Nutritional Status and the Associated Factors in Under Five Years Children of Lamjung, Gorkha and Tanahun Districts of Nepal

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ABSTRACT

Background: The nutritional status of children is important as it determines their health, physical growth as well as development, productive life and academic performance. The national figures for stunting, underweight and wasting in under five years children in Nepal stands at 41%, 29% and 11%, respectively according to NDHS 2011. However, the magnitude of this problem in hilly areas of Nepal is not well understood.

Objectives: The objective of this study was to find the nutritional status of 6 to 59 months of children and its associated factors.

Materials and Methods: A cross-sectional, population-based study design has been used for this study. The study population was 6 to 59 months children who were permanent or temporary residents of the study area. The respondent was the mother of the under 5 year child. A total 10% (n=1353) study participants were selected from each of the 4 VDCs of Lamjung and Gorkha, and each of the 5 VDCs of Tanahun during April-May, 2014 by applying systematic random sampling. A semi-structured questionnaire was administered to mothers by face to face interview method. The anthropometric measurements (weight and height) were also recorded. Binary logistic regression was applied to identify the factors associated to the nutritional status.

Results: In the study, 56.3% were boys and 43.7% were girls. The prevalence of wasting, stunting and underweight was 10.6% (95% C.I: 9.0-12.2), 53.9% (95% C.I: 51.2-56.6) and 20.8% (95% C.I: 18.6-23.0), respectively. The wasting, stunting and underweight were higher in boys than in girls. The factors were duration of breast feeding, occupation of mothers, family size, site of delivery, height of mothers and age of mother during the delivery.

Conclusion: Stunting was more prevalent than wasting in the study districts and implies that there is a problem of chronic malnutrition. The factors highlighted in this study should be adequately addressed by concerned authorities to address malnutrition in these hilly districts of Nepal.

Keywords: Children, district, Nepal, stunting, underweight, wasting.

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INTRODUCTION

The nutritional status of infant and under five years children is an important factor as it determines their health, physical growth as well as development, productive life and academic performance (Ronsmans, Collin, & Filippi, 2008). Nutritional well-being of the population is crucial for accelerated attainment of many of the Sustainable Development Goals (National Planning Commission [NPC], 2015). Malnutrition is a major public health problem in most of the developing countries and is more common among under-five years children (Bhandari and Chhetri, 2013; Masood-us-Syed, Saleh and Butt, 2011; Chatuat and Khanal, 2016). It can be a major deterrent to achieving national, economic and social goals and targets as it reduces child survival and can adversely affect physical development and cognitive function of a child. Malnutrition also perpetuates the malnutrition-infection cycle, leading to considerable morbidity and mortality in children under five years of age. Globally, the prevalence of wasting, stunting and underweight is 8%, 37.4% and 15.7% respectively. South Asia has the highest prevalence of malnutrition as compared to other regions and the prevalence of wasting, stunting and underweight is 10%, 39% and 19.3% respectively (WHO, 2016).

In Nepal, the prevailing high rate of child under nutrition is one of the major nutritional problems despite a steady decline in past several years. The prevalence of wasting, stunting and underweight in Nepal is 11.3%, 41% and 29% (Nepal Ministry of Health and Population, New ERA and ICF International, 2012; UNICEF, WHO, & World Bank, 2016). The children in the rural areas of Nepal are more prone to malnutrition (wasting, stunting and underweight) than the children in the urban areas (WHO, 2016). Among the under five years children, in a span of 10 years (from 2001 to 2011), the percentage of stunting came down from 57% to 41%; the percentage of wasting was at 11% and the percentage of underweight came down from 43% to 29% (Department of Health Services [DoHS], 2016). However, in spite of vigorous efforts and community based nutritional interventions carried out by the Government, we were unable to meet the Millennium Development Goal (MDG) targets for nutrition (DoHS, 2016). The Global Nutrition target aims to reduce the global number of children under five who are stunted by 40 percent and aims to reduce and maintain childhood wasting to less than 5 percent (DoHS, 2016). In order to meet these targets, Nepal needs to address various factors that are associated with under nutrition.

Several factors have been found to be associated with malnutrition in Nepal. Malnutrition is affected by individual variations, household variations, variations in community, lack of knowledge related to health and nutrition, economic constraints, malpractices, social and cultural factors (Haileslassie, Mulugeta and Girma, 2013; Pandey et al., 2013) household food insecurity, frequent

illness and infections, poor environmental practices, inadequate dietary intake, poor hygiene, eating of fast foods, vaccination status of child, breast feeding as well as maternal factors (DoHS, 2016). When combined with these factors, the cycle of intergenerational malnutrition comes into existence and continues. The nutritional status and its associated factors haven't been explored adequately in Lamjung, Gorkha and Tanahun, Hence the present study was carry out to explore the nutritional status and its associated factors in these hilly districts of Nepal.

MATERIALS AND METHODS

A cross- sectional, analytical, population - based study design has been used for this study. The study population was under five years (6 to 59 months) children who were permanent or temporary residents of the study area. The study areas were three hilly districts of Nepal (Lamjung, Gorkha and Tanahun). The sampling was done in two stages. In the first stage, the Village Development Committees (VDC) was selected and in the second stage, selection of under 5 years children was done. A random sampling technique was used to select the VDCs and study subjects were selected from each of the 4 VDCs of Lamjung (Duradada, Chandreswor, Jita and Chakratirtha), each of the 4 VDCs of Gorkha (Finam, Bungkot, Namjung and Taple), and each of the 5 VDCs of Tanhun (Risti, Kyamin, Symgha, Ghansikuwa and Jamune Bhanjyng) for indistinguishable number of study subject. In the second stage, a sampling frame was created using the list of under 5 year children in each selected VDCs separately called second stage units (SSU).Total under 5 years children in 13 SSU were 14060 available during the data collection period. The sampling unit was under 5 years children .The sampling unit was selected by using systematic random sampling. One under 5 years child was selected at random from each SSU and then every 10^{th} under 5 year child was selected in each SSU. A total of 1405 ($\approx$ 10 % 14060) of under 5 year children were selected, out of these 1405 children, only those with complete information i.e. 1353 (96.3%) were included in the final data analysis. The respondent was the mother of the under 5 year child.

The height/length and weight were measured for all children. The height of child $\geq$ 24 months was measured by making the child stand bare feet on a flat and even floor against a wall and with feet parallel and joined together and with heels and buttock touching on the wall. It was made sure that head was held erect and hands were hanging closely at the sides. The height was marked on the wall with the help of a ruler and measured with a tape. The recumbent length of the child < 24 months was taken by keeping the foot plantar flexed, the knee extended and the forehead touching the wall and this was done with the help of an assistant. The weight of the child more than one year was taken using a bathroom scale, which was calibrated every single time the weight was taken. The weight of the child less than one year was measured as follows – Initially, the weight was taken for the child

along with the mother while the mother held the child. After that, only the mother's weight was taken and this weight was then subtracted from the previous weight to get the actual weight of the child. The nutritional status in this study is classified according to the criteria given in World Health Organization (WHO) Growth Standard 2006 (WHO, 2006). A height for age below minus two Standard Deviation (SD) to minus three SD is considered as Moderate Stunting; a height for age which is minus three SD is considered as Severe Stunting ; a weight for height which is below minus two SD to minus three SD is considered as Moderate Wasting ; a weight for height which is minus three SD is considered as Severe Wasting; a weight for age which is below minus two SD to minus 3SD is considered as Moderately Underweight and a weight for age which is minus three SD is considered as Severely Underweight.

The data collection was carried out from 22 April to 10 May, 2014. The data collection tool was a semi-structured interview schedule and the data collection method was face-to-face interview. The data was collected by medical students after orientation and training for 7 days. The data was checked for completeness and accuracy and there after entered in Epi Data 3.1. This data was exported into IBM SPSS 20 version and WHO Anthro for further analysis. The Z score was calculated by using the WHO Anthro software. The data was analyzed by using descriptive and inferential statistics. The frequency, mean and SD were calculated in univariate analysis. For bivarate analysis, the chi square test was applied to test the association between the three types of malnutrition and the predictor variables. The 5% level of significance ($p<0.05$) was taken to be statistically significant. Odds ratio was calculated only for significant variables. Variables which were significant in bi-variate analysis were modeled into multivariate analysis by using logistic regression. The logistic regression was validated using Hosmer and Lemeshow chi square test for goodness of fit, Pseudo R^2 (Cox & Snell R Square) and Nagelkerke R Square. In multivariate analysis, only few variables were significant that might be Pseudo R^2 was low in fitted model. Also, Variance Inflation Factors (VIF) test was applied for diagnosis of multicoliniriaty.

RESULTS

Characteristics of study subjects

A total of 1,353 children were enrolled in the study (36.8% children from Lamjung, 31.9% children from Tanahun and 31.3% children from Gorkha). A total of 60.2% children were living in joint family and 39.8% children were living in nuclear family. As regards family size, 27.1% children had ≤ 4 family members, 46.3% had 5-6 family members and 26.5% had ≥ 7 family members. The Mean±SD of family size was 6±2. More than half (57.4%) of the mothers were engaged in Agriculture. Most of the mothers (82%) had attended school. Less than half (43.1%) of the mothers

consumed more food than usual, during pregnancy. Most of the mothers (89.4%) followed no restriction on any types of food while 10.6% mothers followed restriction of food. Out of the total respondents, 72.8% respondents delivered at government hospitals (Table 1).

Table 1. Characteristics of mothers of under five year children (n = 1353).

Characteristics	Number	Percentage
Occupation of mothers		
Agriculture	776	57.4
Business	103	7.6
Service	474	35.0
Educational status of mothers		
Illiterate	114	8.4
Can read and write	114	8.4
Basic education	490	36.2
Secondary	310	22.9
Higher Secondary and above	325	24.0
Food intake during pregnancy		
More than as usual	584	43.1
As usual	476	35.2
Less than as usual	293	21.7
Food taboos during pregnancy		
Yes	143	10.6
No	1210	89.4
Work load during pregnancy		
As usual	534	39.5
Delivery site		
Hospital	985	72.8
Home and on the way of hospital	368	27.2

A total of (59.3%) mothers exclusively breastfed their children for 6 months. Only 2.8% mothers breastfed their children for more than 2 years. Almost (90.4 %) mothers had fed colostrums to their children (Table 2).

Prevalence of malnutrition

The prevalence of wasting was 10.6 % (95% C.I: 9.0-12.2), prevalence of stunting was 53.9 % (95% C.I: 51.2-56.6) and prevalence of underweight was 20.8% (95% C.I: 18.6-23.0) among under 5 years children. The prevalence of wasting, stunting and underweight was higher in boys than in girls. A total of 4.43% (n=60) were severely wasted, out of which, 2.58% boys were severely wasted as compared to 1.85% girls. A total of 6.2% (n=84) children were moderately wasted, out of which, 3.39% boys were moderately wasted as compared to 2.81% girls.

Table 2. Breastfeeding practice among mothers of under five year children (n = 1353).

Feeding practices	Number	Percentage
Breastfeeding practice (in months)		
< 6 months	163	12.0
Up to 11 months	1079	79.7
Up to 17 months	47	3.5
Up to 23 months	26	2.0
≥24 months	38	2.8
Colostrum feeding		
Yes	1223	90.4
No	122	9.0
Don't know	8	0.6
Exclusive breastfeeding		
6 months	802	59.3

A total of 39.32% (n=532) children were severely stunted, out of which, 22.69% were boys and 16.63% were girls. A total of 14.63% (n=198) children were moderately stunted, out of which, 8.57% were boys and 6.06% were girls. A total of 8.28% (n= 112) children were severely underweight, out of which, 5.39% were boys and 2.87% were girls. A total of 12.5% (n=169) children were moderately underweight, out of which, 6.3% were boys and 6.2% were girls. There is a downward shift of curves throughout the under-five age while plotting age against mean z-score for height for age and for weight for age. Height for age stabilized around -1SD z-score till the age of 23 months. After 23 months, there is a sharp decrease in z- score as the age increased. Similarly, for weight for age, there is a continuous decrease in mean z-score from 23 months onwards. These findings reveal that the prevalence of stunting and underweight gradually increased after 23 months of age. The weight for height curve showed mean z-score to be positive in all age groups. The prevalence of wasting started decreasing from 35 months onwards (Figure: 1).

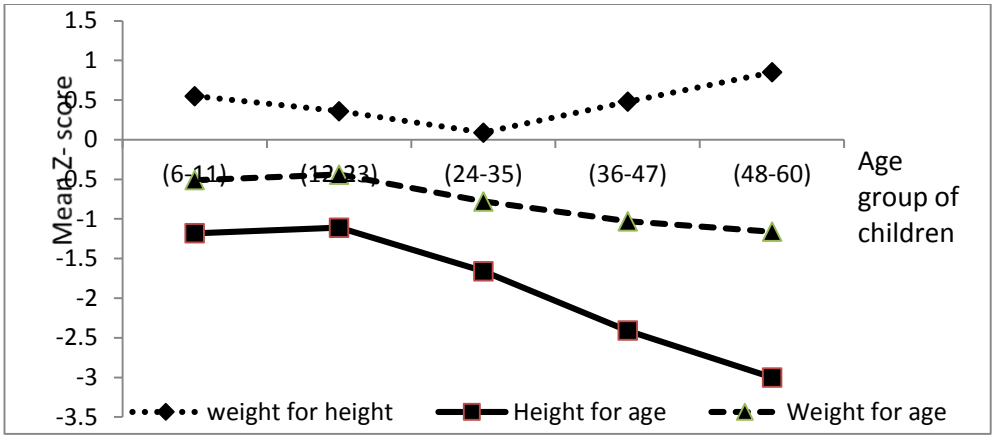

Fig. 1. Age wise distribution of mean z-score for weight for height, height for age, weight for age.

Factor affecting weight-for-height, height -for –age and weight -for –age

Those mothers who breastfed their children for < 6 months, were 1.61 (95% CI: 1.010-2.567) times more likely to have malnourished children than mothers who breastfed their children for ≥6 months (Table No.3). Children of those mothers whose main occupation was service were 1.375 (95% CI: 1.088-1.735) times more likely to be stunted as compared to children of mothers whose main occupation was agriculture. Children of those household whose family size was ≤ 4 were 1.447 (95% CI: 1.072-1.954) times more likely to be stunted as compared to children of household whose family size was ≥7 (Table 3). Children of respondents who delivered at home or on the way to hospital were 1.603 (AOR= 1.705, 95% CI: 1.236-2.350) times more likely to be underweight as compared to children of respondents who delivered at health institutions. Children of those mothers whose height was ≤145 cm were 2.125 (AOR=2.225, 95% CI: 1.288-3.841) times more likely to be underweight as compared to children of mothers who were > 145 cm in height. Children born to mothers who were >35 years of age, were 2.218 (95% C.I: 1.217-4.043) times more likely to be underweight as compared to children born to mothers aged 20-35 years. Regarding the ethnicity, Dalit children were 1.590 (95% CI: 1.106-2.287) times more likely to be underweight as compared to Brahmin children but in multivariate analysis there was no statistically significant association between ethnicity and age of mother during delivery with underweight (Table: 3).

Table 3: Predictor (s) of wasting, stunting and underweight.

Breastfeeding	Wasting		UOR	AOR	*P* value	95% CI
	NO *n* (%)	Yes *n* (%)				
≥ 6months	1058 (89.9)	119 (10.1)	1			
<6 months	138 (84.7)	25(15.3)	1.611	NA	0.045	1.010-2.567
	Stunting†					
*Occupation of mothers**						
Agriculture	386(49.7)	390(50.3)	1			
Business	44(42.7)	59(57.3)	1.327	1.222	0.350	0.802-1.861
Service	193(40.7)	281(59.3)	1.441	1.375	0.008	1.088-1.735
Family size*						
≥7 member	177(49.3)	182(50.7)	1			
5-6 member	304(48.5)	323(51.5)	1.033	1.013	0.921	0.781-1.315
≤ 4 member	142(38.7)	225(61.30	1.541	1.447	0.004	1.072-1.954
	Underweight‡					
*Delivery site**						
Hospital	802(81.4)	183(18.6)	1			
Home and on the way to hospital	268(73.2)	98(26.8)	1.603	1.705	0.001	1.236-2.350
Height of mothers*						
≥145 cm	63(65.6)	33(34.4)	1			
<145 cm	1006(80.2)	248(19.8)	2.125	2.225	0.004	1.288-3.841
Age of mother during delivery						
20-35 years	806(79.3)	211(20.7)	1			
>35 years	31(63.3)	18(36.7)	2.218	1.769	0.079	0.936-3.345
Ethnicity						
Brahmin	290(80.8)	69(19.2)	1			
Chhetri	194(80.8)	46(12.9)	0.997	0.945	0.804	0.593-1.499
Janajati	325(80.8)	77(19.2)	0.996	0.951	0.806	0.636-1.422
Dalit	222(72.5)	84(27.5)	1.590	1.442	0.082	0.954-2.178

1-Reference category, AOR- Adjusted odds ratio, CI-Confidence interval, UOR-Unadjusted odd ratio, NA-Not Applicable,* significant only in multivariate; †Nagelkerke R Square-0.018, Hosmer and Lemeshow test p value=0.993, -2log likelihood=1848.813, VIF value =1.004, for stunting adjusted with occupation of mother and family size; ‡ Nagelkerke R Square-0.043, Hosmer and Lemeshow test *P* value=0.756, -2log likelihood=1048.036, VIF value =1.475, for underweight adjusted with delivery site, height of mother, age of mother during delivery and ethnicity.

DISCUSSION

In developing countries, malnutrition in children is a public health concern. Nepal is a developing country, where a huge number of people live below the poverty line and Nepal has got a high proportion of malnourished children of under-five years of age. This study showed that 53.9% were stunted, 10.6% were wasted and 20.8 % were underweight in Lamjung, Gorkha and Tanahun Districts of Nepal. In NDHS 2011 (Nepal Ministry of Health and Population, New ERA and ICF International, 2012), stunted children were in lesser proportion (41%), wasted children were almost in similar proportion (11%) and underweight children were slightly higher in proportion (29%). The findings of this study were different from findings of NDHS 2011. NDHS 2011 represented the Mountain, Hill and Tarai in all ecological regions but this study was concerned with only three hilly districts. This fact the finding was differing with NDHS 2011. The finding of Nepal Multiple Indicator Cluster Survey (NMICS) in 2014 (DoHS, 2016) shows that the prevalence of stunting is 37% which is lower as compared to this study, wasting is 11% which is similar to this study and underweight is 30% which is higher than in this study. The higher percentage of stunting in this study could be because of the fact that this study was conducted within the hilly region. Similar findings have been reported in various studies (Nepal Ministry of Health and Population, New ERA and ICF International, 2012; DoHS, 2016; Pradhan, 2010).

The prevalence of stunting in this study was observed to be higher as compared to wasting and underweight The studies conducted in sub-Saharan Africa, South Asia, Nairobi Kenya and Ethiopi showed similar results (UNICEF, 2013; Nungo, Okoth and and Mbugua 2012; Mengistu, Alemu and Destaw 2013). However, in contrast to this study, a study conducted in Western Kenya (Nungo et.al., 2012) revealed that 26.6% were stunted, 10.1% were wasted and 13.9% were underweight. Likewise in the study conducted in Sri Lanka (Peiris and Wijesinghe, 2010), 11.8% were stunted, 42.7% were wasted and 41.2% were underweight. A study conducted in Pakistan (Lodhi, Lodhi Wazir, Taimoor and Jadoon, 2009) revealed that 20% were stunted, 21% were wasted and 41.2% were underweight.

The above scenario shows that there is wide variation in malnutrition within and between the countries. This may be due to the fact that malnutrition is widely affected by socio-economic condition, socio-cultural practices, dietary habit, poverty, etc. and these factors are different by geographic locations. Regarding the malnutrition, boys were more wasted, stunted and underweight in comparisons to girls in this study. This finding was similar to findings from NDHS 2011. These findings were also similar to the findings of Kumar, Goel, Mittal and Misra (2006) probably because

socio-cultural factors, economic factors and consumption of food pattern of Nepal and India bear a striking resemblance.

The Mean Z- score of height for age and weight for age was decreasing in trend after 23 months of birth. This finding was similar with the study of NDHS 2011 and Sapkota and Gurung (2009). This might be due to the fact that Nepal government is giving prime importance to infant and young child feeding (IYCF), which focuses on children less than 24 months. This finding could also be because of the fact that there is a growing physical demand for good nutrition beyond 23 months which is difficult to meet in poor households.

This study showed that more than half of the mothers (59%) followed exclusive breastfeeding practice and this finding is slightly higher than the finding in MICS 2014 which states that exclusive breastfeeding is 56.9% nationally (UNICEF, 2016). However; this finding is lower than the finding in NDHS 2011 (70%). This study showed that only 2% children were breastfed up to two years, indicating that optimal breastfeeding practices were not followed by the mother. This observation could be due to the fact that the mothers and family member were not much aware about the importance and need of breastfeeding for under 2 years children or they were not able to provide sufficient time to breastfeed due to daily workload/task. Inappropriate and inadequate breast feeding practices, can lead to stunting, wasting and underweight as well as reduce the learning ability, reduce resistance and immunity against infection and reduce the overall productivity in the future. It is therefore necessary to educate, counsel and motivate mothers for strict adherence to recommended breastfeeding practices so as to enhance the nutritional status of children. In this study, those mothers who breastfed their children for < 6 months, were more likely to have malnourished children. This finding was supported by different studies as NDHS 2011, UNICEF (2016), DoHS (2016), Pandey et al. (2013), Sapkota et. al., (2009) and Dhungana (2014). Babies who are not exclusively breastfeed are more likely to have lower immunity which makes them susceptible to infection and this in turn perpetuates malnutrition.

Around 57% of mothers did not take sufficient food during the pregnancy period. Nearly 10% of mothers had food taboos during the pregnancy period. Around 40% of mothers continue with their usual physical work during pregnancy period. All these factors could have led to a high prevalence of stunting in this study. In this study, those children whose mothers engaged in service or business work were more likely to be malnourished. Similar findings were found in a study conducted by Ruwali D., in Padampur VDC of Chitwan , Nepal (Ruwali, 2014). This observation could be because of the facts that mothers who are solely engaged in service or business maybe unable to devote

adequate time to their children for providing adequate care as well as wholesome and healthy nutritious diet. In the present study, children from larger family size were less likely to be malnourished and this could be because in Nepal, children from larger family size receive care from several family members.

This study showed that 72% deliveries were institutional. The percentage of intuitional delivery is 57% nationally, according to Annual report 2071/72 and 55.2% nationally, according to MICS, 2014 (DoHS, 2016). The percentage of institutional delivery is higher in the study districts possibly because of effective implementation of Amma program. Almost 84% of the mothers in this study had attended school, which means that awareness on the importance of institutional delivery was better among these mothers. Children born from mothers who underwent institutional delivery were less likely to be malnourished as compared to children born from mothers who underwent home delivery. This could be because mothers who had institutional deliveries were more likely to be aware of good antenatal care, healthy feeding practices and good child care and had exposure to health workers' counseling. Height of mother is also one of the predictors for underweight. Children who born from a mother whose height is less than 145 cm were more likely to be underweight. The study conducted by Subramanian et. al. (2009) in India revealed that one cm increase in maternal height was associated with a decreased risk of underweight, stunting, wasting and child mortality. Children of mothers whose age at delivery was more than 35 years were more likely to be malnourished. This finding was supported by the study of Bhandari and Chhetri (2013) which was conducted in Kapilvastu district of Nepal.

CONCLUSION

A significant numbers of under-five children were malnourished in Lamjung, Gorkha and Tanahun. The prevalence of wasting, stunting and underweight among the children were 10.6%. 53.9% and 20.8% respectively. Boys were more likely to be wasted, stunted and underweight compared to girls. The overall prevalence of stunting is higher as compare to wasting and underweight. The factors affecting the nutritional status of under 5 children were duration of breast feeding, occupation of mothers, family size, delivery site, height of mothers and age of mother during the delivery. Several positive and commendable steps have been taken to tackle malnutrition in Nepal. However, malnutrition remains a major public health problem in the Nepalese context. The various factors affecting malnutrition must be adequately dealt with by policy makers, planners, implementers and relevant stakeholders. Relevant policies, effective programmes and a wide variety of activities must be formulated and carried out with concerted efforts to tackle malnutrition in under five years children of Nepal.

CONFLICT OF INTEREST

The author declared that there is no conflict of interest.

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