country faced in 2009 and global economic recession, food inflation in India has been escalated at the rate of 10.20% from January 2008 to July 2010. Other reasons behind food inflation are growth in per capita income, increase in the overall demand for food, bottlenecks in agricultural production, increase in world crude oil and food prices and so on (Nair and Eapen, 2012; Sasmal, 2015). When a commodity-analysis of food inflation is carried out, inflation rate of fruits (11%) is on par with cereals, but the inflation rate of pulses (15%) has surpassed the prices of cereals (11%), vegetables (8%) and fruits during 2008 to 2010. The anatomy of food inflation suggests that protein-based inflation is strengthening in the country.

HOUSEHOLD WELFARE: CONCEPT AND MEASUREMENT

In development discourse, the monthly per capita consumption expenditure was considered a rough proxy of household welfare. According to Kodithuwakku and Weerahewa (2011), household welfare mainly looks at "maximizing satisfaction of all household members by way of consumption of food and non-food items and by way of their engagement in leisure activities, subject to resource constraints". Household welfare is affected by a multiplicity of factors such as the extent of price transmission, credit constraints, the number of net buyers or net sellers of the commodities in question, the share of consumer's budget devoted to the

items, the extent of own-consumption relative to market purchases and the effect of price increases on real wages (Benjamin and Deaton, 1993; Simler, 2010; Rui and Xi, 2010). An understanding of household welfare in rural households is called for when own production forms a substantial portion of total consumption of food grains. Own production is critical for those households which do not make use of PDS and market for rice or wheat consumption or both (Ahluwalia 1993; Dev and Suryanarayana, 1991; Dutta and Ramaswami, 2001).

As a measure of household welfare, net benefit ratios have been worked out. Net benefit ratios are used for estimating the short-run impact of an increase in food prices on household welfare. The ratio is the difference between the production ratio and consumption ratio. The basic model equation is as follows:

$$\Delta W^h = \sum_{i=1}^{n} \Delta Pi\ (PRi^h - CRi^h)$$

Where ΔW^h is the compensating variation expressed as a percentage of total expenditures of a household. By definition, compensating variation shows how much money is needed for a household to maintain its standard of living. PRi^h is the production ratio, which is the value of food commodity produced as a fraction of total household expenditures. CRi^h is the consumption ratio, which is the value of food commodity consumed as a fraction of total household expenditures.

The basic model is built on some important simplifying assumptions (Simler, 2010; Benfica, 2014). First, consumers may abstain from shifting their consumption patterns in response to higher prices. Therefore, the model ignores medium and long-run impacts. Second, it is assumed that the increase in producer price is not at odds with the increase in consumer price, ignoring changes in production and transportation. Third, the model does not take into consideration of the second-order effects that arise from the adjustments in production in response to changes in relative prices. Finally, there is no scope for introducing subsidies or other transfers aimed at diluting the effects of food price shocks (Benfica, 2014).

These assumptions have undergone modifications over time. For example, some recent studies (Minot and Dewina, 2013; Dawe and Maltsoglou, 2014) have relaxed the second assumption that both the producer prices and consumer prices go up in the same proportion. Instead of assuming proportional marketing margin, studies proposed fixed marketing margin, whereby the increase in producer prices will be twice the per cent increase in the consumer price.

The Net Benefit Ratios can be computed for individual commodities or for aggregates of commodities. Households with a positive NBR (net sellers) would gain from a price increase, and households with a negative NBR (net buyers) would lose. By using net benefit ratios, one can identify and separate out the most affected household as a result of food price increase. The net benefit ratio as a policy tool throws light on what should be done to minimize the impact of food price shocks on the severely affected group.

Here net benefit ratios were calculated for four different food groups, namely cereals, pulses, vegetables, and fruits. The computation of net benefit ratios is having the problem of matching production values with the consumption values by the respondents. To circumvent this problem, some adjustments need to be made so that the negative values of NBR at household level will turn into positive values, thereby facilitating the comparison of agricultural and non-agricultural households. This adjustment lies in multiplying the values of NBR with minus one and it is restricted to those households with large size of landholdings (More than 10 hectares).

AGRICULTURAL HOUSEHOLDS AS GAINERS AND LOSERS

This section seeks to explain whether agricultural households have gained from the food price increase or not. To address this research question, both NSS and IHDS datasets will be used.

In case of agricultural households, whose production diversity score is greater than zero, a high positive net benefit ratio can be observed in cereals, followed by vegetables, pulses and fruits. The production of cereals and vegetables is advantageous for the agricultural households. Specifically, the agricultural households in backward states could seize the opportunity of food price increase. In 2004-05, Punjab, Haryana and Tamil Nadu had incurred losses from the production of cereals (Table 1). When we look at 2011-12, Andhra Pradesh and Tamil Nadu were the losers in the production of pulses and vegetables (Table 2). It implies that the losers have changed their production behaviour over time.

In case of non-agricultural households, whose production diversity is equal to zero, a high negative net benefit ratio can be observed in cereals and vegetables. When cereal prices have grown, the non-agricultural households in Assam, Bihar and West Bengal had suffered the most. Thus, a 10% increase in cereal price would hit real income by 5-6% in these states.

A low net benefit ratio in case of pulses shows that pulse cultivation seems to be less lucrative for rural India. This may be due to the fact that farmers are not aware of minimum support prices particularly in case of pulses which pave the way for exploitation by the middlemen and other traders (Aditya et al, 2017). As a result, farmers get lowest price for their produce, which will erode their real income.

The non-agricultural households had suffered due to the increase in fruit price in 2004-05, while non-agricultural households might have reduced fruits consumption in 2011-12. When net benefit ratios of fruits are considered, a break-even situation can be observed. In the remaining food groups, it was found that the estimated welfare losses seem to be higher than welfare gains.

TABLE 1: STATE-WISE MEAN NET BENEFIT RATIOS ACROSS AGRICULTURAL AND NON-AGRICULTURAL HOUSEHOLDS IN 2004-05

State	Agricultural Households				Non-Agricultural Households			
	Cereals	Pulses	Vegetables	Fruits	Cereals	Pulses	Vegetables	Fruits
Andhra Pradesh	0.03	0.01	0.02	0.00	-0.69	-0.11	-0.21	-0.05
Gujarat	0.33	0.13	0.31	0.06	-0.67	-0.17	-0.39	-0.05
Haryana	-0.05	0.06	0.14	0.05	-0.57	-0.11	-0.27	-0.06
Karnataka	0.12	0.03	0.06	0.02	-0.58	-0.14	-0.18	-0.08
Kerala	0.30	0.05	0.09	0.06	-0.44	-0.07	-0.15	-0.15
Maharashtra	0.21	0.08	0.14	0.04	-0.65	-0.17	-0.25	-0.05
Punjab	-0.12	0.05	0.07	0.03	-0.56	-0.16	-0.26	-0.04
Tamil Nadu	-0.01	0.00	0.01	0.00	-0.50	-0.12	-0.21	-0.06
Assam	0.45	0.16	0.33	0.03	-1.33	-0.18	-0.48	-0.03
Bihar	0.30	0.14	0.32	0.04	-1.55	-0.19	-0.43	-0.03
Madhya Pradesh	0.32	0.10	0.25	0.05	-1.03	-0.20	-0.33	-0.04
Orissa	0.51	0.10	0.34	0.04	-1.49	-0.13	-0.43	-0.04
Rajasthan	0.40	0.08	0.24	0.04	-0.80	-0.11	-0.28	-0.05
Uttar Pradesh	0.25	0.18	0.34	0.05	-1.21	-0.23	-0.41	-0.04
West Bengal	0.28	0.08	0.26	0.03	-1.21	-0.10	-0.42	-0.03
Total	0.28	0.10	0.24	0.04	-0.93	-0.15	-0.32	-0.05

Source: Calculated from unit record data of the 61st NSSO round

TABLE 2: STATE-WISE MEAN NET BENEFIT RATIOS ACROSS AGRICULTURAL AND NON-AGRICULTURAL HOUSEHOLDS IN 2011-12

State	Agricultural Households				Non-Agricultural Households			
	Cereals	Pulses	Vegetables	Fruits	Cereals	Pulses	Vegetables	Fruits
Andhra Pradesh	0.29	-0.03	-0.02	-0.01	-0.40	-0.12	-0.15	0.00
Gujarat	0.25	0.01	0.01	0.00	-0.37	-0.14	-0.22	0.00
Haryana	0.07	0.07	0.12	0.00	-0.24	-0.13	-0.23	0.00
Karnataka	0.44	0.02	0.02	0.00	-0.44	-0.15	-0.15	0.00
Kerala	0.19	0.05	0.07	0.04	-0.23	-0.06	-0.09	0.00
Maharashtra	0.34	0.01	0.01	-0.01	-0.40	-0.15	-0.15	0.00
Punjab	0.03	0.06	0.07	0.00	-0.27	-0.13	-0.22	0.00
Tamil Nadu	0.28	-0.03	-0.04	-0.01	-0.38	-0.12	-0.15	0.00
Assam	0.45	0.14	0.17	0.01	-0.55	-0.14	-0.25	0.00
Bihar	0.32	0.11	0.19	0.01	-0.69	-0.19	-0.35	0.00
Madhya Pradesh	0.24	0.02	0.03	0.00	-0.40	-0.17	-0.18	0.00
Orissa	0.44	0.06	0.14	0.01	-0.54	-0.12	-0.27	0.00
Rajasthan	0.17	0.07	0.14	0.00	-0.30	-0.11	-0.18	0.00
Uttar Pradesh	0.24	0.19	0.26	0.00	-0.46	-0.22	-0.33	0.00
West Bengal	0.31	0.02	0.03	0.00	-0.66	-0.08	-0.26	0.00
Total	0.28	0.08	0.12	0.00	-0.46	-0.14	-0.22	0.00

Source: Calculated from unit record data of the 68th NSSO rounds

The IHDS data helps to delineate and arrive at the proportion of agricultural households without the break-up of food groups. The agricultural households can be bifurcated into the gainers and losers on the basis of income and expenses they incur. Agricultural production is subject to farm expenses which comprises of expenditure on seeds, fertilizer, pesticides, water, hired equipment, etc. Hence, if a household is getting positive farm income, it is able to cover all expenditure on seeds, fertilizer, pesticides, water, and hired equipment.

Out of 15 states, 7 states have registered an increase in positive farm income in 2011-12. These states are Andhra Pradesh, Gujarat, Haryana, Punjab, Tamil Nadu, Madhya Pradesh and Rajasthan. More than one-third of households that belong to backward states are found to be the gainers in agricultural production with highest positive farm income (Table 3).

Table 4 shows that the proportion of rural households earning negative farm income due to the mounting expenses was the highest in case of Andhra Pradesh, Karnataka and Bihar. The opposite results hold for Orissa, Punjab, Haryana and Assam.

TABLE 3: STATE-WISE PROPORTION OF RURAL HOUSEHOLDS EARNING POSITIVE FARM INCOME

State	2004-05	2011-12
Andhra Pradesh	20.33	29.00
Gujarat	39.56	45.27
Haryana	33.33	37.01
Karnataka	47.32	43.02
Kerala	30.89	24.72
Maharashtra	59.38	56.59
Punjab	28.87	34.15
Tamil Nadu	13.64	21.89
Assam	38.18	34.57
Bihar	49.33	40.65
Madhya Pradesh	53.28	59.07
Orissa	62.77	59.76
Rajasthan	59.51	63.47
Uttar Pradesh	59.69	58.62
West Bengal	44.67	36.67
Total	47.94	49.33

Source: Computed from IHDS Data

TABLE 4: STATE-WISE PROPORTION OF RURAL HOUSEHOLDS EARNING NEGATIVE FARM INCOME

State	2004-05	2011-12
Andhra Pradesh	5.73	17.42
Gujarat	9.17	8.82
Haryana	3.04	2.94
Karnataka	6.84	14.55
Kerala	5.34	9.39
Maharashtra	5.77	4.53
Punjab	2.37	2.38
Tamil Nadu	11.52	5.06
Assam	2.28	3.57
Bihar	5.39	11.52
Madhya Pradesh	6.52	5.85
Orissa	1.57	1.46
Rajasthan	9.42	7.15
Uttar Pradesh	5.94	6.73
West Bengal	0.80	5.74
Total	5.34	6.99

Source: Computed from IHDS Data

ROLE OF AGRICULTURE IN ALLEVIATING UNDERNUTRITION

The FGT indices of agricultural and non-agricultural households have been compared here. Agricultural households have been designated as those households whose production diversity score is greater than zero. The production diversity score has been worked out for 10 groups, excluding sugar and salt and beverages. In contrast, non-agricultural households have zero production diversity, which implies that these households are not producing at all.

By 2011-12, around 61 per cent of rural households had engaged in agricultural activities. More importantly, in 7 states the proportion of households engaged in agricultural activity declined, while in 2 states, it remained the same. As opposed to this, the proportion of non-agricultural households was 39% in 2011-12. It can also be matched with the proportion of net buyers of cereals and vegetables that stands at 33 per cent and 32 per cent, respectively.

In all states, monthly per capita consumption expenditure has been doubled or more than doubled between 2004-05 and 2011-12. This increasing trend can also be seen in both agricultural and non-agricultural households. The MPCE figures reminds of a period in which majority agricultural households had domination over non-agricultural households. However, in 2011-12, non-agricultural households have overturned agricultural households in terms of income (Table 5).

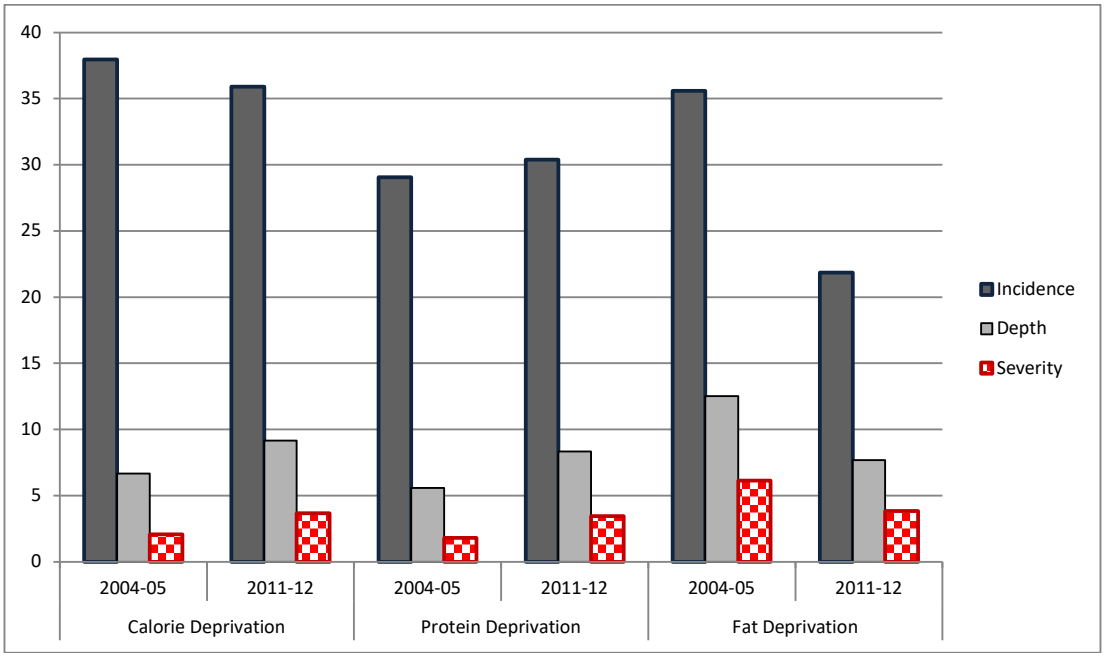
As depicted in Figure 1, around 36% of agricultural households were calorie deficient in terms of head-count ratio during 2011-12. The corresponding head-count ratio for non-agricultural households was 50% (Figure 2). Similar percentage difference could be observed in case of protein deprivation. In terms of fat deprivation, the difference between agricultural and non-agricultural households was negligible.

Across the states, Gujarat seemed to be the highest calorie deprived in both agricultural and non-agricultural households with 61% of agricultural households were calorie deprived in 2004-05. The calorie deprivation for non-agricultural households stood at 69%. This has been followed by Maharashtra and Karnataka, with the reversal of ranks in agricultural and non-agricultural households. The picture in 2011-12 was somewhat different. Kerala and Assam shared the first rank with 47 per cent were calorie deprived in agricultural households. In both 2004-05 and 2011-12, the ranks of the highest calorie deprived states were more or less the same in non-agricultural households. It underscores the shifting of rural households from agriculture to other occupations which they choose to remain in hungry and to compound the issues related to the nutritional deficiencies.

In all the states, the plight of non-agricultural households was worrisome in comparison to the agricultural households. This pattern was similar in all the study periods and undernutrition indices.

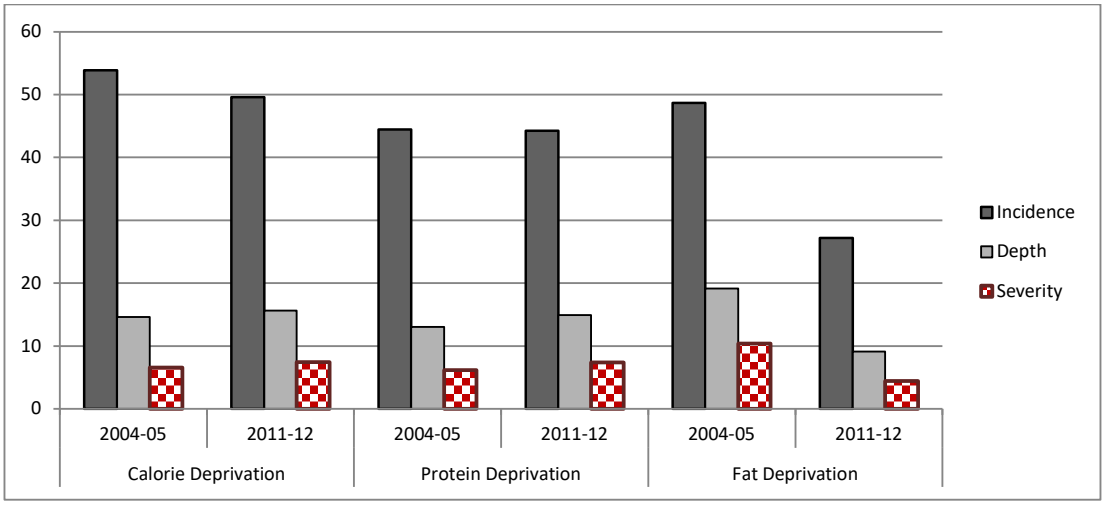
The non-income aspects may be important for the non-agricultural households which need to be probed further beyond the income changes.

FIGURE 1: PROFILE OF UNDERNOURISHED IN AGRICULTURAL HOUSEHOLDS



Source: Estimated from NSS unit record data 68th round

FIGURE 2: PROFILE OF UNDERNOURISHED IN NON-AGRICULTURAL HOUSEHOLDS



Source: Estimated from NSS unit record data 68th round

TABLE 5: MEAN MPCE OF AGRICULTURAL HOUSEHOLDS AND NON-AGRICULTURAL HOUSEHOLDS

State	2004-05		2011-12	
	Agricultural Households	Non-Agricultural Households	Agricultural Households	Non-Agricultural Households
Andhra Pradesh	1013	869	1828	1940
Gujarat	709	723	1674	2097
Haryana	961	797	2643	1712
Karnataka	902	712	1847	1850
Kerala	1558	1391	3996	3729
Maharashtra	793	732	1742	1833
Punjab	1053	865	2813	2023
Tamil Nadu	1105	877	1980	1971
Assam	622	546	1346	1468
Bihar	535	414	1306	1085
Madhya Pradesh	552	477	1317	1390
Orissa	488	429	1125	1187
Rajasthan	655	691	1694	1623
Uttar Pradesh	656	540	1297	1103
West Bengal	672	609	1574	1537
Total	765	724	1729	1749

Source: Calculated from unit record data of the 61st and 68th NSSO rounds

WELFARE OF AGRICULTURAL HOUSEHOLDS

In the last section, nutritional advantage of agricultural households has been portrayed. This section explains the factors accountable for improving the welfare of rural agricultural households.

The MPCE of agricultural households has been adopted as the dependent variable. To normalize the dependent variable, the logarithmic transformation is applied. The independent variables selected for the model are household size, number of children and elderly, consumption diversity score, unit value of rice, wheat, milk and chicken and a host of dummy variables such as the presence of a regular salary earning member, land ownership and education of the household head. Descriptive statistics are presented in Table 6. The average household size was 6 persons in rural areas. The mean dietary diversity score was 12. Also, the average price of pulses and pulse products was higher than cereals and cereal substitutes. Wide variations in average price of milk and milk products and egg, fish and meat products could be observed in rural areas.

Table 7 presents the results using ordinary least square method. The square of household size has been figured in the model to capture the non-linearity. The model has ratified the non-linear relationship between household size and welfare of agricultural households. An increase in family size improves the welfare of the farmers. The result is consistent with the studies by Audu and Aye (2004), who argued that improvement in household welfare can be expected when availability of labour goes up.

The presence of a regular wage earner reduces the welfare of agricultural households. This implies that regular salary earners may not undertake agricultural activities due to paucity of time. Likewise, the younger children within the family contribute less to agricultural income.

The elderly members within the family positively contribute to the welfare of agricultural households. This can be ascribed to their farming experience.

More educated members look for appropriate technologies to relieve their production constraints. The coefficient on education was positive and significant, suggesting that welfare increases with the level of education of the household head. A similar finding has also been generated in related studies that looks at the effects of agricultural technology on household welfare (Audu and Aye, 2014; Ghimire and Huang, 2016).

With an improvement in consumption dietary diversity score, MPCE of agricultural households also increases. So, an important route to augmenting the welfare of agricultural households is through an improvement in dietary diversity. Dietary diversity is likely to improve with improvement in health and it will lead to reduction in medical expenditures.

One may argue that positively significant coefficient of dietary diversity could be because of the high correlation between consumption diversity scores and production diversity scores. However, the results vindicate that the correlation between the variables is 0.086, which was significant at 1% level.

Land ownership exerts a positive impact on the welfare of agricultural households. The model doesn't talk about the quality of lands and for what purpose land is used. When food prices are factored in, the coefficient on land ownership turns negative and it becomes insignificant.

Controlling for food prices, the first model gives an R^2 value of 0.19, which means that 19% of variation in the dependent variable has been captured by the inclusion of independent variables. When food prices are factored in, the explanatory power of the model increases. At this moment, 27 per cent of variation in the welfare indicator is accounted for by the independent variables.

TABLE 6: DESCRIPTIVE STATISTICS

Household characteristics	2004-05		2011-12	
	Mean	SD	Mean	SD
Household Size	5.62	2.76	5.84	2.52
Is any member of the household a regular salary earner?	1.76	0.43	1.78	0.42
Education of household head (1= Literate, 0=Otherwise)	4.25	2.59	0.72	0.45
Land Ownership (1=Yes, 0=Otherwise)	1.03	0.18	1.03	0.16
Number of Persons Below 15	1.88	1.68	1.72	1.57
Number of Persons Above 60	0.37	0.62	0.35	0.62
Consumption Diversity Score	11.36	0.65	11.68	0.59
Price of Cereals and Cereal substitutes	9.76	3.49	15.70	5.33
Price of Pulses and Pulse products	27.95	5.40	56.88	11.57
Price of Vegetables	7.94	3.30	16.06	5.68
Price of Milk and Milk products	28.74	45.87	56.21	84.19
Price of Edible oil	58.07	13.12	82.78	14.83
Price of Egg, Fish and Meat	59.69	28.26	121.82	46.63

Source: Calculated from unit record data of the NSSO for the respective rounds

TABLE 7: RESULTS OF THE OLS REGRESSION ON MPCE OF AGRICULTURAL HOUSEHOLDS IN 2011-12 AND 2004-05

Explanatory variables	Coefficient	Standard Error	Coefficient	Standard Error
Constant	6.651* (5.556*)	0.033 (0.077)	5.825* (4.594*)	0.069 (0.060)
Household Size	-0.092* (-0.047*)	0.003 (0.005)	-0.108* (-0.149*)	0.004 (0.003)
Household Size^2	0.005* (0.002*)	0.000 (0.000)	0.006* (0.007*)	0.000 (0.003)
Is any member of the household a regular salary earner?	-0.185* (-0.155*)	0.006 (0.013)	-0.140* (-0.110*)	0.008 (0.007)
Education of household head (1= Literate, 0=Otherwise)	0.175* (0.129*)	0.006 (0.010)	0.146* (0.040*)	0.007 (0.001)
Land Ownership (1=Yes, 0=Otherwise)	0.098* (-0.103)	0.014 (0.041)	0.064* (0.030*)	0.016 (0.016)
Number of Persons Below 15	-0.082* (-0.060*)	0.002 (0.005)	-0.067* (-0.050*)	0.002 (0.003)
Number of Persons Above 60	0.035* (0.054*)	0.004 (0.011)	0.017* (0.056*)	0.005 (0.005)
Consumption Diversity Score	0.102* (0.102*)	0.002 (0.005)	0.110* (0.175)	0.005 (0.004)
Price of cereals and cereal substitutes	-----	-----	0.018* (0.022*)	0.001 (0.001)
Price of pulses and pulse products	-----	-----	0.002* (0.004*)	0.000 (0.001)
Price of vegetables	-----	-----	0.019* (0.022*)	0.001 (0.001)
Price of milk and milk products	-----	-----	0.006* (-0.001)	0.002 (0.000)
Price of edible oils	-----	-----	0.004* (0.002*)	0.000 (0.000)
Price of egg, fish and meat	-----	-----	0.003* (0.001*)	0.001 (0.000)
R Square 0.191 (0.180)			**R Square 0.270 (0.380)**	

Source: Calculated from unit record data of the 61st and 68th NSSO rounds. Figures in parenthesis show the OLS regression values for the period 2004-05.

Table 7 shows that agricultural households have a higher advantage in terms of vegetable prices, followed by prices of cereals and cereal substitutes, as shown by the higher value of regression coefficient. However, price of high value commodities exerted a minor positive impact on the welfare of agricultural households. A negative impact can also be observed when one takes the prices of milk and milk products into account.

It may be difficult to make out the difference in OLS models in two NSS Surveys. One difference which is perceptible to anyone is that the dummy variable which signifies the status of land ownership was negative but insignificant in 2004-05. But it became positive when the price variables were taken into account. In contrast, landownership created a positive impact in 2011-12, irrespective of the changes in econometric models.

CONCLUSION

The aim of the paper was to reinforce the agriculture-nutrition linkage and to investigate how household welfare has been changed in response to food price shocks. The net benefit ratios as a measure of household welfare has been worked out for major food groups, including cereals, pulses, vegetables and fruits. The results emanating from the net benefit ratio shows that food prices are not helping to improve the welfare of producing states. Instead, the consumers in producing states get some benefits on account of higher production and lower transportation costs which may translate into lower prices. On the basis of net benefit ratios, it can be argued the consumption of fruits can be eschewed at the expense of vegetables, which was more so in case of poor expenditure groups and backward states. The deployment of FGT indices also shows that non-agricultural households struggle with nutritional shortage in all the periods under consideration. At the same time, it was also found that agricultural households were better off from the nutritional perspective. The results from multiple regression model confirmed that education, land ownership and consumption diversity has positively contributed to the welfare of agricultural households. The selected food items also demonstrated that cereals and vegetable cultivation have an edge over pulse cultivation when gains from price increase are taken into consideration. The results also establish the fact rooted in literature that pulse cultivation was not lucrative for the agricultural households as these households were ignorant of minimum support prices.

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