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Nutritional Status in Pakistan

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The Pakistan Institute of Development Economics, established by the Government of Pakistan in 1957, is an autonomous research organisation devoted to carrying out theoretical and empirical research on development economics in general and on Pakistan-related economic issues in particular. Besides providing a firm foundation on which economic policy-making can be based, its research also provides a window through which the outside world can see the direction in which economic research in Pakistan is moving. The Institute also provides in-service training in economic analysis, research methods, and project evaluation.

CONTENTS

List of Tables

I. INTRODUCTION

In Pakistan, despite an increase in per capita food availability and resultant rise in per capita calorie and protein intake, the prevalence of malnutrition has not improved over last 20 years [National Health Survey (1996)]. At the time of the on-set of the Ninth Plan, i.e., 1997-98, the estimated number of malnourished children was about 8 million. Nearly half of the children under 5 years of age were found underweight of age at a level that corresponds to general malnutrition of Protein Energy Malnutrition (PEM). Approximately 5 percent of these are severely underweight and 10 percent were moderately underweight.

The adverse nutritional status can partly be explained by the sustained levels of mass poverty and income inequality and to some extent the behavioural aspects relating to the attitudes of gender bias. In fact the proportion of population who do not have adequate access to food has risen sharply between 1992-93 and 1998-99. In this scenario, it becomes crucial to assess the basic health status, especially among the children of under-five years of age. The robust indicator that reflects the health status of children under five years of age is explained by the anthropometric measurements. This paper uses the recent data of PSES (1998-99) to analyse the current nutritional status of pre-school children in the country.

Malnutrition results from relative or absolute deficiency of one or more essential nutrients. The major nutritional problems are low birth weight due to poor maternal nutrition; protein energy malnutrition; anaemia; iodine deficiency disorders; and other micro-nutrient deficiencies. The nutritional status depends on the availability of food and intake of balanced diet and can be assessed by various methods, such as, clinical methods, anthropometry, assessment of individual dietary intake, and laboratory tests. Anthropometric measures such as height, weight, skinfold thickness and arm circumference with reference to age are considered as important indicators of protein energy malnutrition. These measures are closely linked with the fulfilment of basic needs and standard of living of individuals. Thus, these measures not only help in evaluating the health and nutritional status but also provide an indirect measure of the quality of life.

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Three common indicators, namely, stunting (height-for-age), underweight (weight-for-age) and wasting (weight-for-height) can be computed on the basis of anthropometric information. In order to examine the status of child malnutrition, a comparison with a reference child of the same age and sex is to be made. The growth reference of the United States National Center for Health Statistics is commonly used as basis for this comparison. In this regard, Z-score method is widely recognised to analyse the anthropometric data. Z-score is calculated by using the median value and standard deviation (SD) of the reference population. The percentage of children whose Z-score falls below is defined cut-off point i.e., –2SD from the median of the international reference population identifies malnourished children[1].

This paper is divided into five sections. The prevalence of malnutrition in Pakistan is presented in Section 2. Third section describes the data. analysis is presented in Section 4. Conclusions and recommendations are given in the final section.

II. PREVALENCE OF MALNUTRITION IN PAKISTAN

The nutritional and demographic surveys, conducted during last two decades, indicate extremely poor state of female and child nutrition. According to the National Nutrition Survey (NNS) (1988), nearly 65 percent of the young children and 45 percent of pregnant and lactating women suffered from anaemia due to iron deficiency. Nearly 28 percent of pregnant and 46 percent of lactating women consumed less than 70 percent of recommended daily allowance (RDA) of calories. This proportion has not changed much in 1995 [National Health Survey (NHS) (1996)]. The NNS (1988) observed a high incidence of malnutrition among children under 5 years of age. About 52 percent of children were found to have low weight for age (underweight); 42 percent had low height for their age (stunted); and 11 percent had low weight for height (wasted). In recent years the proportion of children stunted declined to 36 percent, while the proportion of children wasted increased to 14 percent during 1990-94 [NHS (1996)]. NNS (1988) also observed low consumption of protein, calories and iron among children. Almost 10 to 20 percent

[1] $$\text{Z}-\text{score} = \frac{\text{observed value} - \text{median value of reference population}}{\text{standard deviation value of reference population}}$$

children of age under five years, received less than 70 percent of the RDA of protein, nearly 30 to 40 percent received less than 70 percent of the RDA for calories and 25 percent children of the age group 4 to 5 years received less than 70 percent of the RDA for iron.

Malik and Malik (1993) observe that malnutrition amongst pre-school children remained a serious problem in Pakistan. They estimated the prevalence of malnutrition by age groups using the data of Micro-nutrient Survey (1977), National Nutrition Survey (1985-87) and Pakistan Demographic and Health Survey (PDHS) (1990-91). They found lowest weight-for-age in the first six months after birth that increased thereafter and reaches at peak at around 24 to 35 months. They, however, observed an improvement in this indicator over time. The prevalence of chronic malnutrition measured in terms of height-for-age showed improvement for the children three years. However the incidence of severe malnutrition measured in terms of weight-for-height increased during 197-77 to 1988 and declined in 1990-91. Alderman and Garcia (1993) examined the incidence of malnutrition among pre-school children in the selected rural areas of Pakistan. They found a considerably high proportion of underweight children during 1986-89 in these areas. They found a positive and significant impact of mothers' education, per capita intake of calorie, protein and vitamin A, and breast feeding in reducing malnutrition among children. Using the data set of PDHS (1990-91), Ibrahim (1999) observed a high incidence of stunting (51.5 percent) and underweight (40 percent) among the children under five years of age. She observed a positive relation between age and stunting and age and underweight. However, the incidence of wasting was found highest in the age group 6 to 11 months and then showed a declining trend with reference to age.

Infant mortality rate is another indicator that reflects the health status. The Pakistan Integrated Household Survey (1997) observed that infant mortality rate in 1996-97 has increased to 83 per 1000 live births from 81 per thousand live births in 1995-96. This percentage is considerably high (112 per 1000 live births) in rural areas. Haq and Haq (1998) reports a high mortality rate among the children under the age of five years (136 per 1000 live births).

The nutritional status of pregnant women is not different than that of children in Pakistan. Nearly one-third of the pregnant women were malnourished. These mothers often give birth to malnourished babies. Low birth weight babies are up to 10 times more likely to die as infants and those who survive, continue to be malnourished and sick. Such children are at high risk of illness and death due to vicious cycle of infectious diseases and malnutrition. According to the Human Development Report (1999), there were 25 percent infants with low birth weights in Pakistan during 1990-97. The NNS (1988) reports that the maternal malnutrition affects 34 percent of pregnant women who are severely underweight and 48 percent of lactating women have a caloric intake of less than 70 percent of the recommended level. 30 percent of rural women and 19 percent of urban women are malnourished to an extent that they cannot work effectively. A high prevalence of anaemia among women between the ages 15-44 years is an important reason of low birth babies. Nearly 43 to 47 percent women in rural areas and 35 to 39 percent in areas are anaemic. According to WHO criteria, nearly nine million children less than 5 years old are anaemic in Pakistan. Almost 35 percent of urban boys up to 4 years of age and 82 percent of rural boys of 3 years of age are found anaemic by the NHS (1996). Over 8 percent of children in the second year of life are found severely anaemic by this survey. Causes of anaemia other than nutrient deficiency include malaria, intestinal parasites, and thalassemia. The immune system is adversely affected by the iron deficiency that raises morbidity from infectious diseases.

Iodine deficiency in women results in still births, birth defects, mental retardation, and child death in addition to generally reduced intelligence. Recent data indicates that over 70 percent of the Northern Area's people are iodine deficient and that deficiency in the country as a whole may be affecting about 40 million people. The Northern parts of Pakistan belong to the world's most severe endemic areas of iodine deficiency. The problem has been well documented by several surveys showing a goiter prevalence of 20.7 percent in school age children. Data is not available regarding stillbirths, miscarriages, and prenatal mortality. It is estimated that Pakistan's 10-15 million people are at risk of the Iodine Deficiency Disorder (IDD).

The NHS (1996) observed clear differences in the prevalence of malnutrition by socio-economic status. The incidence of underweight ranges between 16-41 percent and 37-

49 percent among urban and rural children respectively. This shows that in low and medium socio-economic groups a lack of effective purchasing power reduces food intake levels. In the case of higher income groups, lack of proper nutritional education may be the main culprit.

Various community factors, such as lack of access to safe drinking water and sanitation facilities, improper system for the disposal of solid waste, lack of awareness about health, nutrition and hygiene contribute significantly in determining the high incidence of malnutrition. According to Haq and Haq (1998), 45 percent of total population in Pakistan do not have access to health services, 40 percent are deprived of safe drinking water, 53 percent are living without sanitation facilities, and nearly 62 percent are illiterate. The use of contaminated water and exposure in polluted environment increases the risk to suffer from diseases spread by air and water pollution, such as, diarrhoea, dysentery, malaria, respiratory infections, influenza, and hepatitis. The NHS (1996) reports that cough and fever affects over one in five children under five years of age. Similarly, frequent occurrence of diarrheal diseases is very common in Pakistan. According to the same survey report approximately 20-30 percent children of this age group have an episode of diarrhoea during last two weeks. During a course of a year the average child may experience between 5 to 12 episodes of diarrhoea.

The high estimates of malnutrition reflect the prevailing weaning practices, especially among the children under the age of 12 months. For many children mother's milk provides the main source of nourishment during the first year of life. However at the age of 4 to 5 months, it should be supplemented by additional food rich in protein and other nutrients. The NHS (1996) found that food other than breast milk begun at approximately 7.6 months of age in Pakistan. This indicates that most of the mothers in Pakistan are not aware of children's proper diet according to their age. The lack of education among women is strongly associated with malnutrition among children. The NHS (1996) finds a high incidence of stunting (38 percent) among the households where no women is literate as compared to those who have at least one women matric or above (24 percent).

III. DATA

In order to examine the impact of structural adjustment policies on income distribution, poverty alleviation, and social welfare, the Pakistan Institute of Development Economics (PIDE), launched a project entitled "Micro Impact of Macro Adjustment Policies" funded by the International Development Research Center (IDRC), Canada. To achieve the gaols of this project, a household survey in the rural and urban areas of all provinces of Pakistan has been conducted during 1998-99. The universe of this household survey was named as "Pakistan Socio-Economic Survey (PSES) 1998-99" [for details see Arif *et al.* (1999)]. For this survey, a two stage stratified random sampling design was adopted so as to select a sample of 3564 households. FATA, FANA, and Military restricted areas were excluded from the universe. The urban/rural distribution of the sample was 1296 and 2268 households respectively. The demographic section of the questionnaire contains information on weight and height measurements of children under-five years of age. A team of trained interviewers, coordinated by supervisors, administered the questionnaire to the mothers of children aged under five years of age (actually taller than 49 cm and shorter than 105 cm). The WHO guidelines for nutritional assessment were used for the taking the anthropometric measurements. Children were weighed using a Salter spring scale. At the beginning of each day in the field, the accuracy of each Salter scale was checked by the team supervisor, using a standard 5 kilogram weight. Height and length were measured with a wooden height board. The interviewers were asked to measure the length for children who are shorter than 85 cm in the supine position. Height for children taller than 85 cm were measured with the child standing up.

Information on each child was asked from the mother including the incidence of a diarrhoeal attack during the last 24 hours at the time of interview. Diarrhoea was defined as having 3 or more loose stools per day. Some information on socio-economic factors was also collected. The information on the absolute amount of income was not solicited due to the problems linked with such type of information extraction from the previous surveys.

However, the data have some limitations relating to age misreporting of children and a probable inclusion of children with oedema as no detailed information was collected on oedema (swelling of the lower limbs), which may have influenced the estimation of Z-scores. The total number of 3256 children under five years of age were found in the

sample, however, due to the non reporting of month of birth, the data reduced to only 1614 children. The outliers in data were cleaned by following the methodology adopted by Malik and Malik (1993). All the observations where weight was less than 2 kilograms or greater than 26 kilogram were excluded from the sample. The rigorous cleaning procedure left 855 valid cases of children for the analysis The survey also may not include those children whose mother's died and therefore no information was gathered from surrogate mothers or other family care takers.

In this sample, 67.1 percent children belong to rural area and 32.9 percent from urban area. Because of appropriate representation of all provinces [53.2 percent Punjab, 21.4 percentSind, 21.7 percent NWFP and 3.8 percent Balochistan], this small sample is still nationally representative.

The Epi-Info Version 6. jointly produced by the WHO and the CDC which includes an integrated Epi-Nut sub-module with downward compatibility of data reading was used for data entry and storage and was used to calculate the Z-score values for the desired anthropometric measurements.

IV. RESULTS

The indicators of malnutrition or anthropometric measures described in section 1 are calculated by commonly used method of Z-scores with cutoff points of –2SD and -3SD. Anthropometric measurements are computed in terms of the percent median and the deviation from the standard population in terms of Z-scores. The Z-scores of the standard population are normally distributed around the zero mean and the unit standard deviation. If the Z-score is zero, it suggests that there is no difference between the standard population and the population under study (well nourished population). The percentage of children's population falling below –2 SD, or less than –2 Z-score from the median of the standard population indicates moderate stage of malnutrition from the reference population. If the Z-score is less than –3 SD, then there appears to be a sever degree of malnutrition in comparison to the well fed reference population. In the well fed population of children, it is expected that only 2.3 percent of children will fall below –2 SD, and less than one percent of children are expected to fall below –3 SD from the median of reference (standard) population. [see Dean *et al.* (1990)]. Children whose height for age measurements fall below –2 Z-scores are termed as stunted, and those who are –3 Z-score are considered to have

undergone a long term adverse situation of food intake possibly under unfavorable environmental conditions. The weight for height index below –2 SD suggests that a child has been wasted (thinness due to malnutrition) and those who fall below –3 SD are considered as severely wasted (severely malnourished). This index of wasting is usually indicative of a short-term effect of inadequate food intake, or may otherwise result from a debilitating disease, as a consequence of which malnutrition may develop. The scenario of malnutrition in Pakistan appears to be very serious as many children of both sexes suffer from this preventable health condition.

Mean and standard deviation of height and weight by age groups from four surveys are reported in Table 1. This table shows an improvement in mean weight and deterioration in mean height for all ages over time. This table shows an improvement in height after the age of 12 months.[2] A decline in mean weight of children under ages 6 months can be noted from this table. This not only implies the incidence of malnutrition among children of this age group but also indicates the prevalence of malnutrition in their mothers. All other age groups show an improvement in mean weight over time. This finding is strengthened by the results reported in Table 2.

Table 1

Mean and Standard Deviations of Height and Weight by Age Groups

	Weight (kgs)				Height (cms)			
Age Group	1976-77	1985-87	1990-91	1998-99	1976-77	1985-87	1990-91	1998-99
All	9.85	9.93	10.07	10.26	77.81	78.28	78.76	77.6
	(3.39)	(3.64)	(3.3)	(3.63)	(13.99)	(14.94)	(13.25)	(15.71)
0–5 mons.	5.09	4.87	5.21	5.13	56.65	56.82	58.3	53.89
	(1.68)	(1.83)	(1.66)	(1.4)	(7.27)	(8.54)	(7.24)	(6.19)
6–11 mons.	6.69	7.13	7.33	7.54	64.35	65.84	66.93	61.78
	(1.85)	(2.5)	(1.85)	(1.52)	(6.9)	(10.21)	(6.72)	(4.94)
12–23 mons.	8.13	8.7	8.81	9.35	69.93	72.44	73.12	74.19
	(2.06)	(2.63)	(1.87)	(1.53)	(7.26)	(9.78)	(6.48)	(6.88)
24–35 mons.	9.86	10.23	10.62	11.49	78.16	78.93	80.85	83.71
	(2.19)	(2.6)	(1.99)	(2.0)	(8.31)	(9.93)	(6.9)	(5.36)
36–47 mons.	11.41	11.68	12.19	12.56	85.28	85.69	87.34	89.53
	(2.23)	(2.7)	(2.23)	(2.43)	(8.49)	(10.29)	(7.95)	(5.79)
48–59 mons.	13.4	13.09	13.56	14.77	92.9	92.47	93.8	97.38
	(2.52)	(2.84)	(2.23)	(2.19)	(9.44)	(10.33)	(8.21)	(4.44)

Source: Malik and Malik (1993), PSES (1998-99).

Figures in parenthesis are standard deviations.

[2]It is observed that the height of nearly 30 percent of the children fall in age groups 0 to 6 months is less than 50 centimetres whereas height of all the children of age group 7 to 12 is less than the reference height of that age group.

Table 2

Trends in the Prevalence of Malnutrition

(%)

Data Year	Height-for-age (Stunted)	Weight-for-height (Wasted)	Weight-for-age (Underweight)
1976-77	42.9	8.6	–
1985-87	41.8	10.8	51.5
1990-91	50.2	9.2	40.4
1998-99	60.1	9.5	38.8

Source: Micro-nutrient Survey (1977).
National Nutrition Survey (1988).
Pakistan Demographic and Health Survey (1990-91).
PSES (1998-99).
– implies not available.

This table presents a comparison of the child current malnutrition prevalence with that in 1977. The indicator weight-for-height or wasting shows a fluctuating pattern. This has increased from 8.6 percent in 1976-77 to 10.8 percent in 1985-87 and has shown a decline during 1985-87 to 1990-91. This indicator increased in 1998-99 to 9.5 percent. Wasting is associated with failure to gain weight or loss of weight due to starvation and/or severe disease. In the absence of any food shortage, the prevalence of wasting is usually below 5 percent. A value of wasted children higher than 5 percent is alarming. The value of 9.5 percent implies that a considerable proportion of children is facing food shortage and due to unfavourable living conditions, they are on higher risk to disease exposure.

Stunting or height-for-age indicates chronic or long-term malnutrition. Table 2 shows a decline in the percentage of stunted children during 1980s. However, in 1990s, this indicator shows an increasing trend. It has increased to 50 percent in 1990-91 and then shows a steep rise to 60.1 percent in 1998-99. This indicator is associated with poor socioeconomic conditions and increased risk of frequent exposure to illness. The high incidence of malnutrition can partly be explained by the increasing trend of poverty in 1990s [see Jafri (1999) and Qureshi and Arif (1999)]. The increased level of food poverty coupled with unfavourable socioeconomic conditions and inappropriate feeding practices has resulted in an increase the incidence of chronic malnutrition.

Weight-for-age or underweight is another indicator of long-term malnutrition. This is primarily a composite of weight-for-height and height-for-age and fails to distinguish tall, thin children from short well-proportioned children. Therefore, nutritionists rely mostly on weight-for-height and height-for-age to examine short-term and long-term malnutrition. This table shows a slight decline in underweight children in 1990s.

The percentage of acute (–2SD) and severe (–3SD) malnourished children by age groups is presented in Table 3. This table shows that the incidence of acute malnutrition increased and that of severe malnutrition declined in Pakistan in 1998-99. According to this table, the percentage of moderately stunted children has increased to 60 percent in 1998-99 from 50 percent in 1990-91. Whereas the percentage of severely stunted children has slightly declined during this period (from 30 percent to 29 percent). This indicator is associated with long-term malnutrition that arises as a result of poor socio-economic living conditions and increased risk of frequent exposure to illness that in our case can partly be explained by the increasing trend of poverty in 1990s. Similar trend is found for the wasted children. However, a decline in both, acutely and severely underweight children has been noted during 1990-99.

Contrary to the findings of NNS (1988), Alderman and Garcia (1993) and NHS (1996), present study observes obvious gender differences as the incidence of malnutrition is found more pronounced in boys. Table 3 reveals that the incidence of malnutrition, both acute and severe, is higher in boys than that in girls. These results are, however, consistent with those of the PDHS (1990-91).

Looking across the anthropometric indicators, one can note from this table that the incidence of stunting is considerably high in 1998-99 at all age groups. The estimates of the PDHS (1990-91) indicate a positive association between age and the incidence of stunting whereas the PSES (1998-99) exhibits a reverse pattern. In this survey a lager number of stunted children has been found in the ages up to 23 months, both in boys and girls. Since then this incidence appears to be declining with age. Stunting is found more pronounced in boys in the first year of life and for girls in the second year of their life. The indicator weight-for-height reveals that the incidence of wasting is also slightly higher in PSES (1998-99) than that found in PDHS (1990-91). A notable decline in the wasted children in

Table 3

Prevalence of Malnutrition (–2SD and –3SD) among Children under 5 Years of Age in Pakistan: PSES (1998-99) and PDHS (1990-91)

	Height-for age				Weight-for-height				Weight-for-age			
	PSES			PDHS	PSES			PDHS	PSES			PDHS
	Male	Female	Both	Both	Male	Female	Both	Both	Male	Female	Both	Both
< 6 Month	82.5	56.8	70.1	16.5	17.5	8.1	13.0	8.0	48.2	22.6	35.8	13.8
	(45.0)	(40.5)	(42.9)	(6.1)	(5.0)	(0.0)	(2.6)	(0.8)	(26.8)	(17.0)	(22.0)	(4.3)
6–11 Months	87.8	65.4	79.1	29.8	2.44	3.8	3.0	11.4	40.6	28.9	35.8	34.4
	(48.8)	(23.1)	(38.8)	(14.6)	(0.0)	(0.0)	(0.0)	(2.1)	(15.6)	(4.4)	(11.0)	(13.7)
12–23 Months	69.1	68.5	68.9	52.2	13.5	4.2	9.5	10.8	48.1	32.5	41.4	42.9
	(42.5)	(45.0)	(43.7)	(30.3)	(2.1)	(1.4)	(1.8)	(3.3)	(7.7)	(1.3)	(4.9)	(13.0)
24–35 Months	57.5	46.1	52.2	56.7	11.6	2.0	11.8	9.6	47.1	44.9	46.1	45.8
	(23.0)	(19.7)	(21.5)	(35.7)	(0.0)	(2.7)	(1.2)	(1.1)	(2.3)	(2.6)	(2.4)	(19.4)
36–47 Months	58.2	56.5	57.5	61.0	5.7	16.1	10.0	9.1	42.4	40.3	41.6	45.9
	(28.6)	(25.8)	(27.5)	(39.2)	(1.1)	(0.0)	(0.7)	(2.4)	(12.0)	(2.9)	(12.3)	(14.9)
48–59 Months	53.1	36.7	45.2	62.8	12.5	1.7	7.3	6.1	37.5	16.7	27.4	46.9
	(9.4)	(3.3)	(6.5)	(39.3)	(0.0)	(0.0)	(0.0)	(0.3)	(4.7)	(0.0)	(2.4)	(12.4)
Total	64.9	53.9	60.1	50.2	10.6	8.1	9.5	9.2	44.3	32.0	38.8	40.4
	(31.2)	(31.1)	(28.9)	(30.2)	(1.2)	(0.9)	(1.1)	(1.8)	(10.5)	(5.9)	(8.4)	(13.7)

Source: PDHS (1990-91) and PSES (1998-99).
Note: Figures in parenthesis are the estimates of sever (–3SD) malnutrition.

the age group 6-11 months has been found in recent years. Table 3 shows that in 1998-99, the incidence of wasting was highest for boys in the age group 12-23 months and for girls in the age group 36-47 months. According to this table, the proportion of underweight children, expressed in terms of weight-for-age, declined in recent years. However, looking at age groups, the percentage of underweight children up to the ages 35 months are found slightly higher than that observed in the PDHS (1990-91). After this age a considerable decline has been noted.

The results show that the incidence of acute malnutrition in terms of stunted and wasted children is high in PSES (1998-99) as compared to the PDHS (1990-91) whereas the proportion of severely malnourished children declined significantly in the 1998-99, especially in terms of wasted and underweight children. Like acute malnutrition, the incidence of severe malnutrition reveals almost the similar pattern that boys are more malnourished than girls. The incidence of long-term severe malnutrition is found highest in the age group 36-47 months for both sexes. The data of 1998-99 indicates that nearly half of the male children of the age group 6-11 months are stunted. In this age infants generally start getting food supplements. In our sample, food supplements had been started to the majority of children up to these ages. In this scenario, the high incidence of stunting needs further investigation by looking at the types of food items given to the children before, during and after stopping breast feeding.

Severe wasting was observed highest for boys in the ages less than 6 months and girls had disadvantage in the age group of 12-23 months. However, overall picture shows that the number of severely wasted children has declined over time. Severely underweight children, both boys and girls, fall in the early age group *i.e.,* less than one year.

These results show that the incidence of acute and severe malnutrition is more pronounced in the ages less than one year or 2-3 years. In these ages, in addition to the proper diet, a child needs additional care and attention, especially of mothers. Whereas in Pakistan, due to shorter birth intervals, mothers usually get busy with the new-born that results in the neglect in the care of children who are already there.

Breast Feeding and Nutritional Intake

Breast milk is the ideal food for infants. It provides the main source of nourishment in the first year of child's life. Under normal conditions, no other food is

required by the baby until 4-5 months after birth. However, after 4-5 months, mother's milk should be supplemented by additional food rich in protein and other nutrients. The PSES (1998-99) provides information on breast feeding practices and also on the ages when fresh/powder milk and solid/semi-solid foods were started to the children. In this sub-section we briefly examine the breast feeding and food supplementation practices in Pakistan.

Previous surveys show that breast feeding is common in Pakistan. According to Pakistan Fertility Survey (1975) nearly 95 percent children were breastfed. This percentage has been observed 98 percent in Pakistan Contraceptive Prevalence Survey (1984-85) and 94 percent in PDHS (1990-91). The figure of PSES (1998-99) is found very close to these finding, i.e., 96 percent. No significant differences in the patterns of beast feeding and place of residence, sex of child and mother's education has been observed in this survey. At the time of survey, 33 percent children were partially breastfed, 16 percent were exclusively and 49 percent were not on breast feeding. This survey observes that nearly 6 percent children were stopped breast feeding by the age of six months; 10 percent by the age of 12 months; 18 percent by the age of 18 months and 43 percent by the age of 24 months. Most common reason for stopping breast feeding after one year were either pregnancy or child had reached the age of weaning. However for the age less than one year, mother's or child illness or child's refusal were found as common reasons. Mean duration of breast feeding was observed 19 months.

In addition to breast feeding practices, this survey also provides information on the ages when fresh milk and solid/semi-solid foods were started to the children. A majority of children (13 percent) started taking fresh milk at the age of six months and 25 percent children were started solid/semi-solid food at the age of 4 months.

Despite the fact that a majority of children is breastfed and a larger number of children start receiving food supplements at the ages of 4-6 months, the incidence of malnutrition is substantially high in Pakistan. This requires to further probe into the problem by examining the intake of various food items that are generally given to the children immediately after birth and at early ages, such as, plain water, water with sugar/honey, ghutti, juice, herbal tea, mushy food, etc. Similarly information on current breast feeding and food supplementation would help in examining the nutritional status of

children. It is observed that in order to supplement mother's milk, after the age of six months, mothers usually start giving fresh milk diluted with the equal amount of water. In this situation not only polluted water can spread infection among children but also the use of unsterlised bottles increases the risk of the intake of unhygienic liquids. Therefore there is a need for examine the role of bottle feeding in Pakistan. In addition, weaning practices also play an important role in determining the nutritional status of children. Due to the lack of data on different food items, initiation of breast feeding, bottle feeding and weaning practices, the effects of these variables on children's nutritional status remain unexplored in the present study.

Determinants of Nutritional Status in Pakistan

The results of the previous section indicate a high incidence of both long-term and short-term malnutrition in the children under 5 years of age. This implies poor living conditions, lesser intake of nourishing diet, and high exposure to disease for a larger number of children in Pakistan. The living conditions and food intake depend on various socio-economic demographic, and environmental factors. In this section we will examine the effect of these factors on the growth pattern of children under 5 years of age. In this regard logistic regression models are used to observe the probability of being nutritional status. The dependent variable in these models ranges from moderate to severe malnutrition.[3] Seven explanatory variables are entered in these models. Means, standard deviations and definitions of these variables are reported in Table 4. This table shows that a majority of mothers in our sample is illiterate. Nearly 96 percent children are breastfed. To examine the effect of socioeconomic status and community modernisation, the presence of electricity connection in house is used. In our sample, almost 81 percent houses had electricity connection.

The results of the logistic regression (odds ratios) of three models, namely HAZ, WHZ, and WAZ are presented in Table 5. The results confirm the *a priori* expectation about the positive association between mother's literacy and child's nutritional status in all three models. This indicates that the children of literate mothers are less likely to be malnourished as compared to the children of illiterate mothers. The incidence of malnutrition was found lower in the households that have electricity connections. This

[3]The dependent variable is one if Z-score ranges between –2 to –6 and zero otherwise.

Table 4

Means and Standard Deviations of Important Variables

Variable	Mean	Standard Deviation	Variable Definition
Age	26.56	16.61	Age of child in months
Mother's Education	0.30	0.45	Dichotomous variable for mother's education (1=literate, 0=illiterate)
Breast-fed	0.16	0.37	Dichotomous variable for breast-feeding (1=yes, 0=no)
Per Capita Calories	1998.71	616.85	Household per capita calorie intake
Electricity	0.81	0.39	Dichotomous variable for the presence of electricity in house (1=yes, 2=no)
Sex	0.56	0.50	Dichotomous variable (1=male, 0=female)
Urban	0.33	0.46	Dichotomous variable (1=urban, 0=rural)
HAZ	–2.51	1.92	Z-score for height-for-age
WHZ	0.487	2.69	Z-score for weight-for-height
WAZ	–1.48	1.38	Z-score for weight-for-age

Table 5

Logistic Regression Effects of Predictors (Odds Ratios) on being Malnourished: PSES (1998-99)

Variable	HAZ	WHZ	WAZ
Age	0.982*	1.005	0.996
Literacy	0.730*	0.746*	0.832**
Calories Per Capita	1.000	0.999*	0.999*
Breasting Feeding	1.291	0.136*	0.092*
Electricity	0.754**	0.711*	0.777**
Sex	2.248*	1.815*	2.148*
Urban	1.048	1.332**	0.855

Note: *Shows significant at 5 percent level of significance.
**Shows significant at 10 percent level of significance.

variable indicates not only the socioeconomic status of the household but also points out the extent of modernization of the place of residence. Breast feeding appeared as the most important determinant of child's nutritional status in WHZ and WAZ models. However, in the HAZ model, which reflects the long-term effect of malnutrition, the sign of the variable of breast feeding has become reverse and turned out insignificant. This indicates that the children who were protected against malnutrition due to breast-feeding were probably not supplemented with the sufficient protein intake that is actually required for their growth after their weaning age.

The role of per capita calorie intake was not found significant in defining long-term malnutrition. This might be due to the fact that the availability of food at household level is necessary but not sufficient condition to improve the nutritional status. "It is possible to be malnourished in a food-secure household as a result of disease, inadequate care, or inequitable allocation of food. A household may be food secure in terms of calories, but dietary quality determines the likelihood of micronutrient deficiencies in individuals" [Alderman and Garcia (1993), page 50]. This implies that in order to reduce the long-term and chronic malnutrition, the intake of nourishing diet is more important. This necessitates the examination of the effect of other nutrients on nutritional status by looking at the intake of different food items, especially those given to the child in early ages. The PSES (1998-99) does not contain these information and therefore this paper is lacking in exploring the effect of dietary quality on nutritional status of children under 5 years of age. The estimated odds ratio of the variable sex reveals that the incidence of malnutrition among boys is almost two times higher than that in girls in all three models. This does not necessarily reflect any behavioural aspect against male children but confirms the fact that girls are biologically stronger than boys in early ages. The rural urban differences have been observed only in short-term malnutrition. In this model, children residing in urban areas apparently faced malnutrition 33 percent higher than the children in rural areas. A positive and significant coefficient of age in HAZ confirms the findings of Table 4 that the incidence of stunting is declining with age.

CONCLUSIONS

This paper finds a deteriorated situation of nutrition among the children under-five years of age in 1998-99. The prevalence of acute malnutrition in terms of stunted and wasted showed an increasing trend. However the proportion of severely malnourished children declined significantly in recent years. In this paper, boys are found more malnourished as compared to girls. A high incidence of malnutrition among male children dispels the notion of any behavioural gender bias in feeding practices of children in Pakistan.

This paper also examines the effect of various socioeconomic factors on the growth pattern of children under five years of age. Mother's education and the proxy for

modernisation effect appeared to be consistent with the *a priori* expectation about their negative impact on malnutrition. This paper highlights the importance of breast feeding in reducing short-term malnutrition. However, the initial effect of breast feeding disappears over time if the children, who initially protected against malnutrition through breast feeding, do not receive adequate nutritional food intakes after their weaning age. Therefore, the high incidence of stunting requires to further probe into the problem by examining the intake of various food items that are generally given to the children at early ages, such as, plain water, water with sugar/honey, ghutti, juice, herbal tea, mushy food, etc. Similarly information on current breast feeding and food supplementation would help in examining the nutritional status of children. Due to the lack of data, the effects of these variables on children's nutritional status remain unexplored in the present study.

The results of this paper show that 38.8 percent children are underweight, 60.1 percent stunted and 9.5 percent are wasted. This indicates that a substantial proportion of children is living in poor socio-economic conditions at high risk to disease exposure. A sustainable nutrition security requires sustainable household food security, improved and equitable provision of health services in terms of health facilities and health manpower, and awareness about the community health. Reduction in poverty, more equitable distribution of income, and stabilisation in prices are the prerequisites of sustainable food security. And sustainable food security only ensures nutritional security if the individual is free from disease and is able to utilise the food nutrients. In addition, the availability of clean potable water plays a significant role in determining the nutritional security, especially in a country like Pakistan, where a larger number of school going children is loaded with worms and parasites.

This paper suggests the implementation of appropriate measures not only to increase food supply but also to maintain a desirable level of household income and reducing poverty through well-targeted programmes. In addition, there is a need to create awareness about hygiene through community health programmes.

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