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Original Article

PREVALENCE AND ASSOCIATED RISK FACTORS OF MALNUTRITION AMONG UNDER FIVE YEARS OF CHILDREN IN THE FIELD PRACTICE AREA OF RURAL HEALTH TRAINING CENTRE, NAILA JAIPUR

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ABSTRACT

Objective: Malnutrition among children under the age of five is a global health concern, particularly in developing countries. In India, prevalent nutritional problems include stunting, wasting, anemia, poverty, and low birth weight. These forms of malnutrition have severe consequences for children's health and overall well-being, making malnutrition a leading risk factor for children under five worldwide. Efforts to address malnutrition in developing countries, including India, have been a focus of United Nations' Millennium Development Goals (MDGs) aimed at improving child health outcomes. However, despite these efforts, malnutrition remains a significant concern, particularly among women and children in India.

Methods: The study was conducted in the rural community of Jamuwaramgarh block in Rajasthan, Jaipur District, India. The sample size was calculated based on a prevalence rate of malnutrition among under-five children. Ethical approval was obtained, and only mothers with children aged 6-59 mo were included in the study. A multistage sampling procedure was used to select the study participants, including sub-block, primary health centers, villages, and households. Data on socio-demographic characteristics, obstetric history, immunization, breastfeeding, and weaning practices were collected through interviews. Anthropometric measurements were taken, and the data were entered into Microsoft Excel for analysis.

Results: The study included 700 children under the age of five. The prevalence of malnutrition among children in the study area was determined. The data collected on socio-demographic characteristics, obstetric history, and other variables were analyzed to identify the determinants of malnutrition among rural Indian children.

Conclusion: Malnutrition among children under the age of five remains a significant public health concern, particularly in developing countries like India. Stunting and wasting are prevalent forms of malnutrition, with serious consequences for children's growth and development. Despite efforts to address the issue, progress has been slow, and the prevalence of malnutrition in India is still alarmingly high.

Keywords: Malnutrition, Children, Under-five, Developing countries

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INTRODUCTION

Malnutrition among children under the age of five is a significant global health issue, especially in developing countries. In India, like many other developing nations, the most common nutritional problems in infancy and early childhood are stunting, wasting, iron-deficiency anemia, poverty, and low birth weight [1-3]. These forms of malnutrition have serious health, social, and economic consequences not only during childhood but also across generations, making it the leading risk factor among children under five worldwide [4].

To address the burden of malnutrition among under-five children, four of the eight United Nations' Millennium Development Goals (MDGs) were specifically directed towards improving child health outcomes in developing countries. Reducing child mortality and malnourishment among children are important indicators of progress towards these goals [5]. However, despite efforts and development initiatives, the nutritional situation of women and children in India remains a significant concern [6].

In India, the prevalence of malnutrition among children is alarming. According to the National Family Health Survey (NFHS-4), more than 38% of under-five children in the country were stunted, 21% were wasted, 7.5% were severely wasted, and 35.7% were underweight [7]. While there has been a decrease in the prevalence of stunting and underweight since 2005-06, the prevalence of wasting has remained relatively stable. The state-wise distribution shows that Bihar, Uttar Pradesh, Jharkhand, and Meghalaya have the highest rates of stunting, while Kerala and Goa have the lowest. Jharkhand also has the highest levels of underweight and wasting [7]. Despite the implementation of large-scale programs to address malnutrition, progress has fallen short of expectations. Systematic reviews of major nutrition interventions, such as promotion of breastfeeding, complementary feeding, and nutrient supplementation, have shown modest impacts on malnutrition prevalence [8]. While these interventions have demonstrated significant impacts on behavior, their effectiveness in reducing malnutrition remains context-dependent.

To address the complex issue of malnutrition, it is essential to consider the multiple risk factors involved. However, much of the modeling and research tend to focus on single risks and interventions, leading to oversimplifications in understanding the determinants of malnutrition [9]. Recent emphasis on systems approaches in epidemiology highlights the need to examine the determinants of malnutrition in their entirety, taking into account the interplay of various risk factors. Several factors have been identified as important determinants of malnutrition among children. These include the mother's nutritional status, child's sex, parental education, poverty, socio-economic status, access to healthcare, child care behavior, cultural beliefs, and environmental ecosystems [10-12].

In India, despite significant progress in improving nutritional status, a large proportion of mothers and children, particularly in rural areas, are still affected by malnutrition [6]. However, there is a limited understanding of the socio-economic correlates of under nutrition among rural children in India. Therefore, there is a need to explore the socio-economic determinants of malnutrition among rural Indian children under the age of five. By identifying these determinants, policymakers and stakeholders can gain a better understanding of the prevalence and risk factors associated with

malnutrition. This understanding is crucial for designing and implementing effective nutritional interventions to reduce child mortality and morbidity in India.

In conclusion, malnutrition among children under the age of five remains a major public health concern, particularly in developing countries like India. Stunting and wasting are prevalent forms of malnutrition, with serious consequences for children's growth, development, and overall health. Despite efforts to address the issue, progress has been slow, and the prevalence of malnutrition in India is still alarmingly high.

MATERIALS AND METHODS

Study site

The study was carried out in rural community in Jamuwaramgarh block, Rajasthan state, Jaipur District. The district has 1481 villages and the rural population 3,154,331 according to census 2011. The under six year comprise 14.7% of the total rural population. Health services are delivered at grass root level through 4 medical college, 28 community health centres (CHC), 119 Primary health centres (PHC) and 616 sub-health centres (SC) in Jaipur District. There are 9 blocks in Jaipur district. One of the blocks Jamuwaramgarh which have 25 gram panchayat, in the district was randomly selected, for the present study PHC (gram panchayat) Naila constituting a population of around 32,222 and comprising of 9 subcentres and 25 anganwadis centres. Among 25 anganwadis, ten anganwadis were selected randomly using random table for study.

Sample size

Sample size is calculated at 95% confidence level assuming a prevalence of malnutrition 41.3% among under five children [according to seed article]. At the relative allowable error of 10%, of prevalence, required sample size will be 568 under five children. Assuming non-response rate to be 10%, minimum target sample size is 640. However, best efforts will be made to increase sample size as maximum as possible to enhance the precision. Finally we have taken up 700 children for this study.

Ethical consideration and study inclusion and exclusion criteria

As the study involves human participants, the study was sort ethical approval from the SMS Medical College, Jaipur Institutional Review Board (IRB). Only those who were willing to participate and give written informed consent were part of this study. The study was maintained the privacy and confidentiality of the study participants. As per study objectives, the study was included only mothers with children aged 6-59 mo were included in the study. If child would be found malnurished we had informed to parents regarding the nutrition status and give the appropriate nutrition education, information about Anganwadi Nutrition supplementation and Mid-day Meal Program in School and give them referral slip for consult to the nearest PHC or CHC Medical officer or LHV/Paramedical staff.

Sampling procedure

The present study was a cross sectional study. The study populations comprise children under five years and their caretakers. Multistage sampling procedure was adapted to select sub block, primary health centers (PHC), village and finally the households. There are 9 blocks in Jaipur district. One of the blocks Jamuwaramgarh which have 25 gram panchayat, in the district was randomly selected, for the present study PHC (gram panchayat) Naila constituting a population of around 32222 and comprising of 25 anganwadis.

Sample technique

To carry out present study at 10 anganwadi centres out of 25 anganwadicenters of naila were selected randomly. Complete list of families covered by selected anganwadicenters was procured and 50% of the families from the list were selected to be included in the study using random number table. It was decided that if selected family is not was to participated in the study or is not available at the home at the time of survey for two attempts, it was replaced by its immediate next family in vicinity. This process was repeated till desired sample size of 700 of children less than 5years are included in the study.

Plan of action

After approaching to the selected family nature and purpose of the study was explained by investigator himself. After obtaining there written consent, detailed history regarding there socio-demographic characteristics and obstetric, immunization, breast feeding and weaning history was taken.

Eligible child/children in this family was examined for their cleanliness, dressing and personal hygiene practices. Anthropometric parameters like weight, height and mid arm circumference were measured by investigator himself following prescribed criterion using same instruments and materials to minimize inter observer and inter instumental variations. All this information were recorded on a predesigned semi structured study proforma. Data thus generated were entered in Microsoft excel sheet to prepare master chart and subjected to statistical analysis.

Operational definitions of various variables used in the study

Age

Age was recorded in completed months, at the time of interview.

Caste

Caste is an endogamous and hereditary social group sharing common cultural features. e. g. Schedule Caste (SC), Schedule Tribe (ST), Other Backward Caste (OBC) and General Caste.

Religion

Religion is simply defined as belief in the interaction of man with supernatural, since no universally accepted definition exists. On the basis of their beliefs, these are a usual religion like Hindu, Muslim, Christian and Sikh etc.

Residence

The subject was considered to be resident of Nayla, Jaipur, if they were staying there at least for last one year.

Family

A family is a group of individuals, who are related by blood or by marriage, living under the same shelter and share a common kitchen.

Type of family

Nuclear family

A group of persons comprising numbers of a single or at most two generations united by blood or adoptive or marital or equivalent ties. E. g.-husband, wife and their children.

Joint family: This type family is a merger of several nuclear families or as a vertical extension of a nuclear family and having more than one couple or we can say more than one couple in a family.

Extended: When some unrelated or distinctly related members live together besides wife, husband and their children.

Family size

Total number of individuals in a family, from a demographic perspective, it refers to the number of total number of children born to a woman at a point of time. It was defined as the total number of live members of an age in the family staying together.

Education

Literacy measures the incorporation of knowledge and values in an individual. As per the census of India, it was assessed as-

Illiterate: Those who could neither read nor write or those who could merely read but could not write in any language with understanding were considered as illiterate.

Primary school certificate: Who has completed and passed up to 5^{th} standard but not completed 8^{th} standard in school.

Middle school certificate: Who has completed and passed up to 8^{th} standard but not completed 10^{th} standard.

Secondary school certificate: Participants who have completed and passed up to 10th standard (metric) but not completed 12th standard.

Graduation: This category includes those who had been awarded bachelor's degree but not awarded post-graduation degree.

Post-Graduation: This category includes those who had been awarded master's degree but not awarded proffessional degree.

Professional: Those who had been awarded any professional degree. E. g.-MBBS/BE/B. Tech/MD/MS/BBA/MBA/BCA/MCA/B. Ed/M. Ed.

Marital status: Marital status was assessed as follows:-

Married: All persons married and living with their spouses.

Widowed: The persons not remarried after the death of his/her spouse.

Divorced/Separated: The persons not remarried after divorce or legal separation and living separately with their counterpart.

Occupation

Occupation is a trade, profession or type of work performed by an individual for his/her livelihood and is widely used or characteristics for social classification due to economic rewards and extent of authority and status associated with it. [99]

Unemployed: person not involved in any earning activity including retired persons on pension

Unskilled workers: Person involved in physical activity requiring no specific set of skills like daily wage workers, coolie, home guard, peon, catering etc.

Semiskilled workers: person involved in physical activity involving use of some instrument with minimal mental skills like factory machine workers, wall painters, furniture workers, cloth workers etc.

Skilled worker: person involved in physical activity with involvement of mental skills like Drivers, salesmen, jewelry workers, Tailors, electrician, computer hardware repair, barbers, line man etc.

Farmer: Person involved in farming practices on the land owned by themselves.

Shop owner: person who owned any type of shop including Vendors

Clerical: any type of writing desk work which may include minimal physical activity, in both Public and private sectors. This includes postman, UDC, clerks, private firm employees etc.

Semi profession: Includes Teachers (not having B. Ed degree), Technicians, Computer operators, paramedics and diploma holder engineers etc.

Profession: includes professional like Doctors, Engineers, Lecturers, advocates, CEOs and teachers having B. Ed degree.

Total family income: In the present study, it is the sum of monthly income of each of family member**.**

Per capita income: It is monthly income per person of family and it is calculated as:-

Total family income/family size

Socio-economic status: Socio-Economic Status (SES) was assessed as per B. G.

Prasad's Socio-economic status scale[100]. As BG Prasad's classification was introduced in 1961 considering the base of Consumer Price Index (CPI) for 1960 as 100.[101]The scale was modified in 1982 and 2001 by introducing linking factors to convert CPI (1982 and 2001) from the new base of 100 to the old base CPI (1960). The linking factors for 1982 and 2001 were 4.93 and 4.63, respectively. So income of each of the class is modified in to present income as per Price index for January 2017. Price index for January 2017was found 274 on base year 2001. Hence income of present time is calculated as follows:-Value of Rs 100 of 1961 = CPI of Jan 2017 at base 2001 × Multiplication factor for 1982 Multiplication factor for 2001 = 274 × 4.63 × 4.93 = 6254.02 =6254 (round to near to 10).

RESULTS

About two thirds (62.9%) were living in pucca houses, while 23.3% were living in semi Pucca houses. Sanitary latrine was present in 90%, while overcrowding was presented in 40% of the study population. Three forth of households were proper ventilated while one forth of household were not ventilated in study population (table 1).

Table 1: Characteristic features of housing condition of study population

Housing conditions	Number	Percentage
Type of House		
Kutcha	62	8.9
Kutcha-Pacca	191	27.3
Pacca	447	63.9
Ventilation		
Yes	537	76.7
No	163	23.3
Overcrowding		
Present	280	40
Not	420	60
Availability of toilet		
Present	631	90.1
Absent	69	9.9

Majority of the mothers (96.5%) visited 4 or more than 4 times for ANC checkup and almost 93% consumed IFA tablets. Comorbidity was found in 19.7% mothers, out of which 11.3% were hypertensive, 7.7 were suffering from hypothyroidism and 0.7% were diabetic. Premature birth was found in 17.6% and Low Birth Weight was found in 23.1% mothers. 40.6% children were having first birth order and 2nd, 3rd and 4th birth order was found in 36.6%, 16.9% and 6% respectively. Majority of mothers (82.86%) were from 21 to 30 y of age and 12.1% were less than or equal to 20 y of age. Only 5.04% mothers were more than or equal to 31 y. Majority (98%) children were delivered in hospital/institution. Exclusive breast feeding was practiced by 77.7% mothers. Bottle feeding was practiced in 40.4% mothers. 70% mothers practiced good hygiene habits for child feeding.

Prevalence of underweight was about 32.40% among which 3.6% were severely underweight. The extent of overall stunting was about 39.29%, and of them, about 2.2% were severely stunted. About 20.14% of children had wasting, of which 1.63% had severe wasting. According to Mid Upper Arm Circumference (MUAC) classification, 31.0% were had severe wasting while 60 % had mild to moderate wasting condition. The mean weight of study population was 8.86±3.33 cm while average height was 76.45±14.36 (table 3).

Table 2: Maternal and Child associated factors of study population

Mother and Child associated factors		
Covariates	**Number**	**Percentage**
No. of ANC visits		
<4 visit	24	3.5
≥4 visit	676	96.5
IFA tablets taken		
Yes	650	92.9
no	50	7.1
Co-morbidity during antenatal period		
Hypertension	79 5	11.3
Diabetes	54	0.7
Hypothyroidism		7.7
Premature birth		
Yes	123	17.6
no	577	82.4
Low Birth weight	162	23.1
Birth order		
1	284	40.6
2	256	36.6
3	118	16.9
4	42	6.0
Age of mother at birth of child		
≤20 y	82	12.1
21-30 y	580	82.86
≥31	38	5.04
Place of delivery		
Home	14	2
hospital	686	98
Exclusive breast feeding		
Yes	544	77.7
No	156	22.3
Bottle feeding		
Yes	283	40.4
No	417	59.6
Hygiene		
Yes	490	70
No	210	30

Table 3: Malnutrition assessment of study population

	Malnutrition assessment	
Shakir's tape	Number	Percentage
Green	416	59.4
Yellow	186	26.5
Red	98	14.1
MUAC (cm)		
<11.5	217	31.0 30.6
11.6-12.4	214	30.1
12.5-13.4	211	8.3
>13.5	58	
Malnutrition		
Under-nutrition	224	32.40 39.29
Stunting	275	20.14
Wasting	141	
Anthropometry		
Weight of child	8.86±3.33	
Height of child	76.45±14.36	
MUAC	12.92±1.18	

Table 4: Logistic regression analysis for household and sanitation level factors with stunting, underweight and wasting

	Stunting (OR 95% CI)	**Underweight OR (95% CI)**	**Wasted (OR 95% CI)**
	Typ e of family		
Nuclear	1	1	1
Joint	1.33[0.82, 2.23]	1.20[0.65, 2.51]	0.96[0.59, 1.28]
Extended	1.22[0.88, 1.96]	1.09[0.51, 1.96]	1.52[0.98, 2.56]
	Ventilation		
No	1	1	1
Yes	0.62[0.43, 0.90]*	0.30[0.16, 0.56]	0.66[0.46, 0.96]
	Typ e of House		

	Stunting (OR 95% CI)	Underweight OR (95% CI)	Wasted (OR 95% CI)
Kutcha	1	1	1
Pucca	0.51[0.32, 0.80]	0.29[0.14, 0.60]	0.68[0.42, 1.08]
Semi-Pucca	0.45[0.29, 0.69]	0.45[0.25, 0.82]	0.71[0.46, 1.10]
	Over-crowding		
No	1	1	1
Yes	2.2[1.11, 4.35]*	2.01[0.15, 3.19]*	1.30[0.65, 2.69]
	Availability of toilet		
Present	1	1	1
Not present	3.01[1.68, 5.30]	2.27[1.21, 4.23]	2.92 1.66, 5.13]

Risk of wasting was significantly (p<0.01) 1.64 time higher among children with mother not maintaining hygiene as compared to children with proper hygiene. The risk of wasting was 1.9 (1.43-1.83) and 1.3 (CI=1.10-1.79) times higher among children whose mothers were illiterate and those educated up to 8th standards, as compared to children whose mothers were educated to the level of higher secondary and above. Risk of wasting was 0.66 (CI=0.46-0.96) time lower in children having proper ventilation as compared to family not having ventilation (table 4).

DISCUSSION

The discussion highlights the prevalence of under-nutrition in rural areas of South and South-East Asia, focusing on India and neighboring countries such as Nepal, Pakistan, and Bangladesh. The prevalence rates of underweight, stunting, and wasting in India were reported as 32.40%, 9.29%, and 20.40% respectively [10]. These rates were similar to the national and regional data available, although some studies reported higher or lower prevalence rates. Stunting was found to be the most common form of malnutrition, followed by underweight and wasting.

The study identified several factors associated with malnutrition. Age was significantly associated with malnutrition, with higher prevalence rates observed among children aged 1-3 y. Hindu children had a higher prevalence of malnutrition compared to children from other religious communities, but the association was not statistically significant. Caste was also non-significantly associated with malnutrition, with the highest prevalence observed among children belonging to the schedule caste [11].

Birth order was found to be associated with underweight, with higher prevalence rates observed among children born at higher birth orders. However, the association with stunting and wasting was not significant. The study also highlighted the negative association between rural residence and child malnutrition [12].

Low family income was identified as a significant predictor of malnutrition, with higher prevalence rates observed among children from families with lower income. Maternal education level was also associated with malnutrition, with higher prevalence rates observed among children whose mothers had lower education levels [13]. Hygiene, antenatal care visits, overcrowding, and water sanitation practices were identified as important factors associated with child nutritional status [14]. The study emphasized the importance of socioeconomic status in determining child nutritional status, with children from higher socioeconomic status having a lower risk of malnutrition. It also suggested that complete antenatal care visits and maintaining sanitation and hygiene practices in households could contribute to better child nutritional outcomes [14].

In addition to the factors mentioned above, the discussion highlighted the need for further exploration of factors such as exclusive breastfeeding practices, type of delivery, family type, supplementation during pregnancy, weaning practices, father's occupation, availability of toilet facilities, and family size, as they are all important determinants of under nutrition.

Overall, the discussion provides insights into the prevalence of under nutrition in South and South-East Asia, specifically in rural areas, and identifies various factors associated with malnutrition. The findings highlight the need for targeted interventions to address the high prevalence of malnutrition and improve child nutritional outcomes in these regions.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INETRESTS

Declared none

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