ORIGINAL RESEARCH

Nutritional status comparison of rural with urban school children in Faisalabad District, Pakistan

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A B S T R A C T

Introduction: Health and nutrition problems are the result of unsatisfactory food intake or severe and repeated infections, or a combination of both, and are closely linked to inadequate health services and an unhealthy environment. In Pakistan, there is a significant difference in the economic status, life style and nutrition between urban and rural populations, and between male and female children. Such differences affect the health and nutritional status of children. This study was undertaken in order to assess the nutritional and growth status of male and female school-going children aged 6-12 years from rural and urban areas in Pakistan.

Methods: Data were collected from male and female school-going children aged 6-12 years in and around Faisalabad, Pakistan. A total of 2042 children (853 male, 1189 female) were studied for being underweight, and for stunting and wasting. Of the males, 42.3% were from urban and 57.7% were from rural areas. Of the females, 72.7% were from urban and 27.3% were from rural areas.

Results: A total of 36.1% children were stunted and 45.3% were underweight; 25.2% were below standard weight for height. Among the urban children, 33% were below the standard for height (stunted), and 32.3% were below the standard for weight (underweight); 32.7% were wasted. Of the rural children, 40.9% were stunted, 64.7% were underweight and 33.3% were wasted. The rural female group was the most affected and malnourished with 61.8% stunted and 84% underweight; 67.1% were wasted.

Conclusion: It is suggested that a comprehensive strategy be implemented in developing countries, especially Pakistan, in order to prevent infant and child under-nourishment. In addition to poverty alleviation, the underlying causes that work against food security, food safety, womens' education, safe water supply, sanitation and adequate health care must be addressed.

Key words: Faisalabad, nutrition, Pakistan, rural, school children, urban.

Introduction

Health and nutrition problems are the result of unsatisfactory food intake or severe and repeated infections, or a combination of both. These conditions are closely linked to inadequate access to food, neglected care for mothers and children, insufficient health services and an unhealthy environment[1]. These parameters are reflected in the standard of living of a population, and whether its basic needs are met, for example with adequate food and healthcare. Disturbances in health and nutrition, regardless of etiology, invariably affect the health of mothers and child growth. Low birthweight babies are prone to frequent infections, leading to undernourished children with a reduced mental capacity. The child who has inadequate food, health and healthcare grows into a stunted adolescent who has a reduced mental capacity[2].

The nutritional status of a population can be determined in various ways. Useful parameters include calorie consumption over a given period; intake of protein and other nutrients; neonatal and postnatal mortality; infant mortality; birthweights; and child growth rates[3]. Growth assessment is the best single measure to define the health and nutritional status of children. There is a definite relationship between children's age, weight and height[4]; any deviation from the established relationship reflects negligence in the upbringing of the child. The worst crime among many human faults and errors is abandoning a child, thereby neglecting the foundation of a life. Many needs can wait but a child cannot, because his bones are being formed, his blood is being made and his senses are being developed. A child needs to be attended to and tended.

Approximately 38 million children are born in south Asia and one in eight fails to survive to the age of 5 years. Approximately 3 million of these child deaths are directly or indirectly associated with malnutrition[5]. These babies are born with impaired growth due to poor nutrition during foetal life. Low birthweight is a retrospective marker of the mother's nutritional and health status while it is also a prospective marker of the child's growth and development. In Pakistan, approximately 25-34% infants are of low birthweight, while 40-49% children under the age of 5 years are underweight[5]. By any standard this is a major human-development problem with profound short- and long-term consequences for individuals, households, communities and the nation. The children suffer from energy malnutrition and often grow up malnourished, stunted or wasted.

In Pakistan, there is a significant difference between urban and rural populations in terms of economic status, lifestyle and nutrition. There is a similar difference between male and female children. Such differences affect the health and nutritional status of affected children. Data on the growth of school-age children that are generated in a consistent manner across countries and over time are difficult to find[2]. The present study was, therefore, undertaken in order to assess the nutritional and growth status of male and female school-going children aged 6-12 years in rural and urban areas in Faisalabad District, Pakistan.

Methods

Sample collection

Of Pakistan's 140.5 million population, 67.5% live in rural areas and 32.5% are urban dwellers[6]. The population is highly diverse in terms of socioeconomic status and living conditions. There is widespread disparity in socioeconomic status throughout the country.

The present study focused on a population that represented socioeconomic poor and middleclass. The study was restricted to the industrial city of Faisalabad, the third largest city in Pakistan, and adjoining rural areas. Data were collected from primary schools during the academic year 2000-2001. Schools within the municipal limits (possessing urban amenities) were regarded as urban and those outside municipal limits as rural.

The selection of schools was made arbitrarily, and data were collected from schools that responded positively to the invitation to participate in the study. Hence, the proportion of male : female, and rural : urban children was not representative of either the District of Faisalabad or the country.

Parameters studied

The recorded parameters were age, height and weight. Age was recorded from the school records; weight was determined using bathroom scales; and height was measured using a measuring tape fixed to a wall. The data were used to calculate:

- Height for age: Low height for age (stunting) demonstrates performance in terms of linear growth and is an indicator of having failed to grow. It results from suboptimal health and/or nutritional conditions and is associated with inappropriate feeding habits or repeated exposure to infection.

- Weight for height: Low weight for height (wasting/thinness) reflects reduced body mass relative to chronological age. In most cases it indicates weight loss associated with starvation and/or severe disease.

- Weight for age: Low weight for age (underweight) represents a convenient synthesis of both linear growth and body proportion.

Regional (urban and rural) prevalence of each index was estimated. The number of underweight, stunted and wasted children were obtained by applying available standards[7]. The data were arranged according to Jelliffe's classification for determination of malnutrition. In this classification, the children whose weight was 90% of the standard weight for their age were considered normal. Those whose weight or height was greater than 10% were regarded as above standard and those below 10% were regarded as stunted, wasted and underweight, respectively. To test the significance of association between independent and dependent variables, Chi-squared (χ^2) test was used. The calculation was made using the formula:

$$\chi^2 = \Sigma \cdot \frac{(O-E)^2}{E}$$

Where:
O = observed frequency
E = expected frequency
Σ = Sum of observations.

Data were analyzed using Statistical Package for Social Scientists (SPSS Inc, Chicago, IL, USA; 1999).

Results

A total of 2042 subjects were studied in and around Faisalabad city. There were 853 males (41.8%) and 1189 females (58.2%). The number of urban subjects was 1225 (60%) and rural 817 (40%). The distribution of male and female children between urban and rural locations is shown (Table 1).

The overall nutritional status of the children studied is reflected in Table 2. The percentage of children whose characteristics fell within the prescribed norms varied between 46.2% and 58.3%, except for underweight among rural children (28%). Those above normal parameters varied from 7.2% (stunting and wasting) to 12% (height for age); however, the percentage of stunted children was high (36.1% overall, 33% urban, 40.9% rural). Wasting among children was high (32.9% overall, 32.7% urban, 33.3% rural); the percentage of underweight children was high (45.3% overall, 32.3% urban, 64.7% rural). The differences between categories were highly significant.

Table 1: Distribution of male and female children between urban and rural locations in Faisalabad District, Pakistan

Urban (n = 1225)		Rural (n = 817)	
Male n (%)	Female n (%)	Male n (%)	Female n (%)
361 (29.5)	864 (70.5)	492 (60.1)	325 (39.9)

Table 2: Comparison of urban and rural school-going children in Faisalabad District, Pakistan

Parameter	Location	Normal n (%)	Above n (%)	Below n (%)	Total n (%)
Height for age	Overall	1098 (53.8)	206 (10.1)	738 (36.1)	2042 (100)
	Urban	674 (55.0)	147 (12.0)	404 (33.0)	1225 (100)
	Rural	424 (51.9)	56 (7.2)	334 (40.9)	817 (100)
Weight for age	Overall	943 (46.2)	174 (8.5)	925 (45.3)	2042 (100)
	Urban	714 (58.3)	115 (9.4)	396 (32.3)	1225 (100)
	Rural	229 (28.0)	59 (7.2)	529 (64.7)	817 (100)
Weight for height	Overall	1162 (56.9)	208 (10.2)	672 (32.9)	2042 (100)
	Urban	692 (56.5)	133 (10.9)	400 (32.7)	1225 (100)
	Rural	470 (57.5)	75 (9.2)	272 (33.3)	817 (100)

χ^2 for height-for-age = 9.811 ($p<0.01$); χ^2 for weight-for-age = 228.072 ($p <0.01$); χ^2 for weight-for-height = 65.608 ($p<0.01$).

Table 3: Comparison of urban male and female school-going children in Faisalabad city, Pakistan

Parameter	Sex	Normal n (%)	Above n (%)	Below n (%)	Total n (%)
Height for age	Overall	674 (55.0)	147 (12.0)	404 (33.0)	1225 (100)
	Male	199 (55.1)	43 (11.9)	119 (33.0)	361 (100)
	Female	475 (55.0)	104 (12.0)	285 (33.0)	864 (100)
Weight for age	Overall	714 (58.3)	115 (9.4)	396 (32.3)	1225 (100)
	Male	213 (59.0)	29 (8.0)	119 (33.0)	361 (100)
	Female	501 (58.0)	86 (10.0)	277 (32.1)	864 (100)
Weight for height	Overall	692 (56.5)	133 (10.9)	400 (32.7)	1225 (100)
	Male	217 (60.1)	29 (8.0)	115 (31.9)	361 (100)
	Female	475 (55.0)	104 (12.0)	285 (33.0)	864 (100)

χ^2 for height-for-age = 0.004 ($p<0.05$); χ^2 for weight-for-age = 1.110 ($p <0.05$); χ^2 for weight-for-height = 5.047 ($p <0.05$).

Table 4: Comparison of male and female rural school-going children in Faisalabad District, Pakistan

Parameter	Sex	Normal n (%)	Above n (%)	Below n (%)	Total n (%)
Height for age	Overall	424 (51.9)	59 (7.2)	334 (40.9)	817 (100)
	Male	300 (61.0)	59 (12.0)	133 (27.0)	492 (100)
	Female	124 (38.2)	0 (0.00)	201 (61.8)	325 (100)
Weight for age	Overall	229 (28.0)	59 (7.2)	529 (64.7)	817 (100)
	Male	177 (36.0)	59 (12.0)	256 (52.0)	492 (100)
	Female	52 (16.0)	0 (0.00)	273 (84.0)	325 (100)
Weight for height	Overall	470 (57.5)	75 (9.2)	272 (33.3)	817 (100)
	Male	389 (79.1)	49 (10.0)	54 (11.0)	492 (100)
	Female	81 (24.9)	26 (8.0)	218 (67.1)	325 (100)

χ^2 for height-for-age = 116.638 ($p<0.01$); χ^2 for weight-for-age = 97.725 ($p<0.01$); χ^2 for weight-for-height = 285.57 ($p<0.01$).

The nutritional status of urban school-going children is shown (Table 3). Overall, more than 55% of urban school children were normal for age, weight and height. Except for stunting in females (33%), the normal subjects varied from 55% to 60%. This clearly reflects better nutrition among the urban children. Only a small proportion of the children was above standard height for age (12%), weight-for-age (8% male, 10% female) and weight for height (8% male, 12% female). Approximately 33% were below standard for the three parameters. The differences among urban children are significant.

The situation of the rural school children is different. The data presented in Table 4 reveal that the number of normal rural subjects was lower than the number of normal subjects in the urban group, except for stunting (61% normal males) and weight for age (36% normal males). The percentage of children below the baseline was high. A total of 61.8% females were found to be stunted, as were 27% males; 84% females were categorised as wasted as were 52% males. Regarding weight for height, 67.1% females were below the standard, as were 11% males. The differences in the three parameters studied are highly significant.

Discussion

The nutritional status of any community is dependent on numerous factors, among them food security, food safety, social status, gender discrimination, women's education, housing, healthcare, supply of portable water and sanitation. Pakistan is a developing country where 25-34% babies have a low birthweight, and 50-59% children under 5 years are underweight[5]. Weight at birth is a strong predictor for size in later life because most intra-uterine growth retarded infants do not 'catch up' to normal size during childhood. In Asian countries, including Pakistan, the incidence of low birthweight predicts the prevalence of underweight during preschool and subsequent years[8]. Childhood and adolescent stunting adversely affects the health of adults, and this is so for child-bearing women[9].

In Pakistan, the causes of growth retardation are deep-rooted in poverty, the lack of women's education and other manifestations of sex discrimination. These conditions not only perpetuate the vicious cycle of poverty, but also lead to an enormous waste of human potential. The schools from which data were collected varied between those where the poor and middleclass seek admission for their children. The difference between rural and urban children was significant.

Urban children now spend time at sedentary in-door activities such as watching television or playing computer games. However, rural children perform more physical activity with less food available and, as a consequence, tend to be underweight.

The physical growth of school children aged 6-9 years depends on environmental and genetic factors and their interaction. Among population groups who have experienced constraints on economic and social development, most of the factors that affect the physical growth of school children are related to the influence of environmental factors before puberty, including poor food consumption patterns, illness, lack of sanitation, poor health and poor hygiene practices[10]. In the present study, female children in rural areas were found to be grossly stunted (61.8%), wasted (84%) and underweight (67.1%). Differences in the treatment of boys and girls is often evident in healthcare and nutritional status. One in six female deaths is caused by gender discrimination and gross neglect. A strong preference for sons leads to the neglect of female children and their mothers. Female feticide is a growing practice on the Indo-Pakistani subcontinent. If the present trend continues, a significant demographic imbalance could result. At the time of the study, the male : female ratio in Pakistan was 10 : 6, and higher in urban areas, due to male-dominated migration from rural areas as men seek employment [6].

Girls are subject to neglect by their families. Studies of life in Pakistani villages show that male children are fed higher quality food than female children[11]. Even in families where there is adequate food, girls are served a smaller amount. Mothers and girls eat last, so when an inadequate amount of food is available, the female family members may not eat at all. Another reason for undernourishment in illiterate and poor families is to delay girls' physical development so that parents have an increased amount of time to find a groom and accumulate the resources for a dowry. Besides girls having a lower allocation of food than boys, families spend less on girls' healthcare. Parents see boys as their old-age insurance and thus feed them well and protect them from illnesses. Hospital records show that more boys than girls are brought in for treatment, while girls are usually admitted only when an illness has become critical. Adolescent girls have fewer opportunities for recreation, healthy physical exercise or even exposure to fresh air.

Conclusion

The results of the present study reveal that the higher proportion of stunted, underweight and wasted children are female. Such a situation is undesirable because these girls grow up to be undernourished mothers. This predisposes the fetus to adverse consequences during pregnancy, which may result in a low-birthweight baby, and so the cycle of stunted child, stunted adolescent, undernourished mother and low birthweight baby is repeated.

Recommendations

Considering the results of this and other studies, it is suggested that a comprehensive strategy should be implemented in all developing countries, and Pakistan specifically, in order to prevent infant and child undernourishment. The Government of Pakistan has recognized that an increase in poverty during the 1990s requires urgent attention[12]. In addition to poverty alleviation, action must be addressed to the underlying factors of food security, food safety, women's education, safe water supply, sanitation and adequate healthcare.

The first step in such a strategy should be a comprehensive school feeding program to help alleviate undernutrition among the children of poor communities. This may also encourage parents to send their children to school, resulting in an increased literacy rate.

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