



## **Determinants of Nutritional Status among children aged less than six years attending Anganwadi Centers (AWCs) of a southern district in India**

**First Author:** Dr. Anjana Sirivella, Former Tutor in Department of Community Medicine, Kasturba Medical College, Mangalore, MAHE, INDIA.

**Email:** [avinashkr566@gmail.com](mailto:avinashkr566@gmail.com)

**Second and corresponding Author:** Dr. Avinash Kumar, Former Associate Professor, Department of Community Medicine, Kasturba Medical College, Mangalore, MAHE, INDIA.

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### **Abstract**

**Background:** Pediatric malnutrition has always been a matter of national concern. To target it, India started a holistic multicentric program named Integrated Child Development Services (ICDS). To facilitate the ICDS programs, AWC was established in urban and rural settings. This project's objective was to assess and compare the nutritional status of children below six years in AWCs and determine the determinants of children's nutritional status below six years.

**Study Design and Setting:** Total 200 children aged less than six years from Anganwadi Centers in the coastal town of Mangalore were recruited for this cross-sectional analytical study. Demographic details were collected from each child using a questionnaire, and the Mid Arm Circumference was measured using an inelastic measuring tape. **Results:** Out of the 200 children assessed, 21(10.5%) were malnourished. However, eight children in urban and 14 children in rural had Mid Arm Circumference lesser than 12.5cm. Only the age of the children from the factors chosen was significantly associated with malnourishment. Logistic regression analysis shows that the risk of malnourishment decreased with higher age.

**Conclusions:** More children enrolled in rural Anganwadi Centers were found to be malnourished compared to urban centers. Among all the determinants analysed, only the age of the children was found to be significant.

**Keywords:** Anganwadi center, ICDS, nutritional status, Mid arm circumference

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### **Introduction**

Malnutrition is a significant contributor to the disease burden in India (1). Although pediatric malnutrition has always been a matter of national concern in India, eradicating malnutrition in children is a significant public health problem and a critical development challenge (2). Nutrition of these preschoolers is of prime importance as they are most vulnerable to deficiency (3). Adequate nutrition is a necessary first step in the improvement of quality of life. Nutrition plays a crucial role in children's physical, mental, and emotional development. Much emphasis has been given to provide good nutrition to growing populations, especially in the formative years of life (4). The growth rate is maximal during the first six years of life; hence malnutrition has a direct impact on infant mortality rate and under-five mortality rates, which are prime indicators of the health status of a country (5).

According to the National Family Health Survey (6), 38.4 % of children below five years are stunted, 35.8% are underweight, and 21% are wasted in India. It is relatively high compared to the rest of the world, where 31% of children are stunted, 26% are underweight, and 10% are wasted (7). Among the world's severely malnourished children, it is found that about forty percent live in India (8). Malnutrition was the predominant risk factor for death in children younger than five years of age in every state of India (1).

Childhood malnutrition is related to a vicious cycle of poverty and illiteracy as children in lower economic strata. Often it is not appropriately nourished due to lack of food and awareness and knowledge about feeding children the correct type of food, in the right amounts and at the right frequencies for different age groups. During the first few years of life, malaria results in lowered immunity with increased susceptibility to infections and diseases. It also has a direct impact on children's physical and cognitive growth. Malnutrition is one of the leading causes of death before five years in India, accounting for 54% of all deaths before five years (9). It is reflected in the higher mortality rates seen in underweight children, being 2.5 and 5 times higher in moderately and severely underweight children, respectively (10).

Recognizing the need to address this significant challenge, India's Government has made it one of the millennium goals to eradicate hunger and poverty. The Integrated Child Development Services (ICDS) was launched in 1975 to meet the nutritional needs of children by providing food supplements and to cater to the needs of growing children. ICDS is one of the most extensive child care programs globally, aiming at child health, hunger, malnutrition, and related issues (11). Despite several achievements that the Integrated Child Development Services scheme has witnessed during its three decades of implementation, there remain some significant challenges about the high burden of child malnutrition in the country.

Response to the challenge of providing preschool education on the one hand and breaking the vicious cycle of malnutrition, morbidity, reduced learning capacity, and mortality on the other (12).

Familial characteristics have a significant bearing on the nutritional status of under-five children. Hence, improvement in literacy, predominantly female literacy, will go a long way in improving the child's nutritional status (13). Early childhood malnutrition can have lasting effects on growth and functional status. Inadequate energy and protein intake lead to malnutrition (3).

This program's unique aspect is that the ICDS Centers, called Anganwadi Centers (AWC), are courtyard play centers that provide integrated services to the community's vulnerable sections. Malnutrition studied by growth assessment serves as a means for evaluating children's health and nutritional status and provides an indirect measurement of the quality of life of an entire population (14). Keeping in view the above said, the present study aimed to assess the nutritional status of children under six years attending AWC in Dakshin Kannada district of south India.

## **Materials and Methods**

### **Research Design**

This present study was a descriptive cross-sectional study conducted from May 30 – July 30, 2017. It was completed in 7 Anganwadi Centers (AWC) in the Dakshin Kannada district, along the western coast of Karnataka, one of the biggest states in India. In the port town of Mangalore, five urban AWCs (Jeppu Market, Jeppu St. Rica, Sootherpete, Babbigudda, and Shantinagar) and two rural AWCs (Mallyangadi and Madani Nagar) were chosen according to convenience sampling, based on the number of beneficiaries below six years and ease of transport. The present study included 200 children below the age of 6 years who were registered in the AWC.

### **Sample size**

The sample size was calculated using the formula  $N = \frac{Z^2pq}{d^2}$  where N was the sample size,  $Z=1.96$ , p was proportion, q was 1-p and d was absolute precision (5%). It was calculated on the prevalence of 85%(15) , with 5% absolute precision and 95% confidence. The final sample size was calculated to be 195.

### **Ethical Approval**

The study was conducted after obtaining approval from the Institutional Ethics Committee (IEC) of Kasturba Medical College, Mangalore, and permission from the Deputy Director of Women and Child Welfare, Zilla Panchayat, to visit the selected AWCs. Informed consent was taken from the parents of the participants. The confidentiality of the participants was maintained.

### **Recruitment procedure**

The inclusion criteria for this study were the registered beneficiary children between 2-6 years from the selected AWCs and those children whose parents assented to the study. The exclusion criteria were the registered beneficiary children whose parents did not consent to be part of the study or were very sick.

The data regarding the determinants of the performance of the AWC and anthropometric measurements were collected using a pre-tested structured questionnaire, designed after an extensive literature review. The participants were selected by non-random sampling, and written informed consent was obtained after briefing the Anganwadi Workers (AWWs) and the parents/guardians of the children about the nature and purpose of the study. The AWWs of the respective centers were asked questions regarding the demographic details of the children enrolled in their center, and a second visit was made to complete all the data.

### **Measures**

#### ***Independent variable***

The questionnaire consisted Sociodemographic variable like Age of children(in month),Place of residence(rural/Urban),Sex(male/Female),Religion(Hindu/Muslim/Christian),Educational status of father(Literate/Illiterate),Educational status of Mother(Literate/Illiterate), Birth Order(1<sup>st</sup>/2<sup>nd</sup> /3<sup>rd</sup> and more),Maturity at birth(Term/Preterm), Enrollment of mother during pregnancy(Yes/No),Weight at birth( $\leq 2.5$  kg, $>2.5$  kg), Number of family members( $\leq 5$ ,  $>5$ ), Exclusive breastfeed(Yes/No).

#### ***Outcome variable***

Anthropometric measurements were carried out according to the standard guidelines for the pediatric age group. The data collected was mid-arm circumference. Mid-arm circumference was measured by using a measuring tape, midway between the tip of acromion and olecranon process of the left arm, with the arm hanging by the side of the body. Mid-arm circumference of less than 12.5cm was taken to indicate significant malnutrition(16). In this study, mid-arm circumference was taken as the anthropometric measurement for determining the nutritional status, due to ease of interpretation.

### **Statistical Analysis**

The collected data was entered in and analyzed using SPSS (Statistical Package for Social Sciences) v16.0. Percentages and proportions was calculated and associations was estimated by using Chi Square Test, where P less than 0.05 was considered as statistically significant association.

### **Results**

Table 1 presents the demographic details of the children enrolled in the Anganwadi Centers. It shows that out of the total 200 children recruited for the study, 49.5% of children were from urban centers and 50.5% from rural centers. It saw that 23% of children were of the age group less than 36 months followed by 55% in 36 to 47 months. About 53.5% were female,

and 55% of them were of the Muslim faith. About 95 % of children's fathers and mothers were literate. About 44% children were of 1st birth order, and only three children were preterm birth. More than three fourth mothers were registered during pregnancy, and about 12 percent were of low birth. About 82 % of children's family members were five or less. About 83% of mothers feed exclusive breastfeeding.

Table 2 presents the association between nutritional status of children enrolled in Anganwadi Centers according to mid arm circumference below 6 years enrolled in the Anganwadi Centers. Analysis showed only age were significantly associated with nutritional status. Table 3 presents the determinants of the nutritional status of the children enrolled in the Anganwadi Centers. From all factors chosen, it was seen that only age of the children had a significant p value, in relation to the nutritional status of the children under survey. Multivariable analysis showed that children aged 36 to 47 months [AOR :0.19, 95% CI (0.063-0.598)] and 48 and more [AOR:0.10, 95%CI (0.017-0.57)] months were less likely to be malnourished than children aged less than 36 months.

## **Discussion**

The majority of the children enrolled in this study were found to be in the age group of 37-72 months. Previous studies conducted in rural Uttarakhand (17), urban Maharashtra (18), rural Mangalore(19) also had the majority of their study participants of the same age group. The only exception was a study conducted in rural Bangalore (20), where half of the children belonged to the age group of 2-3 years. In this study, girls constituted 6% more than boys. A similar trend was seen in other studies conducted in Karnataka, where more than half the children were girls (18,19). This could be attributed to higher average literacy rates and a good sex ratio in Karnataka. More than half of children were Muslim, which could be due to some of the AWCs under survey being in predominantly Muslim areas Ullal of Dakshin Kannada district. According to the 2011 Census, Muslims were 56.1%, followed by Hindus (34.5%) and Christians (9.3%) of the Population of Ullal city (21).

Of all the anthropometric measurements, mid-arm circumference is the easiest to record because the instrument required to record it is easy to carry does not require maintenance, and is simple to interpret (22). For this reason, the mid-arm circumference was taken as the anthropometric measurement for the assessment of nutritional status as it can be done quickly and is quite feasible for AWWs to record. The nutritional status of the children based on the mid-arm circumference was found to be good, with the majority of the children in both urban and rural AWCs with normal mid-arm circumference. This was comparable with other studies, where less than one-third of the children were found to be malnourished (23)(24)(25). This shows a declining trend of malnutrition nationwide, under the guidance of the ICDS scheme.

The previous study saw the association of malnutrition with the place of residence (13), sex(26)(19), religion(13)(26), educational status of father and mother(13)(26), birth order(27), weight at birth(28), family members(13)(26), exclusive breastfeed(19).

In the present study, Bivariate and multivariable analysis showed that higher age lowers malnutrition. The similar, finding was obtained in Bangladesh (26) and Goa, India (9), but contrast were in West Bengal (27) and Karnataka (19). Other factors such as mother and father education, religion, socioeconomic status, and mother's literacy did not show such relation. This was comparable to a study conducted in Ghaziabad where religion was not significantly related (29).

The present study has some limitations, including sampling strategy, which is non-random sampling restricting the generalizability. An additional limitation was that the causality relationship could not entirely be ascertained because of the cross-sectional study design. Although the sample size was calculated through a scientific formula, the results in terms of

residence and gender of children show that the sample size was inadequate. A study with a larger sample size may shed more light on this issue.

### **Conclusion**

Almost double the number of malnourished children were found in rural AWCs in comparison to the urban AWCs. The literacy of the father was found to be the only significant determinant of the nutritional status of the children.

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**Author's Contribution:**

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