Original Article

Risk Factors of Malnutrition among Under Five Children Admitted in a Nutritional Rehabilitation Center in Lalitpur

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Abstract

Malnutrition not only posses immediate threat to child's health and life but also entails long term impact to physical and mental growth. Study Entitled "Risk Factors of Malnutrition among Under Five Children Admitted in a Nutritional Rehabilitation Center in Lalitpur" was conducted to assess the risk factors of malnutrition among under 5 children using case control design. Cases included malnourished under five children admitted in Nutritional Rehabilitation Center (NRC) Lalitpur and controls included well nourished under five children attending Well Baby Clinic of Tribhuvan University, Teaching Hospital (TUTH), Maharajgunj in the ratio of 1:2. Altogether 136 samples were selected by non-probability purposive sampling technique. Interview schedule with semi-structured questionnaire was used for data collection. The findings were analyzed using descriptive statistic (mean, standard deviation) and inferential statistics (multiple logistic regression) for identifying the strength of association. Findings of the study shows that ethnicity (Adjusted Odds Ratio [AOR]=2.462), birth weight (AOR=7.683), birth order (AOR=5.906), number of family members (AOR=2.8), father's occupation (AOR=6.539), economic status (AOR=2.927), Vitamin A (AOR=11.592), washing hand by mother before feeding the child (AOR=40.422), frequency of feeding the child (AOR=24.178), use of purified drinking water (AOR=5.040), method of waste disposal (AOR=16.892), other illness (AOR=5.38), place of first health seeking (AOR=17.435) and previous hospitalization (AOR=2.273) were significantly associated with malnutrition. Most of these risk factors if identified timely can be prevented and controlled by appropriate intervention.

Key Words: Malnutrition, Under Five Children

Introduction

Malnutrition is widely recognized as a major health problem in the world. Malnutrition affects every fourth child worldwide; 150 million are underweight while 182 million are stunted. More than 70% of malnourished children live in Asia, 26% in Africa and 4% in Latin America (Ghai, Gupta & Paul, 2005). In Nepal, 41% of children under age 5 are stunted, 11% are wasted and 29% are underweight (Ministry of health and population [MoHP], New Era and ICF International, 2012). The major causes of malnutrition are maternal illiteracy, paternal illiteracy, economic status, large family size, prelacteal feed, lack of exclusive breastfeeding in the first six month of age, late initiation of complementary feeding etc (Solomon & Zemene, 2008; Egata, Berhane & Alemayehu, 2014). Though the priority of government is to reduce malnutrition very less studies are done in this area. Therefore a case control study was conducted to identify the risk factors of malnutrition among under five children. The study findings will be helpful to health worker in controlling such preventable risk factors of malnutrition by identifying the established risk factors in the early stage and providing health education to mother regarding risk factors of malnutrition.

Methodology

Study was conducted after getting approval from

the research committee of Maharajgunj Nursing Campus and ethical clearance from Institutional Review Board of TU, IOM. Study used case control study design. Purposive sampling technique was used to collect the samples. Children admitted in NRC, Lalitpur who met the inclusion criteria and fall below -2SD in either weight-for-age, height-for-age or weight-for-height according to the standard reference chart of WHO were selected as the cases for the study. During the data collection period, 54 malnourished children were admitted in the center and only 46 children met the inclusion criteria and were taken as cases. Age (±3 month) and sex matched under 5 children attending Well Baby Clinic of TUTH who fall above-1SD in all weight-for-age, height-for-age and weight-for-height according to the standard reference chart of WHO were selected as the control for the study. Controls were taken in the ratio of 1:2 with the cases. Hence the number of cases was 46 and control was 92, altogether 138. An interview schedule was developed as per the objective of the study. Instrument was translated in Nepali and was again back translated to English to ensure that the meaning of questions is retained. Pretesting was done in 10% of the sample in the same setting which were further excluded from the study. Data collection was done during Kartik and Mangsir 2071. Collected data were edited, coded and entered in SPSS 16 and analysed using descriptive statistic (frequency, percentage, mean, standard deviation) and inferential statistic, chi square test and logistic regression. Odds ratio and adjusted odds ratio was calculated to find the strength of association between risk factors and malnutrition.

Findings
Sociodemographic Characteristics
Mean age of the cases was 26.52±14.32 and of the control was 26.63±13.87 and Mann Whitney U test value was not significant (p= 0.906) which justify that there was no difference between age of case and control and thus age of the children in the case and control group matched. More than half of them (56.5%) were female in both groups which showed that the sex of the children in the case and control was matched. Among the cases 56.5% of the children and among the control 25.0% of the children were of disadvantaged janajatis. Among the cases 82.6% of the children and 16.3% among the control were from rural area. Thirty seven percentages of the children in the case group and 4.3% in the control group were low birth weight. Nineteen percentages of the children in the case group and 1.1% in the control group were premature. About 67.4% of the children in case group and 96.7 % in control group were of birth order upto 2nd. Mean birth order among the cases was 2.11±1.23 and among the control was 1.40±0.56.

TABLE 1
Multivariate Analysis on Child Characteristics with Malnutrition

Variables	Case(%) n1=46	Control(%) n2=92	P Value	Crude OR (95% CI)	P Value	Adjusted OR (95% CI)
Ethnicity						
Disadvantaged Janajatis	29(63)	26(28)	0.001*	4.330(2.043-9.179)	0.043*	2.462(1.027-5.900)
Advantaged Group	17(37)	66(72)		Reference		Reference
Birth Weight						
Low birth Weight	17(37)	4(4)	0.000*	12.897(4.014-41.438)	0.002*	7.683(2.05528.725)
Normal	29(63)	88(96)		Reference		Reference
Birth Order						
More than 2nd	15(33)	4(4)	0.000*	10.645(3.283-34.521)	0.009*	5.906(1.573-22.173)
Upto 2nd	31(67)	88(96)	Reference	Reference		

*: p value Significant ≤ 0.05

Table 1 reveals that children who were of disadvantaged janajati group were 3 times more likely to have malnutrition (AOR=2.462, CI: 1.027-5.900, *p*=0.043). Those Children who had low birth weight were 7 times more likely to have malnutrition (AOR=7.683, CI: 2.055-28.725, *p*=0.002). Those Children whose birth order was more than 2 were 5.9 times more likely to have malnutrition (AOR=5.906, CI: 1.573-22.173, *p*=0.009).

TABLE 2

Multivariate Analysis on Parental Characteristics with Malnutrition

Variables	Case(%) n_1=46	Control(%) n_2=92	*p* Value	Crude OR (95% C.I.)	*p* Value	Adjusted OR (95% C.I.)
Number of family members						
More than 4	33(72)	37(40)	0.000*	3.773(1.755-8.111)	0.043*	2.817(1.034-7.675)
Upto 4	13(28)	55(60)		Reference		Reference
Father's Occupation						
Labor	23(50)	2(2)	0.000*	45.000(9.884-204.874)	0.044*	6.539(1.053-40.614)
Others	23(50)	90(98)		Reference		Reference
Economic Status						
No saving	31(67)	18(20)	0.000*	8.496(3.805-18.972)	0.050*	2.927(0.999-8.583)
Saving	15(33)	74(80)		Reference		Reference

*: p Value Significant ≤ 0.05

Table 2 shows that children whose families have more than four members were 2.8 times more likely to have malnutrition (AOR=2.817, CI: 1.034-7.675, *p*=0.043). Those children whose father was labor worker was 6.5 times more likely to have malnutrition (AOR=6.539, CI: 1.053-40.614, *p*=0.044). Children whose family didn't have saving were 2.9 times more likely to have malnutrition (AOR=2.927, CI: 0.999-8.583, *p*=0.050).

TABLE 3

Multivariate Analysis on Child Care Practices with Malnutrition

Variables	Case(%) n_1=46	Control(%) n_2=92	*p* Value	Crude OR (95% CI)	*p* Value	Adjusted OR (95% CI)
Vitamin A Supplementation						
Not Done	14(30)	2(2)	0.000*	19.688(4.240-91.424)	0.007*	11.595(1.975-68.068)
Done	32(70)	90(98)		Reference		Reference
Washing hand by mother before feeding the child						
Didn't wash	7(15)	1(1)	0.000*	16.333(1.944-137.251)	0.010*	40.422(2.440-669.688)
Every time	39(85)	91(99)		Reference		Reference
Frequency of feeding the child						
Upto 4 times	43(93)	37(40)	0.000*	21.306(6.151-73.801)	0.000*	24.178(5.341-109.454)
5 and more times	3(7)	55(60)		Reference		Reference

*: p Value Significant < 0.05

Table 3 shows that children who were not supplemented Vitamin A were eleven times more likely to have malnutrition (AOR=11.595, CI:1.975-68.068, *p*=0.007). Those children whose mother did not wash her hand before feeding the child were forty times more likely to have malnutrition (AOR=40.422, CI: 2.440-669.668, *p*=0.010). Those children who were fed upto four times a day were twenty four times more likely to have malnutrition (AOR=24.178, CI: 5.341-109.454, *p*=0.000).

TABLE 4
Multivariate Analysis on Environmental Factors with Malnutrition

Variables	Case(%) n₁=46	Control(%) n₂=92	P Value	Crude OR (95% CI)	P Value	Crude OR (95% CI)
Use of purified drinking water for the child						
Didn't use purified water	25(54)	11(12)	0.000*	8.766(3.723-20.639)	0.001*	5.040(1.976-12.857)
Used purified water	21(46)	81(88)		Reference		Reference
Method of waste disposal						
Open field disposal	14(30)	1(1)	0.000*	39.812(5.032-314.990)	0.010*	16.892(1.977-144.370)
Other than open field disposal	32(70)	91(99)		Reference		Reference

* : p Value Significant < 0.05

Table 4 shows that children who did not used purified water for drinking were five times more likely to have malnutrition (AOR=5.040, CI: 1.976-12.857, *p*=0.001). Those children whose parents dispose their house hold waste in open field were sixteen times more likely to have malnutrition (AOR=16.892, CI: 1.977-144.370, *p*=0.010).

TABLE 5
Multivariate Analysis on Malnutrition and Health Seeking Factors

Variables	Case(%) n₁=46	Control(%) n₂=92	P Value	Crude OR (95% CI)	P Value	Crude OR (95% CI)
Other illness in the past two weeks						
Sick in the past	44(96)	59(64)	0.000*	12.305(2.802-54.040)	0.035*	5.338(1.124-25.354)
Not sick in the past	2(4)	33(36)		Reference		Reference
Place of first health seeking						
Traditional healer/ pharmacy	19(41)	3(3)	0.000*	20.877(5.738-75.958)	0.000*	17.435(4.532-67.083)
Hospital	27(59)	89(97)		Reference		Reference
Hospitalization in the Past						
Hospitalized	16(35)	17(18)	0.034*	2.353(1.054-5.254)	0.008*	2.273(.885-5.839)
Not Hospitalized	30(65)	75(82)		Reference		Reference

*p Value Significant < 0.05

Table 5 shows that children who had other illness in the past two weeks were five times more likely to have malnutrition (AOR=5.338, CI=1.124-25.354, *p*=0.035).. Children who were taken to traditional healer or medical shop as a first place of health seeking were seventeen times more likely to have malnutrition (AOR=17.435, CI=4.532-67.083, *p*=0.000). Those children who were hospitalized previously were two times more likely to have malnutrition (AOR=2.273, CI=0.885-5.839, *p*=0.008).

Discussion

Child Characteristics

This study revealed that, children who were of disadvantaged janajati group were two times more likely to have malnutrition(AOR=2.462, CI; 1.027-5.900, *p*=0.043) which is supported by the finding of a study on determinants of child malnutrition in Nepal which shows that malnutrition is more in dalit than non dalit child (Shah, 2004). Disadvantaged caste group has been discriminated since a long time and are led behind in many aspects like access to

education, employment, health services etc, which may be the reason that they are at high risk of malnutrition.

Children who had low birth weight were seven times more likely to have malnutrition than normal birth weight children (AOR=7.683, CI: 2.055-28.725, p=0.002). It is supported by the findings of a study on factors causing malnutrition among under five children in Bangladesh which showed that babies who were very small in size and smaller than average had respectively 2.08 and 1.79 times higher risk of being stunted than children who were average or larger in size at birth (Rayhan & Khan, 2006). Children born with low birth weight take longer period of time to reach the normal weight of their age as they have to fight against many problems like hypothermia, sepsis etc. and these children also lack certain essential nutrients required for their future growth and development which may be the reason of malnutrition.

Those Children whose birth order was more than 2 were 5.9 times more likely to have malnutrition than children with birth order upto 2 (AOR=5.906, CI: 1.573-22.173, p=0.009) which is supported by the a study in Bangladesh by Mostafa (2011) which revealed that the odds of being severely stunted was significantly lower for first, third and fourth birth order than fifth and higher birth order. Rearing children requires large amount of resources like mother's time, food and clothes. When the family have many children, demand of those resources may be greater than the family can provide. Mothers have overall less time to extend care equally to each of the children.

Parental Characteristics

Those children whose father was labor worker were 6.5 times more likely to have malnutrition (AOR=6.539, CI: 1.053-40.614, p=0.044). It is supported by a case control study on risk factors for under nutrition among children aged one to five years in Udupi Taluk of Karnataka India which showed that a child whose father was either a laborer or unemployed was 3.7 times more likely to have malnutrition (Basit, Nair, Chakraborthy, Darshan &

Kamath, 2012). Father is the main source of income in majority of the household so families where father is unemployed or has low income occupation are poor which leads to insufficient access to food causing less dietary supply causing inadequate intake ultimately leading to child malnutrition.

Children whose family didn't have saving were 2.9 times more likely to have malnutrition than those who have saving (AOR=2.927, CI: 0.999-8.583, p=0.050). Supported by a study conducted by Egata et. al. (2013) in Ethiopia, which showed that children from household who did not have savings were 8 times more likely to have malnutrition. Children of the families which don't have enough income often have limited range of food sources and don't get nutritions and balanced food required for their growth resulting in higher risk of malnutrition. These people also have less access to basic health services.

Child Care Factors

Children who were not supplemented Vitamin A were 11 times more likely to have malnutrition (AOR=11.595, CI: 1.975-68.068, p=0.007). It is supported by the findings of a case control study in Bostwana that revealed children who were given inadequate Vitamin A supplementation were 13 times more likely to have malnutrition (Kadima, 2012). Vitamin A helps to develop immunity and protect against infection and also ensure adequate growth and development. So Vitamin A supplementation might have worked as a protective factor for malnutrition.

Those children whose mother did not wash her hand before feeding the child were 40 times more likely to have malnutrition. (AOR=40.422, CI: 2.440-669.668, p=0.010). Supported by the findings of a case control study in Ethiopia by Bantamen, Belaynew & Dube (2014) which revealed that hand washing by mother have significant association with malnutrition. Hand washing by caregiver before feeding the child, after handling waste etc. helps to break the link between source and host and the chain of disease transmission is break.

Those children who were fed less than 5 times a day were twenty four times more likely to have malnutrition (AOR=24.178, CI: 5.341-109.454, p=0.000). A community based case control study on risk factors for stunting among children by Paudel, Pradhan, Wagle, Pahari & Onta (2012) revealed that children fed less than four times a day are 3.6 times more likely to have malnutrition. The greater the frequency of feedings, higher is the chances of meeting the required daily intake.

Environmental Factors

Children who did not use purified water for drinking were five times more likely to have malnutrition (AOR=5.040, CI: 1.976-12.857, p=0.001) which is supported by the findings of a case control study in Ethiopia by Bantamen et al. (2014) which revealed that those children whose families use drinking water from unprotected source were 3 times more likely to have malnutrition. Children who use unprotected drinking water is at greater exposure risk infection related to water born disease like diarrhoea which contribute to malnutrition.

Children whose parents dispose their household waste in open field were 16 times more likely to have malnutrition. (AOR= 16.892, CI:1.977-144.370, p=0.010). Open field disposal of waste contaminates the surrounding and acts as a source of communicable diseases. This causes infection in the children which is linked to malnutrition.

Health Seeking Factors

Children who had other illness were five times more likely to have malnutrition. (AOR=5.38, CI=1.12-25.35,P value=0.035). It is supported by a case control study on Risk factors for undernutrition among children aged one to five years in India by Basit et. al. (2012) which revealed that children with illness in the last one month are 4.7 times more likely to have malnutrition. Other illness the child loses appetite which leads to insufficient dietary intake causing malnutrition. Malnutrition decreases immunity and leads to recurrent infection. In this way the vicious cycle of illness and malnutrition continues

Children who were taken to traditional healer or pharmacy as a first place of health seeking are 17 times more likely to have malnutrition (AOR=17.435, CI=4.53-67.08, P value=0.000). Visit to the traditional healer or pharmacy may delay the initiation of appropriate treatment of the illness in the children, prolong the course of disease and even complicate the disease.

Those children who were hospitalized previously are two times more likely to have malnutrition (AOR=2.273, CI=0.885-5.839, P value=0.008). which is supported by the study on the effects of hospitalization on the nutritional status of children conducted by Rocha, Rocha & Martins (2006) which reveals that hospitalization was linked with weight loss. When the child is sick and is hospitalised, the child's appetite decreases, and sometimes is kept in NPO status which further deteriorates the nutritional Status and also medical management of disease is given priority over nutritional management.

Conclusion

The risk factors of under 5 malnutrition identified in this study are low birth weight, birth order, number of family members, fathers occupation, economic status of family, Vitamin A supplementation, hand washing by mother before feeding the child, frequency of feeding the child, use of purified drinking water, method of waste disposal, other illness, place of first health seeking and previous hospitalization. So on the basis of these findings, it can be concluded that the risk factors of malnutrition among under five children are multiple and varied. These risk factors are preventable and controllable with the joint effort of individual, family, health personnel, health organization and government. Among them the predictor of under 5 malnutrition is hand washing by mother before feeding the child. Development and distribution of the Information Education and Communication (IEC) materials on maintenance of personal hygiene and importance of hand washing will create awareness in the society and help to prevent the risk factor.

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