Research Article

Association of Dietary Intake with Nutritional Status of School-Going Children (5-10 years) in District Charsadda

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Abstract | This cross sectional study had two objectives: 1) to evaluate the nutritional status and nutrients intake of the study subject, and 2) to find out the association of nutrients intake with nutritional status. This Study was conducted in Bahlola, a rural Union Council of District Charsadda KPK. The study included 235 school-going children of both sex aged 5-10 years. A Pre-tested questionnaire was used for collection of data for the parameters: socio-demographics, anthropometrics, and dietary intake. Data on anthropometrics included measurement of weight, height and BMI. Age and anthropometrics (weight, height and BMI) were used for z-score calculation following WHO standards and using WHO AnthroPlus software. Dietary data were collected in a 24-HR Dietary Recall Questionnaire. Data were analyzed in SPSS (Version 20) and was reported in means (SD). Pearson correlation analyses were performed to establish relation between anthropometrics and nutrients intake. A p-vale<0.05 was considered as significant. Children of the current study belonged to low-middle socioeconomic class. Prevalence of malnutrition as indicated by any of the three indicators was: underweight 16.8%; stunting 27.7%; thinness 9.8 %. Correlation between age and protein and energy intake, and weight and energy and protein, showed that protein energy intake increased with increasing age and weight. Overall, both stunting and underweight were more common in girls than boys. Girls in general, had poor nutrient intake compared to boys, girls were therefore more likely to suffer from under-nutrition compared to boys.

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1. Introduction

School-going age is the active growing stage of individual's life span (UNICEF, 2003). This stage of life is vital for physical growth and mental development. Balanced diet, both in terms of dietary diversity, amount and all essential nutrients intake is one of the important determinants of malnutrition in this age group (Ergin *et al.*, 2007) While there may be differences in the prevalence and magnitude of malnutrition, children of school going age are considered a risk group for under-nutrition (Odunayo

and Oyewole, 2006). Globally under nutrition is the single larger responsible cause for more than one-third of children deaths (Black *et al*.,2008) and worldwide it is the largest reason for 11 % of the diseases. It is major common problem among low and lower-middle income countries (UNICEF, 2007).

Globally malnutrition in childhood is one of the major health problem which affecting both an individual and community level health status; In particular, childhood malnutrition has serious implications for health which causes serious nutritional problems in later stage of life. Studies have proved that in developing countries malnutrition affecting large number of children (Ergin *et al*., 2007). Under nutrition is the single larger responsible cause for more than one-third of children deaths (4), and worldwide it is the largest reason for 11 % of the diseases. As per UNICEF report, under-nutrition contributes to the deaths of about 5.6 million children under five in the developing world each year (UNICEF, 2006). Nutritional status of children does not only reflect the socioeconomic status and social wellbeing of the family and community, but also reflects the academic out comes and cognitive and mental level efficiency of the health care system, and the influence of the surrounding environment as well as dietary intakes and habits. Research studies has previously indicated that under nutrition status, anemia and poor health in school age children are major causes of low intake of nutrients, high level of absenteeism, high dropout and academic performance below average of school going children (Bobonis *et al*., 2006).

Stunting, wasting, thinness, and underweight are the various forms of malnutrition in school-going children. Thinness refers to wasting which indicates acute malnutrition, and stunting, which results from long term nutritional deprivation (Black *et al*., 2008), are the major childhood nutritional concerns of Pakistan (Black *et al*., 2008). Malnutrition in school-going age children is a major common problem among low and under developed countries (UNICEF, 2007). Globally more than 200 million school-going age children will be stunted and underweight: while one billion of these children will be growing up with impaired physical and mental development by 2020 Trends in Child Mortality HIV/AIDS (UNICEF, 2007).

Pakistan is a developing country where malnutrition is widely spread among all ages, especially at the highest level in school age, according to the National Nutrition Survey (Bhutta *et al*., 2011) about 34% of all children are underweight, nearly 44% are stunted, 15% are wasted and about one-third of these children are anemic. These are alarming figures when compared with international figures of malnutrition prevalence. Pakistan is a country of diverse sets of populations. There are substantial diversity in overall dietary patterns and nutritional behaviors. This fact may compromise the general applicability of national findings on nutritional status on local situation a fact also supported by many scholars, particularly, after the eighteenth amendments and the National Finance Award, 2010 (Zaidi *et al*., 2013). Given the volatile nature of nutritional behavior, life-style changes, and other contributing factors, we hypothesize that there might be possibly significant changes in the prevalence of malnutrition in school-going age children in a rural settings of Khyber Pakhtunkhwa (KPK). Thus, we design the study to trace malnutrition and assess intake practices in school going children in a rural Union Council of District Charsadda of KPK. The main purpose was to see whether and how much, if any, the prevalence rate of malnutrition in a rural setting deviates from that of the national findings. Therefore, this study was conducted to evaluate the nutritional status and Nutrients intake of the study subjects. Another objective of the study was to investigate the association of nutrients intake with nutritional status of the study subjects. The study is very important from the view point of looking at the local data of malnutrition instead of the national data for more robustness and better corrective measures.

2. Materials and Methods

The present cross-sectional study was carried out at District Charsadda Union Council Behlola in selected primary level Government and Private Schools for both genders (boys and girls). Union Council (UC) Behlola of District Charsadda comprises of total of20 villages. At the time of the study, the total population of the UC was 27000 according to the National Census Report, 2017. The total number of children 5-10 years of age at this area was about 12000. The study included 235 students, the study sample consist of 52.1% boys and 47.9% of girls.

Data of the study subject was collected for socio-demographic status, anthropometric and 24 hours dietary intake through asking question using WHO

standard anthropometric tools. This information was recorded in pre-tested questionnaire. Data of socio-demographics, age and sex of the students, family size, and income level including nutrients intake was collected. Data regarding Parent's socio-economic status and educational background was also recorded through self-developed questionnaire. Data regarding Height, weight and age were recorded by using WHO established protocols. Weight was measured using Uni-scale to the nearest of 0.1 Kg following WHO criteria for measuring weight. Height was measured to the nearest 0.1 cm with a wooden stadiometer, following WHO protocol for measuring height. Dates of Birth of the children were collected from School Attendance Withdrawal Register with the support of concern schools Head teacher. Data regarding Weight, Height and age was analyzed by WHO Anthro-Plus software. Dietary recall questionnaire was used to collect data of 24 hours nutrients intake. A briefed interview was held with the study subject regarding 24 hours intake with, teachers were involved to collect accurate information. The collected information was monitor during collection and was analyzed and updated where required.

All data were analyzed using SPSS software (version-20). Descriptive method of statistic applied for categorically variables, for continues variables t-test was used. Chi- square test was performed for the correlations and association of different variables. Anthropometric data was statistically analyzed by using WHO Anthro Plus and Nutrient intake calculator, respectively. Anthropometric. Data of the study subjects was analyzed by converting anthropometric data into anthropometric indices (Weight for age Z score, Height for age Z score and weight for age BMI Z score) by using WHO Anthro Plus software. Data regarding Socio economic, age, gender, family size and family education status were also analyzed by IBMSPSS- statistical package (version-20)

3. Results and Discussion

A total of 235 school going children were selected for this study. Table 1 shows situation of current socio demographic of the study subjects. The mean age of boys was 8.01±1.08 and girls were 7.9±1.53. Majority of their parents (particularly mothers) were illiterate. Relatively a small number (23%) of fathers of children were illiterate. A high number of the mothers of children (89.4%) were housewife. More than half of the children (52.3%) belonged to large family size (≥ 6 persons). Most of the sample comprised of children of 7 years of age (33.1%), followed by 8 years (22.5%) and 10 years (21.1%) of age.

Table 1: Socio-demographic characteristics of the subjects.

Characteristics	N(%age)
N (%)	
Boys	123 (52.1)
Girls	112 (47.9)
Age (yrs.)	
Boys	8.01 (1.08)
Girls	7.9 1.53)
Father's education	
Illiterate	54 (23.0%)
Secondary	58 (24.7%)
Higher Secondary	29 (12.3%)
Graduate	94 (40.0%)
Mothers education	
Illiterate	102 (43.4%)
Secondary	56 (23.8%)
Higher Secondary	44 (18.7%)
Graduate	33 (14.0%)
Profession of father	
Govt. Servant	92 (39.1%)
Business	49 (20.9%)
Farmer	76 (32.3%)
Labor	18 (7.7%)
Profession of mother	
House Wife	210 (89.4%)
Working Lady	25 (10.6%)
Income level	
<25000/month (Low Income)	93 (39.6%)
25000-50000/month (Middle)	108 (46.0%)
>50000 (High)	34 (14.5%)
Family size	
1-6 persons (Small)	112 (47.7%)
> 6 persons (Large)	123 (52.3%)
Family type	
Nuclear	117 (49.8%)
Joint	118 (50.2%)

Table 2 shows mean (SD) weight and height of children according to age and sex. In each age category, boys were taller and heavier than girls.

Table 2: Weight and height of children according to age and sex.

Age in years	Gender	Weight (Kg)	Height (cm)
	Boys	14.3 (9.31)	97.6 (24.63)
5	Girls	25.8 (8.21)	131.2 (27.21)
	Total	40.12(17.52)	228.83(51.84)
6	Boys	19.1 (5.7)	112.1 (9.52)
	Girls	25.0 (4.60)	119.43 (13.68)
	Total	45.1(10.3)	231.53(23.2)
7	Boys	23.2 (5.87)	118.6 (18.3)
	Girls	23.64(6.52)	112.17(11.87)
	Total	46.84(12.39)	230.77(30.17)
8	Boys	27.8 (6.31)	127.6 (18.36)
	Girls	26.11(7.67)	120.61(9.44)
	Total	53.91(13.98)	248.21(27.8)
9	Boys	33.91 (8.00)	134.9 (20.53)
	Girls	25.86(14.74)	114.74(10.83)
	Total	59.77(22.74)	233.64(31.36)
10	M	31.3 (8.58)	131.41 (22.38)
	F	27.60(7.29)	121.10(11.98)
	Total	53.90(15.87)	256.01(34.36)

Table 3 shows mean (SD) values of WAZ, HAZ and WHZ of children. As shown, mean values (SD) of WAZ, HAZ and WHZ of children were positive. Furthermore, boys had mean values of HAZ and WHZ greater than those for girls.

Table 3: Mean (Sd) values of (W.A.Z, H.A.Z and W.H.Z).

Variables	Mean (SD)			p-value
	Cohort	Boys	Girls	
WAZ	0.292 (1.74)	0.41 (1.60)	0.15 (1.88)	0.250
HAZ	0.378 (2.18)	0.08 (1.90)	-0.88 (2.36)	0.000
WHZ	0.727 (1.59)	0.56 (1.3)	0.90 (1.7)	0.100

Figure 1 illustrates WHO reference growth curves: As evident, 16.6 % of the children were underweight (<-2SD WAZ score), 27.7 % were stunted (<-2SD HAZ score), and 9.8 % were thin (BMI z-score; <-2SD).

Table 4 shows a comparison of prevalence of under-nutrition in boys and girls. A one- sample t-test between proportions was performed to determine whether there was a significant difference between the percent boys and girls being underweight, stunting, and thin. Percentage number of underweight boys (16.6%) and girls (7.7%) did not properly different as the t-statistic was not found significant at the 0.05 critical alpha level, t (236)= 1.242, p= 0.412). However, there was a significant difference between the percent stunting and thin boys and girls. There were significantly more stunting girls as compared to boys (27.7 % vs. 10.2 %) and significantly more wasted girls (4.7%) than girls (5.1 %) (p, for all trends<0.05).

Table 4: Nutritional status of children.

Variables	Combined	Boys	Girls	p-value
Underweight	39 (16.6)	18(7.7)	21 (8.9)	0.412
Stunted	65 (27.7)	24 (10.2)	41 (17.4)	0.014
Wasted	23 (9.8)	11 (4.7)	12 (5.1)	0.005

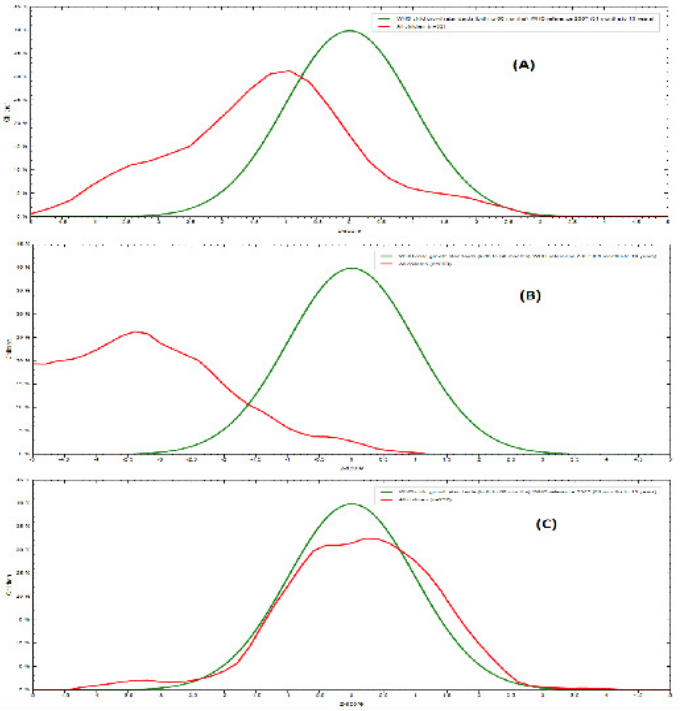

Figure 1: (A) Weight-for-age z-score in comparison to WHO child growth standards; (B) Height for age z-score in comparison to WHO child growth standards; (C) BMI for age z-score in comparison to WHO child growth standards.

Figure 2 shows a comparison of prevalence of underweight, stunting and wasting between boys and girls in two age groups. These further analyses were performed to see differences between percent boys and girls who were underweight, stunting and thin in each of the age groups 5-7 and 8-10 years. A one-sample t-test between proportions was performed to determine whether there was a significant difference between the percent boys and girls being underweight, stunted, and thin in each of the age groups, 5-7 and 8-10 years. In the age group 5-7 years, percentage number of underweight boys and girls (11.6 each %)

did not significantly differ. However, such a difference was significant between boys and girls in the age group 8-10 years (p=0.0315, t=1.814: Figure 1A). There were more stunted girls as compared to boys in both age groups i.e. 5-7 years (15.9% vs 11.55 %) and 8-10 years (70.4 % vs. 3.4 %) (p-values, respectively, >0.05 and <0.05). Similarly, there were significantly more wasted girls (83.3 %) as compared to boy (16.7 %) in the age group 5-7 years as well as in the age group 7.1-10 years (57.2 % vs. 48.8 %) (p, for all trends <0.05).

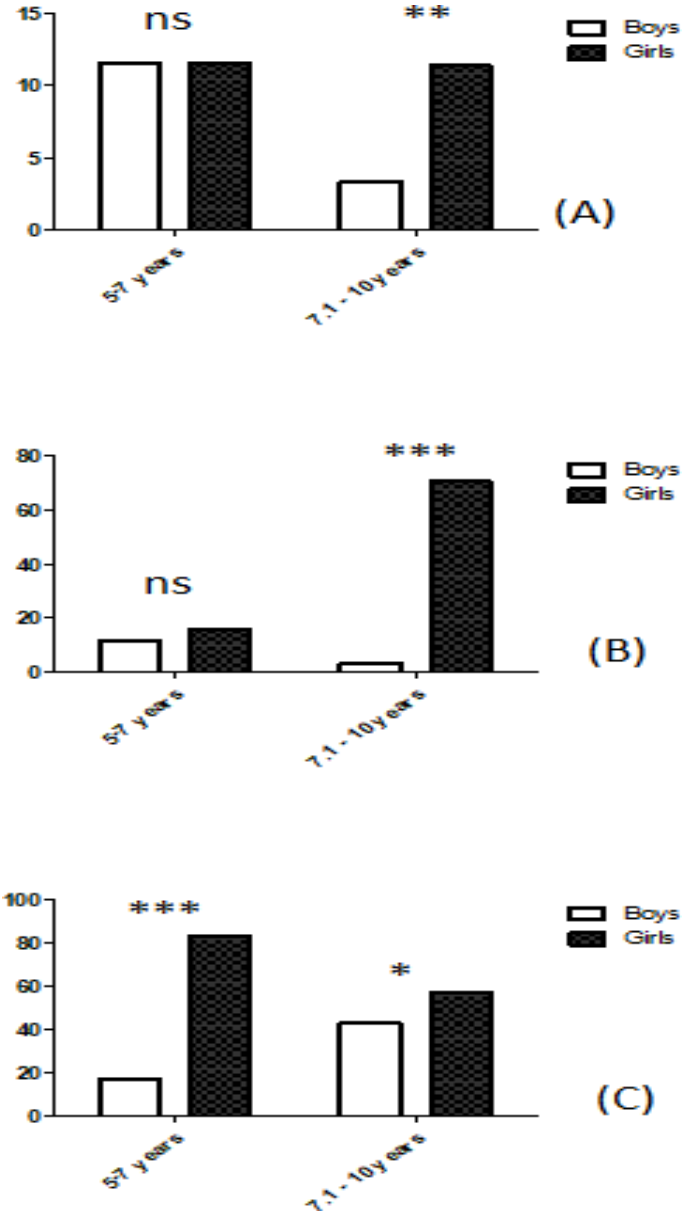

Figure 2: Prevalence of underweight (A), stunting (B) and thinness (C) in boys vs girls in two age groups.

The present study was conducted on school going children at Union Council (UC) Behlola of district Charsadda. This cross sectional study subjects belonged to low- middle socioeconomic families. The burden of malnutrition, as indicated by any of the three indicators, was underweight 16.8%; stunting is 27.7% and wasting is 9.8% (Khan *et al.*, 2016).

The weight for Age Z- score (WAZ) and Height for Age Z- score distribution curves obtained from the study subjects were different than that of WHO standard (Figure 1). In WAZ curve, the mean value of children indicates to the left which means that most of the children in the population were affected as shown in Figure 2. In HAZ curve, the mean value of children was highly shifted to the left indicating that most of the children in the population, and not only those below a given cut-off, were affected as shown in Figure 1. The mean (SD) value of HAZ was 0.426 (2.94). In BAZ curve, the mean value of children was slightly shifted to the left as well as right indicating that only a few children in the population were affected as shown in Figure 1. The shift towards the right shows there were also some overweight and/or obese children. The mean value (SD) of BAZ was 0.92 (1.49) (Bhutta *et al.*, 2013).

In the current study, prevalence of overall under-nutrition (35.1%) was lesser than previously reported (47%) in a study by (12) in Peshawar, a nearby city to our study area. Also, another recent study reported prevalence of underweight (25.4%) and stunting (45.8%) in children in Faisalabad. The National Nutrition Survey of Pakistan, 2011 reported prevalence of underweight (31.5%) and stunting (43.7%) in children (Bhutta *et al.*, 2013). In addition, the gender differences as a whole showed more girls being underweight (8.9 % vs. 7.7; p=0.2415); significantly more girls compared to boys being stunted (17.4 % Vs. 10.2 %) and wasted (5.1 % Vs. 4,7 %) (p, for all trends< 0.05). Khan *et al.* (2016) showed thatthese gender based differences in the percent occurrence of under- nutrition reported in the current study were more prominent in the age group 8-10 years (Khan *et al.*, 2016). The results of the present study are half reliable as compare to the findings of other South Asian countries studies previously conducted on the topic of gender difference in the malnutrition However, most of the previously performed studies resulted that more girls are being suffering from under-nutrition than boys. For example, Khan *et al.* (2016) reported the status of underweight in his study as 39% (Mehmood *et al.*, 2016). Mehmood *et al.* (2016) reported 32% children were malnourished, of these children

stunted were 9%, 11% were underweight, and 4% were wasted. Ali *et al.* (2015) reported 9% of children were stunted, 11% were underweight, and 4% were wasted. Afridi *et al.* (2014) reported that 14% underweight; 8% wasted; while 8% subjects were stunted. Ullah *et al.* (2014) reported results of 38% male and 32% female children are malnourished. Gul and Kibria (2013) reported that 61% boys and 40% girls were resulted as malnourished. They further reported 30% children as malnourished, 18% children were moderately, 10% were slightly and 2% were severely underweight. Mushtaq *et al.* (2011) reported 8% and 10 % children to be stunted and wasted, respectively. However, stunting and wasting was not significantly associated with child gender. Farid-ul-Hasnain (2010) and Khattak and Ali (2010) reported his results as 50% of pre-school children were suffering from malnutrition. Riaz *et al.* (2010) in his study on school age children reported 24% under-weight and 11% children stunted. Anwar and Awan (2003) reported that 46% of schools going kids were malnourished. Khuwaja *et al.* (2005) in his results showed that 16 percent are faced with stunted. Anwer *et al.* (2006) concluded in his study a 36% stunned and 45% underweight. Shah *et al.*, (2003) reported a total of 26% wasted and 15% stunting stated 66% children were affected by malnutrition disorders in children of school going age.

Various factors may be responsible for the overall malnutrition that is gender base exploitation, differences in provision of adequate and proper diet (Laghari *et al.*, 2015). This is a fact that malnutrition from infancy period have a serious consequences on child learning abilities in future stages of life (Asim and Nawaz, 2018). In the 7-10 years age groups of children in the current study, both stunting and underweight were more common in girls than boys. Although, growth spurt among the girls is seen as relatively earlier than the boys by approximately 2-3 years (Park, 2005). It is hypothesized that this difference in the growth status among boys and girls may be attributed to other factors such as nutrients intake, physical activity and due to infections (Batool *et al.*, 2012). Additionally, as boys in general, has balance and proper intake of nutrient as that of girls, girls were found more malnourished as compared to boys, this is observed that boys might have more physical activities and hard work than that of girls, in the access to adequate food intake it is assume that boys having proper adequate nutrients consumptions than that of girls. Hence girls are to be on high risk for malnutrition than boys no easy access to adequate diet (Batool *et al.*, 2012). Similarly, higher rate of malnutrition is observed among school-aged children of low- income and in developing countries such as India and Indonesia (Chhabra *et al.*, 1996; Kulaga *et al.*, 2010). There has been similar studies conducted at other countries such as Poland (Kulaga *et al.*, 2010). Thus, while generally children below five years of age are considered to be a nutritionally vulnerable age group, older, school-age children may be as nutritionally vulnerable. Due to time limitations, unavailability of proper resource and small sample data size this study did not explore to find out the responsible factors for malnutrition. However, various studies have reported different socio-economic factors responsible for malnutrition. For example, children of the low income families were more like to be stunted and wasted as compared to high income families; diarrhea was strongly connected with underweight status of a child (Khan *et al.*, 2016).

Mahmood *et al.* (2016) reported that malnutrition is directly proportional to the mother education status and with presence of family reported that low illiteracy large volume of family and starting of early weaning food during infancy in adequate breast feeding are the main and responsible factors for malnutrition. Achakzai and Khan (2016) recorded that socio-demographic characteristics, maternal health, and child health indicators are very closely associated with stunting and wasting. Khan *et al.* (2016) described that children in a nuclear family setup may have higher risk to be wasted and stunned. In addition, they added mother's education as a strong indicator for reducing the malnutrition burden in children. Moreover, girls were found to be more malnourished as compared to boys and children in the younger age group were found severely malnourished as compared to older age group. Ullah *et al.* (2014) found 38% girls and 32% of boys malnourished in his conducted study for school age children. The authors reported that low awareness, education, lack of immunization, pregnancy in adolescences stage, and large family size are the common causes of malnutrition. Large family size, poor socio and economic status, mother's illiteracy, younger mothers, anemia and multiple-parities were the major causes of child malnutrition. Batool *et al.* (2012) showed his study results as stunting was associated with birth interval less than 02 years. Khattak and Ali (2010) reported a vital relation of

child malnutrition with income level, family size, and number of children in family. Ansari *et al*. reported lack of knowledge of child feeding; food insecurity and lack of child health facilities are the root cause of malnutrition in children (Baig-Ansari *et al*., 2006). Anwar *et al*. (2006) reported that 1/4th of the children face with teeth problems and dental decay, scabies and multiple boils are the most common symptoms associated with malnutrition in children. Khuwaja *et al*. (2005) reported that those children whose fathers are farmers, servants and vendors were having more chances of being stunting in comparison to the children of landholders. Anwar and Awan (2003) stated that girls in rural areas are more underweight as compared to the boys. Mian *et al*. (2020) showed that poor status and big family size are responsible factors in child malnutrition. Shah *et al*. (2003) also mentioned that lack of awareness regarding proper nutrition education and unhealthy habits of children regarding proper nutrients intake are the key factors in child malnutrition in developing countries.

Conclusions and Recommendations

Under-nutrition was common in school going children, particularly it was in girls belonging to rural setting in District Charsadda.

Novelty Statement

This paper reported nutritional status of children from poorly represented community.

Author's Contribution

Attaullah Jan: Conceptualized, methodology, formal analysis and wrote-original draft.
Saleem Khan and Farzeen Khan: Helped in methodology section.
Iftikhar Alam: Helped in analysis.
Muhammad Farooq: Conceptualized, reviewed the manuscript and edited.

Conflict of interest

The authors have declared no conflict of interest.

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