ORIGINAL ARTICLE

Nutritional Status and its Determinants in Toddlers: A case study of Hilly region of Uttarakhand

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| Abstract | Introduction | Methodology | Results | Conclusion | References | Citation | Tables / Figures |

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Citation

Article Cycle

Abstract

Background: Nutrition in early childhood is of utmost importance specifically for first 1000 days. (1) If in this phase nutrition is neglected, it drags the child into the trap of malnutrition. **Aims & Objectives**: The objectives were: assess the nutritional status of children and identify the risk factors related to malnutrition in children (1-3) years. **Methods & Material**: Descriptive exploratory design- conducted in rural villages of Haldwani block, Uttarakhand. Multi stage random sampling technique was used to select 703 children of (1-3) years and their mothers. The children were screened for malnutrition and mothers were interviewed via semi – structured interview schedule. **Results**: It was found that, 74(11%) children were undernourished, 28 (3.9%) were wasted in mild category and 11 (1.5%) in moderate category. About 87 (12%) were found to be stunted in mild to moderate category. Children below 2.5kg at birth [(1.106, 3.817), p= 0.023], non-initiation of breast feed in one hour [(0.979, 3.344), p=0.055], delayed initiation of weaning [(1.162,4.026), p=0.013] and recurrent illness [(1.187,3.447), p=0.009] were factors associated with malnutrition in children at 95% CI. **Conclusion**: It is very important to follow up the identified malnourished children so that in the preschool age the nutritional status can be improved.

Keywords

Introduction

Malnutrition in early childhood is leading cause of mortality in children below five years of age. (2) It occurs due to both under and over nutrition ranging from severe nutritional deficiencies to obesity. (3) Globally in 2020, 149 million children under five years were found stunted and 45 million wasted. About 45% of deaths in children under five years occurs due to undernutrition adding to 22% disease burden to country. (4,5) India is burdened with 8.1 million children with severe acute malnutrition. (6,7) Inadequate knowledge regarding food, religious myths, cultural practices and demographic characteristics have proven to be the most vital predisposing factors to malnutrition. (8,9) As the growth of the child in years is rapid, so inappropriate feeding practices can lead to malnutrition. (10,11) In due course it delays growth and development and deteriorates cognitive performance of children. (12,13)

The data regarding malnutrition and its affects are available but its rates vary from state to state in India. Uttarakhand is a hilly state sharing its borders with Himachal Pradesh and Uttar Pradesh. The available literature on malnutrition in hilly areas are not enough, particularly the hilly regions of Uttarakhand. (14)

Aims & Objectives

1. To assess the nutritional status of children below five years of age.

2. To identify the risk factors related to malnutrition in children below five years of age.

Material & Methods

Study Type: A community based exploratory survey was part of the first phase of the study which was undertaken to screen the children in the selected area with a view to develop a comprehensive intervention package for mothers and families of identified malnourished children. Multi stage random sampling technique was adopted.

Study Population: The participants of the study were the children in age group (1 to 3) years and their mothers who give consent to participate in the study.

Study Area: Haldwani Block, Nainital district, Uttarakhand.

Study Duration: Four Months

Sample Size calculation: Sample size calculation was based upon previous published literature. Considering underweight as a primary outcome of the study and using 95 % confidence interval approach, with 5 % absolute precision for given prevalence of underweight in previous published literature (i.e., =61.78%), a sample of 376 was required to conduct the study. Further using design effect 1.5 and 10% non-response, a total of 622 samples was estimated for the present study which was levelled up to 703 as per the total number of children available in the present area during screening.

Inclusion Criteria: Children in the age group of one to three years and availability of the children at the time of data collection.

Exclusion Criteria: Mothers not willing to participate in the study and who are not able to understand Hindi language.

Strategy for collection: Out of eight blocks in Nainital district, Haldwani block was conveniently selected. There is one community health center and seven primary health care centers with 21 subcenters in Haldwani (15). In order to select the area under the study, 20% of subcenters were randomly selected i.e., 4 sub centers and all the villages in the selected subcenters were screened for malnutrition in children. Door to door screening of the children was done to assess the nutritional status. The tools used for data collection were structured questionnaire on socio demographics, semi structured questionnaire on risk factors related to malnutrition and tools for nutritional screening i.e., weighing machine, inch tape and Shakir tape. Weighing machine and inch tape were calibrated to 0.1% error. The tools were validated and pretested. Nutritional status of children was assessed via weight, height and mid upper arm circumference. In the present study, nutritional status of children was classified as per WHO i.e., undernourished (weight for age), stunting (height for age) and wasting (height for age). (Figure 1)

Data Analysis-Software: Data was analyzed by using statistical software SPSS-22. Categorical data was expressed as frequency and percentage. Anthropometric indices were calculated using WHO Anthro plus software 1.0 version. Chi-square/Fisher exact test was used to find the association between nutritional status of children and selected demographic and associated factors. Logistic regression analysis was carried out to estimate the odds of underweight, Stunting and wasting. Those variables found statistically significant in univariate analysis were include in the multivariable analysis. Some variable found statistically not significant at 5% level of significance in univariate analysis were clinically important. So that p-value was increased to 10% in multivariable analysis by including these variables. A $p < 0.05$ was considered as statistically significant.

Ethical Approval: The study was conducted after obtaining ethical clearance from Swami Rama Himalayan University (SRHU/HIMS/E-I/2019/92). Administrative permission was obtained from child development project officer, Haldwani and Gram Pradhan's of villages under study.

Consent: Informed consent was obtained from mothers of children before recruiting them in the study.

Results

The study findings presented below are part of the first phase of the study conducted. A total of 703 children were screened for malnutrition and among them 255 (36%) children were in the age group of (25-30) months, about 632 (89.0%) children belonged to Hindu religion. The other baseline characteristics of children is shown in (Table 1).

Nutritional status of children is depicted in (Figure 2), (Figure 3) and (Figure.4) below. It was found that about 74(11%) children were undernourished, 28 (3.9%) were wasted in mild category and 11 (1.5%) in moderate category. About 87 (12%) were found to be stunted in mild to moderate category.

Chi square and odds was computed to find association between risk factors and malnutrition as shown in (Table 2) (Table 3) and (Table 4) A logistic regression of 95% confidence interval was carried out to adjust for cofounders and identify the factors associated to malnutrition. A statistically significant association was found between underweight and anemia during pregnancy (p=0.039), children weighing less than 2.5kg at birth (p= 0.023), non-initiation of breast feed within one hour of birth (p=0.045), children with early initiation of weaning (p=0.013), children who were bottle-feeding (p= 0.046), children with recurrent illness (p=0.001), children who skipped meals (p=0.011) and those children who do not enjoy while eating meals (p=0.006). Environmental factors like having an open drain system around house (p=0.007) and children whose families didn't sow their own vegetables (p=0.000) was also found associated. Odds between malnutrition and wasting found that children whose breast feeding was not initiated within

one hour of birth (p=0.048), children still bottle-feeding (p= 0.013) and children whose families who don't sow their own vegetables were (p=0.002) were significantly associated factors.

Between stunting and malnourishment, it was found that the mothers who were anemic during pregnancy (p=0.003), children whose breast feeding was not initiated within one hour of birth (p=0.022), children with bottle-feeding (p= 0.034), children with recurrent illness (p=0.009), children not enjoying while eating (p=0.000), families having pucca house (p=0.014), families not having toilet (p=0.038) and those families who don't sow their own vegetables (p=0.002) were significantly associated risk factors.

In multivariate logistic model, mothers with complications during pregnancy were found to have three times more risk to have a malnourished child [95% CI (1.040 -9.088), p = 0.042)],children weighing less than 2.5kg at birth were twice at risk for development of malnutrition [95% CI (1.103,4.260), p = 0.025)],non-initiation of weaning was found to have two times more risk for malnutrition in children [95% CI (1.323,5.172), p = 0.006)], children who were bottle feeding were 2.12 times higher at risk for malnutrition [95% CI (0.271, 0.826), p = 0.009)], risk for malnutrition in children with recurrent illness was found to be two times more [95% CI (1.372, 4.647), p = 0.003)], children skipping meal were 2.3 times [95% CI (1.312, 4.341), p = 0.004] at higher risk for malnutrition, children not enjoying while eating meals were 1.9 times [95% CI (1.077, 3.351), p = 0.027] at higher risk for malnutrition, families having an open drain system around house was noted to have 2.4 times [95% CI (1.026,5.739), p = 0.043] higher risk for malnutrition in children and children whose families which didn't sow their own vegetables were at 2.9 times [95% CI (1.687,5.315), p = 0.000] risk to develop malnutrition. All these factors were found to be independently contributing to malnutrition.

Discussion

Nutritional status of children below five years are affected by several factors. Malnutrition in children is not affected by food intake alone but access to health services, quality of care for the child and pregnant mother as well as good hygiene practices also influence it. The present study consisted of 703 children in the age group of (1-3) years and their mothers. Majority 255 (36%) children were in the age group of (25-30) months and most of the 632 (89.0%) children belonged to Hindu religion. There are similar studies (15,16,17) conducted which found that majority of the children in this age group of (25-30) months.

The prevalence of malnutrition is a composite marker of nutritional status. In our study it was found that the overall prevalence of undernutrition, wasting and stunting was 74(11%), 28 (3.9%) were wasted in mild category, 11 (1.5%) in moderate category and 87 (12%) respectively.

Findings of the present study were contradictory to a study conducted by Ruhman, where the prevalence of stunting, underweight and wasting was found to be 28.8%, 31% and 27% respectively.(18) Similarly, another study conducted among under five children found the prevalence of underweight, stunted, and wasting to be 21.4%, 27.4% and 11.1% respectively which contradict the findings of the present study.(19) This might be because the above mentioned studies were conducted in children below five years and our study was conducted in toddlers. Very few studies are conducted among toddlers in India. In our study the factors associated to malnutrition were: children weighing less than 2.5kg at birth [95%CI (1.106, 3.817), p= 0.023], non-initiation of breast feed within one hour [95%CI (0.979, 3.344), p=0.055] delayed initiation of weaning [95% CI (1.162,4.026), p=0.013] children who skipped meal [95% CI (1.163,3.447), p=0.011] open drain system [95% CI (1.301,6.346), p=0.007], children with recurrent illness [95% CI (1.187,3.447), p=0.009]. These findings were in accordance to study done by Jeyakumar, where they found that the introduction of complementary feeding before 6 months is associated with malnutrition. (20) Another similar supporting study also found that low birth weight and weaning are factors associated with malnutrition in children. (17)

Conclusion

The findings of the present study identified the prevalence of malnutrition in children (1-3) years. There are very few studies done in specific age groups to identify the prevalence and factors but it is necessary, as if in this age group child is tracked by health care worker it will help in near future to reduce the prevalence of malnutrition in preschool age. This is help us to tackle the malnutrition and overcome it through regular screening of child. It also gives us a clear path to create community awareness about malnutrition in early age i.e., first 1000 days and ways to encounter it by optimal feedings, weaning, screening, and adopting good practices which indirectly affects the health of the child. It is also importance to involve the entire family with mother being the central figure so that one to one/ family counselling can be done and problems can be identified at an early stage. These small steps are urgently required to overcome the problem of malnutrition in under five children.

Recommendation

For better health of children in future it is very important that the ICDS services functioning in Uttarakhand has to be strengthen more so as to make it more accessible to the children living in higher altitudes. It is also important to follow up the identified malnourished children in the age of (1-3) years by Aganwadi workers till the age of five years. There should be proper coordination between the health care workers at all levels and measures should be undertaken to involve the community and family so as to

prevent the ill consequences of undernutrition in children with proper and timely intervention.

Limitation of the study

The study included only toddlers. Also, the information collected from mothers was based in recall method. Other blocks could not be covered due to covid situation.

Relevance of the study

This study helps us to understand the factors contributing to malnutrition in early childhood in the selected geographical location. It has also helped us to understand the current status of health services specifically in hilly areas. As there are limited evidences available regarding the nutritional status of under-five children in hilly terrains, this study in future will help to develop various intervention strategies in order to combat the menace of malnutrition in children.

Authors Contribution

PH: Literature review, Data Collection, Analysis, Interpretation, Manuscript writing. LV: Study Concept and Design, Interpretation, Intellectual content, Manuscript review. AKS: Reviewed the manuscript, Preparation and organization of manuscript, Manuscript review. HCS: Manuscript Review, Intellectual content, Data acquisition, Analysis and reviewed the concepts also.

Acknowledgement

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Tables

TABLE 1: FREQUENCY AND PERCENTAGE DESCRIPTION OF SAMPLE CHARACTERISTICS [N = 703]

Variables	Frequency (%)
Age of child (in months)	
12 – 18	102(15)
19 – 24	171 (24)
25 – 30	255 (36)
31 – 36	175 (25)
Religion:	
Hindu	632 (89.9)
Muslim	56 (8)
Christian	12 (1.7)

Others	3 (0.4)
Type of Family	
Nuclear	249 (35)
Joint	454 (65)
Number of children:	
1	261 (37)
2	337 (48)
3	86 (12)
>4	19 (3)
Health facility accessibility during child illness	
Yes	678 (96)
No	25 (4)
Aganwadi services by ASHA worker	
Yes	673 (96)
No	30 (4)

Only part of table presented

TABLE 2. ADJUSTED ODDS RATIO FOR RISK FACTORS OF MALNUTRITION- UNDERWEIGHT [N = 703]

	Factors	NW	UW	Unadjusted Odds Ratio (95% CI)	*p* value
Anemia during your pregnancy	Yes	65	14	1.95	0.039*
	No	562	62	(0.271-0.965)	
Weight of child above 2.5 kg	Yes	560	61	2.055	0.023*
	No	67	15	(1.106-3.817)	
Breast feeding within 1 hour	Yes	552	61	1.809	0.045*
	No	75	15	(0.979-3.344)	
Weaning initiated after 6 months	Yes	563	61	2.163	0.013*
	No	64	15	(1.162-4.026)	
Bottle feeding	Yes	354	52	1.67	0.046*
	No	273	24	(0.359-0.995	
Child was not well	Yes	540	54	0.396	0.001*
	No	84	22	(1.466-4.361)	
Child skips meal	Yes	251	19	2.002	0.011*
	No	376	57	(1.163-3.447)	
Enjoys eating all cooked by you	Yes	492	49	2.008	0.006*
	No	135	27	(1.209-3.333)	
Open drainage system	Yes	599	67	2.873	0.007*
	No	28	9	(1.301-6.346)	
Pucca House	Yes	145	21	0.787	0.383
	No	482	55	(0.461-1.346)	
Toilet in the House	Yes	604	72	1.458	0.497
	No	23	4	(0.490-4.337)	
Sow your own vegetables	Yes	542	51	3.125	0.000*
	No	85	25	(1.839-5.312)	

*OR> 1 Increased risk of malnutrition; OR= 1 No risk; OR< 1 Decreased risk of malnutrition; * p< .05, = Significant, NW= Normal Weight, UW = Underweight*

TABLE 3. ADJUSTED ODDS RATIO FOR RISK FACTORS OF MALNUTRITION- STUNTING [N = 703]

	Factors	NW	UW	Odds Ratio (95% CI)	p value
Anemia during your pregnancy	Yes	61	18	2.38	0.003*
	No	554	70	(0.239-0.765)	
Weight of child above 2.5 kg	Yes	546	75	1.371	0.331
	No	69	13	(0.723-2.600)	
Breast feeding within 1 hour	Yes	543	70	1.939	0.022*
	No	72	18	(1.090-3.440)	
Weaning initiated after 6 months	Yes	550	74	1.6	0.138
	No	65	14	(0.855-2.994)	
Bottle feeding	Yes	346	60	1.66	0.034*
	No	269	28	(0.372-0.966)	
Child was not well	Yes	528	66	0.49	0.009*

	No	87	22	(1.187-3.447)	
Child skips meal	Yes	236	64	0.988	0.962
	No	379	54	(0.625-1.564)	
Enjoys eating all cooked by you	Yes	487	54	2.395	0.000*
	No	128	34	(1.495-3.837)	
Open drainage system	Yes	583	83	1.38	0.851
	No	32	5	(.0248-2.091)	
Pucca House	Yes	136	30	0.548	0.014*
	No	479	58	(0.339-0.887)	
Toilet in the House	Yes	595	81	2.57	0.038*
	No	20	7	(1.054-6.269)	
Sow your own vegetables	Yes	529	64	2.306	0.002*
	No	86	24	(1.369-3.885)	
*OR> 1 Increased risk of malnutrition; OR= 1 No risk; OR< 1 Decreased risk of malnutrition; * p< .05, = Significant, NW= Normal Weight, S = Stunting*					

TABLE 4. ADJUSTED ODDS RATIO FOR RISK FACTORS OF MALNUTRITION- WASTING [N = 703]

Factors	NW	UW	Odds Ratio (95% CI)	*p* value
Anemia during your pregnancy				
Yes	71	8	2.15	0.059*
No	593	31	(0.205-1.048)	
Weight of child above 2.5 kg				
Yes	585	36	0.617	0.427
No	79	3	(0.185-2.050)	
Breast feeding within 1 hour				
Yes	583	30	2.159	0.048*
No	81	9	(0.989-4.711)	
Weaning initiated after 6 months				
Yes	588	36	0.644	0.471
No	76	3	(0.193-2.14)	
Bottle feeding				
Yes	376	30	2.56	0.013*
No	288	9	(0.183-0.837)	
Child was not well				
Yes	563	31	0.69	0.374
No	101	8	(0.642-3.219)	
Child skips meal				
Yes	256	14	0.89	0.740
No	408	25	(0.571-2.195)	
Enjoys eating all cooked by you				
Yes	515	26	1.728	0.116
No	149	13	(0.866-3.446)	
Open drainage system				
Yes	627	39	1	0.130
No	37	0	(0.045-0.085)	
Pucca House				
Yes	153	13	0.598	0.141
No	511	26	(0.300-1.193)	
Toilet in the House				
Yes	638	38	0.645	0.669
No	26	1	(0.085-4.887)	
Sow your own vegetables				
Yes	567	26	2.922	0.002*
No	97	13	(1.451-5.883)	
*OR> 1 Increased risk of malnutrition; OR= 1 No risk; OR< 1 Decreased risk of malnutrition; * p< .05, = Significant n = 703, NW= Normal Weight, W = Wasting*				

Figures

FIGURE 1. FLOWCHART OF METHODOLOGY

Nainital District

↓

8 Blocks

↓ Conveniently

1 Block

↓

CHC

↓

PHCs covering 21 subcenters

↓ Randomly Selected

4 Subcenters

↓

Door to door screening of children (n = 703)

↓
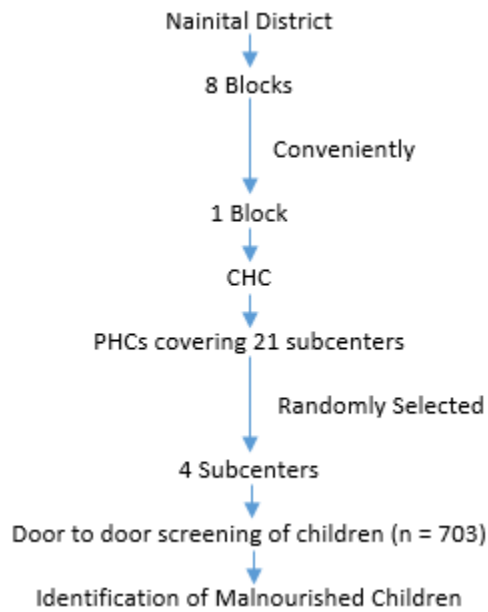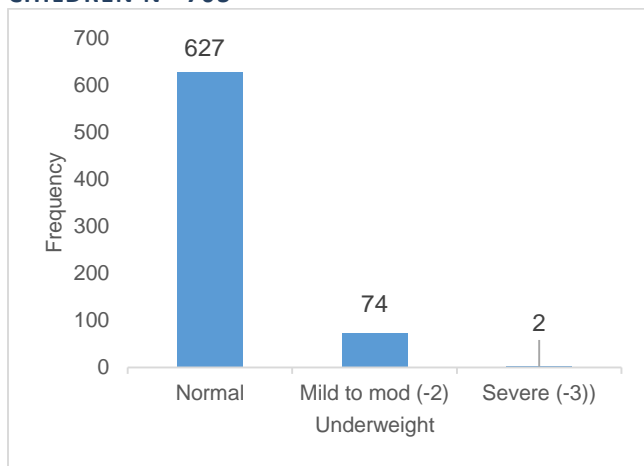
Identification of Malnourished Children

FIGURE 2. BAR DIAGRAM REPRESENTING FREQUENCY DISTRIBUTION OF UNDERWEIGHT CHILDREN N= 703

FIGURE 3. BAR DIAGRAM REPRESENTING FREQUENCY DISTRIBUTION OF WASTING IN CHILDREN N = 703
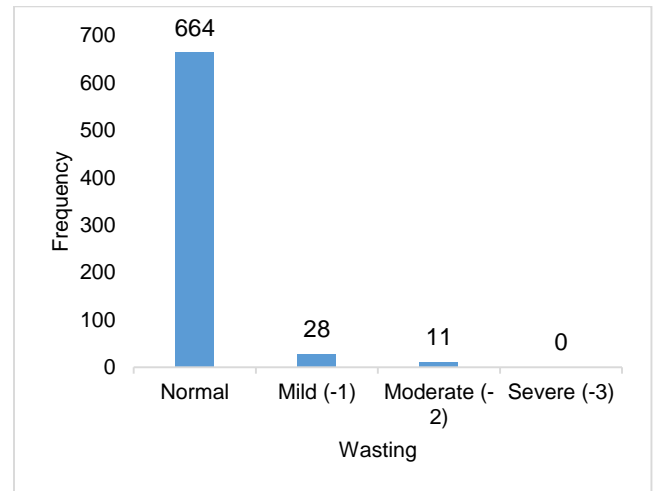

FIGURE 4. BAR DIAGRAM REPRESENTING FREQUENCY DISTRIBUTION OF STUNTING IN CHILDREN N = 703