Food Consumption Patterns and Nutrition Disparity in Pakistan

Haider, Adnan and Zaidi, Masroor

Institute of Business Administration, Karachi, Pakistan

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Adnan Haider[*]†‡ Masroor Zaidi†

†*Department of Economics, IBA Karachi, Pakistan*
‡*Center for Business & Economic Research (CBER), IBA, Karachi, Pakistan*

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ABSTRACT

The study examines the changes in household consumption patterns in Pakistan based on eleven composite food groups. The analysis is based on micro level survey dataset, Household Income Expenditure Survey (HIES) with seven consecutive rounds spanning over the period 2000-01 till 2013-14. Along with differences in consumption and calorie bundles, variations in household's response to change in prices and income have also been estimated. Empirical results based on Quadratic Almost Ideal Demand System (QUAIDS) support the hypothesis that food consumption patterns are not only different across regions but are also different among provinces. Despite the increase in availability of food items and increased per capita income, average calories intake per adult equivalent in the country is still less than 2350 Kcal benchmark. It is estimated that, thirty percent of children under age 5 are underweight, forty-five percent are stunted, eleven percent are wasted and thirty percent are underweighted. The overall scenario may increase vulnerability to poverty, countrywide disease burdens and lower productivity.

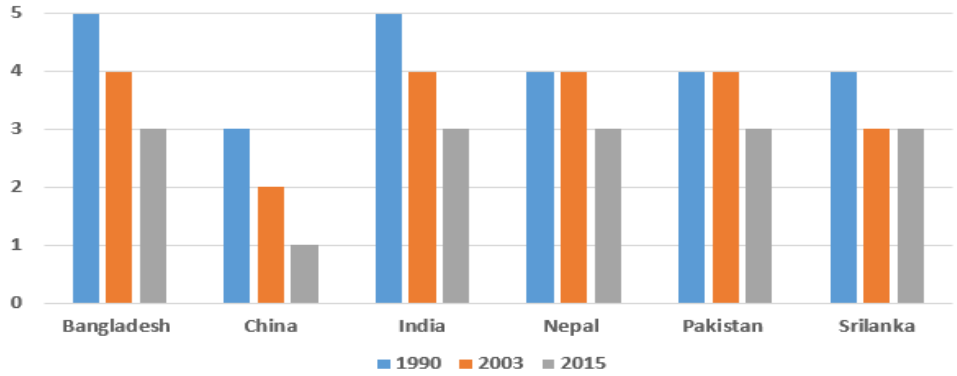
Keywords: Food Consumption Patterns; QUAIDS; Non-linear Engel Curves; Elasticities
JEL Classifications: C31, I12, O12, Q11

[*] Adnan Haider <ahaider@iba.edu.pk> and Masroor Zaidi <syed.zaidi@khi.iba.edu.pk> are Associate Professor and Research Assistant respectively at Department of Economics and Finance, Institute of Business Administration, Karachi, Pakistan. Views expressed in this paper are those of the authors and do not necessarily representation of the IBA Karachi. The other usual disclaimer also applies.

1. INTRODUCTION

Consumption patterns are changing throughout the world from basic staple commodities towards more diversified consumption bundle (Kearney, 2010). The diverse nature of this change may be the result of different demographic and socioeconomic factors like level of education, income level, household size, family structure, etc., or there could be also other important factors like change in preferences or increase in number of products available to consumers to choose from due to trade liberalization. These are the factors which are causing shifts in the consumption patterns across the globe. According to Global Hunger Index, Pakistan has improved its status from alarming hunger to serious hunger but there is still room for improvement (see, Figure 1). All other countries of the region are now at the same level as Pakistan except China who has been continuously improving its status and is doing also good at poverty elevation. It is one of the fundamental responsibilities of any government to make sure the availability of basic necessities and take measures to prevent any worse situations. International Food Policy Research Institute (IFPRI) quoted (Sommer & Mosley, 1972) in its research report[1] that, "*After Cyclone Bhola, the deadliest storm in the last 100 years, struck East Bengal in 1970, the slow and inadequate response of Pakistan's Ayub Khan government to hunger and deprivation helped mobilize the Bangladesh independence movement*". However, it is not the first time that the deprivation of East Pakistan has been discussed but many researchers believed the problem to be multidimensional including deprivation of the region at several fronts. Inequality and deprivation in, the then West Pakistan (now, just Pakistan) is still high and one way to reduce it is to ensure food security for everyone. Food security is a broad term which includes availability, accessibility, utilization and sustainability of food.

Figure 1: Global Hunger Index

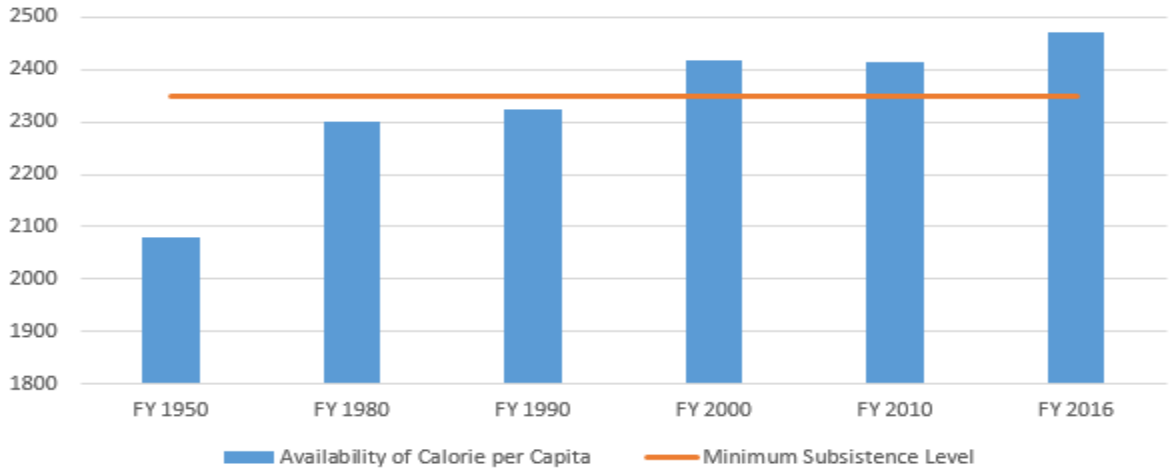


Source: Several issues of The Challenge of Hunger (IFPRI)

[1] IFPRI (2015). *Global hunger index: Armed conflict and the challenge of hunger*, Research Report.

In Pakistan, per capita availability of all commodities has been increasing for a decade except pulses (Economic Survey of Pakistan, 2015). Per capita availability of food has seen the largest increase of 28.5 percent in the recent decade followed by sugar (28.5 percent) eggs (15.4 percent) and meat (9.1 percent). Per capita availability of food itself doesn't give us the complete picture of consumer choices since it much depends on other factors like support prices, floods, procurement facilities etc. Availability of calories per capita in the country has increased during the period 1950 – 2000, but this increase has been almost stagnant during 2000-10 and it has been increasing in the past six years (see, Figure 2). However, availability of per capita calorie shows a better picture to understand consumer wellbeing and dietary patterns but one has to think twice before deriving any micro level implications from these aggregated numbers because it does not tell anything about the distribution of these variables across provinces or different socioeconomic classes. If we derive any micro level implications from these variables we will be assuming that a person living in rural Balochistan is consuming as much as a person living in central Punjab which is not a wise assumption to make.

Figure 2: Per Capita Availability of Calories (KCal)



Source: Several issues of Economic Survey of Pakistan

Over the period in Pakistan, share of agriculture in GDP has been decreasing from 38.9 percent in 1969-70 to 19.82 percent in 2015-16. This figure is worrisome for a country who claimed to be an agrarian economy in the past and whose population has been growing with the fastest pace in the region. There are different components of agriculture sector among which livestock, major crops, and minor crops contribute more. The share in GDP of both major crops and minor crops has been decreased over the period of study from 8 percent and 3.1 percent respectively in 2001-02 to 4.7 percent and 2.3 percent of GDP respectively in 2015-16 while the share of livestock has slightly decreased from 12 percent in 2001-02 to 11.6 percent in 2015-16 (See, Figures 6, 7 and 8). Although there has been a significant increase in the credit offtake in

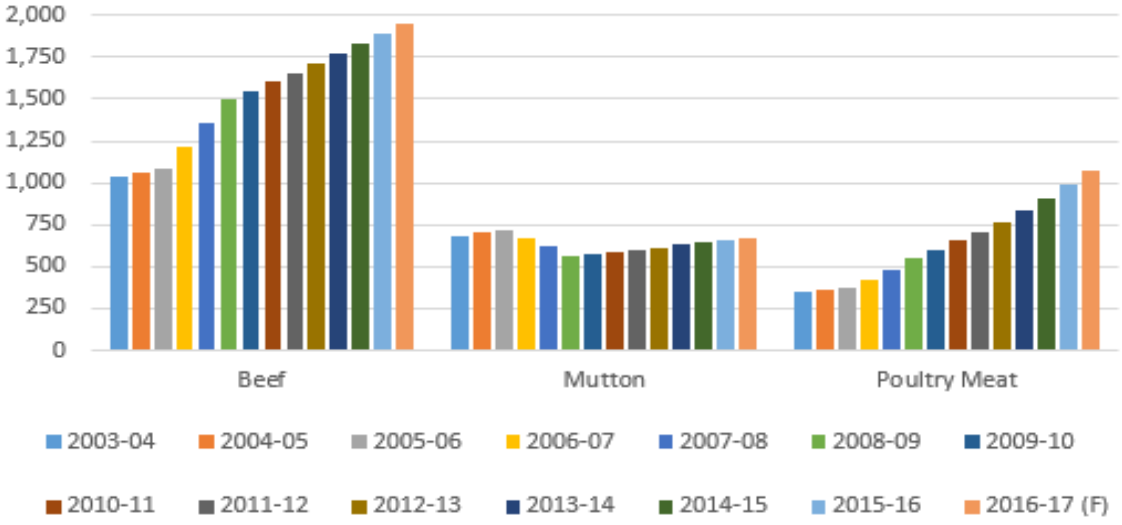
agriculture sector (44.7 billion PKR to 385.54 billion PKR) along with the more distribution of improved seeds (194000 tons to 455000 tons) and increased cropped area (22 million hectares to 23 million hectare) but the water availability and the fertilizer offtake has remained almost stagnant during the period of study. As far as the crop yields are concerned, there has been some increase in their yields. Yield (kg/hectare) of wheat has increased by 22 percent, rice by 35 percent, sugarcane by 27 percent whereas maize has experienced the exceptional growth of 143 percent from 2001-2016. However, the crop yields are increasing over the period of time but there has not been much exceptional growth in yields since the green revolution. Pakistan has low productivity in producing wheat and higher productivity in rice as compare to the other regional countries.[2] Productivity of wheat can be improved by using better seeds, farming techniques and spreading awareness among farmers regarding the use of fertilizers, water, soil management etc. Increasing only production is not enough as bottle necks in supply chain of wheat along with the price distortions also needed to improve (See, Figures 9 to 15).

Livestock accounts for the biggest contribution to agriculture sector and there has been a quite interesting trend in the livestock products where every single product has witnessed a handsome growth in production except mutton. In case of mutton production, there has been a shift in trend, first increasing production from 2001-2004 followed by a sharp decline in 2005-06 and then increasing again. First look at the data suggest that this sharp decline in the production of mutton is due to the substitution effect as the production of its close substitutes (beef and poultry meat) has experienced a sharp increase for the same year but this notion requires detailed analysis (see, Figure 3). Beef production has seen a growth of 100 percent from 2001-2016 while it's the poultry products which has seen the sharpest growth with the growth of 245 percent in poultry meat and 116 percent in the production of eggs. Increasing by every year, milk production in the country has observed a growth of 67 percent from 2001-2016.

However, numbers are showing an increased availability of food products but the improved availability doesn't ensure that everyone is getting the amount they required. Although the per capita income has increased in last decade but increase in prices have been much more than the increase in per capita income (See Appendix for the graphs). Prices of different products vary across provinces and cities and also pretty much depends on the area in the same city from where you buy it. Some of these variations are due to difference in quality but weaker price regulatory bodies are the prime reason for these dissimilarities.

[22] Yield (kg/hectare) of wheat in India = 3140; Bangladesh = 3013; Pakistan = 2752
Yield (kg/hectare) of rice in India = 2372; Bangladesh = 2299; Pakistan = 2479

Figure 3: Three year Moving Average of Production of Meats (000 tons)



Source: Several issues of Economic Survey of Pakistan

To get the better estimates of prices, proxy for prices has been calculated from various issues of HIES (See, Figures 17, 18 and 19). The reason for calculating a proxy instead of using the actual prices is that HIES doesn't collect data on prices and a better way to get prices from HIES is to calculate a proxy by dividing quantities consumed of certain product by expenditure incurred on it. This will give us closer estimates for what consumer has actually paid for the product in his/her environment. The sharpest rise in the prices under the period of study is for FY2011. The main reason of this sharp increase in prices of almost every food category is the international commodity price shock along with the oil price shock. In 2008, crude oil price reached its all-time high price of $145 per barrel which added in to the already increasing commodity prices by increasing cost of transportation. Prices of cereals has witnessed the highest increase during the period of study followed by the prices of meat, vegetables and dairy (See Appendix for the graph). However, price differences are quite evident among provinces and even with in a province but we are not going to discuss it in detail as price distortions is a separate topic of research and need much attention.

Pakistan has witnessed regionally unbalanced economic growth since its beginning and this unbalanced economic growth has significant contribution towards the current consumption patterns. Since 2001 to 2005 the country has seen an increase in the consumption inequality where rural regions observed the highest increase in inequality with 6.4 percent increase in Gini coefficient followed by the urban region with an increase of 5 percent (Anwar, 2009). The biggest cluster of people with high income per capita were

estimated to be in the province of Punjab in 1998 as well as in 2005 (Ahmed, 2011). This tells us about that the concentration of wealth at least geographically has remained the same since 1998.

To understand the consumption patterns and to make more robust implications out of analysis we need to build our analysis on disaggregated level which would provide us with a better picture and would highlight regional disparities, if there are any. Investigating ground realities always gives an edge to policy makers to make more suitable and effective policies and make maximum use of their scarce resources. After 18th amendment, now more autonomous provinces can deal with the problems of food security, poverty and malnutrition with more focus. However, the nature and quality of the transfers that have been made to provinces is also an interesting topic of research. This study aims to highlight the problem of poverty and regional disparities at national, interprovincial and intra-provincial level for Pakistan economy. Furthermore, in the past, most of the analysis has been done on the aggregated level and there are few studies done on the disaggregated level but most of them only focus on one province at a time (see

Table 1). The main research gap is that no significant study has been done at disaggregated level in case of Pakistan so our main research motivation is to fill this research gap and contribute to empirical literature at the disaggregated level which has some policy implication towards food security. The second thing which motivated us to pick up this study is related to the use of superior technique of QUAIDS. Most of the studies that have been done in context of Pakistan used linear Engel curves except (Iqbal & Anwar, 2014) which have applied QUAIDS but their work is at aggregated level (National and Provincial level) with different food groups with independent price data and the importance of consumption bundles and nutritional diversity is not included. However, this study will employ the technique of QUAIDS (Quadratic Almost Ideal Demand System) at disaggregated level over different time horizons (from 2001 to 2014) to capture temporal dynamics for horizontal and vertical comparisons. There are some growing concerns related to micro-geographies of inequality in consumption pattern as well as in terms of food distribution and this study will also contribute to literature in this direction.

One of the major reasons for choosing Pakistan as an empirical case for this study is because the years under study (from 2001 to 2014) are the era of troubled times for Pakistan economy, due to war on terror, financial and food price crisis occurred in 2007-08 and also democracy got better roots and stability in Pakistan while on the other hand Pakistan experienced a devastating climate changes in terms of heat waves and severe floods destroying agriculture crop production both food and cash crops as well as improving vulnerability to poverty. Therefore, the present study tries to explore empirically three broad areas of concerns: (a) to calculate the consumption bundles[3] and investigate its differences over the period

[3] Food expenditure shares

of study (at each cross section[4]), (b) to calculate expenditure and price elasticities and examine their variability under different socioeconomic and demographic variables (i.e. consumption quintiles and controlling for provinces and region), and (c) to calculate calorie intake and observe nutritional disparity in inter and intra-provinces.

The rest of the paper is organized as follows: section two provides a comprehensive literature review, section three discusses data and estimation methodology, results are elaborated in section four and five; section six discusses policy implications; and finally last section concludes.

2. REVIEW OF LITERATURE

The study of consumer behavior is dated back to 17th century when the first empirical demand schedule was published (Davenant, 1700) referred by (Stigler, 1954). However, the study of how consumers allocate their budget started from northern Europe dated back to 1840s but one of the most influential study in the field till date was done by (Stigler, 1954) referred the work of (Engel, 1857) in which he postulated a law which has set the foundation for future research work to come. In his study based on the data of Ducpetiaux's survey based on 153 Belgian families, the author identifies a pattern the way households allocate their budget. He states that "a poor family allocate the greatest share of their expenditure to food and as the family income increases this share becomes smaller". This empirical observation was the first generalization done on the base of survey data and it still plays an important role in modern microeconomics, till dated. After this study, several other researchers (Laspeyres, 1875), (Farquhar, 1891), (Benini, 1907) , (Persons, 1910), (Pigou, 1910), (Lenoir, 1913) and (Davies, 1975) done work on the same topic with their different quantitative approaches and have significantly contributed in the field of consumer behavior and budget allocations. In 1954 study, (Stigler, 1954) has done an impressive work in which he described a brief history of the seminal work done by the other researchers. Since the scope of this study is limited, it is important to mention only few studies which played an important role in refinement of demand estimation techniques. Serious work done on the estimation of consumer behavior derived from budgetary data started from earlier decades of 1900. In his study (Stigler, 1954) referred (Ogburn, 1919) who used the budget data of Columbia district and calculated the expenditure share of each category depending on following variables; family size and family income, which was incorporated using "equivalent adult" scale.

For the data of Italian households (Stigler, 1954) referred the work of (Benini, 1907) who estimated the demand for coffee and made the first application of multiple correlation to demand. There are number

[4] 2001-02, 2004-05, 2005-06, 2007-08, 2010-11, 2011-12, 2013-14

of studies after (Benini, 1907) which introduced several variables and techniques in attempt to incorporate different aspects of consumer behavior[5]. The process of evolution is continuous and will take different shapes with the improved data collection and estimation techniques that allow researchers in the future to incorporate more variables of which data is not available yet.

The study of consumption patterns not only deal with the micro issues but it also has its significant impact on the macro picture. In highly integrated economy a policy devised only for consumers will surely end up having significant impact on other economic players of the system that is why it is important to study how consumer in the economy is making its choices so one can make better micro or macro level policies and also forecast for the future. In the 1960s Pakistan adopted a policy based on trickledown economics whose underline agenda was to facilitate those who allocate greater portion of their income to saving, so aim of this policy feature to lead us to higher amount of national saving which will then lead to higher level of investment and improve the national income as a whole. Entrepreneurs are usually considered to have higher level of marginal propensity to save than other economic players so on the bases of primary household data of urban Karachi (Ranis, 1961) found that entrepreneurs have lower marginal propensity to consume than the workers. Entrepreneurs have higher marginal propensity to save may be because most of the entrepreneurs are in the higher income bracket which are more likely to save. Behavior of the households are not likely to be same across whole country and sometimes there are huge regional disparities with in a country. There are several other studies done on regional consumption disparities in Pakistan (Rahman, 1963), (Hufbauer, 1968), (Khan M. I., 1969), (Khan & Khalid, 2011), (Khan & Khalid, 2012), (Malik, Nazli, & Whitney, 2014) and (Ahmad, Sheikh, & Saeed, 2015). Following table (Table 1) on the next pages will give a brief overview of the work done on the topic in context of Pakistan. This study aims to investigate different dimensions (i.e. primarily in context of consumption preferences, nutritional disparity measured by daily calorie intake) of food consumption patterns some are already explored by the authors mentioned above and some are still under-investigated. Differences among food consumption patterns of rural and urban region and the differences among provinces are the points which are already been investigated by researchers named below.

However, in our study, our empirical attempt is to find estimates at these levels as well as for the differences with in a province with different food groups and by using a better technique (Quadratic AIDS). In addition, this study will highlight the differences for intra-provincial disparities which will be its contribution to the literature.

[5] See for example, (Persons, 1910), (Pigou, 1910), (Lenoir, 1913) and (Davies, 1975)

If there are regional disparities among provinces, rural and urban areas then we cannot make a single policy for all, as people in the different demographics would respond differently. According to a study (Rahman, 1963) on average, cereal consumption in West Pakistan exceeds recommended intake levels by nearly 23 percent. Probably only 10 percent of the West Pakistanis eat too little food grain from the nutrition stand point. Overall, the diet is deficient in all foodstuffs except food grains. In terms of Nutrients, household consumers from West Pakistan receives too little calcium, riboflavin, Vitamin A and vitamin C (Hufbauer, 1968). There might be reasons other than the income levels for differences in consumption patterns, sometime regional preferences play a significant role. Many researchers had done work on the difference in consumption patterns of East and West Pakistan and one of the major factors causing consumption disparity among these two units were the East Pakistan's strong preference towards rice and fish while West Pakistan's preferences were towards cereals. In a study to understand food consumption patterns (Khan M. I., 1969) author found out that a West Pakistani consumes more tonnage of food than an East Pakistani but obtains less calories. The diet of urban consumers is more diversified than their rural counterpart and urban consumers eat more of better quality food than rural consumers. Better income distribution also plays a key role to uplift the living standards of those who are less privileged. From the decade of 1970s Pakistan has seen a slight change in income distribution. This change in income distribution was caused by different governmental policies[6] and since the 1980s foreign remittances has been playing an important role in our economy.

Table 1: Some Relevant Studies

Studies	Year	Brief findings
A.A, Rahman	1963	Found results contradicting to Engle Law. Fresh fruits, poultry and meat along with milk and milk products and vegetables are found to be luxury commodities where other as necessities.
G.C, Hufbauer	1968	On average, cereal consumption in West Pakistan exceeds recommended intake levels by nearly 23 percent. Overall, the diet is deficient in all foodstuffs except food grains. Expenditure elasticity of cereal is found to be 0.22 greater than its elasticity of physical consumption which is 0.15.
Mohammad Irshad Khan	1969	In West Pakistan, wheat is preferred cereal but not a preferred food; people have a tendency to shift to animal products for the major part of the calories if the income is permissive of such a shift.
Bussnik, C.F. Willem	1970	Results showed that the demand of other food grains and pulses will be positively affected by an increase in wheat price.
Rehana Siddiqui	1982	Based on HIES disaggregated data on rural and urban, study found the validity of the Engel's law for some commodity groups.
Aftab Ahmad Cheema;	1985	Results showed that the without much adverse effect on the households

[6] These policies were based on the drastic shift of Pakistan's economy from capitalism to socialism which includes land reforms of 1972, job creation in public sector enterprises (PSEs) and migration of labor specially to Middle East which started inflows of remittances in the country since late 1970s.

Muhammad Hussain Malik		with higher income per capita, consumption level of the poor households can be significantly increased.
Sohail J. Malik; Kalbe Abbas; Ejaz Ghani	1987	Estimated the coefficients and the slopes of consumption functions for urban and rural areas and fount them to be different for every year 1964-84. Therefore, he concluded that any effort of analysis using time series will give spurious results.
Harold Alderman	1988	Slope parameters differ across urban and rural regions, joint estimations, even when weighted, do not give accurate average responses.
Nadeem A. Burney; Ashfaque A. Khan	1991	Expenditure elasticities for commodity groups under study found to be variant with household's income and generally shows a cyclic pattern. This cyclic behavior is explained by qualitative and quantitative changes in consumption basket. As we compare between households of rural and urban areas most of commodity groups differ in both structural and behavioral aspects which highlights the difference in consumption patterns of both areas.
Sohail J. Malik; Nadeem Sarwar	1993	Consumption patterns are different among rural urban regions as well as among all provinces. In Pakistan, marginal propensity to spend is lower for the households receiving international remittances.
Sonio R Bhalotra, Cliff Attfield	1998	Authors didn't find any evidence in the favor of biasness among children of different sex and different birth order and there is also not significant evidence in favor of the notion that elderly get different treatment. Results also showed that adult goods, food and child goods have non-linear Engel curves.
Eatzaz Ahmad; Muhammad Arshad	2007	Results showed that the households living in rural areas consider following items as absolute necessities housing, tobacco, wheat, clothing and foot wear while among middle-income class wheat is considered to be an inferior good. In case of urban households housing, health, wheat is found to be absolute necessities.
Ashfaque H. Khan; Umer Khalid	2011	Consumption patterns are found to be different among rural urban regions as well as among provinces. Results showed that the household consumers spend the greatest proportion on food and drinks.
Ashfaque H. Khan; Umer Khalid	2012	Findings showed that a greater share of financial resources has been devoted to education and health care by Female Headed Households as compare to their main counterparts.
Sohail Jehangir Malik; Hina Nazli; Edward Whitney	2014	Results found limited dietary diversity amongst Pakistani households. Average household consumes less than the recommended number of calories (2350 KCal). Rural and urban areas are found to have different consumption patterns.
Zahid Iqbal; Sofia Anwar	2014	Result confirms the differences in food consumption levels along with the differences in expenditure and price elasticities.
Nisar Ahmad; Muhammad Ramzan Sheikh; Kashif Saeed	2015	Consumption patterns between urban and rural households are found to be different and households with higher income tend to spend more on milk, fish, meat and rice as compare to their counterparts which tend to spend more on pulses, vegetables and wheat.

Pakistan's current account balance has always been dependent on remittances and these remittances also play a crucial role in uplifting the social status of the recipient households. There is a debate in

literature about the use of remittances while some people consider it to be used only for nonproductive purposes by households, other consider it to be one of the most important factor for increasing the socioeconomic status of the household. Remittances has also been found a significant factor in determining consumption patterns for Pakistan households (Malik & Sarwar, 1993). Urban households who receive remittance are likely to consume greater share of their income than their rural counterpart and at country level the households which are receiving international remittances are tend to devote lesser share of their income to expenditure than those who are receiving domestic remittances. The marginal propensities are highest for the domestic migrant households followed by non-migrant households and international migrant households having marginal propensities to spend 0.64, 0.52 and 0.57 respectively. Marginal propensities to spend on total expenditures are lowest in rural KPK and highest in urban Punjab. Marginal propensities to spend for households who does not receive remittances are lowest for urban Sindh and highest for rural Sindh.

It has been observed that more equitable distribution will stimulate demand for basic necessities as the people who are in the bottom income quintile are mostly deprived of most of necessities (Cheema & Malik, 1985). The impact of an increase in income has also significant impact on consumption expenditure, (Ali, 1985) in his analysis of household consumption and saving behavior assessed that an increase of 10 percent in the income per person would increases the household's total expenditure by 7.3 percent and out of a rupee increase in consumption expenditure, 28 percent goes to food. As per capita income of household rises, it effects household in several aspects and the demand for different products changes as per their nature which is determined by their elasticities. Results of earlier work done by many researchers confirms the validation of Engel law[7] however the underlined functional form has remained debatable over the period of time. The estimated values of elasticities are highly related with the functional form that has been used to calculate them, so as we change the underline functional form it will give different estimated values. The difference between these estimated values depends on the nature of the data set as well as the severity of the change in functional form.

Expenditure elasticities for various commodity groups differ with the different socioeconomic variables[8] (Burney & Khan, 1991) showed it in a repeated manner, which is described in the form of qualitative and quantitative alterations in the household's consumption bundle. It is difficult to absorb difference in the quality of products consumed by different tiers of households. Although, there are yardsticks to measure quality but variables measuring quality are not provided in HIES and PSLM.

[7] Engel law states that with an increase in income there will be decrease in share of income spent on food even if absolute expenditure on food increases.

[8] They calculated consumption elasticities for different income groups and also used additive and multiplicative dummy variables to highlight the difference among income groups.

However, difference in prices among different provinces gives us a rough estimate but this idea becomes vague if we bring in the concept of comparative advantage, transportation cost and access to road from households.

It has also been noticed (Khan & Khalid, 2012) that household with the same resources tends to choose different consumption bundles based on the gender and the education level of the household head. It is important to narrow our focus to specific household characteristics which would give us acute policy implications[9]. In their study to evaluate the differences in income allocation between households headed by male and female (Khan & Khalid, 2012) concluded that the households who are headed by females allocate greater share of their resources to productive avenues like increasing education level or getting training to enhance their skills.

Commodity prices are at their low these days which is estimated to change the way consumer optimize their consumption bundle due to the fact that lower level of prices would increase purchasing power of consumers. The current scenario is totally opposite of the situation which occurred from mid to late 2000s due to commodity price shock, which had drastically reduced the consumer's purchasing power. So it is also important to see that how consumers change their consumption bundles in response to change in their real purchasing power. As price of commodities changes, consumer's real purchasing power also changes; for example: if price increases by 100 percent then the consumer will only able to buy half of the products that he was able to buy before change in prices. Consumers are expected to adapt the situation to make changes in their consumption bundle in response to price change. The effect of prices on consumer's quantity demanded of a certain good can be disintegrated into substitution effect and income effect. Income effect captures the changes in consumption choices in response to change in consumer's real income where substation effect shows the effect of price changes on consumption bundle keeping consumer's real income constant.

Food prices has found to be the most important factor in determining the level of demand for other commodities, total expenditure and saving (Ali, 1985). In Pakistan, people who are unable to make it even half of the poverty line[10] are high as 2.3 million while the number of people who are just below the poverty line are 13.7 million and there are 10 million more than that who are just above the poverty line (Haq, Nazli, & Meilke, 2008). As now government of Pakistan has changed its methodology to calculate poverty line by abandoning the Food Energy Intake (FEI) method and adopting new method of Cost of Basic Needs

[9] If we can boil down our model to specify the cluster of households by specific characteristics like gender of the head, education of the head, number of children, etc. So we can make targeted policy implications which will not only save our time and resources but will also be more effective than other options.

[10] Previously poverty line in Pakistan was calculated by cost of minimum required calorie intake of 2350 calories per adult equivalent per day.

(CBN) for capturing non-food expenditures the percentage of population living under poverty has now jumped to 30 percent. Food consumption has significance especially in a country where average consumer spends almost half of his income on food. The problem of getting lower calorie intake is not solely based on the low income levels, quality and availability of food but it also depends on the choice of consumption bundles whether the consumer is having a balanced diet or not. When there is lack of awareness, consumers often end up having unbalanced diet which effects their health status in the long run. The scope of this paper is limited so I would like to bring the focus back to calorie intake and consumption bundle. A consumer would be in a better position to get a balanced diet if he is fully aware or at least have some knowledge about the calorie content of the products he is using. In this way a consumer can optimize his diet given his financial constraints.

Sometimes price response may tend to vary among different market, cities and other demographic variables e.g. Bigger cities have better organized markets that encourage competition and will lead to more variety and lower price level compare to small isolated markets. In case of Spain, consumers' responsiveness to price were greater in large central cities in comparison to rural areas (Navamuel, Morollón, & Paredes, 2014). The main reason of prices being lower in the large central cities is competitive markets and high population density which allow retailers to operate at lower margins and make profits on the basis of volume of their sales. Results like these implies that we need to be specific in our policy making because consumer living in big cities may respond to the same policies differently than the people living in rural or urban areas with small markets.

Urbanization and trade openness also plays a vital role in altering the consumption patterns. Increased trade gives consumer more variety to choose from so they are likely to alter their consumption bundles (Hovhannisyan & Gould, 2011) (Kearney, 2010). It has also been estimated that people across the globe on average allocate the highest share of their income on food (25%) (Selvanathan & Selvanathan, 2006). China is one of the fastest growing economy in the world and this growth has increased the real purchasing power of Chinese consumers which has altered their dietary patterns. Dietary patterns of an average household have now incorporated elements like fine grains into their traditional diets (Hovhannisyan & Gould, 2011). This change might be caused due to the fact that trade liberalization has provided greater variety to Chinese consumers which were not available before. The change in consumption patterns might not be similar across different regions and different socioeconomic classes. India has also witnessed a change in consumption pattern and this change was found to be significant for both rural and urban regions (Viswanathan, 2001). Indian household consumers of lowest quintiles were found to allocate more of their income to non-food expenditures then they were allocating before which has caused by the price changes in rural areas and income changes in urban areas. For the households in middle and upper

quintiles this change has not only been limited to a shift from food to non-food products but also have increased the diversity of food basket by including more fruits and vegetables.

It has been seen that consumers in urban areas are tends to have more diversified consumption bundle than their rural counterpart. Diversified consumption bundle allows people to have better nutritional status than those whose dietary patterns are composed of only few products. In Pakistan, there is limited dietary diversity among Pakistani households (Malik, Nazli, & Whitney, 2014). Large number of population consumes less than the required number of calories and these trends are heterogeneous among rural and urban regions and also vary among different socioeconomic classes. In this study I aim to discover disparity in average household's consumption patterns, calorie intake and their responsiveness to changes in price and income. We will be calculating and highlighting these disparities in different regions (rural and urban), among provinces and within a province for a period of 2001-2014. To the best of our knowledge there has been no comprehensive study done to investigate consumption pattern disparity among all these tiers (National, Inter-Provincial and Intra-Provincial) and we expect consumption patterns to be heterogeneous at these levels on the basis of the fact that Pakistan as a country have seen regionally unbalanced growth since the beginning. Varying levels of income, education, market structure, law and order situation and there are many other factors which have caused these differences at different levels over the period of time but the scope of this study is to only highlight the differences and their severity.

3. DATA AND EMPIRICAL METHODOLOGY

3.1 Data

In this study, the analysis done on six latest data sets (2001-02, 2005-06, 2007-08, 2010-11, 2011-12 and 2013-14) of Household Income Expenditure Survey (HIES) which covers the period from 2001-2014. Pakistan Bureau of Statistics (PBS) conducts HIES since 1963 later it was merged with the Pakistan Integrated Household Survey (PIHS). The latest available dataset is of HIES 2015-16 which is not included in this study. The primary reason is that, the coding scheme for various commodity groups in HIES 2015-16 has been revised and updated. We plan to consider this survey round in our future research work. For current study, average household size and sample size for HIES datasets (2001-02, 2005-06, 2007-08, 2010-11, 2011-12 and 2013-14) are given below.

Summary Table

Year	Sample Size of Households			Average Family Size
	Rural	Urban	Total	
2001-02	10233	5949	16182	7.21
2004-05	8899	5809	14708	6.69
2005-06	9213	6240	15453	7.17
2007-08	9257	6255	15512	6.9
2010-11	9752	6589	16341	6.66
2011-12	10481	6743	17224	6.73
2013-14	11755	6234	17989	6.61

Note: Authors' computations from HIES datasets.

3.2 Empirical Methodology

Calculating elasticities, for different demographic variables and socioeconomic classes, is one of the objectives of this study to fulfill for which we need to choose an appropriate econometric model along with a suitable statistical technique. There are several techniques which can be used to complete this task but every technique has its own advantages and disadvantages. Therefore, to make results stable and robust the selection of best available technique is of dire importance.

(Rahman, 1963), (Siddiqui, 1982) (Burney & Khan, 1991), (Khan & Khalid, 2011) (Khan & Khalid, 2012) employed the technique of Linear and Double Logarithm Engel Curves where, (Bussnik, 1970) used Augmented Engel Curve, (Ali, 1985) worked with Extended Linear Expenditure System, (Malik, Abbas, & Ghani, 1987) used the functional form of Generalized Least Square (GLS) and (Malik & Sarwar, 1993) preferred OLS for estimation and more recently (Ahmad et al., 2015) did his study with Linear Engel Curves. There are few authors who have tried to use many techniques to check differences in their estimated results like (Cheema & Malik, 1985) did using several techniques. However, availability of so many techniques makes you comfortable but such a wide range of options sometimes confuse your which technique to use. That is one of the important reason why some authors try to come up with new techniques which can suit better with the properties of data and the nature of the analysis.

(Farooq, Young, & Iqbal , 1999), (Viswanathan, 2001), (Haq, Nazli, & Meilke, 2008), (Bertail & Caillavet, 2008), (Malik, Nazli, & Whitney, 2014), (Navamuel, Morollón, & Paredes, 2014) used the linear specification of AIDS developed by (Deaton & Muellbauer, 1980). This technique is considered to give more flexibility in demand curve estimation and fulfills more properties of the demand curve. AIDS derives budget share equation using the cost function introduced by (Muellbauer, 1976) named PIGLOG cost functions. However, (Bhalotra & Attfield, 1998) investigated that semi parametric estimates of Engel curves for rural Pakistan suggest that the popularly used (PIGLOG) class of demand models is in appropriate. The

data favor a quadratic logarithm specification. In the case of food, the results for Pakistan stands in contrast to that for the US, UK and Spain, all of which have Engel curves linear in the logarithm of expenditure. To address the issue of dynamics of the Engel curves (Ahmad & Arshad, 2007) used Spline Quadratic Engel Equation System which can incorporate bulges of the Engel Curves. This study finds that the resulting flexibility produces many interesting patterns of changes in the classification of goods into necessities and luxuries across income ranges. These patterns can be taken into account for various tax policy experiments for better design of welfare policies in Pakistan.

For other empirical studies, table (Table 2) tries to summarize the techniques being used in similar topics in context of different countries, including Pakistan.

Table 2: Techniques used by other Researchers

Authors	Years	Techniques Used
Gustav Ranis	1961	Parabolic Consumption Functions
A.N.M. Azizur Rahman	1963	linear and double log form
G.C. Hufbauer	1968	Linear Engle Curve
Muhammad Irshad Khan	1969	Linear Engle Curve
Willem C.F. Bussnik	1970	Augmented Engel Curves
Aftab Ahmad Cheema; Muhammad Hussain Malik	1985	Linear, log-log, semi-log, ratio of semi log inverse and log - log inverse.
M. Shaukat Ali	1985	Extended Linear Expenditure System
Sohail J. Malik; Kalbe Abbas; Ejaz Ghani	1987	GLS and different tests to check pooling
Harold Alderman	1988	Linear Almost Ideal Demand System (LAIDS)
Nadeem A. Burney; Ashfaque H. Khan	1991	linear and double logarithm Engel Curves
Sohail J. Malik; Nadeem Sarwar	1993	OLS
Sinio R Bhalotra; Cliff Attfield	1998	Several estimation techniques
Umar Farooq; Trevor Young; Muhammad Iqbal	1999	Linear Almost Ideal Demand System (LAIDS)
Brinda Vishwanathan	2001	Linear Almost Ideal Demand System (LAIDS)
Eliyathahby Antony Salvanathan; Saroja Salvanathan	2003	Rotterdam Model
Eliaz Mantzouneas; George Mergos; Chrysostomos Stoforos	2004	ECM formulation of AIDS
Eatzaz Ahmad; Muhammad Arshad	2007	Spline Quadratic Engel Equation System
S. Limba Goud	2010	Double Log Expenditure Function
Vardges Hovhannisyan; Brian W. Gould	2011	Generalized Quadratic AIDS
Ashfaque H. Khan; Umer Khalid	2011	linear and double logarithm Engel Curves
Ashfaque H. Khan; Umer Khalid	2012	linear and double logarithm Engel Curves
Elena Lasarte Navamuel; Fernando Rubiera Morollon and Dusan Paredes	2014	Linear Almost Ideal Demand System (LAIDS)

Sohail Jehangir Malik; Hina Nazli; Edward Whitney	2014	Linear Almost Ideal Demand System (LAIDS)
Zahid Iqbal; Sofia Anwar	2014	Quadratic Almost Ideal Demand System (QUAIDS)
Nisar Ahmad; Muhammad Ramzan Sheikh; Kashif Saeed	2015	Linear Engle Curve

Motivating from earlier attempts, if we incorporate the approach of (Bhalotra & Attfield, 1998) then we are left with fewer choices after eliminating linear models. For this analysis the quadratic specification of AIDS has been used. As of today, this technique has not been so commonly used for analysis of the household datasets in Pakistan, except (Iqbal & Anwar, 2014). In order to use this technique, following variables are required: income, prices, quantity demanded, and food bundle shares in total expenditure on food. In household surveys of Pakistan, the data on income is not much reliable as people tend to underreport their income therefore to tackle this problem (Houthakker, 1970) recommended to use total spending as an alternative of permanent income. The use of total expenditure as permanent income may often lead to the problem of economies of scale. Households' total expenditure can be bifurcated into these two effects which are 'income effect' and 'specific effect'.

The specific effect captures the increase in necessities demanded because of increase in household size where the income effect refers to the effect of increase in household size at given level of income which decreases per capita income of household and makes everyone poorer. To tackle this problem, we used the variable of expenditure per capita which can be calculated by dividing total household expenditure and by household size (both can be calculated using HIES dataset). Another problem which arises using HIES datasets is that it does not collect data for prices of commodities consumed. However, data of expenditure done on the specific products and their quantity consumed are available in the datasets which can be used to find a close proxy for prices of the products. Underline estimation method used in this study to estimate QAIDS is non-linear seemingly unrelated regression. This method is the extension of LA-AIDS as developed by Deaton and Muellbauer (1980a,b).[11] The nonlinear extension of LA-AIDS has been done by Banks, et al., (1997).[12]

In this study household consumer's demand for following eleven food groups is considered: wheat, rice, other cereals, pulses, fresh fruits, vegetables, dairy, meats, oils, sugars and others (tea, coffee, spices and condiments etc.). Model used in the estimation is based on the following indirect utility function:

[11] Deaton, A., and J. Muellbauer (1980a). "An Almost Ideal Demand System", *American Economic Review,* 70 (3): 12-26
Deaton, A., and J. Muellbauer (1980b). *Economic and Consumer Behavior,* Cambridge University Press

[12] Banks J, Blundell R, Lewbel A. (1997): Quadratic Engel Curves and Consumer Demand. *The Review of Economics and Statistics*, 79(4): 527–539.

$$\ln a(p) = \propto_0 + \sum_{i=1}^{k} \propto_i \ln p_i + \frac{1}{2} \sum_{i=1}^{k} \sum_{j=1}^{k} \gamma_{ij}\, lnp_i \ln p_k \qquad (1)$$

Where; in the above transcendental logarithm function subscript i denotes the category of food group therefore, p_i is the price of the i^{th} food group. Following is the equation of Cobb-Douglas price aggregator:

$$b\,(p) = \prod_{i=1}^{k} P_i^{\beta_i}$$

$$\lambda(p) = \sum_{i=1}^{k} \lambda_i \ln p_i$$

In the equation above $\propto_0$ could be estimated jointly with other parameters but in practice as most of the researchers set its value slightly less than the lowest value of the logarithm of total expenditures which can be easily calculated from the data. Adding up, homogeneity[13] and slutsky symmetry[14] requires the following restrictions to be imposed:

$$\sum_{i=1}^{k} \propto_i = 1, \qquad \sum_{i=1}^{k} \beta_i = 0\,, \qquad \sum_{j=1}^{k} \gamma_{ij} = 0\,, \qquad \sum_{i=1}^{k} \lambda_i = 0 \qquad and \qquad \gamma_{ij} = \gamma_{ji}$$

By applying Roy's identity to equation (1) which is the equation of indirect utility, I obtain the expenditure share equation:

$$w_i = \propto_i + \sum_{j=1}^{k} \gamma_{ij}\; lnp_j + \beta_i\, ln\left\{\frac{total\ expenditure}{a(p)}\right\} + \frac{\lambda_i}{b(p)} \left[\ln\left\{\frac{total\ expenditure}{a(p)}\right\}\right]^2 \qquad (2)$$

$$i_{1\to k}\ and\ j_{1\to k}$$

Here λ_i is the coefficient of quadratic term. If λ_i becomes zero in any case, then the model above will be reduced to linear version of AIDS.

Demographic variables are also incorporated in this study by using scaling technique introduced by Ray (1983) and developed by Poi (2002a and 2012) to the quadratic specification of AIDS. Here we use a vector m which represents s characteristics. This matrix can incorporate number of characteristics and the simplest can represent only one characteristic which will make m a scalar quantity. Let $expenditure^z(price, utility)$ be a representative function of a randomly chosen household so this household might only be consisting of only one member. Ray suggested Ray to use following expenditure function for each household:

[13] The effect of increase in prices is proportional to increase in expenditure on food.
[14] Cross partial effects are always equal.

$$expesnditure\ (price, m, utility) = h_0(price, m, utility) \times expenditure^{Z}(price, utility)$$

To scale the expenditure function Ray used the function $h_0(price, m, utility)$ to incorporate household attributes. This function can be further decomposed as:

$$h_0(price, m, utility) = \bar{h}_0(m) \times \theta\ (price, m, utility)$$

Both terms used in the above function are placed to absorb different effects. The first expression $h_0(m)$ processes the effect of increase in household's expenditures subject to the matrix m which is incorporating different household characteristics without incorporating the changes in consumption bundle or price effects; a household composed of t members will spend more than the household composed of k members if $t > k$. The second expression in the above term controls for changes in actual goods consumed and relative prices; a household with two infants five children and four adults will consume quite differently from the one composed of five adults. As suggested by Ray (1983), $\bar{h}_0$(m) parameterized as:

$$\bar{h}_0(m) = 1 + \tau'(m)$$

here τ is a vector of parameters to be estimated. $\theta(price, m, utility)$ is parameterized as:

$$ln\theta(price, m, utility) = \frac{\sum_{j=1}^{k} P_j^{\sigma_j} (\prod_{j=1}^{k} P_j^{\delta'_j m} - 1)}{\frac{1}{utility} - \sum_{j=1}^{d} \lambda_j\ lnP_j}$$

This functional form has an edge over other forms that it results in expenditure share equations that closely follows other equations which do not incorporate demographics. Here δ_j represents the j[th] column of $k \times d$ parameter matrix δ. Following is the equation of expenditure shares.

$$w_i = \propto_i + \sum_{j=1}^{k} \gamma_{ij} \ln P_j + (\beta_i + \delta'_i m) \ln\left\{\frac{h}{\bar{h}_0(m) a(P)}\right\} + \frac{\lambda_i}{b(p) c(P, z)} \left[ln\left\{\frac{h}{\bar{h}_0(m) a(P)}\right\}\right]^2 \qquad (3)$$

$$i_{1 \to k}\ and\ j_{1 \to k}$$

Where, $c(P, m) = \prod_{j=1}^{k} P_j^{\delta'_j m}$

In order to satisfy the adding up property $\sum_{j=1}^{k} \delta_{ij} = 0$ for r=1→s. In this study I'll be calculating the compensated price elasticities, uncompensated price elasticities and expenditure elasticities. Following is the formula for uncompensated price elasticity of good i with respect to change in price good j:

$$\epsilon_{ij} = -\pi_{ij} + \frac{1}{w_{ij}} \left(\gamma_{ij} - \left[\beta_{ij} + \delta_i' m + \frac{2\lambda_i}{b(P)c(P,m)} \ln\left\{ \frac{h}{\bar{h}_0(m)a(P)} \right\} \right] \times \left(\propto_j + \sum_l \gamma_{jl} \ln P_l \right) - \frac{(\beta_j + \delta_j' m)\lambda_i}{b(P)c(P,m)} \left[\ln\left\{ \frac{h}{\bar{h}_0(m)a(P)} \right\} \right]^2 \right) \quad (4)$$

$$i_{1\to k} \text{ and } j_{1\to k}$$

The expenditure (income) elasticity of good i can be obtained from the following formula:

$$\mu_i = 1 + \frac{1}{w_i} \left[\beta_i + \delta_i' m + \frac{2\lambda_i}{b(P)c(P,m)} \ln\left\{ \frac{h}{\bar{h}_0(m)a(P)} \right\} \right] \quad (5)$$

Slutsky equation ($\epsilon_{ij}^c = \epsilon_{ij} + \mu_i w_j$) can be used to find compensated price elasticities.

Here I'll use the estimation technique of iterated feasible generalized nonlinear least-squares to estimate the parameters.

4. FOOD CONSUMPTION PATTERNS

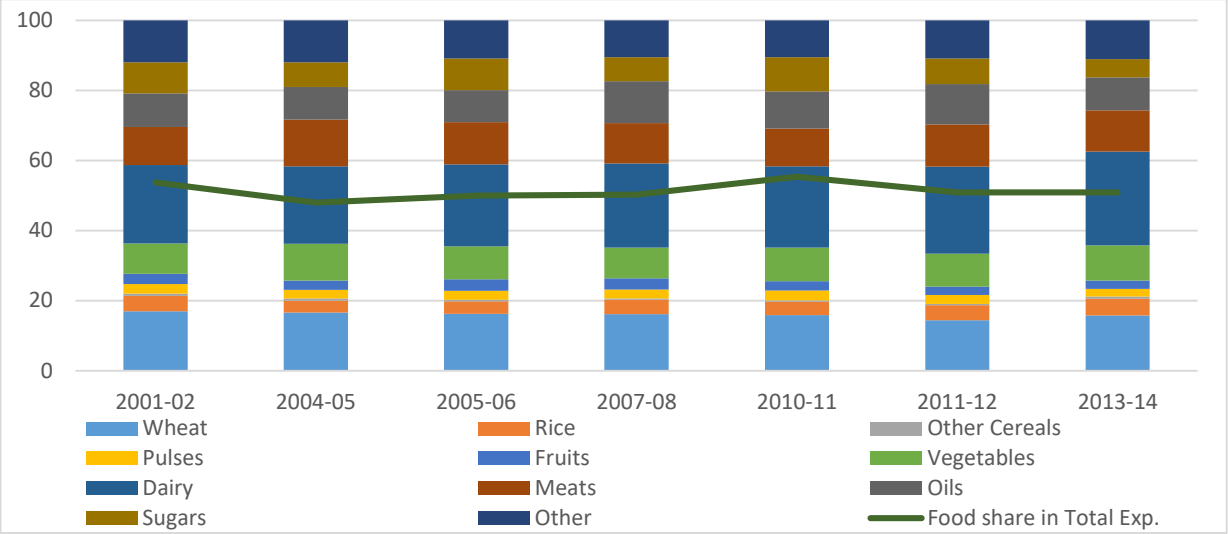
In this section we will be discussing the trends and changes in food consumption bundles, calorie bundles and cost of calories. This section will do the multi-tier analysis as the variables are calculated at national level, provincial level and as well as sub-provincial level. By sub-provincial level we mean the difference between urban and rural regions of a particular province which will enable us to highlight the rural urban diversity in the provinces. See the chart below to have a better look to understand different tiers of analysis.

4.1 Food Consumption Bundles

The share of food expenditure in the total expenditure has been more than 50 percent during 2001-2016 except for the year 2004-05 where it fell down to 48 percent. On average, the food expenditure shares in total expenditure for 2001-2016 has remained 51 percent. This share has been relatively as low as 45 percent for the urban areas while for rural areas this share jumps to 55 percent having its highest value of 59 percent in 2010-11. This share increases as we move towards the families having lower per capita income and decreases as shift our focus to the families having higher per capita income (See, Figure 4). If we look at

these shares at the provincial and sub provincial levels, then urban Punjab has the lowest share (42 percent) of food expenditure in total expenditure followed by urban Sindh (43 percent) while the largest shares are found to be in rural Balochistan (55 percent) followed by rural KPK and rural Sindh both at 54 percent (see Figures 20 and 21). These shares tell us pretty much about the income level in these regions as according to Engel law "share of food expenditures in total expenditures tend to decrease with an increase in total income" and our food expenditure shares are in line with the reality as central Punjab is economically the most prosperous region followed by the urban Sindh (Ahmed, 2011).

Figure 4: Consumption Bundles at National Level



Source: Author's calculations from several issues of HIES

On the aggregate level, the biggest share of this food expenditure is accounted for dairy products which was 27 percent of the total food expenditure in the year 2013-14. The second biggest share of the food expenditure is accounted for Wheat (16 percent) followed by Meats (12 percent) and Vegetables (10 percent) in the year 2013-14. The share of wheat is greater for rural region as compared to urban region whereas shares of dairy and meats are greater for urban region while share of vegetables remains same in both regions. Share of wheat has been almost stagnant for urban regions while its share has been increasing for rural regions during the period of study. However, the shares of different food categories are different at aggregate, urban and rural level but the ranking of the top four food groups are the same where dairy being at top of the list followed by wheat, meat and vegetables. This ranking remains the same with different values for expenditure shares for all provinces except for Balochistan in which wheat has the highest average expenditure share of 20 percent followed by meats (17 percent), dairy (14 percent) and vegetables having average share of 11 percent (See Figures 22 to 38).

If we divide these numbers by bottom and top income quintiles, then we can highlight the differences between consumption bundles of both income groups. Households which lies in the bottom income quintile spends more on wheat as their average food expenditure share on wheat is 24 percent for the period under study. The first rank of wheat is followed by dairy (18 percent), Oils & fats (12 percent) and vegetables (11 percent). This consumption bundle contrasts with the consumption bundle of the households in top quintile which spends most on dairy products (26 percent) followed by meats (15 percent), other products (13 percent) and finally wheat (11 percent). Wheat is the most important food group in bottom quintile of all provinces having its largest share of 27 percent for Balochistan followed by 26 percent in KPK, 25 percent in Punjab and 21 percent in Sindh. Dairy products have the second largest share in all provinces except Balochistan in which vegetables and meats have a similar average share but share of vegetables has been increasing during the period of study while the share of meats is at a decreasing trend. Oils and fats has the third largest share in all provinces where in Sindh food group of vegetables also shares the same position (see Figures 22 to 38).

In contrast with the bottom quintile, the people in top income quintile spends the biggest share of their food expenditure on dairy products in all provinces except Balochistan in which the largest share is possessed by meats. Meats has the second biggest food share in Sindh and Punjab, in KPK the second rank is shared by meats and wheat while dairy products are at the same position in Balochistan. The food shares of meats and dairy products have an increasing trend while the share of wheat has been declining over the period of time. Other interesting thing which can be seen by the food shares of top income quintile is that food group of other products has the third biggest food share in Sindh and Punjab. The analysis using income quintiles clearly contrasts the consumption pattern of both groups where poor spending more on the basic necessities like wheat and rich spending more on dairy and meats.

4.2 Calorie Bundles

It is important to understand the importance of calorie bundles because the diet we consume today is the most important determinant of our health in the future. Wheat is the most important product in the calorie bundle of the country as its average share in calorie bundle is 48 percent. This share soars up to 50 percent in case of rural households and shrinks to 44 percent in case of urban consumers. However, its share has been declining over the period of time but it is still the most important ingredient in the calorie bundle of the country. The second biggest share in the calorie bundle is occupied by the fats & oils having average calorie share of 14 percent and the alarming thing is that this share is increasing over the period of

time. For urban households the third most important food group by calorie share is dairy products[15] (11 percent) followed by sugars (10 percent). In contrast to urban households, sugars have the third largest share in calorie bundle (11 percent) followed by dairy products (10 percent).

Not surprisingly wheat has the biggest share in calorie bundle of each province having its highest share of 54 percent for rural Balochistan and its lowest share of 38 percent for urban Sindh. Oils & fats have the second biggest share in the calorie bundle for all provinces but in the case of Punjab, dairy products also have the same average share in calorie bundle. Dairy products have the third largest share in calorie bundles of all provinces except for Punjab in which this position is taken by sugars. For urban regions dairy products have the third biggest share in calorie bundles of Sindh and Punjab after wheat and oils & fats. In contrast to Sindh and Punjab, sugars have the third largest share in calorie bundles of KPK and Balochistan. For rural Punjab, dairy products have the second biggest share in calorie bundle followed by fats and oils. Unlike rural Punjab, in rural Sindh second largest share has been occupied by fats and oils followed by the sugars. In contrast to bundles in other provinces rural KPK and rural Balochistan has both sugars along with fats and oils at the second position followed by dairy products (see Figures 39 to 46).

To have a balanced diet our food should mainly composed of grains and cereals followed by fruits and vegetables. All kind of meats along with dairy products comes after fruits and vegetables and fats & oils with sugars have the smallest shares. So far all the estimated consumption bundles are missing this dietary diversity which is the main reason of malnutrition among masses. The other most important thing which is absent in these dietary patterns is the use of vegetables and fruits and this is the surprising thing for the country who claims to be an agrarian economy. Pakistani households need to diversify their diet to fight malnutrition and possible health risks.

4.3 Cost of Calories

The data shows that the diet of Pakistani households have not been efficient in terms of expenditures. After having the per AE expenditure and calorie contribution of each food group we calculated the cost of 100 kilo calories. The cost of calories is quite reliable estimate to get an idea what consumer is actually paying for each calorie consumed from different food groups and by how much cost of calories from these groups differ. The cheapest source of calories at all levels is not surprisingly wheat this is one of the most important reasons why we see wheat having the largest share in calorie bundle. The second cheapest source of calories is sugars followed by fats & oils and rice. The cost of calories for almost every food group is higher in urban

[15] If we also include desi ghee in dairy products instead of fats & oils, then the share of dairy products will increase both in food expenditure and calorie bundle.

areas as compare to the rural areas. One possible reason for the cost of calories being lower in rural areas could be the fact of rural region being net producer of food products.

Meats has found to be most expensive source of calories followed by the fruits and vegetables. Five out of eleven food groups have seen rise in the cost of calories during 2001-2014 (see, Table 3 and Figures 47 to 53). Similar patterns have been observed in the case of other food groups. The cost incurred in gaining calories from wheat has been lowest in rural Punjab which is aligned with the fact that the region is the largest producer of wheat in the country. The cost attributable to vegetables, dairy and sugar has also been lowest in the province of Punjab and this finding is backed by the fact that the province has been the biggest contributor in the production livestock. The cost of calories of rice has been lowest in rural Sindh during the period of study and the average cost of calories from sugar has also been lowest in rural Sindh. The average cost of calories from sugar is almost similar in Punjab and Sindh during the period of study. The cost of calories from fruits and meats has been lowest in KPK and Balochistan. If the cost of calories is lower in certain region then it doesn't mean that the cost of calories from everything within that bundle is lower in that region, it's always about the average cost of calories that they are getting from that bundle which could also be effected by the composition of that bundle for that particular region. For example, if there is a region where people prefer poultry meat over other forms of meat (beef, mutton, seafood etc.) then the cost of calories of meat for that particular region will be completely different from the region which prefer to eat seafood and mutton. Therefore, the cost of calories varies with the composition of specific bundles therefore It tends to vary across regions as among different groups.

Table 3: Cost of Calories (2001-2014)

Food Groups	**2001-02**	**2004-05**	**2005-06**	**2007-08**	**2010-11**	**2011-12**	**2013-14**
Wheat	0.26	0.36	0.36	0.48	0.81	0.82	1.12
Rice	0.62	0.73	1.03	1.85	2.53	2.98	2.63
Other Cereals	0.43	0.72	0.49	0.80	1.34	1.56	1.98
Pulses	1.28	1.33	1.61	2.16	3.81	4.12	3.97
Vegetables	2.23	3.31	3.19	3.71	6.56	6.81	9.52
Dairy	1.98	2.33	2.38	2.97	5.41	5.95	7.86
Oils	0.62	0.76	0.75	1.25	1.76	1.98	1.97
Sugars	0.73	0.74	0.85	0.89	2.15	1.91	1.64
Other	2.42	2.33	2.87	3.44	6.52	6.99	7.64

Source: Author's calculations from several issues of HIES

5 ESTIMATED DEMAND ELASTICITIES

In this section we will present the estimates of the Quadratic Almost Ideal Demand System model for seven HIES datasets from 2001-2014. Making a panel of thirteen years would result in single B coefficient and elasticities for whole dataset and would possibly ignore the inter-temporal effects. Therefore, instead of making a panel of these datasets analysis on each cross-section has been preferred. The main reason for doing analysis on each cross section instead of making a panel is that because (Malik, Abbas, & Ghani, 1987) in their study concluded that any attempt of making a time series of the data will give spurious results. Over the period of time the way people respond to alteration in prices and income changes over time along with the demographics of the situation, which highly effects the elasticity numbers which is why it must be different for every year and we cannot fix it by making a time series. In this model, demographic variables have been controlled for region (rural/urban) and province (Punjab, Sindh, KPK, and Balochistan). Food items are classified into eleven groups: wheat (contains wheat and floor), rice (all kind of rice consumed), other cereals (all other cereals that are not included in other categories), pulses, fruits (all kind of fresh fruits except canned fruits), vegetables (all kind of vegetables except canned vegetables), dairy (all dairy products except desi ghee), meats (includes all kind of meats), oils and fats (includes all kind of oils), sugars (all kind of sugars and sweeteners) and others (all other food items are included in others).

HIES doesn't collect data on prices but it collects data on expenditure and quantity consumed for a specific product. Therefore, in order to get some idea of prices we generated a proxy for prices which is calculated by dividing the expenditure on specific product by its quantity consumed. To control for regions (urban and rural) and provinces (Punjab, Sindh, KPK, Balochistan) dummy variables have been incorporated in the model. The dummy variable for provinces is found to be significant while the dummy variable for region is found to be significant for most of the years which shows that the consumption patterns are heterogeneous across regions (urban/rural) and provinces (See appendix for more tables).

5.1 Estimated QU-AIDS model

Some descriptive statistics like daily calorie intake, prices, food expenditure, calorie bundles and expenditures have highlighted the differences between provinces, regions and different income quintiles. These figures showed that the consumption patterns are not homogeneous for different income classes. Prices tend to be higher in urban areas as compare to the rural areas and households which are in higher income quintile are likely to face higher prices as compare to rural areas. These differences in prices are might be because of the dissimilarity in quality of the products but due to limitation of data we cannot confirm it. However, relying on implicit price assumption, we have estimated QU-AIDS model with host of

exogenous variables. The results are reported in Tables 8 to 13 (see, Appendix). Using these empirical results, we have computed expenditure and price elasticities.

5.2 Expenditure Elasticities

Expenditure elasticities gives us the estimate that a proportional increase in income bring how much change in the consumption of specific commodities. This also gives us nature of commodity depending upon the elasticity number. If the number is less than 1 then the good is a necessity if it's greater than 1 then it's a luxury and if it turns out to be less than zero i.e. negative, then its known as inferior good. Fruits, Dairy and Meats stands out to be luxury goods for the period under study each having period average expenditure elasticity of 1.2, 1.1 and 1.2 respectively (see, Table 14). Other food groups found to have average expenditure elasticity less than 1 with a little variation in each year while the average expenditure elasticity of vegetables are found to be 1 which is a bit surprising however it varied among different income groups during the period of study[16]. Other cereals are found to be least sensitive to income changes with the period average expenditure elasticity of 0.7 followed by the wheat. Rice, sugars, fats & oils and others have same average expenditure elasticity of 0.9 but variations in each of them is highly dissimilar for the period under consideration. The expenditure elasticities of all food groups except fruits, meats and others are found to be greater for rural areas as compare to urban areas (see, Table 15 & 16).

At provincial level, the magnitude of income elasticity of wheat is found consistent in all provinces except Balochistan where its average expenditure elasticity is estimated to be slightly greater than 1 (i.e. 1.1, see Tables 17, 18, 19 and 20). It is possible because the per capita income is lowest in Balochistan and income distribution is also quite skewed but the value of expenditure elasticity for wheat falls to less than one if we keep our focus to top income quintile households. Consumption of rice is more income elastic in Punjab as compare to other provinces whereas consumption of fresh fruits is found to be more income elastic in Sindh as compare to other provinces. Pulses are found to be unitary expenditure elastic in Balochistan which is on average higher than other provinces. The expenditure elasticities of vegetables and sugars are higher in KPK and Balochistan while the expenditure elasticity of dairy products are lowest in Balochistan which is less than 1. These different numbers show the dissimilarity of household behaviors in these regions and these dissimilarities increases pretty much if we also include the differences among different income quintiles. On average consumption of households in the top quintiles are less sensitive to changes in income as compared to the consumption of households in the bottom quintile.

[16] See Appendix for more details

5.3 Price Elasticities

This section discusses two types of elasticities Marshallian and Hicksian elasticities. Marshallian elasticities are the elasticities which are not adjusted for income whereas Hicksian elasticities are the one adjusted for income changes. Marshallian elasticities show prices effect which is composed of two effects income effect and substitution effect while Hicksian elasticities only includes substitution effect. We will be discussing two subtypes own (own and cross price elasticities) for each broader classification of elasticities explained above. Own-price elasticities are the one which tells us about the sensitivity of quantity purchased/consumed of a product to its own price that is why it is call own-price elasticities. Cross price elasticities tell us about the relation of quantity consumed of one good with the price of another. At national level, wheat and oils & fats are estimated to have lowest average price elasticity for 2001-14. This shows that the households at national level are least sensitive to the prices of wheat and oils & fats while the other food groups which are less sensitive to price changes are pulses, sugars and vegetables having own price elasticities of -0.25, -0.27 and -0.28 (see, Table 21). These numbers are quite expected as these commodities are considered as necessities. Other cereals are found to be most price sensitive with the average price elasticity of -2.17 followed by rice, dairy and meats having average price elasticities of -1.64, -0.81 and 0.33[17] respectively (see, Tables 21 to 27).

The most unexpected yet interesting thing which came across during this study is the positive price elasticity of meats this is quite possible because bundle of meats have different kind of meats (poultry, beef, mutton, fish etc.) in it and variation in the prices of most categories of meats are high and they all are close substitutes of each other this is the reason why uncompensated (Marshallian) own price elasticity for meats is positive however if we break down this category into different sub categories then price elasticity of each will become negative. Urban households are found to be less price sensitive as compare to the rural households for almost all food groups except other cereals, fruits and dairy products however the nature of all food groups are similar in both regions with the dissimilar elasticities. This implies that the preferences of consumers and the way they react to price changes are different in rural and urban regions (see, Tables 4, 5 & 6). At provincial level, Sindh is found to be least price sensitive among all other provinces for the food groups of wheat, rice, pulses, vegetables, meats and oils & fats while Balochistan is found to be least price sensitive among all province for following food groups: fruits, dairy and other. The nature of food groups is almost similar across provinces having significant variations in the absolute numbers these variations become larger if we compare households of different income quintiles. Households of lower income

[17] Meat is an exception to the general trend mainly due to two reasons first, there being frequent substitution effect among different categories of meat second, difference of responsiveness against income among different income quintiles

quintiles are found to be more price sensitive as compare to the households present in the top income quintile. The food group of meats are found to be almost insensitive to price changes in Sindh while its elasticity follows national trend in case of other provinces by being positive and it can be explained the way we just explained it for the national level. There has been a significant difference in the Marshallian price elasticities and Hicksian price elasticities which shows that keeping the similar utility level afterwards a price change reduces the sensitivity to price changes. The biggest difference between uncompensated and compensated own price elasticity has been witnessed in case of dairy followed by wheat, meats and vegetables which shows the price responsiveness becomes lower after maintaining the same utility level in response to a price change (See, Tables 28, 29, 30 & 31).

Cross price elasticities give the relation between two goods. If the cross price elasticity is negative, then the two goods are said to be compliments whereas its positive value indicates their relation of being substitutes. Most of the food products are seems to look like compliments before allowing for income adjustments. However, if expenditures of households are adjusted to kept the utility level same then most of the food group becomes substitutes. Wheat and rice have positive cross price elasticities in almost every single year but most of them have small coefficient and coefficient for the substitution from rice to wheat is higher than the coefficient for the substation from wheat to rice which is zero for almost every year. These numbers suggest that the rice is more likely to be substituted by wheat but wheat is not likely to be substituted by rice which makes them pretty much price independent (i.e. not sensitive to changing price of wheat but sensitive to a price change of rice). This result is quite expected as importance of wheat as cheapest source of calorie has already been discussed and that is why it was expected to not being substituted by other food groups especially with the one having cost of calorie intake much higher than wheat. Wheat and other cereals also found to have positive price elasticity which makes them substitutes but substitution from other cereals to wheat is more likely to happen as compare to substitution from wheat to other cereals whose coefficient is almost close to zero for most of the years. These results are a bit contradicting with the findings of (Farooq, Young, & Iqbal , 1999), (Haq Z. , et al., 2011) and (Malik, Nazli, & Whitney, 2014) and the possible reasons for that would be my use of Quadratic Almost Ideal Demand System which is a better technique and the use of seven different cross-sections of HIES from 2001 to 2014. Substitution effect is slightly more dominant for rural households as compared to their urban counterpart. Similar trends have been found for all four provinces with different intensities. People living in Balochistan are estimated to make substitution between most products as compared to the people living in other provinces. This trend is leaded by Balochistan and followed by KPK, Punjab and Sindh respectively where people of Balochistan are estimated to substitutes 80 out of 110 combinations in elasticity matrix (we get 110 by subtracting 11 options from $matrix_{(11x11)}$).

Table 4: Price Elasticity Matrix at National Level

	Marshallian Elasticity Matrix at National Level										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.54**	0.06	0.03	0.00	-0.05	-0.03	-0.09	-0.22	-0.07	-0.03	0.03
Rice	0.27	**-1.35**	-0.01	0.04	0.13	-0.03	0.04	0.06	-0.08	-0.11	0.09
Other Cereals	0.96	-0.04	**-2.17**	-0.28	0.13	-0.09	0.32	-0.55	0.43	-0.02	0.64
Pulses	-0.02	0.06	-0.05	**-0.51**	-0.01	0.04	0.02	-0.33	-0.07	-0.07	0.03
Fruits	-0.42	0.19	0.02	-0.01	**-0.60**	-0.17	-0.01	0.00	-0.17	0.00	-0.07
Vegetables	-0.07	-0.01	0.00	0.01	-0.04	**-0.45**	-0.06	-0.19	-0.09	-0.06	-0.03
Dairy	-0.10	0.00	0.00	0.00	0.00	-0.03	**-0.85**	-0.03	-0.02	-0.06	0.00
Meats	-0.43	0.01	-0.03	-0.09	0.00	-0.20	-0.10	**0.07**	-0.23	-0.08	-0.14
Oils	-0.13	-0.02	0.02	-0.02	-0.03	-0.08	0.00	-0.19	**-0.37**	-0.07	0.00
Sugars	-0.08	-0.07	-0.01	-0.02	0.01	-0.07	-0.12	-0.07	-0.11	**-0.48**	0.06
Other	0.05	0.04	0.03	0.01	-0.01	-0.02	0.05	-0.10	0.00	0.05	**-1.01**

	Hicksian Elasticity Matrix at National Level										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.37**	0.10	0.03	0.02	-0.03	0.06	0.12	-0.12	0.03	0.04	0.13
Rice	0.44	**-1.31**	-0.01	0.06	0.16	0.07	0.25	0.15	0.02	-0.03	0.19
Other Cereals	1.10	-0.01	**-2.16**	-0.27	0.15	-0.02	0.48	-0.47	0.51	0.03	0.72
Pulses	0.15	0.10	-0.04	**-0.49**	0.01	0.13	0.23	-0.23	0.02	0.00	0.13
Fruits	-0.20	0.24	0.03	0.02	**-0.57**	-0.05	0.27	0.13	-0.04	0.10	0.05
Vegetables	0.11	0.03	0.00	0.04	-0.01	**-0.36**	0.16	-0.09	0.02	0.02	0.07
Dairy	0.10	0.05	0.01	0.03	0.03	0.08	**-0.61**	0.08	0.10	0.03	0.12
Meats	-0.21	0.06	-0.02	-0.06	0.03	-0.09	0.17	**0.19**	-0.10	0.02	-0.01
Oils	0.03	0.01	0.02	0.01	-0.01	0.01	0.20	-0.09	**-0.28**	0.00	0.10
Sugars	0.10	-0.03	0.00	0.00	0.04	0.03	0.09	0.03	-0.01	**-0.40**	0.16
Other	0.22	0.08	0.03	0.03	0.01	0.07	0.26	0.00	0.10	0.13	**-0.92**

Substitutes **Compliments** **No Relation**

	Elasticity Matrix	
	Marshallian	*Hicksian*
No Relation	13	5
Substitutes	30	80
Compliments	67	25

Source: Author's calculations from several issues of HIES

Table 5: Price Elasticity Matrix for Urban Areas

	Marshallian Elasticity Matrix for Urban Areas										
	Wheat	***Rice***	***Other Cereals***	***Pulses***	***Fruits***	***Vegetables***	***Dairy***	***Meats***	***Oils***	***Sugars***	***Other***
Wheat	**-0.46**	0.07	0.03	0.00	-0.06	-0.03	-0.10	-0.24	-0.08	-0.03	0.04
Rice	0.28	**-1.38**	-0.01	0.04	0.14	-0.03	0.04	0.06	-0.09	-0.12	0.10
Other Cereals	1.50	-0.12	**-2.75**	-0.38	0.20	-0.10	0.44	-0.69	0.63	-0.12	0.94
Pulses	-0.01	0.06	-0.05	**-0.51**	-0.01	0.04	0.03	-0.33	-0.07	-0.07	0.03
Fruits	-0.34	0.15	0.02	-0.01	**-0.69**	-0.14	-0.01	-0.01	-0.14	0.00	-0.07
Vegetables	-0.05	-0.01	0.00	0.01	-0.04	**-0.43**	-0.06	-0.21	-0.09	-0.05	-0.03
Dairy	-0.11	0.00	0.00	0.00	0.01	-0.03	**-0.86**	-0.02	-0.02	-0.06	0.01
Meats	-0.37	0.01	-0.02	-0.08	0.00	-0.19	-0.08	**-0.10**	-0.21	-0.07	-0.13
Oils	-0.13	-0.03	0.02	-0.02	-0.03	-0.08	0.00	-0.19	**-0.35**	-0.07	0.00
Sugars	-0.08	-0.08	-0.01	-0.03	0.01	-0.07	-0.12	-0.07	-0.11	**-0.42**	0.07
Other	0.03	0.03	0.02	0.00	-0.01	-0.03	0.04	-0.09	-0.01	0.04	**-1.01**

	Hicksian Elasticity Matrix for Urban Areas										
	Wheat	***Rice***	***Other Cereals***	***Pulses***	***Fruits***	***Vegetables***	***Dairy***	***Meats***	***Oils***	***Sugars***	***Other***
Wheat	**-0.32**	0.10	0.03	0.02	-0.03	0.06	0.09	-0.14	0.01	0.03	0.14
Rice	0.44	**-1.34**	-0.01	0.06	0.17	0.06	0.26	0.18	0.02	-0.05	0.21
Other Cereals	1.59	-0.10	**-2.74**	-0.37	0.22	-0.05	0.56	-0.63	0.68	-0.09	1.00
Pulses	0.13	0.09	-0.04	**-0.49**	0.02	0.13	0.23	-0.22	0.02	0.00	0.14
Fruits	-0.14	0.20	0.02	0.02	**-0.65**	-0.02	0.28	0.14	-0.01	0.09	0.08
Vegetables	0.10	0.03	0.00	0.04	-0.01	**-0.34**	0.16	-0.09	0.01	0.01	0.08
Dairy	0.07	0.04	0.01	0.03	0.04	0.07	**-0.61**	0.11	0.09	0.03	0.14
Meats	-0.18	0.06	-0.02	-0.05	0.04	-0.07	0.20	**0.04**	-0.08	0.02	0.02
Oils	0.01	0.01	0.02	0.00	0.00	0.00	0.20	-0.09	**-0.26**	-0.01	0.11
Sugars	0.07	-0.05	-0.01	0.00	0.04	0.02	0.08	0.04	-0.02	**-0.36**	0.18
Other	0.18	0.07	0.03	0.03	0.02	0.07	0.26	0.03	0.09	0.11	**-0.90**

Substitutes	Compliments	No Relation

	Elasticity Matrix	
	Marshallian	*Hicksian*
No Relation	10	6
Substitutes	32	78
Compliments	68	26

Source: Author's calculations from various issues of HIES

Table 6: Price Elasticity Matrix for Rural Areas

	Marshallian Elasticity Matrix for Rural Areas										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.58**	0.05	0.02	-0.01	-0.05	-0.04	-0.09	-0.21	-0.07	-0.03	0.02
Rice	0.25	**-1.33**	-0.01	0.03	0.12	-0.02	0.03	0.06	-0.08	-0.10	0.08
Other Cereals	0.81	-0.02	**-1.99**	-0.25	0.11	-0.09	0.27	-0.51	0.37	0.01	0.53
Pulses	-0.03	0.06	-0.05	**-0.51**	-0.01	0.03	0.02	-0.33	-0.08	-0.08	0.03
Fruits	-0.49	0.23	0.03	-0.01	**-0.51**	-0.19	-0.01	0.02	-0.20	0.01	-0.08
Vegetables	-0.07	-0.01	0.00	0.01	-0.04	**-0.47**	-0.06	-0.19	-0.09	-0.06	-0.02
Dairy	-0.10	0.00	0.00	0.00	0.00	-0.04	**-0.84**	-0.04	-0.02	-0.06	0.00
Meats	-0.48	0.02	-0.04	-0.10	0.00	-0.22	-0.12	**0.24**	-0.25	-0.08	-0.14
Oils	-0.13	-0.02	0.02	-0.02	-0.03	-0.08	0.00	-0.18	**-0.38**	-0.07	0.00
Sugars	-0.08	-0.07	-0.01	-0.02	0.01	-0.07	-0.12	-0.07	-0.11	**-0.51**	0.06
Other	0.06	0.04	0.03	0.01	-0.01	-0.02	0.06	-0.10	0.01	0.06	**-1.01**

	Hicksian Elasticity Matrix for Rural Areas										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.39**	0.10	0.03	0.02	-0.03	0.06	0.13	-0.12	0.03	0.05	0.12
Rice	0.45	**-1.29**	0.00	0.06	0.14	0.07	0.25	0.14	0.03	-0.02	0.17
Other Cereals	0.97	0.01	**-1.98**	-0.23	0.12	0.00	0.45	-0.43	0.46	0.07	0.61
Pulses	0.16	0.10	-0.04	**-0.49**	0.01	0.13	0.23	-0.24	0.02	0.00	0.12
Fruits	-0.26	0.29	0.03	0.02	**-0.49**	-0.07	0.26	0.13	-0.07	0.11	0.03
Vegetables	0.12	0.04	0.00	0.04	-0.02	**-0.37**	0.16	-0.10	0.02	0.03	0.07
Dairy	0.12	0.05	0.01	0.03	0.03	0.08	**-0.60**	0.06	0.10	0.04	0.11
Meats	-0.25	0.07	-0.03	-0.07	0.03	-0.10	0.14	**0.34**	-0.12	0.02	-0.04
Oils	0.05	0.01	0.02	0.01	-0.01	0.01	0.20	-0.10	**-0.28**	0.00	0.09
Sugars	0.12	-0.03	0.00	0.00	0.03	0.03	0.10	0.02	0.00	**-0.42**	0.15
Other	0.24	0.08	0.03	0.03	0.01	0.07	0.26	-0.02	0.10	0.14	**-0.93**

Substitutes | **Compliments** | **No Relation**

	Elasticity Matrix	
	Marshallian	*Hicksian*
No Relation	9	8
Substitutes	35	79
Compliments	76	23

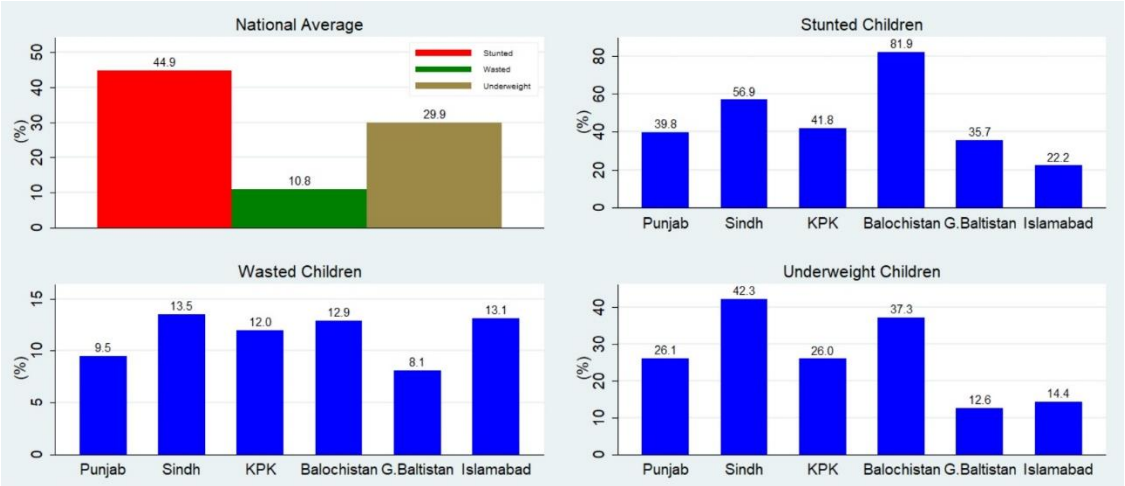
Source: Author's calculations from Several issues of HIES

6 IMPLICATION OF KEY RESULTS

Wheat is found to be most important food group across all levels and among all income groups which is witnessed by its share in calories as well as by the preference of households. Households at all levels are more likely to substitute other food groups to consume more of wheat and floor. Over the period of time nominal wages of both skilled workers and unskilled workers has increased 253 and 325 percent respectively (see, Table 7). This increase in daily wages is significant but price of wheat has also increased during this period and outweighs the increase in wages. To have a better understanding of purchasing power of laborers daily wage calculations have been done by how much amount of wheat can be bought from it.

The reason for choosing wheat to balance the nominal effects is the importance of wheat in households' consumption bundle as well as in calorie bundle which has been highlighted in the sections discussed above. Despite the consistent increase in daily wages (See Figure 16: Average Daily Wages in Appendix), its purchasing power in terms of wheat has decline and this has hurt skilled labor more as compare to unskilled labor because decline in real purchasing power has been 18.5 percent for skilled worker as compare to 1.9 percent for unskilled worker. This decline in real income coupled with the decrease in wheat consumption has serious implications for poverty reduction and malnutrition in the country (See, Table 7). As discussed (Calorie Bundles) wheat possess the largest share in calorie bundles consistently across each cross-section. Consumption of wheat has also been estimated to be less sensitive to price changes and also has its independent preferences as increase in its price will not cause any significant substitution with any other food groups.

Figure 5: Nutritional Status of Children



Source: Pakistan Demographic and Health Survey (PDHS, 2013-14).

Pakistani households have lack of diversity in their diets as the bundle they consume is dense in calories and macronutrients but lacks micronutrients. The Pakistan Demographic and Health Survey (PDHS, 2013-14) data has been used to develop global hunger index (GHI) states that 45 percent of Pakistani children of age under five were suffering from stunting[18], meanwhile 22 percent of the population were malnourished[19]. The same data also shows that 10.5 percent children under the age of 5 were underweight for their height (i.e. wasting) during 2013-14 (see, Figure 5) and 8.6 percent of the children belonging to the same age group prematurely died in 2013. Statistics not only from this dataset but also from other dataset shows alarming estimates. Statistics from National Nutrition Survey (2010-11) shows that almost 50 percent of the women who are in their child bearing are suffering from anemia while 43 percent were suffering from deficiency of vitamin A, 69 percent suffering from deficiency of vitamin D and 48 percent suffering from zinc deficiency.

These deficiencies pose severe risk to health of women in Pakistan which has trapped us into the vicious cycle of malnutrition and hunger. If a woman is unhealthy then she is more likely to give birth to an unhealthy child which will then continue this cycle. As stated above, how severe the health risks are to women of child bearing age and these risks are more likely and have been translating into the health risks for child. According to the National nutrition survey 2010-11, 54 percent of the children under five years of age are suffering from deficiency of vitamin A, 39 percent suffering from deficiency of zinc and 62 percent are suffering from iron deficiency.

This huge burden of malnutrition has severe adverse effects on the mental and physical health of the child and also likely to decrease its productivity when the child becomes an adult and comes into labor force. Early age malnutrition and even its presence in the later age damages the immune system and make individuals more vulnerable to various diseases. This situation becomes worse for the people belonging to lower income levels or living in remote areas where proper facilities are not available. Current scenario of high food prices and lower purchasing power is making the already alarming situation even worse. This is complex issue and hence required more than single measure to deal with. Only dealing with the price distortions and subsidies won't resolve the issue as it has also become important to spread awareness about the diet people eat and the way they eat.

[18] It is defined as the percentage of children, aged 0 to 59 months, whose height for age is below the median of the WHO Child Growth Standards.

[19] Malnourished is defined as the outcome of insufficient food intake and repeated infectious diseases. It includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (wasted) and deficient in vitamins and minerals (micronutrient malnutrition)

Table 7: Table for Poverty Implications

Year	Wheat			Wage (PKR/day) of Labor		Quantity of Wheat can be bought by		Average Family Size
	Quantity Consumed	Price	Cost of 100Kcal	Skilled	Unskilled	Skilled Labor	Unskilled Labor	
2001-02	10.0	9	0.26	252	130	27.2	14.0	7.21
2004-05	9.4	13	0.36	337	193	26.0	14.9	6.93
2005-06	9.2	13	0.36	392	238	29.8	18.1	7.17
2007-08	8.9	17	0.48	567	297	33.2	17.4	6.90
2010-11	9.0	29	0.81	649	379	22.7	13.3	6.66
2011-12	8.6	29	0.82	741	450	25.2	15.3	6.73
2013-14	8.0	40	1.12	890	553	22.1	13.7	6.61

Source: Wages (Economic Survey of Pakistan), Quantities Consumed, Prices and Family Size (Various Issues of HIES)

7 CONCLUSION

This analysis sheds light on various important issues and some of them are summarized here:

a) Limited dietary diversity**:** Pakistani households are found to have limited dietary diversity as only dairy products and wheat on average constitutes 40 percent of food expenditure. Instead of having a balanced diet, Pakistani households are consuming more food items which have high energy density. Households in the lowest income quintile allocate their food expenditure most towards wheat while households in the top income quintile spend greater shares of their income to buy dairy products and meat. Other important products on which average household has been spending their money are cooking oil, sugars, others and vegetables. Awareness should be spread to highlight the importance of having balanced diet to make households understand that it is more important what we eat as compare to how much we eat.

b) Low levels of calorie intake**:** The average daily calorie intake per adult equivalent has witnessed a decline during 2001-14 having its lowest value of 2135 Kcal in 2013-14. Despite consuming more of energy dense foods calorie intake levels are still lower than the minimum subsistence level of 2350 Kcal. The calorie intake levels are seen to be higher in rural areas in contrast to urban areas while diet of urban areas are found to be more diverse. This difference varies among different social classes as well varies across different regions.

c) Variations in consumption patterns**:** Variations in expenditure and price elasticities along with the differences in consumption bundles among different social classes and across different regions highlights the fact that consumption patterns are not same across the country. Poor households tend to

spend more on wheat as compare to rich households who spend more on dairy and meats. Consumption of wheat has the lowest responsiveness to price changes as compare to other food groups followed by pulses, sugars and vegetables. The greatest difference between price responsiveness between rural and urban regions is estimated to be in case of meats followed by wheat where rural region has been more responsive to price changes as compare to rural region. Poor households are estimated to be more responsive to changes in prices.

d) Households maintain the original utility levels by making substitution**:** Uncompensated price elasticities for all regions showed that most of the products have negative cross price elasticities which makes them compliments but if the households are allowed to adjust for changes in real income and maintain their previously attained level of utility then most of these negative cross price elasticities turns positive which make them substitutes. Significant differences among cross price Marshallian and Hicksian elasticities for most of the food groups indicate that households become less responsive to price changes after maintaining their utility level.

e) Importance of wheat prices to reduce malnutrition and poverty**:** As discussed earlier, wheat is the most important food group as it has around 48 percent average share in calorie bundle. However, this share has been slightly decreased over the period of study but its importance increases in case of rural areas as well as in the case of households of bottom income quintile. It also has the second biggest share in the food expenditure and households are not likely to substitute it by other products. Therefore, any increase in the price of wheat reduces the consumer welfare and this reduction in welfare is supposed to hurt poor the most. Except for the international commodity price shocks, price of wheat is also higher due to price distortions and ineffective food supply starting from grower to consumer. Policy interventions are required to tackle this problem of price distortions as smooth and effective supply chain will lower the prices, improve the quality of product and will also reduce the food wastage. Similar interventions also needed in case of all food crops as it will reduce the price gap (i.e. what grower is getting for its crop and what consumer is paying for the product). This will also uplift the small growers and improve their social status as well as increase the purchasing power of urban households because of lower prices. Authorities need to address these issues of malnutrition, poverty and inequality in food consumption. The country is dealing with the various health risks especially in the case of children and women of child bearing age and if these issues are not dealt with appropriate policies then the situation will get worse and it would become difficult for country to break the cycle of malnutrition, poverty and health risks.

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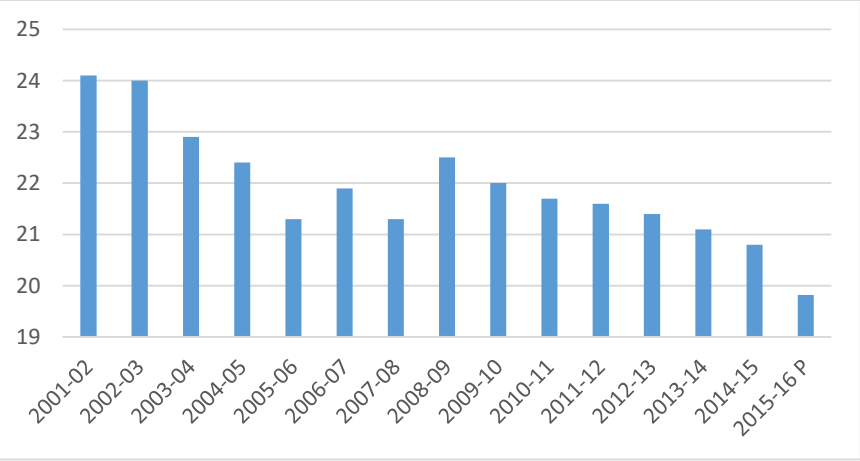
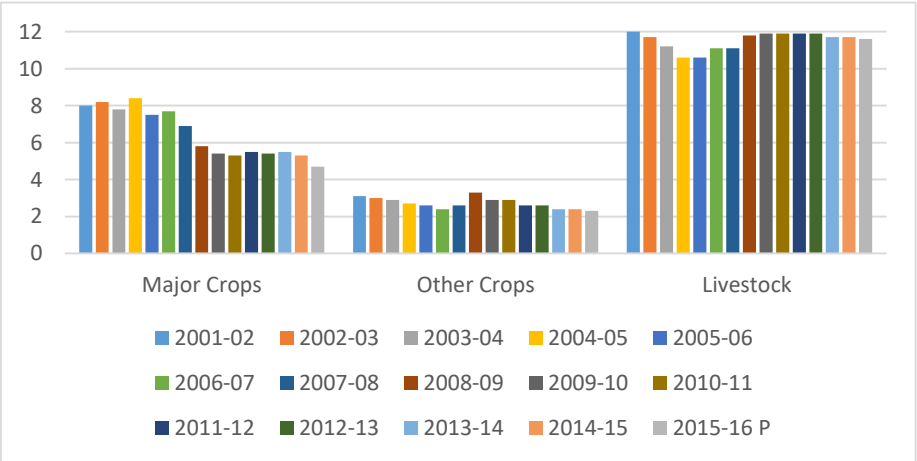
Appendix

Figure 6: Share of Agriculture in GDP



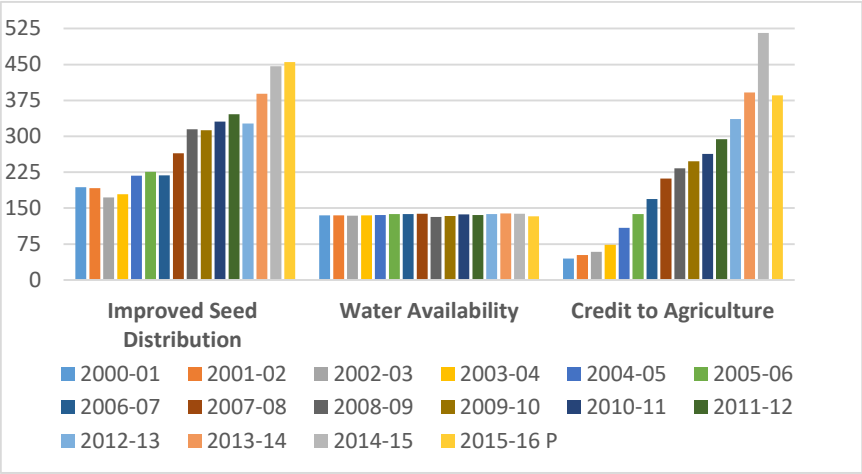
Source: Several issues of Economic Survey of Pakistan

Figure 7: Share of Agriculture in GDP



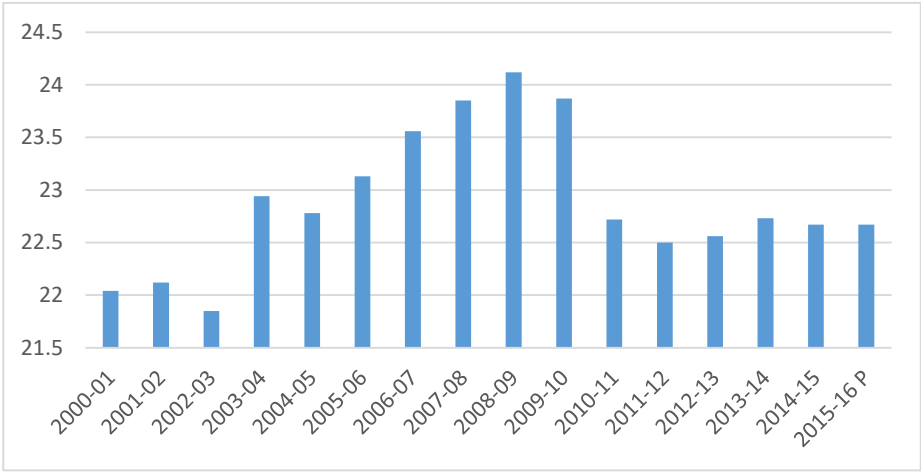
Source: Several issues of Economic Survey of Pakistan

Figure 8: Important Statistics of Agriculture Sector



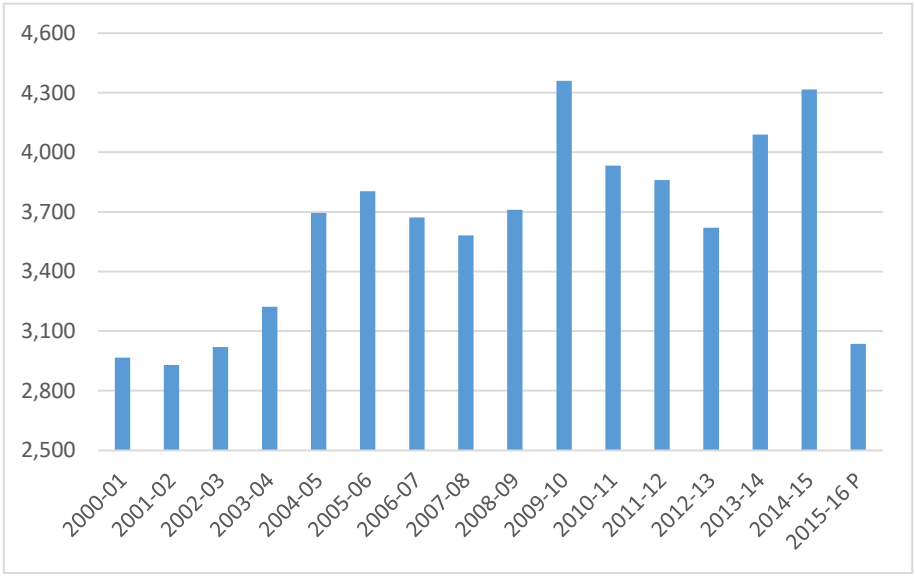
Source: Several issues of Economic Survey of Pakistan

Figure 9: Cropped Area (Million Hectares)



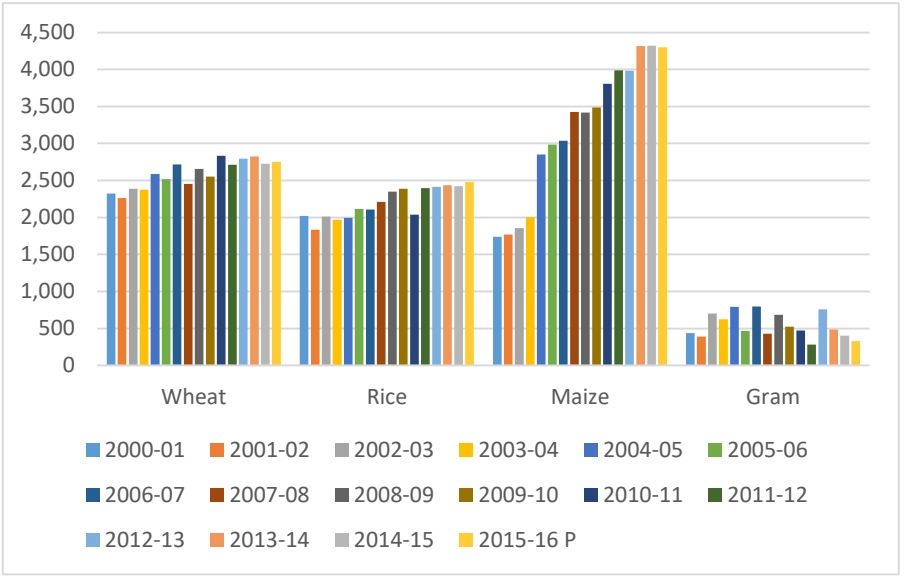
Source: Several issues of Economic Survey of Pakistan

Figure 10: Fertilizer Offtake (000 N/T)



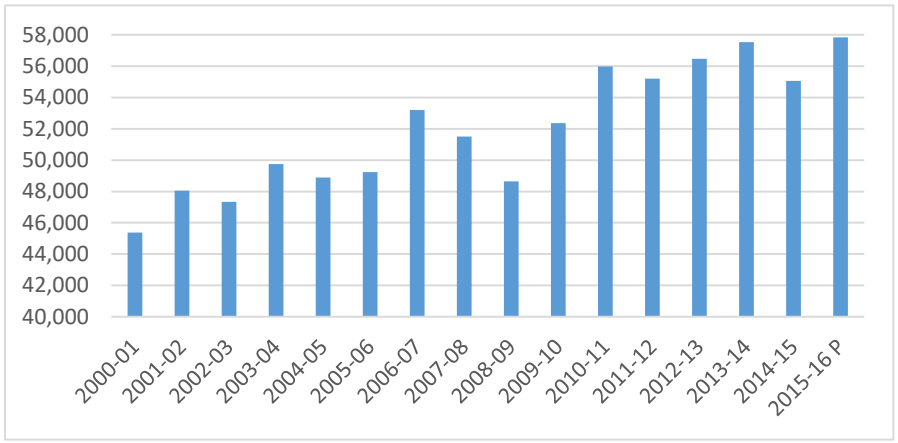
Source: Several issues of Economic Survey of Pakistan

Figure 11: Crop Yields (Kg/Hectare)



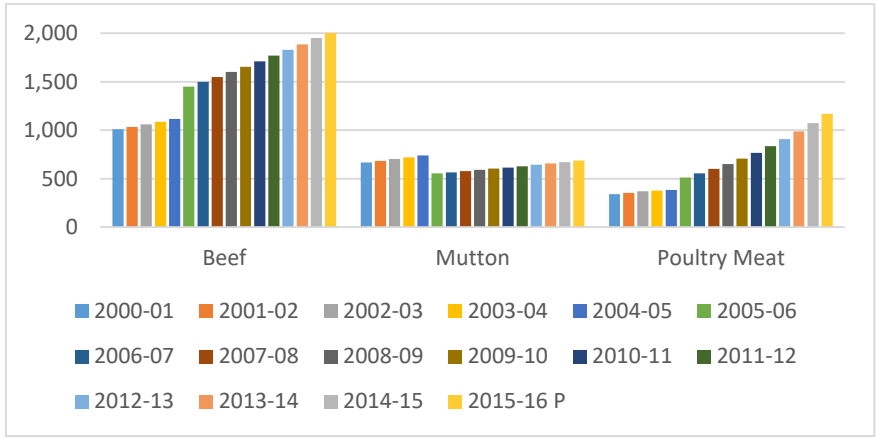
Source: Several issues of Economic Survey of Pakistan

Figure 12: Yield of Sugarcane (Kg/Hectare)



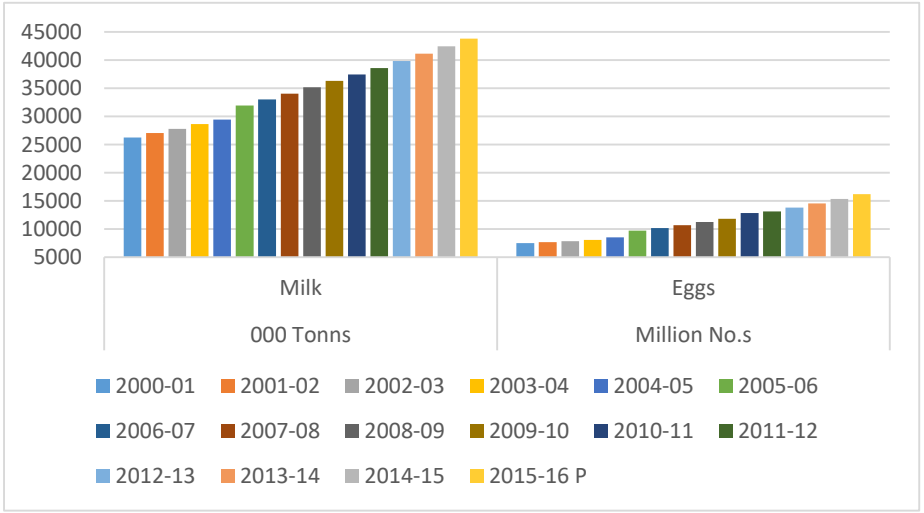
Source: Several issues of Economic Survey of Pakistan

Figure 13: Production of Meat (000 Tons)



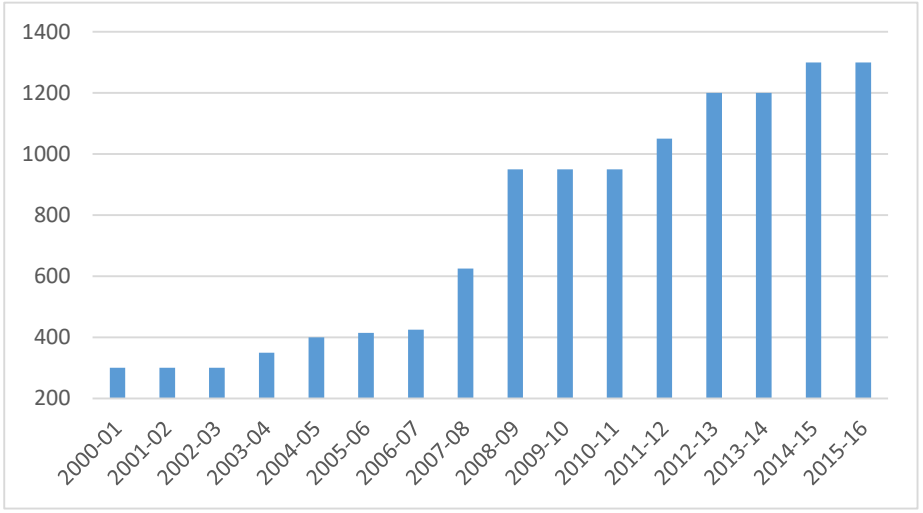
Source: Several issues of Economic Survey of Pakistan

Figure 14: Production of Milk and Eggs



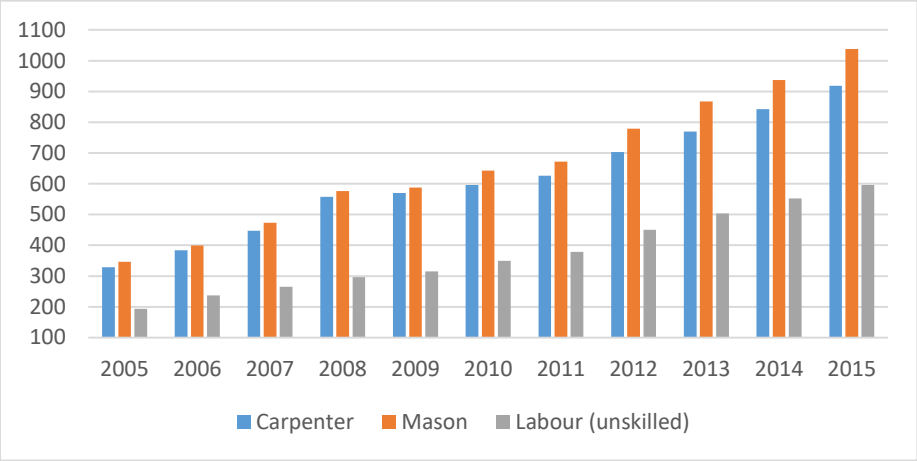
Source: Several Issues of Economic Survey of Pakistan

Figure 15: Support Price of Wheat (PKR/40Kg)



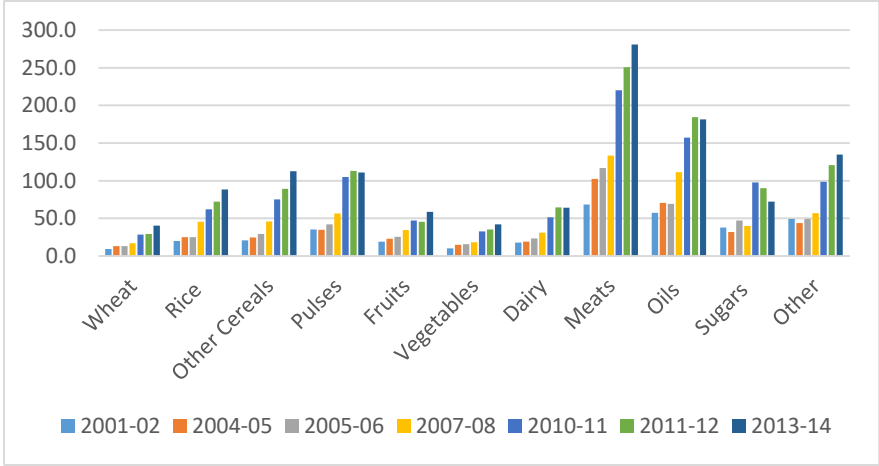
Source: Several Issues of Economic Survey of Pakistan

Figure 16: Average Daily Wages



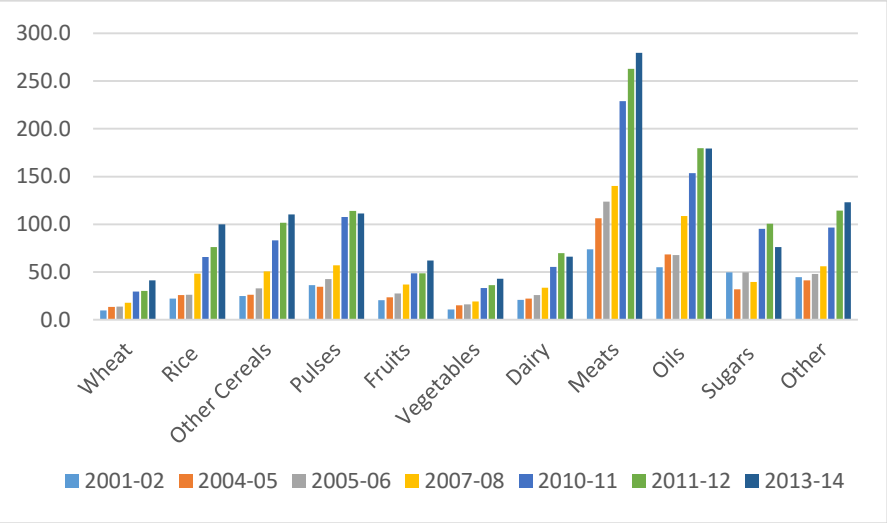
Source: Several Issues of Economic Survey of Pakistan

Figure 17: Prices at National Level



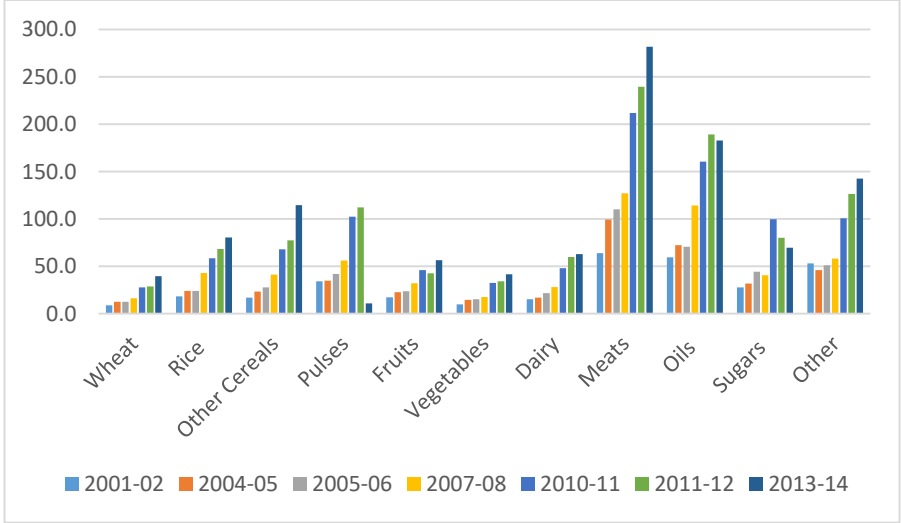
Source: Author's calculations from various issues of HIES

Figure 18: Prices at Urban Level



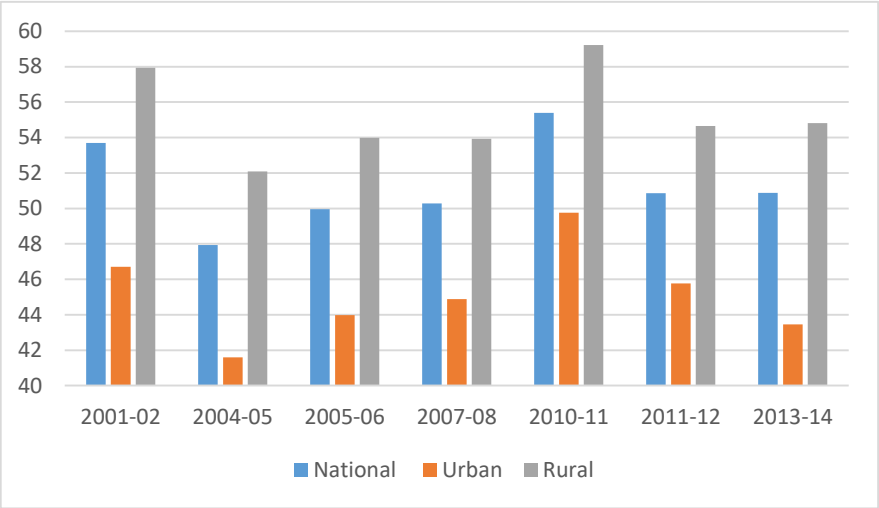
Source: Author's calculations from various issues of HIES

Figure 19: Prices at Rural Level



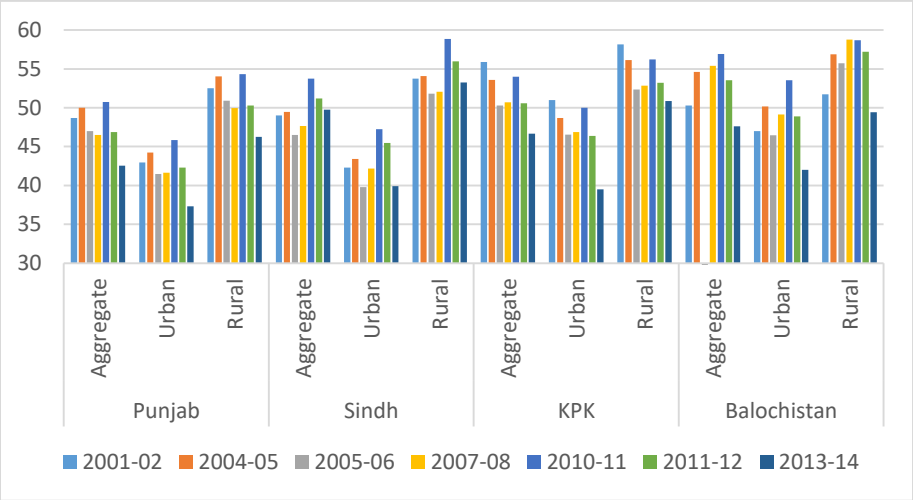
Source: Author's calculations from various issues of HIES

Figure 20: Share of Food Expenditure in Total Expenditure



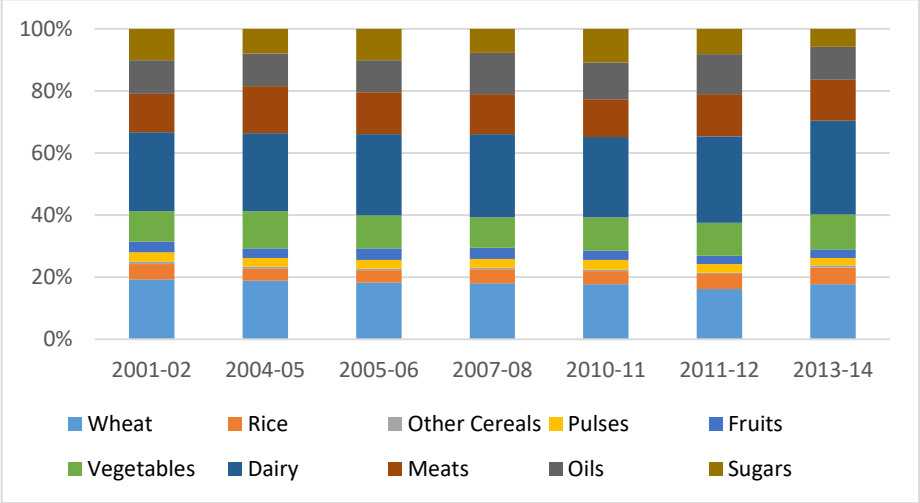
Source: Author's calculations from various issues of HIES

Figure 21: Share of Food Expenditure in Total Expenditure



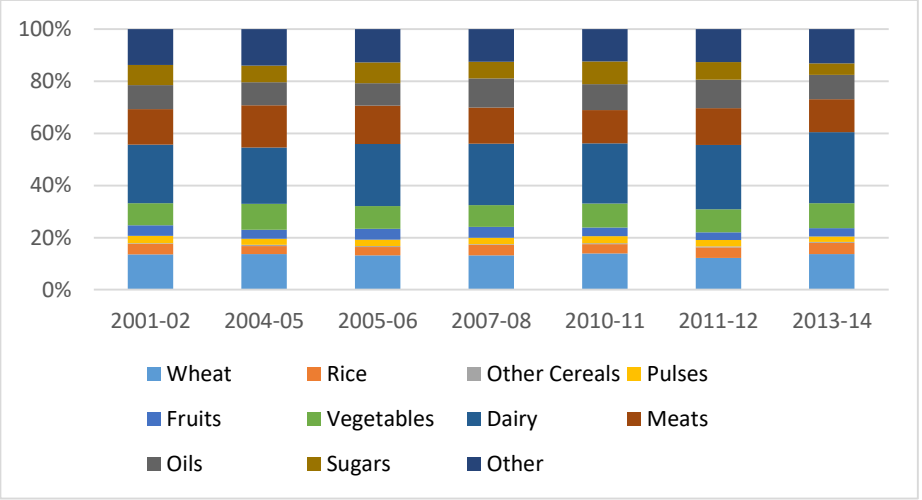
Source: Author's calculations from various issues of HIES

Figure 22: Food Consumption Bundles at National Level



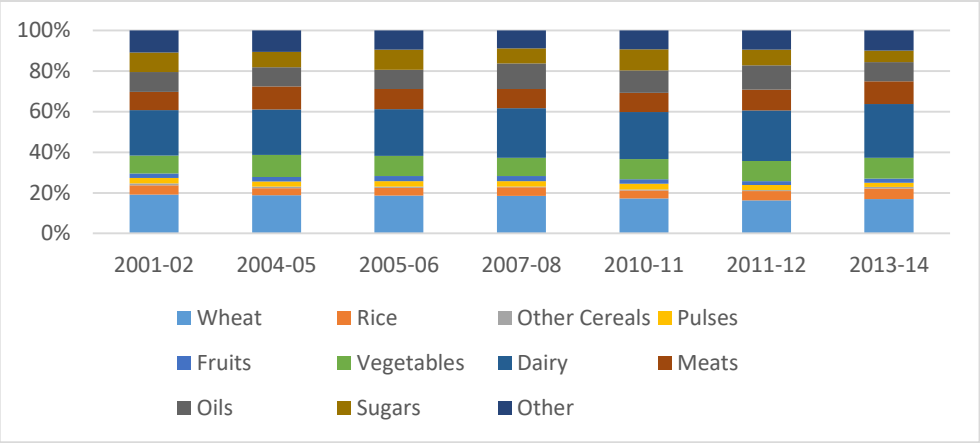
Source: Author's calculations from various issues of HIES

Figure 23: Food Consumption Bundles for Urban Region



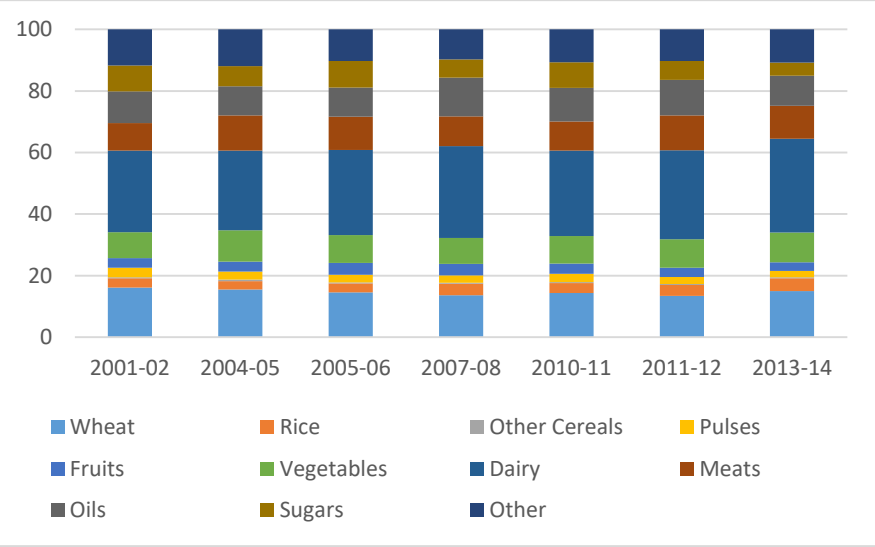
Source: Author's calculations from various issues of HIES

Figure 24: Food Consumption Bundles for Rural Region



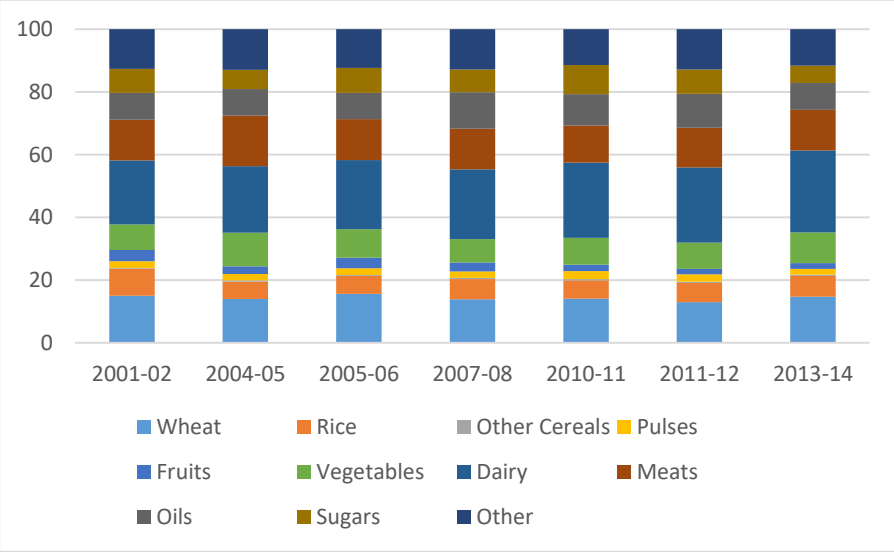
Source: Author's calculations from various issues of HIES

Figure 25: Food Consumption Bundles for Punjab



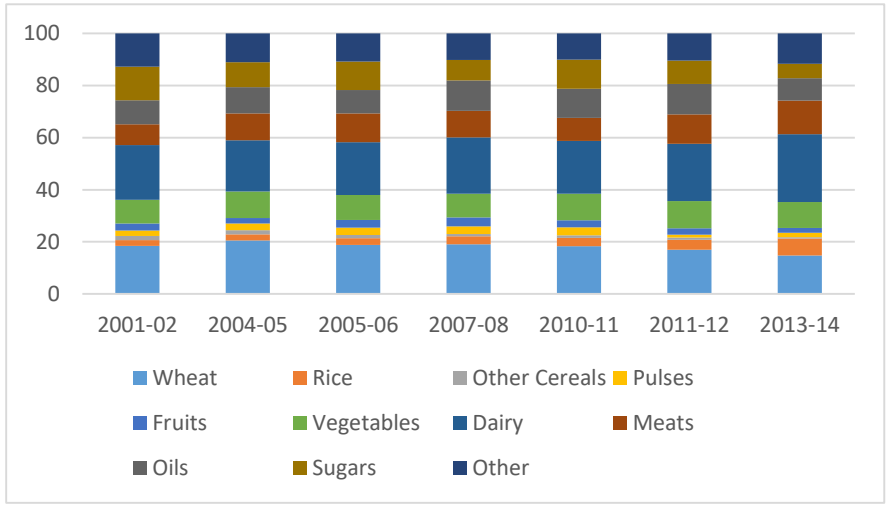
Source: Author's calculations from various issues of HIES

Figure 26: Food Consumption Bundles for Sindh



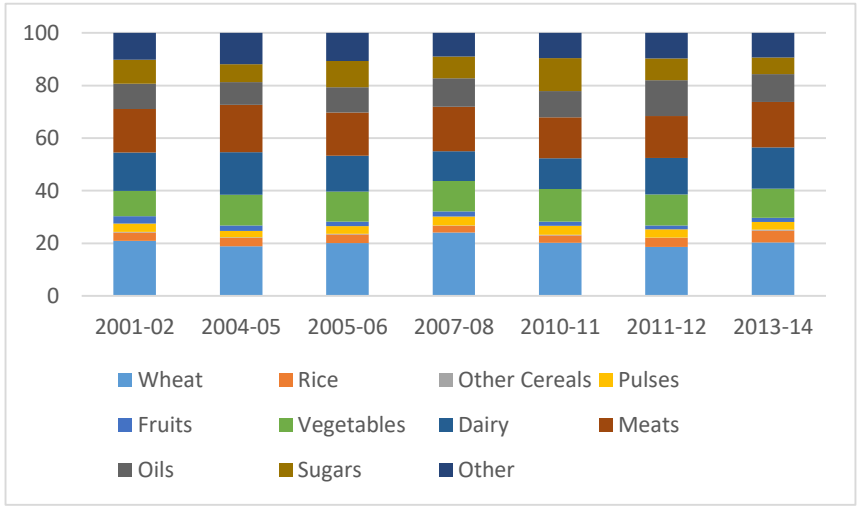
Source: Author's calculations from various issues of HIES

Figure 27: Food Consumption Bundles for KPK



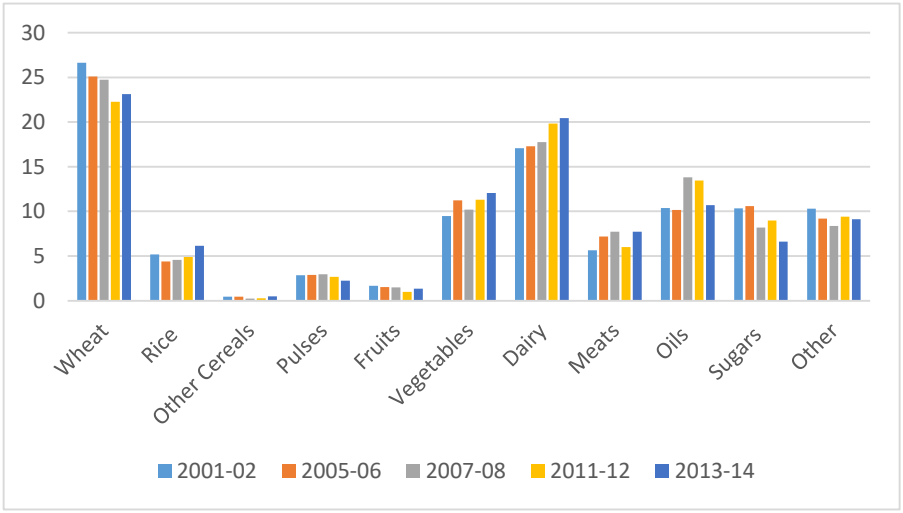
Source: Author's calculations from various issues of HIES

Figure 28: Food Consumption Bundles for Balochistan



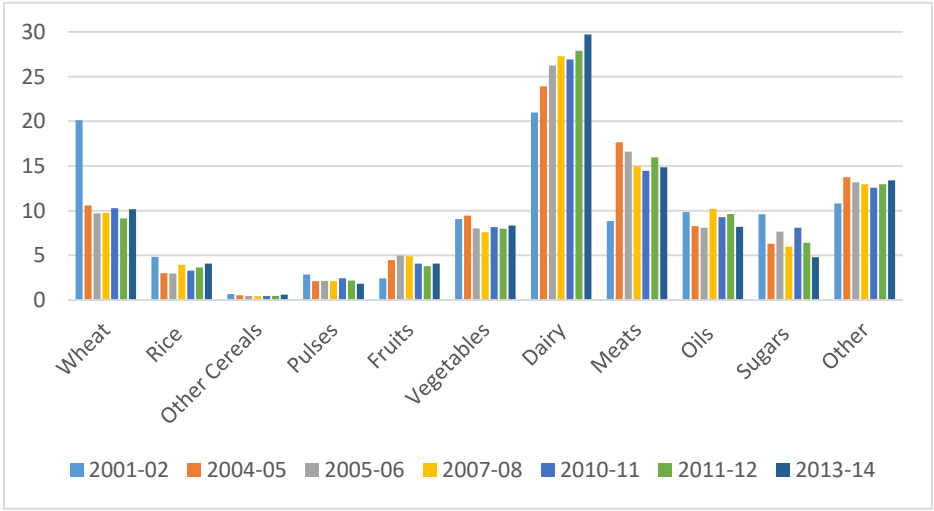
Source: Author's calculations from various issues of HIES

Figure 29: Bundle Shares for Bottom Income Quintile



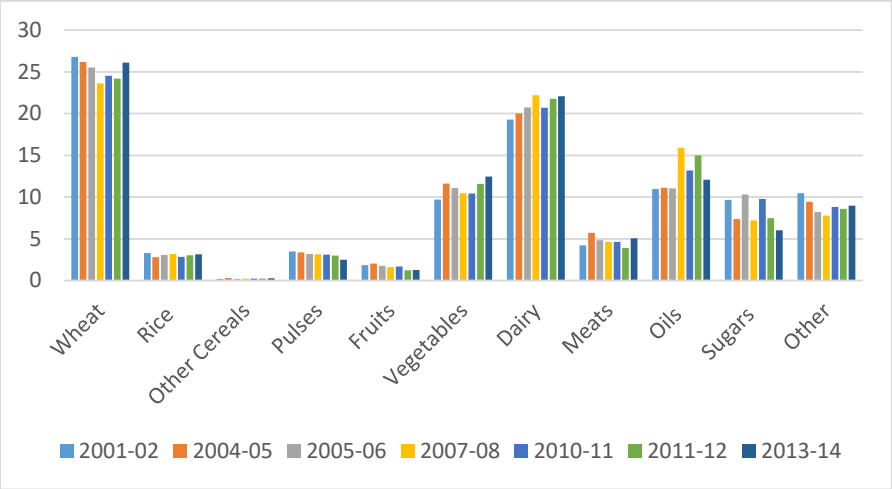
Source: Author's calculations from various issues of HIES

Figure 30: Bundle Shares for Top Income Quintile



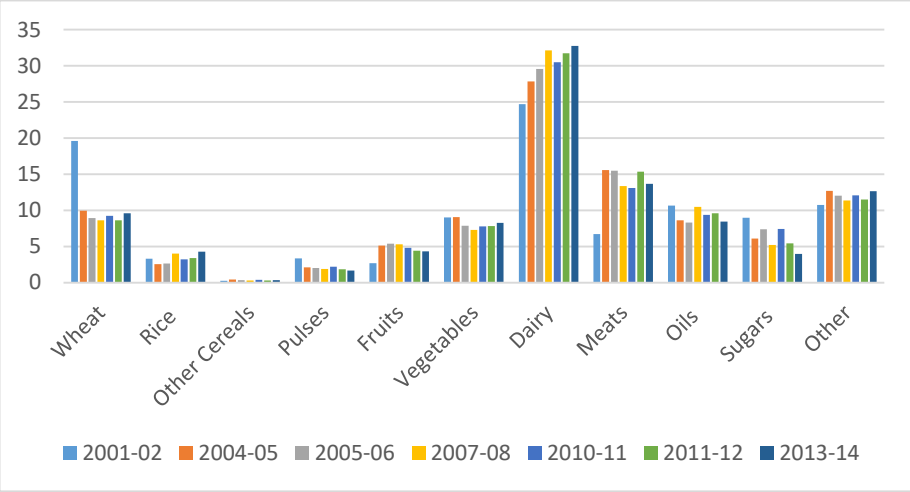
Source: Author's calculations from various issues of HIES

Figure 31: Bundle Shares for Bottom Income Quintile in Punjab



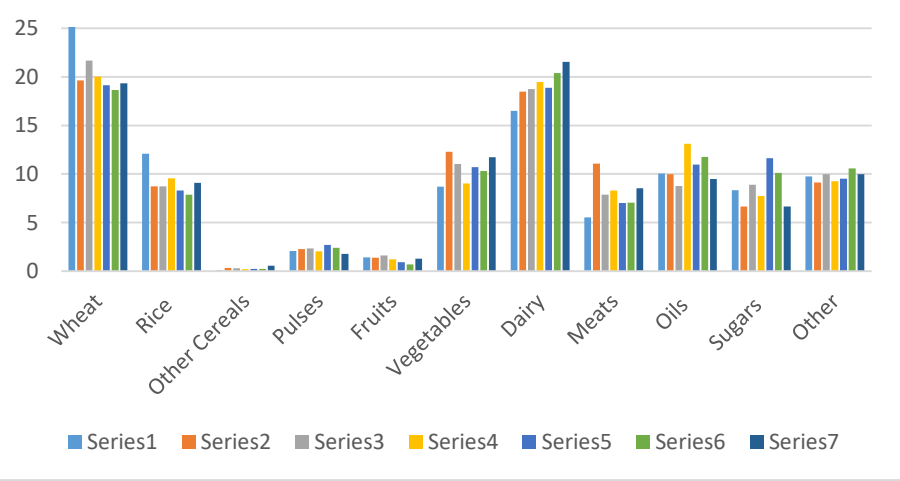
Source: Author's calculations from various issues of HIES

Figure 32: Bundle Shares for Top Income Quintile in Punjab



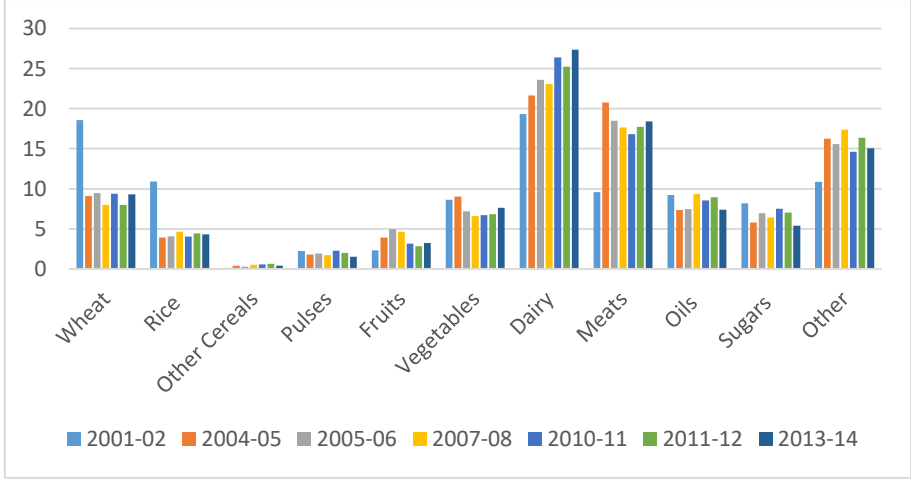
Source: Author's calculations from various issues of HIES

Figure 33: Bundle Shares for Bottom Income Quintile in Sindh



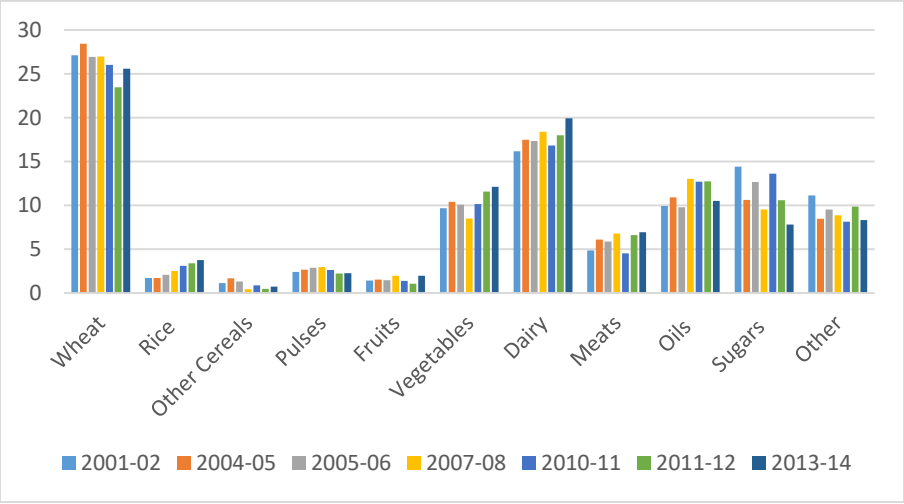
Source: Author's calculations from various issues of HIES

Figure 34: Bundle Shares for Top Income Quintile in Sindh



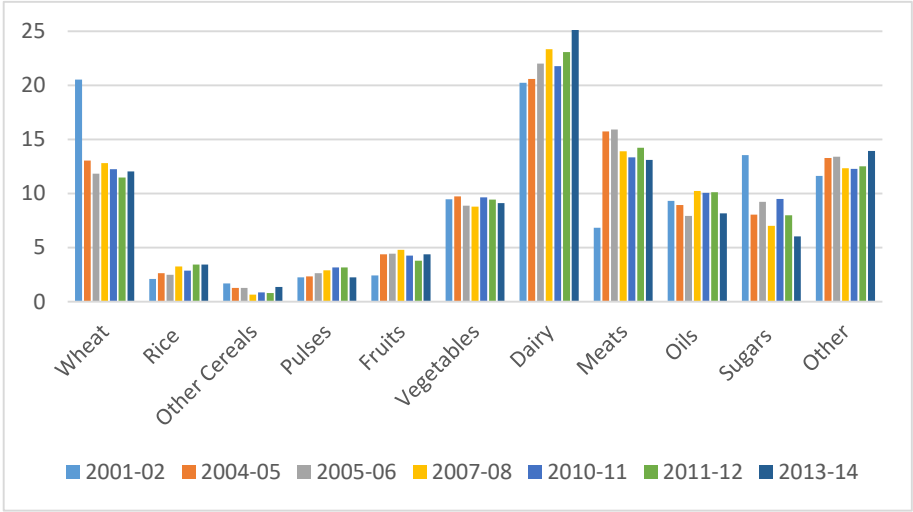
Source: Author's calculations from various issues of HIES

Figure 35: Bundle Shares for Bottom Income Quintile in KPK



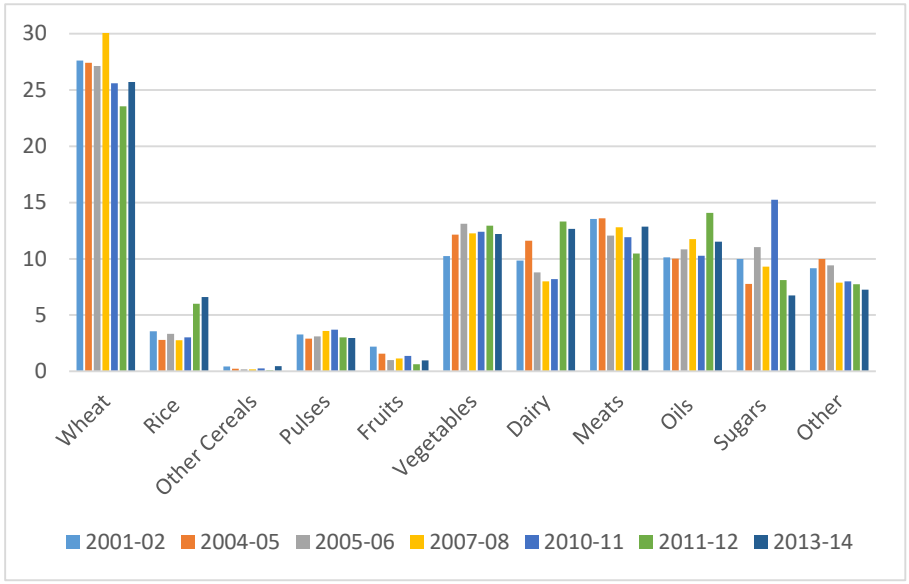
Source: Author's calculations from various issues of HIES

Figure 36: Food Shares for Top Income Quintile in KPK



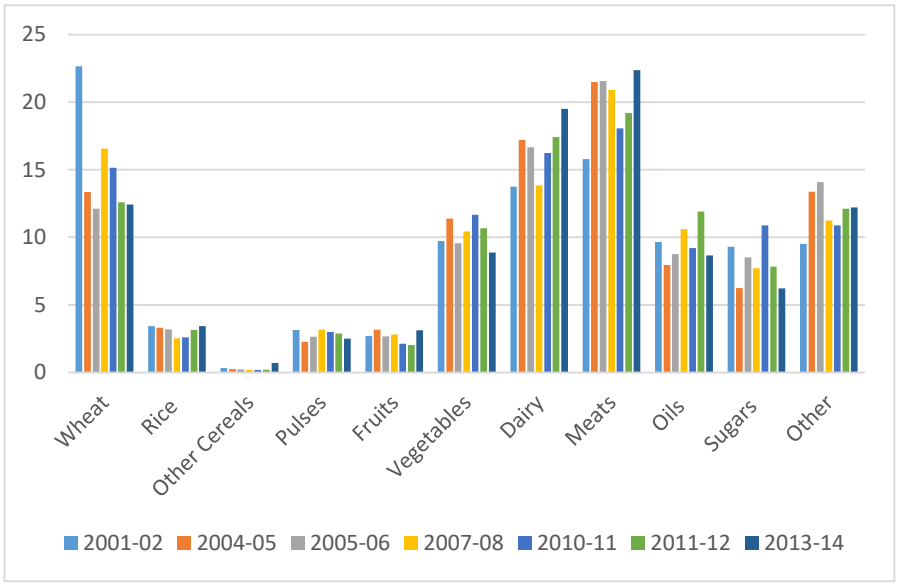
Source: Author's calculations from various issues of HIES

Figure 37: Bundle Shares for Bottom Income Quintile in Balochistan



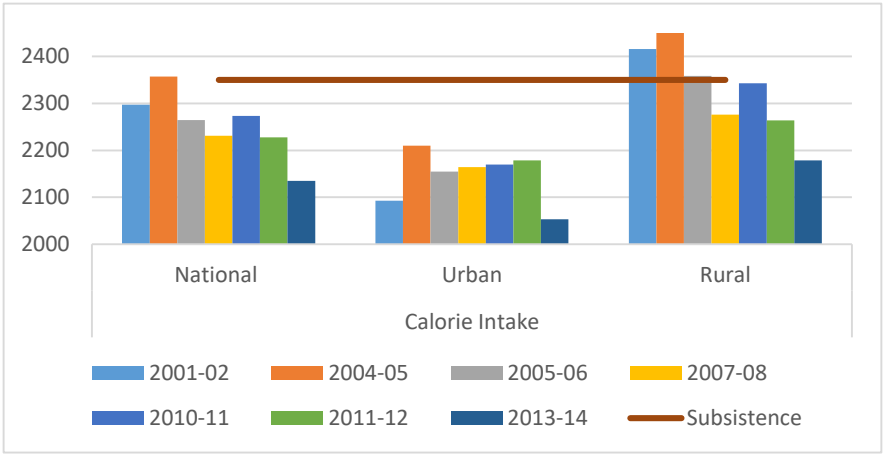
Source: Author's calculations from various issues of HIES

Figure 38: Bundle Shares for Top Income Quintile in Balochistan



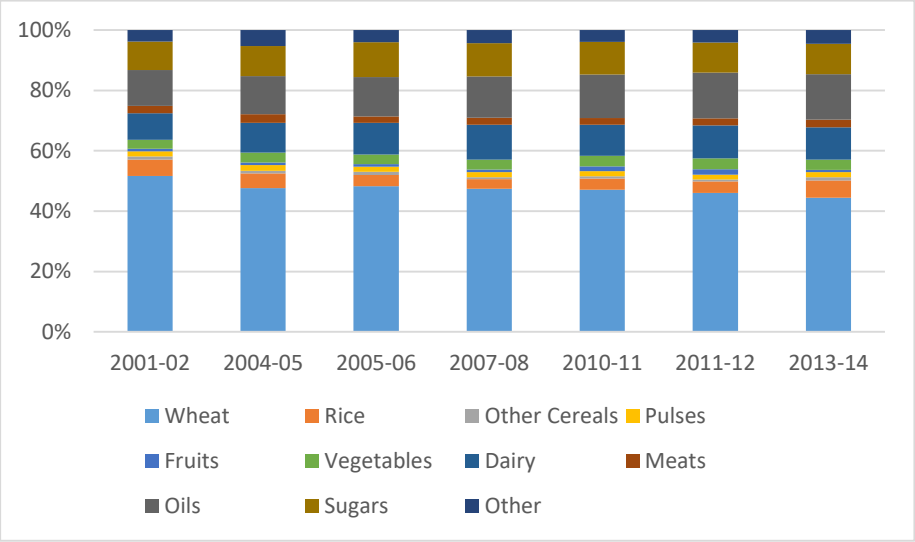
Source: Author's calculations from various issues of HIES

Figure 39: Daily Amount of AE Calorie Intake



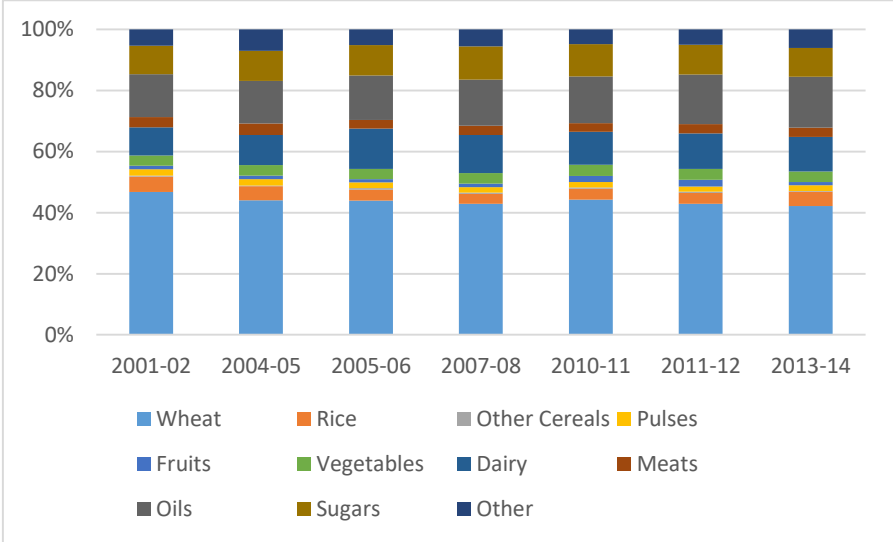
Source: Author's calculations from various issues of HIES

Figure 40: Calorie Bundles at National Level



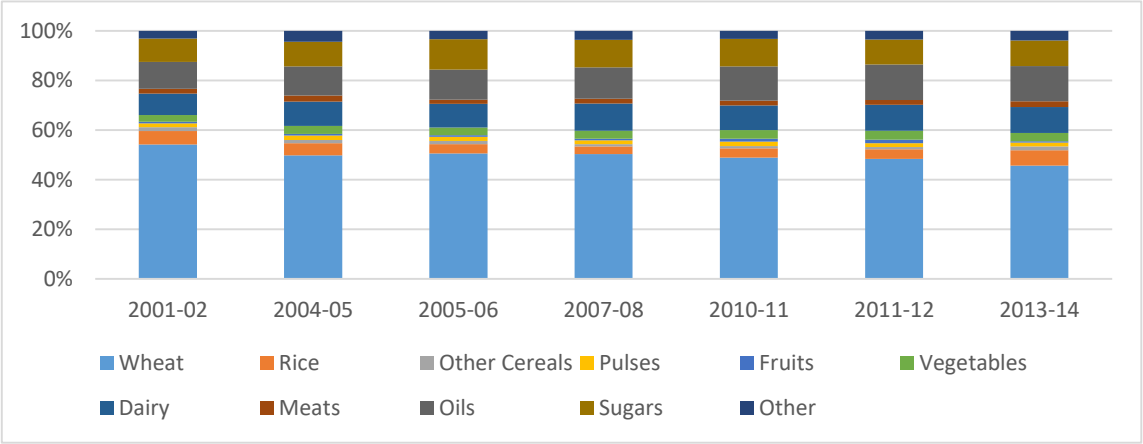
Source: Author's calculations from various issues of HIES

Figure 41: Calorie Bundles for Urban Region



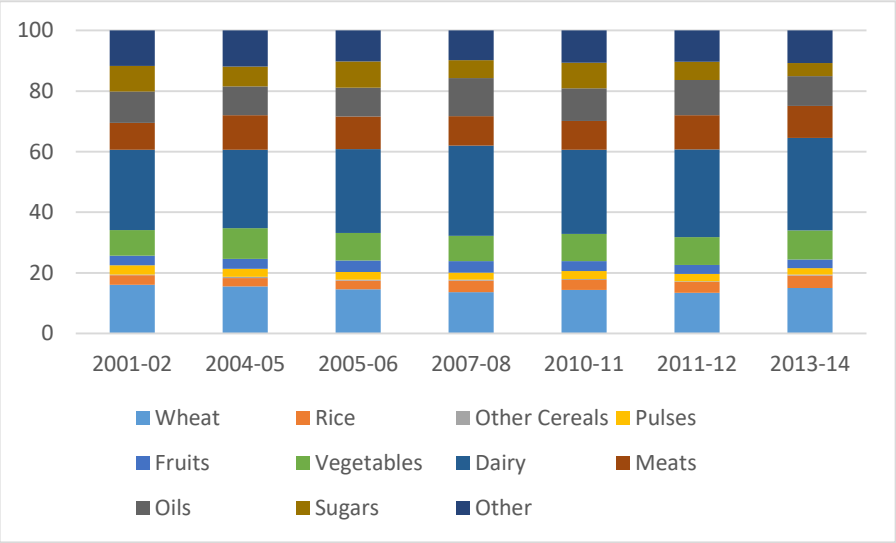
Source: Author's calculations from various issues of HIES

Figure 42: Calorie Bundles for Rural Region



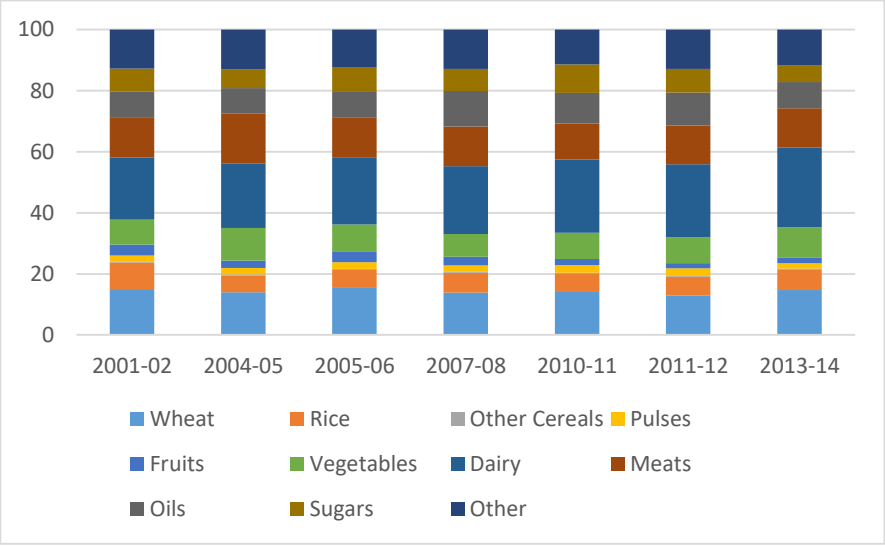
Source: Author's calculations from various issues of HIES

Figure 43: Calorie Bundles for Punjab



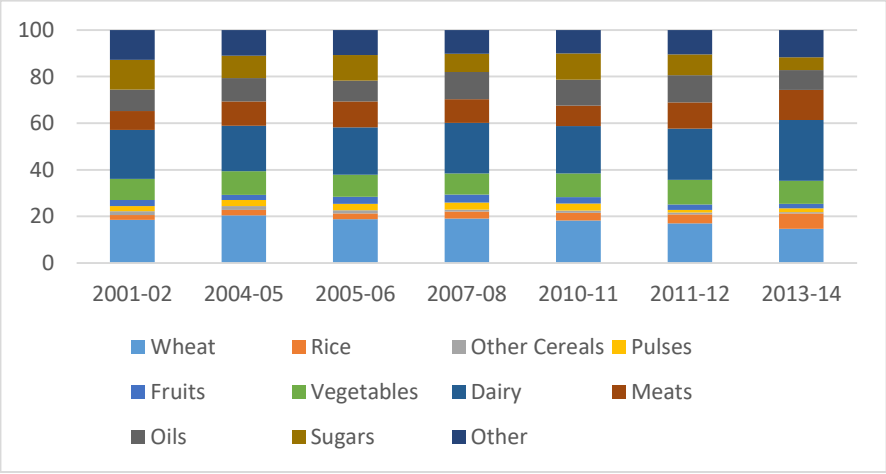
Source: Author's calculations from various issues of HIES

Figure 44: Calorie Bundles for Sindh



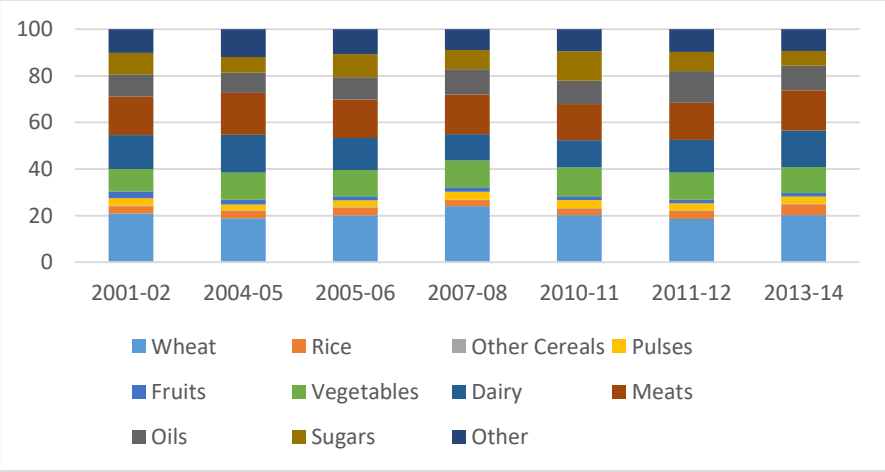
Source: Author's calculations from various issues of HIES

Figure 45: Calorie Bundles for KPK



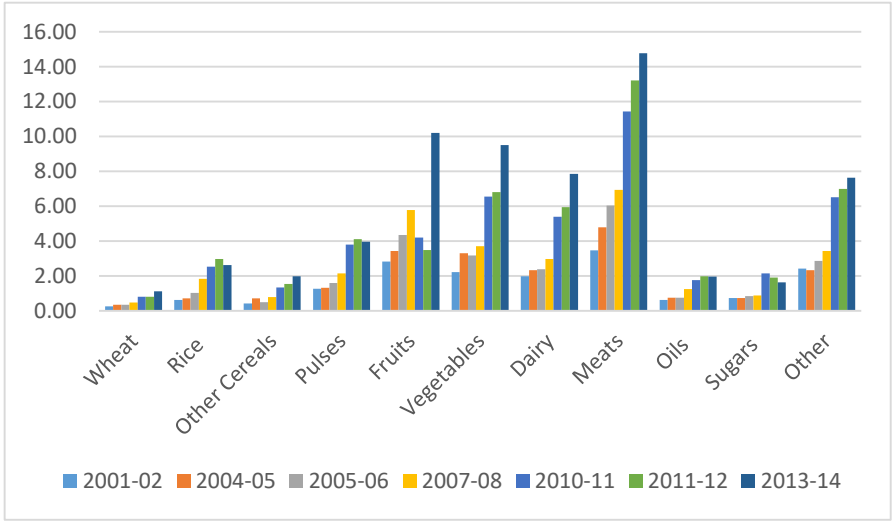
Source: Author's calculations from various issues of HIES

Figure 46: Calorie Bundles for Balochistan



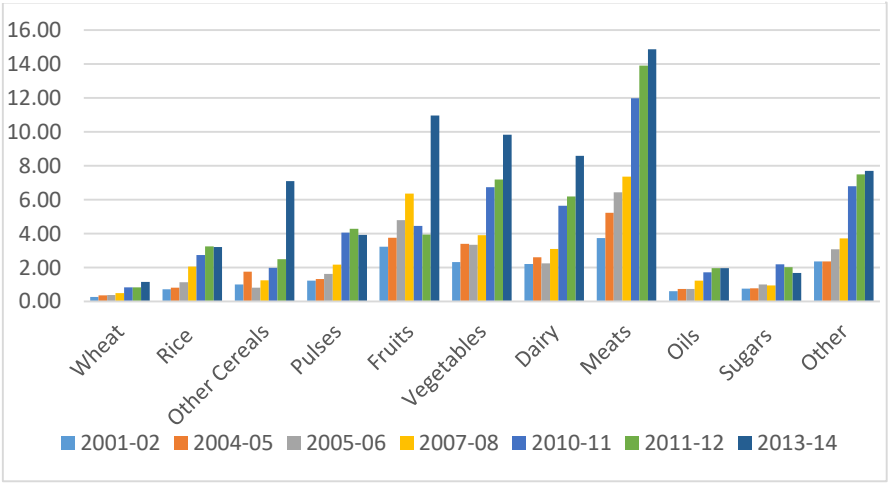
Source: Author's calculations from various issues of HIES

Figure 47: Cost of Calories at National Level



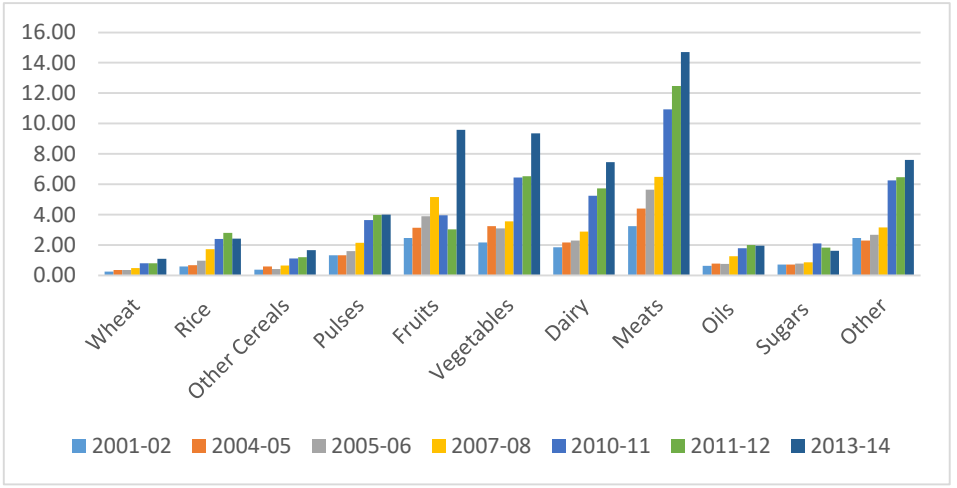
Source: Author's calculations from various issues of HIES

Figure 48: Cost of Calories at Urban Level



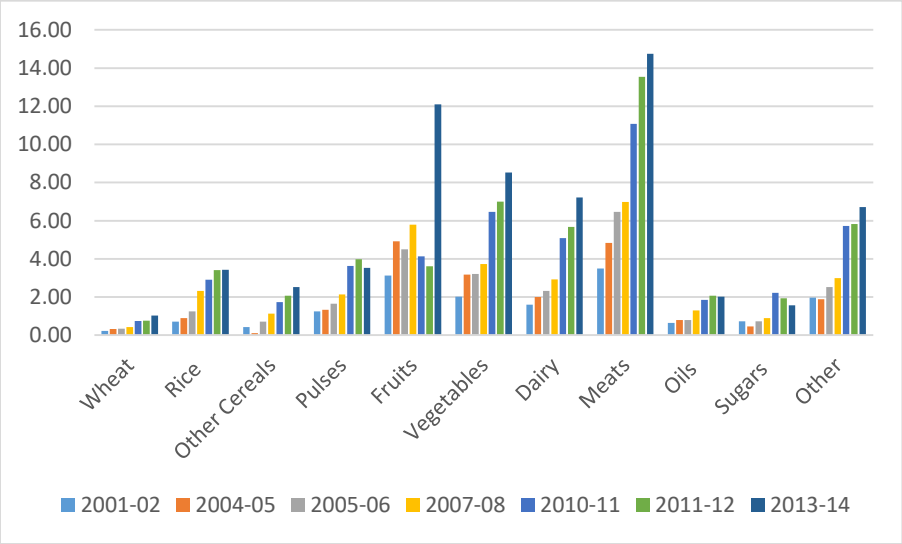
Source: Author's calculations from various issues of HIES

Figure 49: Cost of Calories for Rural Region



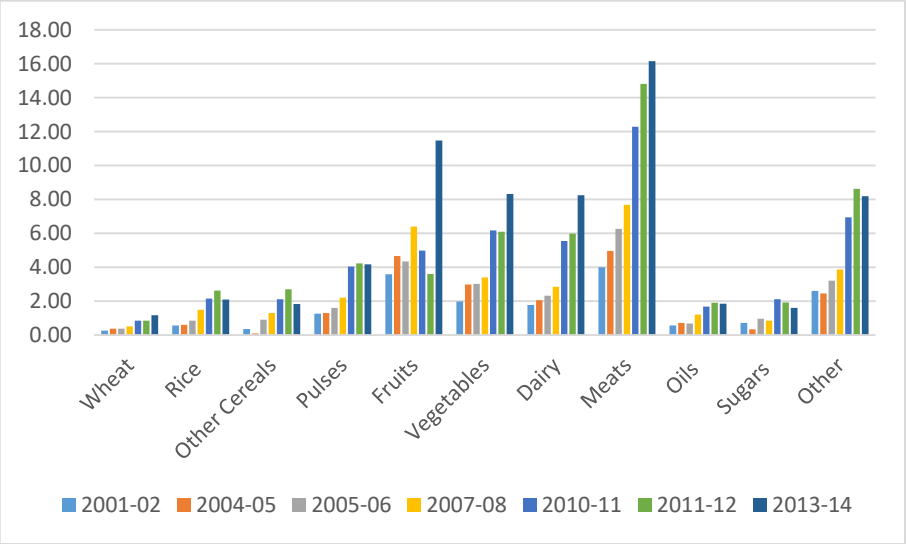
Source: Author's calculations from various issues of HIES

Figure 50: Cost of Calories in Punjab



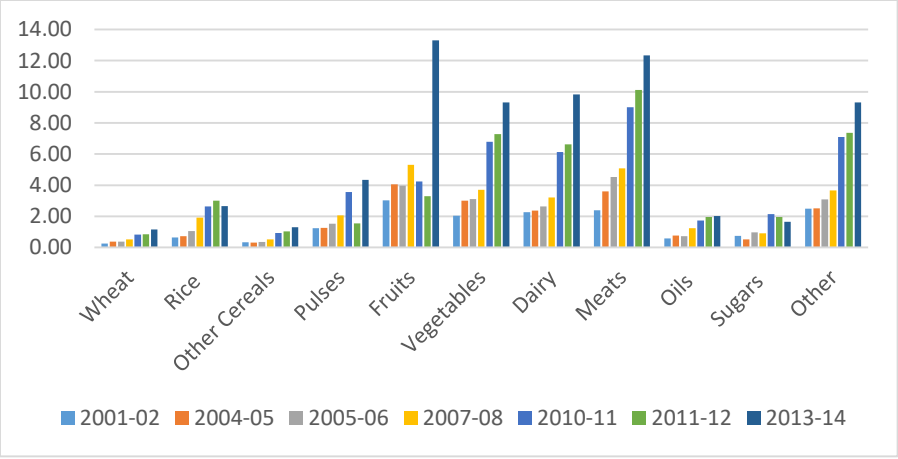
Source: Author's calculations from various issues of HIES

Figure 51: Cost of Calories in Sindh



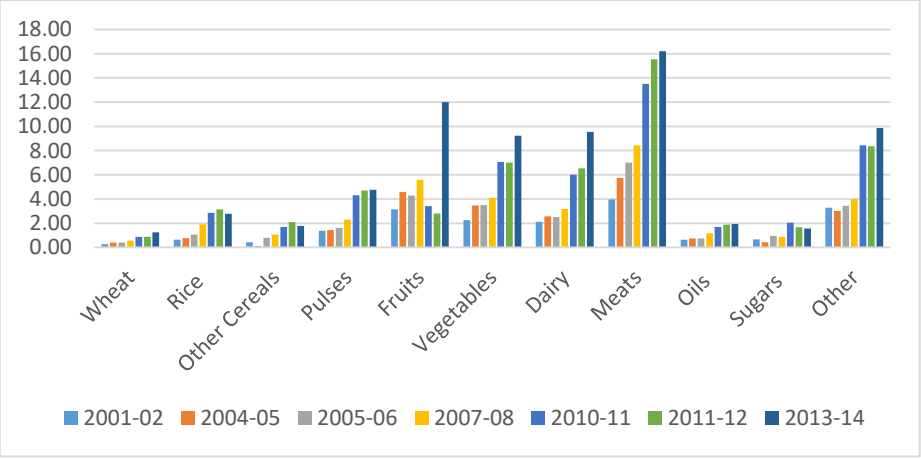
Source: Author's calculations from various issues of HIES

Figure 52: Cost of Calories in KPK



Source: Author's calculations from various issues of HIES

Figure 53: Cost of Calories in Balochistan



Source: Author's calculations from various issues of HIES

Table 8: Regression Coefficients (Alpha)

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
alpha	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Wheat	0.36	0.00	*0.57*	*0.00*	*0.34*	*0.00*	*0.26*	*0.00*	0.30	0.00	0.40	0.00	0.35	0.00
Rice	0.06	0.00	*0.01*	*0.29*	*0.02*	*0.08*	*0.05*	*0.00*	0.05	0.00	0.01	0.06	0.01	0.16
Other Cereals	0.01	0.31	*0.05*	*0.00*	*0.01*	*0.01*	*0.02*	*0.00*	0.01	0.00	-0.01	0.00	0.01	0.02
Pulses	0.09	0.00	*0.07*	*0.00*	*0.05*	*0.00*	*0.05*	*0.00*	0.04	0.00	0.04	0.00	0.04	0.00
Fruits	-0.02	0.20	*0.01*	*0.52*	*0.03*	*0.00*	*0.04*	*0.00*	0.04	0.00	0.01	0.00	0.03	0.00
Vegetables	0.25	0.00	*0.26*	*0.00*	*0.25*	*0.00*	*0.20*	*0.00*	0.18	0.00	0.23	0.00	0.23	0.00
Dairy	0.19	0.00	*0.11*	*0.00*	*-0.03*	*0.39*	*0.08*	*0.00*	0.16	0.00	0.15	0.00	0.13	0.00
Meats	-0.14	0.00	*-0.37*	*0.00*	*0.02*	*0.28*	*0.01*	*0.58*	-0.06	0.00	-0.17	0.00	-0.13	0.00
Oils	0.10	0.00	*0.11*	*0.00*	*0.08*	*0.00*	*0.08*	*0.00*	0.07	0.00	0.17	0.00	0.10	0.00
Sugars	0.00	0.88	*0.12*	*0.00*	*0.12*	*0.00*	*0.09*	*0.00*	0.09	0.00	0.06	0.00	0.11	0.00
Other	0.09	0.00	*0.07*	*0.00*	*0.11*	*0.00*	*0.13*	*0.00*	0.14	0.00	0.10	0.00	0.12	0.00

Source: Author's Own Calculation from Several issues of HIES

Table 9: Regression Coefficient (Beta)

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
beta	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Wheat	*-0.04*	*0.00*	*-0.19*	*0.00*	*-0.05*	*0.00*	*-0.05*	*0.00*	-0.08	0.00	-0.10	0.00	-0.04	0.00
Rice	*-0.01*	*0.04*	*0.02*	*0.05*	*0.02*	*0.03*	*0.00*	*0.36*	0.01	0.00	0.03	0.00	0.02	0.00
Other Cereals	*0.01*	*0.08*	*-0.03*	*0.00*	*0.00*	*0.72*	*0.00*	*0.02*	0.00	0.02	0.01	0.00	0.00	0.17
Pulses	*-0.02*	*0.00*	*-0.01*	*0.00*	*-0.01*	*0.00*	*-0.01*	*0.00*	-0.01	0.00	0.00	0.02	-0.01	0.00
Fruits	*0.03*	*0.00*	*0.02*	*0.00*	*0.01*	*0.12*	*0.01*	*0.01*	0.01	0.00	0.01	0.00	-0.01	0.00
Vegetables	*-0.03*	*0.00*	*-0.03*	*0.00*	*-0.06*	*0.00*	*-0.05*	*0.00*	-0.04	0.00	-0.05	0.00	-0.04	0.00
Dairy	*-0.03*	*0.08*	*-0.02*	*0.29*	*0.18*	*0.00*	*0.16*	*0.00*	0.09	0.00	0.05	0.00	0.08	0.00
Meats	*0.06*	*0.00*	*0.27*	*0.00*	*-0.05*	*0.00*	*-0.03*	*0.00*	0.05	0.00	0.08	0.00	0.04	0.00
Oils	*-0.02*	*0.00*	*-0.03*	*0.00*	*-0.01*	*0.03*	*0.00*	*0.31*	-0.03	0.00	-0.06	0.00	-0.03	0.00
Sugars	*0.04*	*0.00*	*-0.04*	*0.00*	*-0.05*	*0.00*	*-0.04*	*0.00*	-0.03	0.00	0.00	0.32	-0.01	0.00
Other	*0.02*	*0.00*	*0.04*	*0.00*	*0.02*	*0.03*	*0.03*	*0.00*	0.02	0.00	0.04	0.00	0.00	0.27

Source: Author's calculations from various issues of HIES

Table 10: Regression Coefficient (Gamma), Several Tables calculated by Author

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
gamma	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Wheat-Wheat	0.07	0.00	0.00	0.92	0.07	0.00	0.08	0.00	0.07	0.00	0.08	0.00	0.07	0.00
Rice-Wheat	0.01	0.00	0.03	0.00	0.01	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.70
Other Cereals-Wheat	0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.32	0.00	0.03	0.01	0.00
Pulses-Wheat	0.00	0.02	-0.01	0.00	0.00	0.01	0.00	0.17	-0.01	0.00	0.00	0.26	0.01	0.00
Fruits-Wheat	-0.01	0.00	0.00	0.44	-0.01	0.00	-0.01	0.00	0.00	0.00	-0.01	0.00	-0.02	0.00
Vegetables-Wheat	0.00	0.07	-0.02	0.00	0.00	0.09	-0.01	0.00	-0.02	0.00	-0.02	0.00	-0.01	0.00
Dairy-Wheat	-0.03	0.00	-0.03	0.00	-0.01	0.00	-0.03	0.00	-0.02	0.00	-0.03	0.00	0.00	0.08
Meats-Wheat	-0.02	0.00	0.08	0.00	-0.03	0.00	-0.03	0.00	-0.03	0.00	-0.04	0.00	-0.04	0.00
Oils-Wheat	-0.02	0.00	-0.03	0.00	-0.02	0.00	-0.01	0.00	-0.02	0.00	-0.02	0.00	-0.02	0.00
Sugars-Wheat	0.00	0.71	-0.02	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00
Other-Wheat	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.48

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
Gamma	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Rice-Rice	-0.02	0.00	-0.03	0.00	-0.02	0.00	0.00	0.06	-0.01	0.00	-0.01	0.00	0.00	0.00
Other Cereals-Rice	0.00	0.77	0.00	0.50	0.00	0.00	0.00	0.76	0.00	0.48	0.00	0.82	-0.01	0.00
Pulses-Rice	0.00	1.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.80	0.00	0.00
Fruits-Rice	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Vegetables-Rice	0.00	0.65	-0.01	0.00	0.01	0.00	0.00	0.19	0.00	0.03	0.00	0.95	0.00	0.00
Dairy-Rice	-0.01	0.00	0.01	0.00	-0.01	0.02	-0.01	0.00	0.00	0.22	0.01	0.00	0.00	0.00
Meats-Rice	0.02	0.00	-0.01	0.19	-0.01	0.01	0.00	0.01	0.00	0.04	0.00	0.02	0.00	0.06
Oils-Rice	-0.01	0.00	0.00	0.02	0.00	0.77	0.00	0.07	-0.01	0.00	0.00	0.43	0.01	0.00
Sugars-Rice	0.00	0.13	0.01	0.00	0.00	0.70	-0.01	0.00	0.00	0.03	-0.01	0.00	-0.02	0.00
Others-Rice	0.00	0.98	0.00	0.48	0.00	0.31	0.00	0.00	0.01	0.00	-0.01	0.00	0.01	0.00

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
Gamma	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Other Cereals-Other Cereals	-0.01	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00
Pulses-Other Cereals	0.00	0.78	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00
Fruits-Other Cereals	0.00	0.19	0.00	0.00	0.00	0.01	0.00	0.15	0.00	0.00	0.00	0.02	0.00	0.00
Vegetables-Other Cereals	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.48	0.00	0.55	0.00	0.00
Dairy-Other Cereals	0.00	0.05	0.00	0.87	0.00	0.06	0.00	0.12	0.00	0.11	0.00	0.08	0.00	0.17
Meats-Other Cereals	0.00	0.00	0.01	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Oils-Other Cereals	0.00	0.00	0.00	0.05	0.00	0.72	0.00	0.00	0.00	0.94	0.01	0.00	0.00	0.00
Sugars-Other Cereals	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.05	0.00	0.01	0.00	0.03	0.00	0.00
Other-Other Cereals	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Pulses-Pulses	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00
Fruits-Pulses	0.00	0.16	0.00	0.81	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.82
Vegetables-Pulses	0.00	0.01	0.00	0.34	0.00	0.07	0.00	0.01	0.00	0.05	0.00	0.11	0.00	0.00
Dairy-Pulses	0.00	0.04	0.00	0.23	0.00	0.76	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.01
Meats-Pulses	0.00	0.02	0.00	0.35	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00
Oils-Pulses	0.00	0.55	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.35	0.00	0.00
Sugars-Pulses	0.00	0.82	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
Others-Pulses	0.00	0.33	0.00	0.08	0.00	0.03	0.00	0.41	0.00	0.01	0.00	0.00	0.00	0.00

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
gamma	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
Fruits-Fruits	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Vegetables-Fruits	0.00	0.37	0.00	0.51	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00
Dairy-Fruits	0.01	0.00	0.00	0.28	0.00	0.62	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.00
Meats-Fruits	0.00	0.35	-0.01	0.00	0.00	0.12	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Oils-Fruits	0.00	0.07	0.00	0.13	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00
Sugars-Fruits	-0.01	0.00	0.00	0.75	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others-Fruits	0.00	0.29	-0.01	0.00	0.00	0.11	0.00	0.34	0.00	0.17	0.00	0.28	0.00	0.92
Vegetables-Vegetables	0.04	0.00	0.06	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.05	0.00
Dairy--Vegetables	-0.01	0.00	0.00	0.16	0.01	0.03	0.01	0.00	0.00	0.54	0.00	0.53	0.00	0.01
Meats--Vegetables	-0.01	0.00	0.01	0.43	-0.02	0.00	-0.02	0.00	-0.02	0.00	-0.02	0.00	-0.02	0.00
Oils-Vegetables	-0.02	0.00	-0.02	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00
Sugars-Vegetables	0.00	0.06	-0.01	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.01
Others-Vegetables	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.00
Dairy-Dairy	0.00	0.52	-0.02	0.00	0.01	0.10	0.05	0.00	0.03	0.00	0.03	0.00	-0.01	0.00
Meats-Dairy	0.02	0.00	0.04	0.01	0.00	0.81	0.00	0.74	0.00	0.28	0.00	0.70	0.01	0.00
Oils-Dairy	0.00	0.48	0.00	0.87	0.00	0.14	-0.01	0.00	0.00	0.71	-0.01	0.00	0.00	0.06
Sugars-Dairy	0.01	0.05	0.00	0.19	0.00	0.18	-0.02	0.00	-0.02	0.00	-0.02	0.00	0.00	0.48
Others-Dairy	0.01	0.00	0.01	0.00	0.00	0.11	0.00	0.20	0.00	0.39	0.01	0.01	0.00	0.00
Meats-Meats	0.08	0.00	-0.11	0.00	0.09	0.00	0.09	0.00	0.10	0.00	0.11	0.00	0.11	0.00
Oils-Meats	-0.01	0.00	0.01	0.20	-0.01	0.00	-0.02	0.00	-0.02	0.00	-0.02	0.00	-0.03	0.00
Sugars-Meats	-0.04	0.00	0.02	0.00	-0.01	0.00	0.00	0.10	0.00	0.06	0.00	0.83	-0.01	0.00
Others-Meats	-0.02	0.00	-0.03	0.00	0.00	0.83	-0.01	0.00	-0.01	0.00	-0.02	0.00	-0.03	0.00
Oils-Oils	0.07	0.00	0.06	0.00	0.05	0.00	0.07	0.00	0.08	0.00	0.05	0.00	0.06	0.00
Sugars-Oils	-0.01	0.00	-0.01	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00
Others--Oils	0.00	0.01	0.00	0.36	0.00	0.55	0.00	0.55	0.00	0.37	0.00	0.08	0.00	0.16
Sugars-Sugars	0.04	0.00	0.01	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.05	0.00
Others-Sugars	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.34	0.00	0.00	0.00	0.60
Others-Others	0.00	0.04	0.00	0.64	-0.01	0.01	-0.02	0.00	-0.01	0.00	0.00	0.34	0.00	0.00

Table 11: Regression Coefficients (Lambda)

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
lambda	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Wheat	*0.00*	*0.29*	*0.02*	*0.00*	*0.00*	*0.63*	*0.00*	*0.27*	0.00	0.15	0.01	0.00	0.01	0.00
Rice	*0.00*	*0.01*	*0.00*	*0.14*	*0.00*	*0.03*	*0.00*	*0.12*	0.00	0.00	0.00	0.00	0.00	0.00
Other Cereals	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.17*	*0.00*	*0.75*	0.00	0.00	0.00	0.00	0.00	0.00
Pulses	*0.00*	*0.00*	*0.00*	*0.09*	*0.00*	*0.23*	*0.00*	*0.07*	0.00	0.01	0.00	0.00	0.00	0.00
Fruits	*0.00*	*0.01*	*0.00*	*0.01*	*0.00*	*0.76*	*0.00*	*0.02*	0.00	0.03	0.00	0.33	0.00	0.00
Vegetables	*0.00*	*0.10*	*0.00*	*0.96*	*0.01*	*0.00*	*0.01*	*0.00*	0.00	0.00	0.00	0.00	0.00	0.00
Dairy	*0.01*	*0.00*	*0.01*	*0.00*	*-0.02*	*0.00*	*-0.02*	*0.00*	0.00	0.00	0.01	0.00	-0.01	0.00
Meats	*0.00*	*0.00*	*-0.04*	*0.00*	*0.01*	*0.00*	*0.01*	*0.00*	0.00	0.00	-0.01	0.00	0.00	0.00
Oils	*0.00*	*0.19*	*0.00*	*0.09*	*0.00*	*0.75*	*0.00*	*0.02*	0.00	0.00	0.01	0.00	0.00	0.00
Sugars	*-0.01*	*0.00*	*0.01*	*0.00*	*0.01*	*0.00*	*0.00*	*0.11*	0.00	0.00	0.00	0.00	0.00	0.00
Other	*0.00*	*0.73*	*0.00*	*0.01*	*0.00*	*0.45*	*0.00*	*0.05*	0.00	0.00	0.00	0.00	0.00	0.00

Table 12: Regression Dummy for Region

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
Region	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Wheat	*0.02*	*0.00*	*0.01*	*0.00*	*0.01*	*0.00*	*0.02*	*0.00*	0.02	0.00	0.01	0.00	-0.01	0.00
Rice	*0.00*	*0.00*	*0.00*	*0.93*	*0.00*	*0.00*	*0.00*	*0.03*	0.00	0.99	0.00	0.00	0.00	0.37
Other Cereals	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	0.00	0.00	0.00	0.00	0.00
Pulses	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.48*	*0.00*	*0.01*	0.00	0.00	0.00	0.73	0.00	0.02
Fruits	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*-0.01*	*0.00*	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.65*	*0.00*	*0.68*	0.00	0.00	0.00	0.00	0.00	0.00
Dairy	*-0.01*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	*0.01*	*0.00*	0.00	0.55	0.00	0.00	0.00	0.53
Meats	*-0.01*	*0.00*	*-0.01*	*0.00*	*-0.01*	*0.00*	*-0.02*	*0.00*	-0.02	0.00	-0.01	0.00	0.00	0.00
Oils	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.03*	*0.00*	*0.83*	0.00	0.00	0.00	0.18	0.00	0.79
Sugars	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.00*	0.01	0.00	0.00	0.00	0.00	0.00
Other	*-0.01*	*0.00*	*-0.01*	*0.00*	*-0.01*	*0.00*	*-0.01*	*0.00*	-0.01	0.00	-0.01	0.00	0.01	0.00

Table 13: Regression Dummy for Province

	2001-02		2004-05		2005-06		2007-08		2010-11		2011-12		2013-14	
Province	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**	**Coef.**	**P>z**
Wheat	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01
Rice	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.10	0.00	0.00	0.00	0.26	0.00	0.00
Other Cereals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pulses	0.00	0.00	0.00	0.41	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Fruits	0.00	0.03	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetables	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Dairy	0.00	0.01	-0.01	0.00	-0.01	0.00	-0.02	0.00	-0.03	0.00	-0.02	0.00	-0.01	0.00
Meats	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.95	0.00	0.42	0.00	0.05
Oils	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sugars	0.00	0.27	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Other	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.34	0.00	0.00

Table 14: Expenditure Elasticities at National Level

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.7	1.2	0.7	0.7	0.7	1.0	1.1
Rice	1.3	0.8	0.5	1.5	1.2	0.6	0.6
Other Cereals	-0.5	3.3	0.0	1.2	-0.1	-1.1	2.3
Pulses	0.9	0.7	0.8	1.0	0.7	0.6	1.3
Fruits	1.0	0.8	1.3	1.7	1.3	1.3	1.2
Vegetables	0.8	0.7	1.2	1.5	0.8	1.0	1.0
Dairy	1.3	1.5	0.7	0.6	1.3	1.3	1.0
Meats	1.1	0.1	1.9	2.2	1.2	0.9	1.1
Oils	0.8	0.9	0.8	0.6	0.9	1.0	1.0
Sugars	0.8	1.2	1.3	1.0	0.7	0.4	1.0
Other	1.1	0.9	0.9	0.8	1.1	0.8	0.8

Table 15: Expenditure Elasticities for Urban Region

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.5	1.0	0.5	0.5	0.5	1.0	1.1
Rice	1.2	0.9	0.5	1.4	1.2	0.6	0.6
Other Cereals	0.6	2.9	-0.3	1.1	-0.1	-1.1	2.2
Pulses	0.8	0.7	0.8	1.0	0.7	0.6	1.3
Fruits	1.2	0.9	1.3	1.7	1.4	1.3	1.2
Vegetables	0.7	0.7	1.2	1.4	0.8	1.0	1.0
Dairy	1.3	1.5	0.8	0.6	1.3	1.3	1.0
Meats	1.2	0.6	1.8	2.1	1.3	1.0	1.1
Oils	0.8	0.9	0.8	0.6	0.8	1.0	1.0
Sugars	0.8	1.2	1.2	0.9	0.6	0.3	1.0
Other	1.1	1.0	1.0	0.9	1.1	0.9	0.9

Table 16: Expenditure Elasticities for Rural Region

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.8	1.3	0.8	0.8	0.8	1.1	1.1
Rice	1.4	0.8	0.5	1.5	1.1	0.6	0.6
Other Cereals	-0.5	3.5	0.2	1.3	-0.1	-1.1	2.3
Pulses	1.0	0.8	0.8	1.0	0.7	0.6	1.3
Fruits	0.9	0.7	1.3	1.8	1.3	1.3	1.2
Vegetables	0.8	0.8	1.2	1.5	0.8	1.1	1.0
Dairy	1.3	1.5	0.7	0.6	1.3	1.3	1.0
Meats	1.0	-0.3	2.0	2.3	1.1	0.9	1.0
Oils	0.8	0.9	0.8	0.6	0.9	1.0	1.0
Sugars	0.8	1.3	1.3	1.1	0.7	0.5	1.0
Other	1.1	0.8	0.9	0.6	1.1	0.7	0.8

Table 17: Expenditure Elasticities for Punjab

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.7	1.1	0.6	0.6	0.6	0.9	1.1
Rice	1.4	0.9	0.3	1.6	1.3	0.7	0.6
Other Cereals	-1.4	3.5	-0.6	1.1	-0.4	-1.5	2.6
Pulses	1.0	0.7	0.8	1.0	0.6	0.5	1.3
Fruits	1.0	0.8	1.3	1.7	1.3	1.4	1.1
Vegetables	0.8	0.7	1.2	1.5	0.7	1.0	1.0
Dairy	1.3	1.5	0.8	0.7	1.3	1.3	1.0
Meats	1.0	0.0	2.0	2.3	1.2	1.0	1.1
Oils	0.9	0.9	0.8	0.6	0.8	1.0	1.0
Sugars	0.7	1.2	1.3	0.9	0.6	0.3	1.0
Other	1.1	0.9	0.9	0.7	1.1	0.8	0.9

Table 18: Expenditure Elasticities for Sindh

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.5	1.1	0.7	0.7	0.7	1.0	1.2
Rice	1.2	0.9	0.7	1.3	1.1	0.8	0.7
Other Cereals	-0.6	3.0	0.1	1.2	0.2	-0.6	2.0
Pulses	0.8	0.7	0.8	1.0	0.7	0.6	1.3
Fruits	1.1	0.8	1.3	1.9	1.4	1.3	1.2
Vegetables	0.7	0.7	1.2	1.5	0.8	1.0	1.0
Dairy	1.3	1.5	0.8	0.6	1.2	1.3	1.0
Meats	1.1	0.5	1.8	2.1	1.2	0.9	1.0
Oils	0.8	0.9	0.8	0.6	0.9	1.0	1.0
Sugars	0.8	1.2	1.3	1.0	0.7	0.5	1.0
Other	1.1	0.9	0.9	0.8	1.1	0.8	0.9

Table 19: Expenditure Elasticities for KPK

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.8	1.2	0.8	0.8	0.9	1.2	1.0
Rice	1.4	0.7	0.4	1.5	1.1	0.3	0.6
Other Cereals	0.3	2.7	0.6	1.4	0.5	-0.7	2.1
Pulses	0.9	0.8	0.8	1.0	0.9	0.8	1.1
Fruits	1.0	0.7	1.2	1.6	1.2	1.2	1.1
Vegetables	0.8	0.7	1.2	1.4	0.9	1.6	0.9
Dairy	1.3	1.5	0.6	0.5	1.2	1.3	1.1
Meats	1.2	-0.2	2.0	2.3	1.1	0.8	1.1
Oils	0.8	0.9	0.8	0.6	0.9	1.2	0.9
Sugars	0.9	1.2	1.2	1.1	0.8	0.6	0.9
Other	1.1	0.8	0.9	0.7	1.1	0.7	0.8

Table 20: Expenditure Elasticities for Balochistan

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.8	1.2	0.8	0.9	1.0	1.4	1.4
Rice	1.1	0.8	0.7	1.5	0.8	-0.1	0.0
Other Cereals	0.3	3.8	0.8	1.5	-0.4	-2.5	3.0
Pulses	0.8	0.8	0.8	1.0	0.9	0.8	1.6
Fruits	1.1	0.7	1.3	1.7	1.3	1.3	1.4
Vegetables	0.8	0.8	1.1	1.2	1.0	1.3	1.4
Dairy	1.4	1.6	0.5	-0.1	1.1	1.4	0.5
Meats	1.1	0.5	1.6	1.8	1.0	0.7	0.8
Oils	0.8	0.9	0.8	0.6	1.0	1.3	1.2
Sugars	0.9	1.3	1.3	1.2	0.7	0.4	1.3
Other	1.1	0.9	0.9	0.7	1.2	0.5	0.6

Table 21: Own Price Elasticities at National Level

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	-0.23	-0.16	-0.29	-0.16	-0.30	-0.01	-0.30
Rice	-2.05	-2.31	-1.94	-1.12	-1.56	-1.42	-1.09
Other Cereals	-2.83	-0.98	-2.92	-2.24	-1.91	-1.38	-2.91
Pulses	-0.50	-0.18	0.25	-0.16	-0.11	-0.46	-0.59
Fruits	-0.63	-0.43	-0.32	-0.43	-0.80	-0.88	-0.38
Vegetables	-0.41	-0.26	-0.28	-0.11	-0.28	-0.26	-0.34
Dairy	-0.97	-1.09	-0.46	-0.33	-0.88	-0.93	-1.00
Meats	0.23	0.73	0.06	0.06	0.27	0.47	0.51
Oils	-0.07	-0.21	-0.29	-0.25	-0.09	-0.40	-0.18
Sugars	-0.17	-0.74	-0.39	-0.14	-0.39	-0.17	0.10
Other	-0.96	-0.93	-1.04	-1.14	-1.10	-0.95	-0.92

Table 22: Own Price Elasticities at Urban Level

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	-0.02	0.01	-0.13	0.02	-0.17	0.16	-0.17
Rice	-1.96	-2.18	-1.90	-1.12	-1.55	-1.41	-1.09
Other Cereals	-3.21	-1.01	-3.05	-2.29	-1.93	-1.38	-3.04
Pulses	-0.51	-0.16	0.27	-0.10	-0.10	-0.46	-0.59
Fruits	-0.69	-0.52	-0.42	-0.52	-0.82	-0.89	-0.49
Vegetables	-0.40	-0.24	-0.26	-0.11	-0.27	-0.25	-0.33
Dairy	-0.99	-1.10	-0.50	-0.38	-0.88	-0.92	-1.00
Meats	0.02	0.25	-0.12	-0.10	0.11	0.27	0.32
Oils	-0.09	-0.19	-0.28	-0.22	-0.04	-0.38	-0.18
Sugars	-0.06	-0.71	-0.32	-0.04	-0.33	-0.11	0.25
Other	-0.97	-0.94	-1.04	-1.13	-1.09	-0.95	-0.93

Table 23: Own Price Elasticities at Rural Level

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	-0.42	-0.32	-0.45	-0.35	-0.42	-0.24	-0.39
Rice	-2.13	-2.41	-1.97	-1.13	-1.57	-1.43	-1.08
Other Cereals	-2.49	-0.96	-2.80	-2.18	-1.89	-1.37	-2.82
Pulses	-0.49	-0.20	0.22	-0.23	-0.13	-0.46	-0.59
Fruits	-0.57	-0.33	-0.23	-0.34	-0.77	-0.87	-0.30
Vegetables	-0.41	-0.27	-0.29	-0.11	-0.28	-0.28	-0.35
Dairy	-0.95	-1.08	-0.42	-0.28	-0.87	-0.93	-1.00
Meats	0.40	1.14	0.24	0.23	0.43	0.71	0.65
Oils	-0.06	-0.23	-0.29	-0.28	-0.13	-0.43	-0.17
Sugars	-0.27	-0.76	-0.47	-0.23	-0.45	-0.25	0.00
Other	-0.96	-0.92	-1.04	-1.15	-1.10	-0.95	-0.91

Table 24: Own Price Elasticities for Punjab

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	-0.23	-0.14	-0.18	-0.07	-0.24	0.05	-0.31
Rice	-2.12	-2.36	-2.07	-1.14	-1.63	-1.50	-1.10
Other Cereals	-3.41	-0.97	-3.39	-2.49	-2.11	-1.50	-3.40
Pulses	-0.53	-0.21	0.32	-0.12	-0.04	-0.37	-0.54
Fruits	-0.62	-0.47	-0.37	-0.49	-0.81	-0.89	-0.43
Vegetables	-0.38	-0.25	-0.28	-0.15	-0.27	-0.29	-0.35
Dairy	-0.96	-1.11	-0.48	-0.38	-0.91	-0.96	-0.98
Meats	0.45	0.92	0.25	0.21	0.49	0.76	0.78
Oils	-0.15	-0.23	-0.30	-0.26	-0.10	-0.40	-0.22
Sugars	-0.12	-0.71	-0.34	0.00	-0.34	-0.06	0.33
Other	-0.96	-0.93	-1.04	-1.14	-1.10	-0.96	-0.92

Table 25: Own Price Elasticities for Sindh

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	0.14	0.04	-0.32	-0.12	-0.27	0.05	-0.38
Rice	-1.70	-1.98	-1.58	-1.07	-1.40	-1.30	-1.06
Other Cereals	-3.22	-1.00	-2.87	-2.11	-1.76	-1.31	-2.80
Pulses	-0.44	-0.07	0.24	-0.06	-0.11	-0.49	-0.52
Fruits	-0.71	-0.39	-0.26	-0.33	-0.77	-0.86	-0.24
Vegetables	-0.40	-0.23	-0.21	0.07	-0.18	-0.18	-0.21
Dairy	-0.98	-1.09	-0.51	-0.33	-0.89	-0.93	-0.97
Meats	-0.26	0.12	-0.11	-0.08	0.01	0.14	0.20
Oils	-0.01	-0.15	-0.27	-0.26	-0.08	-0.38	-0.13
Sugars	0.05	-0.71	-0.36	-0.10	-0.40	-0.23	0.01
Other	-0.97	-0.94	-1.03	-1.12	-1.09	-0.96	-0.92

Table 26: Own Price Elasticities for KPK

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	-0.43	-0.39	-0.44	-0.37	-0.42	-0.27	-0.49
Rice	-2.30	-2.62	-2.22	-1.15	-1.66	-1.43	-1.11
Other Cereals	-2.09	-0.99	-2.14	-1.95	-1.63	-1.22	-2.43
Pulses	-0.45	-0.21	0.18	-0.39	-0.22	-0.60	-0.66
Fruits	-0.61	-0.36	-0.33	-0.50	-0.82	-0.89	-0.49
Vegetables	-0.46	-0.24	-0.32	-0.20	-0.38	-0.32	-0.37
Dairy	-0.96	-1.07	-0.40	-0.37	-0.83	-0.88	-0.99
Meats	0.41	1.25	0.07	0.08	0.32	0.39	0.65
Oils	-0.03	-0.27	-0.27	-0.23	-0.12	-0.43	-0.19
Sugars	-0.47	-0.81	-0.55	-0.29	-0.52	-0.36	-0.14
Other	-0.96	-0.92	-1.04	-1.15	-1.11	-0.93	-0.92

Table 27: Own Price Elasticities for Balochistan

	2001-02	2004-05	2005-06	2007-08	2010-11	2011-12	2013-14
Wheat	-0.53	-0.33	-0.46	-0.43	-0.54	-0.35	-0.50
Rice	-1.63	-2.20	-1.82	-1.16	-1.50	-1.28	-0.92
Other Cereals	-2.38	-1.00	-2.56	-1.82	-1.65	-1.13	-2.89
Pulses	-0.58	-0.22	0.02	-0.32	-0.42	-0.65	-0.71
Fruits	-0.66	-0.34	-0.27	-0.28	-0.60	-0.85	-0.28
Vegetables	-0.50	-0.36	-0.42	-0.44	-0.44	-0.39	-0.35
Dairy	-0.96	-1.06	-0.31	0.19	-0.66	-0.75	-0.80
Meats	-0.27	2.03	-0.35	-0.38	-0.29	-0.02	-0.09
Oils	-0.03	-0.18	-0.31	-0.21	0.03	-0.49	-0.29
Sugars	-0.12	-0.76	-0.43	-0.35	-0.43	-0.19	0.00
Other	-0.95	-0.93	-1.04	-1.18	-1.10	-0.85	-0.83

Table 28: Elasticity Matrices for Punjab

	Marshallian Elasticity Matrix for Punjab										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.51**	0.06	0.03	0.00	-0.05	-0.03	-0.10	-0.22	-0.07	-0.03	0.04
Rice	0.33	**-1.44**	-0.01	0.04	0.16	-0.04	0.05	0.07	-0.11	-0.14	0.10
Other Cereals	1.77	-0.14	**-3.04**	-0.46	0.25	-0.11	0.55	-0.77	0.80	-0.10	1.11
Pulses	-0.01	0.06	-0.05	**-0.52**	-0.01	0.04	0.02	-0.32	-0.07	-0.07	0.03
Fruits	-0.37	0.17	0.02	-0.01	**-0.65**	-0.15	-0.02	0.01	-0.16	0.00	-0.06
Vegetables	-0.06	-0.01	0.00	0.01	-0.04	**-0.44**	-0.08	-0.19	-0.09	-0.05	-0.03
Dairy	-0.10	0.00	0.00	0.00	0.00	-0.04	**-0.87**	-0.03	-0.03	-0.05	0.00
Meats	-0.50	0.02	-0.03	-0.11	0.00	-0.24	-0.14	**0.29**	-0.28	-0.09	-0.17
Oils	-0.12	-0.02	0.02	-0.02	-0.03	-0.07	0.00	-0.18	**-0.40**	-0.07	0.01
Sugars	-0.07	-0.09	-0.01	-0.03	0.02	-0.07	-0.14	-0.07	-0.12	**-0.40**	0.08
Other	0.05	0.04	0.03	0.01	-0.01	-0.02	0.06	-0.10	0.00	0.05	**-1.02**

	Hicksian Elasticity Matrix for Punjab										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.35**	0.09	0.03	0.02	-0.03	0.06	0.13	-0.15	0.03	0.04	0.13
Rice	0.50	**-1.41**	-0.01	0.07	0.19	0.06	0.31	0.15	0.01	-0.06	0.20
Other Cereals	1.82	-0.13	**-3.03**	-0.46	0.26	-0.07	0.61	-0.75	0.82	-0.10	1.14
Pulses	0.14	0.09	-0.04	**-0.50**	0.02	0.13	0.26	-0.24	0.03	0.00	0.13
Fruits	-0.16	0.21	0.02	0.02	**-0.62**	-0.03	0.31	0.11	-0.02	0.09	0.06
Vegetables	0.10	0.03	0.00	0.04	-0.01	**-0.34**	0.18	-0.11	0.02	0.02	0.07
Dairy	0.09	0.04	0.01	0.03	0.04	0.07	**-0.57**	0.06	0.10	0.03	0.12
Meats	-0.29	0.06	-0.03	-0.08	0.03	-0.12	0.19	**0.40**	-0.14	0.00	-0.04
Oils	0.03	0.01	0.02	0.01	0.00	0.01	0.23	-0.10	**-0.30**	0.00	0.10
Sugars	0.08	-0.06	-0.01	0.00	0.04	0.02	0.10	0.01	-0.02	**-0.34**	0.17
Other	0.21	0.07	0.03	0.03	0.02	0.07	0.30	-0.02	0.10	0.12	**-0.92**

Substitutes **Compliments** **No Relation**

	Elasticity Matrix	
	Marshallian	*Hicksian*
No Relation	11	6
Substitutes	29	77
Compliments	70	27

Table 29: Elasticity Matrices for Sindh

	Marshallian Elasticity Matrix for Sindh										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.48**	0.07	0.03	0.00	-0.06	-0.04	-0.11	-0.25	-0.08	-0.03	0.03
Rice	0.16	**-1.20**	-0.01	0.02	0.08	-0.01	0.03	0.03	-0.05	-0.07	0.06
Other Cereals	1.68	-0.06	**-2.88**	-0.36	0.18	0.02	0.49	-0.89	0.66	-0.08	0.85
Pulses	-0.02	0.07	-0.06	**-0.42**	-0.01	0.05	0.02	-0.39	-0.09	-0.09	0.03
Fruits	-0.50	0.22	0.03	-0.01	**-0.53**	-0.21	-0.01	0.00	-0.21	0.02	-0.09
Vegetables	-0.07	-0.01	0.00	0.01	-0.04	**-0.42**	-0.07	-0.21	-0.10	-0.06	-0.03
Dairy	-0.10	0.00	0.00	0.00	0.00	-0.03	**-0.85**	-0.03	-0.02	-0.06	0.00
Meats	-0.38	0.01	-0.02	-0.08	0.00	-0.18	-0.09	**-0.05**	-0.21	-0.07	-0.13
Oils	-0.14	-0.03	0.02	-0.02	-0.03	-0.09	0.00	-0.20	**-0.32**	-0.08	0.00
Sugars	-0.08	-0.07	-0.01	-0.03	0.01	-0.07	-0.12	-0.08	-0.11	**-0.47**	0.07
Other	0.04	0.03	0.02	0.01	-0.01	-0.02	0.05	-0.09	0.00	0.04	**-1.01**

	Hicksian Elasticity Matrix for Sindh										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.33**	0.13	0.03	0.02	-0.04	0.05	0.10	-0.14	0.01	0.04	0.14
Rice	0.31	**-1.13**	0.00	0.04	0.10	0.08	0.25	0.14	0.05	0.00	0.17
Other Cereals	1.75	-0.04	**-2.87**	-0.36	0.19	0.08	0.60	-0.82	0.71	-0.05	0.90
Pulses	0.13	0.13	-0.05	**-0.40**	0.01	0.13	0.22	-0.28	0.00	-0.02	0.14
Fruits	-0.29	0.31	0.03	0.02	**-0.50**	-0.09	0.28	0.14	-0.08	0.12	0.06
Vegetables	0.08	0.06	0.00	0.03	-0.02	**-0.33**	0.15	-0.10	0.00	0.01	0.08
Dairy	0.07	0.08	0.01	0.02	0.03	0.07	**-0.61**	0.10	0.09	0.03	0.13
Meats	-0.18	0.09	-0.02	-0.06	0.02	-0.08	0.17	**0.08**	-0.09	0.03	0.01
Oils	0.00	0.04	0.02	0.00	-0.02	0.00	0.20	-0.10	**-0.23**	-0.01	0.11
Sugars	0.08	0.00	0.00	0.00	0.03	0.02	0.09	0.03	-0.02	**-0.39**	0.18
Other	0.19	0.10	0.03	0.03	0.01	0.07	0.25	0.02	0.09	0.12	**-0.90**

Substitutes | **Compliments** | **No Relation**

	Elasticity Matrix	
	Marshallian	*Hicksian*
No Relation	10	11
Substitutes	35	76
Compliments	65	23

Table 30: Elasticity Matrices for KPK

	Marshallian Elasticity Matrix for KPK										
	Wheat	***Rice***	***Other Cereals***	***Pulses***	***Fruits***	***Vegetables***	***Dairy***	***Meats***	***Oils***	***Sugars***	***Other***
Wheat	**-0.59**	0.05	0.02	0.00	-0.05	-0.03	-0.08	-0.20	-0.07	-0.03	0.02
Rice	0.42	**-1.56**	-0.01	0.05	0.21	-0.04	0.01	0.12	-0.12	-0.13	0.12
Other Cereals	0.38	0.00	**-1.50**	-0.13	0.05	-0.05	0.10	-0.24	0.19	0.01	0.29
Pulses	-0.03	0.06	-0.04	**-0.52**	-0.01	0.04	0.03	-0.32	-0.07	-0.07	0.03
Fruits	-0.40	0.19	0.02	-0.01	**-0.61**	-0.15	0.01	0.01	-0.16	-0.01	-0.07
Vegetables	-0.07	-0.01	-0.01	0.01	-0.04	**-0.46**	-0.05	-0.19	-0.09	-0.06	-0.03
Dairy	-0.10	0.00	0.01	0.00	0.00	-0.03	**-0.84**	-0.04	-0.02	-0.06	0.00
Meats	-0.50	0.02	-0.04	-0.11	0.00	-0.23	-0.11	**0.27**	-0.27	-0.09	-0.15
Oils	-0.13	-0.02	0.02	-0.02	-0.03	-0.08	0.00	-0.19	**-0.36**	-0.08	0.00
Sugars	-0.07	-0.06	-0.01	-0.02	0.01	-0.06	-0.10	-0.05	-0.09	**-0.57**	0.05
Other	0.05	0.04	0.03	0.01	-0.01	-0.02	0.05	-0.09	0.00	0.05	**-1.01**

	Hicksian Elasticity Matrix for KPK										
	Wheat	***Rice***	***Other Cereals***	***Pulses***	***Fruits***	***Vegetables***	***Dairy***	***Meats***	***Oils***	***Sugars***	***Other***
Wheat	**-0.40**	0.08	0.03	0.02	-0.02	0.06	0.12	-0.11	0.03	0.06	0.12
Rice	0.61	**-1.53**	0.00	0.08	0.23	0.05	0.20	0.20	-0.02	-0.03	0.22
Other Cereals	0.57	0.02	**-1.49**	-0.10	0.07	0.04	0.29	-0.16	0.29	0.10	0.39
Pulses	0.16	0.08	-0.03	**-0.50**	0.02	0.13	0.21	-0.24	0.03	0.02	0.12
Fruits	-0.16	0.23	0.03	0.02	**-0.58**	-0.03	0.25	0.11	-0.03	0.10	0.05
Vegetables	0.13	0.02	0.00	0.04	-0.01	**-0.36**	0.15	-0.11	0.02	0.04	0.07
Dairy	0.12	0.03	0.02	0.03	0.03	0.08	**-0.62**	0.06	0.10	0.05	0.11
Meats	-0.26	0.06	-0.02	-0.07	0.03	-0.12	0.14	**0.38**	-0.14	0.03	-0.03
Oils	0.05	0.00	0.03	0.01	-0.01	0.01	0.19	-0.11	**-0.27**	0.01	0.10
Sugars	0.13	-0.03	0.01	0.01	0.04	0.04	0.09	0.04	0.01	**-0.47**	0.15
Other	0.24	0.07	0.04	0.03	0.01	0.07	0.23	-0.01	0.10	0.15	**-0.92**

Substitutes	Compliments	No Relation

	Elasticity Matrix	
	Marshallian	*Hicksian*
No Relation	10	3
Substitutes	34	85
Compliments	66	22

Table 31: Elasticity Matrices for Balochistan

	Marshallian Elasticity Matrix for Balochistan										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.62**	0.04	0.02	-0.01	-0.04	-0.03	-0.09	-0.22	-0.07	-0.04	0.00
Rice	0.32	**-1.39**	-0.01	0.05	0.16	-0.04	0.02	0.16	-0.11	-0.11	0.15
Other Cereals	1.61	0.12	**-3.00**	-0.45	0.21	-0.28	0.23	-0.93	0.68	0.22	1.23
Pulses	-0.02	0.04	-0.03	**-0.57**	-0.01	0.03	0.00	-0.29	-0.07	-0.06	0.01
Fruits	-0.56	0.26	0.04	-0.01	**-0.40**	-0.24	-0.01	-0.04	-0.24	0.02	-0.12
Vegetables	-0.06	-0.02	-0.01	0.01	-0.03	**-0.53**	-0.04	-0.20	-0.08	-0.06	-0.04
Dairy	-0.13	0.00	0.01	0.00	0.01	-0.02	**-0.70**	-0.02	-0.01	-0.09	0.03
Meats	-0.30	0.02	-0.02	-0.06	0.00	-0.14	-0.05	**-0.27**	-0.15	-0.04	-0.07
Oils	-0.13	-0.04	0.02	-0.02	-0.03	-0.08	0.00	-0.20	**-0.37**	-0.08	-0.01
Sugars	-0.09	-0.06	0.00	-0.02	0.00	-0.08	-0.12	-0.07	-0.11	**-0.54**	0.06
Other	0.04	0.06	0.03	0.01	-0.01	-0.03	0.06	-0.07	-0.01	0.07	**-0.99**

	Hicksian Elasticity Matrix for Balochistan										
	Wheat	*Rice*	*Other Cereals*	*Pulses*	*Fruits*	*Vegetables*	*Dairy*	*Meats*	*Oils*	*Sugars*	*Other*
Wheat	**-0.39**	0.07	0.02	0.03	-0.02	0.09	0.05	-0.05	0.05	0.05	0.10
Rice	0.50	**-1.37**	0.00	0.07	0.17	0.06	0.12	0.29	-0.03	-0.04	0.23
Other Cereals	1.75	0.13	**-3.00**	-0.44	0.23	-0.22	0.30	-0.84	0.69	0.25	1.28
Pulses	0.19	0.08	-0.03	**-0.54**	0.01	0.14	0.12	-0.14	0.03	0.03	0.10
Fruits	-0.28	0.30	0.04	0.03	**-0.38**	-0.09	0.15	0.16	-0.09	0.14	0.00
Vegetables	0.18	0.02	0.00	0.04	-0.01	**-0.41**	0.09	-0.04	0.04	0.03	0.06
Dairy	0.07	0.03	0.01	0.03	0.03	0.09	**-0.57**	0.12	0.09	0.00	0.12
Meats	-0.06	0.06	-0.02	-0.03	0.02	-0.02	0.08	**-0.10**	-0.04	0.06	0.03
Oils	0.08	0.00	0.02	0.01	-0.01	0.03	0.12	-0.06	**-0.27**	0.00	0.08
Sugars	0.14	-0.02	0.00	0.01	0.02	0.04	0.01	0.09	0.00	**-0.45**	0.15
Other	0.23	0.09	0.04	0.04	0.00	0.07	0.17	0.06	0.08	0.15	**-0.91**

Substitutes	Compliments	No Relation

	Elasticity Matrix	
	Marshallian	*Hicksian*
No Relation	6	8
Substitutes	36	80
Compliments	68	22