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# Assessment of Dietary Adequacy and Nutrient Intake of Preschool Children (4–6 Years) in a Rural Area of Muzaffarpur District, Bihar

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## ABSTRACT

Undernutrition among preschool children remains a major public health concern in rural India. Preschool children are nutritionally vulnerable because their growth and development depend largely on the adequacy of diet during early childhood. The present study was conducted to assess the dietary adequacy and nutrient intake of preschool children aged 4–6 years in a rural area of Muzaffarpur district, Bihar. A community-based cross-sectional study was carried out in Gobardhanpur village of Muzaffarpur district. A total of 100 families having at least one preschool child were selected randomly. Socio-economic information was collected using a pre-tested structured interview schedule. Dietary intake was assessed using the 24-hour dietary recall method with weighment of cooked food. Nutrient intake was calculated and compared with the Recommended Dietary Allowances (RDA) 2022 prescribed by ICMR–National Institute of Nutrition (NIN). The findings revealed that the majority of families belonged to the low-income group and mothers had limited knowledge regarding child nutrition, which has been shown to adversely affect child feeding practices. Intake of cereals, pulses, vegetables, fruits, fats, and oils was inadequate. Intake of energy, protein, fat, and iron was below the RDA 2022 levels, while calcium and vitamin A intake were marginal, consistent with findings from other rural Indian studies. The study concludes that preschool children in the rural study area are at high nutritional risk. Nutrition education and promotion of locally available, low-cost, nutrient-rich foods are essential to improve child nutrition.

**Keywords:** Preschool children, Dietary adequacy, Nutrient intake, RDA 2022, Rural nutrition

## INTRODUCTION

Undernutrition continues to be a major public health challenge in developing countries, particularly in rural areas. Food insecurity, poverty, low maternal education, and inadequate dietary diversity are key factors contributing to poor nutritional outcomes among children (Yadav *et al.*, 2024). In India, despite ongoing nutrition programs, undernutrition among preschool children remains widespread, especially in economically disadvantaged regions (NFHS-5, 2019–21).

Preschool age is a critical period of growth and development. Adequate intake of energy, protein, fats,

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vitamins, and minerals during this stage is essential for optimal physical growth, cognitive development, and immune function. Inadequate nutrition during early childhood can result in growth faltering, increased susceptibility to infections, and long-term adverse health outcomes (Petrikova and Kumar, 2025).

Recent national data indicate a high prevalence of undernutrition among children under five years of age, with rural areas showing poorer outcomes compared to urban areas (NFHS-5, 2019–21). Several recent studies have reported inadequate dietary intake and micronutrient deficiencies among preschool children in rural India (Chittapur *et al.*, 2024; Diet and Nutritional Status of Rural Preschool Children in India, 2025).

In this context, the present study was undertaken to assess dietary adequacy and nutrient intake of preschool children (4–6 years) in a rural area of Muzaffarpur district, Bihar, using the updated RDA 2022 guidelines (ICMR–NIN, 2022).

**Objectives of the Study:**

1. To study the socio-economic profile of families having preschool children.
2. To assess the daily food intake of preschool children.
3. To evaluate the nutrient intake of preschool children in comparison with RDA 2022 (ICMR–NIN, 2022).

## METHODOLOGY

The present investigation was a community-based cross-sectional study conducted in Muzaffarpur district of North Bihar. Gobardhanpur village was selected randomly. A total of 100 families having at least one preschool child aged 4–6 years were selected using random sampling.

Data were collected using a pre-tested structured interview schedule covering socio-economic information and dietary practices. Dietary intake was assessed using the 24-hour dietary recall method with weighment of cooked food, a method widely used in community nutrition assessments (Chittapur *et al.*, 2024). The quantities of foods consumed by the children were accurately recorded.

Nutrient intake was calculated using standard food composition tables. Intake of energy, protein, total fat, calcium, iron, and vitamin A was compared with the Recommended Dietary Allowances (RDA) 2022 issued by ICMR–NIN (ICMR–NIN, 2022). Data were analyzed using simple descriptive statistics such as frequency and percentage.

## RESULTS AND DISCUSSION

**Socio-Economic Profile of Respondents:**

The findings show that most families belonged to the low-income group and a large proportion of mothers were illiterate. Poor socio-economic conditions and low maternal education are known to negatively influence child feeding practices and dietary quality, thereby increasing the risk of undernutrition (Chittapur *et al.*, 2024; Yadav *et al*., 2024) (Table 1).

**Table 1 : Socio-economic Profile of Respondents (N = 100)**

| Categories | Frequency (F) | Percentage (%) |
|---|---|---|
| Young (below 45 yrs) | 70 | 70 |
| Other Backward Classes (OBC) | 55 | 55 |
| Joint family type | 56 | 56 |
| Illiterate mother | 47 | 47 |
| Housewife | 80 | 80 |
| Low-income group | 80 | 80 |

**Food Intake of Preschool Children:**

The intake of most food groups was inadequate. Cereals, pulses, vegetables, fruits, fats, and oils were consumed in lower quantities than recommended. Milk intake was relatively better due to the availability of milk animals in households. Similar dietary inadequacies have been reported in recent rural studies (Diet and Nutritional Status of Rural Preschool Children in India, 2025) (Table 2).

**Table 2 : Daily Food Intake of Preschool Children (4–6 Years) Compared with Balanced Diet (N = 100)**

| Food stuff (g) | Actual intake (g/ml) | Percentage (%) | Balanced diet (g/ml) |
|---|---|---|---|
| Cereals | 100 | 50 | 200 |
| Pulses | 17 | 34 | 50 |
| Green leafy vegetables | 09 | 12 | 75 |
| Other vegetable (Root and tubers) | 13 | 26 | 50 |
| Milk and milk products | 400 | 200 | 200 |
| Fat and oils | 10 | 40 | 25 |
| Sugar and Jaggery | 20 | 50 | 40 |
| Meat, fish and egg | 17 | 57 | 30 |
| Fruits | 10 | 20 | 50 |

**Nutrient Intake of Preschool Children (RDA 2022 Comparison):**

The results indicate inadequate intake of energy, protein, fat, and iron even when interpreted using the updated RDA 2022. Although iron requirements are slightly lower in RDA 2022 due to improved bioavailability assumptions, the intake observed in the present study remains inadequate. Calcium and vitamin A intake were marginal but still below recommended levels. These findings align with recent national and regional studies highlighting persistent nutrient gaps among preschool children (Arora *et al.*, 2025; Yadav *et al.*, 2024) (Table 3).

**Table 3 : Daily Nutrient Intake of Preschool Children Compared with RDA 2022**

| Nutrient | Actual intake | Percentage | RDA (ICMR, 2022) |
|---|---|---|---|
| Energy (Kcal) | 1200 | 89.9 | ~1350 (activity-based) |
| Protein (g) | 15 | 71.4 | 20-22 |
| Total fat (g) | 15 | 51.7 | 25–30 (% energy based) |
| Cal (mg) | 500 | 83.3 | 600 |
| Iron (mg) | 10 | 90.9 | 10-11 |
| Retinol (I.U) | 383 | 96 | 400 |

**Conclusion:**

The study concludes that preschool children in the rural area of Muzaffarpur district have inadequate dietary and nutrient intake when evaluated against RDA 2022 guidelines (ICMR–NIN, 2022). Poor socio-economic status, low maternal education, and limited awareness regarding balanced diets contribute significantly to undernutrition (Yadav *et al*., 2024). There is a strong need for nutrition education programs targeting mothers and caregivers. Promotion of locally available, low-cost, nutrient-rich foods such as green leafy vegetables, seasonal fruits, jaggery, groundnuts, and milk can help improve the nutritional status of preschool children, as supported by recent evidence (Petrikova and Kumar, 2025).

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