The Impact of the Food Price Crises on the demand for nutrients in Pakistan

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ABSTRACT

The global economic crisis in 2007-08 resulted in a tremendous food price increase that is likely to have adversely affected food security and nutritional status in many developing countries. Understanding how nutritional intakes may have changed as a result of the food price crisis is important, especially for Pakistan, the country under scrutiny which, despite of being a large producer of staple food, suffers severe problems of undernourishment. We use two survey rounds, 2005-06 and 2010-11, to investigate how calorie and macro nutrient intakes have evolved. The analysis was carried out with the use of a time varying model and is enriched by an in-depth investigation for different quantiles. The results show that food security deteriorated because of the food price crisis. In the light of this outcome, policy implications are discussed.

JEL Codes: D12, O1, O12

Keywords: Food-price crisis, Nutrient consumption, Quantile regression, Pakistan

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1. Introduction

The global economy faced a significant financial and economic crisis in 2007-08. The financial meltdown led to a backlash on consumer markets and markets for services. The crisis, coupled with spikes in commodity and oil prices, led to a contraction in aggregate demand and higher inflation. In developing countries, this crisis emerged in a long-run situation with slow economic growth and is likely to have severely affected poverty and food security. In 2007-08, Pakistan was already facing internal security issues and the surge in food, commodity and energy prices accentuated an already delicate situation by pushing the rise in the consumer price index (CPI) to a record 25.3 percent level.

In Pakistan, food accounts for 33% of the CPI consumption basket which, as a result, is highly sensitive to food price fluctuations. During the global food price crisis (2007-08), the majority of food prices increased rapidly: the prices of staple foods more than doubled. Wheat prices reached $400/ton in 2010, twice the $200/ton level of 2005, and in 2012 the price exceeded $320/ton (Caracciolo & Santeramo, 2013). Inflationary pressures intensified and Pakistan experienced a double-digit inflation as a result of the increase in food prices (Pakistan Economic Survey, 2010-11).

Higher food prices reduce purchasing power and contracts the real income of net food buyers: the larger the proportion of the budget spent on food, the worse this real income reduction will be. As a result, households will tend to have more limited access to health, educational services and nutrient foods, making them poorer and more food insecure (Ivanic and Martin, 2008; Headey and Fan, 2008; Friedman et al., 2011; Santeramo, 2015a, 2015b). Households may adopt different strategies to cope with negative shocks. For instance, they may sell their assets, rely on family assistance, borrow money, or reduce either the number of meals - in the most desperate cases - or the expenditure on non-food vital items such as education and health care (Santeramo et al., 2012). Such coping strategies have nutritional implications, and could negatively affect child growth, family wellbeing and livelihood both in the short and long run (Friedman and Sturdy, 2010). Finally, the lack of food diversity – and therefore a low degree of substitution among nutrients (Santeramo & Shabnam, 2015) – may result in a sharp decrease in nutrient intake with serious consequences for health.

FAO global estimates (2008) show that high food prices contributed to increasing global food insecurity. A considerable literature has been published on the global food price crisis and its impact on

global poverty and food insecurity. Most studies have focused on short-run impacts on poverty by using pre-crisis household survey data (Jansen & Miller, 2008b; Woden et al., 2008; Robles & Torero, 2010; Wodon & Zaman, 2010; Skoufias et al., 2011; Roselli et al., 2012; Ivanic et al. 2012; D'souza & Jolliffe, 2012). Although the effect of price transmission (Santeramo, 2015c) and crises differs in magnitude across countries and households, there is widespread agreement that national poverty levels have increased and that urban populations tend to be more negatively affected than their rural counterparts.

Similar evidence was expected in Pakistan, with more severe effects of the food price crisis on impoverished households. To investigate the effects on household food security, we use two survey rounds, which include consumption data collected in 2005-06 and in 2010-11, respectively and that provide insights about the situation in Pakistan before and after the price crisis. A time-varying model using a pooled dataset was estimated. In order to investigate heterogeneous effects on households, a quantile regression approach was deployed to assess the impact of the price crisis on the demand for calories and nutrients: therefore, light was cast on the way in which households trade off food quality and food quantity in response to increasing prices and decreasing purchasing power.

The Household Integrated Economic Survey (HIES) data for Pakistan provides detailed information on the quantity consumed for 69 food items, which are grouped into 11 food categories. The HIES is useful for examining household consumption behaviour and for evaluating changes in the food security status. Food security is determined by the physical availability of food, economic access to food and food absorption and stability (FAO (2006). A special focus was placed on two of these three dimensions of food security: access (approximated by per capita expenditure) and utilisation (approximated by per capita daily calorie consumption and per capita daily intake of macronutrients such as proteins, fats and carbohydrates). A comparison was made on how the indicators have changed before and after the crisis.

The vast majority of studies have focused on how price spikes affect household poverty and welfare (Rapsomanikis & Sarris, 2008; Kwenda, 2010; Shimeles, 2011), vulnerability (Meade et al., 2007; Heltberg & Lund, 2009) and nutrient intakes (Jensen & Miller, 2008; Ecker & Qaim, 2011; D'Souza & Jolliffe, 2012), whereas the determinants of food price spikes have been investigated in few studies (i.e. FAO, 2008). Against this backdrop, this contribution aims to investigate the nutritional impact of price shocks and to explore the heterogeneity of these impacts according to income level.

Section 2 briefly reviews the situation of food security in Pakistan; section 3 describes the data and presents descriptive analysis; section 4 outlines the methodology; section 5 presents the results and the concluding remarks.

2. Overview of the food security situation in Pakistan

With a per capita income of US$ 1512, Pakistan is ranked almost at the lowest quartile (Pakistan Economic Survey, 2014-15). More than 48% of the agricultural land is irrigated (World Bank, 2012), representing one of the highest proportions of irrigated cropped areas in the world. However, cropped areas have had a slightly annual expansion: from 11.6 million hectares in 1947 to 23.4 million hectares in 2006-07 (on average, 0.2 million per year). The country's economy remains heavily dependent on agriculture. According to Pakistan Economic Survey (2014-15), the share of agriculture in gross domestic product (GDP) is about 21%. Wheat and rice cultivation, livestock, dairy milk and some horticulture are the key agricultural activities in Pakistan; agricultural growth has been slow and the country remains a net importer of several essential food items. Fluctuations in food commodity production in the last few years have worsened the situation of food deficiency even for basic commodities such as wheat (WFP, 2009).

Wheat is a key crop and the main staple in Pakistani diet: more than 50% of the daily calorie intake is provided by wheat. The conspicuous wheat crop production, that reached 21.8 million tons in 2008 (which made the country self-sufficient in wheat), limited the price at a lower level compared to neighbouring countries. During the global food crises, domestic hoardings, informal export and profiteers and shortages led the government to increase the import of wheat and support the price of domestic wheat, which was higher than the international price of wheat (Government of Pakistan (GOP), 2009).

In addition, a natural disaster worsened a delicate, food security situation. Since 2003 several shocks have affected the country: the 2005 earthquake claimed more than 70,000 lives; a sharp rise in the international prices of oil and food in 2007-08 and recurring floods in 2010 and 2011 had a further distressing effect on the economy. For instance, a massive flooding in 2010 affected more than 20 million people by submerging an area of 50,000 square kilometers; the flood slowed down economic growth to about 2.4% in the FY 2010-11 (GOP, 2011), reduced the production of wheat and further

increased the domestic price of wheat. In sum, the domestic prices moved sharply and the consequent volatility severely impacted the poorest segments of the population (Friedman et al. 2011).

The situation of food security in Pakistan has worsened over time. While several countries were hit by the three "*F*" (Fiscal, Fuel and Food) crises after 2005, Pakistan suffered a six "*F*" crisis (Fiscal, Fuel, Food, Functional democracy, Frontier and Fragile climate). The six "*Fs*" had a multiplier effect which caused an extremely worrying situation. The cumulative effect of the six "F" crisis threatened livelihoods as well as overall food security, especially among the poorest segments of society (Sustainable Development Policy Report, 2009). During the 2008 financial, fuel and food crises, the level of poverty increased to 28% (GOP, 2009) from 25-26% in 2006 (World Bank Report, 2006). The most visible impact of an increase in food prices is the rise in inflation. Pakistan has experienced a double-digit inflation over the last few years due to the increase in food prices. Food inflation increased from 17.6% in 2007-08 to 26.6% in 2008-09. A review of the price trend in the period 2007-08 indicates that food CPI in this period stemmed from an increase in the prices of essential food items such as wheat, rice, fresh vegetables, pulses and edible oil, which are mainly consumed by the poorest segments of the population (GOP, 2009).

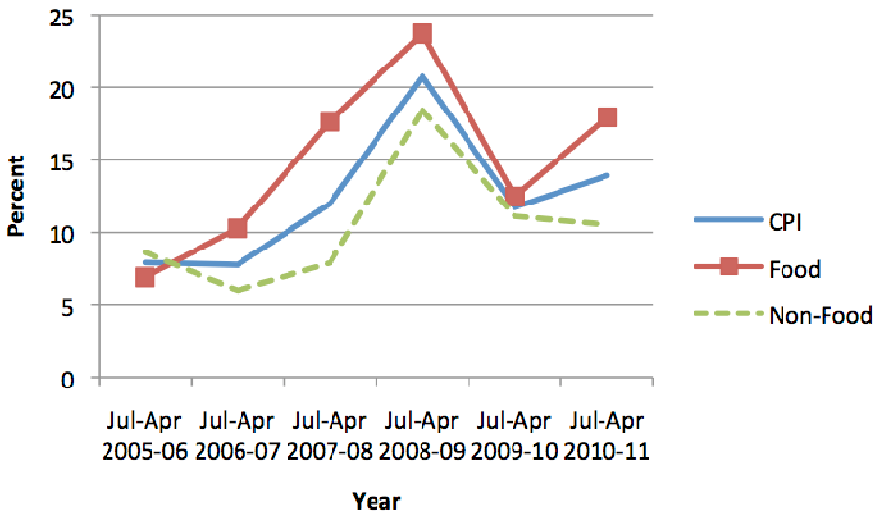

Figure 1: YOY percentage of CPI, Food and Nonfood trends from 2005 to 2011. Source: Economic Survey of Pakistan (2012)

According to the World Food Program (2009), 45 million people in Pakistan in did not have enough food to live a healthy life in 2008. In Pakistan, in the years 2007-2008, food security significantly worsened in response to the rise in food prices and the share of food insecure population increased from 23% in 2005-06 to 28% in 2008 (GOP, 2008). Also, nutrient deficiencies can worsen if cereals replace a diet rich in nutrients (which includes fruit, meat and milk). According to the report ‘‘Vision 2025’’, presented by the Planning Commission of Pakistan (2014), about half of the population in the country suffers from complete to moderate malnutrition. Apart from the lowest income groups the most vulnerable to malnutrition are: children (44%), women and elderly people (50 %). It is also estimated that half of Pakistan’s children aged 5 years or less are stunted, 38% are underweight, while a quarter of all births are low birth weight (WFP and UNICEF 2006). According to the National Nutrition Survey (2001-02), Pakistanis have a greater risk of developing key micronutrient deficiencies such as vitamin A, iodine, iron and zinc. Mortality and morbidity are high and the Government spends only about 2 % of GDP on education and health making it one of the lowest spenders in the region.

In the light of which, investigating the issue of the increase in food prices and their impact on nutrient demand is crucial, also because it could help design effective strategies to deal with the problem of rising food prices, which will ultimately ensure food security.

3. Source and Data Description

This study is based on data from the Household Integrated Economic Survey (HIES). The data analysed was collected through two survey rounds conducted in 2005-06 and in 2010-11 by the Pakistan Bureau of Statistics (PBS) in Islamabad. The HIES is a nationally representative survey of rural and urban areas which covers 14 big cities and 81 districts in each of the country's four provinces. The survey collected information on the quantities and values of 69 food items and differentiates them according to their sources: own production, market purchases or gifts. In addition, it recorded information on 79 nonfood items. The data on household food consumption covered a period of 14 days and referred to a 30 day recall period. Food items are aggregated into 11 food groups (table 1).

The two survey rounds used in the analysis were fielded in July-June (2005-06) taken before the crisis period and July-June (2010-11) in the post-crisis period. In the years 2005-06, 15,431 households were surveyed, while in the years 2010-11 16,341 households were covered. A similar questionnaire and sampling design were used. The questionnaire and sampling frame were revised in 1998-99 and, after

this period, the HIES income and consumption module remained intact. The sampling frame was revised in 2014-15 by the PBS. However, after some preliminary cleaning of the data, the final dataset consisted of 14,863 observations for 2005-06 and 15,191 for 2010-11. The conversion factors provided by the Government of Pakistan Food Composition Table for Pakistan (2001) were applied to compute calories and nutrient (proteins, fat and carbohydrates) consumption for each kind of food (details of these conversions are available on request).

The choice of food group aggregation took into account the typical Pakistani meals and nutritional characteristics of food to represent the level of household nutrient availability. The adoption of the HIES for nutritional assessment has shortcomings with respect accuracy. Firstly, respondents may not remember the exact quantities of food consumed, especially if the recall period is lengthy. Secondly, food consumption includes the entire amount of food acquired by the household, which can be either consumed by household members or by pets, guests and hired workers or wasted. Thirdly, the survey on household consumption did not report information on intra-household food distribution. Hence, a conservative approach was used by assuming an even distribution of food among household members. These limitations need to be kept in mind.

[Table 1 about here] Our analysis focused on average consumers in that we consider only consumers whose caloric consumption falls between 600 and 8000 Kcal/day. We consider consumptions exceeding those thresholds to be outlier and therefore we discarded such information.

The HIES rounds did not provide data on the prices of food commodities, but on the quantity and the value of food items consumed: this piece of information allowed to compute household level unit values. Food consumption changes according to region and season in Pakistan, but it was similar across the surveys (tables 2 and 3). Food prices are rather stable according to the various districts and in every quarter of the year. In order to take into account the variations of food prices, household-specific unit values of consumed food items were replaced with average unit values of 81 districts for each urban and rural area. By considering unit values instead of prices, the measurement errors and differences due to heterogeneity in quality of food consumed were minimised (Deaton 1988, Skoufias et al. 2011).

[Table 2 about here]

Changes in food prices affect food consumption through the reallocation of expenditure shares. In general, when food prices increase, poor households tend to expand the share of income devoted to food. In Pakistan, the average expenditure share for food is 52%, poor households spend 61%, whereas

non-poor households spend 39% (WFP, 2009). When prices increase, poor households tend to replace expensive food with cheaper food, and therefore they tend to replace meat with cereals, and rice with maize. In addition, lower quality cuts of meat are preferred to high quality ones.

Table 2 presents food budget shares of households across the years and quartiles of the expenditure distribution. As the table shows, the characteristics of households are similar across the surveys. It is also evident that crop-based food and animal-based food are the main sources of calories and nutrient intakes. Crop-based foods include cereals, vegetables, fruits and tubers, while animal-based foods include milk and milk products, meat, eggs and fish. Wheat, rice and maize are the main cereals and the main sources of calories in Pakistan. In particular, wheat accounts for 47% to the total caloric consumption (the contribution provided by rice is just as significant). In 2005-2006 the expenditure for wheat and rice accounted, respectively, for 75% and 15% of the total expenditure on cereal, and it has risen up to 91% and 20% respectively in 2010-11. When food prices increase, households increase the share of expenditure devoted to wheat as a way to make sure they satisfy their energy intake. On the other hand, the consumption of fruit, vegetables and meat is more unstable and heterogeneous, with upper-income households spending a much larger share of their budget on fruit and meat than poorer households; furthermore, poorer households tend to substitute the consumption of meat, fruit and vegetables with wheat and rice.

The observed price increase appears to reflect the considerable price increase for staple food due to a gap between demand and supply on international and local markets. An extremely high increase in prices of various essential items has been registered: the sample averages of price per kg of wheat was Rs.17.84 in 2005-06 and Rs.23.64 in 2010-11 (a 32.5 percent increase). During the same period, the price of rice rose from Rs. 36.24 per kg to Rs. 47.83 per kg (a 32 percent increase). Similarly, by 2010-11 the share of income spent on wheat flour had increased from 14.65% to 17.54%, while for fresh milk it reached 20.75% and so on (fresh vegetables 9.64%, rice 3.79%, pulses 2.91% and oil 10.96%). The increase in food prices is likely to be due to the global increase of food prices that has also interested the local prices [3]. Higher food prices lead to a more unequal distribution of income and expenditures, as food accounts for a large share of the total expenditure of the poorest segments of the population (Caracciolo and Santeramo, 2013). Table 2 illustrates the impact of higher food prices on both expenditure groups and, more specifically, it shows the adverse impact on the lower quartile of expenditure distribution. Due to the overall price increase, in 2010-11 households spent 74 percent more on food compared to 2005-06 (1549 Rs compared to 890 Rs). Similarly, in 2010-11 the

households in the lower quartile (for expenditure) spent up to 85% more of the income for food compared to 2005-06. This critical situation requires an urgent action aiming to safeguard the poorest segments of the population and to mitigate the negative impact of rising food prices.

4. Empirical Specification: modeling the demand for nutrients

The analysis of the impact of crisis over time, rather than for a particular period of time, provides a snapshot of the crises across different income groups. The lower demand emphasizes the inverse relationship linking quantity and own price; on the contrary, the demand for substitutes is positively related to the price of the substitute good. However, substitutes in taste may not be close substitutes for nutrients, and therefore food substitution may alter nutrient intake. The effects of prices on nutrient demand are not direct (Behrman and Deolalikar, 1988). The received wisdom is that an increase in food prices tends to decrease nutrient consumption in poor households, considering that poor households divert consumption patterns toward substitutes that may adversely affect nutritional status (Behrman and Deolalikar, 1989). However, if the nutritional contents that experience a change in price and its close substitutes are identical, the effect on income and nutrition from switching consumption will be negligible. On the other hand, if the present food item is nutritionally inferior to its substitutes, substitution may even improve nutrient intake. This last situation occurs when the increase in nutrients intake, due to the substitution effect, overcomes the loss in nutrient intake deriving from the price increase.

Measuring the effects on nutrition in Pakistan is an empirical task. These effects were estimated on calories and several nutrients by using data collected in 2005-06 and 2010-11. By focusing on wheat and rice price variations, the way in which changes in price of major staple foods affected nutrients intake were scrutinized. The quantile regression specification facilitated analysis of how nutrient intake distribution responds to prices.

The demand for the food item depends on household real income (I), a vector of prices (P)[1], and preference shifters (Z). If assumptions on separability of preferences between and within particular food groups are excluded, little can be said on how changes in prevailing relative prices affect the

1As specified above, average unit values of 81 districts for each urban and rural area were used.

demand for a particular commodity: the issue can be addressed empirically. The demand equation for each nutrient was estimated by regressing the natural logarithm of per capita consumption of calorie, protein, fat and carbohydrate for the i^{th} household in the j^{th} district in year t (Y) on the natural logarithm of per capita monthly expenditure (PCE), the natural logarithm of price (P), and household demographic characteristics (Z) such as household size, characteristics of household head (gender, age, education and employment status), gender composition, and regional and provincial dummies and district fixed effects:

$$(1) \qquad lnY_{ijt} = \alpha + \beta lnPCE_{ijt} + \lambda \sum_{k=1}^{11} \gamma_k \ln P_{ijkt} + \sum_{z=1}^{Z} \delta_z Z_{zijt} + \mu_{ijt} + \varepsilon_{ijt}$$

The prices of 11 food groups were included: milk and milk products, meat, fruit, vegetables, spices, sugar, wheat, rice, pulses, oil and other food groups. The term λ accounts for the effect of price changes in 2010: λ_1 thus equals 1 for the observation in 2010 and is zero otherwise:

$$(2) \qquad \lambda = \lambda_0 + \lambda_1 2010$$

By substituting (2) into (1), the demand equation for calories and nutrients was obtained and estimated through robust least squares: the above equations will be referred to as our time-varying model. The dummy variable captures the changes in consumption over time .

The respective coefficients for different food groups uncover the relative contribution of food groups to household nutrients consumption. This specification was capable to take into account own and cross-price effects. In addition, it implicitly revealed the demand for nutrients through food demands (Gaiha et al., 2013). Food choices depend on their nutritional contents, therefore the demand for calories and other nutrients derives from the choice of the food items consumed (Deaton and Dreze, 2009).

In order to explore heterogeneity in nutrient demand, we next estimated the demand model using quantile regression (Koenker and Bassett, 1978; Koenker, 2005; Santeramo and Morelli, 2015):

$$(3) \qquad Q\left(lnY_{ijt} \mid \mathrm{PCE}, \mathrm{P}, \mathrm{Z}\right) = \alpha(\vartheta) + \beta(\vartheta) lnPCE_{ijt} + \lambda \sum_{k=1}^{11} \gamma_k(\vartheta) lnP_{ijkt} + \sum_{z=1}^{Z} \delta_z(\vartheta) Z_{zijt} + \varepsilon_{ijt}$$

where θ indicates the quantiles of per capita nutrient consumption of a household. We tested the statistical differences of the coefficients of the first, second and third quantiles of calorie and macronutrient consumption.

[Table 3 about here]

5 How did the price crisis affect calorie and nutrient demand?

In order to disentangle the effects of the food crisis on the demand for nutrients and calories, price and income elasticities in the pre- and post- crisis periods were examined (Table 3). As expected, negative price and positive income elasticities were found in most cases. An interesting exception is wheat, a key source of calories compared to any other food group (Behrman and Deolalikar, 1988; Behrman and Deolalikar, 1989; Sokufias et al., 2003). The positive price elasticities of wheat and sugar suggests that these commodities are the main sources of calories and nutrients. In most other cases, price elasticities are negative. Similar results were found by Gaiha et al. (2013) for India, using data from 1993 to 2004. Moreover, it should be pointed out that calories and nutrients are quite inelastic to commodity prices. This reflects the critical need for calories and nutrients in developing (and low-consumption) countries. A vast majority of elasticities decreased in 2010, after the food crisis, with the exception of milk and fruit, which have become less sensitive to price changes, and of wheat, whose (positive) price elasticity has remained unaltered (apart from for carbohydrates). In this perspective, the food crisis seems to have exacerbated food insecurity, making the main and healthier source of nutrients (milk and fruit) price inelastic. In a similar study carried out in Pakistan, Friedman et al. (2011) found that the increase in the price of wheat shifted the consumption of calories away from fruit and oil. The coefficient for the time dummy is significant and larger than other price and income elasticities. Its negative magnitude demonstrates the reduction in caloric consumption in 2010 compared to the year 2005.

Diets in Pakistan are mainly composed of staple food and are poorly diversified. Changes in food prices affect food consumption through the reallocation of expenditure shares. We have demonstrated that demands for calories and macronutrients (proteins, fats and carbohydrates) are responsive to price changes. The price elasticities for different food groups decreased from -0.03 to -0.13 for calories, from -0.001 to -0.14 for protein, from -0.007 to -0.196 for fat and from -0.003 to -0.087 for carbohydrates (table 3). The results are in line with the findings obtained by Gaiha et al. (2013), who provide an alternative explanation embedded in a theoretical framework of standard demand with food prices and expenditure.

The implications for food security are relevant, as households may become more vulnerable with the increase in the price of cereals. An increase in wheat prices has resulted in a higher price sensitiveness of households. However, despite the price increase, wheat remains the main source of calories as households are able to buffer the shocks by changing the composition of their diets , cutting the

expenditure on costly food items and replacing them mostly with staples. The findings are consistent with the literature in this field (e.g. Sokufias et al., 2003; D'Souza and Jolliffe, 2012). D'Souza and Jolliffe (2012) showed that the demand for wheat increased despite a price increase in urban areas of Afghanistan. Dimova et al. (2014) also showed that the demand for staple foods may remain unaltered despite the price crisis.

[Table 4 about here]

The quantile regression analysis draws attention to the heterogeneous effects of food crisis on the entire distribution of nutrient demand. It was observed that (table 4) changes in the elasticity of wheat are more relevant for low income households with higher food prices having a significant and harmful effect on poorer segments of the population. Hence, the results are in line with Zheng and Henneberry (2012), who reported the detrimental effect of food prices on poor, urban households in China. Heterogeneous elasticities are also found for milk and oil, with meat, rice, fruit, vegetables and sugar particularly sensitive for the lower income groups.

The effects of price variation on caloric consumption are heterogeneous across households. In almost all cases, the null hypothesis of equal elasticities was rejected across percentiles (Table 4) for calories and carbohydrates. The rejection of the null hypothesis of equal coefficients shows that food security may have deteriorated as a result of the food crisis. The same conclusion cannot be drawn for proteins and fats, in that elasticities are mostly equal across quantiles. Finally, income elasticities for calories and all nutrients are very different across quantiles, with lower elasticities for households with higher calorie/nutrient consumption. Such a clear pattern suggests that caloric and nutrient consumption are less problematic for wealthier households, while affecting poorer consumers through higher prices and income changes. The findings also suggest that price increases can aggravate the low levels of nutrient availability in the country, which has a large share of population living below the poverty line. Even a short-term increase in food prices can have serious implications on food security. Particularly, low levels of diet diversity are linked to poor diet quality and inadequate nutrient consumption.

[Table 5 about here]

6 Conclusion

Pakistan is still food insecure due to poor accessibility and utilisation. In the wake of a sluggish economic growth, the vulnerability to economic (financial, fuel and food crisis) and natural disasters

(earth quakes and floods) has compounded the situation. Due to the 2008 global food crises, Pakistan experienced an increase in the price of staple food that greatly affected the food consumption of the poorest segments of the population. This paper contributes to understanding how consumption behavior and nutrient demand were affected by price shocks: the nationally representative household survey data collected in 2005-06 (pre crisis) and in 2010-11 (post crisis) were analyzed.

On the basis of the analysis, policy initiatives for food security should be aimed at increasing the economic access to food and nutrients by controlling domestic food prices though price or trade policies (Cioffi et al., 2011; Santeramo & Cioffi, 2012; Dal Bianco et al., 2016). A way to achieve this goal is to stimulate the economic growth by providing the poorest segments of society with economic opportunities. For instance, policy makers may adopt traditional recipes and sustainable economic growth policies to enhance economic accessibility of healthy and nutrient food, which would help mitigate the negative consequences of the food prices surge. In particular, the most vulnerable segments of the society are those more in need of social safety net programmes such as, cash transfer, franchises of government-owned utility stores to private sector, the increase of distributional reach of utility stores via weekly markets and the induction of large volume discount store via hyper markets need to be strengthened.

Further improvements may be obtained by ameliorating public provision of health, by improving access to infrastructure, education and other services that have indirect impact on nutrient intakes. In order to sustain micronutrients consumption for poorer households during economic crises, it is desirable to complement income transfer programs with other interventions that enhance economic development. For instance, given the limited nutritional knowledge, special educational campaigns could play a key role in raising the awareness of the benefits of healthy diets, thus encouraging micronutrients consumption. This analysis on food security and nutrients speaks directly to policy makers, lawmakers and humanitarian organizations called to design policies and programmes to alleviate poverty and food insecurity.

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Table 1: Description of variables

Dependent variable	***Definition***
ln_PCDC (C, P, F & Cr)	Logarithm of per capita daily consumption of calories and macro nutrients (protein, fat, carbohydrates)
Control variables	
ln_PCME	Logarithm of per capita total monthly expenditure of a household
HH_head	1= if household is headed by female, 0 = otherwise
Age_head	Age of the household head in years
Education Level	Education level of household head
Head_Illiterate	1 if household head is illiterate, 0 otherwise
Head_Primary	1= if household head has primary education, 0 = otherwise
Head_Higher_Secondary	1= if household head has higher secondary education, 0 = otherwise
Head_Graduate_Above	1= if household head has graduate and above education, 0 = otherwise
Emploment_Status	1 = if household head is self employed, 0 = otherwise
Gender composition	***Ratio of household members of different age brackets to total household size***
rm0_4	Ratio of male members of age 0-4 years to total household size
rm5_9	Ratio of male members of age 5-9 years to total household size
rm10_14	Ratio of male members of age 10-14 years to total household size
rm15_65	Ratio of male members of age 15-55 years to total household size
rm56P	Ratio of male members of age 56 plus years to total household size
rf0_4	Ratio of female members of age 0-4 years to total household size
rf5_9	Ratio of female members of age 5-9 years to total household size
rf10_14	Ratio of female members of age 10-14 years to total household size
rf15_65	Ratio of female members of age 15-55 years to total household size
rf56P	Ratio of female members of age 56 plus years to total household size (taken as base category)
Prices	***Prices of 11 food groups used in the study***
$ln\ P_{Milk}$	Logarithm of price of milk and milk products
$ln\ P_{Meat}$	Logarithm of price of meat, poultry and fish
$ln\ P_{Fruits}$	Logarithm of price of fresh fruits

$ln\ P_{Veg}$	Logarithm of price of vegetables
$ln\ P_{Spices}$	Logarithm of price of spices and condiments
$ln\ P_{Sugar}$	Logarithm of price of sugar and sugar preparations
$ln\ P_{Wheat}$	Logarithm of price of wheat and wheat flour
$ln\ P_{Rice}$	Logarithm of price of rice
$ln\ P_{Pulses}$	Logarithm of price of pulses whole and split
$ln\ P_{Oil}$	Logarithm of price of edible oil and fats
$ln\ P_{Otherfoods}$	Logarithm of price of other foods
Urban	1 = if household resides in urban area, 0 = otherwise
Province	Punjab as base category
Sindh	1= if household belongs to Sindh, 0 = otherwise
KPK(Khyber Pakhtunkhwa)	1 = if household belongs to KPK, 0 = otherwise
Baluchistan	1 = if household belongs to Baluchistan, 0 = otherwise
Year2010	1 if a household is from survey round 2010, 0 = if from 2005

Table 2: Food budget share, total expenditure and total food expenditure for 2005-06 and 2010-11

	Milk (Lit)	Meat (kg)	Fruit (kg)	Vegetables (kg)	Spices (kg)	Sugar (kg)	Wheat (kg)	Rice (kg)	Pulses (kg)	Oil (Lit)	Other Foods (kg)	Total Expenditure (Rs)	Food Expenditure (Rs)
2005-06													
All	16.49	8.56	2.61	7.56	2.72	7.17	14.65	2.92	2.09	7.44	4.69	1764.92	890.94
Q_1	13.31	6.19	1.56	8.78	2.92	8.35	20.1	3.41	2.32	8.16	4.28	922.55	569.92
Q_3	18.64	11.35	3.93	6.14	2.46	5.73	8.63	2.37	1.73	6.37	5.59	1852.76	1020.21
2010-11													
All	20.75	10.04	2.93	9.64	3.63	9.65	17.54	3.79	2.91	10.96	7.77	3380.58	1549.89
Q_1	17.09	6.75	1.79	10.42	3.69	11.33	23.31	3.99	3.04	11.99	6.2	1980.59	1057.46
Q_3	24.59	13.74	4.51	8.21	3.44	7.73	11.52	3.34	2.57	9.5	10.44	3707.17	1812.81

Total expenditure and food expenditure are per capita monthly terms. Q_1 and Q_3 indicate the first and third quartiles. Unit of measurement is given in ( ), Lit = Liter, kg = Kilogram and expenditure is in Pakistani rupees: Rs.

Table 3: Estimated Elasticities for calorie and nutrients with interactions (pooled 2005 – 2010)

Variables	Calorie	Protein	Fat	Carbohydrate
$ln\ P_{Milk}$	-0.146*	-0.169	-0.291***	-0.088***
	(0.005)	(0.011)	(0.014)	(0.008)
$ln\ P_{Meat}$	0.004*	0.003**	-0.058**	0.021***
	(0.004)	(0.009)	(0.011)	(0.006)
$ln\ P_{Fruits}$	0.012***	0.012***	-0.026***	0.026***
	(0.002)	(0.004)	(0.005)	(0.003)
$ln\ P_{Veg}$	-0.172*	-0.128	-0.045*	-0.230**
	(0.011)	(0.021)	(0.027)	(0.016)
$ln\ P_{Spices}$	-0.006*	0.012***	-0.036***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
$ln\ P_{Sugar}$	0.112	0.096	-0.194***	0.138
	(0.006)	(0.012)	(0.016)	(0.009)
$ln\ P_{Wheat}$	0.447***	0.384***	0.407***	0.479***
	(0.006)	(0.013)	(0.017)	(0.009)
$ln\ P_{Rice}$	-0.315***	-0.304***	-0.277***	-0.334***
	(0.005)	(0.010)	(0.013)	(0.008)
$ln\ P_{Pulses}$	-0.076***	-0.006**	-0.214**	-0.026***
	(0.013)	(0.026)	(0.035)	(0.020)
$ln\ P_{Oil}$	0.279**	0.366*	0.000***	0.403***

	(0.018)	(0.038)	(0.049)	(0.028)
ln $P_{Otherfoods}$	-0.022***	-0.013***	-0.018	-0.018***
	(0.000)	(0.000)	(0.000)	(0.000)
	0.348***	0.416***	0.558***	0.271***
ln_PCME	(0.004)	(0.004)	(0.005)	(0.004)
	-1.633***	-1.484***	2.298***	-2.782***
Y_{2010}	(0.360)	(0.379)	(0.519)	(0.413)
Control Variables	Yes	Yes	Yes	Yes
Test for significant interactions	24.65	17.00	16.07	24.88
	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.55	0.57	0.57	0.43
No. of observations	30054	30054	30054	30054

 Prob >F= 0.0000 for all significant interaction terms in the model.

 Standard errors are clustered at districts and given in parenthesis, p<0.10; ** p<0.05; *** p<0.01

 Note: Variables included in the model but not presented here are household size, composition of household male and female member into age brackets, employment status of household head, household head's gender, age of the household head, education of household head, dummy variable for region, dummies for provinces and district dummies.

Table 4: Quantile regression of changes in calorie, protein, fat and carbohydrates intake to variation in prices

	Calorie			Test θ1 = θ2 = θ3 (p-values)	Protein			Test θ1 = θ2 = θ3 (p-values)	Fat			Test θ1 = θ2 = θ3 (p-values)	Carbohydrates			Test θ1 = θ2 = θ3 (p-values)
	θ = 0.10	**θ = 0.50**	**θ = 0.90**		**θ = 0.10**	**θ = 0.50**	**θ = 0.90**		**θ = 0.10**	**θ = 0.50**	**θ = 0.90**		**θ = 0.10**	**θ = 0.50**	**θ = 0.90**	
ln P_{Milk}	-0.197*** (0.022)	-0.203*** (0.021)	-0.165*** (0.030)	0.0517	-0.187*** (0.019)	-0.178*** (0.017)	-0.133*** (0.032)	0.3495	-0.193*** (0.037)	-0.136*** (0.022)	-0.040 (0.033)	0.0022	-0.228*** (0.023)	-0.220*** (0.017)	-0.193*** (0.036)	0.7198
ln P_{Meat}	-0.021 (0.017)	-0.008 (0.010)	-0.061*** (0.023)	0.0820	-0.031** (0.014)	-0.019 (0.011)	-0.047*** (0.016)	0.1090	-0.019 (0.018)	0.031** (0.013)	0.040 (0.021)	0.0177	-0.049*** (0.012)	-0.029** (0.012)	-0.101*** (0.019)	0.0012
ln P_{Fruits}	-0.115*** (0.016)	-0.082*** (0.007)	-0.116*** (0.014)	0.0197	-0.126*** (0.014)	-0.123*** (0.012)	-0.137*** (0.018)	0.7453	-0.104*** (0.019)	-0.109*** (0.020)	-0.216*** (0.031)	0.0004	-0.104*** (0.016)	-0.069*** (0.011)	-0.094*** (0.016)	0.0301
ln P_{Veg}	-0.008 (0.050)	-0.083*** (0.031)	-0.007 (0.070	0.3138	-0.016 (0.050)	-0.037 (0.044)	-0.043 (0.058)	0.8769	-0.075 (0.055)	-0.089 (0.049)	0.007 (0.101)	0.4869	0.031 (0.055)	-0.074 (0.047)	0.012 (0.071)	0.1921
ln P_{Spices}	0.041*** (0.011)	0.005 (0.008)	-0.032*** (0.012)	0.000	0.040*** (0.010)	0.016*** (0.009)	-0.010 (0.013)	0.0063	-0.035*** (0.016)	-0.051*** (0.009)	-0.041*** (0.015)	0.4767	0.046*** (0.012)	0.022*** (0.008)	-0.036*** (0.013)	0.0000
ln P_{Sugar}	0.125*** (0.018)	0.166*** (0.018)	0.105*** (0.028)	0.0107	0.104*** (0.023)	0.127*** (0.016)	0.113*** (0.022)	0.5574	-0.026 (0.023)	-0.016 (0.022)	-0.035 (0.036)	0.7551	0.091*** (0.022)	0.156*** (0.014)	0.092*** (0.023)	0.0045
ln P_{Wheat}	0.147*** (0.027)	0.206*** (0.023)	0.150*** (0.043)	0.0865	0.158*** (0.030)	0.177*** (0.023)	0.175*** (0.038)	0.8351	0.025 (0.037)	0.063 (0.034)	0.051 (0.069)	0.5007	0.219*** (0.044)	0.253*** (0.030)	0.161*** (0.051)	0.0886
ln P_{Rice}	-0.224*** (0.027)	-0.205*** (0.014)	-0.159*** (0.030)	0.2301	-0.172*** (0.022)	-0.196*** (0.020)	-0.139*** (0.039)	0.2706	-0.146*** (0.033)	-0.081*** (0.029)	0.016 (0.042)	0.0015	-0.271*** (0.028)	-0.262*** (0.023)	-0.157*** (0.032)	0.0033
ln P_{Pulses}	-0.166*** (0.037)	-0.251*** (0.028)	-0.293*** (0.075)	0.0585	-0.039 (0.038)	-0.123*** (0.028)	-0.123*** (0.061)	0.0946	-0.039 (0.055)	-0.010 (0.044)	-0.030 (0.076)	0.8992	-0.242*** (0.056)	-0.294*** (0.032)	-0.426*** (0.060)	0.0830
ln P_{Oil}	-0.014 (0.043)	-0.022 (0.034)	-0.147* (0.088)	0.2486	0.042 (0.039)	0.128*** (0.034)	0.028 (0.053)	0.0126	0.197*** (0.063)	0.203*** (0.051)	0.208*** (0.087)	0.9885	-0.111** (0.065)	-0.093*** (0.042)	-0.286*** (0.075)	0.0418
ln $P_{Otherfoods}$	0.011*** (0.004)	0.018*** (0.004)	0.028*** (0.008)	0.0925	0.010* (0.005)	0.007** (0.004)	0.011 (0.008)	0.7533	-0.001 (0.004)	-0.001 (0.007)	-0.014 (0.009)	0.3867	0.022*** (0.005)	0.021*** (0.004)	0.035*** (0.006)	0.0656

ln P_{Milk} * Y_{2010}	0.085*** (0.036)	0.115*** (0.026)	0.156*** (0.044)	0.4875	0.049 (0.050)	0.032 (0.022)	0.014 (0.032)	0.7600	-0.037 (0.055)	0.026 (0.031)	0.102 (0.039)	0.0333	0.121*** (0.034)	0.163*** (0.030)	0.221*** (0.054)	0.2361
ln P_{Meat} * Y_{2010}	0.131*** (0.019)	0.094*** (0.013)	0.152*** (0.028)	0.0254	0.054*** (0.018)	0.054*** (0.013)	0.085*** (0.019)	0.3173	0.018 (0.025)	-0.045*** (0.017)	0.016 (0.029)	0.0172	0.180*** (0.014)	0.158*** (0.015)	0.224*** (0.023)	0.0082
ln P_{Fruits} * Y_{2010}	0.101*** (0.018)	0.069*** (0.010)	0.103*** (0.015)	0.0150	0.114*** (0.019)	0.113*** (0.014)	0.154*** (0.022)	0.1515	0.060*** (0.020)	0.049*** (0.020)	0.185*** (0.035)	0.0000	0.101*** (0.021)	0.059*** (0.015)	0.085*** (0.020)	0.0351
ln P_{Veg} * Y_{2010}	-0.224*** (0.049)	-0.130*** (0.040	-0.084*** (0.079)	0.2986	-0.133*** (0.059)	-0.090* (0.055)	0.010 (0.080)	0.3550	-0.133 (0.064)	-0.008 (0.053)	0.001 (0.101)	0.1464	-0.336*** (0.075)	-0.198*** (0.050)	-0.055 (0.079)	0.0137
ln P_{Spices}* Y_{2010}	-0.029*** (0.012)	-0.007 (0.009)	0.022 (0.015)	0.0135	-0.038*** (0.014)	-0.024*** (0.011)	0.006 (0.018)	0.1375	0.030*** (0.021)	0.028*** (0.011)	-0.027 (0.020)	0.0080	-0.017 (0.014)	-0.005 (0.012)	0.023 (0.017)	0.1056
ln P_{Sugar}* Y_{2010}	-0.095*** (0.024)	-0.123*** (0.021)	-0.068*** (0.029)	0.0634	-0.061** (0.028)	-0.055*** (0.023)	-0.050 (0.028)	0.9556	-0.146*** (0.030)	-0.041* (0.026)	-0.032 (0.037)	0.0160	-0.095*** (0.027)	-0.153*** (0.025)	-0.124*** (0.033)	0.0611
ln P_{Wheat}* Y_{2010}	0.120* (0.040)	0.061** (0.031)	0.000*** (0.056)	0.0292	0.057** (0.039)	0.073*** (0.024)	-0.026 (0.046)	0.1508	0.173*** (0.033)	0.010 (0.036)	-0.005 (0.069)	0.0004	0.085* (0.048)	0.096** (0.037)	-0.028 (0.044)	0.0294
ln P_{Rice} * Y_{2010}	-0.054** (0.028)	-0.057*** (0.021)	-0.037 (0.036)	0.8515	-0.088*** (0.028)	-0.034* (0.016)	-0.015 (0.038)	0.1832	-0.129*** (0.043)	-0.082*** (0.029)	-0.154*** (0.051)	0.0743	-0.024 (0.029)	-0.038* (0.022)	-0.0253 (0.026)	0.8289
ln P_{Pulses}* Y_{2010}	0.199*** (0.054)	0.071*** (0.032)	0.056 (0.091)	0.0269	0.195*** (0.054)	0.113*** (0.049)	0.029 (0.065)	0.0719	0.006 (0.066)	-0.014 (0.057)	0.031 (0.104)	0.8339	0.107** (0.066)	0.217** (0.042)	0.086 (0.090)	0.4463
ln P_{Oil} * Y_{2010}	0.296*** (0.059)	0.314*** (0.059)	0.433*** (0.127)	0.4815	0.129** (0.071)	0.076 (0.061)	0.144 (0.082)	0.6041	-0.285 (0.091)	-0.342 (0.060)	-0.032 (0.135)	0.0972	0.483*** (0.071)	0.546*** (0.063)	0.733*** (0.128)	0.1371
ln $P_{Otherfoods}$* Y_{2010}	-0.037*** (0.004)	-0.051*** (0.005)	-0.048*** (0.012)	0.0814	-0.043*** (0.007)	-0.042*** (0.006)	-0.035*** (0.011)	0.7850	-0.033*** (0.007)	-0.035*** (0.008)	-0.029*** (0.013)	0.8761	-0.048*** (0.006)	-0.047*** (0.005)	-0.053*** (0.008)	0.7238
ln_PCME	0.432*** (0.006)	0.359*** (0.003)	0.312*** (0.004)	0.0000	0.501*** (0.005)	0.428*** (0.004)	0.375*** (0.006)	0.0004	0.678*** (0.009)	0.58*** (0.006)	0.492*** (0.008)	0.0001	0.337*** (0.005)	0.269*** (0.004)	0.234*** (0.006)	0.0000
Y_{2010}	-3.467*** (0.730)	-1.802*** (0.314)	-1.997*** (0.398)		-2.245*** (0.532)	-1.312*** (0.431)	-0.808*** (0.509)		2.197*** (0.674)	2.086*** (0.446)	-0.434 (0.753)		-5.085*** (0.470)	-3.147*** (0.407)	-2.897*** (0.835)	
Pseudo-R^2	0.26	0.33	0.39		0.28	0.36	0.42		0.30	0.36	0.39		0.20	0.24	0.28	

No. of observations	30054	30054	30054	30054

 Standard errors are given in parenthesis, p<0.10; ** p<0.05; *** p<0.01

 Note: Variables included in the model but not presented here are household size, composition of household male and female member into age brackets, employment status of household head, household head's gender, age of the household head, education of household head, dummy variable for region and dummies for provinces.

Appendix-A

Table A-1: Descriptive statistics of key variables used in the models

	2005		2010	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**
Per-capita consumption of				
PCDCC	2078.882	711.991	2111.344	675.782
PCDPC	55.343	20.750	55.497	21.020
PCDFC	60.015	30.180	65.555	31.589
PCDCrC	341.766	148.562	348.959	111.393
PCME	1764.920	2041.227	3380.579	2988.284
Average unit prices of				
MILK	17.732	3.657	41.158	7.538
MEAT	58.923	20.229	106.988	44.640
FRUIT	9.580	2.742	14.233	5.014
VEGITABLES	15.452	1.536	31.419	2.626
SPICES	0.127	0.157	0.357	0.403
SUGAR	28.878	4.092	56.807	11.852
WHEAT	17.843	2.284	23.640	5.753
RICE	36.242	6.814	47.829	13.428
PULSES	40.985	2.683	102.728	11.187
OIL	66.362	6.637	155.969	12.582
OTHERFOODS	0.805	1.032	2.218	2.806
Proportion of household members of different age brackets to total household size and Excluded Category is females 56 years of age and over				
HHsize	6.814	2.862	6.410	2.591
rm0_4	0.062	0.102	0.055	0.099
rm5_9	0.071	0.104	0.070	0.106
rm10_14	0.063	0.097	0.064	0.100
rm15_55	0.258	0.163	0.276	0.168
rm56P	0.048	0.099	0.045	0.095
rf0_4	0.060	0.101	0.057	0.100
rf5_9	0.065	0.099	0.062	0.099
rf10_14	0.058	0.094	0.055	0.093
rf15_55	0.271	0.147	0.277	0.151
rf56p	0.042	0.103	0.040	0.100
Household head characteristics				
Female headead household (F_HHH)	0.075	0.263	0.084	0.278
HHH_Age	45.573	13.746	45.999	13.122
Head_Illiterate	0.011	0.104	0.297	0.457

Head_Primary	0.399	0.490	0.635	0.481
Head_Higher_Secondary	0.517	0.500	0.645	0.479
Head_Graduate_Above	0.137	0.344	0.171	0.377
Employment Status	0.266	0.442	0.190	0.392
Region				
Urban	0.403	0.491	0.423	0.494
Rural	0.597	0.491	0.577	0.494
Provinces				
Punjab	0.439	0.496	0.431	0.495
Sindh	0.246	0.430	0.234	0.423
KPK	0.185	0.388	0.186	0.389
Baluchistan	0.131	0.337	0.149	0.357
N	14863		15191	

Table A-2: Demand for calorie, protein, fat and carbohydrate in 2005

Variables	Calorie	Protein	Fat	Carbohydrate
$ln\ P_{Milk}$	-0.211*** (0.016)	-0.207*** (0.016)	-0.206*** (0.020)	-0.207*** (0.019)
$ln\ P_{Meat}$	0.001 (0.010)	-0.023* (0.010)	-0.015 (0.013)	-0.001 (0.012)
$ln\ P_{Fruits}$	-0.025* (0.009)	-0.055*** (0.010)	-0.063*** (-0.012)	-0.018 (0.010)
$ln\ P_{Veg}$	-0.209*** (0.034)	-0.216 *** (0.035)	-0.0394 *** (0.045)	-0.169*** (0.040)
$ln\ P_{Spices}$	-0.035*** (0.006)	-0.019** (0.006)	-0.107*** (0.008)	-0.020* (0.008)
$ln\ P_{Sugar}$	0.171*** (0.015)	0.146*** (0.015)	0.030 (0.019)	0.164 *** (0.017)
$ln\ P_{Wheat}$	0.217 *** (0.025)	0.138*** (0.026)	0.023 (0.033)	0.321*** (0.029)
$ln\ P_{Rice}$	-0.348 *** (0.019)	-0.271 *** (0.020)	-0.315 *** (0.025)	-0.391 *** (0.022)
$ln\ P_{Pulses}$	-0.516*** (0.032)	-0.327*** (0.032)	-0.395*** (0.044)	-0.506*** (0.036)
$ln\ P_{Oil}$	0.173*** (0.031)	0.306 *** (0.032)	0.093* (0.042)	-0.172*** (0.036)
$ln\ P_{Otherfoods}$	-0.001 (0.004)	-0.011* (0.004)	-0.041*** (0.005)	0.016** (0.004)
ln_PCME	0.334 *** (0.006)	0.393 *** (0.006)	0.533 *** (0.008)	0.26*** (0.006)
Control Variables	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
Intercept	6.913*** (0.207)	1.72*** (0.214)	0.096 (0.281)	6.396 (0.243)
R^2	0.50	0.54	0.57	0.37
No of observation	14863	14863	14863	14863

 Standard errors are given in parenthesis
 Significance levels are 1% (***), 5% (**) and 10% (*).

 Note: Variables included in the model but not presented here are household size, composition of household male and female member into age brackets, employment status of household head, household head's gender, age of the household head, education of household head, dummy variable for region, dummies for provinces and district dummies.

Table A-3: Demand for calorie, protein, fat and carbohydrate in 2010

Variables	Calorie	Protein	Fat	Carbohydrate
ln P_{Milk}	-0.109** (0.016)	-0.001 (0.017)	-0.064 (0.023)	-0.143*** (0.018)
ln P_{Meat}	-0.049** (0.008)	-0.068*** (0.008)	-0.185*** (0.011)	-0.003 (0.009)
ln P_{Fruits}	0.005 (0.006)	0.004 (0.006)	-0.028*** (0.009)	-0.009 (0.007)
ln P_{Veg}	-0.139** (0.023)	-0.074** (0.024)	-0.302*** (0.032)	-0.119* (0.027)
ln P_{Spices}	-0.009 (0.005)	-0.029* (0.006)	-0.113*** (0.008)	0.039* (0.006)
ln P_{Sugar}	0.031*** (0.013)	0.075*** (0.013)	-0.095* (0.019)	0.269*** (0.015)
ln P_{Wheat}	0.078*** (0.021)	0.101*** (0.022)	0.332*** (0.030)	0.082*** (0.024)
ln P_{Rice}	-0.218*** (0.015)	-0.183*** (0.015)	-0.131*** (0.021)	-0.242*** (0.017)
ln P_{Pulses}	-0.194*** (0.031)	-0.017** (-0.032)	-0.064 (-0.045)	-0.231*** (-0.036)
ln P_{Oil}	0.248** (0.038)	0.225** (0.041)	-0.156* (0.060)	0.468*** (0.043)
ln $P_{Otherfoods}$	-0.032*** (0.003)	-0.032*** (0.003)	-0.023*** (0.004)	-0.023*** (0.004)
ln_PCME	0.361*** (0.005)	0.437*** (0.005)	0.582*** (0.007)	0.28*** (0.005)
Control Variables	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
Intercept	4.523*** (0.245)	-0.323 (0.253)	0.215 (0.371)	3.153*** (0.280)
R^2	0.56	0.59	0.54	0.43
No of observation	15191	15191	15191	15191

 Standard errors are given in parenthesis

 Significance levels are 1% (***), 5% (**) and 10% (*).

 Note: Variables included in the model but not presented here are household size, composition of household male and female member into age brackets, employment status of household head, household head's gender, age of the household head, education of household head, dummy variable for region, dummies for provinces and district dummies.