Malnutrition and Associated Factors with Nutritional Status among Orphan Children: An Evidence-Based Study from Nepal

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Abstract

Background: Malnutrition is a common public health problem among children in low and middle-income developing countries. Orphan's children are vulnerable and neglected groups in society and are more prone to malnutrition. The study aims to identify the prevalence of underweight, stunting, thinness, and factors associated with nutritional status among orphan children.

Methods: Quantitative method & analytical cross-sectional research design were used to assess the nutritional status and its associated factors among orphan children in Pokhara Valley, Nepal. The sample size of 160 children was obtained by a simple random technique. The semi-structured questionnaire, digital bathroom scale, stadiometer was used as the data collection technique. Data management and analysis were done from Epi-info, SPSS 25 version, and WHO Anthro plus.

Findings: The majority of children were malnourished (80.6%) with the prevalence of stunting (55.1%), thinness (13.8%), and overweight (6.9%). Prevalence of underweight, stunting, and thinness was high among the boys (85.5%, 26.3%, and 15.8%), but overweight was more prevalent among the girls (7.1%). Ethnicity, sex, age, stay duration in an orphanage, and education of caregivers was associated with the nutritional status of orphan children (p <0.05). Non-privileged children and children below 11 years were more prone to malnutrition.

Conclusion: Malnutrition is highly prevalent in orphan children and needs to be addressed. There is still limited study available on the nutritional status of orphan children in Nepal. Nutritional status should be monitored regularly for early identification and timely intervention of malnutrition to promote the nutrition health status of orphan children.

Keywords: Overweight, Stunting, Underweight, Malnutrition, Orphan Children.

INTRODUCTION

According to (WHO), nutrition is food intake, considered in relation to the body's dietary needs. Optimum nutrition is required for the physical, mental growth, and development of the children [1]. Malnutrition is the common public health problem among children in low and middle-income countries [2-6]. In many countries, Demographic and Health Surveys (DHS) and national nutrition and surveillance systems have measured the height and weight of children below the age of 5 years, starting in the early 1990s. However, there is a scarcity of anthropometric data for school-aged children (5–14 years) [3]. Globally 150.8 million children are stunted 50.5, and 38.3 million children are wasted and overweight, respectively, and 2.01 billion adults are overweight and obese. Children living in children's homes are most vulnerable, and malnutrition is a particular concern [24]. In Asia, the total orphan population is around 5,72,20,000, accounting for 5.8% of the total child population. Asia is

the home for nearly 60 million children. The highest rate of under-nutrition in the world is seen in Asia. One in every two children is malnourished. The national nutrition survey (1995-96) report shows that about 62% of the children aged 6–9 years are malnourished, 43.4% are stunted but not wasted, and 9.3% of the children are wasted but not stunted. Besides, 9.1% of the children are both stunted and wasted [25, 26].

According to the state of children of Nepal, 2014, a total of 16,617 children are living under the care and protection of 594 residential child care homes across the country, and they have been deprived of nutrition. The political situation has leftover 5000 children homeless, according to a UNICEF study, and of those children, 50% may be HIV positive and much more ill. 2.6 million children are working in Nepal, and nearly 5% of those working are in the cruelest forms of work [27]. The number of children who are left orphaned in the world due to the loss of mother or father or both has increased in recent years. According to UNICEF, about 151 million children worldwide have lost one or both parents, where 61 million in Asia, 52 million in Africa, 10 million in Latin America and the Caribbean,

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and 7.3 million in Eastern Europe and Central Asia in which 17.8 million children are orphans due to the global HIV epidemic [28]. In every 2.2 seconds, a child loses a parent somewhere in the world [13].

Orphan children may experience a reduction in health, nutrition, and psychological well-being [7]. They are a vulnerable and neglected group [6, 8-12], in the society and are more prone to malnutrition [13]. Chronic undernutrition during childhood results in slower cognitive development and severe health impairment in later phases of life [14]. Whereas, inadequate dietary intake is the direct cause of malnutrition and indirectly household food security, maternal and child care, health services, and environment [6, 15].

METHODOLOGY AND MATERIAL

Quantitative methods and analytical cross-sectional study design were used to assess the nutrition status of orphan children in Pokhara Metropolitan, Nepal, from June 2019 to October 2019. Children staying at the orphanage for more than 3 months and between 6-14 years of age were included in the study. Based on Nepal's population statistics, the number of orphan children of age group 6-14 of child homes in Pokhara Metropolitan, Nepal, was 702 [29]

Simple random sampling was adopted. The sample size was calculated using the formula,

$$n = \frac{Z^2 pqN}{d^2(N-1) + Z^2 pq}$$

Z = standard normal variable at 95% CI (1.96), N = number of orphan children of age group 6-14 of child homes in Pokhara Metropolitan, Nepal (702), p = estimated proportion (p = 0.16) based on the previous study [30], q = 1-p, d = margin of error (5%). i.e. the sample size for this study was calculated to be 160.

A semi-structured pretested and predesigned questionnaire was used to collect information regarding age, gender, hygiene practices, etc. Details like orphan status, reasons for stay, duration of stay in orphanages, age at admission were taken from orphanage records. A child was subjected to anthropometric and personal hygiene assessments. Weight was measured with a bathroom weighing scale. Weighing Machine was regularly standardized with known standard weights. The scoring system evaluated personal hygiene; data was collected on important hygiene aspects like hair, skin, oral cavity, nails, etc. and depending on the

scores, different grading was done as good (>8), fair (6-8) and poor (<5). Anthropometric data, namely weight for age, was assessed through BMI classification and height for age. BMI for age Z-scores was assessed using WHO ANTHRO PLUS 2007 software and the Z-scores of the children then compared to the existing World Health Organization growth standards (WHO, 2007). Data entry, management, and analysis were done with EpiData 3.1, SPSS version 25, and WHO Anthro plus. Chi-square (χ^2) test was performed to find an association between study variables.

Age, religion, sex, ethnicity, duration of stay, the reason for stay, orphan status was socio-demographic variables. Education, income source, the occupation was as assessed as socio-economic variables. Personal hygiene, physical activity, food consumption were assessed as behavioral variables. Nutrition status was considered as dependent variables for the study purpose.

Ethical Approval was taken from IRB of Pokhara University (IRB Ref. No. 127/076/077), local government, and respondents for conducting this study. Informed consent was taken from the respondents. The privacy of the information was maintained and used for the research purpose only.

RESULTS

Among the 160 total population, more than half of the participants were female. The majority of the respondents were the followers of the Hindu religion, i.e. (76.9%). The highest number of the participants, 44.4%, were of the age group 12-14 years, where the mean age was 10.7 years, the minimum age was six years, the maximum age was 14 with SD 2.6. The majority of 31.9% of the participants have the only mother as parental status. The number of upper caste groups among other ethnic groups was highest, i.e. (28.1%). The highest number of participants are in the orphan home due to poverty (36.9%), as shown in Table **1**.

The prevalence of underweight was 80.6%, which was more among the boy's comparison to girls. (85.5% vs. 72.2%). The prevalence of stunting, thinness, and overweight was 55.1%, 13.8%, and 6.9%. Moderate and severe stunting were found high in boys about 22.4% and 3.9% comparison to girls 13.1% and 3.6% respectively, whereas moderate (15.8%) and severe (6.6%) thinness was also more prevalent among boys. Still, overweight was high among girls, about 7.1% comparison to boys 6.6%.

Table 1:   Socio-Demographic Characteristics of the Participants (n=160)

Gender	Frequency	Percent%
Male	76	47.5
Female	84	52.5
Age		
6-8	38	23.8
9-11	51	31.9
12-14	71	44.4
Mean=10.7, Min=6, Max=14, SD=2.6		
Education		
Illiterate	2	1.3
Informal	20	12.5
Basic	138	86.3
Religion		
Hindu	123	76.9
Buddhist	25	15.6
Christian	12	7.5
Ethnicity		
Upper caste group	45	28.1
Relatively advantaged Janajati	33	20.6
Disadvantaged Janajati	35	21.9
Disadvantaged Non-Dalit Terai	7	4.4
Dalit	40	25
Orphan status		
Only father	28	17.5
Only mother	51	31.9
No one	50	31.3
Both present	31	19.4
Duration of stay		
6 month-3 year	47	29.4
3-6 year	60	37.5
>6 year	53	33.1
Reason of stay		
Parents are not alive	47	29.4%
Poverty	59	36.9%
Abandoned	39	24.4%
Streets children	12	7.5%
Parents in prison	10	6.3%
Others	13	8.1%

Table **2** elicited the consumption pattern in terms of different food groups. It was seen that cereals, protein-rich food like pulses and lentils, other vegetables, roots and tubers, sugar and fats, and oil were consumed daily. Fried snacks and milk and milk product are maximally consumed once a week. Personal hygiene

Table 2:   Food Frequency Distribution

Food Groups	Every day (%)	Once a week (%)	Once a fortnight (%)	Once a month (%)
Cereals	100	-	-	-
Pulses and lentils	100	-	-	-
Green leafy vegetables	68.8	31.3	-	-
Other vegetables	100	-	-	-
Roots and tubers	100	-	-	-
Fruits	37.5	53.8	8.8	-
Milk and Milk products	26.3	57.5	7.5	8.8
Fish and meat products	-	100	-	-
Sugar and jiggery	100	-	-	-
Fats and Oils	100	-	-	-
Fried snacks/Sweet snacks	-	63.7	-	36.3

Table 3:   Personal Hygiene Characteristics of Children

Wash hand before eating(n=160)	Frequency	Percent %
Yes	160	100
No	0	0
Wash hand after using toilet (n=160)		
Yes	160	100
No	0	0
Wash hand by (n=160)		
Soap water	160	100
Only water	0	0
Brush teeth regularly (n=160)		
Yes	141	88.1
No	19	11.9
Weekly bath (n=160)		
Daily	18	11.3
4-6 times	12	7.5
<4 times	130	81.3
Weekly tidy clothes (n=160)		
Daily	91	56.9
Sometimes	69	43.1
Trim nail regularly (n=160)		
Yes	84	52.5
No	76	47.5

Table 4:   Gender Wise Grading of Under-Nutrition and Personal Hygiene Score

Nutrition status	Total children		Gender			
			Boys (n1)		Girls (n2)	
Body Mass Index (kg/m$^{2)}$)	N (n1=n2)	%	N	%	N	%
Underweight (<18.5)	129	80.6	65	85.5	64	76.2
Normal (18.5-24.9)	29	18.1	11	14.5	18	21.4
Stunting (height for age)						
Mild stunting (>-2SD to <-1 SD)	54	33.8	24	31.6	30	35.7
Moderate stunting (>-3 SD to <-2 SD)	28	17.5	17	22.4	11	13.1
Severe stunting (<-3 SD)	6	3.8	3	3.9	3	3.6
Total	88	55.1	44	57.9	44	52.4
Thinness (BMI for age)						
Moderate thinness (>-3 SD to <-2 SD)	16	10	12	15.8	4	4.8
Severe thinness (<-3 SD)	6	3.8	5	6.6	1	1.2
Overweight (+1 SD to +2 SD)	11	6.9	5	6.6	6	7.1
Total	33	20.7	22	29	11	13.1
Status of personal hygiene	**Good** N (%)	**Moderate** N (%)	**Poor** N (%)		**Total** N (%)	
Boys	6(7.9)	63(82.9)	7(9.2)		76 (100)	
Girls	13(15.5)	65(77.4)	6(7.1)		84 (100)	
Total	19(11.9)	128(80.0)	13(8.1)		160 (100)	

was observed regarding washing hands before eating, washing hands after using the toilet, and washing had by soap water was found to be 100% (Table **3**). The status of personal hygiene was assessed using a ten-point grading system [13], which was graded as >8 points as good, (6-8) points as moderate, and ≤5 as poor. It was found that study participants (11.9%) had good personal hygiene scores, while 80% had moderate hygiene scores, and 8.1% were found to have poor hygiene (Table **4**). There was a statistically significant association between nutrition status with age, ethnicity and time of stay in children's home with p-value <0.01 in both age and time of stay in children's home, OR of age with 3.99 and C.I (1.70-9.36), the ethnicity of respondents (p-value <0.05, OR = 5.00, C.I (1.44-17.36) as shown in Table **5**.

DISCUSSION

In the present study, unlike the common perception that children's home includes orphaned children, in our study, only 31.3% of the children had neither of their parents. Interestingly 36.9% of them cited poverty and education as a reason for seeking children's homes. Only 6.3% of children were there because their parents are in prison for years. A study done in Kaski in 2017, found that 34.5% of people are in orphanages because their parents are not alive [16]. Almost similar to our study result that may be due to the same area and the same study population. On the contrary, a study conducted in orphanages in Bhubaneshwar India in 2018 found that the highest percentage of people (47.1%) are in orphanages because their parents are not alive [13]. A study conducted in orphanages in Bangladesh in 2013 found that the highest percentage of people (50.7%) were living in orphanages for educational purposes, and this may be due to poor economic status of parents [17].

In the present study, food frequency consumption patterns of respondents 100% are found to have cereals, pulses and lentils, vegetables, sugar, and fat product daily. A study conducted in Bhopal India in 2013, founds that 100% of people have cereals, vegetables, fat, and oil product in daily basis which is similar to our study but least people were found to have green vegetable about 4% in regular basis and 100% in milk and milk product which is higher than ours, this may be due to small age group of children [18]. A study conducted in orphaned adolescents' girls of children's

Table 5: Association between Underweight and Socio-Demographic Variables

Variable	Underweight					Chi-square χ²	p-value	OR	OR 95% CI
	Yes		No		Total				
Sex	N	%	N	%					
	129	80.6	31	19.4					
Male	65	85.5	61	14.5	76	2.23	0.136	1.847	0.82-4.16
Female	64	76.2	20	23.8	84				
Age									
<=11	80	89.9	9	101	86	11.016	0.001**	3.99	1.70-9.36
>11	49	69	22	31	71				
Education									
Illiterate	2	100	0	0	2	0.49	1.00#	1.24	1.15-1.34
Literate	127	80.4	31	19.6	158				
Religion									
Hindu	102	82.9	21	17.1	123	1.80	0.179	1.799	0.76-4.27
Non-Hindu	27	73	10	27	37				
Ethnicity									
Privileged	45	93.8	3	6.3	48	7.56	0.006**	5.00	1.44 - 17.36
Non-Privileged	84	75	28	25	112				
Time of stay in children's home									
6 months-3 years	44	93.6	3	6.4	47	10.59	0.005**	-	-
3-6 years	49	81.7	11	18.3	60				
>6 years	36	67.9	17	32.1	53				
Orphan status									
Having parents	90	81.8	20	18.2	100	0.32	0.57	1.27	0.56-2.89
Not having parents	39	78	11	22	50				
Reason of stay									
Parents are not alive	37	78.7	10	21.3	47	0.15	0.69	0.84	0.36-1.96
Parents are alive	92	81.4	21	18.4	113				

*p-value significant at α<0.05, **significant at α<0.01, ***significant at α<0.001, # Fisher's exact test.

home in Uganda in 2018 found that 97.7% have cereals product in daily basis whereas, vegetables are found half than ours about 50% and dark green vegetables are found to be 15% which is one- quarter to ours [19].

In the present study prevalence of underweight was 80.6% among the study population. A study done in Bangladesh in 2013 among (5-14 year) orphan children founds that 65% of children were underweight, which were similar to our findings [17]. A study was done among orphan children (6-14) year in 2018 in India founds that 55.7% were underweight [13]. Also, another study from India done in 2013 among the orphan and non-orphan children (6-16) years founds

that 45.7% were underweight [1]. This study seems to have less underweight than ours. This might be due to less sample size as it was a pilot study and also consist of non-orphan children. From the annual report of Nepal, it was found that total 27% under-five children population are found to be underweight [6, 21], which is least than our study as it is under five age group and it is evident that children from children's home came from a poor economic family where children could not get adequate nutritious food.

In the present study, the prevalence of stunting was 55.1% among the study population. Our research is supported by a study done in India in 2019 in orphan children of (6-14 years) founds that 53.3% of stunting

prevalence [13]. A study done in Uganda among (10-19 years) adolescents' girls in 2018 found that 18.9% were stunting [19]. A study done in India in 2013 among the orphan and non-orphan children (6-16) years found that 37.1% were stunting [1], which is quite similar to our study findings. The high rate of stunting was not surprising as the children's home participants are more likely to have grown up in poor conditions. According to Nepal Demographic & Health Survey (NDHS), stunting is relatively high among children from the lowest wealth quintile (49%) compared with the most top wealth quintile (17%) [22]. From the Annual Report of Nepal, it was found that a total of 36% under-five children population found to be stunted, which is near similar to our study [21].

In the present study, the prevalence of thinness was 13.8% among the study population. A study done in India in 2019 in orphan children of (6-14 year) founds that 25.3% had thinness [13], While a study done on orphans in Bangladesh found that 48% children had thinness and this difference may be due to poor standards of living and nutrition in Bangladesh [17]. A study done in Gondar city, Ethiopia, in 2014, among orphan children below age five, was found to be 9.9%, which is similar to our study result [23]. It was found that a total of 10% under-five children population are found to be wasted, which is near similar to our study [21].

In the present study prevalence of overweight was 6.9% among the study population. A study was done among the orphan, and vulnerable children in Kaski district in 2017 among (6-18 age) found 4.3% overweight [16]. A study was done in Douala, Cameroon in 2019, found that 1.7% were overweight, which was done among orphan children up to 18 years, which is quite relevant to our findings [2]. The study found that girls were following hygiene practices better than boys. Similar findings were found in India's orphanages children's study [13]. Another similar finding was found in a study conducted in 2010 among primary school children (5-10 years) in South Kolkata [20]. Though the hygiene practices were found to be better, the situation of nutritional status was very poor and critical among the orphan children, leading to child mortalities.

CONCLUSION

Malnutrition is highly prevalent in children living in orphanages and needs to be addressed. Age, ethnicity, sex, and duration of stay at the orphanage were the major associated factors with malnutrition of orphan children. The major prevalence of underweight, stunting with thinness and overweight among the orphan children, indicates the severity of children's overall health. Interestingly, a high percentage of the children are in children's homes due to poverty, education, and abandoned. There is still limited study available on the nutritional status of orphan children in Nepal. Nutritional status should be monitored regularly for early identification and timely intervention for improving the nutritional status of children living in orphanages.

FUNDING AND CONFLICT OF INTEREST

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