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Prevalence of Protein Energy Malnutrition among Under-five children in Odisha: A Review

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ABSTRACT

The WHO has identified PEM as one of the major problems among the children round the world. Also, over the years it has been found that developing countries like India have been facing the issue of PEM among children particularly at the most crucial stage of their development. Moreover, this is prevalent mostly among the rural masses and the poor and arises due to issues relating to poverty, poor environmental sanitation, poor dietary practices, low socioeconomic status, maternal education, frequent infection, and poor household food security, high consumption of rice, frequency of acute illness and low birth weight of child. This paper is a review on the status of PEM among young children (under the age of five) in Odisha. The study is based on analysis and meta-analysis of secondary sources of relevant literature and the inferences thereof suggesting possible strategies to combat this problem.

Keywords: Malnutrition, Stunting, Underweight, Wasting.

INTRODUCTION

As the most vulnerable segment of the population, children under the age of five serve as a critical indicator of community health and nutrition. They are usually impacted by PEM as a result of a lack of nutrients to meet their needs. Malnutrition affects children under the age of five, primarily in disadvantaged settings. Kwashiorkor generally affects children between the ages of one and three, while marasmus primarily affects children under the age of two. Despite slight progress over the years, India has the highest rate of stunting, according to the National Family Health Survey (NFHS)-4(2015-16). In India, 38.4 percent, 35.8 percent, and 21% of children were found to be stunted, underweight, or wasting in 2015-16, respectively, but in Odisha, the percentages were 38.2 percent, 34.4 percent, and 18.3 percent. Malnutrition is caused by a lack of access to highly nutritious foods, poor feeding practices such as non-exclusive breast feeding, poor environmental conditions, large family size, poor maternal health, premature babies, negative cultural practices related to child rearing and weaning, delay in introducing supplementary feeding, and high female illiteracy. Malnutrition is exacerbated by frequent diseases such as diarrhea, respiratory infections, measles, and intestinal worms^[1]. Malnutrition is responsible for more than a third of all child fatalities. Malnutrition causes long-term impairments such as lower labour ability, growth retardation, and poor social and mental development in later life. Malnutrition causes mortality, disability, stunting, and mental and physical development retardation in children. A systematic review of published publications was conducted primarily using secondary sources of literature from internet databases such as Research Gate and Google Scholar. The articles were picked based on important subjects such as assessing various forms of malnutrition and the variables that influence it. The goal of the research, titled "Prevalence of Protein Energy Malnutrition among Under-five Children in Odisha" was to learn more about the prevalence of malnutrition and the variables that influence it.

Prevalence of Protein Energy Malnutrition among under-five years of children

Khargekar *et al.*^[2] performed a research in Parol, Thane district, Maharashtra, India, to measure protein energy malnutrition in children aged one to five years. A total of 225 children between the ages of 1 and 5 years were chosen for the research. Malnutrition was found to be more common (26.83 percent) in children aged 2-3 years, whereas underweight, stunting, and wasting were found to be more common (38.67 percent, 34.67 percent, and 36 percent, respectively). Mild and severe malnutrition were observed in 25.78 percent and 9.33 percent of children, respectively, based on mid upper arm circumference.

Prevalence of malnutrition in under-five children in urban slums of Berhampur, Odisha, India was studied by Sethy *et al.*^[3]. For the research, a sample size of 300 children aged 6 to 59 months was used. According to the findings, 69 percent of children are undernourished, as shown by underweight (55.3 percent), wasting (75 percent), and stunting (42 percent). Males made up 59.6% of the 208 malnourished youngsters, while females made up 40.4 percent. The group of children aged 37 to 60 months has the

highest percentage of underweight children (52.6%). Malnutrition was linked to characteristics such as maternal education, hygiene standards, and mother's feeding habits.

Agrawal *et al.* [4] investigated the nutritional status of children aged 12-36 months and the variables that influence it in rural Maharashtra. Malnutrition was found to be 40% among youngsters (MUAC 13.4 cm) with 36.4 percent boys and 43.7 percent girls, according to MUAC criterion. Nearly a quarter of the population (7.5 percent men and 19.41 percent females) had severe malnutrition (MUAC 12.4 cm).

In a tertiary care facility in Odisha, India, Jena *et al.* [5] performed a hospital-based prospective observational research on socioeconomic and demographic predictors of severe acute malnutrition in children aged 6-59 months. The incidence of severe acute malnutrition was found to be high in the research (2.8 percent). Male children (54.2 percent) were found to have more instances than female youngsters (45.8 percent). Malnutrition was most prevalent in the 6-12 month age group (37.4%). The majority of malnourished youngsters (96.4 percent) were from lower socioeconomic backgrounds.

Darsene *et al.* [6] performed a cross-sectional research in Ethiopia among children aged 6-59 months to determine the extent of under nutrition and its determinants. The research included a total of 811 youngsters who were chosen at random. Stunting accounted for 39.3 percent of the total, followed by underweight (15.8%) and wasting (15.8%). (6.3 percent). The age range 36-47 months had the greatest rate of underweight, accounting for 4.6 percent of the total sample, with males (8.4%) and females (8.4%). (7.4 percent). Underweight was linked to maternal education, diarrhoeal illness in the previous year, and family size. Similarly, wasting was shown to be linked to characteristics such as supplemental feeding frequency, age at which nursing was stopped, birth interval, and not being provided colostrum.

In Malawi, Ntenda *et al.* [7] performed a cross-sectional research to determine the relationship between low birth weight and under nutrition in preschool-aged children. For the research, a total of 4047 children under the age of five were chosen. Stunting, underweight, wasting, and LBW were found to be prevalent in 39 percent, 11 percent, 2 percent, and 10% of the population, respectively. Severe stunting was seen in the LBW category (adjusted odds ratio (AOR): 1.72; 95 percent confidence interval (CI): 1.35-2.20), underweight (adjusted odds ratio (AOR): 2.30; 95 percent CI: 1.68-3.14), and wasting (adjusted odds ratio (AOR): 1.47; 95 percent CI: 1.38-4.25) groups.

Yalew *et al.* [8] published a cross-sectional research titled "Prevalence and Factors Associated with Stunting, Underweight, and Wasting among Children Age 6-59 Months in Lalibela Town, Northern Ethiopia." A total of 844 homes were included in the investigation. Stunting, underweight, and wasting were seen in 47.3 percent (95 percent confidence interval: 43.2-51.1), 25.6 percent (95 percent confidence interval: 20.6-30.6), and 8.9 percent (95 percent confidence interval: 6.9-10.2) of the children, respectively. Stunting was shown to be linked to variables such as de-worming and the child's gender. When compared to offspring of illiterate moms, offspring of moms with a higher education (0.2 percent) were less wasted (5.7 percent). Father's occupation was significantly linked to wasting (p 0.05).

Hoque *et al.* [9] conducted a research to determine the nutritional condition of children under the age of five in Dhaka. For the research, a sample size of 100 children under the age of five years was

purposefully chosen. Z-score was used to calculate nutritional status. 39 percent and 13 percent of total children were found to be moderately and severely wasted, respectively, while 47 percent and 4 percent were found to be moderately and severely stunted. Underweight people were found to be 46 percent and 16 percent in the moderately and seriously underweight categories, respectively.

In Kolar, Madhya Pradesh, Meena *et al.* [10] performed a cross-sectional research on the nutritional condition of children under the age of five in anganwadi centers. Anthropometric measures and a clinical examination were used to determine nutritional status. According to WHO child growth criteria, 51% of children under the age of five were found to be malnourished in some way. A clinical assessment revealed that 49% of the patients were malnourished. Around 40% of children over the age of one year had a mid-arm circumference of less than 13.5cm. Family size, mother's education, career, surroundings, and child feeding and raising habits were all shown to be strongly linked to malnutrition.

Kumari *et al.* [11] investigated the "Prevalence of Protein Energy Malnutrition in Under-Five Children in Rural Areas of Ambala, Haryana, India" in a cross-sectional research. A total of 300 youngsters under the age of five were chosen for the research. According to the Gomez categorization, 44.43 percent of the population was classified as normal, while 39.34 percent, 15.66 percent, and 0.66 percent were classified as first, second, and third degree malnutrition, respectively.

FACTORS AFFECTING PROTEIN ENERGY MALNUTRITION

Dietary Factors

Adequate nutrition is the most important requirement for growth throughout the childhood.

Childhood is characterized by learning, exploration, socialization, increased physical activity.

Preschool children require relatively more calories and protein/kg body weight.

Niraula *et al.* [12] conducted a cross-sectional research in Borbote, Nepal, to determine the prevalence of malnutrition and the risk factors associated with it. 186 children under the age of five were chosen using a targeted sample strategy. The results were compared to the WHO categorization of malnutrition, which found that 20% of children were malnourished, with 14% being moderately undernourished and 6% being severely undernourished. Mothers who exclusively breastfed their babies for 6 months were found to be 20.0 percent underweight, whereas those who did not breastfeed were found to be 34.8 percent underweight (P=0.041). Females were found to be malnourished in greater numbers (27.7%) than men (20.4 percent).

Emmanuel *et al.* [13] performed a thorough investigation on the variables that contribute to malnutrition in children under the age of five in the Nigerian local government area. Using a multi-stage sampling methodology, a sample size of 250 people was analyzed. Stunting, wasting, and underweight were found to be present in 47.6%, 8.8%, and 25.6 percent of the study area, respectively. Around 18 percent had been diagnosed with protein energy deficiency in one form or another. Male children were found to have the highest levels of malnutrition. Marasmus was the predominant cause of protein

energy deficiency (63.6%). The study also indicated that 23.2 percent of children, 13 percent of whom were female, had PEM. Gender and PEM were shown to have a significant relationship. PEM was identified in 19.7% of infants who were not exclusively breastfed, while 7.1 percent of infants who were exclusively breastfed were diagnosed with PEM.

Shukla *et al.* [14] conducted a cross-sectional research on malnutrition and risk factors in children aged 6 to 59 months in the Jabalpur district's urban region (M.P.). 720 children between the ages of 6 and 59 months were chosen using a random sample procedure. Anthropometric measurements and data collecting were documented. 34.3 percent of the children were underweight, 41.5 percent were stunted, and 18.9 percent were wasting. Underweight and wasting were observed to be present in 34.7 percent and 20 percent of females, respectively. Males were shown to be more likely than females to perform stunts (42.7%). (40.4 percent). Children born with low birth weight, birth order, insufficient vaccination, and unsuitable feeding habits, such as absence of exclusive breast feeding and poor weaning, were more likely to be malnourished.

Sharma *et al.* [15] performed a community-based cross-sectional study with a sample size of 496 under-five-year-olds aged 6-59 months to determine the variables linked to malnutrition. According to the research, 83 percent of the participants were underweight, with 6 percent being seriously underweight. Stunting and wasting affected 54 percent and 63 percent of the children, respectively. Stunting harmed 2.2 percent of the 54 percent of those who were stunted. Under-nutrition was more common in young children due to poor feeding habits such as delayed supplemental feeding, non-exclusive breast feeding for the first six months, and a high incidence of illnesses such as diarrhoea, ARI, and worm infestation.

Teferi *et al.* [16] used a simple random sample strategy to identify 324 infants aged 6-59 months for their study. Within the age group 6-59 months, the frequency of stunting was found to be rather high (33.3%). Stunting was 0.06 times [AOR0.06; 95 percent CI (0.02-0.08)] less common in children aged 12-24 months, and 0.12 times [AOR0.12; 95 percent CI (0.03-0.56)] less probable in children aged 24 months and higher. Children born within 2 years of one other were 2.31 times more likely to suffer from chronic malnutrition [AOR 2.31; 95 percent CI (1.43- 3.08)]. Children who began supplemental feeding before the age of six months or after the age of six months were 3.78 [AOR 3.78; 95 percent CI (1.39-4.25)] times more likely to be stunted than those who began supplemental feeding after the age of six months.

Ecological Factor

Ingestion of high quantities of faecal bacteria from both human and animal sources by infants affects their nutritional status by diminishing appetite, impairing nutrient absorption and increasing nutrient losses.

Khan *et al.* [17] studied 3964 children under the age of five. Stunting, wasting, and underweight were measured using the WHO growth standards height-for-age Z-scores (HAZ), weight-for-height Z-scores (WHZ), and weight-for-age Z-scores (WAZ). The percentages of stunting, wasting, and underweight were 48.2%, 16.2%, and 39.5 percent, respectively. Boys had a slightly greater rate of stunting (51%) than girls (45%), which was statistically significant at the 1 percent level. Diarrhoea was mostly linked to being underweight. There was a strong link between home wealth and stunting, wasting,

and underweight. Stunting was seen in children from the poorest and wealthiest households, with stunting rates of 50% and 42%, respectively. When compared to the wealthiest families, the poorest families had two times the rate of stunting (20.6 percent) (10.3 percent).

Gebre *et al.* [18] performed a community-based cross-sectional investigation on the Prevalence of Malnutrition and Related Factors among Children under the Age of Five. The research included 840 children between the ages of 6 and 59 months. To collect anthropometry-related data, a systematic questionnaire was created. The prevalence of wasting, stunting, and underweight was 16.2 percent, 43.1 percent, and 24.8 percent, respectively, according to the research. In the previous two weeks, characteristics such as family size (AOR=2.72, 95 percent CI: 1.62-4.55), prelacteal feeding (AOR=3.81, 95 percent CI: 1.79-5.42), and diarrhoea (AOR=4.57, 95 percent CI: 2.56-8.16) were significantly linked with wasting. Stunting was predicted by the child's age (12-23 months: AOR=3.44,95 percent CI:2.24-5.29), AOR=3.58,95 percent CI:2.255.69), and AOR=4.42,95 percent CI:2.796.94), as well as the child's vaccination status (AOR=3.34,95 percent CI:1.31-4.81). Furthermore, underweight was linked to the mother's education, the child's sex, prelacteal feeding, and the child's vaccination status.

Chaudhary *et al.* [19] conducted an empirical study in the Slum Area of Jaipur City, Rajasthan, India, on variables impacting malnutrition among children under the age of five. An anthropometric sample of 200 children aged 6-59 months was chosen using height, weight, and mid upper arm circumference measurements (MUAC). Underweight (35.7 percent), stunting (43 percent), and wasting (10.5 percent) were all found to be prevalent. Malnutrition has been linked to socio-demographic characteristics such age, caste, family type, birth weight, birth order, parents' educational profiles, and family economic condition. More over half (56%) of the children were born with a low birth weight. The prevalence of stunting was found to be high, at 43%.

In rural India, Rah *et al.* [20] investigated the link between household access to water, sanitation, and personal hygiene habits, and stunting in children aged 0-23 months. There were 41% and 27% stunting and wasting, respectively. In the previous two weeks, 15 percent of youngsters reported diarrhoea. Stunting was observed to have an inverse relationship with caregivers cleaning their hands with soap before meals and after defecation. The availability of household sanitation was linked to stunting in children aged 0-23 months.

Other factors contributing to childhood malnutrition

Undernutrition among children mostly associated with higher family food insecurity, low quality of complementary foods and intestinal parasites and other infections, poor socio-economic status, low birth weight (LBW). Rural and tribal community are mainly affected by undernutrition.

Tiwari *et al.* [21] conducted an empirical study in a Mumbai slum to investigate the prevalence of PEM among under-five-year-old children and the relationship between socio-demographic parameters. PEM was found to be prevalent in 56 percent of 450 children. The majority of PEM was discovered in the 13-24 month age group, as opposed to the 3-5 year age group. Malnutrition was found in 52.3 percent of children of illiterate mothers and 47.7 percent of children of literate mothers, which was statistically significant (p=0.004). In a study of 450 children, 75.7 percent of those who were not provided exclusive breast feeding were found to be malnourished, whereas only

24.3 percent of those who were given exclusive breast feeding were found to be malnourished. The link was also shown to be statistically significant ($p=0.007$). PEM was linked to characteristics such as the child's age, the mother's education, birth order, immunisation status, exclusive breast feeding, the mother's early marriage, ARI history, diarrhoea, and the family's socioeconomic position.

Kassa *et al.* [22] investigated the extent of malnutrition and its related variables in children under the age of five. Stunting, underweight, and wasting were found to affect 38.3 percent, 49.2 percent, and 25.2 percent of children under the age of five, respectively, according to the research. Stunting was linked to characteristics such as the mother's educational position and the child's age. Underweight was linked to complementary feeding habits, whereas waste was linked to the mother's profession. Females made up the majority of malnourished children aged 6-59 months. Stunting was most common among children aged 24-35 months (9.9%), followed by children aged 12-23 months (9.9%). (9.6 percent). Children aged 48-59 months, on the other hand, had the lowest rate of stunting (3.1 percent).

Abdulrahim *et al.* [23] conducted a cross-sectional research on the prevalence of underweight and its determinants in children aged 0-59 months. A total of 365 youngsters under the age of five were chosen using a systematic sampling procedure. When comparing children aged 12 months to children aged 37-54 months, the prevalence of underweight children was much higher (38.6%). When compared to infants born with a birth weight of 2.5kg or more, children born with a birth weight of less than 2.5kg had a considerably higher prevalence of underweight (41.9%). (21.8 percent).

Purohit *et al.* [24] carried out a community-based descriptive cross-sectional research on the nutritional condition of under-five children in Maharashtra state at the Urban Health Centre. Stratified random sample was used to pick 650 under-five children proportionally from the slum and non-slum areas, i.e. 400 from the slum and 250 from the non-slum region. According to the findings, 40.46 percent of under-five children were stunted, 38.15 percent were underweight, 16.00 percent were wasting, 5.23 percent had severe acute malnutrition (SAM), and 10.77 percent had moderate acute malnutrition (MAM). The proportion of underweight children under the age of five had a statistically significant relationship with their age, socioeconomic position, mother's education, birth weight, and birth order.

In an urban area in Haryana, Jain *et al.* [25] conducted a cross-sectional study on the prevalence of under-nutrition among children and its association with mothers' educational and occupational status. The research involved 400 children aged 1 to 5 years old who were chosen at random from 14 anganwadi centers. Stunting, wasting, and underweight were shown to be prevalent in 33.8 percent, 21.5 percent, and 34.5 percent of the population, respectively. Children whose moms were uneducated and worked outdoors had greater rates of under-nutrition.

An Epidemiological Study of Malnutrition in Under-five Children in Rural and Urban Haryana was undertaken by Yadav *et al.* [26]. For the research, a total of 750 youngsters were chosen. 41.3 percent of the 750 children were underweight (WAZ -2 SD) and 14% were severely underweight (WAZ -3 SD). The 12-23 month age group has the highest frequency of underweight. Females were more likely to be underweight, with 42.9 percent being underweight. Males and females had a prevalence of severe underweight of 13.4% and 14.7 percent,

respectively. Underweight was strongly associated with maternal education and work.

In West Bengal, India, Sarkar *et al.* [27] conducted a cross-sectional research on malnutrition and related risk factors among children under the age of five. According to WHO child growth standards, stunting accounts for 51% of children, followed by underweight (41%), and wasting (4%). (22 percent). The majority of underweight children (56%) were found to be between the ages of 24 and 35 months, with 47 percent and 39 percent in the 3637 months and 611 months age categories, respectively. Gender discrimination, religion, caste, and the child's birth order were all shown to be strongly related with malnutrition in the research.

In Takusa area, Northwest Ethiopia, Nigatu *et al.* [28] performed a cross-sectional research on the prevalence and related causes of underweight among children aged 6-59 months. Using the multi-stage sampling process, a total of 645 youngsters were chosen. The prevalence of underweight, stunting, and wasting was found to be 19.5 percent, 36.5 percent, and 8%, respectively, in the research. Underweight was shown to be connected with marital status, mother's work, age, child-care practices, household income, and supplemental feeding.

CONCLUSION

The study concluded that poverty, poor environmental sanitation, poor dietary practices, low socioeconomic status, maternal education, frequent infection, poor household food security, high consumption of rice, frequency of acute illness and low birth weight of child were the main reasons behind malnutrition. Emphasis should be given to strengthen the health extension programme to improve and provide participatory nutrition education by creating awareness and developing better child feeding and caring practices. Nutrition education should be intensified by ASHA, ANM, Anganwadi Workers (AWWs) of the villages so that vital information on child care can be transferred to mothers to improve the nutritional status of the children. Supplementary feeding should be introduced immediately after completion of six months of age as a better practice to combat malnutrition.

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