Original Article

A CROSS-SECTIONAL STUDY TO ASSESS CAUSES OF UNDERNUTRITION IN UNDER 5YEAR CHILDREN IN GWALIOR DISTRICT: A POPULATION BASED STUDY

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ABSTRACT

Background: India has the largest burden of child mortality and under-nutrition in the world. More than one-third of the world's 150 million undernourished children younger than 5yr old live in India. This study was conducted with objectives to identify possible causative factors for under-nutrition; to identify prevalent nutrition practices for sick children; and to assess the perception of respondents towards Govt. programs and Govt. health services for improving the nutrition of children.

Material &Methods: This cross-sectional study was conducted in Gwalior District among doctors, Supporting Staff (Anganwadi workers, ANM and Feeding Demonstrators) and Mothers using a pre-designed, pre-tested, semi-structured questionnaire.

Results: Total 82% Doctors believed that lack of awareness about nutritional requirements of young children, 78% supporting staff believed Faulty feeding habits and 71.66% mothers believed that low quality of health care were the most important cause of child undernutrition. Majority of mothers said that being too busy with household and other work was the most important reason for their inability to give best care to their under five children. Majority of mothers were dissatisfied with the quality of Anganwadi services.

Conclusion: Study clearly indicates that there are still miles to go in dealing with the problem of undernutrition. Empowering mother, improving Anganwadi services and most importantly spreading knowledge and awareness about child rearing practices can help in solving the problem of undernutrition.

Key words: Undernutrition, under five children, Z score

INTRODUCTION

Child under nutrition continues to be a major public health problem and is considered by many to be the largest global burden of disease[(1)]. Several estimates have attributed 53-55% of all childhood deaths worldwide to under nutrition[(2,3)]. These statistics indicate that approximately twelve million children younger than five years of age die every year from under nutrition[(4)].

Under nutrition causes high rates of child mortality because of synergistic relationship with infectious diseases. A strong and consistent association has been observed between the nutritional status of a child and mortality from diarrhea, acute lower respiratory infection, measles, and malaria [(4)]. Under nutrition is estimated to be the underlying cause of death in young children for 60% of deaths from diarrhea, 52% of deaths from pneumonia, 45% of deaths from measles, and 57% of deaths from malaria[(2)].

Undernutrition compromises a child's immune system and predisposes a child to infectious diseases. Undernutrition interferes with the body's ability to produce humoral antibodies, mucosal secretory antibodies, T cell lymphocytes, and complement[(5)].

In addition to increases in morbidity and mortality from infectious disease, under nutrition also impedes the physical and cognitive development of children. Persistent under nutrition in children impedes normal growth and results in short stature, called stunting. If a child begins receiving adequate nutrition, they will grow more rapidly to compensate for the periods of slow growth but will never achieve their original growth potential[(7)].

Under nutrition and stunting are correlated with poor school performance, grade repetition, school dropout, illiteracy, and impaired learning. Each year of schooling increases the earning potential of an adult by 9.7%. Therefore, recent estimates claim that undernourished

children will earn 22.2% less as an adult due to the effects of under nutrition on a child's school performance [8].

Mild to moderate under nutrition accounts for three quarters of child deaths due to under nutrition and therefore accounts for a greater global burden of disease than severe under nutrition[9]. The severity of under nutrition is measured in Z-scores, which indicate the number of standard deviations below or above a reference mean of healthy children[10].

The above facts clearly indicate that India has the largest burden of child mortality and under nutrition in the world. Over 2.1 million children die in India every year, the most of any country. The national under-five mortality rate is 74.3 per 1000 live births and is widely ranging from as high as 96.4 deaths per 1000 live births in Uttar Pradesh to 16.3 deaths per 1000 live births in Kerala[11]. More than one-third of the world's 150 million undernourished children younger than five years old live in India[6].

Most of the earlier studies have focused on factors related to prevalence and management of severe under nutrition in the society. This study is expected to identify prevalent factors in the community responsible for the high prevalence of moderate undernutrition so that early steps towards their management and prevention of progression to severe form of under nutrition can be taken.

MATERIALS AND METHODS

The present study was a population based cross-sectional study carried out in Gwalior district for a period of 14 months from 1st October 2012 to 30th November 2013. Study was conducted in Government health centres in Gwalior District.

Total 50 Government Doctors; 100 Supporting Staff (Anganwadi workers, ANM, Feeding Demonstrators); and 300 Mothers were included on the study. Mothers were selected based on nutritional status of the child. Using the growth chart 'Normal', 'Moderately undernourished' and 'Severely Undernourished ' children were selected, 100 in each group. Mothers of these children were included in the study. All these above mentioned participants were selected across the district giving equal representation of each area.

Doctors and Supporting Staff not willing to participate were not included in the study while mothers having child below 06 months or above 05yrs of age were not included. Separate pre-designed, pre-tested, semi-structured questionnaire for Doctors, Health Care Workers and Mothers were used for data collection. Data analysis was carried out by percentage, proportion, chi-square test and Odds ratio was calculated utilizing Odds Ratio calculator.

The study received ethical approval from the Ethics Committee, Gajra Raja Medical College, Gwalior.

Modified B.G.Prasad Classification was used[13,14] to classify socio-economic condition.

RESULTS

India's march towards becoming economic superpower is strikingly visible in many forms; but when it comes to nutritional status of population the story becomes entirely different. Even after huge economic success large sections of the society live under poverty, hunger, illiteracy and social deprivation.

Table 1: Socio-demographic Profile of the families included in Study

Variables	Normal Child (n=100)	Moderate Under nutrition (n=100)	Severe Undernutrition (n=100)	Unadjusted OR (95% CI)	P value
Caste of the family					
Scheduled Caste(SC)	14	34	38	Reference	
Scheduled Tribe (ST)	05	30	35	2.57(0.84-7.90)	0.0972
OBC	32	30	18	4.82(2.08-11.19)	0.0002
Others	49	06	09	14.77(5.78-37.77)	0.0001
Type of Family					
Nuclear Family	52	64	62	Reference	
Joint Family	48	36	38	1.50(0.85-2.64)	0.1540
Mother's Education					
Illiterate	04	11	18	Reference	
Upto class 5th/ informal education	21	36	44	2.14(0.64-7.14)	0.2125
6th- 10th std.	29	30	28	4.66(1.40-15.49)	0.0120
Higher secondary	31	20	07	19.92(5.12-77.55)	0.0001
Graduate	15	03	03	22.50(4.33-116.73)	0.0002
Socio-Economic Status (SES)					
BPL	16	23	32	Reference	
Cat. V	19	25	30	1.26 (0.55-2.90)	0.5771
Cat. IV	28	39	27	2.07(0.93-4.61)	0.0738
Cat. III	29	13	11	5.27(2.10-13.19)	0.0004
Cat. II	08	00	00	33.48(1.81-616.58)	0.0182
Cat. I	00	00	00	1.97(0.03-103.79)	0.7375

The data shown in **Table No. 1** clearly indicate that majority of the undernourished children belong to underprivileged sections of society. Mothers of undernourished children were less educated as compared to mothers of normal children (OR=22.50, p=0.0002). Data from current study also indicate that majority of undernourished children belonged to nuclear families (OR=1.50, p=0.1540).

When asked about the underlying causes of child undernutrition the views varied from food shortage to lack of awareness among the parents. Majority of Doctors (82%) believed that lack of awareness about nutritional requirements of young children/ illiteracy/ ignorance (i.e. malnutrition not considered serious) was the most important cause of undernutrition (p=0.0001). Majority of supporting staff (78%) believed Faulty feeding habits/Delayed start of complementary food/food with low energy density to be the most important underlying factor of Child Undernutrition (p=0.0001) **(Table No.2)** Majority of mothers (71.66%) believed that quality of health care and access to health facility were the most important underlying factors of Child undernutrition (p value=0.0001).This includes reach of program, focus on poor and marginalized segments, poor implementation. Biological factors include early marriage, early children, improper care of pregnant women, undernourished mother, LBW infants.

Table 2: Perception of respondents about possible factors responsible for Child Undernutrition

Factors	Doctors (n=50)	Supporting Staff*(n=100)	Mothers (n=300)	*P* value	Uncorrected Chi Square
Poverty/Insufficient Food	38 (76.00)	52 (52.00)	181 (60.33)	0.0183	8.02
Faulty feeding habits	15 (30.00)	78 (78.00)	144 (48.00)	0.0001	38.67
Biological reasons	14 (28.00)	49 (49.00)	48 (16.00)	0.0001	44.29
Lack of awareness/illiteracy/ malnutrition not considered serious	41 (82.00)	56 (56.00)	121 (40.33)	0.0001	32.74
Issues related to quality of and access to health facility	12 (24.00)	10 (10.00)	215 (71.66)	0.0001	132.92

Multiple Responses; Figures in parenthesis indicate percentage; *AWW, ANM, FD;

Table 3: Effect of the time spent by Mothers for exclusive Care of Under Five Children on their nutritional status

Approx Time Spent	Normal Child (n=100)	Moderate Undernutrition (n=100)	Severe Undernutrition (n=100)	Unadjusted OR (95% CI)	P value
> 3 hrs	16	08	03	Reference	
1-3 hrs	46	29	28	3.24 (0.86-12.14)	0.0803
≤ 1 hrs	38	63	69	9.68 (2.65-35.36)	0.0006

Table 4: Reasons cited by Mothers for their inability to give best care and its effects on the nutritional status of Children

Reason	Normal Child (n=100)	Moderate Under nutrition (n=100)	Severe Under nutrition (n=100)	Unadjusted OR (95% CI)	*P* value
Nuclear families/multiple children	48% (48)	54% (54)	59% (59)	1.55(0.89-2.72)	0.1197
Mother too busy at home	48% (48)	66% (66)	78% (78)	3.84(2.07-7.10)	0.0001
Working mother/mother going out	30% (30)	51% (51)	60% (60)	3.50(1.94-6.28)	0.0001
Lack of knowledge	32% (32)	23% (23)	25% (25)	0.70(0.38-1.31)	0.2738
Mother's illness	11% (11)	23% (23)	19% (19)	1.89(0.85-4.22)	0.1170

*Multiple Responses

Over the past decade there has been an increase in number of pre-school children whose mothers are employed in various earning activities. This means that mothers have less time available for exclusive care of the child. Only 09% (27) mothers were able to spend >3 hours every day for exclusive care of their under five child. 56.67% (170) mothers could give <1 hour per day for exclusive care of their under five child (OR=9.68, p=0.0006)**(Table No.3).** The trend of mothers spending less time with children was more visible in households with under nourished children as compared to those with better nourished children.

The most important reason given by mothers for their inability to give best care to their under five children was being too busy at home **(Table No.4**). In rural areas women have to look after family as well as cattle (OR=3.84, p=0.0001). The other important reason given by the mothers was that they have to work outside home to help in earning livelihood (OR=3.50, p=0.0001). In rural areas many mothers were working in agriculture fields and as laborers while in urban areas mothers were involved in diverse employments ranging from school teachers, receptionists to shopkeepers, housemaids and laborers.

During illness, the amount and quality of food provided to children was modified for a many reasons including social beliefs, the mother's perceptions and her busy schedule **(Table No.5).**

Diarrhoea: During diarrhoea mothers usually avoided milk, roti, rice etc. and tend to feed khichdi, daliya and other semi-liquid foods (OR=3.20, p=0.0001).

Table 5: Effect of feeding pattern on nutritional status of children during some Sickness: Mother's Perspective

Feeding pattern during sickness	Normal Child (n=100)	Moderate Under nutrition (n=100)	Severe Under nutrition (n=100)	Unadjusted OR (95% CI)	*P* value
Diarrhea					
Avoided solid food	41%	61%	69%	3.20(1.79-5.73)	0.0001
Withholding of milk	36%	58%	57%	2.35(1.33-4.16)	0.0031
ARI/Pneumonia					
Avoided Ghee & other energy dense food	48%	36%	40%	0.72(0.41-1.26)	0.2550
Avoided Liquid items	38%	76%	72%	4.19(2.31-7.60)	0.0001
Fever					
Withholding of milk	21%	46%	44%	2.95(1.58-5.50)	0.0006
Avoided cold and sour foods	48%	72%	79%	4.07(2.19-7.58)	0.0001

Multiple Responses

Table 6: Effect of child nutrition schemes on nutritional status of Children: Mother's Perspective

Schemes	Normal Child (n=100)	Moderate Under nutrition (n=100)	Severe Under nutrition (n=100)	Unadjusted OR (95% CI)	*P* value
Utilizing AWC Services	47%	79%	78%	3.99(2.16-7.39)	0.0001
Regular Weighing and Growth monitoring	18%	22%	23%	1.36(0.68-2.71)	0.3821
Regular home visits by AWWs	16%	04%	13%	0.78(0.35-1.73)	0.5475

*Multiple Responses

Table 7: Perception of different respondents regarding difficulties perceived in utilizing Public Health Services for children

Difficulties Perceived	Doctors (n=50)	Supporting Staff (n=100)	Mothers (n=300)	*P* value
Busy mother	22%	51%	75.66%	0.0001
Accessibility/inconvenient location of health facility	28%	58%	62.33%	0.0003
Society barriers (caste/class/gender)	30%	44%	52.33%	0.0091
Inadequate infrastructure	52%	76%	77.33%	0.0006
Lack of focus on managing nutrition (Focus on treating infections & complications)	88%	36%	27.00%	0.0001

Multiple Responses; *AWW, ANM, FD

ARI/Pneumonia: During ARI, mothers usually avoided curd, foods with ghee, fried foods and liquid items and preferred to feed daliya, moong dal etc (OR=4.19, p=0.0001).

Fever: During fever mothers usually avoided certain food items considered as cold or sour like curd, rice etc. and preferred to feed khichdietc(OR=4.07, p=0.0001).

When asked about Anganwadi services, mothers in all the groups were dissatisfied with the quality of services **(Table No.6)**. At most of the study sites, the ICDS program was in demand and well known. Few families were utilizing Anganwadi services (OR=3.99, p=0.0001). Most important reason of non-utilization was unsatisfactory quality of services. Few mothers said that their child was regularly weighed. More than three-fourth mothers complained that there were no home visits by AWWs.

The quality of services/facilities provided in government hospitals appears to be in grave condition; henceforth the parents use them only when the child is seriously ill or in a critical state. Majority of mothers (77.31%) as well as the AWWs (67%) believed that inadequate infrastructure was the main cause of reluctance in utilizing public health services (p=0.0001) while majority of Doctors (88%) believed that they focus on managing infections rather than undernutrition (p=0.0001) adding that most of the mothers from poor families were unable to comply with the advice given for the nutritional requirements of a sick child and there was no follow up of sick children **(Table No.7).** As per the Doctors, even parents are interested in the immediate treatment of their child and not about the nutritional needs of the child which requires long term and sustained efforts.

DISCUSSION

As a result of this study, many causes of undernutrition were identified.These causes have been grouped into following broad categories for the purpose of explanation:

Insufficient availability of food: Evidence from the study revealed that more than 50% households experience some type of food shortage, including seasonal shortages. Shortages were primarily due to poverty and other financial factors like husband being unemployed, large family etc. In majority of the households experiencing shortage of food, young children were given preference during the distribution of food and milk. Many mothers could not provide milk to their children regularly due to poverty. As per the National

Sample Survey, 19 per 1000 households in rural areas and 4 per 1000 households in urban areas reported getting enough food only in some months of the year[15]. The poor buy less quantity of food at one time, for which they unknowingly pay more [16].

Increased burden over mother: The role of the mother as caregiver and bread earner: The mother remains the main child care provider despite her emerging roles outside the home, as an additional or sole bread earner. The mothers are now engaged in various income generating opportunities involving long hours of activity outside home. Many women are also working as laborers and are involved in agriculture related activities and other earning activities. In urban areas many women are working as housemaids/domestic help and laborers. Thus the Indian woman in today's society is overburdened with her routine household work and income generating activities.

According to the 1991 Census data, the number of male main workers (principal bread winner) had increased by 23 percent since the 1981 Census while the number of female main workers increased by 40 percent. Rural women were more likely to be counted in the Census as working as compared to urban women; 27 percent versus 9 percent respectively[17]. According to the Register General and Census Commissioner of India (RGCC) in 1993, women contributed 46.3 percent in agriculture labour and 34.6 percent in cultivation sectors while men contributed 23 percent to agriculture labour and 39 percent to cultivation[17].

The quality of child care is likely to be affected by the time spent by the main care provider (i.e. the mother with the child). Using the 1992 time use survey data, Miller and Mulvey (2000) found that although there was a difference between the time devoted to children between employed and non employed parents, the difference was much less than expected[18]. In a study done by Sivakami, working mothers on an average spent less than two hours daily with their children whereas non-working women spent three to four hours per day[19]. Other studies point out that working mothers often spend very little time per day for direct child care[20]. Although most of the studies did not find a simple association between increased times spent in child care and improved nutrition status, there were trends towards greater prevalence of under-nutrition among families with working parents particularly the mothers[21]. In the study by Mittal et al, chances of the child being underweight increased if the mother was employed (46.15%) as compared to the group where the mother was unemployed (37.8%), however, the differences were not statistically significant[22].

Along with this, a lot of patience and time is required to feed a child. Previous studies have shown that the time spent feeding children among women with very young children differed significantly by work status of the mother[19]**.** Some studies have revealed that mothers with higher socio-economic status were able to spend more time with their children than the mothers with a lower socio-economic status[23].

Inadequate and inappropriate child feeding: Modification (reduction) in child's diet during illness: As per socio-cultural beliefs, food was either further diluted, thereby reducing the energy density even more or certain foods were completely avoided. Foods considered to escalate the infection were withheld. The reduced quantity and reduced energy/nutrient value of food provided to sick children were likely to further deteriorate their health and nutritional status. Apparently, mothers were unable to recognize or understand that decreasing/ withholding food was causing under-nutrition in their children over time.

Delayed recognition of under-nutrition: Universally, the state of under-nutrition was recognized too late or not at all, and the efforts to alleviate under-nutrition were also delayed. The mothers in the current study said that the AWWs did not regularly weigh the child and hence the mild and moderate under-nutrition in children were easily missed. AWWs did not seem to discuss the interpretation of growth monitoring and recognition of under-nutrition with care providers; most mothers did not know or remember the value of growth monitoring. Timely diagnosis and treatment of under-nutrition can avert wasting, stunting and undernutrition. In the current study majority of mothers misclassified the nutrition status of their child irrespective of their actual weight for age. Mothers usually base their assessment on child's physical appearance, energy, eating behavior etc[24]**.** The current study revealed that very few mothers identified undernutrition as a reason to visit hospital or physician; this gradually leads to other health complications. An Ethiopian study highlighted that mothers correctly evaluated their child's growth performance in only 53.7%. [25]**.**

Responsiveness of government programs: The current study emphasized the fact that govt. schemes like ICDS were having many operational and management flaws[26]; fund problems, quality of food, dedication of field workers and lack of communication between supporting staff and community were some important ones. But this study also reveals that ICDS is also considered as the only program to help time constrained mother and also an opportunity to empower women and underprivileged sections of the society. Studies have shown that the information that AWW is conveying to mothers may not be communicated effectively enough to impact positively on mother's behavior [27]**.**A program evaluation in Bangladesh found that nutrition education increased dietary intake and improved children's weight gain[28].

CONCLUSION

The essence of this study lies in the fact that it provides the view of different respondents. This study involves Doctors who are involved in treatment of undernourished children, Anganwadi Workers who

are a part of the government sponsored scheme to combat undernutrition and the mothers who are the ultimate care providers for their children. The problem of undernutrition is multifactorial; hence further research is required. The inter-sectoral nature of the problem therefore requires coordinated and effective action. In our society, the mother is always held responsible for inappropriate growth of the child. So the challenge to be answered is how mothers can be empowered so that they can manage their time between child care and other duties and how quality care can be provided to infants and young children with the available resources.

LIMITATIONS

Purposive/convenient sampling has been used because of limited time and resources and large size of district. Perception of Doctors and AWWs may be biased towards the performance of govt. schemes and govt. health facilities.

REFERENCES

1. Ezzati, M., A.D. Lopez, A. Rodgers, S. Vander Hoorn, and C.J.L. Murray. "Selected Major Risk Factors and Global and Regional Burdern of Disease *Lancet*. 360 (2002): 1347-1360.
2. Caulfield, Laua E, Mercedes de Onis, Monika Blossner, and Robert E. Black. "Undernutrition as an Underlying Cause of Child Deaths Associated with Diarrhea, Pneumonia, Malaria and Measles" *American Journal of Clinical Nutrition* 80 (2004): 193-8.
3. Pelletier, DL, EA Frongillo JR, DG Schroeder, JP Habicht. "The Effect of Malnutrition on Child Mortality in Developing Countries." *Bulletin of the World Health Organization*. 73 (1995): 443-448.
4. Rice, Amy L., Lisa Sacco, Adnan Hyder, and Robert E. Black. "Malnutrition as an Underlying Cause of Childhood Deaths Associated with Infectious Diseases in Developing Countries." *Bulletin of the World Health Organization* 78(10) 2000: 1207-21.
5. Scrimshaw, Nevin S. and John Paul San Giovanni. "Synergism of Nutrition, Infection, and Immunity: an Overview. *American Journal of Clinical Nutrition* 66 (1997): 464S-77S.
6. Gragnolati, Michele, Meera, Shekar, Monica Das Gupta, Caryn Bredenkamp, and Yi Kyong Lee. India's Undernourished Children: A Call for Reform and Action. The World Bank, Washington DC: 2005.
7. Shettey Prakash, "Malnutrition and Undernutrition.:*Medicine* 34.12 (2006): 524-529.
8. Grantham-McGregor, Sally, Yin Bun Cheung, Santiago Cueto, Paul Glewwe, Linda Richter, Barbara Strupp, et al. :Child Development in Developing Countries 1: developmental Potential in the First 5 years for Children in Developing Countries." *Lancet* 369 (2007) : 60-70.
9. Progress towards the Millennium Development Goals, 1990-2003. Department of Economic and Social Affairs. United Nations. http:/www.un.org/special-rep/ohrlls/1dc/MDGs/Goal_1-final.pdf.
10. De Onis, Mercedes and Monika Blossner. WHO Global Database on child Growth and Malnutrition. Programme of Nutrition, World Health organization. Geneva, 1997.
11. International Institute for Population Sciences and ORC macro Internation. National Family health Survey-3, IIPS, Mumbai: 2007.
12. http://www.motherchildnutrition.org/india/pdf/nfhs3/mcn-NFHS-3-Madhya-Pradesh-state-report.pdf page no. 85
13. Agarwal AK: Need to update in the present scenario. Indian Journal of Community Medicine Vol. 33, No. 1, January 2008: 50-51
14. Hindu Business Line 2012; 21st May
15. Purchasing power in rural areas up by 2 percent: National Sample Survey 2003. Available from: URL: www.financialexpress.com/news/purchasing-power-in-rural-areas-up-by-2-per-cent-national-sample-survey/77419. Accessed on 4th May,2010
16. Parhalad CK. A Fortune at the bottom of the pyramid. Eradicating poverty through profits. Warton School Publishing 2006
17. Dunlop JE ,Velkoff VA. Women and the economy in India. International program center. U.S Census Bureau, the Official Statistics 1998; 1-7.
18. Paul M, Charles M. Women's time allocation to childcare: Determinants and consequences. Australian Economic Papers 2000; 39 (1): 1-24.
19. Muthusamy S. Are working mothers in India investing less time in the next generation? Population of Association of America (PAA) 2006 Annual Meeting, California, USA 2006; 1-44.
20. Leslie J, Lycette M, Buvinic M. Weathering economic crises: The crucial role of women in health, in Dover E. Bell and Michael M. Rich (eds.), Health, Nutrition and Economic Crises. Dover, Mass.: Auburn House Publishing Company 1988; 307-348.
21. Engle PL, Menon P. Care and nutrition: concepts and measurements. World Development 1999; 27 (8): 1309-1338.
22. Mittal A, Singh J, Ahluwalia SK. Effect of maternal factors on nutritional status of 1-5 years old children in urban slum population. Indian Journal of Community Medicine 2007; 32 (4):1-4.
23. Sayer LC, Gauthier AH, Furstenberg FF. Educational difference in parents' time with children: Cross national variations. Journal of Marriage and the Family 2004; 66(5) : 1152-1169.
24. Turnbull B, Andrade G M, Huerfano N, Ryan GW, Martinez H. A contrast between mother's assessment of child malnutrition and physical anthropometry in rural Mexico: A mixed methods community study. Journal of Nutrition Education and Behavior 2009. 41 (3); 281-206.
25. Christiaensen L, Alderman H. Child malnutrition in Ethiopia. Can maternal Knowledge Augment the role of Income. African Regional Writing Paper Series No.22. Economic Development & Cultural Change 2004.
26. Saxena NC, Srivastava N. ICDS in India: Policy, Design and Delivery Issues, IDS Bulletin 2009; 40 (4), 45 - 52.
27. Gragnolati M, Bredenkamp C, Shekar M, Das Gupta M and Lee Yi-K. India's undernourished children: A call for reform and action. 2006. World Bank Washington
28. Brown L V, Rogers BL, Zeitlin MF et al. Comparison of the costs of compliance with nutrition education messages to improve the diets of Bangladeshi breastfeeding mothers and weaning-age children. Ecology of Food and Nutrition 1993; 30:99-126.