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Assessment of Stunting and Its Associated Factors in Children Under 2 Years of Age in Tehsil Umerkot

Shahzad Farid Khan¹, Ume Sughra¹, Marriam Suleman¹ and Najm Us Sabah¹

¹Department of Public Health, Al-Shifa School of Public Health, Rawalpindi, Pakistan

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*Corresponding Author:

Shahzad Farid Khan
Department of Public Health, Al-Shifa School of Public Health, Rawalpindi, Pakistan
shahzad.farid@yahoo.com

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ABSTRACT

Stunting, a key indicator of chronic undernutrition, remains a critical public health challenge in Tehsil Umerkot, Pakistan, reflecting underlying socioeconomic and nutritional deficits. **Objective:** To find stunting in children under 2 years old and its association with sociodemographic variables in Tehsil Umerkot Pakistan. **Methods:** A cross-sectional study was conducted at urban Tehsil Umerkot, Pakistan. A total of 385 respondents were selected from 4 different public healthcare facilities of District Umerkot, through a simple random sampling technique. SPSS version 26.0 was utilized for data entry and analysis. An anthropometric assessment was carried out for the children and height for age was calculated. All children with a z-score below -2 S.D of WHO standards were considered stunted. Pearson Chi-Square was used to investigate the variables linked with stunting. **Results:** Among the 385 respondents, the majority of the children were female (n=202, 53%). Mothers of the majority of the children were illiterate (n=293, 76%). It was found that the majority of the children were stunted (n=360, 96%) out of which 8% (n=30) were severely stunted. Breastfeeding, duration of exclusive breastfeeding, and fruit and vegetable consumption were found statistically significant with stunting (p value<0.050). **Conclusions:** The majority of the children under 2 years of age in Umerkot were stunted. Various factors were identified that play a protective role against stunting among them exclusive breastfeeding, and fruit and vegetable consumption were important. Routine nutritional assessment and interventions are needed to prevent stunting in Pakistan.

INTRODUCTION

Stunting is a malnutritional condition in which a child's growth is hindered and is not according to his or her age. It affects nearly 22% of the children in the world [1]. Stunting causes a huge burden of physical, psychological, and social problems. It is also responsible for the poor quality of life of the individuals [2]. Previous studies found that stunting is associated with long-term consequences which include poor academic achievement and productivity loss in adulthood [3]. Stunting is a complex issue resulting from inadequate in-utero nutrition, childhood illnesses, poor maternal health and nutrition, micronutrient deficiencies, low socioeconomic position, and insufficient feeding habits for infants and early children [4]. Stunting frequently begins in utero and correlates with inadequate breastfeeding and supplemental eating habits; hence, the

period from conception to the second birthday is crucial for preventing the adverse consequences of malnutrition [5]. Other risk factors include socioeconomic inequalities, household food insecurity, geographical differences, childhood morbidities and maternal literacy [6]. Furthermore, stunting is also associated with poor sanitary conditions, improper hygiene, and indoor air pollution [7-9]. Other factors associated with stunting among under-fives are gender, age, birth order birth size, and Low Birth Weight (LBW) of children [10]. Stunting has serious health consequences throughout life. This condition has the potential to result in significant difficulties at delivery, decreased cognitive capacity and development, absence from school, and poor social and emotional skills. Furthermore, chronic illnesses are more prevalent in

advanced age, resulting in elevated healthcare expenditures [11]. Consequently, the prevention of stunting has been established as one of the six primary global nutrition objectives for the period leading up to 2025 [12]. Studies indicate that the job output of stunted youngsters is inferior to that of their non-stunted counterparts [3]. Pakistan's elevated malnutrition rates (40.2% stunting, 28.9% underweight, and 17.7% wasting) signify a persistent child nutrition problem [4]. These levels of malnutrition position Pakistan as the second-highest burdened country in the region, behind India. Although progress has taken place and the proportion of underweight children under 5 years has declined from 32% to 28.9% between 2011 and 2018, during the same period stunting has decreased from 44% to around 40.2%. Improving uptake of maternal and early childhood health services thus becomes the first and perhaps most critical step towards improving human capital in Pakistan. Various studies have been carried out in Pakistan to highlight this crucial issue. However, the literature is scarce regarding the nutritional status of children in remote areas of Pakistan. So, to fill this gap, the current study was carried out in a remote area of Pakistan, Umerkot. Umerkot is a small tehsil in Sindh, Pakistan where the majority of the people are illiterate and belong to lower socioeconomic status. The district has access to only one functioning Nutrition Stabilization Centre at the District headquarters in Umerkot.

Despite persistently high national stunting rates in Pakistan, district- and tehsil-level data from remote and socioeconomically deprived areas such as Umerkot remain limited. Most existing studies focus on provincial or national estimates, with insufficient attention to localized determinants including infant feeding practices, household income, and maternal characteristics among children under two years of age. Furthermore, evidence exploring the combined influence of breastfeeding practices and early dietary patterns in this specific population is scarce. Therefore, context-specific research is essential to better understand the magnitude of stunting and its associated factors in Tehsil Umerkot. The current study was intended to identify the levels of stunting among children under 2 years of age in Umerkot and highlight different sociodemographic, healthcare, and environmental factors associated with stunting.

METHODS

It was a cross-sectional study, carried out from March 2022 to August 2022. Geographical selection was done by using the random sampling method. A list of public health facilities, District headquarters hospitals, and Rural and basic health centres were selected based in urban locations of Tehsil Umerkot for the collection of data. The study was carried out at different public healthcare

facilities in District Umerkot. A total of 4 health facilities were selected for data collection. From the list of Lady Health Supervisors (LHS) and Lady Health Workers (LHWs) attached with the randomly selected health facilities, randomly select the LHS and the LHWs in the study [4, 12]. The study population consisted of children aged 6 to 23 months who lived in the study region and were picked at random. Data were collected from their mothers/caregivers regarding the feeding practices of children, healthcare facilities, and environmental factors. Respondents to assess their nutritional status by taking their anthropometric measurements (weight, length/height, MUAC, and Oedema). In order to get the sample size, the OpenEpi, Version 3.01 software's proportional formula for sample size computation was used. The previous prevalence of stunting among children was taken as 39.4% [6]. The calculated sample size was 367 with a 95% Confidence Interval (C.I.) and a 5% margin of error. After adding a 5% non-response rate, the final sample size came out to be 385 children. Data were collected using an interview-administered questionnaire. The length/height, weight, Mid-Upper Arm Circumference (MUAC), and oedema of the children under research were measured using medical-grade equipment from SEECA. Each kid was measured three times to obtain the precise reading. The height for age was tested against WHO-provided guidelines to assess the levels of stunting among the study population. Data were analyzed using SPSS version 26.0. Children were divided into two groups: stunted and non-stunted based on study findings. The Pearson Chi-Square test was employed to examine the connection between stunting and sociodemographic factors. Study was conducted after taking ethical approval from the IRB committee of Al-Shifa School of Public Health Rawalpindi (IRB No. MSPH-IRB/13-36).

RESULTS

In total, there were 385 people who signed up to participate in this study. The majority of the respondents were girls (n=202, 52.5%). Mothers of most of the children were housewives (n=333, 86.5%) and were illiterate (n=293, 76%). Demographic features of the children and their mothers are shown in table 1.

Table 1: Sociodemographic Characteristics of Under 2-Year Children and Their Mothers (n=385)

S. No.	Variables	Frequency (%)
Age of the Child		
1	6-10 Months	88 (23%)
	11-17 Months	172 (45%)
	18-23 Months	125 (33%)
Birth Order		
2	1-3	279 (73%)
	4-7	104 (27%)

	>7	2 (0.5%)
Gender		
3	Male	183 (48%)
	Female	202 (53%)
Family Monthly Income		
4	<15,000 Rs/-	202 (54%)
	15,000-30,000 Rs/-	174 (45%)
	31,000-50,000 Rs/-	2 (0.5%)
	>50,000 Rs/-	2 (0.5%)
Age of the Mother		
5	<20 Years	7 (1.8%)
	20-34 Years	360 (93.5%)
	35 Years and Above	18 (4.7%)
Marital Status		
6	Married	360 (94%)
	Separated	6 (1.6%)
	Widow/Divorced	19 (4.9%)
Occupation		
7	Housewife	183 (48%)
	Working	202 (53%)
Education		
8	Illiterate	293 (76%)
	Primary	77 (20%)
	Secondary	13 (3.4%)
	Higher	2 (0.5%)
Under 5 Year Children		
9	0-2	242 (62.9%)
	3-5	137 (35.6%)
	>5	6 (1.6%)
Total no. of Children		
10	1-3	213 (55.3%)
	4-6	152 (39.5%)
	>6	20 (5.2%)
Age of Mother at the Time of 1st Birth		
11	17-20 Years	226 (58.7%)
	21-24 Years	135 (35.1%)
	25 Years and Above	24 (6.2%)

In current study, child carrying practices of the mothers were also assessed. It was found that nearly 65% (250) of the children in study area were breastfed while 31% (121) were immediately breastfed after birth. Majority of the children were not given any kind of pre-lactation food (n=278, 72%). Dietary practices of under 2-year children were analysed and it was found that only 31% (n=120) of the children were bottle fed during last 24 hours. While only 53% (n=205) of the children consumed fruits and vegetables during last 24 hours. A brief summary is given in table 2.

Table 2: Child Carrying and Dietary Practices

S. No.	Variables	Frequency (%)
Was this Child ever Breastfed?		
1	No	135 (35%)

	Yes	250 (65%)
How many Hours after the Birth was the Child Breastfed?		
2	Immediately	121 (31%)
	Between 1-24 hours	157 (41%)
	After a day	107 (27%)
Is the Child Still Breastfeeding?		
3	No	116 (30.1%)
	Yes	269 (69.9%)
What type of Pre-Lactation Food/Fluid the Child was Provided with?		
4	None	278 (72.2%)
	Water	28 (7.3%)
	Butter/Honey	41 (10.6%)
	Cow/Camel/Goat milk	38 (9.9%)
Period of Exclusive Breastfeeding		
5	<4 months	114 (29%)
	4-6 months	124 (32%)
	>6 months	147 (38%)
Reasons for not Breastfeeding		
6	Maternal health issues	27 (7%)
	Refusal of child	21 (5.5%)
	Maternal pregnancy	36 (9.4%)
	None	301 (78.2%)
Weaning Status of the Child		
7	None	185 (48.1%)
	Partial	116 (30.1%)
	Full	84 (21.8%)
Age of Child when Breastfeeding Stopped		
8	0-6 months	267 (69.4%)
	7-14 month	18 (4.7%)
	>14 months	100 (26%)
Age of Child at the Time of Complementary Feeding		
9	0-6 months	295 (76.6%)
	7-14 month	86 (22.3%)
	>14 months	4 (1%)
How many Times was the Child Fed Solid Food during Last 24 Hours?		
10	<3 times a day	209 (54.3%)
	>3 times a day	176 (45.7%)
Was the Child Bottle Fed during the Last 24 Hours?		
11	No	265 (68.8%)
	Yes	120 (31.2%)
What is the Method of Feeding the Child has been Used?		
12	Bottle	70 (19%)
	Cup	63 (16.4%)
	Spoon	30 (7.8%)
	None	219 (56.9%)
Did the Child use Salt during the Last 24 Hours?		
13	No	48 (12.5%)
	Yes	337 (87.5%)
Did the Child take Fruits/Vegetables during the Last 24 Hours?		
14	No	180 (47%)
	Yes	205 (53%)

Did the Child take Egg/Meat during the Last 24 Hours?		
15	No	219 (56.9%)
	Yes	166 (43.1%)

Based on anthropometric assessment, height for age, the findings of this study revealed that 95.9% (n= 369) of the participant children were stunted with a z-score below -2 S.D of WHO standards. Out of these, 30 children (7.8%) were severely stunted (Figure 1).

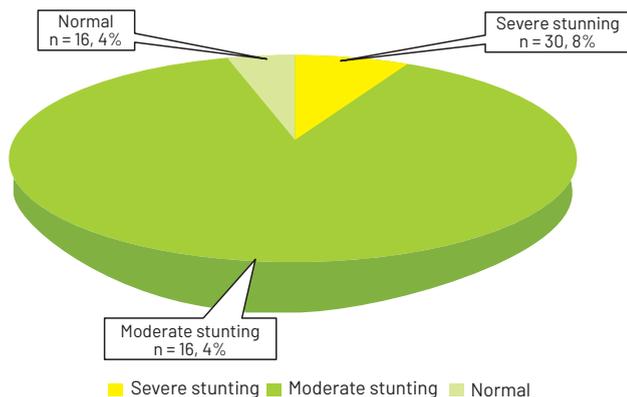


Figure 1: Proportion of Stunting among Under 2-Year Children

The association of stunting with socio-demographic variables, child-carrying characteristics of the mothers, and dietary patterns of the children was determined using the Pearson Chi-Square Test of Independence after confirming the assumptions of the test. It was observed that age of the child, birth order of the child, family income, and total number of children in the household were significantly associated with stunting among under 2-year children (p-value <0.050). Furthermore, children who were breastfed were less prone to stunting as compared to those who were never breastfed (p value <0.050). Similarly, children who were immediately breastfed after birth were less prone to stunting as compared to children who were breastfed after 1-24 hours or 1 day (p value <0.050). Moreover, children who were exclusively breastfed for more than 6 months were less prone to stunting as compared to those with less duration of exclusive breastfeeding (p value <0.050). The age at which breastfeeding stopped and consumption of fruits and vegetables were also found significantly associated with stunting (p value <0.050). A summary of these results is given in Table 3.

Table 3: Association of Socio-demographic characters, child carrying characteristics of the mothers, and dietary patterns of the children with Stunting under 2 years' children

Sr. No.	Variables	Stunting		χ ² (df)	P-Value
		Stunted Frequency (%)	Normal Frequency (%)		
1	Gender		0.04 (1)	0.840	
	Male	175 (46%)			

2	Female	194 (50%)	8 (2%)	23.25 (2)	<0.001
	Age of Child				
	6-10 months	88 (22.9%)	0 (0%)		
	11-17 months	170 (44.2%)	2 (0.5%)		
3	Birth Order of the Child			7.26 (2)	0.026
	1-3	272 (70.6%)	7 (1.8%)		
	4-7	95 (24.7%)	9 (2.3%)		
	>7	2 (0.5%)	0 (0%)		
4	Livestock			2.34 (1)	0.126
	No	210 (55%)	6 (2%)		
5	Family Income			12.84 (3)	0.005
	<15,000 Rs/-	196 (50.9%)	11 (2.9%)		
	15,000-30,000 Rs/-	170 (44.2%)	4 (1%)		
	31,000-50,000 Rs/-	2 (0.5%)	0 (0%)		
	>50,000 Rs/-	1 (0.3%)	1 (0.3%)		
6	Age of Mother			0.39 (2)	0.820
	<20 years	7 (1.8%)	0 (0%)		
	20-34 years	345 (89.6%)	15 (3.9%)		
	35 years and above	17 (4.4%)	1 (0.3%)		
7	Occupation of Mothers			0.75 (1)	0.386
	Housewife	318 (83%)	15 (4%)		
8	Education of Mother			7.67 (3)	0.053
	Illiterate	278 (72%)	15 (3.9%)		
	Primary	77 (20%)	0 (0%)		
	Secondary	12 (3%)	1 (0.3%)		
9	Age of mother at the Time of 1st Birth			4.85 (2)	0.080
	17-20 years	219 (56.9%)	7 (1.8%)		
	21-24 years	129 (33.5%)	6 (1.6%)		
	25 years and above	21 (5.5%)	3 (0.8%)		
10	No. of under 5-Year Children			0.27 (2)	0.870
	0-2	232 (60.3%)	10 (2.6%)		
	3-5	131 (34%)	6 (1.6%)		
11	Total no. of Children			8.97 (2)	0.010
	1-3	29 (7.5%)	4 (1%)		
	4-6	140 (36.4%)	12 (3.1%)		
	>6	20 (5.2%)	0 (0%)		
12	Was this Child Ever Breastfed?			11.33 (1)	0.001
	No	115 (29%)	20 (5%)		
13	How many hours after the Birth was the Child Breastfed?			14.0 (2)	0.001
	Immediately	40 (10%)	81 (21%)		
	After 1-24 hours	92 (24%)	65 (16%)		
	After a day	66 (17%)	41 (10%)		
14	What type of Pre-Lactation Food/Fluid the Child was Provided with?			2.36 (3)	0.500
	None	269 (70%)	9 (2.3%)		
	Water	26 (7%)	2 (0.5%)		
	Honey/Butter	38 (10%)	3 (0.8%)		

	Cow/Camel/Goat milk	36 (9.4%)	2 (0.5%)		
15	Period of Exclusive Breastfeeding			10.34 (2)	0.010
	<4 months	60 (15%)	54 (14%)		
	4-6 months	50 (12%)	74 (19%)		
	>6 months	60 (15%)	87 (23%)		
16	Weaning Status of the Child			5.57 (2)	0.610
	None	181 (48%)	4 (1.1%)		
	Partial	107 (28%)	9 (2.4%)		
17	Age of Child when Breastfeeding Stopped			8.20 (2)	0.020
	0-6 months	261 (67.8%)	6 (1.6%)		
	7-14 months	27 (7%)	2 (0.5%)		
	>14 months	81 (21%)	8 (2.1%)		
18	Age of the Child at the Time of Complementary Feeding			4.46 (2)	0.110
	0-6 months	283 (73.5%)	12 (3.1%)		
	7-14 months	83 (21.6%)	3 (0.8%)		
	>14 months	3 (0.8%)	1 (0.3%)		
19	How many Times was the Child Fed Solid Food during the Last 24 Hours?			2.88 (1)	0.080
	<3 times	197 (51.2%)	12 (3.1%)		
	>3 times	172 (44.7%)	4 (1%)		
20	Was the Child Bottle-Fed during the Last 24 Hours?			2.71 (1)	0.100
	No	251 (65%)	14 (3.6%)		
	Yes	118 (30.6%)	2 (0.5%)		
21	Did the Child use Salt during the Last 24 Hours?			2.37 (1)	0.120
	No	48 (12.5%)	0 (0%)		
	Yes	321 (83.4%)	16 (4.2%)		
22	Did the child take fruits/vegetables during the last 24 hours?			4.37 (1)	0.036
	No	81 (22%)	99 (25%)		
	Yes	79 (20%)	126 (33%)		
23	Did the Child take Meat/Eggs during the Last 24 Hours?			0.322 (1)	0.570
	No	211 (54.8%)	8 (2.1%)		
	Yes	158 (41%)	8 (2.1%)		
24	Is the Child Still Breastfeeding?			8.30 (1)	0.430
	No	106 (27.5%)	10 (2.6%)		
	Yes	263 (68.3%)	6 (1.6%)		
25	Complementary Food in the Last 48 Hours in Addition to Breastfeeding			28.46 (1)	0.170
	No	40 (10.4%)	9 (2.3%)		
	Yes	329 (85.5%)	7 (1.8%)		

DISCUSSION

Current study was carried out at urban tehsil Umerkot, Pakistan. The key goal of the study was to determine the level of stunting and its associated issues among children under 2 years in study area. Study results revealed that nearly 96% (n= 360) of the children out of total 385, were stunted out of which 8% (n= 30) were severely stunted. This is quite an alarming number which highlights the need of

nutritional interventions and routine nutritional assessments in such remote areas of the country. Current study percentage of stunting is quite high as compared to previous studies conducted in different areas of Pakistan. A study conducted in Lahore, Pakistan reported the prevalence of stunting among male children to be around 67% while in female children, it was reported to be 33% [13]. Similarly, another study conducted in 2019 found the overall prevalence of stunting among under 5 years' children to be around 44% [6]. The high percentage of stunting in current study population could be due to demographic characteristics of the area as this study was conducted in a remote area of Pakistan where level of education is low, people are mostly illiterate. Therefore, their nutritional knowledge is also quite unsatisfactory which ultimately affects the feeding practices of the children and lead them to nutritional deficiencies like stunting. Results of the current study revealed that age of the children was significantly associated with stunting (p value=0.0001). It was noted that out of total 96% (n= 360) stunted children, 44% (n= 170) children were 11-17 months of age. Study conducted in Mexico in 2020 found that nearly 12.3% of children were stunted and their age was approximately 6-35 months [14]. Birth order of the children was also found significantly associated with stunting (p value= 0.026). It was noted that children with first order, second order and third order were more prone to stunting (n= 272, 70.6%) as compared to others. These findings are not completely supported by the previous literature. A study that was conducted in 2018 found that children in the first birth order have a lower risk for stunting (20%, p-value<0.01). The income level of the family was also found statistically significant with stunting among under 2 years' children in the current study (p value= 0.005). It was observed that children belonging to families with income less than 15000 Rs/- were more likely to be affected by stunting (n= 196, 50%). These results were somehow consistent with the previous literature. A study that was conducted in Indonesia in 2020, found that family income was positively associated with stunting among children aged 0.5-12 years [15]. Breastfeeding was also found to be a significant factor that can affect stunting among under 2 years children (p value= 0.001). It was noted that out of the total study population, 135 children (35%), and 115 children (29%) were stunted. This showed that breastfeeding can be an important factor in preventing stunting among children. These results are consistent with previous literature. A study conducted in Indonesia in 2019 also reported that stunting decreased with exclusive breastfeeding (p value=0.042) [16]. In the current study, it was also noted that out of the total population children who were

breastfed immediately after their birth, were the least stunted ($n=40$, 10%) as compared to other groups. These findings are statistically significant (p value=0.001) and consistent with the prior literature available [16]. Current results showed that the period of breastfeeding also contributed significantly towards stunting (p value=0.006). It was found that children who were breastfed exclusively for less than 4 months were more stunted ($n=60$, 15%) as compared to other groups. These findings can be supported by previous literature available. A study that was carried out in Indonesia in 2020, found that breastfeeding can prevent stunting, and the period of exclusive breastfeeding is an important factor for predicting stunting among under 5 years children (p value=0.039) [17]. In the present study, it was noticed that the children who stopped breastfeeding before the age of 6 months or at the age of 6 months, were more likely to be stunted ($n=261$, 68%) as compared to other children who breastfed for longer duration and these results were statistically significant (p value=0.01). These findings are contrary to the previous literature. A study conducted in Ethiopia in 2015 revealed that children who breastfed for more than 24 months were prone to stunting [18]. The current study revealed that stunting was less reported among children who consumed fruits and vegetables ($n=79$, 20%) as compared to those who did not consume fruits and vegetables ($n=81$, 22%) and these findings were statistically significant (p value=0.036). A study conducted in 2015 in Brazil, found that nutritional deficiencies were higher among those children who did not consume fruits and vegetables [19, 20]. So, the current results are similar to the previous findings.

The cross-sectional design of this study limits the ability to establish causal relationships between identified risk factors and stunting. Additionally, reliance on caregiver-reported feeding practices may introduce recall bias, and the facility-based sampling approach may limit the generalizability of findings to the wider community. Future research should employ longitudinal and community-based designs to explore causal pathways and seasonal variations in nutritional status. Intervention-based studies focusing on maternal education, breastfeeding promotion, and dietary diversification programs are recommended to reduce the burden of stunting in similar underserved settings.

CONCLUSIONS

It was found that the majority of the children under 2 years of age were stunted in the study area. Various factors can play an important role in preventing stunting. Results of the study revealed that breastfeeding and duration of exclusive breastfeeding are important in preventing stunting.

Authors' Contribution

Conceptualization: US

Methodology: MS

Formal analysis: NUS

Writing and Drafting: SFK, US, NUS,

Review and Editing: SFK, US, NUS, MS

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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