

VULNERABILITY OF SMALL FARMERS TO HIGH FOOD PRICES – A CASE STUDY OF INDIAN FARMERS³

Food price spikes increase the vulnerability of poor, marginalized people to food insecurity and are often associated with landless rural or urban poor. Nevertheless, high food prices are commonly understood as instrumental in increasing farm incomes. For this reason, agriculture price policies are used to provide higher incomes to farmers. Income gains could be real for farmers with large landholdings but often attributed to all farmers without regard to their holding-size. Farmers with small holdings are typically net food buyers of essential food commodities and thus vulnerable to rising food prices. Fluctuations in food prices globally have increased the significance and the probable policy response to such price rise in recent years. Studies in different countries have revealed that household responses depend upon the region's market structure where the household is situated. However, the extent of vulnerability is rarely accessed in any such analysis.

In this context, the present study uses India as a case study to understand the distributional impact of food prices on farm households and their vulnerability position. Many of these farm households are net food buyers such that the effect of high food prices is counterproductive for them. Results show that about sixty-four percent of producer households in India are net buyers of food, and nearly two-thirds of these lie in the lowest quintile. Around one-third of these agriculture households are significant food buyers, further increasing their vulnerability to high food prices. Short-term policy interventions like income transfers and, in the long run, better livelihood opportunities in other sectors would be required to shield such farmers from the detrimental effect of increased crop prices. Results also suggest the need for reexamining the role of price policy instruments as a tool to increase the incomes of all farmers in India.

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1. Introduction

When individuals or some socio-economic groups of people have low potential to predict, deal with, prevent and mitigate the effects of anthropogenic or natural hazards such that they are differentially affected by such risks (Wisner et al., 2004), then they are identified as vulnerable in case of some potentially hazardous event. Such vulnerability is oftentimes embedded in complex social relations and mediated by external shocks, risks, and stress.

Vulnerability is the degree to which some groups, individuals, or communities are likely to suffer damages due to exposure to peril, either a perturbation or distress (Turner et al., 2003; Suryahadi, Sumarto, Pritchett, 2000).

Macroeconomic shocks due to various factors such as international trade environment, climate events, or domestic policy changes (Philip, Rayhan, 2004) may result in spikes in food prices and expose the poor communities to hunger and food insecurity. Many of these poor people live in rural areas and have limited land holdings to support themselves and low access to other assets and services.

Food prices have risen dramatically in the last few years. The use of food grains for producing biofuels has been one of the triggers contributing to the rise in food prices. These spikes in food prices have coerced many countries to implement various trade policy instruments like taxes on exports and prohibitions to halt the rise in food prices. Such measures are understood as necessary in order to shield the vulnerable poor households from the negative impact of food prices. During the food crises of 2008, the prices of wheat, rice, and maize increased by more than 50%, and the F.A.O. (Food and Agriculture Organization) index rose by 61%. A second such wave of the sharp spike was observed in 2010-11, and since then, the prices of food have remained at a high level (FAO, 2011).

These high food prices have increased the poor peoples' vulnerability in developing and underdeveloped countries and augmented their susceptibility to hunger and poverty, even though the percentage of price transmission to regional economies has varied (Baltzer, 2013; Minot, 2010). Inflated food prices reduce the real income of the poor in the urban areas and force them to spend more on food and also switch to less nutritious substitutes. This increases the challenge of hunger and nutrition for countries facing acute undernutrition situations. Many of the protests in the Arab world and other such countries have been attributed to high prices in the recent past (Bellemare, 2015; Benson, Mugarura, Wanda, 2008; Perez, Wire, 2013).

Inflated prices of staples are understood as detrimental for the poor in the urban areas who devote a major portion of their expenditure on food. Apart from this, many studies have also found that food price rise is unfavourable for rural households, and in rural areas, quite frequently, poor households are buyers of food (Ivanic, Martin, 2008; Seshan, Umali-Deininger, 2007; Barrett, Dorosh, 1996).

Nevertheless, food prices are considered beneficial for the food growers as they can get remunerative prices of their produce, which raises their incomes. However, this may not be valid everywhere, particularly in countries with lower development in secondary and tertiary sectors and a considerable number of poor people reliant on agriculture (Headley, Fan, 2008).

Price hikes have the potential to increase the earnings of agricultural households, but only if they have a surplus left after fulfilling their own food requirements. Besides, these farmers may not grow all crops and need to purchase other food products. Some households do not have surplus production for their own needs and, as a result, may additionally be net buyers of their own produce, and therefore, higher food prices may harm them as well. Farm households with some additional livelihood sources depend upon the market for the food crops in which their output is low and are net food buyers. This is especially true of households allocating a larger portion of their household's capital and labour resources but still unable to generate sufficient output for their own consumption.

However, the real question is that, among these net buyer farm households, which landholding categories will be most vulnerable to a rise in food prices, especially in those developing countries where land distribution is quite uneven. Such net buyer farm households may include some well-off households. However, they are mostly poor farmers with some landholding, but still insufficient to meet their own food needs. Hence, they are employed as labourers in agriculture or other sectors to utilize the extra incomes for consumption and home production. In the past few years, several studies have utilized the data from household surveys to study the net position of rural households, in particular, the farm households (Barrett, Dorosh 1996; Budd, 1993; Deaton, 1989; Jayne et al., 2001; Rios, Shively, Masters, 2009) to understand their behavioural responses to high food prices. However, it is observed that, even if the supply elasticity of high food prices is positive, the same may not be valid for price elasticity of consumption. And hence, the household response will depend upon the region's market structure where the household is situated (Gamboia et al., 2020). Consequently, analysis of the sale position in a few low-income countries of Asia, Africa and Latin America have found a favourable redistribution of income from the affluent food buyers to poorer food producers (Aksoy, Isik-Dikmelik, 2008; Dimova, 2015; Minot, Goletti, 2000). In contrast, others have found a negative redistribution of income from the poor to the rich (Balagtas et al., 2014; De Janvry, Sadaolet, 2009).

Such a unique case is that of India, which has risen as a significant producer and exporter of agricultural commodities in the last few decades (Bala, & Sudhakar; Shinoj & Mathur, 2008). At the same time, the country's unequal landholding pattern has given rise to a large number of very small farmers. Around 86% of the farm households are left with small and marginal holdings (Agriculture Census, 2015) such that these farmers are worse off in case of food price fluctuations. Hence, such producers have to be shielded from high prices more than the urban consumers (De Janvry, Sadaolet, 2009). Many such farm households do not have any other means of livelihood and are hence vulnerable to hunger and food insecurity. The resilience of smallholder farming and their food security are dependent on their propensity to safeguard themselves from the impact of price increases. Besides, their capability to generate profitability from crop production and escape the poverty trap is extensively influenced by the degree to which price shocks can be coped.

Hence, analyzing the vulnerability position of different landholding groups may shed more light on the intra-farming pattern of benefit/loss distribution when the food prices rise. Such an analysis would also reveal the direction of redistribution and the inequality pattern of farm households in the context of rising food prices. The present study attempts to analyze and quantify the situation of such farm households in India and how the food price shocks affect

their vulnerability differentially. In light of the issues described above, the present study attempts to investigate three objectives:

- Understand the Intra-farm pattern in the allocation of welfare effects due to food price rise and the groups among the farmers that are benefitted/negatively impacted due to high prices
- Which income categories among farm households are more likely to be negatively affected due to high food prices?
- Which are the groups among the net buyer (negatively impacted) farm households that are more vulnerable to food price spikes in developing countries like India and would require protection during sudden domestic price change?

For our analysis, we define vulnerability as the extent to which the farm households are likely to encounter a decrease in real income due to food price spikes. It is the risk that the net food buyers would experience income losses due to high food prices in the future and food insecurity due to their dependence on the market for their food, which perpetuates their vulnerability and sustains food insecurity.

2. Literature Review

The significance of rising food prices on the welfare of low-income households in developing and underdeveloped countries has been investigated in various studies. One of the first such studies was conducted by Deaton (1989), in which he constructed a ratio (net benefit ratio) to measure the short-term welfare impact of prices on households. Using Thailand rice cultivators' data, he stated that increased rice prices would positively impact all rural households irrespective of their incomes. However, the middle-income cultivators would gain the most from such a price rise.

Budd (1993) used the data from Cote d'Ivoire with more crops and concluded that to increase crop production, high food prices may not serve as a useful policy tool. Nevertheless, an increase in home production does have the capability to shield the poor from the harmful impact of such price effects. Very recently, the welfare impacts of rising food prices in Cote d' Ivoire for all households concluded that food price increases would redistribute the benefits from rich to poor households. This is because low-income households are predominantly involved in food and cash crop production than the rich (Dimova, 2015).

Barrett and Dorosh (1996) studied price changes in Madagascar and reported that first-order price changes would severely impact the poor rice farmers as nearly one-third of them would be net buyers of rice. However, in a study examining the effect of liberalization of food markets in Vietnam, conducted by Minot and Goletti (2000), it was found that the consequence of the liberalization would be an increase in the real income gains for the rural poor and hence, a decrease in the poverty rate.

The dramatic food price rise of 2007-2008 and then in 2011 has revived the discussion on the welfare impact of such a price rise. To this effect, several studies were conducted; one such study, done in Mexico and Mali, concluded that for estimation of the distributional effect

of reforms (e.g., free trade agreements), which influence food prices, the quantification of net food buyers and net sellers is essential. For such a quantification, the definition of food buyers and sellers would yield better estimates than that of net producers and consumers (Vergez, 2007). A comprehensive picture of the households obtained by studying households' economic profile from different regions may provide a better picture of a price increase's repercussions. To realize such a comprehensive picture, Aksoy & Isik-Dikmelik (2008) studied households' net position in nine countries with low per capita income in Africa, Asia, and Latin America. They found that except in one country, in all others, the net food buyers were affluent compared to the net food sellers, and hence they argued that there would be income gains from such food buyers to sellers and redistribution of wealth.

Some studies have gone further to understand the second-order impacts of price increases. One such study in Bangladesh (Klychikova, Diop, 2006) reported that for rural net buyers, income grew over a period of five years, which may have been the result of an increase in wages both in agriculture and other informal sectors in the long run. However, it was also reported that this positive trend was overridden due to the commodity price rise in 2008, which pushed around 13 million people in rural areas of Bangladesh into poverty (Balagtas et al., 2014). Similar such studies were done for Ethiopia (Schreitter, 2016) by calculating the first-order effects and then incorporating behavioural responses in a more general equilibrium analysis for second-order effects; and Uganda (Van Campenhout, Pauw and Minot, 2018), where it was inferred that the estimates are very much influenced by the complexity of the model being used. Gamboa et al. (2020) recently studied the change in quinoa production and consumption, a staple crop for Peruvian farmers, due to the global increase in its price. They found that both the price elasticity of supply and consumption are positive as the households are raising both the production and consumption of quinoa in response to a rise in its price.

The case study of a country like India, where the land distribution is quite unequal, may reveal some more findings. In this context, Ravallion (1998) found a correlation between food prices and poverty conditioned upon erratic monsoonal patterns in India. The repercussions of food price changes on consumers in both urban and rural areas were studied by De Janvry and Sadaolet (2009). It was inferred that the rural poor are the most vulnerable category as opposed to the urban consumers. However, as food prices increase, a study on the various landholding groups might shed more light on the intra-farming pattern of profit/loss distribution. Such a study will also show the direction of wealth redistribution and inequality trends among farm households when the food prices increase. Such an examination becomes crucial because various farmer groups in India often demand higher prices for crops, and government policies have also tried to increase farm production and increase income for farmers by increasing the support prices of basic staples. Such price increases have often fuelled food inflation, but it has also been seen as benefitting the farm community. Only when an estimation of the net producers and buyers of crops is provided, we may understand the distributional impact of these price increases. Also, focussing on the households which spend a significant part of their household income on food purchases would reveal the level of vulnerability among the net buyer farmers (Aksoy, Isik-Dikmelik, 2008). Many of such net buyers depend upon the markets for their food supply and are poor. This further increases their vulnerability to food price changes and contributes to their food insecurity (Asibey, Abubakari, Peprah, 2019; Barker, Sedik, Nagyet, 2008; Cantore, 2012). The present study

has attempted to study a comprehensive picture of farm households in India with respect to food price changes and their vulnerability to such price increases.

3. Research Methodology

The welfare impact of a price change can be measured by compensating variation (CV). Compensating variation is the least amount of money by which the consumer has to be compensated for bringing the consumer to the original utility level after an economic change. Deaton (1989) developed a simple analytical expression for calculating rice farmers' first-order welfare effects in Thailand and is expressed as follows:

Let there be a farm household H_i producing j crop. Q_j is the production and X_j consumption of the household in one agriculture year. The net sale position of H_i is given as:

$$\frac{CV}{I_h} = \frac{1}{I_h} \sum_{j=1}^{j=n} P_j(Q_j - X_j) \quad (1)$$

We use the total household consumption expenditure of H_i as an indicator of their income I_h . Consumption expenditure is used because it is an established fact that consumption is more accurately recorded than income in household surveys. Hence consumption expenditure gives a more consistent estimate of household income in a year than income itself (Benjamin, Deaton, 1993; Meyer, Sullivan, 2003; Ravallion, 1994).

The right-hand side of equation (1) is called the net benefit ratio (NBR). It is determined by the net sales (i.e., the net of marketed and consumed product in terms of its monetary value) defined as the net sale value of commodity j as a fraction of household income. This ratio can be viewed as the short-term elasticity of household H's welfare in relation to the price of j commodity. Also, the computation of the expression does not involve details on household reaction to change in price and hence its functionality for policymakers. However, the expression is valid with a few assumptions. Firstly, the time period is short such that the input prices do not change. Secondly, the consumers or producers are unable to respond to prices in this short time period. In other words, it calculates the first-order welfare change associated with a price change. Furthermore, the analysis on total food production and consumption is more relevant for understanding the comprehensive household position than that of single crops for welfare analysis (Aksoy & Dikmelik, 2008). Hence, for i commodities, the expression can be modified as:

$$NBR_h = \frac{1}{C_h} \sum_{i=1}^{i=n} (P_i^p \cdot Q_i^p) - (P_i^c \cdot X_i^c) \quad (2)$$

Here, P_i^p, P_i^c are the producer prices and retail consumer prices of i commodities respectively; Q_i^p, Q_i^c are the associated quantities, which are marketed and bought by the agriculture household H_i

The NBR is used to calculate the net buyers, sellers, and self-sufficient households. If NBR's value is negative/near-zero/positive, then the household is net buyer/self-sufficient/net seller, respectively. If a price rises, the household stands to gain/suffer a loss/has no effect if they are net sellers/net buyers/self-sufficient in the crops.

To calculate farm households' vulnerability, we use a vulnerability measure to segregate the fraction of farm households likely to be more vulnerable to food price changes from the others. For this, significant net buyers (highly susceptible to food price changes) are segregated from marginal net buyers (which will not be much affected by food price changes) and net seller (experience income gains due to high prices) farm households. Such segregation allows us to better understand the intra-farm household picture and avoid exaggerated food price change effects.

To this effect, the net buyers have been further segregated into vulnerable and non-vulnerable food buyers. Vulnerable food buyers are the net food buying agriculture households with a larger proportion of their consumption expenditure on food purchases. Furthermore, non-vulnerable food buyers spend only a small portion of their income on food purchases. The vulnerable food buyers are susceptible to price shocks, and oftentimes, they are poor farmers with small landholdings. Alternatively, the non-vulnerable food buyers may be either near self-sufficient farm households or, they may be affluent households with a minuscule fraction of expenditure on food.

4. Data Source

This study uses farm households' production, income, and expenditure data from the India Human Development Survey (IHDS)II conducted in 2012 (Desai, Vanneman and National Council of Applied Economic Research, 2015). The survey encompasses a rural sample composed of households from 1420 villages selected by stratified random sampling. The households in possession or cultivation of agricultural land were segregated for the analysis, and 18,782 agricultural households were identified. We segregated farm households into four categories. The percentage of farm households in our sample and percentage of total in India (based on Agriculture Census of 2015 (G.O.I., 2019) conducted by the Ministry of Agriculture) are shown on Table 1.

Table 1

Percentage of farmers in different land categories in the study sample and in India

Household	Land Size (in Hectares)	Percentage in sample	Percentage in India (as per agriculture census, 2015)
Marginal	Below 1.00 ha	68.72	67.10
Small	1.00-2.00 ha	18.94	17.91
Medium	2.00-10.00 ha	11.63	14.29
Large	Above 10.00 ha	0.70	0.70

Source: Authors' Calculations and agriculture census (G.O.I., 2019)

Comparing the sample with the census data shows that the sample is quite consistent with the total number of different sizes of holdings in India.

5. Results

The percentage of net food sellers, buyers, and self-sufficient farm households with different landholdings are shown in table 2. The results show that around 76% of the marginal farmers with very small holdings of less than 1 hectares are net food buyers. Small farmers' position is only a little better as 44% of small farmers are net food buyers, and almost the same percent is only self-sufficient in food. Twenty-one percent and forty-five percent of marginal and small farmers, respectively, are not affected by high food prices and are self-sufficient. Whereas 23% of the medium farmers and 47% of large farmers are net sellers of food, and as envisaged, the percentage of self-sufficient and net food seller households increases with land size.

Table 2

Percentage of net food seller, buyer, and self-sufficient farm households with different landholdings

Landholding	NBR	Net Buyer (%)	Self Sufficient (%)	Net Seller (%)
Marginal	-0.04	76	21	3
Small	0.31	44	45	10
medium	0.69	30	47	23
large	1.76	17	36	47
Total	0.13	64	29	7

Source: Authors' Calculation.

As already stated above, marginal and small farmers are the single largest farmers group in the country. Furthermore, our analysis reveals that net food buyer households are much greater than the net sellers amongst the marginal and small farmers. The above fact indicates that higher food prices are detrimental to a large number of farmer families in India. Surprisingly, a sizeable number of medium and large farmers also net buyers of food, which was quite unexpected. Improper land utilization and historic negative association of farm size with productivity in India (Chand, Prasanna, Singh, 2011; Deolalikar, 1981) could be one of the causes, though the opposite relation may also be true (Fan, Chan-Kang, 2005; Singh et al., 2018) and hence would need further investigation.

NBR's absolute value indicates that except for marginal farmers, the income gains from higher food prices would be positive for small, medium, and large farmers. Marginal farmers would suffer income losses in such a situation. If we assume a food price increase of 10%, then marginal farmers would have income losses by 0.4%.

As already mentioned, the share of net buyers is substantial amongst small and marginal farmers. An important issue worth considering is whether these net buyers are prevalent among the rich or poor farmers. The most common perception is that the net food buyers would be poor farmers with smallholdings, and the net sellers are supposed to be the rich

ones with large landholdings. However, given India's socio-economic situation, it is also possible that the farmers with meagre holdings have alternate sources of livelihood, and their economic situation better off than the farmers dependent on farming alone.

To test such assumptions, the farmers were divided into rich and poor. The farmers in the lowest two quintiles of income were defined as poor and the top quintile as rich farmers. Per capita household consumption expenditure was used as a measure for income as in most household surveys, expenditures are better recorded than incomes (Benjamin, Deaton, 1993; Meyer, Sullivan, 2003; Ravallion, 1994). Table 3 shows the proportion of net sellers and buyers in the poorest and the richest quintiles of incomes.

Table 3

The percentage of net sellers and buyers in the poorest and richest income quintiles

Quintile	NBR	Net Buyer (%)	Self Sufficient (%)	Net Seller (%)
Poorest quintile	-0.017	74	22	4
2nd quintile	0.032	70	25	5
3rd quintile	0.123	64	28	8
4th quintile	0.219	60	31	9
Richest quintile	0.279	52	38	9

Source: Authors' Calculation.

On average, only 4% of the poor farmers are food sellers compared to 9% of the rich farmers. Keeping the self-sufficient households aside, almost two-thirds of the poor farmers and around half of the wealthy farmers are not self-sufficient in food and are net buyers. A more significant fraction of the low-income farmers are the net buyers of food as compared to rich farmers. Nevertheless, it is pertinent to mention that the share of food sellers in different quintiles increases gradually, but is still not much different. It can be stated that the net sellers are positioned fairly judiciously around all levels of wealth distribution.

In the attempt to understand the ramifications of the rise in the prices of food on poverty, it would be more significant to focus on the farmers who allocate a larger portion of total income on buying food commodities. These classes of producers will be more influenced by rising food prices than those whose food expenses are insignificant as compared to their total expenditure. Hence, by concentrating on vulnerable net food purchasers in greater detail, we would better understand the price impact on them. The net food seller and buyer definition fail to distinguish between the net buyers (of food) whose net staple purchases are negligible portions of their income (measured using per capita consumption expenditure) and the ones with higher expenditures on food, i.e., non-vulnerable and vulnerable food buyers. The non-vulnerable food buyers would be the farm households with higher incomes such that the expenditure on food is less than that on other items, or they could also be the farmers that are nearly self-sufficient with small food purchases. Hence, such households would not be vulnerable. Alternatively, vulnerable buyers of food are the farmers with a larger proportion

of food spending such that they will be deleteriously affected by changes in prices of food commodities.

Net staple food buys by farmers' households as a percentage of their total spending (as income proxy) have been used to quantify vulnerability. For convenience, we describe two classes of net food purchasers. Non-Vulnerable net buyers are net buyer households that spend less than 30% of their income on food purchases. Vulnerable households are those marginalized households that utilize 30% or higher expenditure (of the total consumption expenditure) on food purchase.

Table 4

Vulnerability profile of net Food buyers

Quintiles of Income	Non-Vulnerable	Vulnerable
Total	71.7	28.3
quintiles (by per capita consumption expenditure)		
Poorest quintile	54.8	45.2
2nd quintile	64.1	35.9
3rd quintile	74.0	26.0
4th quintile	82.7	17.3
Richest quintile	90.8	9.2

Source: Authors' Calculation.

Table 4 above shows the percentage of vulnerable and non-vulnerable farm households. On average, non-vulnerable net food buyers are around 72% of the total net food buyers, and less than 30% are vulnerable. Added to this, the total net food buyers are 64% (see Table 2 above), which implies that around 46% of total farm households devote 30% or less of their income on the purchase of food and hence the effect of food price increases on these households would be minimal. On the other hand, a little less than 20% (17.9%) of the farm households are vulnerable food buyers and devote 30% or more of their income to food. Consequentially, the rise of food prices by 10-20% would adversely affect the poor food buyers, and their real incomes would be reduced by 4-8%. Only if the second-order welfare impacts would be positive, they would be able to shield themselves from the high prices in the long run.

Households show the highest vulnerability rates in the poor income quintiles, with around 45% of agriculture households being vulnerable food buyers. The percentage of vulnerable food buyers decreases with income, and in the higher income quintiles, vulnerable category households form a smaller proportion of the total number of farm households. Moreover, they are mainly marginal food buyers with low food purchases. These results could be understood by the fact that around 47% of the farm households in the higher income quintiles are net sellers or self-sufficient (Table 3). Moreover, the vulnerability position shows that

these are mainly non-vulnerable marginal food buyers, so it can be ascertained that they are not much affected by the food price rise.

Table 5

Vulnerability of agriculture households according to land size

Landholding	Non-Vulnerable	Vulnerable
Marginal	71.2	28.8
Small	76.0	24.0
medium	70.8	29.2
large	50.0	50.0

Source: Authors' Calculation

Table 5 shows the vulnerability of different farm categories. These results should be seen vis-a-vis the net position depicted in Table 2 above. The percentage of net food buyers decreases with the increase in landholding with agricultural households. However, a large percentage of net food buyers are marginal food buyers and make limited food purchases from the market. This can be concluded from Table 5, as around 70 to 75% of the marginal to medium farm households are in the non-vulnerable category of net food buyers. Less than 30% of these households make significant food purchases from the market and are hence vulnerable. The increased vulnerability of large farmers shown by the data can be understood by the fact that most of the large farmers were net food sellers, and very few were in the net food buyer category. These small numbers of data points of net food buyers got further divided into vulnerable and non-vulnerable, which produced such discrepancy in the results. Hence, we refrain from making any analysis for such limited data, though the results have been presented to maintain the continuity in the results.

6. Discussion

The results suggest that many farm households in India are net buyers of food, and an escalation in food prices on account of international price fluctuations or price policies will affect them negatively and lead to income losses. This can be ascribed to the verity that a large number of farm households have minimal holdings and little means of external livelihood support in other non-farm sectors. So, in case of sudden price shocks, these households would require some form of income and other support to shield them from vulnerability to food insecurity.

Our results also show that a more significant number of large farmers are also net buyers of food. These large farmers not being self-sufficient may indicate some income transfers from them. However, unlike in other countries, these gains will accrue again to big farmers as a large percentage of small farmers are not self-sufficient in food and do not participate in the market as sellers. As a matter of fact, there will be a regressive distribution of wealth from

the small and marginal farmers, most of whom are in net buyer position in the market to the medium and large farmers. But as already stated, the number of medium and large landholdings together make up only around 15% of the total landholdings in India (G.O.I., 2019). Hence we infer that the benefits of high prices would accrue to a very small fraction of farm households in India while a large percentage of farm households would have income losses due to high prices.

As the analysis of the sale position of different income quintiles reveals that the food sellers are more or less equally distributed in all income quintiles, an assumption that the net sellers belong to a particular income group is not valid, and the gains of high prices do not favour any particular economic strata of farm households. The vulnerability position further clarifies the main groups of farm households negatively affected due to food price spikes. The lowest income strata households are the most vulnerable to high food prices due to high-income spending on food. And as the food prices increase, they shift to less nutritious food and are further pushed to hunger and food insecurity.

However, these results should be seen with caution. In rural areas, many small and marginal farmers and landless labourers may be dependent on wage labour in agriculture and other sectors (Dev, 2012; Nithyashree, Pal, 2013). Since there are linkages between agriculture and other non-agriculture sectors in the rural areas (Dorosh, Thurlow, 2018; Van Campenhout, Pauw, Minot, 2018), price rise, in the long run, may contribute to higher wages. This would have different consequences for different kinds of farmers, depending upon their livelihood sources. There would be income gains for the small and marginal farm households who depend upon wage labour as a secondary income source. The net sellers with large landholdings would experience two contradictory phenomenon- reduced profits due to higher factor prices and higher sale prices for the final output. The dominant effect would lead the direction of welfare impact for the net sellers.

Until now, the policymakers' focus has been on urban poor or rural landless poor, and the susceptibility of landowners to such price rise has been overlooked. Due to the inherent distinction in the farm households by virtue of the size of their holdings and access to other resources, the distributional impact of food prices on them is dissimilar. Food price policies designed to increase farm households' incomes may be ineffectual and, in fact, lead to retail food price hikes, which increases their vulnerability if they are net buyers of food. In India, a large number of food producers (around 64%) are forsooth food buyers; however, less than a third of these net food buyers are vulnerable to high food prices. In a more extended period of time, capacity building, and better livelihood opportunities in other sectors would be required to be developed to safeguard them from high prices. It is also essential that the role of price policy instruments as a course of measure to enhance the income of all farmers in India be reexamined.

7. Limitations and Future Scope

This study addresses the first order welfare impact of food price increases on farm households in developing countries like India, with a highly skewed land distribution pattern. A limitation of the present study is that due to data constraints on the availability of farm

households' long-term panel data, long term second-order welfare impacts of high prices have not been studied. Over a more extended time-frame, supply structures may be able to respond to high prices and may be able to increase production. The wages may also respond to higher prices, and rates may increase. This would have welfare consequences for large farmers (by pushing up the input prices) and the small and marginal farmers (who are additionally employed as wage labourers for secondary sources of livelihood). Such a long-term analysis would be able to guide effective policymaking. Also, the spatial distribution of welfare impacts on different regions of the country needs to be explored. This would reveal those pockets of vulnerability that would need additional resources to shield the food insecure population from sudden price changes. The pattern of behavioural shifts in food consumption and production decisions by the farm households during food price spikes may have nutritional consequences, and this aspect would need further study.

8. Conclusion

Results suggest that around 76% of the marginal and 44% of India's small farmers are net buyers of food hence vulnerable to high prices. Also, many of these farmers are among the poorest of the farmers in India, which increases their vulnerability to high food prices. Hence, high prices' welfare impacts would be unequally distributed to different categories of farm households in India. This is due to the variance in the farmer groups' net sales positions. Nonetheless, the results would be subject to the alternative choice of production, available and the complexity of regional and local markets' institutional architecture.

The percentage of vulnerable food buyers decreases with income. In the higher income quintiles, vulnerable households form a tiny proportion of the total farm households, and even then, they are mainly marginal food buyers with low food purchases. So, in the event of a food price rise, a significant fraction of low-income farm households would be negatively impacted. This would be against the conventional notion in India that higher food prices are beneficial to the farmer community in general. Hence, this issue should be factored in when using price policy tools for influencing farmer welfare.

Since vulnerable farmers mainly lie in the lower-income categories, so they would need extra cushion during the waves of price spikes. If such safety nets are not provided to these resource-poor groups, then they may be forced to smooth their consumption by shifting to inferior food choices or cutting the expenditure on food. This would severely impact their food security and make them vulnerable to hunger. In order to shield such farmers from the adverse impact of high food prices, short-term policy measures like income transfers and, in the long run, better livelihood opportunities in other sectors would be required. The results also suggest the need for reexamining the role of price policy instruments as a tool to increase the incomes of all farmers in India.

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