RESEARCH ARTICLE

Prevalence and factors associated with undernutrition among 6-59 months children in Tehsil Battagram, Pakistan

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Abstract

Objective: To find out the prevalence and associated factors of undernutrition in a semi-rural setting.

Method: The community-based cross-sectional study was conducted in Tehsil Battagram of Khyber Pakhtunkhwa province, Pakistan, in January and February 2020 after approval from the ethics review committee of Nanjing Medical University, Jiangsu, China, and comprised children aged 6-59 months who had no physical or mental disability. Data was collected using a structured questionnaire. Anthropometric data was analysed using the World Health Organisation Anthro software. Multivariate logistic regression analysis was used to find out the association between dependent variables, like wasting, underweight and stunting, and independent variables, like socioeconomic, child, maternal and environmental characteristics. Data was analysed using SPSS 21.

Results: Of the 504 children, 257(51%) were girls and 247(49%) were boys. The largest group was aged 36-47 months 127(25.2%), while the smallest group was aged 6-11 months 56(11.1%). Overall, 94(18.7%) children were wasted, 167(33.1%) were underweight and 248(49.2%) were stunted. Children whose family income was high had low odds for being wasted (odds ratio: 0.59, 95% confidence interval: 0.25-0.71), underweight (odds ratio: 0.30, 95% confidence interval: 0.08-0.72) and stunted (odds ratio: 0.54, 95% confidence interval: 0.30-0.80). Similarly, those children who were exclusively breastfed had low odds of being wasted were (odds ratio: 0.45, 95% confidence interval: 0.32-0.53), underweight (odds ratio: 0.56, 95% confidence interval: 0.42-0.78) and stunted (odds ratio: 0.62, 95% confidence interval: 0.51-0.97). Children who were not immunised had higher odds of wasting (odds ratio: 4.16, 95% confidence interval: 2.18-7.93), underweight (odds ratio: 4.45, 95% confidence interval: 2.77-7.14) and stunted (odds ratio: 4.36, 95% confidence interval: 2.32-8.71). Children of mothers who did not have antenatal care visits had higher odds of being wasted (odds ratio: 1.91, 95% confidence interval: 1.13-3.22), underweight (odds ratio: 1.32, 95% confidence interval: 1.22-2.13) and stunted (odds ratio: 1.48, 95% confidence interval: 1.32-2.62). Children who did not have a latrine facility had higher odds of being wasted (odds ratio: 1.63, 95% confidence interval: 1.29-1.58), underweight (odds ratio: 1.76, 95% confidence interval: 1.36-3.84) and stunted (odds ratio: 1.45, 95% confidence interval: 1.22-2.12).

Conclusion: Undernutrition among children aged 6-59 months was widespread. Nutrition awareness, interventions and multi-sectoral approaches were found to be needed to cope with the problem in the study area.

Keywords: Malnutrition, Undernutrition, Under 5 years children, Wasting, Underweight, Stunting.

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Introduction

According to the World Health Organisation (WHO), malnutrition refers to deficiencies, excesses or imbalances in a person's energy and/or nutrients' intake.[1] Malnutrition has two main subtypes. The first type is 'undernutrition', which comprises wasting, which is low weight for height, stunting, which is low height for age, underweight, which is low weight for age, and micronutrient deficiencies, which indicate a lack of important vitamins and minerals. The second type is 'overnutrition', which comprises overweight, obesity and diet-related non-communicable diseases, such as cancer, diabetes, heart disease and stroke.[1]

There are 52 million wasted, 17 million severely wasted and 155 million stunted children aged <5 years around the world.[2] The percentages for wasted, stunted and underweight children aged <5 years are 8%, 26%, and 16%, respectively, in the world.[3] Globally, about 5.9 million under-5 children die each year, and undernutrition contributes to 45% of these deaths.[4] About half of the global population suffers from maternal and child undernutrition, which leads to intrauterine growth restrictions (IUGRs), low birth weight (LBW) and micronutrient deficiencies.[5] India, Bangladesh and Pakistan show the highest prevalence of undernutrition.[6] More than half of all stunted, about half of all

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underweight, and two-third of all wasted children happen to be in Asia.[7]

Among the under-5 population, Pakistan is the 3rd highest undernutrition-prevalent country, with 40.2% stunted, 28.9% underweight, and 17.7% wasted children.[8] In Pakistan, undernutrition is one of the major factors responsible for deaths among under-5 children.[9] The Khyber Pakhtunkhwa (KP) province of Pakistan has 40% stunted, 23.1% underweight, and 15% wasted under-5 children, showing that KP is facing severe undernutrition for long.[8]

Major risk factors of undernutrition include illiteracy, poverty and food insecurity.[10] Socioeconomic status, environmental and biological factors are basic causes for inadequate dietary intake, which turns into undernutrition.[11] Maternal illiteracy is linked with poor dietary practices, which causes undernutrition in children.[12] Mothers who are educated ensure that their kids receive proper medical treatment and balanced nutrition. Many studies have confirmed the relationship between maternal education and high socioeconomic status.[13] Another study confirmed that the number of siblings in the home have a positive association with stunting, while it has a negative association with wasting and underweight.[14]

Multi-sectoral and multi-dimensional strategies are needed to cope with undernutrition in a particular area.[15] Bringing improvements in socioeconomic status of people is a step toward eliminating undernutrition among under-5 children.[16] Interventions needed for tackling basic and underlying causes of undernutrition are to improve maternal health and nutrition, promote infant and child feeding practices, access to family planning services, supporting mothers in their professions and improving water and sanitation hygiene.[17]

According to evidence, Pakistan is among the highest undernutrition-prevalent countries.[8] Battagram is one of the districts of Khyber Pakhtunkhwa (KP) province in Pakistan. In recent years, no study on undernutrition has been conducted in Battagram. The current study was planned to find out the prevalence of undernutrition and its associated factors in Tehsil Battagram.

Subjects and Methods

The quantitative, analytical, community-based, cross-sectional study was conducted in Tehsil Battagram of KP, Pakistan, in January and February 2020 after approval from the ethics review committee of Nanjing Medical University, Jiangsu, China. According to the 2017 Population census, the population of Tehsil Battagram stood at 296,198, and about 20% of the population is composed of chidren aged <5 years. There are 12 Union Councils (UCs) in Tehsil Battagram, namely Kuza Banda, Banian, Gijbori, Peshora, Thakot, Trand, Batamori, Ajmera, Paimal Sharif, Shumlai, Battagram and Rajdhari. It is surrounded by District Mansehra to the east, District Shangla to the west, District Torghar to the south and District Kohistan to the north.[18]

The sample size was calculated using the OpenEpi online calculator[19] while taking the frequency of undernutrition to be 40% in the KP province.[8]

The sample was raised using multistage sampling technique. In the first stage, the area was divided into UCs, and from among the 12 UCs, 6(50%) were randomly picked using the lottery method. In the second stage, one village was randomly picked through the same lottery method from the selected UCs. In the third stage, 84 households were picked from every 6 villages using systematic random sampling technique. Each village comprised roughly 600 households. The first household was randomly picked, and then every 6th household was selected. A single sample was taken through the lottery method if the selected household had >1 Child aged 6-59 months. If the children were not present at the time of data collection, another visit was carried out. If a household did not have any chid aged 6-59 months, the adjacent house was considered for selection (Figure).

All children aged 6-59 months in the targeted households were included. Those outside the age bracket and those having any acute infection, and those with mental or physical disability were excluded.

After taking informed consent from the parents, data was collected related to wasting, underweight and stunting status of the child. Wasting was identified in children whose weight-for-height Z-score (WHZ) was <-2 standard

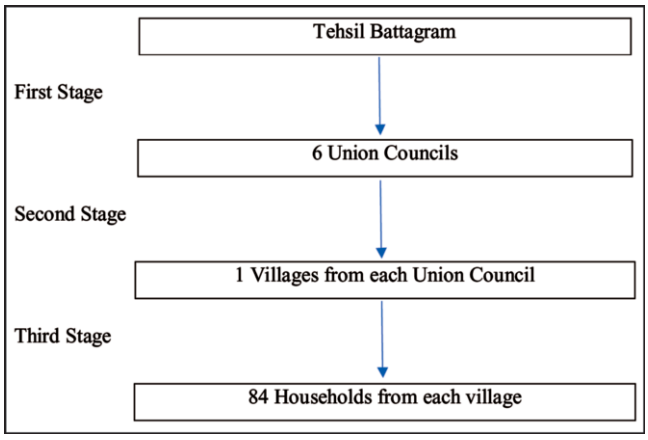

Figure: Flowchart of multi-stage sampling technique.

deviation (SD).[20] Children were taken as underweight if weight-for-age Z-score (WAZ) was <-2SD.[20] Stunting was identified in children whose height-for-age Z-score (HAZ) was <-2SD.[20] Socioeconomic data included parents' education, parents' occupation, family income, family type, family composition and type of accommodation, like Kacha houses made up of mud or stone, or Pakka houses made up of cement and Semi-Pakka houses having both mud and cemented sections. Child characteristics included gender, age birth order, birth space, place of delivery, exclusive breastfeeding, fever, measles, diarrhoea and acute respiratory infection (ARI). Child caring practices included initiation of breastfeeding, duration of breastfeeding, initiation of complementary feeding, hand-wash before the meal, hand-wash after using toilet, immunisation, and healthcare-seeking behaviour. Maternal characteristics include mother's age, number of children ever born, antenatal care (ANC) visits, health status during pregnancy, extra food during pregnancy, extra food during lactation, and autonomy in decision making regarding money expenditure. Environmental characteristics included source of water supply, separate room for kitchen, latrine facility and type of latrine.

Data was collected using a structured questionnaire with closed-ended questions. The questionnaire was translated from English to Urdu and then from Urdu to Pashto, before being back-translated from Pashto to Urdu and from Urdu to English. All necessary changes were incorporated. Face-to-face interviews were conducted with mothers. Anthropometric data from children was collected by using a weighing scale, measuring tape and mid-upper arm circumference (MUAC) measuring tape.

Anthropometric data was collected according to WHO growth standards.[21] The age of the child was calculated according to the date of birth card or related to a major local event prior to anthropometric data. Mothers were questioned if the baby was born after or before that major event.

WHA, WAZ and HAZ scores were calculated using the WHO Anthro tool.[22]

Data was analysed using SPSS 21. Descriptive statistics were used for calculating frequencies and percentages of wasting, underweight and stunting. Multivariate logistic regression model was used to find out the association between dependent and independent variables. P<0.05 was taken as significant.

Results

Of the 504 children, 257(51%) were girls and 247(49%) were boys. The income of majority of families 159(31.5%)

Table-1: Socioeconomic characteristics of children aged 6-59 months.

Variables		n	Percentage
Family income	Up to 20 Thousands	92	18.3
	21-30 Thousands	159	31.5
	31-40 Thousands	154	30.6
	≥41 Thousands	99	19.6
Household composition	Kacha	256	50.8
	Pakkha	216	42.9
	Semi Pakkha	32	6.3
Family type	Nuclear	218	43.3
	Joint	224	44.4
	Extended	62	12.3
Mother education	Illiterate	380	75.4
	Primary	46	9.1
	High School	40	7.9
	≥Bachelor	38	7.5
Mother occupation	Housewife	435	86.3
	Employed	69	13.7
Father Education	Illiterate	217	43.1
	Primary	35	6.9
	High School	84	16.7
	≥Bachelor	168	33.3
Father occupation	Daily Labour	239	47.4
	Merchant/Trade	38	7.5
	Employed	227	45.1

Table-2: Prevalence of undernutrition among children aged 6-59 months.

Child Characteristics	Wasting (%)		Underweight		Stunting	
	Yes	No	Yes	No	Yes	No
All Children	94 (18.7)	410 (81.3)	167 (33.1)	337 (66.9)	248 (49.2)	256 (50.8)
Gender						
Boys	48 (19.4)	199 (80.6)	92 (37.2)	155 (62.8)	134 (54.3)	113 (45.7)
Girls	46 (17.9)	211 (82.1)	75 (29.2)	182 (70.8)	114 (44.4)	143 (55.6)
Child age						
6-11 months	13 (23.2)	43 (76.8)	21 (37.5)	35 (62.5)	29 (51.8)	27 (48.2)
12-23 months	19 (18.8)	82 (81.2)	24 (23.8)	77 (76.2)	42 (41.6)	59 (58.4)
24-35 months	23 (21.1)	86 (78.9)	53 (48.6)	56 (51.4)	67 (61.5)	42 (38.5)
36-47 months	18 (14.2)	109 (85.8)	36 (28.3)	91 (71.7)	63 (49.6)	64 (50.4)
48-59 months	21 (18.9)	90 (81.1)	33 (29.7)	78 (70.3)	47 (42.3)	64 (57.7)

Table-3: Social factors associated with undernutrition among children aged 6-59 months.

Variables	Wasting		Underweight		Stunting	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Mother's education						
Illiterate	Ref					
Primary	0.57 (0.20-1.60)	0.740	0.87 (0.36-2.08)	0.846	0.97 (0.43-2.25)	0.936
High School	0.71 (0.52-1.98)	0.170	0.56 (0.34-1.85)	0.301	0.62 (0.22-1.56)	0.105
Bachelors/Above	0.29 (0.12-1.69)	0.220	0.73 (0.36-1.35)	0.122	0.73 (0.45-1.82)	0.120
Mother's occupation						
Housewife	Ref					
Employed	0.54 (0.07-0.95)	0.004	0.49 (0.12-0.80)	<0.001	0.57(0.22-0.89)	<0.001
Father's education						
Illiterate	Ref					
Primary	0.57 (0.22-0.93)	0.001	0.85 (0.41-0.96)	<0.001	0.87 (0.5-1.95)	<0.001
High School	0.45 (0.12-0.88)	0.001	0.76 (0.35-0.82)	<0.001	0.45 (0.15-0.92)	<0.001
Bachelors/Above	0.43 (0.13-0.85)	0.001	0.42 (0.21-0.70)	<0.001	0.38 (0.22-0.68)	<0.001
Father's occupation						
Daily Labour	Ref					
Merchant/Trade	0.67 (0.58-1.76)	0.075	0.89 (0.77-1.03)	0.095	0.84 (0.68, 1.83)	0.120
Employed	0.57 (0.50-1.65)	0.081	0.77 (0.67-1.88)	0.152	0.47 (0.39, 1.58)	0.101
Family income in Rupees						
Up to 20 Thousands	Ref					
21-30 Thousands	1.19 (1.11-2.18)	0.033	0.50 (0.24-0.82)	0.042	1.90 (1.01-3.80)	0.040
31-40 Thousands	0.74 (0.40-0.87)	0.036	0.80 (0.40-0.95)	0.011	0.82 (0.42-0.96)	0.027
≥41 Thousands	0.59 (0.25-0.71)	0.002	0.30 (0.08- 0.72)	0.017	0.54 (0.30-0.80)	0.001
Family type						
Nuclear	Ref					
Joint	1.36 (1.22-2.02)	0.001	1.70 (1.29-2.55)	0.002	2.03 (1.28-3.24)	0.005
Extended	2.61 (1.57-4.32)	0.001	2.94 (1.87-4.62)	0.001	2.12 (1.96-0.64)	0.001
House composition						
Kacha	Ref					
Semi pakka	0.76 (0.66-0.87)	0.001	0.85 (0.74-0.97)	0.017	0.72 (0.60-0.85)	0.021
Pakka	0.60 (0.52-0.89)	0.001	0.66 (0.57-0.76)	0.001	0.57 (0.48, 0.77)	0.028

OR: Odds ratio, CI: Confidence interval, Ref: Reference. Significance at $p<0.05$. Family income in Pakistani rupees (PKR). Kacha = Made from mud or stone. Semi pakka = Both mud and cemented sections. Pakka = Cemented.

was in the range of Pakistani rupees (PKR) 21,000-30,000, 256(50.8%) families were living in Kacha houses, 218(43.3%) respondents were living in nuclear families, 380(75.4%) were illiterate, 435(86.3%) mothers were housewives, 217(43.1%) fathers were uneducated, 239(47.4%) fathers were daily-wage labourers (Table-1).

The largest group among the children was of those aged 36-47 months 127(25.2%), while the smallest group was aged 6-11 months 56(11.1%). Overall, 94(18.7%) children were wasted, 167(33.1%) were underweight and 248(49.2%) were stunted. The status was distributed in terms of gender and age (Table-2).

Mother's occupation, father's education, family income, family composition and type of accommodation had a significant association, while the rest of the characteristics had no significant association with undernutrition (Table-3).

The age, birth order, birth space, exclusive breastfeeding, measles and diarrhoea in children had a significant association, while gender, place of birth, fever and ARI had no significant association with undernutrition (Table-4).

Breastfeeding duration, initiation of complementary feeding, hand-wash before meal, immunisation and healthcare-seeking behaviour had a significant association, while other factors, like the initiation of breastfeeding and hand-wash after using the toilet, did not have significant association with undernutrition (Table-5).

Maternal characteristics, like the number of children, ANC visits, health status during pregnancy, extra food during lactation and autonomy in decision-making regarding money expenditure were significantly associated, while mother's age and extra food during pregnancy were not significant association with undernutrition among the

Table-4: Characteristics associated with undernutrition among children aged 6-59 months.

Variables	Wasting		Underweight		Stunting	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Gender						
Male	1.16 (0.70-1.70)	0.360	1.44 (0.92-2.09)	0.254	1.37 (0.97-1.95)	0.451
Female	Ref					
Age						
6-11 months	Ref					
12-23 months	1.32 (1.16-2.17)	0.001	1.25 (1.12-2.11)	0.033	1.64 (1.15-2.68)	0.001
24-35 months	1.26 (1.11-2.12)	0.001	1.21 (1.15-2.27)	0.032	2.12 (1.47-3.56)	0.001
36-47 months	0.49 (0.29-0.84)	0.001	0.41 (0.22-0.78)	0.015	0.56 (0.41-0.78)	0.001
48-59 months	0.59 (0.34-0.88)	0.001	0.53 (0.27-0.83)	0.012	0.75 (0.49-0.85)	0.001
Birth order						
1st	Ref					
2nd	1.31 (1.18-2.17)	0.001	1.28 (1.16-1.52)	<0.001	1.69 (1.12-2.55)	<0.001
3rd	1.17(1.12-2.04)	0.001	1.44 (1.22-3.32)	<0.001	1.49 (1.27-2.3)	<0.001
4th and above	2.27(1.27-4.05)	0.001	3.08 (2.11-8.5)	<0.001	2.3 (1.41-3.7)	0.030
Birth space						
≤2 years	Ref					
3-4 years	0.78 (0.31-0.92)	0.042	0.12 (0.04-0.37)	<0.001	0.59 (0.12-0.86)	0.001
≥5 years	0.49 (0.33-0.75)	0.002	0.18 (0.02-0.56)	<0.001	0.49 (0.21-0.74)	<0.001
Place of delivery						
Home	Ref					
Hospital	0.97 (0.61-1.55)	0.170	0.65 (0.35-1.20)	0.081	0.81 (0.36-1.77)	0.602
Exclusive Breastfeeding						
No	Ref					
Yes	0.45 (0.32-0.53)	0.001	0.56 (0.42-0.78)	0.047	0.62 (0.51-0.97)	0.006
Fever						
Yes	Ref					
No	0.78 (0.43-1.43)	0.594	0.62 (0.15-1.36)	0.883	0.60 (0.32-1.11)	0.663
Measles						
Yes	Ref					
No	0.62 (0.40-0.96)	0.033	0.55 (0.44-0.69)	0.001	0.69 (0.44- 0.87)	0.030
Diarrhoea						
Yes	Ref					
No	0.77 (0.51-0.89)	0.001	0.60 (0.46-0.78)	0.001	0.65 (0.49-0.86)	0.001
ARI						
Yes	Ref					
No	0.99 (0.82-1.19)	0.872	0.94 (0.74-1.19)	0.618	0.98 (0.82-1.19)	0.883

OR: Odds ratio, CI: Confidence interval, Ref: Reference, ARI: Acute respiratory infection. Significance at $p<0.05$. Fever at the time of data-collection. Measles ever in life time. Diarrhoea in the preceding 2 weeks.

children (Table-6).

Environmental characteristics, like the source of water supply, separate room for kitchen and availability of latrine were significantly associated, while the type of latrine was not significantly associated with undernutrition (Table-7).

Discussion

Undernutrition among children aged 6-59 months was widespread in the study area. The findings were higher than the overall provincial and national data, which might be due to the low socioeconomic status of people in the area.[8,23,24]

The frequency of wasting in the current study was higher than Ethiopia (5.9%) and Vietnam (5%), and lower than Bangladesh (19.1%). The underweight data was higher than Ethiopia (27.5%) and Vietnam (15.8%), while it was less than Bangladesh (43.7%). Stunting numbers were higher than Bangladesh (47.1%) and Vietnam (20.7%), but lower than Ethiopia (50.7%).[25] The frequency of wasting, underweight and stunting in the current study was higher than the WHO standard prevalence cut-off values for public health significance, and, hence, the frequency of undernutrition was considered to be "very high".[26]

The difference in terms of gender in the current study was in-line with studies conducted in Ethiopia,[27,28] and the

Table-5: Child-caring practices associated with undernutrition among children aged 6-59 months.

Variables	Wasting		Underweight		Stunting	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Initiation of Breastfeeding						
Immediately	Ref					
After 1 hour	1.60 (0.91-2.34)	0.312	1.64 (0.85-2.68)	0.825	1.12 (0.73-1.73)	0.467
Duration of breastfeeding						
<12 months	Ref					
>12 months	0.27 (0.12-0.38)	0.004	0.69 (0.54-0.88)	<0.001	0.13 (0.07-0.23)	<0.001
Initiation of complimentary feeding						
<6 months	1.45 (1.28-1.72)	<0.001	1.16 (1.11-1.65)	<0.001	1.88 (1.54-2.74)	<0.001
>6 months	Ref					
Hand wash before meal						
Yes	Ref					
No	1.30 (1.14-1.49)	0.001	1.20 (1.15-1.43)	0.039	1.39 (1.25-1.75)	0.026
Hand wash after toilet						
With soap	Ref					
Without soap	3.80 (0.74-3.75)	0.206	5.76 (0.46-9.58)	0.125	3.72 (0.56-5.66)	0.322
Immunization						
Yes	Ref					
No	4.16 (2.18-7.93)	0.026	4.45 (2.77-7.14)	<0.001	4.36 (2.32-8.71)	0.012
Health care Seeking						
Yes	Ref					
No	4.62 (2.83-7.53)	0.006	5.46 (3.25-9.09)	0.001	6.8 (3.90-11.87)	<0.001

OR: Odds ratio, CI:Confidence interval, Ref: Reference. Significance at $p<0.05$. Immunisation = Attended extended programme for immunisation (EPI).

Table-6: Maternal characteristics associated with undernutrition among children aged 6-59 months.

Variables	Wasting		Underweight		Stunting	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Mother's age						
≤20 years	3.00 (0.93-5.91)	0.378	2.47 (0.89-5.09)	0.936	2.12 (0.87-3.56)	0.291
21-25 years	1.23 (0.82-1.83)	0.137	1.12 (0.73-1.73)	0.987	1.83 (0.88-2.61)	0.182
26-30 years	0.75 (0.49-1.95)	0.221	0.56 (0.41-1.78)	0.733	0.57 (0.29-1.72)	0.623
31-35 years	0.49 (0.29-1.84)	0.412	0.62 (0.43-1.92)	0.412	0.59 (0.34-1.84)	0.823
≥36 years	Ref					
No of child ever born						
≤3	Ref					
4-5	1.23 (1.14-1.81)	0.004	1.49 (1.15-2.11)	0.005	1.69 (1.18-2.52)	0.001
≥6	2.45 (1.78-3.38)	0.015	2.45 (1.78-3.38)	0.038	2.29 (1.41-3.75)	0.018
ANC visits						
Yes	Ref					
No	1.91 (1.13-3.22)	0.033	1.32 (1.22-2.13)	0.012	1.48 (1.32- 2.62)	0.017
Health status during pregnancy						
Good	Ref					
Not good/sick	1.26 (1.18-1.92)	0.025	1.42 (1.24-2.29)	0.044	1.61 (1.43-2.66)	0.045
Extra food during pregnancy						
Yes	Ref					
No	1.05 (0.71-1.56)	0.712	1.56 (0.95-2.56)	0.655	1.50 (0.95-2.37)	0.731
Extra food during lactation						
Yes	Ref					
No	1.85 (1.59-2.15)	0.001	1.39 (1.11-1.73)	0.001	2.25 (1.79-2.82)	0.017
Autonomy in decision making						
Yes	Ref					
No	1.23 (1.14-1.81)	0.010	1.25 (1.18-2.09)	0.002	2.45 (1.78-3.38)	<0.001

OR: Odds ratio, CI: Confidence interval, Ref:Reference, ANC: Antenatal care. Significance at $p<0.05$. Autonomy in decision making = Monetary expenditure.

Table-7: Environmental characteristics associated with undernutrition among children aged 6-59 months.

Variables	Wasting		Underweight		Stunting	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Source of water supply						
Tape water	Ref					
Well water	0.57 (0.29-0.72)	0.011	0.56 (0.41-0.78)	0.003	0.69 (0.50-0.96)	0.022
Pond	1.97 (1.58- 2.45)	0.001	1.44 (1.17-1.78)	0.001	1.85 (1.34-2.56)	0.015
Separate room for kitchen						
Yes	Ref					
No	1.14 (1.08-1.58)	0.012	1.22 (1.14-1.36)	0.015	1.72 (1.46-3.90)	0.037
Latrine availability						
Yes	Ref					
No	1.63(1.29-2.34)	0.001	1.76 (1.36-3.84)	0.007	1.45 (1.22-2.12)	0.005
Type of Latrine						
Private cement slab	Ref					
Shared cement slab	1.02 (0.60-1.80)	0.378	1.04 (0.79-1.93)	0.936	1.19 (0.82-1.40)	0.733

OR: Odds ratio, CI: Confidence interval, Ref: Reference. Significance at p<0.05. Latrine = Toilet, Private cemented slab = Room-attached toilet. Shared cement slab = Common toilet inside the house.

difference in terms of age was similar to the findings of a study conducted in the Sindh province of Pakistan.[29]

The current study's findings about maternal education matched those of a study conducted in the Democratic Republic of Congo.[30] However, other studies established a significant association between maternal education and children undernutrition.[31,32] The findings related to mother's employment status were in line with previous studies,[33-35] and same was the case with the father's education level.[36] The current results about family monthly income matched the findings of earlier studies,[27,37] and those about the type of accommodation were in-line with a study done in rural India.[38]

The current study also found that gender had no significant association with wasting, underweight and stunting, as established by earlier studies in Ghana and Brazil.[39,40] However, a study found that gender had a significant association with undernutrition.[28] Undernutrition was significantly associated with child age in the current study which was in-line with studies conducted in China and South Asia.[41,42] Children who were born first to their parents were less likely to become undernourished in the current study. A systematic review stated that undernutrition among later-born children was higher than earlier born children which might be because of maternal stores depletion owing to multiple pregnancies.[43] Those children who had birth space <2 years were more likely to get undernourished compared to children who had birth space >2 years. Study findings were confirmed by literature.[44] In the present study, there was no significant association between place of delivery and childhood undernutrition, which contradicted an earlier study.[21] Children exclusively breastfed were less likely to have undernutrition compared to those who were not exclusively breastfed, which also confirmed earlier results.[45] Also, children with diarrhoea in the preceding 2 weeks were significantly more predisposed to undernutrition, as stated by other studies.[36,46] Fever had no significant association with undernutrition, but a study conducted in eastern Ethiopia established the association between fever and undernutrition.[47]

Duration of breastfeeding and immunisation had a significant association, as proven by other studies.[48,49] Children who initiated complementary feeding at age <6 months were significantly associated with higher odds for being undernourished compared to those who initiated it >6 months, as reported by a previous study.[33] Children who washed their hands before the meal were significantly less likely to get undernourished, and it was also reported by a study in India.[50]

There was no significant association between maternal age and child undernutrition, and these observations were strengthened by a study in Africa.[51] The number of children ever born to a mother had a significant association with child undernutrition, and this was supported by a previous study.[52] The children of mothers who visited ANC centre during pregnancy were less likely to be undernourished, which was in accordance with previous studies.[27,46] Children of mothers who were healthy during pregnancy were at less risk of getting undernourished, and the finding was parallel to a community study conducted in Somali region.[53] The current study also found that children of mothers who had autonomy in decision-making regarding money expenditure had significantly lower odds for being undernourished, which was in-line with findings reported

by a study in Bangladesh.[54]

Children of households having latrine facility had significantly fewer chances to be undernourished, and similar results were reported by a previous study.[55]

In the light of the findings, it is obvious that the situation may worsen over time if necessary actions were not taken today. The relevant health department should consider the issue of undernutrition in its service delivery, and the ministry concerned should design and strengthen nutrition interventions and promote activities related to undernutrition in the study area. Training regarding nutrition for healthcare providers must be arranged, while the community should be sensitised regarding nutrition education and the need to have a balanced diet.

Furure studies should explore the effect of undernutrition on health and intellectual ability of children at the school level.

Conclusion

Undernutrition was found to be widespread among children aged 6-59 months in Tehsil Battagram, and it was considered to be an issue of "very high" public health significance, according to WHO standards.

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