Food Price Subsidy and its Effects on Poverty in Khyber Pakhtunkhwa, Pakistan

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Abstract *We estimate the effect of food price subsidy on poverty in Khyber Pakhtunkhwa, Pakistan in this paper. The study uses Linear Approximate Almost Ideal Demand System for the estimation of compensated and uncompensated price and expenditure elasticities of food using Household Integrated Economic Survey. The estimated own and cross price Hicksian elasticities are used for estimating the changes in the quantity of food consumed, expenditure on food and its effect on poverty. The study uses two recent available poverty lines for estimation, showing that the scheme of food price subsidy increase real income of the households which has a decreased poverty state. The analysis shows that the subsidy program marginally decreases poverty in the province. The study recommends targeted food price subsidy for poverty alleviation and eradicating chronic hunger.*

Introduction

Pakistan, like other developing economies of the world, has been witnessing high inflation rate for the last few years. The consumer price index, which represents the yearly variations in prices, has increased from 103.54 points in 2002 to 203.06 points in December 2015 showing an increase of about 100 points. Food inflation presents even a far grimmer picture as it has been increased by 116 points during the same period (GoP, 2015). Ahsan, Iftikhar, and Kemal, (2012) observe consequences of price hike become more intense in developing economies such as Pakistan where more than 70 % of household's income is spent on food and high inflation adversely affects national welfare by decreasing purchasing power of people. Haq et al. (2008) estimated an increase of 32.2 % poverty in rural and 44.6 % in urban areas of Pakistan due to the food price shock of 2008. The price shock of 2008 have potentially pushed 10.3 million people into poverty in Pakistan

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reaching total number of people living below poverty line to 40.3 million (Haq et al., 2008). The effects on poor were more intense as they have been further pushed below the poverty line (Easterly & Fischer, 2000).

To combat food inflation, food subsidy program is often used to focus on and improve the welfare and nutritional status of people living in chronic hunger and poverty. The main objectives of food subsidies may differ from one country to other, but it primarily enhances the nutritional status of poor and eradicates chronic hunger and poverty in the country. India and Egypt provide annual food subsidies on wheat and rice by allocating one percent of their Gross Domestic Products (GDP) for the poverty alleviation (Jensen & Miller, 2008). However, scope of food subsidies is expanding worldwide after the recent worldwide recession. In developing countries, in addition to food subsidies, food rations and other social safety nets have become an important tool for poverty alleviation (Babu, 2003; Bibi, 1998). During price shocks and food inflation, food subsidy program can be important tool for tackling food insecurity among poor. This has been proved in Egypt where food subsidy protected majority of the population from starvation or stern malnutrition during the period of food inflation (Trego, 2011). In south Asia, price subsidies and food transfer program have also been very helpful in achieving the desired results of poverty reduction (Babu, 2003; Rogers & Coates, 2002).

The main objective of the policy is to ensure enough domestic production for sustaining people in the agriculture sector. Such sustaining would have not been possible without the policy intervention. In developing countries, on the other hand, government places price ceiling for basic foods to ensure supply of food rather than trusting the market forces (Amid, 2007). However, price ceiling in one hand supports food prices above the world prices to increase food supply and ensure abundant availability of food but also increases market prices of food, on the other hand. Alternatively, government procures food on high prices and then releases the same to market on lower prices, facing large cost in the form of subsidies. The structural adjustment program of the IMF and World Bank has gradually led governments to eliminate these subsidies but allowed to offer subsidy on food prices to the poor.

The people of Khyber Pakhtunkhwa (KP) endured a chain of exterior shocks, which has eroded their standards of living. These shocks include migration of Afghan refugees in millions to KP after the Soviet invasion of Afghanistan, militancy, earthquake of 2005, internally displacement of about three million people due to war against terrorism and the devastating flood in 2010. KP shares border with Afghanistan and became a frontline province in the war against terrorism as well. Hence, it faced terrorist attacks taking lives, damaging business, properties and livelihood. As a result, capital flew from the region causing unemployment and poverty. These phenomena are also manifested in the labor force participation of KP, standing at 37 %, which is the lowest as compared to other provinces of the country. Unemployment, especially among the young, is an

issue of concern because they are prone to the militants for recruitment. Further, about 39 % of the population of the province is living below the poverty line, which is significantly higher from the national average (Ikram et al., 2014).

To combat militancy, the military operation also significantly devastated the physical infrastructure and displaced some three million people internally due to which many of the internally displaced persons lost their houses and livelihoods (Bank, 2012). The government of Khyber Pakhtunkhwa started food subsidy program for enhancing food security of the poor, eradication of hunger and malnourishment. It obviously helps the poor and especially those poor segments who have lost their homes and livelihood in the war against terror. The Government of Khyber Pakhtunkhwa announced Rs. 7.3 billion special food packages for the poor deserving families in 2014. This special package is expected to target about one million eligible poor families for a year. Only households getting cash transfer under the income transfer program, called Benazir Income Support Program (BISP) are eligible for food subsidy. Each BISP registered household receives Rs 600 per month including Rs. 400 per 10 bags of flour and Rs. 200 per 5 kg ghee. The Government of Khyber Pakhtunkhwa has made an agreement with Utility Store Corporation (USC) of Pakistan to provide food items at subsidized prices. Understanding the effects of food price subsidy is important for policy makers. This is particularly important for a developing country like Pakistan facing financial challenges on one front and poverty and malnutrition on the other hand. The goal of this study is to estimate the impact of food price subsidy on poverty in Khyber Pakhtunkhwa. Towards this end, price and expenditure elasticities for food commodities are estimated using household income and expenditure data for the year 2011-12. These elasticities are used to derive the impact of food price subsidy on food demand, its expenditures and lastly poverty.

The paper has five Sections. Section 2 provides food consumption pattern of households in the Province. Section three presents detail of the system of demand equation that is Linear Approximate Almost Ideal Demand System (LA-AIDS) used in the study. Estimates of all the elasticities for Khyber Pakhtunkhwa are presented in section four. This section also presents poverty and welfare implications of the food subsidy program. The last section presents conclusion and policy implications.

Household Food Budget Shares and Monthly Food Expenditures

Expenditure shares measure the proportion of income to a food group relative to total food expenditures. Food expenditures per household are divided into ten groups. Table 1 (given on next page) shows that the average monthly food expenditures of households on food is Rs. 9772 per month. Wheat flour and dairy products are major food consumption groups having total budget share of 40 % of household expenditure. Wheat alone accounts for 19 % of the food expenditure of

households. Meats, fruits and vegetables are the other important food items accounting for 10.6, 13.2, and 11.6 % of the food expenditure.

Table 1. Pattern of Nominal Monthly Food Expenditures and Food Budget Shares of Household in Khyber Pakhtunkhwa

Food Group	Malakand	Peshawar	Kohat	DI Khan	Hazara	Bannu	Mardan	KP	F-Stat
Wheat flour	1888(19.0)	1765(17.8)	1895(20.6)	2149(20.8)	1639(14.2)	1699(17.9)	1718(19.1)	1804(17.9)	12.9*
Rice	759(7.6)	174(1.7)	172(1.9)	135(1.3)	621(5.4)	241(2.5)	157(1.7)	385(3.8)	217.2*
Sugar	667(6.7)	585(5.9)	644(7.1)	992(9.6)	737(6.4)	706(7.5)	457(5.1)	679(6.7)	45.7*
Dairy	2172(21.8)	2240(22.6)	1775(19.3)	2425(23.5)	2881(25.1)	1964(20.7)	1949(21.7)	2277(22.6)	27.9*
Pulses	249(2.5)	292(2.9)	239(2.6)	136(1.3)	490(4.3)	90(0.9)	284(3.2)	284(2.8)	277.4*
Meats	1045(10.6)	1267(12.8)	1054(11.5)	1122(10.9)	1050(9.1)	894(9.4)	1277(14.2)	1106(11.0)	4.9*
Fruits /vegetables	1118(11.2)	1394(14.1)	1396(15.2)	1273(12.3)	1595(13.9)	1673(17.7)	1238(13.8)	1380(13.7)	35.3*
Ghee	1091(11.0)	1221(12.3)	1165(12.7)	1329(12.9)	1051(9.1)	986(10.4)	1053(11.7)	1124(11.1)	17.0*
Beverages	494(5.0)	443(4.5)	398(4.3)	435(4.2)	661(5.7)	714(7.5)	301(3.4)	505(5.0)	41.0*
Other food	462(4.6)	534(5.4)	446(4.9)	327(3.2)	775(6.7)	500(5.3)	545(6.1)	538(5.4)	37.5*
Total	9945	9915	9184	10323	11500	9467	8979	10082	15.7
No of Households	653	626	329	332	688	316	332	3276	

Source: Author's calculation using 2011-12 HIES data.
The figures in parentheses are budget share of food item.* show estimates are statistically significant at 1%.

Table 1 also shows consumption expenditure pattern of the household across the different divisions of the province. A division is an administrative unit consisting of more than one district. Hazara division has the highest monthly total expenditures on food, which is Rs.11084 per household. The average expenditure on wheat flour is much higher for the Dera Ismail Khan division (Rs. 2149) per/ household as compared to other divisions. Dera Ismail Khan Division is also a relative poor part of the province, located in the south and close to the areas affected by militancy. The table shows that expenditure pattern differs across the divisions of the province as indicated by the statistically significant F-statistics.

Conceptual and Empirical Models

Conceptual Model

The major aim of the study is to estimate the effect of food subsidy on poverty in Khyber Pakhtunkhwa. Under the price subsidy program, selected food items are offered on lower prices in the government sponsored utility stores. The economic analysis of this mechanism can be carried out by estimating compensating and equivalent variations. Compensating variation is the amount that can be taken away from (given to) the consumers after an economic change to leave them as well off as they were before it, while equivalent variation is the additional amount that is needed at the original prices to make the consumer as well off as he would be facing new prices.

It is assumed that a household has income, y_0 and faces the purchase of a food item having price, p_0. The consumption of this product, $c(p_0, u_0)$ leads to utility, U_0. After price subsidy scheme, a household will have the same level of income y_0 but will faces new price p_1, where $p_1 = kp_0$. For comparing the welfare of household facing different prices, King (1983) used reference prices to define equivalent income, p^r, for given prices and income (p, y). allowing the same utility under the given income that is $v(p^r, y_e) = v(p_0, y_0)$ where $v(.)$ is the indirect utility function, p_0 is prices vector, and y_0 is a household's per capita income, p^r is constant across households, then y_e is monetary metric measure of the actual utility $v(p_0, y_0)$. Thus, by inverting the indirect utility function, the study will obtain the equivalent income function $y_e(.)$ as

$$y_e = e\big(p^r : v(p_0, y_0)\big) = y_e \ (p^r, p_0, y_0),$$

where e is the expenditure function. Thus, the equivalent gain of the subsidy program for households is

$$y_e(p^r, p_1, y_0) - y_e(p^r, p_0, y_0) \text{ (King, 1983)}.$$

Specification and Estimation of LA-AIDS

This study estimates the effect of food price subsidy on poverty in Khyber Pakhtunkhwa. Towards this end, food elasticities are estimated, and used to estimate the effect of subsidy on poverty. Linear Approximate Almost Ideal Demand System (LA-AIDS) is employed to estimate food elasticities. Our analytical plan closely follows the counterfactual experiments, estimation technique and specification of the LA-AIDS model given in Haq et al. (2008).

Deaton and John Muellbauer (1980) introduced the AIDS model. The AIDS model has several advantages over the other contrary rivals such as Translog and the Rotterdam models as it satisfies exactly the axioms of choice, simple to estimate, and testing the empirical validity of the restrictions of symmetry and homogeneity. Although, both the Translog and Rotterdam models have some these properties, neither of them has all the theoretical properties (Deaton & Muellbauer, 1980).

Deaton and Muellbauer (1980a) generated the AIDS model from a consumer cost minimization problem. Deaton and Muellbauer (1980) used Price Independent Generalized Linear Logarithmic (PIGLOG) form of preferences, which lets perfect aggregation over consumers. Haq et al. (2008) also used LA-AIDS. The demand equation of the LA-AIDS in the form of budget share is:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j \tag{1}$$

where $\ln \quad p_j = \alpha_0 + \sum_j \alpha_i \ln p_i + \frac{1}{2} \sum_i \sum_j \gamma_{ij} \ln p_i \ln p_j.$

In line with Haq et al. (2008), equation (1) is added with socioeconomic characteristics, z to give

$$w_i = \alpha_i + \sum_j y_{ij} ln p_j + \beta_i \left(\frac{x}{p}\right) + \Phi z \tag{2}$$

where x represents the total expenditure, w_i is the estimated budget share of commodity i, β_i represents the coefficient of real expenditure, measuring the effect of real income on product i, budget share. For a luxury good $\beta_i > 0$ and for a necessity good $\beta_i < 0$ and γ_{ij} represents the change in the commodity i budget share with respect to a percentage change in commodity $i's$ price when holding real expenditure constant. Additionally, if $\gamma_{ij} > 0$, products $i \ and \ j$ are substitutes otherwise complements. The socioeconomic characteristics considered in the analysis include household size and literacy of the household head.

The Tran slog price index usually makes the relationship between the prices of foods and the price index nonlinear, which makes the estimation process difficult. Deaton and Muellbauer (1980) suggested using linear price index replacing the price index (*p*) with Stone price index (P^*) of the form

$$\ln P^* = \sum_j w_i \ln P_j \tag{3}$$

This study uses Stone's price index (1954) as a measure of P^*. The general restrictions of consumer theory are imposed on the parameters in the LA-AIDS as follows.

Adding up

$$\sum_{i=1}^{n} \alpha_i = 1; \qquad \sum_{i=1}^{n} \gamma_{ij} = 0 \qquad \sum_{i=1}^{n} \beta_i = 0 \tag{4}$$

Homogeneity

$$\sum_j \gamma_{ij} = 0 \tag{5}$$

Symmetry

$$\gamma_{ij} = \gamma_{ji} \tag{6}$$

The parameters of the estimated model used to derive elasticities using the following relationships.

For the good i with respect to good j Marshallian elasticity ($\mathcal{E}ij$) is

Marshallian ($\mathcal{E}ij$): $\qquad \mathcal{E}_{ij} = \frac{y_{ij} - \beta_i \omega_i}{\omega_i} - \delta_{ij} \tag{7}$

For good i with respect to good j the Hicksian elasticity ($\mathcal{E}ij$) is,

Hicksian elasticity (e_{ij}): $\quad e_{ij} = \frac{y_{ij}}{\omega_i} + \omega_j - \delta_{ij} \tag{8}$

Expenditure elasticity(η_i): $\quad \eta_i = \frac{\beta_i}{\omega_i} + 1 \tag{9}$

where δ_{ij} is kronecker delta which is one for own price and 0 for cross prices.

LA-AIDS is estimate using seemingly unrelated regression procedure of Zellner (1963). Delta method is used to estimate the statistical significance of the elasticities (STATA, 2005). Imposing the additivity restriction makes the variance and covariance matrix of the expenditure function singular and hence one of the equations needs to be dropped to estimate the LA-AIDS (Haq et al. 2008). However, these restrictions are used to estimate the parameters of the dropped equation.

Data

The study uses Household Integrated Economic Survey (HIES) data. The 2012 HIES survey covers 15807 households that were selected from Pakistan rural and

urban areas of the four provinces of Pakistan. The survey adopted sample design of two stages for selecting the households. The survey selected 1158 primary sampling units in the first stage of selection from rural and urban areas of the four provinces of Pakistan. The HIES survey randomly selected the sample 15807 from these sampling unit in the second stage. The survey used the method of random systematic sampling technique with a random start, selecting carefully either 12 or 16 households from each primary sampling unit (GoP, 2013). The household integrated economic survey gathers important data on consumption patterns, income of households and its source, characteristics and some social indicators of households. This detailed data of information qualifies us to study share of budget of different items of food to evaluate the LA-AIDS system. For this study 3276 cases of the Khyber Pakhtunkhwa province were selected for the analysis.

Results and Discussion

Table 2 (given on next page) presents the estimated coefficients of LA-AIDS. The estimated coefficients are significant at the 99 % level of significance. The R-squared ranges from 0.08 for fruits and vegetables to 0.41 for beverages. Household size has a positive and significant effect on the consumption of wheat flour, sugar, ghee and other food, but has a negative effect on the consumption of rice, dairy, pulses, fruits/ vegetables and beverages.

The expenditure elasticities for ten food groups consumed by households are reported in Table 3. All food groups are normal as indicated by the positive and significant expenditure elasticities. The estimated elasticities range from 0.645 for wheat flour to 1.345 for meat. Out of ten food commodities, expenditure elasticities for five of the food commodity groups (rice, dairy, meats, beverages and other food groups) are greater than one showing that these food commodities are luxuries while the other five food commodity groups (wheat flour, sugar, pulses, fruits/vegetables and ghee) are necessities in Khyber Pakhtunkhwa. Comparing to the results Farooq et al. (1999) who described that pulses are necessities and milk and meat are luxuries while Haq et al. (2011) reported that milk and meat are luxuries and cooking oil and vegetables are necessities food items.

Estimates of the uncompensated (Marshallian) own price and cross elasticities show how consumers response to a change in price. These elasticities are used to study the welfare effect of a change in price. The price elasticity of demand shows the proportionate change in the quantity demanded due to a proportionate change in price showing both income and substitution effect, while, Hicksian elasticity of demand represents only the substitution effect as a result of a change in prices, keeping the utility level constant (Haq et al. 2008).

The estimated uncompensated own, cross-price elasticities are also presented in table 3.

Table 2. Parameters Estimates of the LA-AIDS Model

Explanatory Variable	Wheat Flour	Rice	Sugar	Dairy	Pulses	Meats	Fruits /Veg.	Ghee	Beverages	Other Food
Log of Price of Wheat flour	0.056* (0.002)	0.002 (0.001)	0.005* (0.001)	-0.015* (0.004)	0.001 (0.001)	0.007** (0 .003)	-0.002 (0.002)	0.005* (0.002)	-0.047* (0.002)	0.001 (0.002)
Log of Price of Rice	-0.006* (0.001)	0.010* (0.001)	-0.006* (0.000)	-0.004* (0.001)	0.002* (0.000)	0.000 (0.001)	0.002* (0.001)	-0.002* (0.001)	0.000 (0.001)	0.003* (0.001)
Log of Price of Sugar	-0.003* (0.001)	0.003* (0.001)	0.019* (0.001)	-0.002 (0.001)	0.001* (0.000)	-0.004* (0.001)	-0.002*** (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.011* (0.001)
Log of Price of Dairy	-0.009* (0.001)	0.005* (0.001)	-0.003* (0.001)	0.021* (0.003)	0.003* (0.001)	0.003 (0.002)	-0.010* (0.002)	-0.002 (0.001)	-0.009* (0.002)	0.000 (0.001)
Log of Price of Pulses	0.003** (0.001)	-0.002* (0.001)	-0.003* (0.001)	-0.004** (0.002)	0.008* (0.000)	0.000 (0.002)	0.002** (0.001)	0.001 (0.001)	-0.007* (0.001)	0.002** (0.001)
Log of Price of Meats	-0.004* (0.001)	-0.002* (0.000)	0.000 (0.000)	-0.005* (0.001)	-0.002* (0.001)	0.019* (0.002)	-0.001* (0.000)	0.000 (0.000)	-0.002* (0.000)	-0.003* (0.000)
Log of Price of Fruits/Vegetables	-0.006** (0.002)	-0.004** (0.001)	0.005* (0.001)	0.003 (0.003)	-0.002* (0.000)	0.022* (0.003)	0.013* (0.002)	-0.006* (0.001)	-0.015* (0.002)	-0.011* (0.001)
Log of Price of Ghee	-0.001 (0.002)	0.001 (0.001)	-0.002** (0.001)	-0.011* (0.002)	-0.001* (0.001)	-0.004** (0.002)	-0.002 (0.001)	0.028* (0.001)	-0.009* (0001)	0.000 (0.001)
Log of Price of Beverages	0.017* (0.001)	0.007* (0.001)	0.002* (0.001)	0.005** (0.002)	0.001* (0.000)	-0.015* (0.002)	-0.015 (0.002)	-0.001 (0.001)	-0.017* (0.001)	-0.001 (0.001)

Log of Price of Other Food	0.015* (0.002)	-0.012* (0.001)	-0.005* (0.001)	0.000 (0.002)	0.000 (0.001)	-0.003 (0.003)	0.009* (0.000)	0.005* (0.001)	-0.015* (0.001)	0.006* (0.002)
Household Size	0.010* (0.000)	-0.001* (0.000)	0.002* (0.000)	-0.007* (0.001)	-0.001* (0.000)	-0.005* (0.004)	-0.001* (0.000)	0.004* (0.000)	-0.002* (0.000)	0.000*** (0.000)
Household Education	-0.002* (0.000)	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.001* (0.000)	0.001* (0.000)	0.000 (0.000)	0.001* (0.000)	0.000 (0.000)
Constant	0.399* (0.022)	-0.058* (0.016)	0.158* (0.011)	-0.240* (0.031)	-0.007 (0.007)	-0.142* (0.028)	0.175* (0.018)	0.262* (0.014)	0.417* (0.016)	0.037** (0.015)
Number of Observations	3269	3269	3269	3269	3269	3269	3269	3269	3269	3269
R-Squared	0.400	0.123	0.385	0.113	0.219	0.308	0.081	0.309	0.414	0.129
Chi	2181.72	459.87	2042.71	418.29	914.93	1456.07	289.71	1464.67	2306.77	484.19

Standard errors are reported in parentheses. *, ** and *** show estimates are statistically significant at 1, 5 and 10% respectively.

Table 3. Estimated Uncompensated Own-price, Cross-Price and Expenditure Elasticities of Demand for Khyber Pakhtunkhwa

Food group	Wheat Flour	Rice	Sugar	Dairy	Pulses	Meats	Fruits /Vegetable	Ghee	Beverages	Other
Wheat flour	**-0.640**	0.039	0.054	0.024	0.083	0.047	0.039	0.066	0.154	0.148
Rice	0.055	**-0.764**	0.072	0.113	-0.070	-0.052	-0.105	0.017	0.170	-0.323
Sugar	0.097	-0.069	**-0.706**	-0.023	-0.021	0.015	0.096	-0.007	0.052	-0.056
Dairy	-0.141	-0.087	-0.078	**-0.971**	-0.088	-0.095	-0.058	-0.12	-0.046	-0.069
Pulses	0.030	0.053	0.034	0.106	**-0.717**	-0.062	-0.074	-0.04	0.051	-0.011
Meats	-0.106	-0.030	-0.078	-0.006	-0.033	**-0.836**	0.197	-0.077	-0.187	-0.063
Fruits/ Vegetables	-0.004	0.026	-0.003	-0.067	0.024	0.001	**-0.895**	-0.006	0.011	0.074
Ghee	0.083	0.028	0.039	0.028	0.048	0.04	-0.012	**-0.724**	0.037	0.086
Beverages	-0.922	-0.009	-0.032	-0.189	-0.149	-0.048	-0.297	-0.188	**-1.339**	-0.308
Other Food	0.005	0.040	-0.219	-0.001	0.022	-0.062	-0.203	-0.006	-0.022	**-0.903**
Expenditure elasticities	0.645*	1.229*	0.721*	1.332*	0.967*	1.345*	0 .933*	0.655*	1.327*	1.169*

Source: Computed by author based on HIES data for the year 2011-2012.
 * show estimates are statistically significant at 1%**.**

Table 4. Estimated Compensated Own-Price and Cross-Price Elasticities of Demand for Khyber Pakhtunkhwa

Food group	Wheat flour	Rice	Sugar	Dairy	Pulses	Meats	Fruits/ Veg	Ghee	Beverages	Other
Wheat Flour	**-0.516**	0.010	0.053	0.168	0.044	0.074	0.106	0.117	0.137	0.134
Rice	0.257	**-0.716**	0.149	0.334	-0.032	0.053	0.039	0.146	0.232	-0.259
Sugar	0.272	-0.049	**-0.657**	0.170	-0.010	0.092	0.212	0.094	0.085	-0.021
Dairy	0.123	0.022	0.060	**-0.688**	0.012	0.072	0.148	0.070	0.077	0.056
Pulses	0.223	0.091	0.101	0.318	**-0.688**	0.033	0.060	0.079	0.102	0.042
Meats	0.121	0.041	0.023	0.241	0.030	**-0.706**	0.366	0.076	-0.102	0.024
Fruits/ Vegetables	0.180	0.056	0.056	0.137	0.044	0.087	**-0.768**	0.105	0.053	0.119
Ghee	0.235	0.026	0.066	0.199	0.036	0.095	0.082	**-0.646**	0.047	0.099
Beverages	-0.712	0.047	0.053	0.041	-0.103	0.065	-0.145	-0.050	**-1.271**	-0.237
Other food	0.069	0.104	-0.156	0.063	0.086	0.001	-0.139	0.057	0.041	- 0.840

Source: Computed by authors based on HIES data for the year 2011-2012.

The compensated own, cross-price elasticities are presented in table 4 (given on previous page). All the estimated uncompensated and compensated own-price elasticities are statistically significant and have the expected negative signs, elucidate the fact that price of a good itself have negative impact on its quantity demand. The own price elasticity of beverages is greater than one showing high responsiveness to changes in price. The uncompensated own price elasticity of beverages is much higher than other food showing that households are more reactive to changes in the price of beverages compare to other food. Except of beverages, other nine food commodity groups have inelastic own-price elasticities. Cross price elasticity is very useful in deciding the nature of commodity for their complementarity and substitutability. If a cross price elasticity is positive, then products are substitutes, while they may be called complementary if they have negative cross price elasticity. Out of the ninety uncompensated cross-price elasticities, thirty-eight elasticities are positive indicating gross substitutes, and the other fifty-two elasticities are negative indicating complementary consumer goods. On the other hand, out of ninety compensated cross-price elasticities, eleven elasticities are negative showing gross complements and the other seventy-nine elasticities are positive indicating gross substitutes. Comparing to the results of Haq et al (2012) who examined that out of fifty-six uncompensated (Marshallian) cross-price elasticities, sixteen have positive and forty have negative sign while out of 56 compensated (Hicksian) cross-price elasticities, 40 have positive sign and 16 have negative sign.

Poverty Analysis

For determining, that how the food price subsidy has influenced poverty in Khyber Pakhtunkhwa, the study required an estimate of the decrease in total food expenditure of the consumer resulting from the food price subsidy. This has been estimated using three steps as given in Haq et al. (2008) And this study exactly follow these steps. In the first step, new estimates of household consumption due to price subsidy are derived using own and cross price compensated elasticities. Theoretically, after the price change the new quantities of consumption that is obtained hold utility level constant. In step two, the quantities of each food group calculated in step 1 is used to calculate their expenditures. This estimation provides equivalent variation (86.78 Rs/per month/per capita) for the price changes in food sector; for maintaining original utility level of 2011-12, how much money a consumer would have to give up at the new prices. Just like Haq et al. (2008), the study assumes no price changes in the nonfood sector for focusing the welfare effects arising only from the food subsidy program. Hence, the study presumed nonfood expenditure unchanged for the period 2011-12. In step three, equivalent variation (decrease in the expenditure of food) which is calculated in second step is added to the total real expenditure in 2011-12 and the estimated increased total

expenditure is then used for estimating the food price subsidy effect on poverty in Khyber Pakhtunkhwa.

The study used two poverty lines for estimating the effects of food subsidy on poverty. The first one is the government estimated poverty line of Rs. 1745, and second one is Rs. 2013 estimated by Social Policy and Development Institute of Pakistan.

Table 5. Impact of Food Price Subsidy on Poverty in Khyber Pakhtunkhwa

Poverty line = Rs. 2013			
	Poor	**Rich**	**All**
KHYBER PAKHTUNKHWA			
Pre-Subsidy Poverty	1722	1457	3179
	(54.2)	(45.8)	(100)
Post Subsidy Poverty	1631	1548	3179
	(51.3)	(48.7)	(100)
Change in Poverty	91	91	
	(2.9)	(2.9)	
RURAL			
Pre-Subsidy Poverty	1148	764	1912
	(60.0)	(40.0)	(100)
Post Subsidy Poverty	1091	821	1912
	(57.1)	(42.9)	(100)
Change in Poverty	57	57	
	(2.9)	(2.9)	
URBAN			
Pre-Subsidy Poverty	574	693	1267
	(45.3)	(54.7)	(100)
Post Subsidy Poverty	540	727	1267
	(42.6)	(57.4)	(100)
Change in Poverty	34	34	
	(2.7)	(2.7)	

Source: Author's calculation using 2011-12 HIES data.
Values in parenthesis represent percentage of household.

Table 5 shows the subsidy effects on poverty using poverty line Rs 2013. The study used a sample of 3179 household in which 1457 are rich household while the remaining 1722 household are living below the poverty line. After the provision of subsidy by the government out of 3179 household 91 households cross the poverty line which is 2.9 percent of the total sample. Estimation for urban rural areas showed that food subsidy is more effective in rural areas of the province. About 70 % of the population is living in rural areas of the country so poverty is more prevalent in rural areas. For this reason, food subsidy is more effective in the rural region of the study area.

Table 6. Impact of Food Subsidy on Poverty in Khyber Pakhtunkhwa

Poverty line = Rs. 1745			
	Poor	**Rich**	**All**
KHYBER PAKHTUNKHWA			
Pre-Subsidy Poverty	1464	1715	3179
	(46.1)	(53.9)	(100)
Post Subsidy Poverty	1413	1766	3179
	(44.4)	(55.6)	(100)
Change in Poverty	51	51	
	(1.7)	(1.7)	
RURAL			
Pre-Subsidy Poverty	1002	910	1912
	(52.4)	(47.6)	(100)
Post Subsidy Poverty	976	936	1912
	(51.0)	(49.0)	(100)
Change in Poverty	26	26	
	(1.4)	(1.4)	
URBAN			
Pre-Subsidy Poverty	462	805	1267
	(36.5)	(63.5)	(100)
Post Subsidy Poverty	437	830	1267
	(34.5)	(65.5)	(100)
Change in Poverty	25	25	
	(2.0)	(2.0)	

Source: Authors' own estimation with survey data.

The effect of food subsidy on poverty using a poverty line of Rs. 1745 per capita per month is given in table 6. Poverty estimates are derived using 2011-12 poverty line. These estimates show that 46.1 % of the household are living below

the poverty line. Using this poverty line, out of 3179 household, 1715 household are rich while the remaining 1464 household are living below the poverty line. Hence, the program decreased poverty by 1.7 percent. The results for urban rural showed that the food subsidy is more effective in urban areas as compared to rural region. In urban region the food subsidy, alleviate poverty by 2 percent as compared to rural region where poverty decrease by 1.4 percent.

Table 7. Food subsidy Effect on Per Capita Income and Per Capita Food Expenditure

	Pre	**Post**	**T-test**	**Sig (2- tailed)**
Per Capita Income	2683.66	2770.4	-182.995	0.000
Per Capita Food Expenditure	1522.12	1608.9	-182.995	0.000

Source: Authors' own estimation with survey data.

This study also estimated food subsidy effect on per capita monthly expenditure as well as per capita food expenditure. Table 7 indicates that per capita expenditure is Rs. 2683.66 before subsidy program of the government. The average per capita expenditure increased to Rs. 2770.4 when consumer receive subsidy for the selected food item. Table 7 of the study also shows food subsidy effect on per capita food expenditure in the study area. Before food subsidy program per capita food expenditure is Rs. 1522.12 which has increased to Rs. 1608.9. Results for both estimates are statistically significant showing that food subsidy has positive impact on per capita expenditure as well as per capita food expenditure of the consumer.

Conclusion: Policy Implications and Limitations

The study examined the effects of food price subsidy scheme on poverty for Khyber Pakhtunkhwa. In this regard, the study used price elasticities that were estimated for estimating the welfare significances of the relative changes food prices in terms of equivalent variation. Poverty is more prevalent in rural areas as compared to urban areas. As compared to 2011-12, the changes in food prices resulting from the scheme of food price subsidy increase real income and purchasing power of the household which decreased poverty by 2.9 and 1.7 percent respectively. Even though the food price subsidy has had differential effects on the urban and rural consumers, the changes in prices have brought easiness through

low prices of food for the rural households. The counterfactual experiment indicates that targeted food price subsidy is a very effective tool of the government for the poverty alleviation and eradicating chronic hunger. The simulation exercise suggests that food subsidies tend to promote household welfare of the needy and poor people in special and public at large in general. Needy people would be the utmost beneficiaries of the scheme. As a social safety net, the food price subsidy program playing a vital role in improving nutritional status of the poor and in the alleviation of poverty in Khyber Pakhtunkhwa. The results derived in this study is very important for policy making. Based on this research food pricing policies and poverty reduction projects can be made. The very poor population may be targeted instead of moderately poor for improving the efficacy of the subsidy program. The reduction in cost of food expenditures show that a targeted subsidy is very effective in the alleviation of poverty. As compare to general subsidies, in future targeted food subsidy like the present project would be more helpful in improving nutritional status of the poor. Increased production of wheat and efficient system of distribution are needed for the nutritional need because wheat flour is the dominant food item in the diet of household in KP. The government may give more attention to the production of wheat and other cereals for securing the province future food demand. By increasing the budget size of the food subsidy program is expected to have better effect on the reduction of poverty. The food subsidy resources in the Province should be allocated to each division or region according to its contribution to the total poverty.

The study has only focused on food expenditure and not included nonfood expenditures of the households. The advantage of the present method is that it gives information about food demand and food expenditure. However, Expenditures other than food are vital elements that define the overall living standard of the people. Therefore, the result would be more accurate if both food and nonfood expenditure have been taken for the required results.

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