ORIGINAL ARTICLE

Prevalence and predictors of undernutrition among under -5 children in slum of Gwalior city

Rajesh Gupta[1], Durgesh Shukla[2], Ashok Mishra[3], Manoj Bansal[4], Sasmita Mungi[5]

[1]Junior Resident, Department of Community Medicine, Gajra Raja Medical College, Gwalior, Madhya Pradesh; [2]Demonstrator cum Statistician, Department of Community Medicine, Gwalior, Madhya Pradesh; [3]Professor & Head, Department of Community Medicine, Gajra Raja Medical College, Gwalior, Madhya Pradesh; [4]Associate Professor, Department of Community Medicine, Gwalior, Madhya Pradesh; [5]Demonstrator; Department of Community Medicine, Gajra Raja Medical College, Gwalior, Madhya Pradesh.

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

Corresponding Author

Mr. Durgesh Shukla, Demonstrator cum Statistician, Department of Community Medicine, Gajra Raja Medical College, Gwalior, Madhya Pradesh
E Mail ID: durgeshstatsgrmc2019@gmail.com

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Article Cycle

Abstract

Background: Under-nutrition in young children has long-term negative effects on physical and cognitive development. Under nutrition problems are affecting overall development of the country. **Aim and Objectives:** This study was undertaken to assess the prevalence and to examine predictors of undernutrition among children of less than 5 years of age in urban slum of Gwalior district. **Materials and Methods**: A community based cross sectional study was conducted on 550 children with age group 6 months to 5 years residing in urban slum. Chi square test and logistic regression were performed to see association and to predict risk factors. **Results**: Undernutrition was prevalent among 68% children. Unreserved category(UR) was found to be at lesser risk as compared to SC/ST (OR: 0.238 ;CI : 0.133-0.423).Nuclear families had more risk for undernutrition as compared to Joint families (OR:1.947;CI: 1.352-2.803),Illiterate mothers showed more risk (OR:5.696 ,CI:2.791-11.625) ,Similar results were obtained for illiterate fathers (OR: 3.950; CI:1.868-8.353) as compared to fathers having qualification of at least graduation. Females with one parity were protective for undernutrition (OR: 0.411; CI: 0.182-0.928).Low birth weight (OR: 1.996; CI: 1.332-2.991) and total member in family also played a significant role. **Conclusion**: Poverty and education predispose undernutrition in slum children. There is a need to undertake intervention through community education regarding breastfeeding, ANC, birth spacing and to adopt practices that favour good nutrition of child.

Keywords

Undernutrition; Children; Slum; Births; Gwalior

Introduction

Above 90 percent of developing world's chronically undernourished children is found in Asia and Africa. (1,2) Despite the recent achievement in economic progress in India, the fruit of development has failed to secure a better nutritional status of children in the country. (3,4,5) As far as Madhya Pradesh is concerned, it is one of the worst affected states in India.(6,7) Global burden of under-nutrition among under -five year children was 24%, Stunting was 44% and Wasting was 33%. (8) In Madhya Pradesh as per NFHS − 4, prevalence of underweight was 42.8%, Stunting was 42%, Wasting was 25.8% and Severe Wasting was 9.2% while same for Gwalior District

was 48.5%, 42.8 %, 28% and 11.1% respectively.(9)Preventing undernutrition has emerged as one of the most critical challenges to India's development planners.(10)It is projected that more than half of the Indian population will live in urban areas by 2020 and nearly one third of this urban population will be of slum dwellers.(11) Addressing nutritional problems of urban slum is therefore a must for overall development of the country. Comprehensive study, regarding causative, aggravating and associated factors leading to undernutrition will be the initial step to address the problem in depth.

Aim & Objectives

To determine the prevalence and predictors of undernutrition among less than five years children of urban slums.

Material & Methods

Study Design: The present study was a cross sectional study, undertaken in Urban slums of Gwalior city for a period of one year from 1st March 2018 to 28th February 2019. The children of age group 6 months to less than 5 years whose parents had given their consent to participate in the study were included in this study.

Study Area, Sampling technique and Sample size: Multistage sampling was used to select under five children. For the study purpose Gwalior City had been divided into 66 wards. In 66 wards, there were about 250 urban slum areas. On the basis of list of urban slum areas collected from the Office of the Commissioner, Municipal Corporation, Gwalior 25 Urban slum areas were selected randomly. From each slum area, 22 under five children were selected by random sampling; so that the desired sample size of 550 was met. According to recent reports of NFHS-4 (2015-16) prevalence of Under Nutrition among under five years' children varies from 40-42.8%. To calculate the sample size for the morbidity profile among Under five children we took upper limit of prevalence among them, i.e. 42.8 %. By considering a 10% allowable error and 95% confidence interval, the sample size was taken using formula N= 4PQ/L2 , the minimum sample size required for the study was 535, so to round off the sample size minimum of 550 Under five children was taken.

Study tools and technique: A predesigned pre tested interview based questionnaire was used for data collection. For study purposes WHO growth reference data was used. Nutritional assessment was done using anthropometry and clinical examination.

Children were weighed as per WHO guidelines on anthropometry. After getting the measurements the necessary Z scores of different indices such as weight/age, height /age and weight/height were computed using Z score tables and WHO Z score charts. Children stunted or wasted or underweight were considered as having undernutrition. Ethical approval was obtained from Institutional Ethical Committee of GR Medical College, Gwalior.

Statistical Analysis: After collection, the required data was entered in MS excel spreadsheet after generation of proper template. Data analysis was done using SPSS software version 16. Frequency table were generated to see the distribution of variable. Chi square test was applied to see the association between categorical variables. Binary logistic regression was performed to calculate OR and AOR. For all statistical analysis significance was checked for p-value < 0.05.

Results

Among 550 participants undernutrition was found among 68% (375) of the participants while 32 %(175) participants were normal. Among the participants prevalence of underweight was 49.1%, Stunting was 58.2%, Wasting was 23.5%.In present study 185(72%) male while 190(64.8%) female participants were undernourished. More than 3/5th of the participants in each age group 6-12months (68.9%), 13-24 months (66.4%), 25-26 months (76.2%), 37-38 months (63.5%) and 49-60months (68.4%) were having undernutrition. Hindu preponderance was seen. Among Hindu participants 292(67.3%), while among Muslims 83(71.6%) participants were undernourished. Majority of them belonged to OBC Category. In caste category 76.7% SC-ST were undernourished followed by 69.0 % OBCs.In type of family 75.1% undernourished children belonged to nuclear family while it was 60.8 % for joint family. Mothers who were homemaker had 356(68.6%) undernourished children while for working mothers they were 19(61.3%). Majority of the fathers of the undernourished children were semiskilled and unskilled workers. 75.2% and 70.4 % children had undernutrition whose fathers were unskilled and semiskilled workers respectively. Undernutrition was more prevalent among the children who belonged to lower middle class (71.6%) and lower class (70.3%). Undernutrition among those living in kutcha house was 87.8% while for semi-pucca house it was 54.2%. Households using fire wood as a medium of cooking

food had 47(78.3%) while those with LPG as medium of cooking food had 328(66.9%) children with undernutrition. Majority of undernourished children were found to be non-vegetarian(70.0%).Caste ,type of family, education of mother, education of father, occupation of the father ,type of house were the factors found to be statistically significant.[Table 1] Among mothers with parity one undernutrition was present in 80 (61.5%) children while mothers with parity two, three and ≥4 had 186(69.1), 74(69.2%), 35(79.5%) undernourished children respectively. Participants with low birth weight were more prone to Undernutrition (77.5%).Prevalence of undernutrition in family having total under five children only one was 67%(189) while for two it was 71.0%(176).Children who had not given pre-lacteals was more prone to undernutrition and number was 365(67.6%).Prevalence of undernutrition among children who breastfed only was 56.2 % ,those breastfeed with water was 50% ,those breastfed with complementary feeding was 66.2% while for those who were only on complementary feeding it was 71.2% . Undernutrition among the infants who were given breast milk not even water up to 6 months was 70%.It was found if complementary feeding was initiated before six months undernutrition was 68.2% and for complementary feeding initiated after six months it was 66.7% . It was found in the present study that 105(66.9%) children were undernourished whose number of complementary feeds per days was less than four. Total number of ANC,Type of delivery, Number of IFA tablets consumed ,Child given prelacteals , Duration of breastfeeding were the other factors significantly associated variables with undernutrition while parity, total under five children in family, initiation of breast feeding after delivery (hrs), colostrum feeding, feeding practices, up to what age(months) the infant was given breast milk and not even water, Initiation of complementary feeding, number of complementary feeds per day, immunization status of child were the factors not found statistically significant.[Table 2]

Unreserved category(UR) was found to be at lesser risk as compared to SC/ST (OR: 0.238; CI : 0.133-0.423).Nuclear family had more risk for undernutrition as compared to Joint families (OR:1.947;CI: 1.352-2.803),Illiterate mothers showed more risk (OR:5.696 ,CI:2.791-11.625) ,Similar results were seen for illiterate fathers (OR: 3.950; CI:1.868-8.353) as compared to fathers having

qualification of at least graduation. It was seen that as the education level of mother and father was increasing the risk was reducing. Fathers involved in unskilled occupation were more prone towards the undernutrition of their children. Children living in the kutcha house were more prone as compared with pucca housing (OR: 3.512; CI: 1.352-9.120), Those with less members in the family were found at more risk (≤4, OR: 2.626; CI: 1.484-4.648). In univariate analysis unadjusted odds ratio (OR) were calculated and those predictors which came as risk factor were used to calculate adjusted odds ratio (AOR).In multivariable analysis it was found that caste(UR; AOR:0.326;CI:0.155-0.683) came as significant factor. It was also observed as the education of mother decreased risk increased (Illiterate ,AOR:4.179,CI:1.419-12.311), Semi pucca house was found to be at low risk(AOR:0.325,CI:0.118-0.893), total members in a family(Member 5-8, AOR:2.159,CI:1.070-4.355) ,these were the statistically significant factors.[Table3A] Females with one parity were protective for undernutrition (OR:0.411; CI:0.182-0.928) . Low birth weight (OR:1.996;CI:1.332-2.991),interval between last two births 24-35 months (OR:1.795,CI:1.105-2.917), As total number of Antenatal checkups (ANC) decreased risk increased, type of delivery(cesarean; OR :0.641;CI:0.434-0.947),duration of breast feeding, feeding practices (currently breast fedding plus water; OR: .404;CI:0.170-0.962), up to what age(months) the infants was given breast milk and not even water(5 months ,OR:0.236;CI:0.070-0.795) played a significant role for undernutrition in the present study. In Multivariable analysis Low birth weight was seen as risk factor (AOR: 2.846,CI:1.637-4.948) ,Lesser number of total under five children in a family had more risk , interval between last two births was observed as important predictor. Among the children it was seen that those only breastfeeding (AOR: 0.277; CI: 0.084-0.918) and breastfeeding with water (AOR:0.144,CI:0.039-0.529) were at lesser risk as compared with complementary feeding only. Those infants, given breast milk and not even water upto starting three months were at more risk but not statistically significant.[Table3B]

Discussion

Undernutrition is an important area of concern in India as undernourished children have higher chances of death as compared to normal children. In

the present study undernutrition was found among more than half of the children. Similar findings were also reported in other studies. (12,13,14) Children below 12 months were less affected by undernutrition, similar finding was also reported by Nyaruhucha et al (15) Though undernutrition was higher in females (50.7%) than males but differences were not statistically significant; similar finding was also reported by Pradhan.(16) Among the caste category undernutrition was statistically higher among SC/ST class followed by OBC class. The present study also depicted that undernutrition was more prevalent among families who were nuclear in nature; the reason behind this could be availability of less number of persons to take care of children. It was also seen in the present study that as the education of the father and mother increased the undernutrition among children started declining. According to Rijal P et al., education of mothers and fathers had significant effect on the nutritional status of their children (17) Nyaruhucha also reported that as the number of years of formal education of mothers increased undernutrition tended to decline. (15) Similar findings were also reported by other studies. Those children whose fathers were working as unskilled and semiskilled workers were found more prone towards undernutrition. The rationale attributed to this linkage appeared to align with the increased economic power to provide quality food and services for the family (Islam et al., 2013), as father contributed to increase the economic power of the family. Undernutrition was more prevalent among the children belonging to low socioeconomic status. Dhakal et al also reported that malnourishment affected poor children with low socioeconomic status. (18) Maternal and child care indicators like birth weight, interval between last two births, total number of ANC, type of delivery, number of IFA tablets consumed ,child given prelacteals , duration of breastfeeding were the important factors significantly associated with undernutrition . Females with one parity were protective for undernutrition (OR: 0.411; CI:0.182-0.928). Higher parity appeared to be an important risk factor as suggested by other studies.(19)Duration of breastfeeding came out to be significant factor. Similar findings were reported by Mostafa and Jacobs & Robert. (19,20) It was seen that as the consumption of Iron folic acid (IFA) tablets increased undernutrition showed declining trend. Poor feeding practices were common during infancy. Breastfeeding came out as good predictor and findings supported breastfeeding as essential component for the better nourishment of the child. The finding also implied that only complementary feeding should be avoided. The rates of exclusive breast feeding and complementary feeding were higher for mothers who had more antenatal visits and watched television. (21) Previous study carried out reported high prevalence of undernutrition among the socio-economically poor communities such as SC and ST. (22) Higher prevalence of undernutrition among children of illiterate mothers suggested that educated mothers could do more efficient management of limited household resources, greater utilization of health care services, better health promoting behaviour, low fertility and more child-centred caring practices. Educated women were also more likely to get steadier, higher paying jobs; to get married to men with higher education and higher income; and to live in better neighbourhoods, which had influence on child health and survival . (23)Low Birth weight was predicted as risk factor; similarly it was also reported in Hyderabad based study. (24)Extensive research from developing countries on the role of maternal education suggested that it might influence child growth and health through better feeding practices. Nutrition is an important determinant of immunological status. Under-nutrition can cause poorer immune competence of these children and leads to their increased susceptibility and vulnerability towards infections. The immediate causes of malnutrition and high mortality of under five year children are inadequate dietary intake and frequent episodes of diarrhoeal and respiratory diseases.

Conclusion

Nearly two-thirds of the participants were found to be undernourished. Undernutrition among children is actually a manifestation of many socio-economic and cultural factors. General poverty coupled with lack of assured employment round the year is the major issue which needs to be looked into. Generally there is a tendency among the planners and administrators to look into malnutrition as a health related issue and accordingly the interventions also focus on it. The main livelihood and poverty get missed out. All this necessitates that the problem is dealt with a more comprehensive multi-disciplinary approach. It was more prevalent among females

than males, among Muslims than Hindus, among children of low socioeconomic status groups and from nuclear families, and among children of illiterate mothers. Maternal education, birth weight and birth order of children were significantly associated with undernutrition. This study strongly points toward the importance of proper infant feeding practices, proper nutrition, parental education, and improved living conditions for reducing malnutrition among under-five children. More research is required in this area in order to see the effect of interventions applied to reduce the level of undernutrition. Studies need that approach to address the issue of complementary feeding patterns.

Recommendation

It is said that "Healthy mother, healthy child" so if the mother is healthy, educated and taking proper nourishment herself she will automatically provide proper nutrition for her infant or child. The most important intervention is promotion of appropriate infant and young child feeding and nutrition practices and correction of related maternal under nutrition. So our special focus should be on the women of underprivileged area to motivate them regarding the proper feeding practices.

Intense supportive supervision should be undertaken specifically at local anganwadies centres such as immunization, growth monitoring and nutritional supplementation etc.

The high prevalence of malnutrition in the community requires a multipronged approach encompassing maternal and child health care, nutritional education, growth monitoring, and coordination with income generation and food production activities to make nutritional interventions more effective.

Relevance of the study

Present study looks into the predictors of undernutrition specifically among under 5 slum children because by identifying the root causes of undernutrition in these slum children proper steps for their rectification can be taken at the earliest in accordance with the circumstances prevailing in the slum area.

Authors Contribution

RG: Conception, design and acquisition of data. DS: Data analysis and interpretation of data, drafting the article. AM: Final approval of the version to be published. MB: Drafting the article and revising it critically for important intellectual content. SM: Revising it critically for important intellectual content

Acknowledgement

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Tables

TABLE 1 COMPARISON TABLE FOR SOCIO-ECONOMIC PROFILE OF UNDER FIVE CHILDREN (N-550)

Variables		Normal	Undernutrition	χ^2	p value
Caste	UR	41(56.2)	32(43.8)	26.02	0.00*
	OBC	92(31.0)	205(69.0)		
	SC/ST	42(23.3)	138(76.7)		
Type of family	Nuclear	71(24.9)	214(75.1)	13.003	0.00*
	Joint	104(39.2)	161(60.8)		
Education of mother	Illiterate	20(18.3)	89(81.7)	36.827	0.00*
	Primary school	23(21.5)	84(78.5)		
	Middle school	48(32.2)	101(67.8)		
	High school	36(45.6)	43(54.4)		
	Intermediate	16(32.7)	33(67.3)		
	Graduate/Postgraduate	32(56.1)	25(43.9)		
Education of father	Illiterate	20(20.2)	79(79.8)	25.397	0.00*
	Primary school	19(19.6)	78(80.4)		
	Middle school	49(32.9)	100(67.1)		
	High school	39(39.0)	61(61.0)		
	Intermediate	24(42.1)	33(57.9)		
	Graduate/Postgraduate	24(50.0)	24(50.0)		
Occupation of father	Profession/Semi-Profession	6(50.0)	6(50.0)	26.219	0.00*
	Clerical/ Shop-owner	26(55.3)	21(44.7)		
	Skilled worker	20(51.3)	19(48.7)		
	Semiskilled worker	68(29.6)	162(70.4)		
	Unskilled worker	55(24.8)	167(75.2)		
Type of house	Kutcha	5(12.2)	36(87.8)	9.659	0.008*
	Semi pucca	11(45.8)	13(54.2)		
	Pucca	159(32.8)	326(67.2)		

TABLE 2 ASSOCIATION TABLE FOR DEMOGRAPHIC AND MATERNAL – CHILD HEALTH CARE INDICATORS OF UNDER FIVE CHILDREN (N-550)

Variables		Normal (175)	Undernutrition(375)	χ^2	p value
Birth weight	< 2.5 kg	42(22.5)	145(77.5)	11.44	0.001
	≥ 2.5 kg	133(36.6)	230(63.4)		
	First born	54(38.8)	85(61.2)	9.845	0.020

Interval between last two births	12-23 months	27(31.8)	58(68.2)		
	24-35 months	47(24.0)	149(76.0)		
	≥36 months	47(36.2)	83(63.8)		
Total No of ANC	1	2(28.6)	5(71.4)	14.248	0.006
	2	8(14.0)	49(86.0)		
	3	69(29.4)	166(70.6)		
	4	72(37.1)	122(62.9)		
	≥5	24(42.1)	33(57.9)		
Type of delivery	CS	60(39.0)	94(61.0)	5.030	.025
	Normal	115(29.0)	281(71.0)		
No. of IFA tablets consumed	<30	12(17.6)	56(82.4)	17.32	.001
	31-60	65(28.5)	163(71.5)		
	61-90	97(39.4)	149(60.6)		
	>90	1(50.0)	1(50.0)		
	Not Consumed	0(0)	6(100.0)		
Initiation of breast feeding after delivery (Hrs)	≤1	41(31.5)	89(68.5)	0.331	0.848
	2-4	107(31.3)	235(68.7)		
	5-11	27(34.6)	51(65.4)		
Duration of breast feeding	Baby on breast feed	56(35.9)	100(64.1)	12.133	0.033
	≤ 6 months	7(18.4)	31(81.6)		
	7-12 months	20(29.4)	48(70.6)		
	13-24 months	71(35.7)	128(64.3)		
	25-35 months	12(35.3)	22(64.7)		
	≥36 months	9(16.4)	46(83.6)		
Colostrum feeding	Yes	163(31.0)	363(69.0)	3.824	0.051
	No	12(50.0)	12(50.0)		
	≥4	123(31.3)	270(68.7)		
Immunization status of child	Completely Immunized	139(31.2)	307(68.8)	0.463	0.496
	Partially Immunized	36(34.6)	68(65.4)		

TABLE 3A MULTIVARIATE LOGISTIC REGRESSION ANALYSIS OF SOCIO-DEMOGRAPHIC VARIABLES INFLUENCING UNDERNUTRITION

Variables		OR (CI)	AOR(CI)
Caste	UR	0.238(0.133-0.423)	0.326(0.155-0.683)
	OBC	0.678(0.444-1.036)	0.750(0.436-1.292)
	SC/ST	1(ref)	1(ref)
Type of family	Nuclear	1.947(1.352-2.803)	1.159(0.542-2.477)
	Joint	1(ref)	1(ref)
Education of mother	Illiterate	5.696(2.791-11.625)	4.179(1.419-12.311)
	Primary school	4.675(2.327-9.390)	2.745(0.980-7.689)
	Middle school	2.693(1.440-5.036)	1.604(0.631-4.078)
	High school	1.529(0.770-3.034)	0.848(0.338-2.128)
	Intermediate	2.640(1.194-5.839)	2.192(0.797-6.031)
	Graduate/Postgraduate	1(ref)	1(ref)
Education of father	Illiterate	3.950(1.868-8.353)	1.750(0.495-6.183)
	Primary school	4.105(1.928-8.743)	1.741(0.536-5.656)
	Middle school	2.041(1.054-3.953)	1.144(0.396-3.301)
	High school	1.564(0.781-3.131)	0.965(0.339-2.746)
	Intermediate	1.375(0.635-2.977)	1.325(0.454-3.870)
	Graduate/ Postgraduate	1(ref)	1(ref)
Occupation of father	Profession/Semi-Profession	0.329(0.102-1.063)	1.921(0.362-10.193)
	Clerical/ Shop-owner	0.266(0.139-0.510)	0.556(0.227-1.362)

	Skilled worker	0.313(0.156-0.629)	1.369(0.502-3.736)
	Semiskilled worker	0.785(0.518-1.189)	1.193(0.715-1.992)
	Unskilled worker	1(ref)	1(ref)
Type of house	Kutcha	3.512(1.352-9.120)	1.877(0.621-5.669)
	Semi pucca	0.576(0.253-1.315)	0.325(0.118-0.893)
	Pucca	1(ref)	1(ref)
Total members in family	=<4	2.626(1.484-4.648)	2.435(0.875-6.777)
	5-8	1.902(1.128-3.210)	2.159(1.070-4.355)
	≥9	1(ref)	1(ref)

TABLE 3B MULTIVARIATE LOGISTIC REGRESSION ANALYSIS OF DEMOGRAPHIC AND MATERNAL-CHILD CARE VARIABLES INFLUENCING UNDERNUTRITION

Variables		OR (CI)	AOR(CI)
Parity	First	0.411(0.182-0.928)	2.706(0.456-16.065)
	Second	0.576(0.265-1.253)	0.707(0.238-2.100)
	Third	0.577(0.249-1.335)	0.670(0.236-1.905)
	≥ Fourth	1(ref)	1(ref)
Birth weight	< 2.5 kg	1.996(1.332-2.991)	2.846(1.637-4.948)
	≥ 2.5 kg	1(ref)	1(ref)
Total under-5 children in family	1	2.032(0.817-5.054)	4.604(1.099-19.292)
	2	2.444(0.976-6.124)	6.202(1.557-24.709)
	3	1(ref)	1(ref)
Interval between last two births	First born	0.891(0.544-1.461)	0.392(0.083-1.867)
	12-23 months	1.216(0.681-2.173)	1.669(0.728-3.829)
	24-35 months	1.795(1.105-2.917)	2.016(1.071-3.795)
	≥36 months	1(ref)	1(ref)
Type of delivery	CS	0.641(0.434-0.947)	0.791(0.469-1.333)
	Normal	1(ref)	1(ref)
Total No of ANC	1	1.818(0.325-10.175)	0.363(0.051-2.598)
	2	4.455(1.786-11.109)	1.261(0.397-4.005)
	3	1.750(0.964-3.176)	0.882(0.382-2.037)
	4	1.232(0.676-2.248)	0.937(0.421-2.085)
	≥5	1(ref)	1(ref)
Duration of breast feeding	Baby on breast feed	.349(0.159-0.767)	0.898(0.289-2.758)
	≤ 6 months	.866(0.292-2.571)	0.683(0.129-3.615)
	7-12 months	.470(0.194-1.137)	0.344(0.117-1.014)
	13-24 months	.353(0.163-0.763)	0.402(0.161-1.005)
	25-35 months	.359(0.132-0.978)	0.484(0.147-1.590)
	≥36 months	1(ref)	1(ref)
Feeding practices	Breast fed only	.519(0.249-1.084)	0.277(0.084-0.918)
	Currently breast fed plus water	.404(0.170-0.962)	0.144(0.039-0.529)
	Currently breast fed plus Complementary feeding	.792(0.523-1.198)	0.385(0.165-0.897)
	Complementary feeding only	1(ref)	1(ref)
Up to what age(Months) the infants was given breast milk not even water	≤1	1.297(0.406-4.136)	1.192(0.203-6.988)
	2	2.829(0.338-23.697)	3.118(0.220-44.286)
	3	3.065(0.683-13.745)	5.671(0.839-38.313)
	4	1.257(0.329-4.803)	0.645(0.095-4.378)
	5	0.236(0.070-0.795)	0.047(0.009-0.237)
	≥6	1(ref)	1(ref)