Chapter 3

CONSUMPTION, NUTRITION, AND POVERTY

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Introduction

While the slow pace of overall economic growth in Pakistan—particularly in the agricultural sector and the wider rural economy—was discussed in Chapter 2, the picture is incomplete without a closer examination of poverty, nutrition, and food security, both throughout the country and in its rural areas. Traditional measures of poverty focus on income, taking a "money-metric approach," but a more complete understanding of poverty dynamics requires data on other aspects of human well-being. Among the most important is access to sufficient, nutritious food; for the poor in Pakistan, who spend more than half of their incomes on food, food prices can have a major impact, not only on health and education expenditures but on health and long-term nutritional outcomes as well. Poverty measures thus benefit from a strong understanding of food consumption patterns, costs, and security.

The official estimates of poverty incidence, set forth in the Ministry of Finance Economic Survey 2013–2014 (GoP 2014), and earlier in the Planning Commission of Pakistan's *Millennium Development Goals Report 2013*, place the figure at just 12 percent in 2010/2011, down from 34.5 percent in 2001/2002 (GoP 2013b). Yet official estimates of child malnutrition from the 2011 National Nutrition Survey (NNS) place the prevalence of underweight, stunting, and wasting at 32, 44, and 15 percent, respectively—figures that are relatively unchanged from similar estimates produced a decade earlier (NNS 2011). Various estimates of both poverty and malnutrition also show significantly higher incidences in rural Pakistan than in urban Pakistan.

At first glance, the evidence suggests that progress in poverty reduction has not been accompanied by improvements in health and nutrition in Pakistan. While this is not necessarily surprising—the pathway from economic growth to nutritional improvement is often circuitous—the issue at hand may be even more complex. The analysis of poverty dynamics in Pakistan requires more

attention—greater disaggregation, higher resolution, and finer detail—to fully understand the forces at play. Disaggregation of poverty figures between provinces and agroecological zones, between urban and rural populations, and over short and long time frames is critical to fully understand the prevalence and nature of poverty in Pakistan.

The discourse around policy making for poverty reduction in Pakistan is increasingly highlighting the importance of a range of related issues, from poverty measurement to micronutrient malnutrition to the linkages between agriculture, health, and nutrition. This suggests that there is growing demand for more and better analyses that further the understanding of poverty dynamics in Pakistan and, ultimately, inform policy making in support of inclusive growth strategies and social protection programs.

This chapter attempts to deepen the analysis of poverty dynamics in Pakistan. It does so by drawing on and comparing several key sources of data and analyses that are useful in estimating poverty in Pakistan across different dimensions. First and foremost, the chapter draws on household survey data from various sources. These surveys, referred to throughout the chapter, provide important information on household demographics and the consumption, nutrition, and health status of individuals in those households.

The main source of household data derives from successive rounds of the Pakistan Household Income and Expenditure Survey (HIES) that has been conducted by the Pakistan Bureau of Statistics in both the rural and urban areas of all provinces since 1963.[1] The HIES collects information on household characteristics, consumption patterns, household income by source, and social indicators. With this data, we can estimate, across various sectors of society, both income distribution and income and nonincome measures of poverty. The chapter also draws on analysis from the official series of nutrition and health surveys conducted by government agencies and partner institutions between 1977 and 2011, as well as independent surveys conducted by various universities, research institutes, and others between 2001 and 2010. Finally, the chapter also uses data from the Pakistan Rural Household Panel Survey (RHPS) Round 1 (IFPRI/IDS 2012) and Round 2 (IFPRI/IDS 2013; see Chapter 1 for details).

The chapter proceeds as follows. The second section explores household consumption patterns to gain an initial understanding of how food

1 Since 1998/1999 the name has been changed to the Household Integrated Economic Surveys. The Federal Bureau of Statistics was renamed as the Pakistan Bureau of Statistics in 2013. In this chapter we use the acronym *HIES* to refer to both the previous Household Income and Expenditure Surveys and the renamed Household Integrated Economic Surveys.

consumption and household welfare are measured in Pakistan, and how changes in prices and public policy can affect welfare. The third section explores the impact of these consumption patterns on nutrition, specifically the nutritional status of children in Pakistan. The fourth section examines poverty estimates for Pakistan and offers several novel insights on both poverty levels and trends that help explain the apparent disconnect between official poverty figures and the persistence of malnutrition. The fifth section offers concluding thoughts on policy options required to address poverty, malnutrition, and food security in Pakistan.

Consumption and Expenditure Patterns

Consumption patterns are central to understanding poverty because they provide an accurate picture not only of a household's income but also its savings and dissavings, the public transfers and private remittances it receives, and the shocks it must weather in bad times. Because estimates of the value of consumption and poverty levels over time hinge on consumer price indexes (CPIs), these consumption measures have far-reaching policy impacts. For example, a CPI that underestimates the true increase in consumer prices will exaggerate the true economic performance of an economy. This in turn affects not only decision making on broad monetary and fiscal policies but also the design of programs that are focused on productivity growth or poverty reduction. Thus, a nuanced understanding of the construction of Pakistan's CPI and how accurately it reflects consumption patterns—especially food consumption patterns—is essential to determining how price and policy changes affect poverty in the country.

Average monthly consumption expenditures, calculated from successive rounds of the HIES, show that, between 2001/2002 and 2010/2011, urban households spent a significantly larger amount on consumption than rural households, with urban consumption exceeding rural consumption by 40 to 55 percent. While the gap in rural-urban expenditure has not widened sharply, the consistently large differences may indicate several factors at play: the baskets of goods and services consumed in each sector may be different, the prices facing consumers in each sector may be different, the baskets and prices may have changed over time and at different rates across sectors, or some combination of all of these factors may be in play. Given these potential differences, policy makers need to be aware of how well the CPI reflects the aggregate movements in prices that affect poverty, because the CPI is a key input to the official measurement of poverty and, in turn, poverty alleviation policy.

TABLE 3.1 Shares of expenditure categories in total expenditure in two surveys, 2007/2008

Expenditure category	FBS 2007/2008 (%)	HIES 2007/2008 (%)		
		Pakistan	Urban areas	Rural areas
Food and nonalcoholic beverages	34.83	43.61	36.82	50.60
Restaurants and hotels	1.23	0.97	1.27	0.67
Alcoholic beverages and tobacco	1.41	1.12	0.82	1.44
Clothing and footwear	7.57	6.62	5.87	7.38
Furnished household equipment and house	4.21	2.80	3.24	2.36
Housing, water, electricity, gas, other	29.41	23.61	28.86	18.20
Health	2.19	3.69	3.12	4.27
Transportation	7.20	8.26	8.34	8.19
Communication	3.22	2.21	2.66	1.75
Recreation and culture	2.02	2.15	2.86	1.42
Education	3.94	2.33	3.32	1.30
Miscellaneous goods and services	2.76	2.63	2.82	2.43
Total	**100.00**	**100.00**	**100.00**	**100.00**

Source: Authors, based on data from GoP (2008b, 2008c).

Note: FBS = *Family Budget Survey*; HIES = *Household Integrated Economic Survey*.

To better understand its impact, we first consider whether the CPI understates the share of food in the consumer's consumption basket. Comparing HIES 2007/2008 (GoP 2008c) data with the Family Budget Survey 2007/2008 (GoP 2008b) data, which forms the basis of the CPI, we find that the latter understates the share of food and nonalcoholic beverages by about 9 percentage points (Table 3.1). Similarly, food accounts for nearly 49 percent in total expenditure in HIES 2010/2011 (GoP 2011); that is, a share that is 14 percentage points higher than that in the FBS 2007/2008. Data from RHPS Round 1 (IFPRI/IDS 2012) further validate the HIES finding: according to this survey, rural households allocate nearly 57 percent of their expenditures to food. The HIES 2007/2008 data also indicate that the share of food in total expenditure in rural areas is 13.8 percentage points higher than that in urban areas (GoP 2008c).

Importantly, the CPI also fails to capture significant differences in the prices of several key food items between urban and rural areas (Table 3.2). Most of the items that are produced in rural areas, such as cereals, pulses, meat, and milk, are relatively more expensive in urban areas, while processed items such as edible oil/ghee and sugar are more expensive in rural areas. Yet as Malik et al. (2014a) indicate, the prices used to compute the CPI are urban

TABLE 3.2 Unit costs of selected food items in urban and rural areas of Pakistan, 2010/2011

Food item category	Detailed food item	Urban (PKR)	Rural (PKR)	Urban/rural difference (%)
Cereals	Wheat and wheat flour	29.8	28.5	4.6
	Rice and rice flour	63.7	58.8	8.3
Pulses	Gram (black and white)	80.2	79.8	0.5
	Lentils (masoor)	132.0	133	−0.8
Milk and milk products	Milk	49.4	44.6	10.8
	Yogurt	59.0	49.8	18.5
Oil and ghee	Hydrogenated vegetable oil (banaspati ghee)	149.6	150.2	−0.4
	Other cooking oil	150.6	153.5	−1.9
Meat	Beef	234.7	222.5	5.5
	Mutton	409.4	394.7	3.7
Vegetables	Potatoes	26.8	27.5	−2.5
	Onion	32.8	34.4	−4.7
Fruits	Banana	32.1	30.8	4.2
Sweeteners	Sugar	74.3	76.5	−2.9

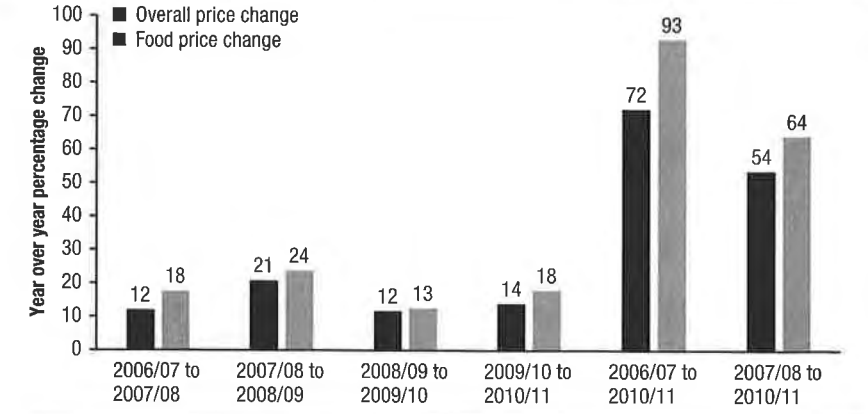
Source: Authors, based on data from GoP (2011).

Note: PKR = Pakistani rupees.

based, collected from 40 urban centers and no rural locations. While computation of the official CPI is based on a systematic and standard international method, the survey used to collect information on the basket of goods and services and commodity prices focuses only on urban areas and is based on a survey design that is not publicly available for scrutiny (Malik et al. 2014a). It is not surprising that the sizeable differences between rural and urban sectors in terms of economic, social, and demographic attributes, and specifically prices, are not reflected; this has led to an underestimation of the share of food expenditures in the CPI. Given the much higher food expenditure shares and the size of the rural sector, the expenditure patterns of the "average Pakistani consumer" can be reasonably expected to be substantially different from those of the "average urban consumer," which the CPI represents (State Bank of Pakistan 2002; Jamal 2012; Malik et al. 2014a). The data presented in Table 3.2 confirm that this is the case.

Because food accounts for a large share of total expenditures of Pakistani households, food price inflation has a significant effect on the purchasing power of the population and on the incidence of poverty. However, the effects of movements in the prices that consumers face are not captured if the CPI

FIGURE 3.1 Food price inflation and overall inflation, 2006/2007–2010/2011



Source: Authors, based on data from GoP (2013a).

estimate does not adequately reflect the share of food expenditures, their constituent items, or changes over time. There is thus strong reason to review the CPI methodology to assess how well it reflects both the real consumption baskets of people and the price trends over time.[2]

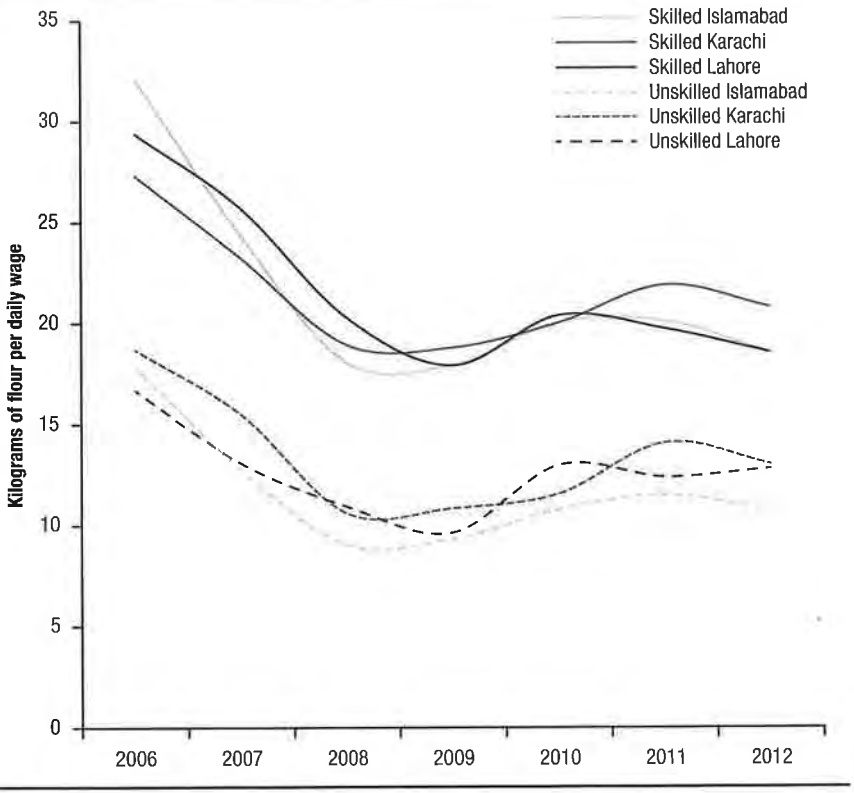
The data indicate that food prices have been increasing, with a 93 percent rise between 2006/2007 and 2010/2011 (Figure 3.1). This trend has persisted to the present: a month-to-month comparison reported in the 2014 Pakistan Economic Survey indicates that the prices of wheat, lentils, and milk went up by 21 percent, 15 percent, and 6 percent, respectively, between March 2013 and March 2014 (GoP 2014). These price increases have adversely affected purchasing power. For example, real wages in three of Pakistan's main cities, measured in terms of the wheat flour equivalent of one day's wages, have noticeably declined (Figure 3.2).

Rural–Urban Variations

In an effort to further disentangle rural–urban differences in consumption expenditures, we examine consumption data from HIES 2010/2011 (GoP 2011) in greater detail. Tabling the limitations of a solely money-metric estimation of poverty to a later point in this chapter, we classify households in

2 On February 11–12, 2015, the Pakistan Bureau of Statistics held a conference on Change of Base of Price Indexes in Islamabad at which many of these aspects were discussed, and a consensus was established on addressing these shortcomings.

FIGURE 3.2 Kilograms of flour purchased by one day's wages in three cities, 2006–2012



Source: Authors' calculations based on GoP (2013a).

the HIES data that are in the lowest two expenditure quintiles as "poor," and those that are in the higher three quintiles as "non-poor." We control for variations in household size by using the standard adult equivalence scale for Pakistan to transform the number of persons in a household to adult equivalents (GoP 2003).

Food is the major expenditure category in the typical household budget in Pakistan. According to data from HIES 2010/2011 (GoP 2011), food accounts for 53 percent of total expenditure: 46 percent in urban areas and 57 percent in rural areas. Understandably, the poor allocate a higher proportion, about 57 percent of their expenditures, to food, while the non-poor allocate 51 percent. Translated into an equivalent in US dollar terms, poor households spend less than 50 cents per day per adult equivalent, of which about 30 cents is spent on food and 20 cents on nonfood. This amount is

TABLE 3.3 Budget shares of food items by poverty status for urban, rural, and all households, 2010/2011

	Pakistan			Urban			Rural		
Food item	Overall	Non-poor	Poor	Overall	Non-poor	Poor	Overall	Non-poor	Poor
Percentage of food expenditure									
Wheat	17.5	14.6	21.9	15.1	11.8	20.1	18.8	16.1	22.8
Rice	3.8	3.7	3.9	3.8	3.6	4.1	3.8	3.8	3.9
Other cereals	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4
Pulses	3.0	3.0	3.1	3.0	2.8	3.2	3.0	3.0	3.1
Fruits, vegetables	13.0	13.1	12.8	13.2	13.4	12.9	12.8	12.9	12.7
Dairy	24.3	26.7	20.7	24.5	26.6	21.2	24.2	26.8	20.4
Meats	9.7	11.4	7.1	12.2	14.7	8.4	8.4	9.7	6.4
Oils	10.9	10.1	12.1	10.5	9.5	12.0	11.1	10.4	12.1
Sugars	9.0	8.9	9.2	8.6	8.5	8.8	9.2	9.1	9.3
Other	7.0	6.9	7.1	7.8	7.9	7.7	6.6	6.4	6.8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total monthly per adult equivalent food expenditure									
Mean (PKR)	1,624	1,972	1,102	1,754	2,147	1,165	1,556	1,880	1,069
Food share (%)	53.1	50.9	56.5	45.8	42.1	51.3	56.9	55.5	59.2

Source: Authors' estimates based on GoP (2011).

Note: PKR = Pakistani rupees.

substantially less than half the US$1.25 per day per adult equivalent that is used to define income level of the poor.

A breakdown of budget allocations to specific food items reveals more about poverty in rural and urban Pakistan. On average, households spent nearly two-thirds of their food budget on four items in 2010/2011: wheat (18 percent), dairy (24 percent), oils (11 percent), and sugars (9 percent) (Table 3.3). Poor households spent 22 percent of food expenditures on wheat—20 percent in urban areas and 23 percent in rural areas. Non-poor households spent 15 percent of food expenditures on wheat—12 percent in urban areas and 16 percent in rural areas. The non-poor spent three times as much on dairy products at did the poor. Most of the dairy products are consumed in the form of milk (mostly for tea) and ghee (clarified butter used for cooking).

These shares of food item expenditure illustrate considerable differences in both caloric intake and the range of foods from which the intake is derived, both of which are important aspects of poverty and welfare measurement.

TABLE 3.4 Calorie shares of food items by poverty status across urban, rural, and all households, 2010/2011

	Pakistan			Urban			Rural		
Category	Overall	Non-Poor	Poor	Overall	Non-Poor	Poor	Overall	Non-Poor	Poor
Percentage of calories									
Wheat	46.5	43.0	51.8	42.5	38.0	49.3	48.6	45.7	53.0
Rice	5.7	5.6	5.7	6.0	5.9	6.1	5.5	5.5	5.5
Other cereals	0.6	0.7	0.5	0.4	0.5	0.3	0.7	0.7	0.6
Pulses	2.3	2.4	2.1	2.5	2.6	2.4	2.2	2.3	2.0
Fruits, vegetables	4.5	4.7	4.1	5.0	5.4	4.5	4.2	4.4	4.0
Dairy	13.1	15.1	10.1	13.5	15.8	10.0	12.9	14.8	10.1
Meats	2.5	3.1	1.6	3.5	4.4	2.1	2.0	2.5	1.4
Oils	13.9	14.1	13.6	15.4	15.8	14.8	13.1	13.2	12.9
Sugars	4.4	4.6	4.0	4.9	5.2	4.3	4.1	4.3	3.8
Other	0.9	1.0	0.6	1.3	1.6	0.9	0.6	0.7	0.5
Total	100	100	100	100	100	100	100	100	100
Total calories per adult equivalent per day									
Mean	2260.1	2535.6	1847.0	2086.7	2291.9	1779.1	2350.6	2662.7	1882.5

Source: Authors' estimates based on GoP (2011).

Poverty limits the diversity in consumption to a narrower range of foods. Table 3.3 indicates that poor households rely on wheat, oils, and sugars to a greater extent than do non-poor households.

Using the HIES 2010/2011 data (GoP 2011), we calculate that the average calorie consumption per adult equivalent per day is 2,260 calories, which is slightly less than the recommended allowance of 2,350 calories per day (Table 3.4). The poor fall far below the national average in calorie consumption. The average calorie intake for the poor is only 1,847 calories per day—1,883 for the rural poor and 1,779 for the urban poor.

Wheat not only accounts for the largest proportion of food expenditures, but Table 3.4 shows that it also supplies the bulk of calories consumed. For the poor, more than half of all calories are derived from wheat consumption, with the rural poor relying on wheat significantly more than the urban poor. Variation in the source of calories also exists across and within provinces.

Using the average food expenditures and calories intakes (per adult equivalent per day), we compute the average cost of 100 calories of food. And given the importance of wheat in the average diet and household budget, we also

TABLE 3.5 Consumption of calories and the cost of calories by poverty status of households, 2010/2011

Poverty status of households	Population (%)	Total calories	Food expenditure (PKR)	Cost to obtain 100 calories (PKR)	Calories from wheat	Expenditure on wheat (PKR)	Wheat cost to obtain 100 calories (PKR)
Rural poor	31.2	1,883	35.63	1.89	1,007	8.15	0.81
Rural non-poor	35.6	2,663	62.67	2.35	1,208	7.73	0.64
Urban poor	15.8	1,779	38.83	2.18	881	9.20	1.04
Urban non-poor	17.5	2,292	71.56	3.12	872	7.25	0.83
National	100.0	2,260	54.12	2.39	1,041	7.28	0.70

Source: Authors' estimates based on GoP (2011).

Note: Total calories, Food expenditure, Calories from wheat, and Expenditure on wheat are daily per adult equivalent. PKR = Pakistani rupees.

compute the cost of 100 calories derived from wheat. Our calculations indicate that a household must spend an average of PKR 2.39 to obtain 100 calories (Table 3.5). However, 100 calories from wheat costs only PKR 0.70. Understandably, given the wider range and possibly better quality of their food intake, non-poor households spend more than poor households to obtain 100 calories in both urban and rural areas. Interestingly, the cost of calories from wheat is higher for poor households than for non-poor households—possibly a consequence of the markets where smaller-quantity bags and unpackaged quantities are sold at higher prices.

Because of the centrality of wheat in consumption patterns in Pakistan, Table 3.6 presents the budget share, average consumption, and expenditure and price elasticities of wheat. On average, an adult consumes nearly 9 kilograms of wheat in a month (304 grams of wheat every day). Wheat consumption and the percentage expenditure are higher in rural areas than in urban areas. Non-poor households in rural areas consume more wheat than poor households in rural areas, whereas little difference is observed between poor and non-poor households in urban areas. Poor households spend more than one-fifth of their food expenditure on wheat. The expenditure and price elasticities reported in this table—figures that are consistent with Haq, Nazli, and Meilke (2008) and Haq, Nazli, and Meilke (2011)—indicate that an increase in income (expenditure) by 10 percent increases the demand for wheat by more than 7.7 percent. Poor households have higher expenditure and price elasticities than non-poor households, while urban poor households have higher expenditure elasticity (0.92) as compared to rural poor households

TABLE 3.6 Budget share and elasticity of wheat consumption by poverty status and rural and urban location, 2010/2011

Poverty status	Consumption (kg/adult equivalent/ day)	Budget share on wheat (%)	Expenditure elasticity	Own-price uncompensated elasticity[a]	Own-price compensated elasticity[a]	Wheat-rice elasticity
Rural areas	0.334	18.8	0.79	−0.32	−0.21	0.01
Poor	0.301	22.8	0.84	−0.35	−0.17	−0.01
Non-poor	0.356	16.1	0.75	−0.35	−0.23	0.02
Urban areas	0.244	15.1	0.74	−0.31	−0.12	0.01
Poor	0.248	20.1	0.92	−0.36	−0.16	−0.00
Non-poor	0.242	11.8	0.67	−0.20	−0.11	−0.00
Pakistan	0.304	17.5	0.77	−0.32	−0.18	0.01
Poor	0.277	21.9	0.81	−0.21	−0.16	−0.01
Non-poor	0.310	14.6	0.76	−0.39	−0.17	0.02

Source: Authors' estimates based on GoP (2011).

Note: kg = kilogram.

[a] Own-price uncompensated elasticities denote any change in the quantity demanded of a commodity when its price changes. This change in demand results in a change in the consumption level. Own-price compensated elasticities maintain original consumption levels by making possible substitution between two commodities if the price of one commodity changes.

(0.84). However, an increase in the price of wheat has only a small effect on the demand for wheat, because the price elasticity of demand for wheat is generally low across all categories.

A useful way of illustrating the sensitivity of consumption to changes in food prices—and thus the vulnerability of the poor to price shocks—is to examine Pakistan's experience during the recent food price crisis (for international experience, see Harttgen and Klasen 2012; De Hoyos, Rafael, and Medvedev 2009; Ivanic and Martin 2008; World Bank 2010; Headey and Fan 2010; for Pakistan's experience, see Haq, Nazli, and Meilke 2008; Friedman, Hong, and Hou 2011). This crisis was manifested in the 42 percent increase in the world food price index between 2006 and 2013/2014 and by sharp price spikes during the period 2006–2008. Although the crisis was largely driven by cereal price increases on the order of 60 percent between 2006 and 2013, the prices of meats, dairy products, oils, and sugars also increased during the period by 31, 59, 47, and 4 percent, respectively (FAO, IFAD, and WFP 2014).

In Pakistan prices of most food items increased by more than 100 percent during the period 2000/2001–2008/2009. For example, the price of wheat increased by 162 percent, rice by 207 percent, milk by 101 percent, ghee by

147 percent, and onions by 140 percent (GoP 2013a). Estimates of compensating variation by Haq, Nazli, and Meilke (2008) and Friedman, Hong, and Hou (2011) provide a measure of the extent of the decline in the welfare of households attributable to these food price increases in Pakistan. Haq, Nazli, and Meilke (2008) found that after the food price crisis of 2008, PKR 44.3 per adult equivalent per month in urban areas and PKR 40.3 per adult equivalent per month in rural areas were required to maintain consumption at 2004/2005 levels. Similarly, Friedman, Hong, and Hou (2011) suggest that average households would need an additional amount equivalent to 38 percent of their pre-crisis expenditures to maintain pre-crisis consumption levels, and estimated that average household caloric provision fell by almost 8 percent between 2006 and the first half of 2008. Moreover, Friedman, Hong, and Hou (2011) found that urban households were relatively worse off than rural households during the crisis and declines in the welfare of households widened the inequality between the poor and non-poor. Our estimates indicate that the demand for wheat changes little when prices rise—as they did during the 2007/2008 food price crisis—meaning that households must allocate a larger share of their budgets to the purchase of wheat, often at the expense of other foods that are required to maintain a balanced diet.

In summary, the cost of meeting either national averages of calories or recommended daily allowances of calories remains a struggle for the poor. Levels of calorie consumption for a large proportion of Pakistan's population indicate, as discussed above, the possibility of a high prevalence of malnutrition—which is measured in the simplest of terms as an inability to meet minimum dietary energy requirements.

This conclusion is in line with the increasing awareness that food consumption levels are well below the minimum defined food basket for most households due to high food price inflation during 2010/2011 (GoP 2013a). Gazdar and Mallah (2013) conclude that given the high poverty and unemployment levels in the country, the increase in the cost of vital food items in recent years has adversely affected the poorer sectors of the population. Food price inflation, together with other shocks affecting the household, forces families to cut down on the consumption of nonstaple items and reduce the food intake, which further increases both vulnerability and malnutrition. But the question of how to use these conclusions to move poverty reduction strategies in Pakistan toward viable solutions—effective programs for social protection, nutrition, and health, for example—remains an important part of the ongoing discussion in both government and civil society.

Nutrition and the Nutritional Status of Children

Although discussions about poverty and food security often revolve around standard measures of caloric intake and costs per calorie, it is important to examine the nutritional consequences of limited dietary diversity in Pakistan and the extensive reliance on wheat as a source of nourishment. A growing body of research suggests that persistent malnutrition in Pakistan is characterized by significant but hidden micronutrient deficiencies that arise from limited diversity in the diet (Malik and Malik 1993; Alderman and Garcia 1993; Ibrahim 1999; Qureshi, Nazli, and Soomro 2001; Arif et al. 2012; Di Cesare et al. 2015). The consequences of micronutrient malnutrition—limited cognitive development early in life and low economic productivity later in life—are well established (FAO, IFAD, and WFP 2014; von Grebmer et al. 2014). But recognition of the important linkages between health and nutrition, on the one hand, and agriculture and the rural economy, on the other hand, have only recently emerged in the public discourse on poverty in Pakistan (see, for example, Gazdar and Mallah 2013). There is now some recognition in official circles in Pakistan that food consumption levels are below the minimum defined food basket for most households, and that the food basket itself might need closer scrutiny to identify the sources of micronutrient malnutrition and strategies to address it (GoP 2013a).

Clearly, the relationships between household budgets and food prices discussed earlier fall short in explaining the trade-offs that households make among food options, that is, substitution between good-quality and inferior-quality food. A decline in real incomes as a result of high food prices may force households to substitute cheaper or inferior food for more nutritious options. Of concern is the fact that for poor households that may already be consuming inferior or cheaper foods, substitution may take place between food and essential nonfood items that may be related to, for example, health and education. Restricting expenditures on health and education may affect labor productivity in the short term and school attendance and performance in the long term (Behrman 1993; Chapter 8 on public service provision).

Recent research demonstrates the impact of food price increases on the intake of micronutrients such as calcium, zinc, and iron (Ecker and Qaim 2011; Harttgen and Klasen 2012; Zaki et al. 2014). A closer look at the HIES 2010/2011 (GoP 2011) data sheds light on the issue of micronutrient malnutrition and dietary diversity. HIES 2010/2011 data contain a considerable amount of detail on the types of fruits and vegetables that poor and non-poor households consume. Poor households primarily spend their money on onions

and potatoes and few other fruits and vegetables. Non-poor households, on the other hand, spend more on fruits and vegetables other than onions and potatoes. Differences are also found in the types of meat consumed by poor and non-poor households, with poor households spending more on beef and non-poor households spending more on mutton and chicken. While these figures suggest that the poor have limited diversity in their diets, the overall picture suggests that all Pakistani households, irrespective of their location of residence or poverty status, have similar narrow diets comprising primarily cereals, dairy products, oils, and sugars, and lower amounts of green leafy vegetables and fruits.

Data from the NNS 2010/2011 (NNS 2011) provide insight into the consequences of limited micronutrient consumption and dietary diversity. The data indicate that nearly half of women of childbearing age are suffering from anemia, 43 percent from vitamin A deficiency, 48 percent from zinc deficiency, and 69 percent from vitamin D deficiency. The micronutrient malnutrition of women is also reflected in children. The NNS (2011) data show that a large number of children under five years of age in Pakistan also suffer from vitamin A deficiency (54 percent), zinc deficiency (39 percent), and iron deficiency (62 percent). In addition, the prevalence of protein-energy malnutrition (PEM) is not only high but has also increased over time.[3] In 2011 estimates indicated that nearly 44 percent of children were stunted, 15 percent were wasted, and 32 percent were underweight. These estimates in 2001 were 32.5 percent stunted, 11.2 percent wasted, and 42.3 percent underweight.

All of the national nutritional surveys—from the first Micro Nutrient Survey of Pakistan of 1977 to the most recent NNS conducted in 2011—show extremely high rates of child malnutrition in Pakistan (Table 3.7). There is considerable variation in levels of malnutrition across these surveys, making them difficult to compare and even more difficult to track over time. However, what is consistent across these surveys is data that suggest high levels of malnutrition.

This high incidence of malnutrition is confirmed by a number of studies conducted among preschool children in Pakistan (Malik and Malik 1993; Alderman and Garcia 1993; Ibrahim 1999; Qureshi et al. 2001; Arif et al. 2012). The association between child malnutrition and various socioeconomic

3 The anthropometric indicators that reflect the protein-energy malnutrition, measured by heights and weights of children at different ages, are considered to be robust measures of children's nutritional status. The PEM is defined by measurements that fall below minus two standard deviations of the normal weight for age (underweight), height for age (stunting), and weight for height (wasting).

TABLE 3.7 Levels of malnutrition found by surveys (%), 1977–2013

Data source	Underweight	Stunted	Wasted
Micro Nutrient Survey 1977	53.3	43.3	8.6
National Nutrition Survey 1985–1987	47.9	41.8	10.8
Pakistan Demographic and Health Survey 1990	40.4	50.2	9.2
National Nutrition Survey 2001	31.5	41.6	14.3
Pakistan Socio-Economic Survey 2001	51.4	52.7	—
Pakistan Rural Household Survey 2001	56.6	64.4	18.4
Pakistan Panel Household Survey 2010	39.8	64.5	17.2
National Nutrition Survey 2011	31.5	43.7	15.1
Rural Panel Household Survey 2013	39.7	45.9	23.1

Source: Authors, based on data from NNS (2011); NIPS (1992); PIDE (2001, 2002, 2010); IFPRI/IDS (2013).

Note: — = not available.

TABLE 3.8 Indicators of malnutrition by province in rural Pakistan (%), RHPS 2013

	Underweight (WAZ)	Stunting (HAZ)	Wasting (WHZ)
All Pakistan	39.7	45.9	23.1
Punjab	35.4	40.9	22.0
Sindh	51.6	59.1	28.1
Khyber Pakhtunkhwa	30.9	37.5	15.9

Source: Authors' estimates, based on the RHPS (IFPRI/IDS 2013).

Note: RHPS = Rural Health Panel Survey; WAZ = weight-for-age; HAZ = height-for-age; WHZ = weight-for-height.

and demographic indicators is also well documented in Pakistan (Qureshi, Nazli, and Soomro 2001; Arif et al. 2012; Bhutta et al. 2013; Di Cesare et al. 2015). While the scope, coverage, and methodologies differ across these studies, their results consistently show a high proportion of malnourished children as indicated by stunting, wasting, and underweight. In an effort to add to this body of work with more up-to-date data specifically on rural Pakistan, we present in Table 3.8 estimates of nutritional status and corresponding determinants based on the RHPS (IFPRI/IDS 2013) to estimate the z-score values for three common indicators, namely, underweight (weight-for-age [WAZ]), stunting (height-for-age [HAZ]), and wasting (weight-for-height [WHZ]). Annex A describes the data and methodology used in this analysis.

Results indicate that overall 39.7 percent of rural children were underweight, 45.9 percent were stunted, and 23.1 percent were wasted in the sampled population in 2013. Of particular note is the high rates of wasting relative to the studies summarized in Table 3.7. On a provincial basis, Sindh

showed the highest levels of stunting, wasting, and underweight, and Punjab and Khyber Pakhtunkhwa (KPK) showed levels that were lower than the national average.

Results also indicate a close association between various socioeconomic, demographic, community, and location variables and the nutritional status of children under five years of age. We use a logistic regression model to estimate the determinants of a z-score ranging from −2 to −6, noting that according to standards set by the World Health Organization (WHO), if a z-score for weight-for-age (WAZ), height-for-age (HAZ), or weight-for-height (WHZ) is less than −2, then the child is considered malnourished (WHO 2008). Estimation results given in Table 3.9 indicate the probability of a child being malnourished based on the three measures (WAZ, HAZ, and WHZ); an odds ratio of greater than 1 indicates that the probability of being malnourished is positively correlated with the explanatory variable, and an odds ratio of less than 1 indicates that the probability of being malnourished is negatively correlated.

Results indicate that the nutritional status of children is significantly and negatively correlated with the mother's education, the presence of a toilet facility, and the presence of a healthcare provider within the community. The probability of being stunted increases with a child's age. This may be due to the fact that younger children are protected because of breastfeeding; after weaning, children may not get adequate food for their age. The incidence of wasting declines with age,[4] implying a declining mortality rate with age.[5] Better hygiene, indicated by the presence of a flush toilet in the house, reduces the risk of exposure to infectious diseases and therefore reduces the incidence of stunting. The presence of a Lady Health Visitor (LHV) and access to healthcare services significantly reduces the incidence of underweight and wasting; however, no effect on stunting has been observed. This indicates that the presence of LHVs improves the short-term nutritional status of children but does not play a significant role for the long-term growth of children. This is consistent with the fact that the LHV's role in Pakistan is confined primarily to child birthing. These workers are responsible for providing maternal and child health services, including basic curative care and essential drugs

4 Wasting is generally considered to be a strong indicator of mortality among children under five years of age.

5 These results are consistent with Qureshi, Nazli, and Soomro (2001), whereas Arif et al. (2012) found a nonlinear relationship between age and stunting. However, the definition of poverty status in terms of households in consumption levels in the lowest two quintiles versus those in the upper three quintiles does not accurately define poverty.

TABLE 3.9 Determinants of malnutrition among children under age five, rural Pakistan

Variables	Underweight (WAZ)	Stunting (HAZ)	Wasting (WHZ)
Age of child (months)	1.004	1.011***	0.990***
	(0.003)	(0.003)	(0.004)
Sex (male = 1)	1.011	1.124	0.791**
	(0.117)	(0.127)	(0.103)
Mother age at childbirth (years)	0.995	1.000	1.007
	(0.009)	(0.009)	(0.011)
Mother literacy (Literate = 1)	0.671***	0.745**	0.818
	(0.098)	(0.103)	(0.135)
Number of siblings	1.010	0.997	0.990
	(0.032)	(0.030)	(0.035)
Family type (Nuclear = 1)	0.946	0.896	1.082
	(0.117)	(0.108)	(0.152)
Household type (Farm = 1)	0.957	0.911	0.938
	(0.114)	(0.106)	(0.126)
Toilet facility (Yes = 1)	0.930	0.697***	1.031
	(0.125)	(0.091)	(0.158)
Presence of a Lady Health Visitor (Yes = 1)	0.719***	1.066	0.778**
	(0.096)	(0.138)	(0.118)
Distance from Basic Health Unit (km)	0.980**	1.000	0.968**
	(0.010)	(0.009)	(0.012)
Sindh	1.887***	1.702***	1.361**
	(0.282)	(0.253)	(0.229)
Khyber Pakhtunkhwa	0.971	0.873	0.768
	(0.193)	(0.164)	(0.184)
Constant	0.831	0.798	0.475**
	(0.308)	(0.289)	(0.197)
	1,352	1,352	1,352

Source: Authors' estimates based on the RHPS (IFPRI/IDS 2013).

Note: Standard errors reported in parentheses. Asterisks denote statistical significance at the * 10 percent, ** 5 percent, and *** 1 percent levels. WAZ = weight-for-age; HAZ = height-for-age; WHZ = weight-for-height; km = kilometers.

for the treatment of minor ailments such as diarrhea, malaria, acute respiratory tract infection, and intestinal worms. They can play a significant role in controlling long-term malnutrition as well by creating nutritional awareness among mothers.

Poverty can be an important determinant of the incidence of malnutrition. However, for analytic purposes, since poverty and malnutrition are determined by the same variables, inclusion of poverty as explanatory variable may cause the problem of endogeneity (Arif et al. 2012). In fact malnutrition indicators are often used as a proxy for poverty (Reinhard and Wijayaratne 2002; Setboonsarng 2005; Heltberg 2009; Klaver 2010).

Poverty Indicators

Considerable debate has taken place in Pakistan over the level of the poverty line and resulting estimates of poverty in recent years. In part, this is due to alternative methodologies for the determination of a poverty line derived from a minimum calorie consumption level. In addition, the data problems discussed above involving the calculation of appropriate CPIs have added more uncertainty to calculations of poverty lines and poverty levels over time. (See Annex B for a discussion of methodology and alternative estimates of poverty levels and trends.)

Given these uncertainties in money-metric measures of poverty, we present several other indicators of welfare, along with the official estimates of poverty. As shown below, while there are some differences in the timing and magnitude of variations in these other indicators, a broadly consistent picture emerges of relatively small changes in the welfare of the poor since the early 1990s, in contrast to the sharp downward trend in official poverty estimates.

Table 3.10 presents the official estimates of poverty in Pakistan. According to these estimates, poverty fell sharply between 2001/2002 and 2010/2011, from 34.5 percent to 12.4 percent.[6] The estimates also show a dramatic 24 percentage point decline in the rural poverty headcount ratio during the same period—a decline that is much greater than the corresponding decline in the urban poverty headcount ratio. Despite the greater decline, the rural poverty headcount ratio in 2010/2011 remains higher than the urban poverty headcount ratio.

However, survey data on food budget shares over the same period suggest that the welfare of households in Pakistan has changed relatively little.[7] As Figure 3.3 shows, food budget shares of rural and urban households remained steady, consistent with the absence of a change in real incomes of these groups. (Food expenditures are, in general, income inelastic, that is, a 1 percent gain in income results in less than a 1 percent increase in quantities consumed. Thus, the budget share of food is expected to decline when incomes rise.)[8]

Various indicators of malnutrition also suggest that income levels of the poor may not have risen (and poverty rates may not have fallen) in this period

6 The estimates for 2010/2011 were first reported in the Government of Pakistan's Millennium Development Goals progress report (GoP 2013b) and were officially released in the 2014 *Pakistan Economic Survey* (GoP 2014).

7 For details see the official survey reports on various issues of HIES, which are available at the Government of Pakistan website (GoP 2015).

8 This phenomenon is known as Engel's Law (Engel 1857) and is widely cited in consumption and poverty analysis. See, for example, Timmer, Falcon, and Pearson (1983).

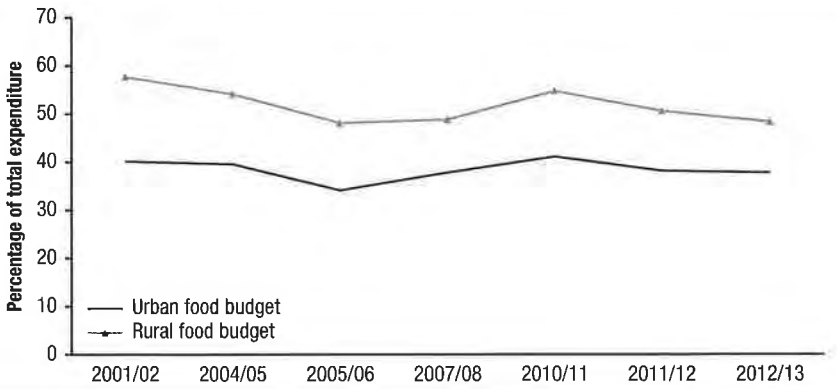
TABLE 3.10 Poverty indicators based on the official poverty line, 1992/1993–2010/2011

	Poverty headcount ratio (%)			Poverty gap			Severity of poverty		
Year	Urban	Rural	Pakistan	Urban	Rural	Pakistan	Urban	Rural	Pakistan
1992/1993	20.0	27.6	25.5	3.4	4.6	4.3	0.9	1.2	1.1
1993/1994	15.9	33.5	28.2	2.7	6.3	5.2	0.7	1.8	1.4
1996/1997	15.8	30.2	25.8	2.4	5.3	4.4	0.6	1.4	1.1
1998/1999	20.9	34.7	30.6	4.3	7.6	6.4	1.3	2.4	2.0
2001/2002	22.7	39.3	34.5	4.6	8.0	7.0	1.4	2.4	2.1
2004/2005	14.9	28.1	23.9	2.9	5.6	4.8	0.8	1.8	1.5
2005/2006	13.1	27.0	22.3	2.1	5.0	4.0	0.5	1.4	1.1
2007/2008	10.0	20.6	17.2	—	—	—	—	—	—
2010/2011	7.1	15.1	12.4	—	—	—	—	—	—

Source: Cheema (2005); GoP (2008a, 2014).

Note: — = not available. No official estimates were released for the excluded years prior to 2010/2011.

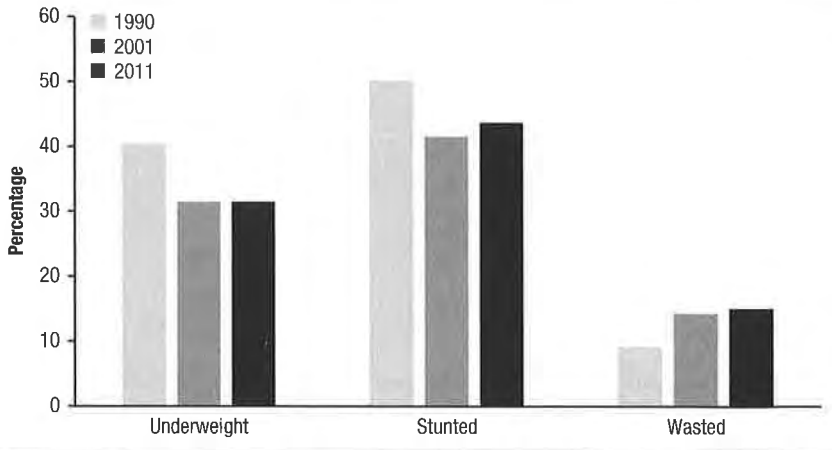
FIGURE 3.3 Food budget share of total expenditure of rural and urban households, 2001/2002–2012/2013



Source: Authors, based on data from HIES (GoP various years).

(Figure 3.4). Both the percentage of children underweight (measured by weight-for-age) and stunted (height-for-age) showed substantial improvement between 1990 and 2001, which was a period of strong agricultural growth and total national income (including remittances) growth. Surprisingly, wasting (weight-for-height), an indicator of acute (short-term) malnutrition, actually increased. Between 2001 and 2011, however, all three indicators of malnutrition either remained the same or increased slightly.

FIGURE 3.4 Indicators of malnourishment in Pakistan, 1990–2011



Source: Authors, based on data from NNS (2011); NIPS (1992); PIDE (2001, 2002, 2010).

Putting aside the issues of sensitivity of poverty estimates to methodology and specification, we examine the concentration of poor households across agroclimatic zones (Table 3.11).[9] We assume a poverty line here that is consistent with the expenditure to obtain to 2,350 calories per day per adult equivalent, based on the consumption of the lowest 66 percent of the population. Our analysis indicates that a large proportion of the rural poor are in the cotton/wheat areas. Table 3.11 shows that 19.6 percent of the poor are located in Cotton/Wheat Punjab and another 11.7 percent in Cotton/Wheat Sindh. Together, these two zones account for 31 percent of Pakistan's rural poor but only 28 percent of the total rural population (17.6 percent in Cotton/Wheat Punjab and 10.0 percent in Cotton/Wheat Sindh). The second column in Table 3.11 shows the poverty headcount ratio within each zone. Overall rural poverty is 47.5 percent, which is higher than overall poverty as defined above; this result is consistent with the persistent higher poverty rates for rural Pakistan, also highlighted above. Poverty headcount ratios are highest in Low-Intensity Punjab (63.0 percent), Rice/Other Sindh (58.3 percent), Cotton/Wheat Sindh (55.6 percent), and Cotton/Wheat Punjab (53.0 percent).

To further explore the intensity of poverty by agroclimatic zone, we calculate an index that is based on the ratio of the following two ratios: the

9 Based on the cropping patterns, Pinckney (1989) classifies districts of Pakistan into agroclimatic zones. These zones are described in Chapter 2.

TABLE 3.11 Indicators of the concentration of rural poor by agroclimatic zones, 2011

Agroclimatic zone	Percentage of rural population	Percentage of poor within zone	Percentage of rural poor	Index: Intensity of poor	Percentage of farm income in total income
Rice/wheat Punjab	14.6	35.7	10.9	0.75	44.5
Mixed Punjab	11.9	39.1	9.8	0.82	46.9
Cotton/wheat Punjab	17.6	53.0	19.6	1.11	54.0
Low-intensity Punjab	8.9	63.0	11.8	1.32	48.6
Barani Punjab	5.6	33.7	3.9	0.71	14.5
Cotton/wheat Sindh	10.0	55.6	11.7	1.17	41.1
Rice/other Sindh	8.2	58.3	10.1	1.23	50.6
Khyber Pakhtunkhwa	17.4	45.4	16.6	0.96	17.4
Balochistan	5.9	44.8	5.6	0.94	22.4
Total (%)	100	47.5	100.0	1.00	39.8
Total (number)	**86,963,986**		**34,832,395**		

Source: Authors' estimates based on GoP (2011).

Note: For the index, an index value of 1 implies that the zone has a share of the poor equal to its share of the rural population, a value greater than 1 shows that the zone has a share of poor higher than its share of the rural population, and a value less than 1 shows a share of poor smaller than its share of the rural population.

proportion of the poor in that zone out of total rural poor and the proportion of the population in each zone relative to total rural population.[10] The index values (Table 3.11) show that Low-Intensity Punjab has the highest proportion of poor relative to its share of population, followed by Rice/Other Sindh, Cotton/Wheat Sindh, and Cotton/Wheat Punjab. Other zones have a lower concentration of poverty, that is, a smaller share of poor households relative to the zone's share of the rural population. Barani Punjab has 71 percent of its share of poor compared to its share of the rural population. Relatively low poverty in the barani areas of northern Punjab is attributed to a number of socioeconomic characteristics, including the lowest dependency ratio; the highest levels of literacy, particularly female literacy; and the lowest number of unpaid family workers. These factors reflect the health of the region's economy. The rural areas in this region are well integrated with prosperous urban centers that have strong linkages to the services sector, and the region's labor force is employed primarily in the armed forces and the government sector. A high incidence of domestic and overseas migration means that remittances

10 An index value of 1 implies that the region has a share of the poor equal to its share of the rural population, a value greater than 1 shows that the zone has a share of poor higher than its share of the rural population, and a value less than 1 shows a share of poor smaller than its share of the rural population.

contribute a significant proportion to total household income in the barani areas of Punjab. In contrast, in the zones where the incidence of poverty is higher, households' dependence on farm income is much higher. For example, farm income accounts for 54 percent of the total income generated in Cotton/Wheat Punjab, 50.6 percent in Rice/Other Sindh, and 48.6 percent in Low-Intensity Punjab.

Social Protection Policies

In an effort to reduce poverty and increase resilience to shocks among the poor, the Government of Pakistan has identified priority areas for intervention in its social protection strategy, which was developed in 2007. This Social Protection Strategy to Reach the Poor and Vulnerable aims to (1) support chronically poor households and protect them from destitution, food insecurity, exploitation, and social exclusion; (2) protect poor and vulnerable households from the impacts of adverse shocks to their consumption and well-being that, if not mitigated, would push them into poverty or, if already poor, into deeper poverty; and (3) promote investment in human and physical assets, including their health, nutrition, and education, by poor households that would give them the capability to maintain their resilience in the medium term and interrupt the intergenerational cycle of poverty. The strategy emphasizes the need to expand the coverage of cash transfers through a combination of unconditional programs, conditional programs aimed at increasing school enrollments and reducing malnutrition, and other interventions that would combine cash transfers with skills-development interventions aimed at "graduating" the poor out of poverty (GoP 2015a).

Yet the formal safety net system in Pakistan that is required to implement this vision of social protection is, at present, insufficient in size and scope to cope with the challenge (World Bank 2013). Prior to 2008, Pakistan's formal safety net system was much smaller and was composed of two main cash transfer programs: Zakat, or the formal collection and distribution of taxes for charitable use mandated by Islam and administered by the Ministry of Religious Affairs, and the Food Support Program, administered by the Bait-ul-al under the Ministry of Social Welfare and Special Education (Ahmad and Farooq 2010). Both programs were weakly targeted to the poor: only 46 percent of total Bait-ul-Mal expenditures (and 43 percent of total Zakat expenditures) reached the poorest 40 percent of the population (World Bank 2007). At present the main vehicle for social protection—the Benazir Income Support Program, launched in 2008—has grown rapidly, from 1.7 million households served in 2008/2009 to 4.7 million in late 2014. Further attention

to sustainability, targeting, graduation, monitoring, and evaluation are required to expand the reach and impact of the program (World Bank 2013).

Conclusions

The foregoing analysis highlights several issues that deserve attention as Pakistan continues its struggle against persistent poverty and malnutrition. Food insecurity is high and relatively unchanging, while calorie intake remains low, consumption patterns are skewed toward cheaper sources of calories, and malnutrition levels remain high, especially among children. Low levels of calorie consumption, overall and by the poor in particular, and, equally important, limited dietary diversity warrant immediate attention. To address these problems, public policy and poverty programs need to take a broader view of poverty, beyond the money-metric approach.

Better design and implementation of public poverty reduction programs are critically needed to address the country's persistent challenge of malnutrition and poverty. Programs need to take a multidimensional approach to the issue by addressing not only the most basic food security concerns—access to calories—but also by improving healthcare services, increasing awareness about sanitation and hygiene, engaging communities in healthcare provision, and empowering women to tackle child and infant malnutrition. There is clearly a need for addressing these issues throughout the country, in its rural areas, and especially in Sindh.

Additional investments in healthcare, education, and poverty reduction programs are also vitally important (Chapters 8 and 10 examine these programs further). For example, there are potential gains to be made from expanding the LHV's role beyond providing assistance with childbirth alone to purveying nutritional information that would shift preferences away from fats and sugars and toward more calorie-efficient and micronutrient-dense foods. Other national programs are also worth supporting with higher levels of investment. The Zero Hunger Program, which was launched in 2012, has made progress in addressing the issue of food insecurity. The Pakistan Integrated Nutrition Strategy, launched in 2013, aims to address the underlying causes of malnutrition such as lack of food diversity, and the Water, Sanitation, and Hygiene (WASH) program and various school feeding programs approach these issues from other angles. The Scaling-Up Nutrition program, initiated in 2013, aims to identify the hurdles in access to food and address the issue of malnutrition in Pakistan. In addition to these programs, the federal and provincial governments have opportunities to mainstream

poverty and malnutrition concerns into the integrated programs for economic growth and development that are currently being pursued.

But experience shows there is a need for a stronger monitoring and evaluation system to improve program implementation and effectiveness. There is opportunity to strengthen the statistical framework for better policy research and implementation. Our analyses of the CPI calculations demonstrate the need for scrutiny and improvement of the statistical basis that underlies the analysis of consumption and nutrition. Specifically, the Family Budget Survey that forms the basis of the CPI estimation needs to be updated and restructured in order to make it representative of rural-urban distinctions. Similarly, the methodology behind the CPI calculations needs to be revised and updated to reflect the actual (higher) weights of the food expenditures as well as the evolving consumption patterns and prices of the rural sector. Since the Family Budget Surveys are conducted every five years, whereas prices and consumption patterns change frequently, it is important to test for and continuously remove the potential biases that may arise in calculating the CPI. This can be done through smaller, more periodic sample surveys.

In sum, consumption, nutrition, and poverty must remain central to the wider discussion of growth and development in Pakistan's overall economy, in the agricultural sector, and in the rural economy. There is scope to refine both the measurement of poverty in Pakistan—to capture a broader understanding of its causes and consequences—and to strengthen public policies and programs designed to reduce poverty and malnutrition. The national discourse around policy making for poverty reduction in Pakistan is headed in the right direction insofar as poverty measurement, micronutrient malnutrition, and agriculture-health-nutrition linkages are all on the agenda. This discourse signals the need for higher-quality analysis of poverty dynamics in Pakistan to provide the evidence base needed for informed policy making on inclusive growth strategies and social protection.

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Annex A: Estimation of Malnutrition among Children, Using Data from the Rural Household Panel Survey

As part of the RHPS, a team of trained interviewers, monitored by supervisors, administered the questionnaire to the mothers of children under five years of age and conducted the anthropometric measurement of the children. The WHO guidelines for nutritional assessment were used for taking the anthropometric measurements. Children less than two years old were weighed using a tared weighing method (WHO 2008). In this method, first the mother/helper is weighed alone; then the mother/helper and child are weighed together and the mother's weight is subtracted to determine the child's weight. The weight of children between two and five years old was measured on regular weighing scales. Height or length was measured with a wooden height board. The interviewers were asked to measure the length for children less than two years in the recumbent position using special measurement boards. The heights for children more than two years old were measured with the child standing up.

Data were prepared following WHO guidelines. All observations with weights less than 0.9 kilograms and more than 58 kilograms were dropped. Likewise, all observations with heights less than 38 centimeters and more than 150 centimeters were dropped. A total of 336 observations for weight and height were dropped. The software WHO Anthro was used to estimate the z-score values for three common indicators, namely, stunting (height-for-age), underweight (weight-for-age), and wasting (weight-for-height). In order to examine the status of child malnutrition, a comparison with a reference child of the same age and sex was made. The growth reference of the United States

National Center for Health Statistics is commonly used as basis for this comparison. A z-score is calculated using the median value and standard deviation (SD) of the reference population. The percentage of children whose z-score falls below a defined cutoff point—that is, −2SD from the median of the international reference population—defines the malnourished children.

The analysis presented here uses the data from the second round of the RHPS conducted in April–May 2013. A total of 1,753 children under five years of age were included in the sample; 51 percent were boys, and 49 percent were girls. Of these, 58 percent of the children resided in Punjab, 29 percent in Sindh, and 13 percent in KPK. After cleaning, 1,403 valid cases were left for analysis.

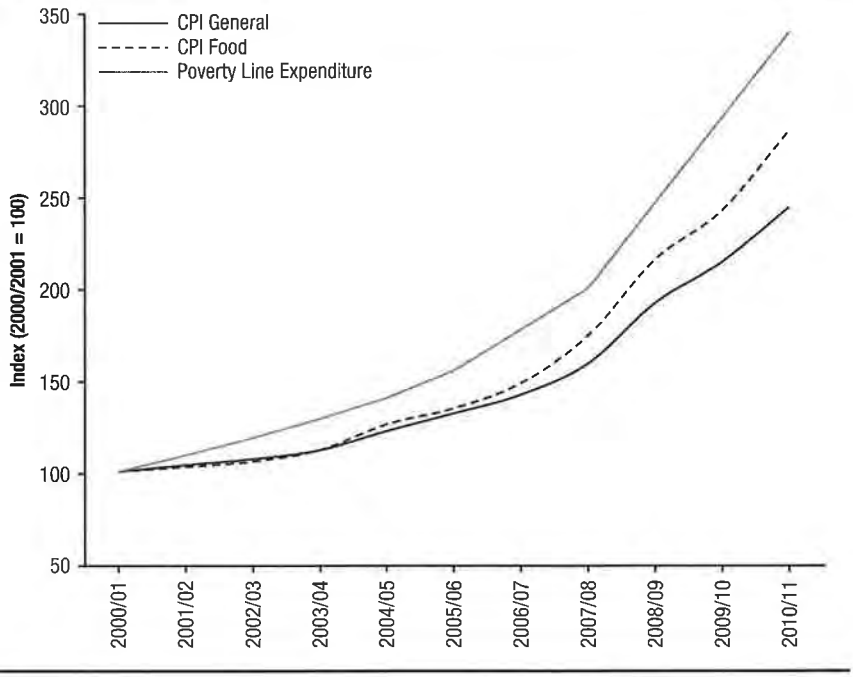
Using these data, we estimated the standard anthropometric measures by estimating z-scores.

$$z\text{-}score = \frac{observed\ value - median\ value\ of\ reference\ population}{standard\ deviation\ value\ of\ reference\ population}$$

Annex B: Alternative Poverty Line Methodologies and Poverty Estimates

This annex describes three alternative methodologies for estimating the poverty line in Pakistan, and summarizes the resulting poverty estimates. The first methodology, referred to as "Official Methodology," is taken directly from the *Poverty Reduction Strategy Paper* produced by the Government of Pakistan in 2003 (GoP 2003). This methodology employs a single regression of calorie consumption on total household expenditures using data for all of Pakistan for each year having a national household survey. The poverty line in the baseline year is derived from the fitted regression curve as the level of expenditure that corresponds to a threshold level of 2,350 calories per day per adult equivalent household member. Poverty lines for subsequent years are calculated using changes in the national CPI. The second methodology, the "Official Methodology (Regional Estimates)" is based on separate regressions of calorie consumption on total household expenditures for rural and urban households in each of the four major provinces of Pakistan. The third methodology, referred to as the "Arndt-Simler (2010) methodology," employs the poverty estimation toolkit presented in Arndt and Simler (2010), then adjusts the consumption basket used to calculate poverty lines to ensure consistency across space and over time, as described below.

FIGURE B3.1 CPI, CPI for food, and poverty line expenditure, 2000/2001–2010/2011



Source: Authors' calculations based on HIES datasets (GoP various years) and GoP (2013a).
Note: CPI = consumer price index.

Official government estimates of poverty are based on a single poverty line for the entire nation. This poverty line represents the cost of obtaining the minimum threshold of 2,350 calories per day for each adult equivalent household member, and it represents a national average of individual item quantities and the prices of those items for households in the bottom three quintiles of the population in terms of per capita expenditures.

However, as discussed in this chapter and in Malik et al. (2014b), the prices and consumption preferences for major calorie sources vary across provinces and across urban and rural areas. A single national poverty line masks this variation in prices and consumption preferences, thus providing an inaccurate portrayal of poverty across the country.

We highlight this issue by comparing trends in the estimates of poverty line expenditures computed for each year directly from the successive HIES datasets (Malik, Nazli, and Whitney 2014b) and the national CPI. As shown in Figure B3.1, poverty lines calculated from new regressions using the values

of household expenditures for each survey year (and therefore price data from each HIES rather than price data used in the CPI) are consistently higher than those derived using percentage changes in the national CPI. (The CPI for food rose from 100 in 2001/2002 to 280 in 2010/2011, while the poverty line index increased to 348 over the same period, a difference of nearly 70 percentage points.) To the extent that these official poverty lines are too high, the poverty rates will be overstated.

In principle, estimating separate poverty lines for each spatial domain enables the calculation of even more accurate poverty numbers by capturing regional price differences as well as differences in consumption patterns of the poor. Thus, for our Official Methodology (Regional Estimates), we estimate poverty lines separately by spatial domain by regressing logged adult equivalent household expenditures on calories consumed per day per adult equivalent.[11]

In contrast to the official government methodology, the Arndt-Simler (2010) methodology yields poverty lines that represent consistent levels of utility across spatial domains and across time. Similar to the estimates from the Official Methodology (Regional Estimates), the data source for these estimates is the Government of Pakistan's HIES data for five available survey years. As described in Arndt and Tarp (2015), the toolkit includes the following specifications. First, using household demographics, we calculate a weighted average of calorie requirements for each household in a spatial domain using 2,150 calories as the minimum daily threshold for an adult equivalent household member. Second, we calculate consumption aggregates in the same way as the Official Methodology (Regional Estimates), with the exception that we include the use value of assets and we omit items for which only total value is reported (for example, ready-made meals and some miscellaneous "other" items, which together represent a small portion of total consumption).

The consumption basket and prices used in calculating poverty lines are a product of an iterative process developed by Ravallion (1998) that yields the consumption basket and prices for the household at the poverty line. For each spatial domain and for each survey year, the steps in the iterative process used to produce the Arndt-Simler (2010) methodology are described as follows:

11 The household expenditures aggregate is constructed using the food expenditures and nonfood expenditures recorded in the consumption modules of the HIES. In addition to purchases, we include consumption from gifts, transfers, in-kind payments, and own production. We estimate housing costs using a hedonic regression approach and omit the use value of assets.

1. Calculate average quantities, prices, and budget shares for all food commodities for individuals in the bottom 60 percent of the per capita expenditure distribution.
2. Using the average budget shares and the average prices faced by the bottom 60 percent of the per capita expenditure distribution, define the poverty line as the level of expenditures needed to reach 2,350 daily calories per adult equivalent.
3. Recalculate quantities, prices, and budget shares for all food commodities for poor households using the new poverty line defined in the previous step.
4. Using the budget shares and prices from the previous step, define a new poverty line as the level of expenditures needed to reach 2,350 daily calories per adult equivalent.
5. Repeat steps 3 and 4 until the series of estimated poverty lines converge.[12]

Using this procedure, the final poverty line should be consistent with the average budget shares of the individuals falling at or below the poverty line.[13] However, additional steps are necessary in order to produce poverty lines that are utility consistent across spatial domains and time. Arndt and Simler (2010) provide a method to ensure that the composition of consumption baskets satisfies revealed preference constraints and thus provides utility consistent estimates of poverty across spatial domains and time.[14]

Results

National estimates of poverty incidence using the three methodologies are presented in Annex Table B3.1 and Annex Figure B3.2. Both sets of survey-based estimates indicate that, contrary to the official money-metric estimates, the incidence of poverty in Pakistan has not decreased between 2001/2002 and 2010/2011. These findings are consistent with the evidence presented earlier

12 This approach is based on the Cost of Basic Needs (CBN) method, developed by Ravallion (1998) and Ravallion and Bidani (1994) and explained in greater detail in Ravallion (1999), Deaton and Zaidi (2002), and Deaton and Grosh (2000).

13 See Ravallion (1998) for a discussion of possible instances where convergence does not take place.

14 See Arndt and Simler (2010) for a detailed description of the entropy approach used to impose revealed preference conditions across consumption baskets.

TABLE B3.1 Estimates of the poverty headcount ratio by three methodologies (%), 2001/2002–2010/2011

Source of estimate	Coverage	2001/2002	2004/2005	2005/2006	2007/2008	2010/2011
1. Official methodology (poverty lines extrapolated CPI)	National	34.5	23.9	22.3	17.2	12.4
	Urban	22.7	14.9	13.1	10.0	7.1
	Rural	39.3	28.1	27.0	20.6	15.1
2. Official methodology (poverty lines estimated)	National	38.6	39.7	42.4	43.7	45.6
	Urban	31.8	30.5	35.6	36.7	39.7
	Rural	41.4	44.0	45.9	47.1	48.6
3. Arndt-Simler (2010) methodology	National	21.7	18.4	20.5	20.4	22.9
	Urban	15.9	13.3	11.6	13.7	14.4
	Rural	24.0	20.7	24.9	23.6	27.2

Source: Official methodology (poverty lines extrapolated CPI): Cheema (2005) and GoP (2008a, 2014); Official methodology (poverty lines estimated) and Arndt-Simler (2010) methodology: authors' estimates based on GOP (2001, 2005, 2006, 2008, 2011).

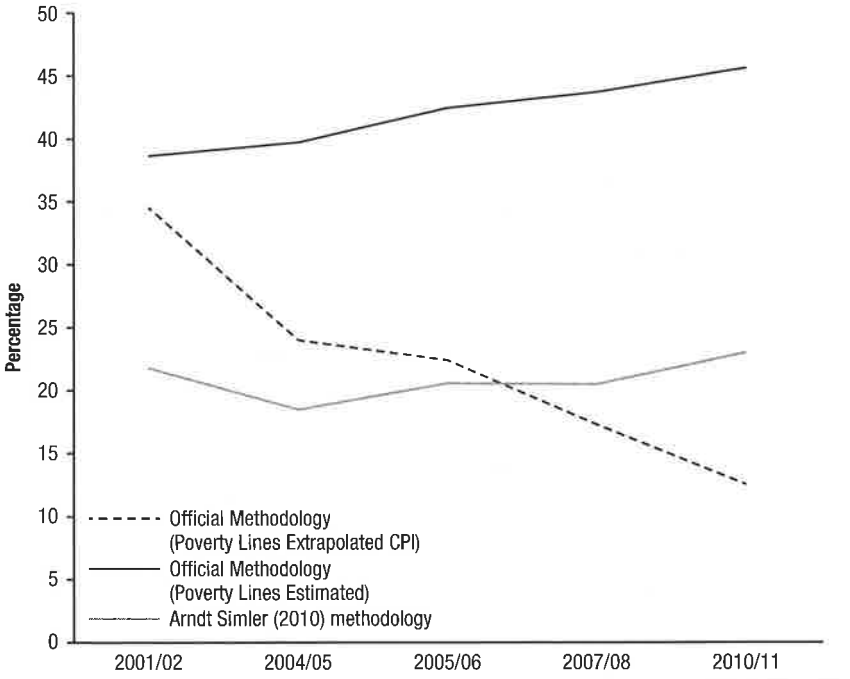
Note: CPI = consumer price index.

in the chapter of rising food prices and declining real wages as reflected in the declining purchasing power of a day's wages to buy wheat flour.

A comparison of the three estimates of the poverty headcount ratios confirms the sensitivity of the estimates to the methodology used and the large underestimation of official poverty estimates compared to the two alternatives. The official estimates, based on the household consumption patterns prevailing in 1998/1999, do not capture changes in consumption patterns over time. In particular, the substantial increases in the prices of food and fuel after 2007 resulted in higher shares of these items in consumption baskets of the poor after that, which raised the cost of the minimum consumption basket, thereby resulting in higher estimates of the poverty line. Adjusting the poverty line using the CPI, which suffers from urban bias both in consumption weights and prices of the consumption basket, does not fully capture the real increase in prices, especially for the poor. As a result, the official poverty estimates show a decline in poverty in rural and urban areas.

In contrast with the official estimates, both alternative sets of estimates presented here show that poverty incidence increased during the period of food and fuel price increases. The direct estimates (method 2 in Table B3.1) are higher than estimates using the Arndt and Simler (2010) methodology (method 3 in Table B3.1), reflecting differences in the regression model and adjustments for changes in consumption baskets across households. Because there is a large percentage of rural households with per capita expenditures

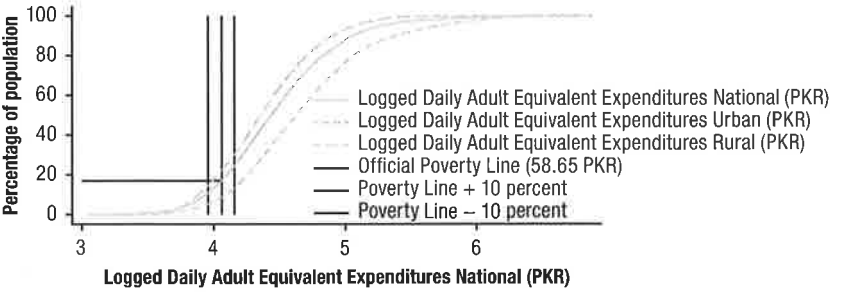
FIGURE B3.2 Estimates of poverty incidence using three methodologies, 2001/2002–2010/2011



Source: Official Methodology (Poverty Lines Extrapolated CPI): Cheema (2005) and GOP (2008a, 2014); Official Methodology (Poverty Lines Estimated) and Arndt-Simler (2010) methodology: authors' estimates based on GOP (2001b, 2005, 2006, 2008c, 2011).

Note: CPI = consumer price index.

FIGURE B3.3 Estimate of poverty lines (logged) and CDF of logged expenditures, 2010/2011



Source: Official Methodology (Poverty Lines Extrapolated CPI): Cheema (2005) and GoP (2008a, 2014); Official Methodology (Poverty Lines Estimated) and Arndt-Simler (2010) methodology: authors' estimates based on GOP (2001, 2005, 2006, 2008, 2011).

Note: Intersection of poverty line with CDF curve indicates corresponding (read horizontally across) y-axis value of poverty headcount. CPI = consumer price index; CDF = cumulative distribution function; PKR = Pakistani rupees.

near the poverty line, a small change in the poverty line results in a large change in estimates of the incidence of poverty (Figure B3.3). For example, a 10 percent increase in the poverty line lowers the poverty rate from 17.3 percent to 10.6 percent of the population. A 10 percent decrease in the poverty line increases the poverty rate to 24.5 percent of the population.

The estimate using the Arndt and Simler (2010) methodology finds rural poverty to be 13.3 percentage points higher than urban poverty, as compared to the 10.0 percentage point difference in the rural and urban poverty estimates based on the official methodology. Note, though, that in all three estimates presented, rural poverty is always higher than urban poverty.