Child Malnutrition in Pakistan: Trends and Determinants

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July 2012

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Islamabad

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1 Introduction

The role of economic factors, particularly income and consumption, in the wellbeing of a population is well documented. However, the wellbeing does not depend solely on these factors, social indicators such as life expectancy, health, education and nutrition serve an important complementary function' (Linnemayr et al., 2008). The most significant social problems in many developing countries including Pakistan are widespread child malnutrition, high infant mortality and low literacy. Child malnutrition is considered as the key risk factor for illness and death, contributing to more than half the deaths of children globally (Cheah et al., 2010). It also affects child morbidity rate and poses threat to their physical and mental development, which result in lower level of educational attainment (Chirwa and Ngalawa, 2008). Although the causes of child malnutrition are interrelated and multi-sectoral involving many different aspects of life (Cheah et al., 2010), food insecurity, poor nutritional status of mothers, frequent infections, utilization of health services and care provided to children are considered the most important correlates of malnourishment (Linnemayr et al., 2008).

However, there is no consensus in the literature regarding the role of poverty in child malnutrition. Results are rather mixed. Several studies have shown malnutrition as the reflection of poverty, with people not having enough income to buy food, while many other empirical studies have found no association between poverty and child malnutrition (Chirwa and Ngalawa, 2008). The findings of this study are in line with the second perspective, that is there is no association between poverty and child nutritional status.

The performance of Pakistan in social indicators including the nutritional status of children is not satisfactory. Although the proportion of underweight children has declined during the last one

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and half decade, still approximately one-third of young children are counted as underweight, according to the 2011 National Nutrition Survey (NNS). Stunting and wasting, the other two measures of children nutritional status have even shown some deterioration. Thus, child malnutrition in Pakistan can be considered as a widespread phenomenon. Very few studies have so far been carried out to understand the causes and/or consequences of malnutrition in Pakistan, primarily because of the lack of suitable data. The 2011 NNS has been carried out after a gap of ten years, and it has little information on household income, consumption, food security and utilization of health services, which are important for the analysis of determinants of child malnutrition.

Pakistan Institute of Development Economics (PIDE) Islamabad completed the third round of a panel data in 2010 named as 'Pakistan Panel Household Survey' (PPHS), which has collected data on weight and height of all individuals including children and their mothers. The PPHS-2010 also has comprehensive modules on household consumption expenditure, education, labour market, perceived food security, self-reported morbidity and utilization of health services.

The major objective of this paper to examine the determinants of child malnutrition, based on the PPHS-2010. The study has focused on individual (child), household and community variables to understand differentials in child malnutrition. Child illness, health status of their mothers and poverty status of households are the key factors utilized in this study to understand the malnutrition phenomenon.

The rest of the study is organized as follows. The conceptual framework, data sources and methodology used in the study are discussed in the next section 2, followed by a presentation of the magnitude and trends in child malnutrition in section 3, which also presents the differentials in malnutrition by gender and age of children and two characteristics of their mothers, namely BMI and education. The determinants of child nutrition are examined in a multivariate fashion in section 4 while the final section presents the discussion and conclusion.

2 Conceptual Framework, Data Sources and Methodology

The conceptual framework to examine the determinants of children's nutritional is based on the household utility maximizing model by specifying a household production function (Becker, 1965; Behrman and Deolalikar, 1988; Strauss and Thomas, 1995). In this model, it is assumed

that a household has preferences that can be characterized by the utility function, U which depends on consumption of a vector of commodities, X, leisure, L, and quality of children represented by their nutritional status, N:

$$U = u(X, L, N) \tag{1}$$

Household utility is maximized subject to several constraints, including a time specific nutrition production function and income constraints. The nutritional status of children is determined by food availability, morbidity, access to health services and the quality of care at home. The nutritional outcome of each child measured by standard anthropometric measures can be derived as:

$$Ni = n(C, W, H, Z, e) \tag{2}$$

Where *C* is consumption, *W* is a vector of child-specific characteristics, *H* is a vector of household specific characteristics, Z is a vector of health variables and e is child-specific disturbance term. In equation 2, *N* is measured by standardized anthropometric measures of height-for-age z-score (HAZ), weight-for-age z-score (WAZ) and weight-for-height z-scores (WHZ). The z-score are computed by using the World Health Organization recommended reference population (WHO, 2006). The WAZ of a child, for example, is the difference between the weight of the child and the median weight of the reference population of the same age and sex, divided by the standard deviation (SD) of the weight of same group of children:

$$\text{WAZ} = \frac{Wi - Wr}{SD} \tag{3}$$

Three anthropometric measures, WAZ, HAZ and WHZ, provide different information about the nutritional status of children. HAZ is described as stunted, a condition that reflects chronic malnutrition. WHZ measures the current nutritional status of a child while WAZ captures aspects covered in both HAZ and WHZ (Chirwa and Ngalawa, 2008).

The PPHS-2010, the primarily data source for this study, was carried out in rural and urban areas of 16 districts located in four provinces of the country. The total rural sample consisted of 2800 households while the urban sample comprised of 1342 households, leading to the total sample as 4142 households. In the PPHS-2010, data on weight and height of all children less than 6 years old were obtained. However, this study has included in the analysis 6-59 months old children.

The study has identified in this age group 3218 children, about half of them (48.2%) are female (Table 1). However, the data on weight and height are not available for all the children.

Table 1: Sampled Children by Region and Gender, PPHS-2010

Region	Both Sexes	Male	Female
Total	3218	1666	1552
Urban	844	440	404
Rural	2374	1226	1148

Following the WHO recommendations, for WAZ analysis, children with -6 to 5 z-scores are included. For HAZ and WHZ, the included scores are -6 to 6 and -5 to 5 respectively (WHO, 2008; WFP and CDC, 2005). Outliers or children out of the given ranges were found more in HAZ z-scores than in scores for WAZ and WHZ. A child is characterized as malnourished if s/he is more than two standard deviations below the standard reference population.

Equation 2 has been used to examine the determinants of child nutritional status. Individual characteristics of children, household level characteristics and community variables are entered into this equation. Individual child characteristics include age and gender of the child. Two characteristics of children's mothers entered into the equation are their level of educational attainment and Body Mass Index (BMI). For poverty status of the sampled households, per capita consumption expenditure is used. Health variables represent the incidence of morbidity among children and sanitation. Household structure (*pucca/katcha*) and type of toilet represent the environmental factors at the household level. Availability of lady health workers and region of residence (urban/rural) represent the community variables.

Per capita expenditure, a household level variable, is likely to be determined by the anthropometric outcomes through its effect on the health status of adults and their earnings (Chirwa and Ngalawa, 2008). The use of OLS may thus yield biased estimates because of endogeneity of per capita expenditure in Equation 2. In order to account for the endogeneity problem, following Chirwa and Ngalawa (2008), two-stage least square (2SLS) is used where

per capita expenditure is instrumented by household variables including landholding, ownership of livestock, work status of the head of households and household size.

The use of per capita expenditure represents well the poverty status of the sampled households. However, a change in poverty status may also be an important factor for the investigation of the determinants of child nutritional status. As noted earlier, the PPHS-2010 is the third round of a panel data. Its earlier two rounds were carried out in 2001 and 2004 respectively. In second stage of the analysis, a variable showing a change in poverty status of households between 2004 and 2010 is computed and it replaces the per capita expenditure. The change in poverty status has four categories: poor in two periods (2004 and 2010); non-poor in two periods; moved out of poverty; and moved into poverty. The last two categories are combined to represent transitory poverty. The PPHS-2010 has also included a module about the perception of households about the food shortage. The question asked in the survey was: whether the household faced food shortage during last 12 months. In the final stage, per capita expenditure is replaced by the perceived household food security. The OLS technique has been applied in the second and third stage of analysis, where poverty dynamics and perceived food security are used as independent variables instead of per capita expenditure.

3. Child Nutrition: Trends and Magnitude

Pakistan has a long history of data collection on socio-economic and demographic issues through household surveys, but information on child nutrition is generally missing in these surveys. It is, thus, difficult to analyze the trends in nutritional status of children for a long period of time. However, the NNS carried out in 1985-7, 2001 and 2011 has to some extent filled the gap. Some other surveys, though relatively smaller in their sample sizes, such as Pakistan Socio-economic Surveys(PSES) 2001, Pakistan Demographic and Health Survey (PDHS) 1990, Pakistan Rural Household Survey (PRHS) 2001 and PPHS-2010, have also gathered data on height and weight of children to determine their nutritional status.

Table 2 has pulled together information from these sources on three well know anthropometric measures; underweight, stunting and wasting for rural and urban areas. According to the NNS series, the incidence of underweight among children aged 6-59 months old has gradually declined from around 48 percent in 1985-7 to about 32 percent in 2011. This decline has been observed in both rural and urban areas. The two rounds of the panel dataset, PRHS-2001 and

PPHS-2010 also support the NNS data and show a decline in underweight during the last decade, although they differ in magnitude. However, despite this decline in the proportion of underweight children overtime, at present more than one-third of children (32% in NNS-2011 and 39% in PPHS-2010) are underweight.

The situation of other two anthropometric measures, stunting and wasting,is different and alarming. The stunting, which reflects chronic malnutrition, has increased between 2001 and 2011. According to the NSN-2011 data, around 44 percent of children were stunted. This proportion is about 2 percentage points higher than the stunting in 1985-7 (Table 2). The panel data, however, show no major change in stunting between 2001 and 2010. The magnitude of stunting is higher in the panel datasets (PRHS-2001 and PPHS-2010).

Table 2: Trends in Child Nutrition in Pakistan

Data Source	% Underweight			% Stunted			% Wasted		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
NNS 1985-7	47.9	–	–	41.8	–	–	10.8	–	–
NNS 2001	41.5	42.3	38.7	31	32.5	24.5	11.6	11.2	12.1
NNS 2011	31.5	33.3	26.6	43.7	46.3	36.9	15.1	12.7	16.1
PDHS 1990	40.4	–	–	50	–	–	9.2	–	–
PSES 2001	48.2	51.4	41.7	49.7	52.7	43.5	–	–	–
PRHS 2001	–	56.6	–	–	64.4	–	–	18.4	–
PPHS 2010	39.4	39.8	38.1	63.9	64.5	62.1	17.9	17.2	19.9

Note: The differences between figures may be due to methodological variations among these surveys. PDHS 1990-1 used NCHS standard with reference population of children (0-59) months. The figures reported for NNS 2001 are percent median with reference population (6-59) months. PRHS, PSES, PPHS-2010, NNS-2011 are using reference population of 6-59, 0-59, 6-59 and 0-59 months respectively.

According to the NNS series, the incidence of wasting has also increased from 11 percent in 1985-7 to 15 percent in 2011.The panel series, however, shows a mild decline in the wasting, from 18 percent in 2011 to 17 percent in 2010. The deterioration in stunting overtime, with the high prevalence of underweight (more than one-third), reflects the weak performance of Pakistan in improving the nutritional status of children. Table 2 also presents data on the nutritional status of children for rural and urban areas separately. All data sources indicate higher prevalence of underweight and stunted children in rural areas than in urban areas. However, the case is opposite for wasting, which appears to be moderately higher in urban areas than in rural areas. Majority of malnourished children in urban as well as rural areas are in the `severe' category

(Table 3).The proportion of children in this category is very high in the case of stunting. Thus not only the overall prevalence of stunting is high, but also children are severely malnourished.

Table 3: Child Nutrition Status (moderate/severe) by Region, 2010

Nutritional status of children	% Underweight			%Stunted			%Wasted		
	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
Normal	56.9	57.7	56.7	31.2	32.6	30.7	61.8	61.9	61.8
Moderate	15.7	15.0	15.9	20.2	23.2	19.2	8.9	9.4	8.7
Severe	23.7	23.1	23.9	43.7	38.9	45.4	9.0	10.5	8.5
Over weight/height	3.7	4.2	3.5	4.9	5.3	4.8	20.3	18.2	21.0
Total	100	100	100	100	100	100	100	100	100

Source: Authors' computation from the micro-data of PPHS-2010
Note: Normal children are healthy children having Z-scores between -2 and +2 SD, while Z-scores for moderate malnourished child is below -2 SD and severe malnourished child is below -3 SD.

Figures 1-3 present data on three anthropometric measures by gender for the total sample as well as rural-urban areas, while Figure 4 presents data on the nutritional status of children by their age. Overall there is no major gender difference in the three measures. However, gender differences are more profound within the rural and urban areas. In rural areas, for example, more males are underweight and wasted than females while in urban areas the prevalence of malnutrition is higher among females than among males. It is not easy to explain these gender differentials in rural and urban areas. Food habits, morbidity and health seeking behaviour, which are likely to affect the child nutritional status, may differ for girls and boys in rural and urban areas.

There appears to be a nonlinear relationship between the age of child and the three measures of their nutritional status (Figure 4). In the case of underweight, it is highest for the 6-11 months old children. It decreases for the next age group (12-21 months), but it increases for the 2-3 years old children. The lowest prevalence is found for children in age group 48-59 months. Despite these variations across the age groups, the minimum prevalence of underweight stands at 36 percent, suggesting widespread malnutrition in all age groups of the sampled children. The situation is not different for stunting and wasting (Figure 4).

Figure 1: Child Nutrition Status by Gender, 2010

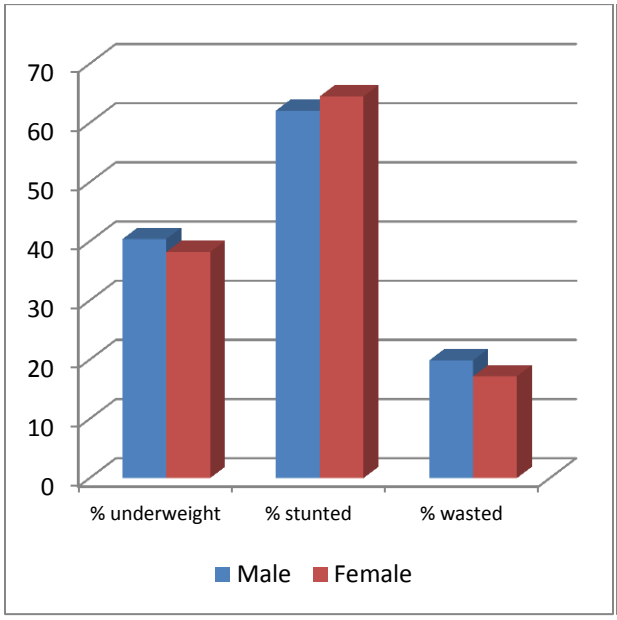
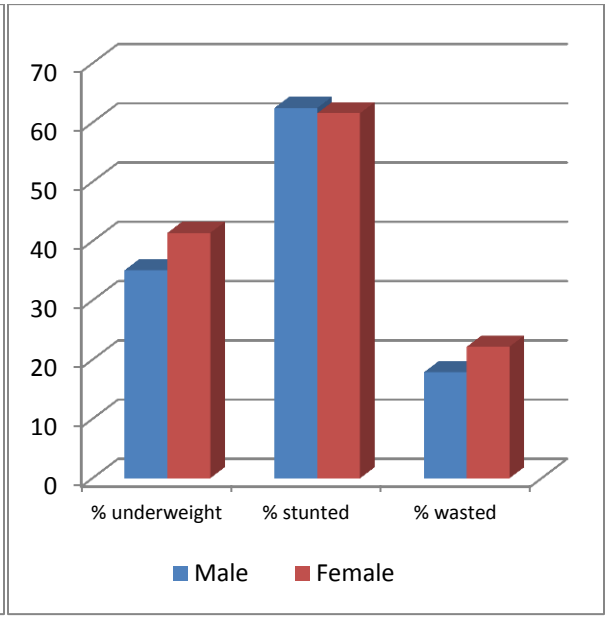


Figure 2: Child Nutrition Status by Gender in urban areas, 2010



Source: Authors' computation from the micro-data of PPHS-2010

Figure 3: Child Nutrition Status by Gender, 2010

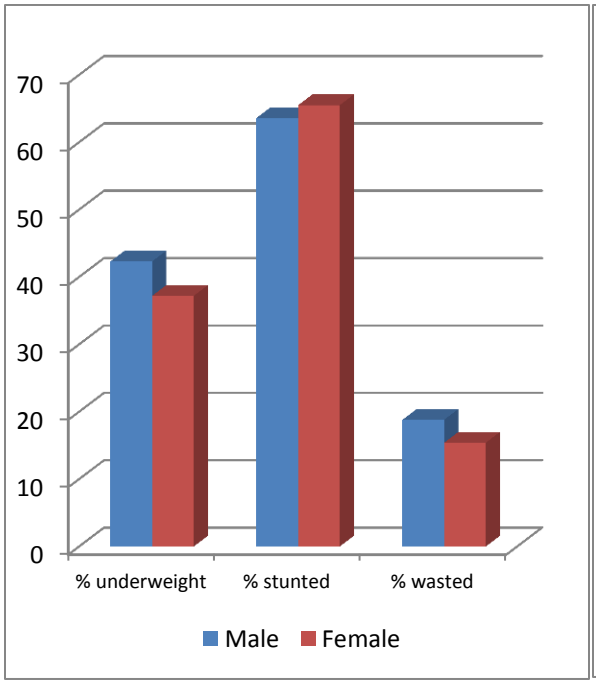
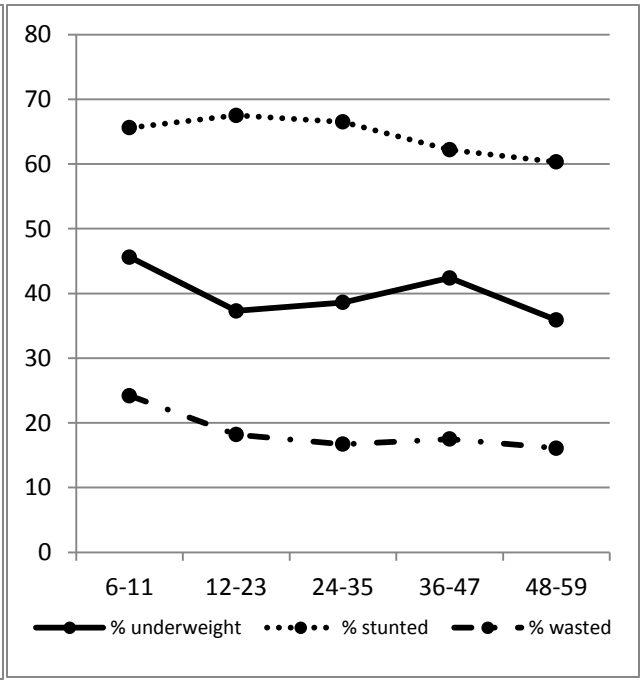


Figure 4: Nutrition Status by Child Age, 2010



Source: Authors' computation from the micro-data of PPHS-2010

The nutritional status of children is related in Table 4 to their mothers' BMI and educational attainment. Both characteristics do not seem to be correlated with stunting, a measure of chronic malnutrition. However, both underweight and wasting are related to these mothers' characteristics, higher the BMI of mothers, higher the nutritional status of their children. Education also has a similar relation with the child nutrition. As compared to 40 percent, the prevalence of underweight is about 30 percent among children of mothers having a college or higher level of education. Both the BMI and education of children's mothers are also related to wasting, a measure of current nutritional status of children. Wasting is relatively higher among children whose mothers are underweight and less educated than among those whose mothers have better BMI and more educated.

Table 4: Child Nutritional Status by Mother's BMI and Education

Mothers' characteristics	% underweight	% Stunted	% Wasted
BMI			
Under weight	52.8	66.4	26.8
Normal	40.7	65.5	18.9
over weight	32.6	61.0	12.4
Obesity	27.8	63.4	12.3
Education			
No education	40.2	64.0	18.5
Primary	41.1	64.5	20.7
sec and Matric	33.3	63.4	11.1
College and Higher	29.7	61.7	12.0
Total	39.4	63.9	17.9
(N)	2568	1937	1949

Source: Authors' computation from the micro-data of PPHS-2010

4 Determinants of Child Nutrition

The determinants of child nutritional status were examined by estimating the equation (2), where WAZ z-scores, WHZ z-scores and HAZ z-scores are used as the dependent variables. Independent variables include, child characteristics (gender and age), child illness (incidence of diarrhea and other illness), mothers' characteristics (BMI and education), per capita expenditure as an indicator of household poverty, number of siblings, environmental factors (structure of the dwelling unit and toilet with flush) and two community variables, region (rural-urban) and the

presence of lady health workers (LHW). As noted in section 2, because of the endogeniety problem, per capita expenditures are instrumented by household ownership of land and livestock, and work status of the head of households. The 2SLS regression has been used.Table 5 provides the summary statistics of the dependent and independent variables.

Table 5: Summary Statistics for Dependent and Independent Variables					
Determinants	Mean	Mininum	Maximum	SD	N
WAZ	-1.55	-5.98	4.94	1.96	3540
HAZ	-2.38	-6.00996	6.00	2.20	2742
WHZ	0.12	-4.99	5.00	2.22	2280
Per Capita Expenditure (Rs)	2718.75	55.91	35901.27	1978.43	6409
Child Characteristics					
Sex (male =1)	0.53	0	1	0.50	4604
Age (in months)	31.36	6	59	14.97	3218
Number of Siblings (< 2)	0.21	0	1	0.415	6509
2-3	0.35	0	1	0.489	4214
4-6	0.26	0	1	0.449	4214
7+	0.06	0	1	0.24	4214
Incidence of Diarrhea last 30 days (yes=1)	0.09	0	1	0.295	4635
Incidence of other illnesses last 30 days (yes=1)	0.14	0	1	0.35	4635
Mother Characteristics					
Body Mass Index (BMI)	22.98	13.11	56.70	4.79	3623
Mother Education (No education)	0.81	0	1	0.49	4635
Primary (yes=1)	0.08	0	1	0.27	4635
Secondary(yes=1)	0.07	0	1	0.25	4635
College(yes=1)	0.04	0	1	0.19	4635
Housing and Hygeine					
Housing type (Pacca=1)	0.33	0	1	0.47	4616
Toilet (Flush=1)	0.55	0	1	0.50	4609
Community Factor					
LHW presence (visit in last 3 months)	0.56	0	1	0.50	6480
Region (Urban=1)	0.26	0	1	0.44	4635

The mean values for the z-scores of WAZ, HAZ and WHZ are -1.50, -2.44 and 0.15 respectively. Per capita expenditure is computed at Rs.2707 per month. About half of the sampled children are female and their mean age is about 31 months (Table 5). About 11 percent of the children had diarrhea during the month preceding the survey while another 15 percent of children had other

illnesses during this period, mainly respiratory tract infection. Regarding the mothers' characteristics, Table 5 shows the mean value of BMI as 22.93. More than half of the housing units where children live are *pacca* (cemented) and about two-third of them have a toilet with flush. LHWS have visited the homes of 63 percent children. The mean value of regional dummy (urban) is 0.26.

Results of the 2SLS regression for the three equations (WAZ, HAZ and WHZ) are presented in Table 6. First, take the child characteristics, gender and age. The gender variable has significant and negative relation with only WAZ z-score, showing that boys are more likely than girls to be underweight. Whereas age^2 has a significant and positive association with the HAZ z-score only, suggesting a non-linear relationship where boys gradually improve their height/age score.

Table 6: The Determinants of Child Malnutrition-Two-Stage Least Square Regression (per capita expenditure is instrumented)

Determinants	WAZ	HAZ	WHZ
	Coefficients	Coefficients	Coefficients
Per Capita Expenditure (Rs)	0.00002	0.00003	0.00011
Per Capita Expenditure (sq)	-1.5	-2.07001	-5.97001
Sex (male=1)	-0.21390***	-0.07455	-0.01812
Child age (months)	0.02034	-0.03274	-0.02541
Child age^2	-0.00027	0.00058*	0.00376
Number of Siblings (<2 as reference)			
2-3	-1.11921	0.18445	-1.11462
4-6	-0.30096*	0.33559*	-0.41678**
7+	-0.16573	0.32119	-0.59825*
Diarrhea (yes=1)	-0.60165***	-0.42692**	-0.35303*
Other illnesses (yes=1)	-0.11436	-0.39066***	0.05315
Mother's BMI	0.06953***	-0.01682	0.07844***
Mother's education (no education as reference)			
Primary	-0.05852	0.06455	-0.03131
Secondary	-0.12829	-0.05722	-0.06474
College	-0.00571	0.02637	0.01382
Housing Type (Pacca=1)	-0.05529	0.1041	-0.16252
Toilet Facility (yes=1)	0.33656***	-0.20369	0.05983***
LHW visited (yes=1)	0.37323***	0.29574**	0.17524
Region (Urban =1)	-0.31404***	0.16582	-0.06081***
Constant	-4.04473***	-2.69587***	-1.59778**

Note: *denote significant at 1 percent, ** denote significant at 5 percent, ***denote significant at 10 percent

The number of siblings has a negative relation with WAZ (underweight) and WHZ (wasting) but a positive association with HAZ (stunting). It means that while the number of siblings affects negatively the current nutritional status, they contribute positively in child growth in the long term. The other noteworthy finding is the statistically significant negative association of the incidence of diarrhea and other illnesses, particularly the former, with the three anthropometric measures. It appears that morbidity adversely affects the growth of children. The episodes of illness reduce the ability of a body to convert food into energy. Surprisingly mothers' education did not turn out to be statistically significant, but their BMI has a strong association with the nutritional status of children, suggesting a strong correlation between the mothers' health status and their children nutritional status.

An environmental factor represented by the availability of flush toilet at home has a statistically significant relation with WAZ and WHZ z-scores, but the relationship is insignificant for the HAZ z-score. It appears from this association that the household level environmental factors such as toilet with a flush system affect the current health status more than impacting the chronic malnutrition (HAZ).

The role of LHWs on improving the nutritional status of children is positive and statistically significant with WAZ and HAZ z-scores. It means that the visits of LHWs help improve not only the current nutritional status but it also affects child growth in the long term through improving the HAZ.The regional dummy (rural-urban) was entered into the models to examine the effect of community factors on the nutritional status of children. It appears from the negative sign of this variable that the nutritional status of urban children is lower than their rural counterparts.

Finally, per capita expenditure, which shows the poverty status of the sampled households, did not turn out to be statistically significant. In other words, poverty has no direct impact on the nutritional status of children (Table 6).

To explore further the relationship between poverty and the nutritional status of children, per capita expenditure, which represents the current poverty status, has been replaced by the poverty status in 2004 and poverty dynamics in equation (2). The hypothesis is that the poverty of a household in recent past and movement in poverty status affect the nutritional status of children. As noted earlier, the sampled children included in the nutritional status equation were 6-59 months old. The PPHS was carried out in the last quarter of the year 2010. It is part of the panel

survey. Its earlier round was carried out in 2004, but only in rural areas of Punjab and Sindh, the two largest province of the country. Poverty in 2004 or a change in the poverty status of households between 2004 and 2010, when the sampled children were born, may have an impact on their nutritional status. In another study based on this panel data, Arif and Shujaat (2012) have estimated that between 2004 and 2010, 15 percent of the households moved out of poverty while 18 percent fell into poverty. Another 9 percent households were identified as chronic poor, remained in poverty in two rounds, 2004 and 2010.

Table 7 shows the results of OLS, where four models have been estimated. In the first model for WAZ (underweight), per capita household expenditures are replaced by the household poverty status in 2004; poor in 2004 are given the value 1, zero otherwise.In other three models (WAZ, HAZ and WHZ), three dummies of dynamism are used; moved into poverty, fell into poverty and chronic poverty while the fourth category, remained non-poor in 2004 and 2010 is entered as the reference category. Essentially, model 1 (WAZ) examines the effect of poverty status in 2004 on the child nutritional status while the remaining models are concerned about the role of poverty dynamics on the child nutritional status.

No single category turned out to be statistically significant (Table 7). It shows that not only the current poverty status of households (per capita expenditure in 2010) has little impact on the nutritional status of their children but their poverty status in recent past as well as their movement into or out of poverty is not relevant to the nutritional status of children in Pakistan. It is noteworthy that age and the number of siblings that were statistically significant in the models shown in Table 6 did not turn out to be significant in the models shown in Table 7. There is no change in the significance of other variables.

Table 7: The Impact of Poverty and Poverty Dynamics on Child Malnutrition- OLS Regression				
Determinants	**WAZ**	**WAZ**	**HAZ**	**WHZ**
Poverty status in 2004 (poor=1)	-0.21872	–	–	–
Poverty dynamics (non-poor as reference)				
Chronic (poor in 2-periods)	–	-0.14043	-0.40912	0.06713
Transitory (moved into or out of poverty	–	-0.06055	0.19287	0.17597
Sex (male=1)	-0.22621	-0.22799	-0.04055	-0.08535
Child age (months)	0.01632	0.0178	-0.00038	-0.00943
Child age^2	-0.00023	-0.00024	0.00013	0.000102
Number of Siblings (<2 as reference)				
2-3	-0.02767	-0.06239	-0.03609	0.03363
4-6	-0.21127	-0.22787	0.17871	-0.27058
7+	-0.27325	-0.30459	-0.08322	-0.51504
Diarrhea (yes=1)	-0.81456***	-0.8209***	0.10535	-0.58821**
Other illnesses (yes=1)	-0.09647	-0.10661	-0.29124	-0.28534
Mother's BMI	0.05695***	0.05754***	0.00122	0.04407**
Mother's education (no education as reference)				
Primary	0.17595	0.16176	0.13125	0.16306
Secondary	0.3676	0.42127	0.56022	-0.13302
College	-0.75571	-0.76871	0.01646	0.29564
Housing Type (pacca=1)	0.13908	0.15124	-0.08093	0.08191
Toilet Facility (yes=1)	0.27132*	0.28244*	0.04988	0.48111***
LHW visited (yes=1)	0.38765***	0.39669***	0.01534	0.41305**
Constant	-3.47382***	-3.51597***	-2.95795***	-1.42942**

Note: *denote significant at 1 percent, ** denote significant at 5 percent, ***denote significant at 10 percent

In the PPH-2010, the sampled households were asked if they faced food shortage during the last 12 months. In another similar question, they were asked whether the food during last 12 months has been insufficient for the household members. These two questions show the perception of households about the food security. This type of household perception may not reflect true picture of the household food security because it has not determined that for how many days they have faced food shortage and what was the nature of the food shortage? However, it does provide information about the households that have faced food shortage for some time during the 12 months preceding the survey. The PPHS-2010 shows that about one-third of the households reported such shortage.

In the final stage of analysis, the equation (2) is estimated by replacing per capita expenditure with the household's perceived food security variables. If a household faced food shortage or food was insufficient during the last 12 months, it was coded 1, otherwise zero. Two models (for WAZ only) have been estimated. In model 1, the variable food shortage is entered while in model 2, it is replaced by the perceived food insufficiency. Table 8 presents the findings of the OLS regression. Interestingly, these variables also did not turn out to be statistically significant. Like poverty, the perceived food security is not related to the nutritional status of children. There is no major difference in the magnitude and significance of other variables entered into the models. The results of models for HAZ and WHZ regarding the perceived food security are similar to the findings of the WAZ equation.

Table 8: OLS for underweight children (perceived food security)

Determinants	**WAZ**	**WAZ**
Food shortage (yes=1)	0.05179	–
Sufficient Food (yes=1)	–	0.04598
Sex (male=1)	-0.21544**	-0.21352**
Child age (months)	0.01693	0.01696
Child age^2	-0.00022	-0.00022
Number of Siblings		
2-3	-0.13345	-0.13583
4-6	-0.03228**	-0.33750**
7+	-0.20781	-0.20825
Diarrhea	-0.57140***	-0.57546***
Other illnesses	-0.10985	-0.12347
Mother's BMI	0.07200***	0.07312***
Mother's education		
Primary	-0.04041	-0.03609
Secondary	0.00777	0.02015
College	0.1148	0.13794
Housing Type	-0.53747	-0.05432
Toilet Facility	0.34353***	0.03618***
LHW Presence	0.33706***	0.34791***
Region	-0.27220**	-0.27975**
Constant	-3.66645***	-3.71176***

Note: Significance level 0.05*, 0.01 **, 0.001***

5 Discussion and Conclusion

Now the question is how to explain this non-association between poverty and child nutritional status in Pakistan. As noted earlier, there is no consensus in the literature regarding the role of poverty in child malnutrition. Several studies have shown malnutrition as the reflection of poverty, while other empirical studies have found no association between poverty and child malnutrition (Chirwa and Ngalawa, 2008).In the case of Pakistan, based on the PSES-2001, Arif (2004) found a positive impact of per capita expenditure only on weight-for-age, but no association with stunting or wasting.

Nutritional status is a different dimension of welfare from income and consumption (Babatunde et al., 2011). The findings of this study show that both poverty status of a household or its dynamics may not be an important determinant of child malnutrition in Pakistan for several reasons. First, there is no sustained reduction in poverty during the last five decades, it has rather fluctuated. In the 1990s, poverty increased, but the prevalence rate of underweight declined. The first decade of this millennium witnessed a declined in poverty. Although the proportion of underweight children also declined during this period, stunting and wasting remained unchanged or even increased (see Table 1). Second, poverty in Pakistan is largely considered a rural phenomenon. Despite high landlessness, a large segment of rural population depends on own food production, ensuring dietary intake of all household members. Third, social support is deeply imbedded in Pakistani culture. Different government schemes also provide support to poor families.

The nutritional status of children is, thus, more likely to be rooted in their illness, nutritional status of their mothers, and environmental and community factors than poverty. The episodes of illness particularly diarrhea reduce the ability of body to convert food into energy. The incidence of diarrhea is still high in Pakistan and environmental conditions at home are not satisfactory. The positive and significant contribution of LHWs in the child nutritional status shows the importance of health care services in improving child nutrition.

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