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IMPACT OF FOOD PRICES ON FARMERS' WELFARE WITH DIFFERENT LANDHOLDING SIZE AND POVERTY PROFILE- A SITUATION ASSESSMENT OF INDIAN STATES

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Abstract

Agriculture pricing policies are one of the most important policy tools used by the policy makers to provide higher incomes to the farmers and increase their overall welfare. Since the food prices have increased tremendously in recent years so the beneficial effects of such price rise on the farm incomes and welfare has drawn the attention of policy makers and researchers. However, whether such prices actually benefit the farmers depend upon their overall sales position, and for very small farmers most of their sale values are off-set by their purchases of food commodities. Present study examines the micro level household data to calculate the net position of every household in different states of India and then tries to study the linkages of this net-position of household with his landholding and poverty level to formulate a picture of how the welfare of farmers in different states would be affected in case of a price rise. The results suggest that small and marginal farmers living in poorer states of Jharkhand, Bihar, Odisha and Uttar Pradesh will be in a state of loss whereas farmers in states where landholdings are large like that in Punjab, Haryana, Gujarat and Maharashtra would be high gainers.

Keywords: *Poverty, Food Prices, Farmers' Welfare, Net Benefit Ratio, States*

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Introduction

Global food prices have spiked in 2007-08, 2012-14 and then remained consistently high over the last few years (International Grain Council, 2019). These high food prices get transmitted to under developed and developing countries and affect them negatively as these countries are net food importers. The poor in these countries are the ones who have to bear the brunt of high prices as they spend a major portion of their incomes on food. High food prices reduce their purchasing power considerably and access to nutritious food. A large number of these poor households live in rural areas and are also the producers of food (Headley & Fan, 2008), with small landholdings and limited resources. In addition to home produced consumption they also depend upon the markets for their food supply. So, the effect of increase in food prices on such cultivator household will be a function of their production. Hence there will be differential impact on different cultivators of such a price change. And in the shorter time period, there will be welfare losses to the poor in the lower income quintiles who not only depend upon cultivation as a source of livelihood but also spend most of their income on food purchases. However, in a longer time frame, the producers may respond by higher production (Mellor, 1978) and their welfare may increase by higher incomes.

India has been consistently identified as a country with high hunger levels such that it has been placed at 102nd position in the Global Hunger Index (GHI) in 2019 (Von Grebmer et al., 2019). Moreover, high food prices make the poor food insecure and increase their vulnerability to such price shocks. A large fraction of these poor households resides in the rural areas on meager landholdings. Agriculture census of 2015 reports that there are around 118 million cultivators in India out of which 86 percent of the farm households have marginal and small size holdings (GOI, 2019). Both the Central and state governments have resorted to various types of policy initiatives to boost the income levels of farm households in order to increase their welfare. To this effect, various price policy tools have been often used by the policy makers to influence the producer prices of major

crops (by announcement of minimum support prices (MSP) before the cropping season, government procurement at assured support prices, shielding domestic markets from international price volatility). These measures shield the farmers in case of price crashes and distress sales and assure remunerative prices for their produce. Moreover, MSPs are increased from time to time to assure higher agricultural incomes to the farmers and increase their welfare. However, many studies have found linkages between higher producer prices and food price inflation and a positive correlation between the two (Bhattacharya & Gupta, 2015; Gulati & Saini, 2013; RBI, 2018; Subbarao, 2011). Increase in producer prices have been found to be instrumental in increasing the food inflation and making the food less affordable to the poor especially in the landless poor in rural areas. Also, as already mentioned, a large number of landowning farm households have small and uneconomical holdings, such that they are not able to meet the needs of the households, and hence have to depend upon the markets (in addition to home production) to meet their own needs of food. Food price rise in such a case are counterproductive and affect these farm households negatively. Hence rather than being a benefit to the farmer, higher prices may have an effect of decreasing their welfare by lowering their purchasing power. So, the way food price shocks affect the cultivating households would be conditioned upon them being a net seller or buyer of the food crops. If there will be a large number of net buyers, then the overall effect would be a decrease in the welfare of the farm households (mediated through lower real incomes or higher expenditure on food). Another significant factor worth consideration is that due to differences in the climate, cropping patterns, yield and productivity, procurement policies, landholding pattern and agriculture being a state subject, farmers in different states will be impacted differently due to food price rise. Hence, a study of such patterns would be instrumental in formulating more effective pricing policy tools for increasing the welfare of farmers and shielding the vulnerable farm households from food price changes.

Objectives

In the light of above-mentioned issues this study aims to:

- Understand the differential welfare impacts of changes in food prices on farm households in different Indian states.
- Quantify the percentage of farm households who gain/loss in case of a food price rise and segregate them according to their landholding size.
- To understand how such welfare changes are linked to landholding size and poverty profiles of farm households in different states to bring out inherent patterns if any.

Literature Review

Since the welfare of the poor is directly affected by high food prices, several studies have investigated the distributional impact of higher food prices in developing countries. To measure the short run first order impacts of price rise many of these studies have used the micro data from each household to measure their net buyer or seller position, and then expressed it as a ratio to the household income (which may be measured by household consumption expenditure), as proposed by Deaton (1989). Higher food prices are then simulated to study their impact on the households. This ratio is called the Net Benefit Ratio (NBR) and in the case of Thailand, Deaton found that higher prices were beneficial for all rural households. Barrett and Dorosh (1996) while studying the impact of high food prices in the case of Madagascar concluded that around one third of the poor rice farmers were mainly net buyers who would be adversely affected in the case of price rise. But in the case of Vietnam, Minot and Goletti (2000) found that higher prices due to liberalization of the rice market would have a positive impact on farm incomes. Food prices again spiked in 2007-08 and 2010-12 and then post 2019 renewed the interest of policy makers to study the impact of these prices on the rural poor. Subsequently, many studies were done in different countries; Vergez in 2007 studied the effect of food prices in

Mexico and Mali using different expressions of NBR; World bank, in 2008 in a study on nine countries from Africa, Latin America and Asia (Aksoy & Isik-Dikmelik, 2008), found that around half of the net buyers were those who would not have been affected adversely and indicated a possible transfer from these well off buyers to poor net sellers. In India correlation between poverty and higher food prices in the post reform period were studied by Ravallion (1998); Effect of higher food prices in rural and urban areas were studied by De Janvry and Sadoulet (2009) using 59th and 61st round of NSSO data but none of these studies addressed the effect of food price changes on the incomes of farm households separately. This study has attempted to study the welfare effect of food price changes on the farm households in different Indian states and with different landholding sizes and then bring out the regional vulnerability patterns of poverty.

Research Methodology

The welfare impact of food price change is measured by:

$$\frac{\partial W}{\partial lnpj} = \sum \theta_i(X_i, U_i) \frac{P_j\ (y_{ij} - q_{ij})}{X_i}$$

……Deaton (1989)

Here, P_j denotes the price of good j, θ_i signifies social value when one unit of money is transferred to household i, X_i is the total consumption expenditure of household i, U_i symbolizes the characteristics of household i, W is social welfare, y_{ij} is the total amount of good j produced by household i, and q_{ij} is the amount of good j consumed by household. θ_i is normally not specified due to the subjectivity involved in its measurement. Hence, the last term on the right-hand side of equation is referred as the "net benefit ratio" which gives us the measure of the net sales of each product. The Net Benefit Ratio (NBR) measures the net selling position of the household in order to arrive at the first order effect of price change in a very short time period. Under such a time frame, it can be assumed that the producers and consumers are unable to respond to price change. Also, it is

assumed that the wage rate and input prices do not change during this small time period.

NBR of household i will be then given as:

$$NBR_h = P_i \frac{Q_i - X_i}{C_h}$$

C_h, is the total household expenditure of i, P_i is the price of crop i. Q_i, the quantity produced and X_i the quantity consumed.

It is impossible to rule out the possibility of some kind of substitution in consumption and to a limited extent in production among different food groups. Furthermore, if the research is based on individual goods, it is less useful for poverty analysis. And for such a purpose, the study of total food intake will be more useful than individual crops for predictions of welfare consequences. However, due to different varieties and quality of individual food items it would be very difficult to calculate impacts and even distinguish net buyers and sellers. In such a case, the use of total expenditure on food and total food sales is more useful (Aksoy & Dikmelik, 2008) and has been used in the present study.

Hence for k commodities the expression can be modified as

$$NBR_h = \frac{1}{C_h} [\sum_{k=1}^{j} (P_k^p \,.\, Q_k^p) - (P_k^c . Q_k^c)]$$

P_k^p, P_k^c being the producer and consumer retail prices of k commodities respectively; and, Q_k^p, Q_k^c their corresponding quantities for production and consumption.

The Net Benefit Ratio shows the net sale position of the household (as a percentage of household income) and if the NBR is positive/negative/near zero, then the household stands to gain/loss/self-sufficient, from an

increase in food prices in the short run. Higher the value of NBR, more are the welfare gains from food price increases to a farm household.

Data Source

The data from India Human Development Survey (IHDS)-II has been used for the study. The survey was conducted in 2012 on 42,152 households, out of which 18,782 farm households were segregated and divided into five categories based on landholding size, using the definition of the Agriculture Census 2015-16. The sample had 69 percent marginal (less than 1-hectare land) and 19 percent small farmers (1-2 hectare). The percentage of semi-medium (2-4 hectare) and medium (4-10 hectare) farmers were 8 and 3 percent respectively; and 0.70 percent farmers had large landholdings (more than 10-hectare landholding).

The first order welfare impacts of the change in food prices is given by the values of NBR or the net sales position, which has been calculated using the unit level individual household data. Thereafter, the regional values have been aggregated for every state and the households have been segregated into three groups (net buyers, net sellers and self-sufficient) based upon the value of NBR. To understand the association of price welfare changes with landholding patterns we then calculate the percentage of net sellers and buyers in different landholding groups.

The association of these NBR groups with different states, poverty levels of farm households and the landholding are then studied using multiple corresponding analyses (MCA). MCA is a data reduction and analysis technique for analysis of cross tabulated data with categorical variables. It places multidimensional data in a Euclidean space and then displays it in a graphical bi-plot to bring out the association between the variables plot (for details see Greenacre, 1984; Moser et al., 1990). Poverty line for 2012 (using the Tendulkar methodology for poverty estimation) was used to arrive at the figures of poor and non-poor farm households.

Analysis

This section presents the results of the data analysis. Firstly, we quantify the welfare impact of high food prices on farm households in different Indian states by using the Net Benefit Ratio as an indicator of farmer welfare. We then calculated the percentage of farm households who stand to gain (loss) from food price changes according to their landholding size. Lastly, we analyze the high and low welfare gaining or losing households in different farm-size categories in the states along with their poverty profile using multiple correspondence analyses. This was done to understand if there are any spatial patterns of land size, poverty and welfare gains/losses. Such a depiction would be instrumental in providing customized remedial measures in case the price increases hurt the farm households negatively.

Table 1 shows the net position of households at the country and the state level. The percentage of net buyer farm households are indicated by negative NBRs (NBR<1), the ones which are net sellers and would gain higher incomes and welfare gains in the event of food price rise by positive NBR (NBR>1) and self-sufficient households lying between 0 and 1(0<NBR<1). Overall NBR is slightly positive (0.13 in absolute terms), which implies that higher food prices will have a small positive welfare impact on the farm households across the country and raise their income levels. If the food prices increase by 10 percent then there will be welfare gains of around 1.3 percent.

Category	Net Benefit Ratio (NBR)	Net Buyer (in %) NBR<0	Self Sufficient (in %) 0=<NBR<1	Net Seller (in %) NBR>1
All-India	0.13	64	29	7
States				
Jharkhand	-0.18	87	11	2
Bihar	-0.17	83	15	2
Odisha	-0.09	78	21	2
Uttar Pradesh	-0.06	75	22	3
West Bengal	-0.03	76	21	3
Himachal Pradesh	-0.01	78	18	4
Andhra Pradesh	-0.01	70	24	5
Uttarakhand	0.07	66	26	8
Chhattisgarh	0.08	64	32	4
Rajasthan	0.09	61	34	5
Tamil Nadu	0.11	55	39	6
Jammu & Kashmir	0.13	67	24	9
Madhya Pradesh	0.13	60	34	6
Karnataka	0.13	68	25	8
Kerala	0.34	57	31	12
Haryana	0.43	37	47	15
Maharashtra	0.44	41	45	14
Gujarat	0.50	54	29	17
Punjab	0.64	24	56	20

*totals may not tally due to rounding off

Table1. Source: Authors' Calculations based on IHDS Survey

However, if we look at the actual number of households who stand to gain from the high prices, it is quite evident that there are a large number of farm households (64 percent) who are net buyers of food commodities. This

result is not surprising considering the fact that agriculture census 2015 reported around 86 percent of the farmers in India are small and marginal, commanding less than 50 percent of the operated area (GOI, 2019), and the low per hectare productivity in India does not allow them to produce enough to meet their own needs of food. The net sellers have been divided into two groups, one with a positive NBR but less than one, and others with higher NBR. Since NBR is measured in value terms, it is not possible to have an NBR of absolute zero, but NBR values between 0 and 1 signify that these households are nearly self-sufficient. Around 29 percent of the farm households are near self-sufficient and only 7 percent have an NBR value greater than 1. There is a very thin line between the net buyer (negative NBR) households and the ones near self-sufficiency as these dynamics may change from year to year depending on the monsoon patterns and hence its effect on the production.

NBR values for major states vary between -0.18 for Jharkhand to 0.64 for Punjab. The percentage of net buyers progressively reduces for states with higher NBRs although with less regularity.

Table 2 shows the welfare gains/losses of farmers in the event of a food price rise according to their landholding sizes, and the percentage of farmers with high welfare losses (NBR<1), High welfare gains (NBR>1) and self-sufficient (0<NBR<1) in different land categories.

Table2. Net Benefit Ratio (NBR) calculation for farm households according to their landholding sizes

Landholding size	NBR	Net Buyer (in %) NBR<1	Self-sufficient (in %) 0=<NBR<1	Net Sellers (in %) NBR >1
Marginal (land<1Ha)	-0.04	76	21	3
Small (1-2Ha)	0.31	44	45	10
Semi-Medium (2-4 Ha)	0.56	32	49	19
Medium (4-10 Ha)	1.03	24	43	34
Large (land>10Ha)	1.76	17	36	47

Source: Authors' calculations based on IHDS survey

Only 17 percent of the large farmers have negative NBRs. If the food prices increase by 10 percent then the large farmers will have the highest gains of around 17 percent whereas marginal farmers will have income losses of around 0.4 percent. Except for marginal farmers all other categories of farmers on an average gain from food price increases. But around 76 percent of marginal farmers, and a large percentage of small and semi-medium farm households (44 and 32 percent respectively) as well as a small percentage of medium farm households lie in the net buyer position and would suffer welfare losses in case the food prices increase.

Figure 1 shows the results of multiple correspondence analysis using NBR category, poor/non poor status and landholding category of farm households.

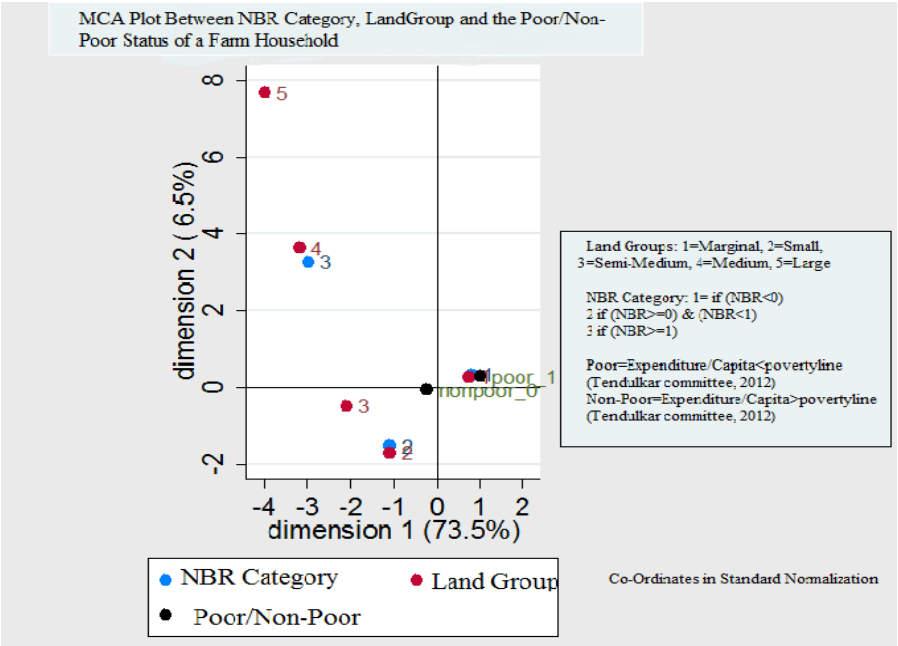

Figure1. MCA plot between NBR category, Landholding and Poverty status of a farm household

As measured by the poverty line of 2012 based on the methodology of Tendulkar committee (GOI, 2013), marginal farmers were found to be the most vulnerable group of farm households and mostly poor in terms of consumption expenditure.

It is evident from figure 1 that the variable “poor” coincides with a landholding of less than one hectare (marginal) and a negative NBR. Farm households with larger landholdings are non-poor hence the variable does not show any definite association with any single group and lies closer to the origin. The next graph (figure 2) shows the regional picture of states with respect to the position of their farm households. The plot is able to capture around 75 percent of the variation of the data in two dimensions but some trends are clearly evident. States like Chhattisgarh, Odisha, Jharkhand, and Assam have a large number of poor farm households. But while many of the farm households in Jharkhand had marginal

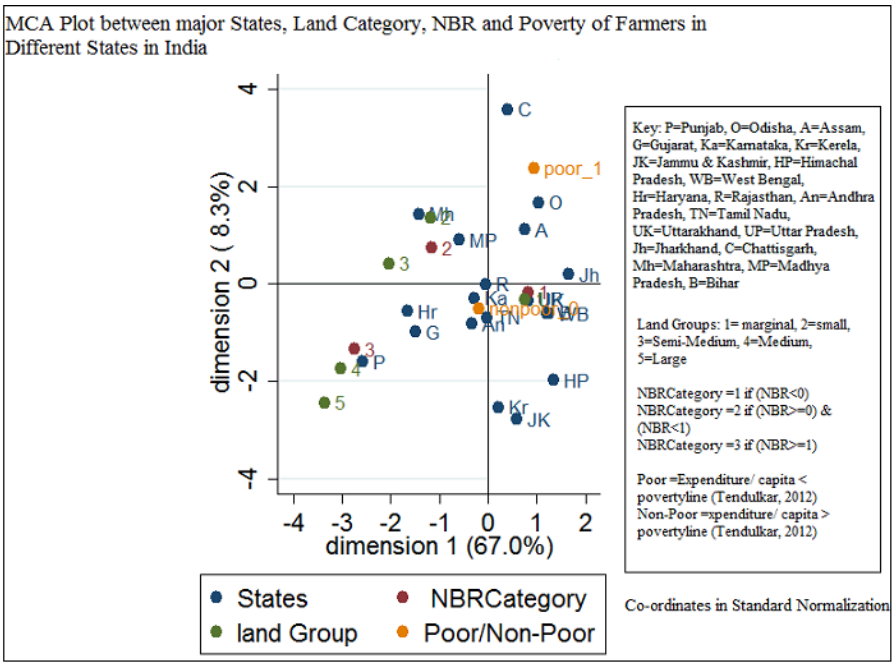

Figure2. MCA plot between States, Landholding, NBR and poverty of Farm Households

landholdings of less than one hectare and were net food buyers (NBR<1), states like Chhattisgarh Odisha and Assam had a large number of farm households with small landholdings and many of them were nearly self-sufficient. Angular position of Chhattisgarh shows the presence of households which are net buyers or just self-sufficient. Situation is a bit different for Uttarakhand, Uttar Pradesh, Bihar and West Bengal, where though the landholdings are mostly marginal, and they are net buyers, but still non poor (on Tendulkar poverty line of 2012). This may have been the result of alternate livelihood opportunities, the analysis of which is beyond the scope of this paper. Maharashtra and Madhya Pradesh both have a high percentage of nearly self-sufficient households. While a large number of farm households in Maharashtra have small landholdings, in Madhya Pradesh many households have small and semi-medium holdings. This does not imply that these states do not have marginal farmers, but since MCA plot is about relativities, so the nearness of these states near small and semi-medium variables signifies that they have a large fraction of these landholdings as compared to other sizes of landholdings within the state. Punjab, Haryana and Gujarat clearly have quite well-off farmers in terms of the sizes of landholdings and net seller position. In case of a price rise, the farm households in these states would be in a position of advantage and will gain from such high prices. Tamil Nadu, Andhra Pradesh and Karnataka clearly have a large non poor population, and association with medium and large size landholding and with NBR category 1 and 3 (but the association is not very strong). Himachal, Jammu and Kashmir and Kerala have a large percentage of farmers with low landholdings, net buyers and non-poor.

Findings

Higher food prices are presumed to increase the farmers' welfare by offering remunerative prices for their produce. However, the above results indicate that higher food prices' welfare effect would result in differential income gains for different farm households. NBR shows a slightly positive value suggesting that higher food prices' aggregate welfare effect would be

beneficial for farm households in India. Our findings are not very different from those of previous studies in other developing countries. Numerous other studies have also found that the vulnerability of net food buyers in these countries is significant due to their poverty (Ivanic and Martin, 2008; Ravallion, 1989;). Some studies have also concluded that the number of net food buyers is higher than the number of sellers in agriculturally dependent regions and that the relationship is valid for all income quintiles (Aksoy & Isik-Dikmelik, 2008; Christiansen & Demery, 2006). There are inter-state variations in different states due to differences in land-distribution patterns, input use, yield levels, cropping intensity, infrastructure, regional development of markets, procurement policies, and institutional architecture development for agriculture. Hence farm households in such a case would be affected differently due to food price changes.

Results show that Punjab, Gujarat, Haryana, and Maharashtra are the states with the highest number of net seller households and would benefit the most from food price increases. Another important observation is that in some states like Uttar Pradesh, Bihar, and West Bengal, the landholdings are marginal, but the farmers were still non-poor. In contrast, other states like Chhattisgarh, Odisha, Jharkhand, and Assam have marginal holdings and also high poverty incidence of farm households.

In a short time-frame, the relative and absolute real incomes of poor farm households are significantly affected by the change in food prices as they depend directly and indirectly on agriculture for their livelihood and spend a significant part of their income on food. However, if the supply systems are able to respond to new prices by higher output in a longer time frame of a few years, food price policy can be successful (Mellor, 1978). However, such a response of the supply structures is also subject to other bottlenecks in the system.

Nevertheless, if any kind of off-farm income streams in the rural or nearby urban areas are available to support farm households with unprofitable holdings, they can shield themselves from higher food prices and break the

poverty cycle. Such extra avenues of employment may be one of the possible explanations for some areas with marginal holdings and a high number of net food buyers among farm households but a still lower level of poverty.

Results suggested that there are many net food buyers among the farm households, and most of these have marginal holdings of less than 1 hectares with a little marketable surplus to gain from the price rise. These were also identified as poor based upon their consumption expenditure. These are the most vulnerable category of farmers and are mostly poor, with little means of income outside agriculture.

Small farm households, too, are predominantly either net buyers or self-sufficient. Self-sufficient households are also not very well shielded from the adverse effect of high food prices. This vulnerability of self-sufficient households arises because the boundary between a net buyer (negative NBR) households and the near self-sufficient ones are relatively obscure as these dynamics may change from year to year depending on the monsoon patterns and hence its effect on the production. These results are not very surprising considering the fact that agriculture census 2015 reports that around 86 percent of the farmers in India are small and marginal (holdings of less than 2 hectares), commanding less than 50 percent of the operated area (GOI, 2019), and support around 126 million farm households. So owing to their number and state of impoverishment, they are an essential analytical category of analysis. The low per hectare productivity in India does not allow them to produce enough to meet their own food needs.

NBR will be directly proportional to the marketable surplus with the farmer. The amount of marketable surplus will depend upon landholding with the farmer, productivity, assured irrigation and input usage, and agro-climatic zone. Subsistence farmers usually grow some cereal for home production. Hence, the landholding size becomes a key factor influencing the surplus with the farmer and the value of NBR. NBR values of different states reflect such a trend where states like Bihar, Uttar Pradesh, Odisha, West Bengal,

and Jharkhand have a large number of marginal landholdings (agriculture census, 2010-11). Whereas states with high NBR values like Punjab, Haryana, Gujarat have comparatively more significant landholding sizes, their per capita consumption of inputs and irrigation coverage is also high (agriculture census, 2011; state of Indian Agriculture, 2015).

Repeated fragmentation of the landholdings in India has increased the number of marginal holdings, and the farm households supported by these holdings are net food buyers. Many such small farm households are often involved in multiple employment activities in rural and nearby urban areas to supplement their incomes. The agriculture sector ability to absorb workforce has been completely exhausted, and the role of the non-farm sector in contributing to employment growth in the recent years has been increasing (Chadha & Sahu, 2002; Kumar et al., 2011). States in which the sample showed high poverty incidence of farm households (Chhattisgarh, Odisha, Jharkhand, and Assam) are also the states with higher levels of rural poverty (as estimated by the erstwhile planning commission based on Tendulkar Methodology) (GOI, 2013). Some of these states are also associated with low per capita GDP (RBI, 2019) and less investment and slow growth in other economic sectors. (Aneja et al.,2020; Bhattacharya & Sakthivel, 2004). If the shrinking of the average holding size is not accompanied by the simultaneous growth of employment opportunities in other sectors of the economy, then these farmers become vulnerable due to high prices.

Suggestions

Food prices have risen dramatically in recent years both internationally and in the domestic markets. There has been a perception that higher food prices are advantageous to farm households as it provides them higher incomes by offering better value for their produce. However, the above findings suggest that the welfare impact of higher food prices in terms of income gains will not be the same for all farm households. Due to differences in the climate, yield levels, cropping intensity, landholding

patterns, and infrastructure, farmers in different states will be impacted differently due to food price increases. Most of the farmers with small landholdings of less than 1 hectare would not have the marketable surplus to gain from the price rise. These are also the most vulnerable farmers and are mostly poor, with little income support outside agriculture. In order to shield these farm households from hunger and vulnerability, policies need to be designed to provide them with adequate livelihood opportunities in off-farm employment.

Results indicate that in some states like Uttar Pradesh, Bihar, and West Bengal, the landholdings are marginal, but the farmers were still non-poor. In contrast, other states like Chhattisgarh, Odisha, Jharkhand, and Assam have marginal holdings and also high poverty incidence of farm households. Only where off-farm income sources are available to sustain the farm households with uneconomical holdings can they escape the poverty trap. Such multiple income sources outside agriculture could be one of the potential reasons for some states with many net food buyers among farm households but low poverty incidence. There is a need to identify the states with predominantly small landholdings and high poverty incidence. Separate policy measures like income transfers in during price shocks and long -term planning like alternate livelihood opportunities in other sectors need to be designed to shield the poor farmers from vulnerability due to high food prices.

States like Maharashtra and Madhya Pradesh, where the farmers were found to be in a net position of nearly self-sufficient, they too need attention. There is not much distinction between self-sufficient households and net food buyers, and their situation can shift from year to year, depending on monsoon trends or sudden price fluctuations. Policies incentivizing and promoting allied agriculture activities or other value addition activities can provide them with an alternate and better income. Also, knowledge transfers of improved farming practices like integrated farming, layered, and multiple cropping systems may offer more viable and resilient solutions to small farmers to enhance their productivity and nutrition security. Also, to

facilitate such knowledge transfers, a redesigning of the extension services would be required.

Conclusion

This paper has analyzed the differential welfare impact of change in food prices on the farm households in different Indian states and having different landholding sizes. By analyzing their poverty profile, the paper also studies the vulnerability of farm households in different states that suffer income welfare losses. The analysis assumes importance considering the fact that higher food prices are seen as benefitting the producers and policy makers in India have quite often relied on market mechanisms and price policy tools in order to provide higher incomes to farmers.

Owing to the frequent fragmentation of holdings in past years, a substantial number of farmers in the country are small and marginal. Different states in India inherited different agro-climatic and socio-economic conditions so they differ in terms of their landholding patterns, infrastructure and overall stage of development. These factors would influence the amount of surplus left with the farm household and their net seller or buyer status. High food prices would lower the real incomes of net food buyers. If such net food buyers do not have additional livelihood support then their poverty will worsen. The availability of additional off-farm sources of livelihood to farm households with meager landholdings and low surpluses would depends upon the growth of other sectors in the states, thereby affecting their total income and vulnerability to food prices. The average value of NBR for the country was found to be small (0.13) but positive, indicating that there will be small income gains to the farmers in case of a rise in food prices. But most of these benefits will accrue to the large farmers who would be net sellers and gains would increase with landholding size. A large percentage of farm households in the states of Jharkhand, Bihar, Odisha, West Bengal, and Uttar Pradesh were found to be net food buyers and increase in food prices would lower their real incomes. Some of these states were also associated with high poverty incidences of farm households which makes

them more vulnerable in case of food price increases. So, policies which tend to rely on higher food prices as a tool to increase farmers' income have to be devised with caution and other income support mechanisms for vulnerable farm households should be simultaneously employed to benefit the vulnerable farm household categories.

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