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A CASE STUDY IMPACT OF MALNUTRITION ON WOMEN AND CHILDRENS WITH REFERENCE TO KALYANA KARNATAKA

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Abstract

Poor nutritional status was associated with socioeconomic variables such as sex of the child and father's occupation. Female gender (OR = 3.44, p = .02) and father's occupation as a laborer (OR = 2.98, p = .05) were significant risk factors for severe malnutrition. The two groups showed a significant difference in nutrition-related knowledge of mild mixed malnutrition (OR = 2.62, p = .05). No significant difference was apparent in health-careseeking attitudes. Based on their traditional beliefs, the mothers did not believe that medical care was an appropriate intervention for childhood illnesses such as malnutrition or measles. The results suggested that the gender of the child and socioeconomic factors were stronger risk factors for malnutrition than health-care availability and health-care-seeking attitudes. The father's occupation was a more accurate indicator for malnutrition than household income. These results suggest a need for intensive nutritional programs targeted toward poor female children and their mothers.

Keywords: Malnutrition, Protein, Kalyana Karnataka region

Introduction

The children, particularly in rural areas of India are vulnerable to malnutrition because of insufficient dietary intakes, recurrent infections, lack of proper care, and uneven distribution of food within the family. Optimal nutrition in infancy and early childhood is essential to meet the demands of rapid growth and development. Under-nutrition reduces immunological capacity to defend against diseases, and recurrent infections, in turn reduce and deprive the body from essential nutrients. This leads to the dismal growth of children which adversely affect child's mental and physical development and, learning capacity in future life. Under nutrition, which is an important determinant of maternal and child health, has significant negative effects on brain and cognitive development of children.

Malnutrition is a public health problem affecting millions of children all over the world. **[1,2]** The World Health Organization (WHO) classifies malnutrition as undernutrition, overweight, obesity, and inadequate vitamins or minerals. Globally around 45% of deaths among under five (U5) children are attributed to undernutrition. Undernutrition is characterized by three conditions, wasting, stunting and underweight. **[3]** Amongst these conditions, wasting or acute malnutrition is a major contributory factor for child mortality. Globally, in 2018, an estimated 7.3% prevalence (49 million) U5 children were wasted. **[4]**

Maternal undernutrition plays a crucial role in influencing maternal, neonatal and child health outcomes [5]. With India's commitment to Millennium Development Goal (MDG 4), actions for maternal mortality reduction has received substantial attention. New programme directions and strategies have been introduced. These include focus to increase antenatal service (ANC), institutional delivery coverage and provision of family planning services. With such intensive efforts, health services for women in India have increased substantially and the maternal mortality rate (MMR) has dropped from 301 per 100,000 live births in 2003 to 212 in 2009 [6]. However, for reaching the MDG target of 109 and for reduction of stunting rates in children, interventions for improving nutritional status of women is crucial but has remained a low priority except for measures directed for reduction of anaemia or policy for providing supplementary food to pregnant women under the Integrated Child Development Services (ICDS) programme of Government of India. Today, the relationship of women's nutrition with birth outcomes, and stunting rates in young children is well established and it is imperative that measures for improving nutritional situation in the country is accorded a high priority.

Today, urban women have become more empowered and are more aware. This change is increasingly evident in their nutrition status and overall well-being. Education has played a major role in providing more autonomy to women. Studies show that education not only contributes to their own physical wellbeing but also to that of the whole family.

Materials and Methods

The hypothesis was that the following factors would be associated with children's nutritional status (normal weight-for-age vs. < 60 percent of median weight-for-age): (1) socioeconomic status, gender of the child, family size and type (nuclear or extended), and maternal education; (2) mother's knowledge of the causes of malnutrition; and (3) mother's health-care- seeking attitudes. Both subjects and the field worker who conducted the interviews were blind to the study purposes.

Study Area

An observational case-control study was conducted in a small area Kalyana Karnataka Region. Kalyana-Karnataka, also known as Hyderabad-Karnataka, is a region located in the northern part of the Indian state of Karnataka, which was part of Hyderabad State ruled by the Nizams and the Madras presidency of British India. The region comprises Bidar, Yadgir, Raichur, Koppal and Kalaburagi of Hyderabad state and, Ballari and Vijayanagara of the Madras province that are now present in the state of Karnataka. The Northeast-Karnataka region is the second largest arid region in India. Kalaburagi and Ballari are the largest cities of this region. About 40 percent of the population lives below the poverty line and is illiterate; this percentage may be as high as 70 percent for women. Malnutrition is prevalent among children. A survey conducted in 2019 by the Community Health Department.

Sample Collection

Cases: The study included thirty mothers as cases, based on their children's nutritional status and their location of residence. Inclusion criteria were residence in Kalyana Karnataka Region and being a mother of a severely malnourished child under four years of age. Severe malnutrition was defined as having less than 60 percent of expected median Saito et al.: Maternal health knowledge in South India weight-for-age for healthy Indian children (Grade III malnutrition). The expected weight was based on the Indian Academy of Pediatrics criteria. Controls. Thirty matching controls were included in the study. The controls were mothers in Kalyana Karnataka Region with their children selected from the list of young children at hospital. The children were matched by two criteria. They were: (1) born one month prior or following the birth of each case child and (2) living in close proximity to the case child. The controls were not matched by gender because the investigator wished to determine if gender was an independent predictor of children's nutritional status.

Data collection

The study focused on the following data: (1) sociodemographic information on the family size and type (nuclear or extended), number, age and gender of children in the household, mother's age, education and occupation, father's

occupation, household income and ownership of land and livestock; (2) knowledge of the causes of severe malnutrition; and (3) health-care-seeking attitudes for common childhood illnesses, including malnutrition. Part (1) was adapted from the Socio- Economic Scale and Guidelines for Filling Up the General Survey Proforma developed by the Community Helath Department [7,8]. Part (2) employed interview methods used by Sivaramakrishnan and Patel [9]. Questions for Part (3) were adapted from the Rapid Assessment Procedures for Nutrition and Primary Health Care developed by Scrimshaw and Hurtado [10].

To assess the knowledge of malnutrition, a field worker showed pictures of children with symptoms of two types of protein-energy malnutrition: severe marasmus [11,12] and mild marasmus-kwashiorkor mixed malnutrition [13]. First, the field worker asked the mothers about the symptoms in each picture. If mothers could not correctly identify all the essential symptoms (e.g., enlarged stomach, wasting, and swelling), the field worker verbally told them the symptoms. Then, the mothers were asked to explain what they believed caused these symptoms. Their answers were grouped into three categories: nutrition-related, health-related and non-relevant. If a mother could provide one nutrition-related or health-related cause, then she was considered to have general knowledge of the causes of malnutrition. Second, in order to determine health-care-seeking attitudes of mothers, the field worker asked which health resources they would use if their children had each of the following common childhood illnesses: diarrhea, cold, worms, measles or malnutrition. The interviews were conducted mostly in Kannada. A language of a neighboring state,Telegu, was used for one non-Kannada speaking subject. The interviews lasted between 20 and 40 minutes. At the end of each interview, the height and weight of the target child were measured using a tape measure and a spring balance with a hanging cradle respectively.

Data analysis

The data were entered and analyzed using SPSS and EpiInfo. The statistical software package SAS was used to assess associations and frequencies. For categorical variables, chi- squared univariable analysis was performed to determine the associations between nutritional status and socioeconomic factors, nutritional knowledge and healthcare seeking attitudes. For continuous variables such as household income, one-way analysis of variance test was used.

Furthermore, stepwise multiple logistic regression was used to analyze a possible interaction of these variables.

Results

Anthropometric profile and ages of the sampled children the sample consisted of 30 severely malnourished children and 30 healthy children, matched on age and residence. Their ages ranged from two to 38 months, and the mean age of the children was 19.1 months (Table 1). The mean height and weight of the healthy children were 76.0 cm and 9.40 kg respectively, whereas the mean height and weight of the severely malnourished children were 68.2 cm and 6.21 kg. The differences in the mean height and weight of healthy and malnourished children were 7.8 cm and 3.19 kg respectively.

Table 1. Anthropometric profile and ages of the sampled children, Kalyana Karnataka Region

	Cases (n = 30)	Controls (n = 30)	Difference
Mean height	68.2 cm	76.0cm	7.8cm
Mean weight	6.21 kg	9.40 kg	3.19 kg
Mean age	19.1 months	19.1 months	
Age range	2 to 38 months	2 to 38 months	

Sociodemographic profile of the mothers

The 60 mothers interviewed were young (mean age 25; range: 18-35), poor and mainly illiterate (Table 2). The mean age at first childbirth was 22 for both cases and controls (range 20- 30). The mothers had an average of two children. The mean family income was 1050 rupees per month. The mean per capita income was 200 rupees per month for each person in the family. About 22 percent of all the fathers were daily wage farmers. Only 15 percent of the mothers worked their home, while the majority worked caring for the home and children. Approximately 37 percent of the

families owned their own land and one or more livestock. Only 32.4 percent of the 68 mothers knew how to read and write.

Sociodemographic risk factors for malnutrition

The analysis of sociodemographic variables showed the following factors to be significant risk factors for severe malnutrition: female gender (crude OR = 3.38, p = .02), and having a father doing labor (in contrast to civil and private service profession) (crude OR = 3.67, p = .01). Other sociodemographic factors that did not show significant associations with children's nutritional status were family type (nuclear or extended), family size, maternal education, mother's type of work or ownership of land and livestock. The data were analyzed using stepwise multiple logistic regression, to determine if there was confounding between sex and other variables, or whether other variables influenced the strength of the effect of sex (effect modification). When non- significant independent variables were removed from the analysis,, two variables persisted in being statistically significant: sex and father's occupation (defined as laborer vs. other) (Table 3). The adjusted odds ratio for serious malnutrition among children of laborers compared to children of non-laborers was 2.98 (p = .05). The adjusted odds ratio for malnutrition among girls as compared to boys was 3.44 (p = .02).

Table 2. Demographic profile of 30 mothers interviewed in Kalyana Karnataka Region

	Cases (n = 30)	Controls (n = 30)	Total (n = 60)
Mean age (range)	**25 (18-30)**	**25 (19-35)**	**25 (18-335)**
Mean age at 1st childbirth (range)	**22 (18-30)**	**22 (20-30)**	**22 (18-30)**
Illiterate	**20 (66.6%)**	**18 (60%)**	**38 (63.33%)**
Mean number of children	**2.2**	**2.2**	**2.2**
Mean family income	**1050 Rs/mo.**	**1100 Rs/mo**	**1056 Rs/mo**
Mean income per capitl	**200 Rs/mo.**	**200 Rs/mo.**	**200 Rs/mo.**
Father's daily-wage (farmer)	**10 (29.4 %)**	**5 (14.7 %)**	**15 (22.1 %)**
Mother employed outside home	**5 (14.7 %)**	**5 (14.7 %)**	**10 (14.7 %)**
Owned land	**9 (26.5 %)**	**16 (47.1 %)**	**25 (36.8 %)**
Owned one or more animals	**10 (29.4 %)**	**16 (47.1 %)**	**26 (38.2 %)**

Table 3. Potential sociodemographic risk factors for malnutrition and their associations to children's nutritional status, Kalyana Karnataka region

Potential risk Factor	Cases (n=30)	Control (n=30)	Odds ratio	95% confidence interval	p-value
Have a nuclear family (parents & children)	**18 (60%)**	**18 (60%)**	**1.00**	**0.34<OR<2.92**	**1.00**
Live with less than 6 family members	**21 (70%)**	**19 (63.33%)**	**1.28**	**0.69<OR<1.86**	**0.62**
Being a girl	**23 (76.6%)**	**13 (43.33%)**	**3.38**	**1.1 l<OR<10.54**	**0.02***
Have a mother with no schooling	**25 (83.33%)**	**21 (70%)**	**1.72**	**0.54<OR<5.53**	**0.30**

Have a father engaged in agri-labor	**10 (33.33%)**	**5 (16.66%)**	**2.42**	**0.63<OR<9.66**	**0.14**
Have a laboror as a father	**25 (83.33%)**	**15 (50%)**	**3.52**	**1.12<OR<11.27**	**0.05***

*Significant at a = 0.05

Knowledge of the cause of malnutrition

Severe marasmus. 43.33 percent of cases and 30 percent of controls attributed the cause of marasmus to the lack of food or nutrition (Table 4). Lack of food, breast milk equivalent to strength or nutrition, were common answers given by the mothers. Sixty-five percent of the cases and 74 percent of the controls attributed the cause of marasmus to nutrition. Since marasmus can be directly and indirectly caused by both food-related and other health-related causes, answers such as diarrhea, premature birth and lack of immunization were categorized as correct causes. The results showed that approximately 90 percent of both cases and control had general knowledge of the causes of marasmus.

Table 4. Frequency of occurrence of concepts related to the cause of marasmus, Kalyana Karnataka region

Concepts of causes	**Cases (n = 30)**	**Controls (n = 30)**
Nutrition-related causes		
Lack of food	**13 (43.33%)**	**9 (30%)**
Lack of breast milk	**7 (23.33%)**	**9 (30%)**
Lack of strength	**4(13.33%)**	**7 (23.33%)**
Lack of food during pregnancy	**1 (3.33%)**	**1 (3.33%)**
Lack of strength in breastmilk	**1 (3.33%)**	**0 (0%)**
Improper food	**1 (3.33%)**	**1 (3.33%)**
Total N	**22 (73.33%)**	**25 (83.33%)**
Health-related causes		
Lack of immunization	**3 (10%)**	**3 (10%)**
No care	**1 (3.33%)**	**1 (3.33%)**
Polio	**1 (43.33%)**	**1 (3.33%)**
Diarrhea	**1 (43.33%)**	**0 (0%)**
Born premature	**1 (43.33%)**	**0 (0%)**
Total N	**5 (16.66%)**	**1 (3.33%)**
Have general knowledge**	**28 (93.33%)**	**27 (90%)**
Don't know	**2 (6.66%)**	**3 (10%)**

*Does not include those who gave both nutrition- and health-related causes
**The number of subjects who have a general knowledge of marasmus

Mild marasmus-kwashiorkor mixed malnutrition. Significantly more controls (40 percent) attributed causes of mixed malnutrition to the lack of food or nutrition than cases (30 percent) (OR
= 2.62, p = .05) (Table 5). Including those who answered health-carerelated causes of mixed malnutrition, approximately half of both cases and controls had general knowledge of the causes of mild mixed malnutrition.

Table 5. Frequency of occurrence of concepts related to the cause of protein-energy malnutrition, Kalyana Karnataka Region

Concepts of causes	Cases (n = 30)	Cases (n = 30)
Nutrition-related causes		
Lack of food	**8 (26.66%)**	**13 (43.33%)**
Lack of breast milk	**2 (6.66%)**	**5 (16.66%)**
Lack of strength	**3 (10%**	**2 (6.66%)**
Lack of immunization	**(0%)**	**1 (3.33%)**
Total N*	**12 (40%)**	**20 (60.66%)**
Health-related causes		
Lack of immunization	**2 (6.66%)**	**0 (0%)**
No care	**2 (6.66%)**	**0 (0%)**
Worms	**4 (13.33%)**	**3 (10%)**
Diarrhea	**2 (6.66%)**	**0 (0%)**
Mud eating	**1 (3.33%)**	**0 (0%)**
Total N	**6 (20%)**	**3 (10%)**
Have general knowledge	**18 (60%)**	**23 (76.66%)**
Non-relevant causes		
Tuberculosis	**2 (6.66%)**	**2 (6.66%)**
Too much food	**2 (6.66%)**	**0 (0%)**
Total N	**4 (13.33%)**	**2 (6.66%)**
Don't Know	**12 (40%)**	**9 (30%)**

Health-care seeking attitudes

Health-care seeking attitudes did not differ between cases and controls, but differed significantly with the type of disease. For diarrhea, colds and worms, taking the child to a doctor was a common practice. For malnutrition and measles, however, mothers tended not to seek medical care. For malnutrition, 72 percent of the mothers said they would try to treat the child at home. Only 28 percent would seek medical care such as private doctors or government-run nutrition centers. No significant differences were found in mothers' healthcare seeking attitudes toward malnutrition between two groups. With measles, 90 percent of all the mothers answered that they would not take the child to a doctor. Instead, they preferred to keep their children at home. Thirty percent of the mothers preferred giving home remedies to their children when they have diarrhea. Nine percent of the mothers would take their children to a traditional healer. If the child had a cold, 12 percent would provide home remedy to the child. All others would take the child to either private doctors. If a child had worms, most mothers answered that they would consult a doctor at a private doctor, or the Government Hospital

Discussion

This study suggests that socioeconomic factors and knowledge of the cause of malnutrition are stronger risk factors for malnutrition than health care availability or healthcare- seeking attitudes. Female gender (OR = 3.44, p = .02) and father's occupation (OR = 2.98, p = .05) were independently and significantly related to severe malnutrition. Other socioeconomic variables

were unrelated to children's nutritional status. Mothers of the well-nourished children were significantly more aware that mild marasmus-kwashiorkor mixed malnutrition was caused by lack of nutrition. Health-care-seeking attitudes did not differ between cases and controls, but differed significantly with the type of disease. Gender, occupation and nutritional status The finding of the present study about gender inequalities in nutritional status is congruent with the existing literature. A preference for sons over daughters has existed for centuries in India. Family and social pressure is placed on mothers to bear sons, in order to maintain the economic strength of the family. Traditionally, sons remain in the family and take care of the parents while daughters marry and start their own family. Daughters are not only seen as temporary boarders in the family, but also as a financial burden. Parents have to provide a considerable dowry for their daughters to assure a good marriage. As a result, female infanticide, selective abortion

and a skewed sex ratio in the population have been reported [14,15]. Even in an area with a comprehensive health and development program such as in Kalyana Karnataka region, a case of a possible female infanticide has been reported while an investigator was in the area [16]. Social discrimination against female children, particularly in South Asia, has been repeatedly documented to have a strong impact on child nutrition [17]. For example, a survey done by Gupta [18] found that Indian mothers selectively fed male children better than female children. More female children suffered from protein energy malnutrition, especially those with mothers in traditional communities. A study of a rural Punjabi village examined milk supply in relation to gender within families and found that little milk was given to female children in families where mothers-in-law control the milk supply [19]. Contradictory results were found in other studies conducted in India, Nepal, Sri Lanka and Bangladesh as no gender differences were found. Recently, Basu [20], after reviewing field data and the existing literature, concluded that gender discrimination in food allocation between boys and girls did not exist in South Asia.

A correlation between the household income and the children's nutritional status was not found in this study. This finding is contradictory to an existing theory that malnutrition is largely due to poverty [21,22]. A possible source of this contradiction is an inaccurate assessment of the household income. Household earnings reported by the mothers may not have been an accurate assessment of the actual income, income spent on food, or food allocation in the family. For example, even if a husband earned a sufficient income for the family, he may choose to spend it on things other than food for the family. Thus, asking how many rupees mothers have control over would have been a better question in assessing the real availability of the income to the family members. An expenditure on nutrition, rather than income, might have measured poverty more accurately [23]. Future studies should use other measures such as occupation and land ownership to assess the socioeconomic status.

Knowledge of the causes of malnutrition and nutritional status

The knowledge of the nutrition-related cause of mild marasmus-kwashiorkor mixed malnutrition significantly differed between cases and controls. The mothers who could identify the cause of mixed malnutrition as lack of nutrition were more likely to have well-nourished children. This supports the findings from other studies. Other studies that determined relationships between maternal nutrition-related knowledge, attitudes and practices using yes or no answers generally showed an association between the knowledge and children's nutritional status. However, for severe marasmus, this knowledge did not differ between two groups. There could be several explanations. First, since mild mixed malnutrition is more common than severe marasmus, the mothers may attribute the cause of mild malnutrition to a variety of factors related to certain folk beliefs. people tend not to associate the disease to lack of food. Also, the case mothers might have acquired their knowledge of marasmus from the nutritional education prior to the interview. Some of the case mothers have already gone through the nutritional education at certain nearby hospitals and the present study did not take their prior knowledge into consideration. The study also found a large variance within, rather than between, the knowledge of the cases and controls. For example, some cases could confidently provide insightful answers about nutrition, while others
repeatedly replied "I don't know." Moreover, having knowledge of malnutrition does not necessary mean that the person will put the knowledge into practice, especially if the knowledge is still new and foreign to them. The case mothers who recently received the nutritional education may be aware that the lack of food can cause severe malnutrition, yet may not realize that it can also cause mild malnutrition, or they may not be able to apply the concept to her own feeding practice. Thus, it is important for a nutritional education program to provide the information continuously in a coherent manner, to review, and to test knowledge periodically. It would be useful for future researches to examine recipients and non-recipients of nutritional education and compare their nutrition-related knowledge, attitudes and practices.

Conclusion

The results showed that gender of the child, father's occupation and knowledge of nutrition- related cause of mild mixed malnutrition were more significant risk factors for malnutrition than health care availability and health-care-seeking attitudes. The study suggests that it is important for any nutritional intervention programs to incorporate social components into medical practices. Since girls are much more disadvantaged than boys, Community Health Programmes's continued emphasis on the health of women and their female children is essential.

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