

## An Epidemiological Study of Nutritional Status of Rural Children in Jaipur District (Raj.)

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### Abstract

**Background:** Uncontrolled fertility in rural areas without the requisite economic and social infrastructure has resulted in a great problem of malnutrition among the under five children of rural population. Their nutritional status is far from being satisfactory.

**Objectives:** To determine the nature and extent of the health and nutritional problems of under-five rural children, to highlight the various factors contributing to the health and nutritional problems, and to develop a project for solving the nutritional and health problems.

**Method and Material:** A cross sectional epidemiological study was conducted in field practice area of Rural Health Training Center, Achrol village, district Jaipur (Rajasthan). The mothers or care givers of under-fives were interviewed and the children were examined clinically with the help of a pre-designed, pre-tested pro-forma after taking informed consent. WHO Child Growth Standards were used to assess the nutritional status of children. Results were subjected to statistical analysis.

**Results:** In present study of rural children, out of 334 children 137 (41.01%) were found to suffer from various grades of malnutrition. Among malnourished 45.98% were male and 54.01% were female under-fives. 42.33% children belonged to nuclear family, 29.92% to joint family and 27.73% children belonged to three generation type of family among the malnourished children. 35.03% of malnourished children were delivered at hospital and remaining 64.96% were delivered at home. Among the malnourished only 5.10% mothers were studied up to secondary and above, a majority i.e. 46.71% were illiterate. 41.60% malnourished children were having three and more siblings. Third and above birth order children suffered more from malnutrition (44.52%). Among malnourished only 12.81% were weaned by 4-6 months. SC (48.17%)/ST/OBC (33.57%) children suffered more from malnutrition than general caste. Malnourished children were from grade I (3.64%), grade II (6.56%), grade III (25.54%), grade IV (29.19%) and grade V (35.03%). Most of the malnourished belonged to the age group 2-3yrs (48.90%) and 3-5yrs (35.03%). 56.93% female and 43.06% male were among the malnourished children. 40.87% malnourished were from grade I, 29.19% were from grade II, 18.24% were from grade III, and 11.67% were from IV grade of malnutrition. Vit. A deficiency was observed in 7.29% malnourished, Vit. D deficiency in 11.67% malnourished, Vit. B. deficiency in 18.97% malnourished, and Protein deficiency was observed in 17.5% of malnourished children in present study. Most of the deficiency signs were seen in 2-3 years and 3-5 yrs age groups.

**Conclusion:** Malnutrition is the most widespread condition affecting the health of children. Scarcity of suitable foods, lack of purchasing power of the family as well as traditional beliefs and taboos about what the baby should eat, often lead to an insufficient balanced diet, resulting in malnutrition.

**Keywords:** Deficiency, Illiteracy, Malnutrition, Under-fives.

Access this article online	
Quick Response Code:	Website: www.innovativepublication.com
	DOI: 10.5958/2394-6776.2016.00013.8

### Introduction

Jelliffe (1968) <sup>1</sup>has rightly said “Young children of preschool age are the main groups suffering from malnutrition, hence the principal targets of nutritional work. Among the maternity and child health problems, (Malnutrition, Infection and Uncontrolled fertility)-Malnutrition, is a grave problem having its direct and indirect influences on the health of children. Direct

effects are occurrence of frank nutritional deficiency diseases, whereas the indirect effects are high incidence of low birth weight, retarded growth, high infant mortality, high still birth rates, high sickness rate and lower expectation of life. Malnutrition is a result of adverse socio-economic, poor educational status, deep rooted cultural beliefs, poor environmental sanitation and unsafe water supply resulting in high prevalence of infections particularly diarrhea. (Gopalan, 1963, Jelliffe, 1966, Joan and Retchi, 1967).

A Joint expert committee of FAO/ WHO in 1963<sup>2</sup> estimated that between 1000 to 15000 million people were suffering from Malnutrition. Another expert committee of WHO in the year 1971 observed that existing knowledge is inadequate and from the available data, it is difficult to obtain a rough estimate of the prevalence of malnourished children in the

world. Through WHO conducted surveys in 24 developing countries during the year 1966-69, the prevalence of severe PCM (III degree malnutrition in the Gomez classification) was found to be 0.5 to 4.6, whereas moderate PCM (II degree malnutrition) was found in 4.4 to 43.1 % of children up to 5 yrs of age (Bangoa, 1970)<sup>3</sup>.

A childhood mortality study in America showed that no less than 50 % of the children who died before the age of 5 yrs were found to have malnutrition as underlying or associated cause of death. The peak of their mortality being in the post-neonatal period. During 2006-12, more than 15% of world children under the age of 5 yrs were underweight for their age, WHO (2014)<sup>4</sup> World Health Statistics 2014.

At present in India, 43.5% children under 5 yrs age are underweight. This includes 43% moderate to severe cases. 16% severe malnutrition, of these 20% have moderate to severe wasting and 48% moderate to severe stunting. (WHO- World Health Statistics, 2014).

Incidence of PEM in India in preschool age children is 1-2%. The great majority of cases of PEM nearly 80% are the intermediate ones that is the mild and moderate cases, which frequently go unrecognized (Gopalan. C et al<sup>5</sup> (1980).

Malik (1974)<sup>6</sup> in a survey in rural area detected Marasmus and signs of PEM in 16%, Hypovitaminosis A in 8.76% and Rickets in 0.7% of preschool children.

In Rajasthan, Bhandari and Gupta (1970)<sup>7</sup> found that 80% of preschool children were having one or more nutritional deficiency signs in rural area of Udaipur district (Raj)

Bhansali (1973)<sup>8</sup> also observed 80.3% preschool children were under weight (below 80% of American standard). Vandana (1976)<sup>9</sup> reported 51% to 82% malnourished in various age groups with an average of 68.6%.

In 2015, Global Hunger Index, GHI report ranked India amongst leading countries with a serious hunger situation. Amongst South Asian nations it ranks 3<sup>rd</sup> only behind Afghanistan and Pakistan with a GHI score of 29 (serious situation).

## Objectives of Study

1. To determine the nature and extent of the health and nutritional problems in preschool rural children.
2. To highlight the various factors contribution to the health and nutritional problems of rural children.
3. To develop a project for solving the health problems with special stress on nutrition of rural children.

## Method and Material

A cross-sectional epidemiological study was conducted in field practice area of Rural Health Training Center, Achrol village, district Jaipur (Raj). of NIMS Medical College under the Community Medicine department. Taking prevalence of malnutrition in India as 41.5%, a sample size of 388 was calculated. Out of this 59 under 5 years could not be included in the study because of various reasons and 334 subjects were included in present study. The mothers or care givers of under-fives were interviewed and clinically examined with the help of a pre-designed, pre-tested pro-forma after taking informed consent. Modified Udai Pareek Scale was used to study socio-economic status (SES). Infants were weighed with light clothing by using Salter scale. Standard procedure was adopted while weighing the under-fives. Weighing scale was regularly standardized by putting a known weight over it. WHO Child Growth Standards were used to assess the nutritional status of infants. Results were subjected to statistical analysis.

## Exclusion criteria

1. Mother / care giver not willing to participate.
2. Under 5 children suffering from any congenital abnormality or chronic illness.

## Period of study

Study was conducted from 1/2/2014 to 1/8/2014.

## Observations

**Table 1: Distribution of children according to sex**

	Male	Female	Total
Malnutrition cases	63 (45.98%)	74(54.01%)	137
Normal Children	108 (54.82%)	89 (45.17%)	197
Total	171 (51.19%)	163 (48.80%)	334 (100%)

$X^2 = 2.53$  with 1 df P- 0.112.

**Table 2: Distribution of children according to type of family.**

	Nuclear	Joint	Three generation
Malnourished cases. (137)	58(42.33%)	41(29.92%)	38(27.73%)
Normal children (197)	45 (22.84%)	67(34.01%)	85(43.14%)
Total	103(30.83%)	108(32.33%)	123(36.82%)

$X^2 = 7.13$  with 1 df P-0.008.

**Table 3: Distribution of children according to place of delivery**

	Home	Hospital
Malnourished cases.(137)	89 (64.96%)	48 (35.03%)
Normal children (197)	35 (17.76%)	162 (82.23%)
Total (334)	124 (37.12%)	210 (62.87%)

$X^2 = 77.1$  with 1 df P- 0.000.

**Table 4: Distribution of children according to education of mothers**

	Illiterate	Primary	Middle	
Malnourished cases (137)	64 (46.71%)	43 (31.38%)	23 (16.78%)	7 (5.10%)
Normal children (197)	43 (21.82%)	85 (43.14%)	47 (23.85%)	22 (11.16%)
Total 334	107 (32.03%)	128 (38.32%)	70 (20.95%)	29 (8.68%)

$X^2 = 23.9$  with 3 df P < 0.000.

**Table 5: Distribution of children according to number of siblings**

	Zero	One	Two	Three and more
Malnourished cases (137)	11(8.02%)	27 (19.70%)	42(30.65%)	57 (41.60%)
Normal children (197)	84 (42.63%)	69 (35.02%)	31 (15.73%)	13 (6.59%)
Total 334	95 (28.44%)	96 (28.74%)	73 (21.85%)	70 (20.95%)

$X^2= 96.1$  with df 3 P < 0.000.

**Table 6: Distribution of children according to birth order**

	First Child	Second Child	Third Child and above
Malnourished children (137)	24(17.51%)	35(25.54%)	78(56.93%)
Normal children (197)	119(60.40%)	62(31.47%)	16(8.12%)
Total 334	143(42.81%)	97(29.04%)	94(28.14%)

$X^2 = 10.2$  with df 2 P < 0.000.

**Table 7: Distribution of children according to age of weaning**

	4-6 month	6-9 month	9 months
Malnourished children(137)	21 (12.81%)	55(40.14%)	61 (44.52%)
Normal children(197)	106 (53.80%)	67(34.01%)	24 (12.18%)
Total 334	127 (38.02%)	122 (36.52%)	85 (25.44%)

$X^2=65.5$  with df 2 P < 0.000.

**Table 8: Distribution of children according to caste**

	Muslim	Hindu			Jain	Christian
		S.C	ST/OBC	General		
Malnutrition cases (137)	3(2.18%)	66 (48.17%)	46 (33.57%)	22 (16.05%)	0	0
Normal Children (197)	3(1.52%)	47 (23.85%)	36 (18.27%)	111 (56.34%)	0	0
Total. (334)	6 (1.79%)	113 (33.83%)	82 (24.55%)	133 (39.82%)	0	0

**Table 9: Distribution of children according to economic status**

	I	II	III	IV	V
Normal Children. (197)	67 (34.01%)	49 (24.87%)	39 (19.70%)	27 (13.70%)	15 (7.61%)
Malnourished children (137)	5 (3.64%)	9 (6.56%)	35 (25.54%)	40 (29.19%)	48 (35.03%)
Total. (334)	72 (21.55%)	58 (17.36%)	74 (22.15%)	67 (20.05%)	63 (18.86%)

**Table 10: Distribution of malnourished children according to age group**

0-1Yr	1-2Yr	2-3Yr	3-5 Yr	Total
9(6.56%)	13(9.48%)	67(48.90%)	48(35.03%)	137

**Table 11: Distribution according to grade of malnutrition**

	Male	Female
Malnutrition Grade. I. (56) (40.87%)	27 (48.21%)	29 (51.78%)
Malnutrition Grade. II. (40) (29.19%)	16(40%)	24 (60%).
Malnutrition Grade. III. (25) (18.24%)	11(44%)	14 (56%)
Malnutrition Grade. IV. (16) (11.67%)	5(31.25%)	11 (68.75%)
Total (137)	59(43.06%)	78 (56.93%)

**Table 12: Distribution of children according nutritional deficiency**

	Vit. A. defi	Vit. D. defi	Vit. B complex. Defi	Protein. def. signs	Total	Total children with deficiency signs
Malnourished. (137)	10 (7.29%)	16 (11.67%)	26 (18.97%)	24 (17.51%)	76.	105
Normal (197)	2 (1.01%)	7 (3.55%)	12 (6.09%)	14 (7.10%)	35	31
Total (334)	12 (3.59%)	25 (7.48%)	38 (11.37%)	38 (11.37%)	111 (33.23%)	136 (40.71%)

**Table 13: Age wise distribution of malnourished children according to deficiency sings**

Age Groups	Vit.A deficiency	Vit.D deficiency	Vit. B.complex Deficiency	Protein deficiency signs	Total deficiency signs
0-1. Yr (9)	-	-	1(11.11%)	1(11.11%)	2
1-2.Yr (13)	2(15.38%)	3(23.07%)	3(23.07%)	4(30.76%)	12
2-3.Yr (67)	4(5.97%)	5(7.46%)	11(16.41%)	10(14.92%)	30
3-5.Yr (48)	4(8.33%)	8(16.66%)	11(22.91%)	9(18.75%)	32
Total (137)	10(7.29%)	16(11.67%)	26(18.97%)	24(17.51%)	76

## Discussion

In the present study, as depicted in Table 1, 171 males (51.19%) and 163 females (48.80%) were studied. Among Malnutrition cases (as per WHO child growth standards) of various grades it was found that 63 (45.98%) were male children and 74 (54.01%) were females. 108 (54.82%) were males and 89 (45.17%) were females in the normal group. More or less similar prevalence rates were reported by Bhansali (1973), Vijay Kumar et al. (1975) and Vandana et al (1976). As reported by the "2015 Global Hunger Index Report", in India- 44% of children under the age of 5 years were under weight.<sup>9</sup>

As shown in Table 2, type of family influenced to some extent, the occurrence of malnutrition in the family. It was observed that 58 (42.33%) were malnourished and 45 (22.84%) normal children were from single families. 41 (29.92%) malnourished cases and 67 (34.01%) normal children belonged to joint families. At the same time 38 (27.73%) malnourished and 85 (43.14%) normal children were from three generation families. The difference was found statistically significant, explaining that children are

better cared by elderly as they are better experienced and they have spare time to look after the child.

As depicted in Table 3, most of the malnourished cases 89 (64.96%) were delivered at home and only 48(35.03%) were hospital deliveries. Among the normal children only 35 (17.76%) were home delivered and 162 (82.23%) were delivered in some hospital. The difference was statistically highly significant. Gupta, B.L. revealed in his study that 76.77% of deliveries were conducted by untrained dais and relatives. Gradually the situation is improving by the provision of JSSY and availability of trained dais and other grass root level workers.

As it is clear by looking at Table 4 the education level of mother has a great impact on nutritional status of children. It was observed that among the malnourished children group, 46.71% mothers were illiterate, 31.38% primary, 16.78% middle and only 5.10% mothers were secondary educated and above. On the other hand among normal children 21.82% were illiterate, 43.14% primary, 23.85% middle and 11.16% studied up to secondary level and above. The difference was statistically highly significant. Kanwal Preet Gill et al (2014) in their study found that Odds of infants with

under nutrition were higher among those whose mothers were illiterate (OR=22, CL= 1.2-3.8, p=0.008). Similar findings have been observed in slums of Ludhiana, where the prevalence of under nutrition among children was higher if mothers were illiterate. Uneducated mothers, with little or no exposure, are unaware of effective home based health care practices such as need for immunization or preventive steps against diseases which might be the reason for these findings.

As shown in the Table 5, it was observed that only 8.02% children were having no sibling in Malnourished group while 19.70% had one sibling, 30.65% had two siblings, and 41.60% were having three and more siblings. Among normal children, 42.63% were having no sibling and 35.02% one sibling, 15.73% had two siblings and only 6.59% were having three and more siblings. Findings clearly suggested that there were more chances of malnourishment where there are more siblings, difference was statistically significant. Our findings are in consonance with the observation of Prasad and Nath (1970) and Cutting et al. (1972).

As depicted in Table 6, maximum malnourished children (56.93%) group were from third and above birth order group and minimum were from first birth order group (17.51%). On the other hand maximum normal children (60.40%) were observed from first birth order group and minimum were from third birth order group (8.12%). Vishesvara Rao (1969) significantly demonstrated the influence of birth order on the health status of children.

As shown in Table 7, the age of weaning has an impact on occurrence of malnutrition. In malnourished children, 12.81% children were weaned in 4-6 months while 44.52% were weaned after 9 months. At the same time 53.80% children of normal children group were weaned at 4-6 months and only 12.18% children were of the group who were weaned at 4-6 months of age. In a study by Gupta, P.R. et al. (1978) introduction of solids was done in 45.5% children by 12 months of age and 32% children by 18 months of age and in the remaining 22.5% children, solids were started after 18 months. Gupta, B. L. (1977) observed that majority of malnourished children were started supplementary feeds in 7-12 months age and in only 15.4%, weaning was done by the age of 6 months. It appears that prolonged breast feeding, without any introduction of supplementary foods in child's diet, provokes the phenomenon of malnutrition and findings are highly significant statistically.

The studied children were from Muslim and Hindu (SC, ST/OBC, GENERAL) community. Only 2.18% were from Muslims, 48.17% SC, 33.57% ST/OBC, and 16.05% General children were among malnutrition group. On the other hand 1.52% were Muslims, 23.85% SC, 18.27% ST/OBC, and 56.34% General from normal children. Kanwal Preet Gill, et al in their study of prevalence and demographic correlates of Under-

Nutrition among Infants found 58.25% normal and 41.8% undernourished in upper class while in lower class, 48.2% were normal with 51.8% under-nourished children. Overall living standard of particular caste reflects the occurrence of malnutrition in that caste group, as is clear in Table 8. Many factors including region, religion and caste affect the nutritional status of women living in rural area also contribute to nutritional status.<sup>12</sup>

As shown in Table 9 among the normal children 34.01% and 24.87% were of economic state I and II respectively while 19.70% were of grade III, 13.70% of grade IV and only 7.61% were from grade V. On the other hand in the malnourished group 3.64% belonged to grade I, 6.56% to grade II, 25.54% were of grade III, 29.12% were of grade IV and 35.03% belonged to economic status grade V. Williams, et, al, (1967), Dutta et, al, (1970), Mukerjee, et, al. (1972) and Vijay Kumar et,al (1975) also observed that the prevalence of malnutrition increases as the socio- economic status falls. In general those who are poor are at risk for under nutrition, while those who have high socio economic status are relatively more likely to be over nourished.<sup>12</sup>

As shown in Table 10, among the malnourished children, majority i.e. 48.90% were of the 2-3yrs age group followed by 3-5yrs (35.03%), 1-2 yrs (9.48%) and 0-1yrs (6.56%) age group. Ghai (1970)<sup>13</sup>revealed that prevalence of malnutrition based on weight was significant between the age of 18-29 months. 34.4% of children in second year of life weighted less than 80% of reference weight for age. Similarly Vijay Kumar (1975) reported 73% of infants during the first 6 months were well nourished. This percentage reduced to only 27% in 12-24 months of age. Vandana (1976) reported 51% to 82% malnourished in various age groups, with an average of 68.6%.

As shown in table 11 Out 40.87% of grade malnutrition I. 48.21% were male children and 51.78% children were females. Out of 29.19% of grade malnutrition II. 40% were male and 60% were female children. Out of 18.24% of malnutrition grade III. Males children were 44% and females were 56%. Similarly out of 11.67% of malnutrition grade IV children 31.25% children were male and 68.75% were female children. Ghai et al (1970) in a study in Haryana reported frank marasmus in 1.7% yet according to another study by P. Chandra, et al. (1978) using Gomez classification, 21.7% were in III degree malnutrition. Bhansali (1976) in a study of Ajmer brought out that as many as 30.55 were having weights below 60% of Harwards standard. Over all female suffered more than male, this might be due to male being more cared in rural Rajasthan as old mind setup still dominates.

Table 12. Shows that among the malnourished group 7.29% had Vita. A deficiency, 21.89% had Vita. D deficiency, 40.87% had Vita. B. Complex deficiency, 61.31% had Protein deficiency signs. They were having a total of 180 deficiencies in 105 under 5 children. On

the other hand among the normal children Vita. A. deficiency was observed in only 1.01%, Vita. D deficiency in 3.55%, Vita. B. Complex deficiency in 6.09% and protein deficiency was observed in 7.10% children. Total deficiency was 35 observed in 31 normal under 5 children. Comparable figures of Vita. A and Vita. D deficiency were reported by Dutta et al. (1971), Sharma et al. (1972), Rao et al (1969), Shrivastava, et al (1970), and Gupta et al. (1973). Reports of the Indian ministry of health based on recent surveys indicate that in the poor section of the population the prevalence of Vita. A deficiency is about 3-8 % in preschool, children (I.C.M.R., 1972) and (Ajit Kumar et al). Choudhri et al (1973) in a study found vitamin B. Complex deficiency was highest in their sample. Kango, R.N. (1967) reported evidence of B. Complex deficiency in 30% of preschool children. Clinical protein deficiency was reported in 61.31 % of malnourished children in present study. Ghai (1970) reported nutritional oedema in 0.9% children, hair changes in 6%, mild to moderate muscle wasting in 4.6% and nutritional dermatosis in 18% Of children.

Table 13 is showing that among malnourished children 0-1yr group 44.44% had Vita. B. Complex and 88.88% had protein deficiency signs. Among 1-2 yrs group 30.76% had Vita, A deficiency, 46.15% had Vita. D deficiency, 69.23% had Vita. B. complex deficiency and 84.61% were observed with protein deficiency signs. In 2-3 yrs group 5.97% had Vita. A deficiency, 23.88% had Vita. D deficiency, 29.85% had Vita. B. Complex deficiency and 38.80% were having protein deficiency signs.

Similarly among the 3-5yrs group 4.16% had Vita. A deficiency, 16.66% had Vita. D deficiency, 8.33% had Vita. B. Complex deficiency and 25% were suffering from protein deficiency signs. Over all among the malnourished children 7.29% had Vita. A deficiency, 21.89% had Vita. D deficiency, 40.87% had Vita. B complex deficiency and in 61.31% protein deficiency signs were observed.

### Conclusion

Indian rural child usually succumbs to pernicious combination of malnutrition, communicable diseases and consequences of unregulated fertility. In present study it was observed main factors contributing to the problem of malnutrition are inextricably linked with total environment of community, e.g. poor living condition, ignorance, high morbidity etc.

It appears that despite the rudimentary medical services, people by and large have failed to utilize them. Instigation of various socio-economic developmental program me with the community, with

organized community efforts can really contribute to tackle the problem of malnutrition. Integrated, multidisciplinary approach is needed for solution of various problems. In such a strategy the improvement of environment sanitation, availability of medical and health services in far flung rural areas and non-formal health education, must find its due place. All the modern available audiovisual medias must be utilized for imparting, so far neglected, health education.

**Conflict of Interest: None**

**Source of Support: Nil**

### References

1. Jelliffe; D.B. (1968). Nutrition in sub tropics and tropics. W.H.O. Monograph series. No 23. Second edition.
2. F.A.O./W.H.O.(1963). Third food survey, joint F.A.O./W.H.O. expert committee report.
3. Bengoa; J.M. (1970) Recent trends in public health nutrition. Protein calorie malnutrition. In nutrition proceedings of the eighth international congress. Prague, Sept, 1969. Austerdom, Excerpta Medica . (cited in W.H.O. Technical Report Series No . 477( 1971).
4. W.H.O.(2014) World Health Statistics 2014.
5. Gopalan. C. and Kamla Jaya Rao (1980). In prevention in childhood of health problems in adult life. F. Falkner (ed), Geneva, W.H.O.
6. Malik; A.K. General Health Survey in Rural Health Training Center Naila, Jaipur. (1973). Thesis submitted for M. D. (PSM) Rajasthan University.
7. Bhandari; B. and Gupta; B.M. Nutritional assessment of rural preschool children, Ind. Jr. Paed. (1973).40:142.
8. Vandana (1976). A longitudinal study of morbidity in children upto 5 yrs in an urban community. Sindhi Colony, Jaipur. Thesis submitted for M. D. (P.S.M.). Rajasthan University.
9. "2015 Global Hunger Index Report". International Food policy research institute (IFPRI).
10. Superpower,230 million Indians go hungry daily. Subodh Verma, 15 January 2012, The Times of India.
11. NFHS 3. Nutritional status of adults retrieved 2009-11-26.
12. Kanji Lal, B et al (2010). Nutritional status of children in India: Household socio-economic condition as the contextual determinants. Int. Journal for Equity in Health 9:19.doi;10.1186/1475-9276-9-19.
13. Ghai O.P, Chaudhary S.N, Kapoor S, Jaiswal V.N and Sinolair Seeta (1970). Nutritional status of pre-school children of rural community. Ind. Jour. Med. Resch.58:162.