Socio-Economic Determinants of Malnutrition in Under Five Years Children

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Abstract

Malnutrition is defined as "the cellular imbalance between the supply of nutrients and energy and body's demands for them to ensure growth, maintenance, and specific function. There are two types of malnutrition under nutrition and over nutrition. Marasmus is a kind of malnutrition caused by lack of protein that can promote weakness, muscles squandering, and lessened muscles versus fat levels, decreased vitality levels and weight reduction. Globally in 2014 it was estimated that 195 million children under-five years were stunted, 95 million were under weight and 50 million stunted. Pakistan is one of the highest prevalence of malnutrition as compared to other countries. The study aimed to assess the nutritional status of under nourished children and to find out prevalence of marasmus in under five years of children. This study was conducted in public hospital at District Head Quarter Mardan located at district Marda, Khyber Pakhtunkhwa Pakistan. About 200 children were enrolled in this study at the age of 6-59months. For the assessment of nutritional status following parameters were used weight in kg, height in cm, MUAC (mid-upper Arm Circumference) in cm and Z-score. All the data was analyzed by using SPSS" statistical Package for Social Sciences" version 22. The results depict high percentage of maternal as well as paternal illiteracy, majority of the study cohort was girls as compared to boys and most of the undernutrition was prevalent infants at the age of 7-12 months as compared to other age group. Majority of children were following inappropriate feeding practices and high percentage of children were in SAM category followed by stunted. The current study concluded that maternal and paternal educational status, and poor feeding practices were major correlates of undernutrition.

Keywords: under five, gender, wasting, stunting, breastfeeding, complementary feeding

Introduction

The World Health Organization (WHO) defines malnutrition as ‘‘the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions (De Onis *et al.*, 1993). Malnutrition is a state of deficiency or excess of energy, protein, and other nutrients. There are two types of malnutrition undernutrition and overnutrition. Undernutrition results from not getting enough protein, calories or micronutrients. It leads to low weight-for-height (wasting), height-for-age(stunting) and weight-for-age(underweight). Overnutrition results from overconsumption of certain nutrients, such as protein, calories, or fat. This usually results in overweight or obesity (Collins *et al.*, 2010; Grover and Ee, 2009). Severe malnutrition symbolized by marasmus as severe wasting, kwashiorkor as edema or marasmic kwashiorkor characterized by both edema and wasting common in children. Marasmus is a kind of malnutrition caused by lack of protein that can prompt weakness, muscles depletion, and lessened muscles versus fat levels, decreased vitality levels and weight reduction (Khan *et al.*, 2017; Müller and Krawinkel, 2005).

Marasmus, kwashiorkor is developed in those under 5 children who are malnourished for a prolong period. Adequate undernourished children were less susceptible to the effect of infectious disease as compared to undernourished children. Due to sustained under nutrition childhood can lead to clinical syndromes of severe acute malnutrition. The mortality rate of kwashiorkor is much higher than for marasmus (Forrester *et al.*, 2012). Malnutrition is the leading cause of illness and mortality worldwide, affecting hundreds of pregnant women and young children (Bryce *et al.*, 2005). Prevalence of protein energy malnutrition among children under 5 years in Asia approximately 70.0% of the world's malnourished children live in Asia about half of the preschool children are malnourished. The prevalence of malnutrition amongst children is highest in Asia compare with another continent (Martorell, 1999).

Globally in 2014 as estimated that 195 million children under-five years were stunted, 95 million were under weight and 50 million were stunted. In 2014 the Islamic republic of Pakistan is listed among the countries in the world with the highest rates of child malnutrition (stunting 44%, wasting 15% and underweight 31%). The national nutrition survey 2011 indicated little change over the last decade in terms of childhood nutrition indicators. Among children under-five 44% were stunted in 2011 as compared to 41% in 2001. 15% were wasted as compared to 14% and 31% were underweight, which has not changed since 2001 (Khan *et al.*, 2016). In Pakistan, many studies have been done on undernutrition in children less than

five year of age. A report on hospitalized children from Lady Reading Hospital, Peshawar showed malnutrition in under 5 years of children was 30.1% with 13.6% mortality (Irshad *et al.*, 2014).

More than 12 million children in six Asian nations suffer from severe acute malnutrition (SAM). 0.6 million in Bangladesh, 8.0 million in India, 1.2 million in Indonesia, 1.4 million in Pakistan, and 0.6 million in Yemen (Ahmed *et al.*, 2014). Pakistan is one of the highest prevalent countries with the risk of malnutrition as compared to other countries. Malnutrition is the fundamental cause of morbidity and mortality among the children. Almost half of the mortality in children around the globe is attributed to under nutrition. It has been estimated that 170 million (30%) children at the age of under 5 were moderately or severely stunted almost half of stunted children were from Asia.51 (8%) were wasted and two third of all wasted children live in Asia (Asim and Nawaz, 2018).

Objectives

- To find out gender-based prevalence of undernutrition in under five children.
- To explore feeding practices among under five years of age.

Materials and Methods

Study location, design, and protocol:

A cross-sectional study was conducted in public hospital at District Head Quarter Mardan located in district Mardan, Khyber Pakhtunkhwa, Pakistan. The hospital is well established and provides huge health services for various diseases. An approval for data collection was taken from the Medical Superintendent of respective hospital. Before the enrollment, the purpose of the study was fully explained to the caretaker or guardians and a consent letter was signed from them. This study was conducted over a period of three months from January 2021 to March 2021.

Sample size and inclusion criteria:

A total of 200 sample size was collected randomly. The study included children under 5 years of age, both boys and girls.

Data collection:

Demographic and socioeconomic information were assessed by a pre-defined questionnaire including data about family size, family type, father's education, father's occupation, mother's education, mother's occupation, and monthly income. Anthropometric parameters including weight in kg, height in cm and MUAC (mid-upper Arm Circumference) in cm and Z score were measured of each subject. Weighing scale for weight and stadiometer for height were used, and upper arm circumference was measured with the help of Mid Upper Arm Circumference (MUAC) tape for the assessment of muscle mass and subcutaneous fats of a child. Mid-Upper Arm circumferences (MUAC) is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow the olecranon process and acromion. The mid-point was marked between tip of the shoulder bone and elbow. The measurement was taken of that mid-point by using MUAC tape. The child had MUAC less than 125mm or 12.5cm was considered as severe malnourished. MUAC between 125mm (12.5cm) and 135mm (13.5cm), indicated that the child is at risk for acute malnutrition (De Onis and Blössner, 2003). WHO Z-Score chart was used for nutritional assessment which is developed for under five years of children of both genders' boys and girls. To assess Z-score of the subject's height and weight was measured and according to age the nutritional status of child was assessed. Find the figure closest to the child's length/height and labeled at the top of the column shows the child nutritional status. There are three categories for malnourished children. -3, -2and -3. -1 (acutely malnourished), -2 (moderately malnourished) and -3 (severely malnourished).

Data Analysis:

All analysis was executed using SPSS 22 version. All continuous data with normal distribution are shown as mean and standard deviation, and categorical variables are expressed as frequency and percentage.

Results

The current cross-sectional study was carried out in the pediatric unit, District Head Quarter Mardan to evaluate the prevalence of undernutrition and feeding practices in under five years of children. The study concluded with the following results.

Socio demographic characteristics of the subjects

Table no 1 shows the socio demographic characteristics of the subjects. Out of 200 high percentage 56% (112) of the study cohort were girls and 44% (88) were boys. Most of the subjects 55% (109) were in the age group 7 to 12 months while others 31% (62) and 14% (29) were in age group between 13 to 24 months and 25 months to 36 months, respectively. High percentages 45% (89) of the subject's fathers was illiterate and were laborers 63% (125). Similarly, majority of the subjects 63% (125) mothers were illiterate and were 92% (183) was housewives. Majority of the study subjects 54% (107) were living in joint family systems and 61% (121) had family size of 4 to 6 members.

Table 1: Socio demographic characteristics of the subjects (N=200)

Variables		**Frequency**	**Percentage**
Gender	**Boys**	88	44%
	Girls	112	56%
Age	**7month to 12month**	109	55%
	13month to 24month	62	31%
	25months to 36months	29	14%
Father education	**Nil**	89	44%
	Primary	18	9%
	Secondary	49	24%
	Intermediate	39	19%
	Undergraduate	5	3%
Father Occupation	**Labour**	125	62%
	Shopkeeper	45	23%
	Driver	25	12%
	Businessman	5	3%
Mothers Education	**Nil**	125	62%
	Primary	17	9%
	Secondary	20	10%
	Intermediate	22	11%
	Undergraduate	16	8%
Mothers Occupation	**Housewife**	183	92%

	Working	17	8%
Family Type	**Nuclear**	93	46%
	Joint	107	54%
Family members	**1-3**	17	9%
	4-6	121	60%
	>6	62	31%

Anthropometric Characteristics of the subjects

Table no 2 illustrates the anthropometric characteristics of the subjects. The mean weight and height of the subjects were 6.9± 2.42 and 70.50±10.76, respectively. Majority of the subjects 61% (121) were severely malnourished followed by 39% (79) who were moderately malnourished. Height for age Z-Score measurements of the subjects showed that 31% (63) were mildly stunted and 26% (52) were normal.

Table 2: Anthropometric Characteristics of the subjects (N=200)

Variables		**Frequency (%) Mean ± SD**	
Weight		6.90 ± 2.42	
Height		70.50 ± 10.76	
MUAC	SAM (< 11.5)	121	61%
	MAM (11.5-< 12.5)	79	39%
Height for age Z-Score	Mildly Stunted	63	31%
	Moderately Stunted	40	20%
	Severely Stunted	45	22%
	Normal	52	26%

Feeding Practices of the subjects:

Table 3 shows the feeding practices of subjects. Highest percentage 60% (119) of the subjects were exclusively breastfed and 55% (109) 45% (91) had formula and cow's milk feeding respectively. Most of the subjects 52% (104) received bottle feeding 3 to 4 times a day. Most of the subject's mothers 49% (98) reported that they started bottle feeding because of no milk. Most of the subjects 59% (118) had started complementary feeding at 7 to 12 months of age and 24% (49) subjects started complementary feeding before 6 months of age. Similarly, a very high percentage 73% (145) of the study cohort had inappropriate feeding

practices. Most of the subjects 59% (118) had started complementary feeding at 7 to 12 months of age and 24% (49) subjects complementary feeding before 6 months of age. Similarly, a very high percentage 73% (145) of the study cohort had inappropriate feeding practices.

Table 3: Feeding practices of the subjects (N=200)

Variables		**Frequency (%)**	
Exclusive breast feeding	**NO**	119	60%
	YES	81	40%
Bottle feeding type	**formula milk**	109	55%
	cow milk	91	45%
Bottle feeding quantity	**1-2 times**	40	20%
	3-4 times	104	52%
	5-10 times	56	28%
Bottle feeding reason	**No milk**	98	49%
	Next pregnancy	51	25%
	Adopted baby	12	6%
	Infection	39	20%
Complementary feeding age	**before 6 months**	49	24%
	At 6	33	17%
	7-12	118	59%
Complementary feeding type	**Healthy**	55	27%
	Un healthy	145	73%

Comparison of Malnourished children with Age and Gender:

Table no 4 illustrates MUAC in relation to the age and gender of the subjects. The highest percentage 56% (112) of the subjects were females 36% (72) were SAM and 20% (40) were MAM respectively. About 44% (88) were males 24% (49) were Severe Acute Malnutrition (SAM) and 19.5% (39) were MAM. The high percentage 55% (109) of the subjects was at the age of 7 to 12 months.

Table 4: Prevalence of Malnutrition in Children by Age and Gender (N=200)

Variables		**MUAC**		
		SAM	**MAM**	**Total**
Gender	Male	49(24.5%)	39(19.5%)	88(44%)
	Female	72(36%)	40(20%)	112(56%)
Age	7month to 12month	69(34.5%)	40(20%)	109(54.5%)
	13month to 24month	36(18%)	26(13%)	62(31%)
	25months to 36months	16(8%)	13(6.5%)	29(14.5%)
	Total SAM and MAM	121(60.5%)	79(39.5%)	-----

Discussion

The current study concluded that a total of 200 subjects were recruited where 44% (88) were males and 56% (112) were females. These results are associated with a study conducted by Bhutia (2014) and they concluded that a high prevalence of girls is suffering from undernutrition in India. Similarly other studies resembles also supported these findings. Shahid *et al.* (2022) study findings are linked with the current study and concluded that stunted were found higher in female children than male children. Current findings also resembles to the work of (Khattak *et al.*, 2017) according to their results it was shown that high prevalence of undernutrition was found in rural areas of Pakistan and their results also depicts that more girls than boys suffer from undernutrition.

Most of 55% (109) of the current study subjects were in age group 7 month to 12 and some 14% (29) were in age group between 25 month to 36 months, these findings are associated with the study of (Medhin *et al.*, 2010); Pawellek *et al.* (2008) their study concluded that high prevalence of undernutrition was shown in infants and toddlers.

Subject's father education wise 45% (89) were illiterate and 3% (5) were undergraduate while 62% (125) were labors. Most 62% (125) of mothers were illiterate and 92% (183) were housewives. Joint family system was found for 54% (107) of the subjects and 60% (121) had family size of 4 to 6 members. Similarly another study carried out by Bhatti *et al.* (2021) in rural communities of Lahore. Their results showed that more girls than boys suffered 56.8% girls and 49.3% boys. The study also showed that children belongs to illiterate mothers were having more undernutrition (58%) than children of literate mothers (48%) and these findings are in line with a study conducted by Vollmer *et al.* (2017) and Makoka and Masibo (2015) their results depicts that maternal education has an impact on child nutrition status. Father education level was also significantly linked with undernutrition fathers who were illiterate or primary education having children with undernutrition 40% and these findings shows that both

maternal and paternal education has significant impact on children nutritional status and also associated with higher risk of malnutrition (Rahman and Chowdhury, 2007) (Alderman and Headey, 2017; Kavosi *et al.*, 2014). In this study the severity of undernutrition was found 31.5% mild or grade I, 20.0% moderate or grade II, 22.5% sever or grades III and 26% were normal. These results are in line with the work of Kumar and Deswal (2016) they find out that 33% grade I, 18% grade II and 13.5% grade III. In this study undernutrition was found highest in children having more siblings 62% with $P<0.05$. The result supported by the work of Bhatti *et al.* (2021); (Gul and Kibria, 2013) their finding concluded that more than half of undernourished subjects were having high number of sibling. Similarly, 61% undernutrition was found in low socioeconomic status that is similar to the findings of (Madjdian *et al.*, 2018); Owoaje *et al.* (2014) their study concluded that undernutrition is high in children belongs to low socioeconomics background. Undernutrition was found more in children 55% (109) at the age of 7-12 months because they were followed by inappropriate feeding practices These findings are supported by a study (Hirani, 2012; Khadilkar *et al.*, 2007; Raju, 2017).

Our findings depicts poor feeding practices in infancy and at young age that are associated with the studies conducted by Ibrahim (2010), Lamichhane *et al.* (2016) and Ali *et al.* (2021) their results concluded that inadequate feeding practices are the cause of undernutrition in infancy and young children.

Conclusions

The study concluded that the prevalence of undernutrition was more in girls as compared to boys. The study also found that more girls were stunted as compared to boys. Children at the age of 7-12 months were more prevalent to undernutrition and poor feeding practices were found in high number of undernourished children. This study also demonstrated that the children under five did not meet the requirement during growth period.

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