Determinants of Nutritional Status in Children Aged 0 - 6 Years in Rural Rajasthan

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ABSTRACT

BACKGROUND

Child malnutrition estimates for the indicators stunting, wasting, overweight and underweight describe the magnitude and patterns of under- and over-nutrition. India is facing a major malnutrition crisis as shown in NFHS 4 data (2015-2016) that 35.7 per cent children below five years are underweight, 38.4 per cent are stunted and 21 per cent are wasted. Malnutrition is a widely prevalent health problem in Rajasthan also. However, there has been reduction in malnutrition among children from 44% NFHS-3 (2005-06) to 39.1% in NFHS-4 (2015-2016) in Rajasthan.

METHODS

A cross-sectional study was carried out in 25 randomly selected villages of Jaipur district, Rajasthan for a period of one month during December 2013. The prevalence of under nutrition among the age group of 0 - 6 years in Rajasthan (NFHS-2) was 40%. As per the above assumptions, the sample size calculated was 396. Weight for age criteria of WHO was used to detect the nutritional status of children. Chi square test was used, and a p value <0.05 was considered significant. Associations of nutritional status with factors like antenatal care, birthplace, birth order, birth attendant, immunization status, supplementary nutrition and sociodemographic profile were determined.

RESULTS

Only 41.70% of children had normal nutritional status, 47.72% were moderately undernourished and 10.60% were severely undernourished respectively. Mother's literacy level, mother's age, mother ANC registration, place of delivery, supplementary nutrition, and immunization status were significantly associated with the nutritional status of the child.

CONCLUSIONS

Early nutritional status assessment, identification of potential determinant factors with nutrition-specific interventions are major strategies to prevent childhood morbidity and mortality. Other affordable interventions like adolescent girls' education and skill development programme, and mother and child health care are required to halt the deteriorating malnutrition situation in India.

KEY WORDS

Nutritional Status, Immunization

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BACKGROUND

Early childhood, that is the first six years, constitutes the most crucial period in life, when the foundations are laid for cognitive, social, and emotional, language, physical/motor development and cumulative lifelong learning. The young child under 3 years is most vulnerable to the vicious cycles of malnutrition, disease/ infection and resultant disability.¹

The proportion of 0-6 year's children in India is 13.12% of the total population in India ² of which 68.84% live in rural areas of India. The mothers in rural areas are less literate and less aware about nutrition and health. Early childhood is period for growth of children and their needs make them vulnerable as they depend on their parents for nutrition, parent's education personal care, hygiene, childbirth order and healthcare services.

The Infant Mortality Rate (IMR) and under five mortality rate in India are high and the causes are mostly preventive. Malnutrition has been identified as the main factor retarding improvements in human development and hindering further reductions in infant mortality in India¹

Globally, nearly half of all deaths in children under 5 are attributable to undernutrition³ In India, the prevalence of under nutrition in children aged 0-5 years in 2010-11 was 47%. The World Bank puts the number – probably conservatively – at 60 million.⁴ According to the National Family Health Survey-3, among under five children, about 48%, 43%, and 20% are stunted, underweight, and wasted, respectively, whereas about 24% are severely stunted and 16% are severely underweight.⁵ In terms of number, about 54 million children under five years are underweight which constitutes about 37% of the total underweight children in the world.⁶

Malnutrition is a widely prevalent public health problem in Rajasthan also. There has been reduction in malnutrition among children 0-3 years of age from 51% in 1998-99 [National Family Health Survey-2 (NFHS-2)] to 44% in 2005-06 (NFHS-3) and 39.9% in 2008-09.⁵

For assessment of children's nutritional status in western Rajasthan, the present study was carried out with the objectives of finding out prevalence of under nutrition in 0-6 year's old children who were registered with local AWC of the village, and to find factors related to the child and parents and services received during ANC, immunization, supplementary nutrition.

METHODS

A cross-sectional study was conducted in rural area of Jaipur district, Rajasthan for a period of one month during December 2013. This study was conducted by Department of Community Medicine, MGM & H, Sitapura, Jaipur Rajasthan. A sample of 396 children in the age group of 0-6 years was arrived at by using reported prevalence of under nutrition (40%) in Rajasthan (NFHS-2).⁷

Sample size was calculated by the formula

$$n = z_{\alpha}^2(pq)/d^2$$

where n= sample size, z= statistic at α level of significance i.e. 1.96, p= expected prevalence (40), q= 100-p= 60, and d= absolute error accepted (5%).

A village having an Anganwadi centre (AWC) was taken as the sampling unit. 396 children out of those registered with the local Anganwadi Centre (AWC) were studied in randomly selected 25 villages of Jaipur district. Information from mother/father was collected by home visit using preformed standardized and pretested schedule. Demographic information on child's age, gender, religion, family type was gathered. Factors like antenatal care, birthplace, birth order, birth attendant, immunization status, supplementary nutrition and those related to parent's sociodemographic profile like age, education, occupation and Socio -economic status (SES) were studied for their influence on nutritional status of the child. Chi square test was used to find any association of the factors with occurrence of under nutrition, and a value of $p < 0.05$ was considered for significance.

The weight of child was recorded using a portable weighing scale to the nearest 0.1 Kg. As per WHO guidelines of weight for age ⁸ they were classified in three categories of nutritional status: Normal, Malnourished and severe malnutrition. (weight -2 to -3 SD as moderate under nutrition and <- 3 SD as severe under nutrition).

For SE Status modified BG Prasad's classification (2013) was used.⁹

Statistical Analysis

The data thus collected was transferred into the Excel worksheet and was imported to SPSS 20.0 (statistical package for the social sciences). Initially, the descriptive statistics were generated for all the variables under study Statistical significance of any association may be prevalent between two qualitative variables was tested using the popular Chi-square test. The valid inferences were drawn from the information revealed and the results were thoroughly discussed with other available studies conducted in same field.

RESULTS

Total 396 children (0-6 years) were included in this cross-sectional study. It was observed that maximum number of children were in age group 0-12 and 13-24 months i.e. 116 (29.29%) and 121 (30.55%) respectively and least number of children were observed in the age group of 61-72 months and 49- 60 months i.e. 24 (6.06%) and 17 (4.29%) respectively Table 1. Of these 183 (46.12%) were male and 213 (53.78%) were female. Out of 396 children studied, 193 children's (48.73%) belongs to nuclear family and 203 (51.27%) children were from joint family. It was observed that majority of children i.e. 378 (95.45%) were Hindu and only 18 (4.54%) were Muslim. As per Socio economic classification, majority of children i.e. 174 (43.93%) belonged to class IV and 132 (33.33%) belonged to class III. Least number of children belongs to class I and V i.e. 1.76% and 7.57% respectively. 13.38% children belong to class II. distribution of children according to nutritional status using weight for age as parameter.

Age (in Months)	No.	%
0-12	116	29.29
13-24	121	30.55
25-36	68	17.17
37-48	50	12.62
49-60	17	4.29
61-72	24	6.06
Total	396	100
Sex- wise	No.	%
Male	183	46.12
Female	213	53.78
Total	396	100
Type of family	No.	%
Nuclear	193	48.73
Joint	203	53.78
Total	396	100
Religion	No.	%
Hindu	378	95.45
Muslim	18	4.54
Total	396	100
Socio economic class	No.	%
I	7	1.76
II	53	13.38
III	132	33.33
IV	174	43.93
V	30	7.57
Total	396	100

Table 1. Sociodemographic Characteristics of Children (0 - 6 Years) (n= 396)

Age (in Months)	Nutritional Status			Total (%)
	Normal	Malnourished	Severely Malnourished	
0-12	57(49.13%)	42(36.21%)	17(14.66%)	116(100%)
13-24	65(53.71%)	54(44.63%)	2(1.65%)	121(100%)
25-36	9(13.23%)	56(82.35%)	3(4.41%)	68(100%)
37-48	24(48.00%)	21(42.00%)	5(10.00%)	50(100%)
49-60	6(35.29%)	7(41.17%)	4(23.52%)	17(100%)
61-72	4(16.66%)	9(37.50%)	11(45.83%)	24(100%)
Total (%)	165(41.70%)	189(47.72%)	42(10.60%)	396(100%)

($\chi^2= 53.017$ with df= 6, P<0.0001)

Table 2. Nutritional Status of Children According to Age of Child (n= 396)

Mother's Age (in Years)	Nutritional Status			Total (%)
	Normal	Malnourished	Severely Malnourished	
<20	8(53.33%)	3(20.00%)	4(26.66%)	15(100%)
21-30	144(45.14%)	141(44.20%)	34(10.65%)	319(100%)
31-40	13(21.66%)	43(71.66%)	4(6.67%)	60(100%)
Total (%)	165(41.70%)	189(47.72%)	42(10.60%)	396(100%)

($\chi^2= 12.274$ with df= 2, P= 0.002)

Table 3. Nutritional Status of Children According to Mother's Age (n= 396)

Place of Delivery	Nutritional Status			Total (%)
	Normal	Malnourished	Severely Malnourished	
Home	61(39.10%)	86(55.13%)	9(5.76%)	156(100%)
Government Hospital	104(44.63%)	96(41.20%)	33(14.16%)	233(100%)
Private Hospital	0(0.00%)	7(100%)	0(0.00%)	7(100%)
Total (%)	165(41.70%)	189(47.72%)	42(10.60%)	396(100%)

($\chi^2= 9.038$ with df= 2, P= 0.011)

Table 4. Nutritional Status of Children According to Place of Delivery of Their Mother (n= 396)

Birth Interval with Preceding Child	Nutritional status			Total (%)
	Normal	Malnourished	Severely Malnourished	
<3yr	84(35.29%)	129(54.20%)	25(10.50%)	238(100%)
>3yr	24(46.15%)	14(26.92%)	14(26.92%)	52(100%)
Single child	57(53.77%)	46(43.39%)	3(2.83%)	106(100%)
Total (%)	165 (41.70%)	189 (47.72%)	42(10.60%)	396(100%)

($\chi^2= 11.059$ with df= 2, P= 0.004)

Table 5. Nutritional Status of Children According to Birth Interval with Preceding Child (n= 396)

Immunization Status	Nutritional Status			Total (%)
	Normal	Malnourished	Severely Malnourished	
Completed	153(44.73%)	155(45.32%)	34(9.94%)	342(100%)
Not completed	8(23.52%)	18(52.94%)	8(23.52%)	34(100%)
Not known	4(20.00%)	16(80.00%)	0(0.00%)	20(100%)
Total (%)	165(41.70%)	189(47.72%)	42(10.60%)	396(100%)

($\chi^2= 9.759$ with df= 2, P= 0.008)

Table 6. Nutritional Status of Children According to Their Immunization Status (n= 396)

Among these 396 children overall prevalence of under nutrition was 189 (47.72%) and that of severe under nutrition was 42 (10.60%) and only 165 (41.70%) of them had normal nutritional status.

Table 2 is showing age wise distribution of children according to their nutritional status. Proportion of under nutrition was highest 56 (82.35%) in the age group of 25-36 months children and lowest in 13- 24 months. The proportion of severe under nutrition was more 11 (45.83%) in the age group of 61-72 months compared to other age groups. This association between the age of child and nutritional status was found to be highly significant. ($\chi^2= 53.017$ with df= 6, p<0.0001)

Prevalence of malnutrition in female children was more 141 (66.20%) as compared to the male children 90 (49.19%). But prevalence of severe malnutrition was marginally more in males (11.47%) than that in females. This difference between the gender of child and under nutrition was found to be highly significant ($\chi^2= 53.017$ with df= 2, p<0.0001). Proportion of under nutrition was significantly more 130 (67.35%) in children from nuclear families compared to that in children from joint families 101 (49.75%).

Surprisingly, according to Socio Economic Status maximum number of children with normal nutritional status 82 (47.12%) were in SE class IV followed by those from (43.33%) class V & 3 (42.85%) class I and maximum prevalence 35 (66.03%) of malnutrition was in children from SE class II. This shows SE class does not bear any significant effect on the nutritional status of child.

Among 396 children, the prevalence of malnutrition increased with increase in age of father from 8 (53.33%) at less than 20 years to 93 (65.43%) after 30years age of father. This association between father's age and nutritional status was not found to be significant. ($\chi^2= 5.841$ with df= 2, p= 0.05).

Proportion of children with normal nutritional status increased unevenly with improving education level of father from it being 21 (28.76%) in children of illiterate father to those of Intermediate/graduate fathers, being highest when father had studied up to VIII class 74 (56.48%). Out of 396 children, the prevalence of malnutrition was maximum (72.72%) in children whose father were illiterate. This positive association between the literacy status of father and better nutritional status was found to be highly significant. ($\chi^2= 20.605$ with df= 5, p<0.0001).

Out of 396 children the nutritional status in relation to father's occupation showed that maximum number of normal children were in professional group of workers while maximum numbers of malnourished children 27 (86.66%) were in semi-professional group. The difference shows father's occupation does not bear any significant effect on the nutritional status of child. ($\chi^2= 6.775$ with df= 4, P= 0.148)

The prevalence of malnutrition in children was more 47 (78.33%) where mother's age is between 31-40 years followed by 175 (54.85%) in 21-30 years age as compared to the younger age group. This reverse association between mother's age and better nutritional status was found to be significant. ($\chi^2 = 12.274$ with $df = 2$, $P = 0.002$) as depicted in Table 3.

The data indicates the nutritional status of children according to mother's literacy. The prevalence of malnutrition was highest 110 (74.83%) in children whose mothers were illiterate or just literate. As the literacy level of mother increased the nutritional status of child also improved. This association between literacy status of mother and nutritional status was found to be highly significant. ($\chi^2 = 46.154$ with $df = 3$, $P < 0.0001$).

The nutritional status in context of mother's occupation showed that maximum number of children with normal nutritional status was in skilled mothers while maximum numbers of malnourished 7 (70%) were in unskilled group. However, this difference was statistically not significant. ($\chi^2 = 0.088$ with $df = 1$, $P = 0.766$).

The nutritional status of children according to mother's pregnancy registration with a Health Facility. The prevalence of malnutrition was more 52 (77.6%) in children where mother's pregnancy was not registered. The mother's pregnancy registration significantly affected nutritional status positively. ($\chi^2 = 11.395$ with $df = 1$, $p < 0.0001$).

The nutritional status of children according to place of delivery of pregnant woman. The prevalence of malnutrition was maximum 7 (100%) in children who were delivered in private hospital as compared to those who delivered in government hospital 129 (55.36%) and at home 90 (60.90%) as mentioned in Table 4. This association between the place of delivery and nutritional status was found to be statistically significant. ($\chi^2 = 9.038$ with $df = 2$, $p = 0.01$).

The nutritional status of children according to birth order. It was observed that higher proportion of normal children had 1st, 2nd and 3rd birth order [74 (41.34%), 59 (43.70%) and 29 (47.54%) respectively], while maximum numbers of malnourished children were in 4th, 5th and 6th birth order as 9 (100%), 4 (57.14%) and 5 (100%) respectively. But the difference was not significant. Table 5

Nutritional status of children according to duration of supplementary nutrition received from AWC. It was observed that the prevalence of malnutrition was maximum 89 (75.43%) in children who didn't receive supplementary nutrition than those children 142 (51.07%). The nutritional status was more remarkable in those who continued to receive supplementary nutrition from AWC for more than one year 31 (63.27%). This association between the duration of supplementary nutrition and better nutritional status was found to be highly significant. ($\chi^2 = 36.328$ with $df = 6$, $P < 0.0001$).

The nutritional status of children according to birth interval with preceding child. It was observed that the prevalence of malnutrition was higher 154 (64.7%) in children where the birth interval was less than 3 years. Those children who were single, had better nutritional status 57 (53.7%). This association between longer birth interval and better nutritional status was highly significant. ($\chi^2 = 11.059$ with $df = 2$, $P = 0.004$).

The nutritional status of children according to their immunization status. It was observed that the prevalence of malnutrition was 26 (76.46%) in children whose immunization status was incomplete as per age of child as shown in Table 6. Those children who were fully immunized, had better nutritional status 153 (44.73%). This positive association between immunization status and nutritional status was highly significant. ($\chi^2 = 9.759$ with $df = 2$, $p = 0.008$).

DISCUSSION

In this study, most (59.84%) of the children's attending Anganwadi Centre (AWC) were from 0-2 years of age group. 116 (29.29%) of the children were in 0- 12 months age group, 121 (30.55%) in 13- 24 months age and 68 (17.17%) were in 25- 36-month age group. Less than 15% children were in 3- 6 years age group. According to Sangrulkar TV and Gandham SV (2011)¹⁰ in their study found that out of 64 beneficiaries of 0- 6 years age group, 40 belonged to 2-6 years age group. Out of them 29% belonged to both 2-3 years and also 3-4-year age group. 22.60% belonged to 4-5 years and 19.45% to 5-6-year age group. It was concluded that as the age increased the number of attendees in AWC decreased. In the study by Niharika N¹¹ (2012) of the registered of children in AWC 40% were in 6-36 months age and 38% were in the 37-72 months age.

Sex wise distribution shows that 46.12% children were males and 53.78% were females respectively. Similar results found in Sangrulkar TV and Gandham SV (2011)¹⁰ study in which female beneficiaries were 53.20%. However, many studies as Kapil U and Tandon M (1999)¹² found that 56.8% children were males and 43.2% were females registered in Anganwadi. Similar were findings of Pandey V and Awasthi S.¹³

In our study, 51.26% children were from joint family and 48.73% were from nuclear family. Singh A and Arora AK¹⁴ (2007) found that majority (75.20%) children were resident in joint family in their study in rural north India. Similar results were found in study by Sangrulkar TV and Gandham SV (2011).¹⁰

In the present study, 95.45% children were Hindu and only 4.54% were Muslim. Tripathy M (2011)¹⁵ observed in his study that ICDS respondents about 70% of the respondents were Hindus and 30% were Christian. According to NFHS-3⁽⁵⁾ report, Hindu and Muslim children were equally likely to be undernourished, but Christian, Sikh, and Jain children were considerably better nourished.

The proportion of children in higher was much less as majority (84.83%) of them belonged to lower SE class (SE class III, IV and V) in this study. Tripathy M (2011)¹⁵ also found that about 92% respondents earn below 500/- per month. Similarly, in a study done by Harishankar et al (2004)¹⁶ the prevalence of malnutrition was found to be 52.20%, 35.70% and 11.90% in children belonging to low, middle and high socioeconomic status group respectively.

We found that 18.4% of fathers were illiterate, 17.10% were educated up to primary and 33.08% were educated up to middle level. Less than 10% were educated more than higher secondary. Similarly, Bhasin, Sanjiv K et al (2001)¹⁷ found that 27.60% fathers of ICDS beneficiaries are illiterate.

In our study, majority of fathers (36.30%) are unskilled workers and 27.02% were skilled worker. Only 1.50% was unemployed and 7.50% were semiprofessional. Mallikarjun Rao, Kumar HR (2004)¹⁸ also found in their study that 82% head of the household were agricultural laborers.

In present study, 37.10% of mothers were illiterate and 32.80% were educated up to primary level. Less than 10% were educated more than middle level. Ahmed P, Khan AZ (1982)¹⁹ also found in their study in Aligarh that majority of parents 68.50% father and 88.80% mother were illiterate. But in contrast Kumari (2001)²⁰ found in their study at Kurnool that 42.30% children under ICDS had literate mothers and but another 57.20% were those whose mothers were illiterate. However, Sangrulkar TV and Gandham SV (2011)¹⁰ found in their study at Kolhapur that 84.40% were educated up to 10th standard and only 15.60% were educated more than higher secondary.

In current study, 96.96% mothers of respondents were homemaker and 2.52% mothers were unskilled worker as labourer and farmer. Only 0.5% were skilled workers. Launer J et al (1990)²¹ highlighted that in developing countries like India, women are responsible for a wide range of household work and childcare duties as well as work outside the home. Tripathy M (2011)¹⁵ found in their study that 92% mothers were unskilled laborers or seasonal farmers.

In present study, 45.20% children were of first birth order and 34.09% and 15.40% were respectively of 2nd, 3rd birth order. Less than 5% children were of 4th, 5th and 6th birth order. This seems to be due to adopting birth spacing. 60.10% children had birth interval less than 3 years and only 13.13% had more than 3 years birth interval.

It was observed that maximum prevalence of underweight (82.35%) was in age group 25- 36 months i.e. 56 children and least was in 13- 24 months age group i.e. Children with normal nutritional status were 65 (53.71%) in this age group. On the other hand Chakraborty S (2006)²² in a rural population of Jhansi district (U.P.), found that prevalence of malnutrition significantly higher in the age group of 1-3 yrs. (80.90%) as compared to other age groups (52.30% in 0-1 yr. age and 59.40% in 3-6 yrs. age). Ray SK et al²³ cross sectional study in municipal area of Siliguri found that overall prevalence of malnutrition was highest (74.19%) in the age group 12-23 months, followed by 24-35 months (66.18%) and 36-59 months (60.47%). In contrast, a study in rural areas of Allahabad by Harishankar et al.¹⁷ 436 under six children were examined for malnutrition. Maximum overall prevalence of malnutrition was recorded 33 (32.02%) in age group of 13-24 months followed by 43 (28.09%) in the age group 37-72 months, 18 (24.31%) in age group of 0-12 months and 23 (21.68%) in age group of 25-36 months. Majority of children having grade II malnutrition were in age group of 13-24 months.

The prevalence of malnutrition in female child is significantly more i.e. 141 (66.48 %) as compared to the male child where prevalence is 90 (49.17%) in this study. Similar studies as that of Banerjee B et al. (2005)¹⁶ in Midnapore district of West Bengal, consisting mainly of tribal population, prevalence of malnutrition was found to be 50.67%. Much higher rates of undernutrition were reported by In Ray SK et al²³ with 64.74% of males and 61.58% of females being malnourished. On the other hand, in a study conducted in Gond tribal community in Madhya Pradesh by Rao VG et al

(2005)²⁴ prevalence of underweight was found to be similar among both males and females. This might be due to non-differentiation of gender in the tribals.

In the present study, the nutritional status when compared in different Socio-Economic Class (SEC) showed maximum number of normal children in class IV followed by class V and class I while maximum numbers of malnourished children (66.03%) were in SE class II. This shows SE class does not bear any significant effect on the nutritional status of child. In contrast, in a contrast study by Harishankar et al (2004)¹⁶ had reported the prevalence of malnutrition to be 52.20%, 35.70% and 11.90% in children belonging to low, middle and high socioeconomic status group respectively⁴. Anoop I et al (1993)²⁵ study showed that 43.80% of the children of the poorest families (with monthly income of under Rs. 1000) were malnourished, and 32.60% in those with monthly family income of Rs. 1000-1999.

In the present study, the prevalence of malnutrition was significantly higher 56 (72.72%) in children whose father were illiterate compared to the children with educated father. Similar were findings of Ray SK et al (2000)²³ observing substantial differences in the prevalence of malnutrition were observed among children belonging to illiterate fathers (74.76%) and (57.28%) in children of literate fathers.

In the present study, the prevalence of malnutrition was maximum 47 (74.83%) in children whose mother were illiterate and malnourished children were less in literate group than illiterate. As the literacy level of mother increased the nutritional status of child had improved. This association between better literacy status of mother and nutritional status was statistically significant. In West Bengal Ray SK et al²³ observed that prevalence of underweight among children of literate mothers was comparatively lower (54.93%) than in children of illiterate mothers (69.55%) and the difference was statistically significant. Higher maternal education was associated with lower prevalence of childhood malnutrition, which is similar to the present study.

In this study, it was observed that as birth order increased prevalence of malnutrition also increased, with least prevalence for first birth and maximum prevalence with higher birth order. Similarly, NFHS 3⁵ reports that under nutrition is generally lower for first births than for subsequent births and consistently increases with increasing birth order for all measures of nutritional status. In Allahabad study by Harishankar et al¹⁵ in children of less than 6-year age group, the prevalence of malnutrition increased with increase in birth order and it was statistically significant.

In the present study, the prevalence of malnutrition was much higher 89 (75.43%) in children who didn't receive supplementary nutrition than among those who received supplementary nutrition for more than 1-year duration and their nutritional status had improved. Similarly, Farzana Alim & Farhat Jahan (2012)²⁶ concluded in their study of supplementary nutrition utilization through ICDS noticed improvement in nutritional status of children (0-3 years). The study shows that only 229 (76.4%) of children received supplementary nutrition through ICDS out of which 188 (62.7%) children were normal while 41 (13.70%) were underweight. It can thus be concluded that majority of children were normal who received supplementary nutrition through ICDS.

In this study, the prevalence of malnutrition was more 26 (76.46%) in children whose immunization status was incomplete as per age than children who were fully immunized. In a study by Ray SK et al ²³ in Calcutta West Bengal a significantly higher prevalence of malnutrition was observed among partially immunized and non-immunized children (81.25% and 88.23% respectively) in comparison to fully immunized children (62.07%).

CONCLUSIONS

The present study revealed that prevalence of malnutrition was high among children of 0 - 6 years enrolled in Anganwadi Centres. Early nutritional status assessment, identification of potential determinant factors with nutrition-specific interventions are major strategies to tackle under nutrition. Other affordable interventions like adolescent girls' education and skill development programme, and mother and child health care, are required to halt the deteriorating malnutrition situation in India.

REFERENCES

- [1] Children in India. A Statistical Appraisal. Social Statistics Division Central Statistics Office Ministry of statistics and Programme Implementation Government of India. 2012: p. 46.
- [2] Census of India 2011. Rural-Urban Distribution of population, Provisional Population Totals, Dr. C. Chandramouli, Registrar General & Census Commissioner, Ministry of Home Affairs, New Delhi: 15th July 2011.
- [3] UNICEF/WHO/World Bank Joint Child Malnutrition Estimates, March 2019 edition.
- [4] World Bank, World Development Indicators & Global Development Finance, public data (2012).
- [5] NFHS-3 (National Family Health Survey-III), International Institute for Population Sciences, Mumbai, India, 2005-06: p. 191-222.
- [6] Global Nutrition report 2018. <https://globalnutritionreport.org/reports/global-nutrition-report-2018/burden-malnutrition/>
- [7] National Family Health Survey-2 Rajasthan. [rchiips.org > nfhs > Rajasthan](http://rchiips.org/nfhs/Rajasthan). Accessed on 12 Dec 2012.
- [8] WHO guidelines of weight for age. https://www.who.int/childgrowth/standards/chts_wfa_girls_p/en/. Accessed on 13 Dec 2012.
- [9] Rahul Sharma. Revision of Prasad's social classification and provision of an online tool for real-time updating South Asian J Cancer 2013;2(3):157.
- [10] Sangrulkar TV, Gandham SV, Sable SA, et al. Profile of ICDS beneficiaries with special reference to nutritional status: a community based follow-up study. Bombay Hospital Journal 2011;53(Special Issue):364-9.
- [11] Niharika N. Criteria for selection of beneficiaries under SNP for ICDS; BITS, Ranchi 2011.
- [12] Kapil U, Tandon M, Pathak P, et al. Nutrient intake and consumption of supplementary nutrition by safely malnourished children in two ICDS projects in Rajasthan state. Indian Pediatrics 1999;36(8):799-802.
- [13] Pandey V, Awasthi S, Srivastava VK, et al. Study of nutritional status of children attending. ICDS services in Lucknow. Indian J Prev Soc Med 2011;42(2):142-5.
- [14] Singh A, Arora AK. The changing profile of pregnant women and quality of antenatal care in rural north India. Indian Journal of Community Medicine 2007;32(2):136.
- [15] Manojkumartripathy. Barriers in accessing child development programme in Daringbadi block, Centre for Children Studies, Bhubaneswar and UNICEF July 2011.
- [16] Harishankar, Dwivedi S, Dabral SB, et al. Nutritional status of children under 6 years of age. Indian J Prev Soc Med 2004;35(3&4):156-62.
- [17] Bhasin SK, Bhatia V, Kumar P, et al. Long term nutritional effects of ICDS. Indian Journal of Pediatrics 2001;68(3):211-6.
- [18] Rao KM, Kumar HR, Venkataiah K, et al. Nutritional Status of Saharia – a primitive tribe of Rajasthan. J Hum Ecol 2006;19(2):117-23.
- [19] Ahmad P, Khan AZ, Hasan B, et al. Morbidity pattern in relation to birth interval and birth order in children. The Indian Journal of Pediatrics 1982;49(400):689-93.
- [20] Kumari IR. A study on the child health in Kurnool district. The Nursing Journal of India 2001;92(11):245.
- [21] Launer LJ, Villar J, Kestler E, et al. The effect of maternal work on fetal growth and duration of pregnancy: a prospective study. British Journal of Obstetrics and Gynaecology 1990;97(1):62-70.
- [22] Chakraborty S, Gupta SB, Chaturvedi B, et al. A study of protein energy malnutrition (PEM) in children (0 to 6 year) in a rural population of Jhansi District (U.P). Indian J Community Med 2006;31(4):291-2.
- [23] Ray SK, Biswas AB, Gupta SD, et al. Rapid assessment of nutritional status and dietary patterns in a municipal area. Indian Journal of Community Medicine 2000;25(1):14-8.
- [24] Rao VG, Yadav R, Dolla CK, et al. Undernutrition and childhood morbidities among tribal pre-school children. Indian Journal of Medical Research 2005;122(7):43-7.
- [25] Benjamin AI, Zachariah P. Nutritional status and feeding practices in under-3 years old children in a rural community in Ludhiana, Punjab. Health and Population Perspectives and Issues 1993;16(1&2):3-21.
- [26] Alim F, Jahan F. Assessment of nutritional status of rural Anganwadi children of Aligarh under the ICDS (Integrated Child Development Services) and Rural Health. Studies on Home and Community Science 2012;6(2):95-8.