



PREVALENCE OF MALNUTRITION AMONG UNDER FIVE-YEAR-OLD CHILDREN IN A RURAL COMMUNITY OF NELLANAD PANCHAYAT, KERALA

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ABSTRACT:

Introduction: Malnutrition is an important global issue, with India having one of the highest prevalence rates of malnourished children worldwide. Nearly 35% of children under 5 years old in India are suffering from malnutrition. Indicating the need for tackling malnutrition.

Aim: The study is focused on determining the prevalence of malnutrition among children under five years old in Nellanad Panchayath, Kerala, and identifying the relationship between maternal factors, neonatal implications, dietary habits, and the presence of undernourishment children in the same community.

Materials and Methods: Data was collected from the community using the cluster sampling method through house-to-house visits and interviews using a structured questionnaire among the 100 identified participants.

Results: The study revealed that 11% had grade 1 protein-energy malnutrition (PEM), 4% had grade 2 PEM, and 2% had grade 3 PEM indicating a notable association between antenatal complications and malnutrition, as evidenced by a statistically significant p-value of 0.018.

Conclusion: Poverty, poor food access, insufficient healthcare facilities, and socioeconomic inequities contribute to malnutrition among children in India. Awareness about malnutrition alongside poverty reduction, healthcare access, maternal and child care, and nutrition education is needed for effective malnutrition-reduction through government, non-profit, and community collaboration.

Keywords: Prevalence, Malnutrition, Antenatal complications, poverty reduction, healthcare access.

1. INTRODUCTION

India is a developing country. Since independence, India has made significant progress in terms of health. Still, the problem of malnourishment exists substantially in the community. Malnourishment is a serious impediment to the growth of our economy. According to NFHS data, 34% of Indians are malnourished (Chaudhuri, S., et al., 2023). Around the globe, nearly half of the deaths of children are due to malnutrition (WHO-UNICEF, 2020). A multi-pronged strategy including community participation and political will is inevitable to tackle the problem of malnutrition (Lagunju, D., 2012).

Rationale of the Study

- WHO defines malnutrition as deficiencies, excesses, or imbalances in a person's intake of energy or nutrients.
- The child's future socioeconomic development is dependent on proper nutrition and development (WHO-news, n.d.).
- Regular assessment of malnutrition in the community helps us not only to understand the magnitude of the problem but also to reduce the incidence of malnutrition in the community. There should be a constant assessment of under-5 malnutrition at the community level. This study tries to unravel the prevalence of malnutrition in a rural area of Trivandrum district. Even though Kerala boasts excellent socioeconomic indicators, there are rural pockets in which socioeconomic backwardness still prevails and where assessment of malnutrition is essential.

2. MATERIALS AND METHODS

In Nellanad Panchayat, we conducted an observational and case-control study from September 2021 to October 2021. We recruited five-year-olds as research participants. For this study, our research instrument to access the data was a semi-structured questionnaire, considering the following criteria:

Inclusion Criteria: Children under the age of 5.

Exclusion Criteria: Children with congenital malformations and chronic ailments

Sample Size: The prevalence (p) from a study (which is adopted from Meena, P., et al., 2021) conducted in Nellanad Panchayat, was taken as 53 percent. Sample size was calculated using the formula:

$$\frac{(Z\alpha)^2 pq}{L^2} = \frac{(1.96)^2 \times 41.1 \times (100-41.1)}{(10\% \text{ of } p)^2} = 96$$

$$Z\alpha = 1.96$$

Final sample size ~ 100

Sampling Technique: Cluster sampling was employed. We divided the 16 wards into 32 clusters, with one cluster completing each day of data collection. Each cluster consisted of three households. After obtaining informed consent, we conducted face-to-face interviews with the participants using an interviewer-administered semi-structured proforma for data collection.

Data Collection Strategies: Anganwadi centers and the Nellanad Panchayat office picked under-5-year-old children. We used a spring balance with a 500-gram precision for older children (2–5 years) and an infant weighing machine with a 100-gram precision for smaller children. We took the weights while the children removed their shoes and wore light clothing to prevent contact. We used "double weighing" for restless children if solo weighing didn't work. The youngster was required to stand on a level surface without shoes, maintain the "Frankfurt plane," and measure height. We measured the lying-down length with both knees extended for children under 2 who couldn't stand.

Ethical Considerations: Informed consent was obtained from parents before taking measurements.

Study Variables: Age, Weight, Birth weight, Birth complications, Age of mother at delivery, Antenatal complications, and Weaning age

3. STATISTICAL ANALYSIS

We used SPSS Software Version 26 for statistical analysis. We collected and analyzed the data using SPSS software version 26.0. We presented the quantitative data in the form of mean and SD. We used bivariate logistic regression to determine the odds ratio and an unpaired t-test to analyze the mean differences between two groups to identify risk factors.

4. RESULTS

4.1. Data Analysis - Results

4.1.1. Participants' Demographic details

Gender-based inequalities exist in India. Under-nutrition and developmental delays disproportionately affect female children. We collected a total of 100 samples and observed that the surveyed participants were 43% males and 57% females is well explained in figure 1 to 11. The data reflect Kerala's favorable sex ratio.

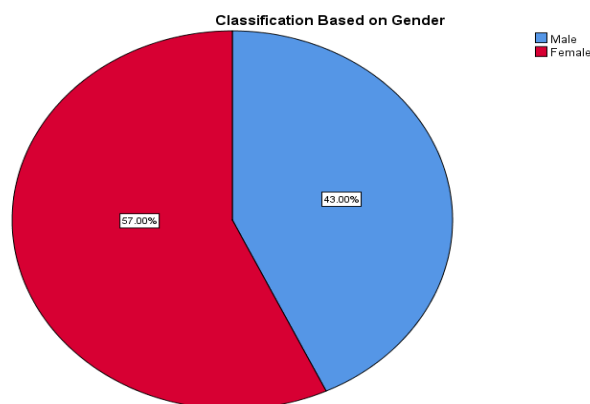


Figure 1: Gender

In a total of 100 samples taken, 40% of the births were preterm and 60% were term. Preterm delivery is an independent risk factor for underweight children. The overall prevalence in the study is 40%. Babies born early, before 32 weeks, are more prone to infant deaths, developmental delays, and other complications is below the table 1.

Table 1: Delivery Term of Children

	N	Percent
Preterm	40	40.0
Term	60	60.0
Total	100	100.0

4.1.2. Antenatal complications in the mother of study participants

In a total of 100 samples taken, 40% had no complications, 19% had hypertension, 20% had thyroid disease, 17% had gestational diabetes mellitus, 1% had anemia, 2% had placental abnormalities, and 1% had polio. Antenatal complications are an important determinant of child health and malnutrition. Hypertension is an important risk factor for complications during labor and may cause low-birth-weight babies. Thyroid disorders are also a significant risk factor for pregnancy complications and may affect the child's health. We found 1% anemia in the mothers. There is a significant association between pre-eclampsia and IUGR.

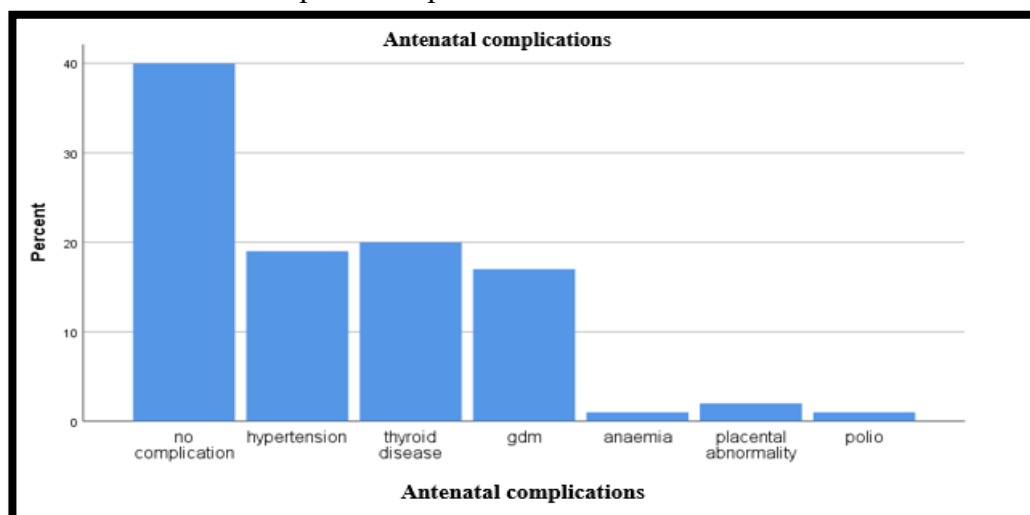


Figure 2: Antenatal Complications

4.1.3. The age of mother of study participants at the time of delivery

In the total of 100 samples taken, 37% are in the age group between 18 and 24, 55% are between 25 and 30, and 8% are more than 30. The elderly mother, aged more than 35, is a risk factor for the new-born. All other mothers were in the age group of 25 to 34.

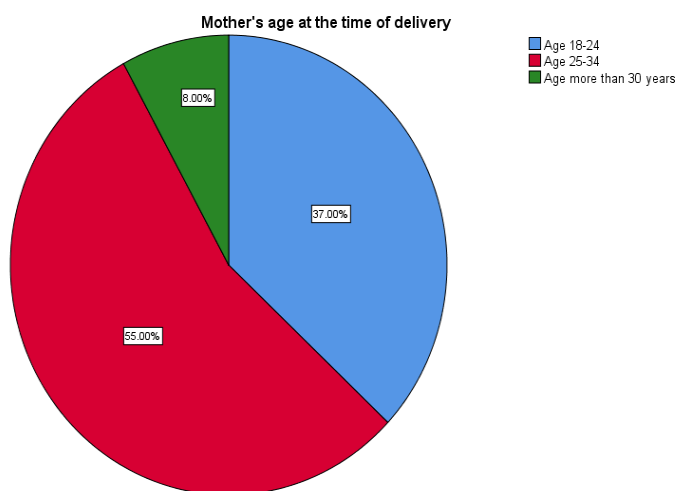


Figure 3: Mother's age at the time of delivery

4.1.4. Immunisation status among the study participants

Out of 100 samples, 95% have received full immunization, while the remaining 5% have only received partial immunization. Despite numerous government campaigns, the immunization status remains incomplete. This is a cause for worry. The anti-vaccination campaign on social media and other areas poses a serious threat to full immunization coverage.

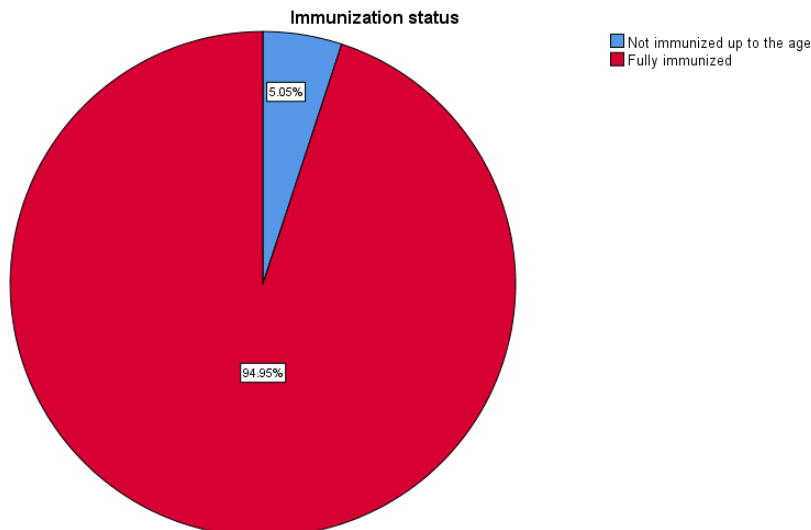


Figure 4: Immunization Status

4.1.5. Birth weight among the study participants

Among the total sample of 100 children, 8% were underweight, 33% were normal weight, and 59% were overweight at birth. Underweight babies pose a serious risk to the child's health.

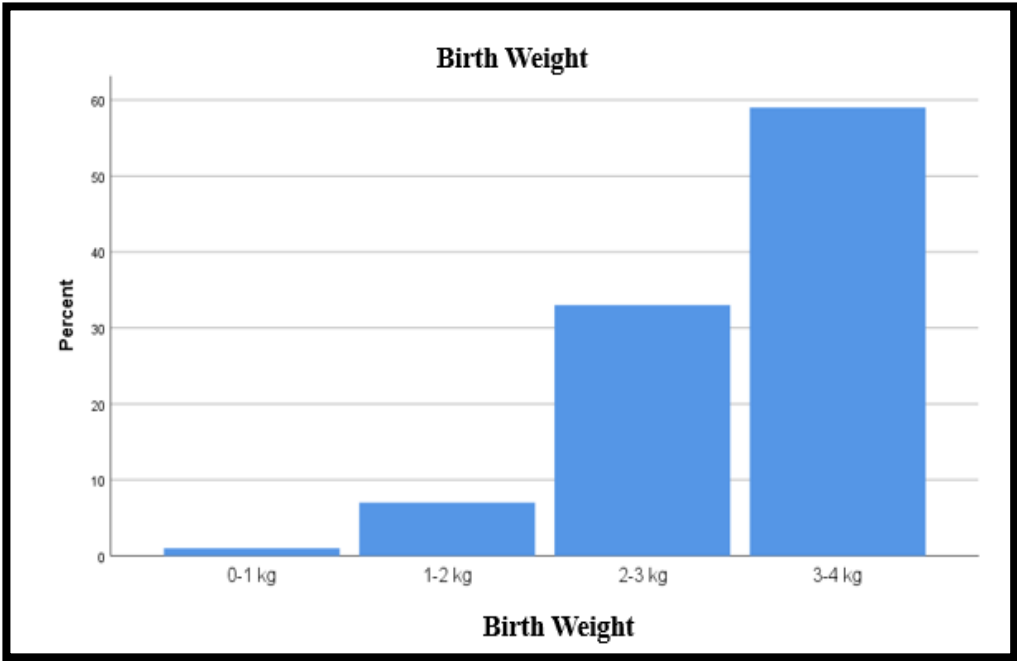


Figure 5: Birth Weight

4.1.6. Time since delivery for initiation of breast feeding among study participants

Out of the total sample of 100 children, 21% went to bed immediately after delivery, 64% between 1-4 hours, 8% between 5-12 hours, and 7% after 12 hours. We should universally recommend early breastfeeding initiation as an intervention that significantly improves neonatal outcomes.

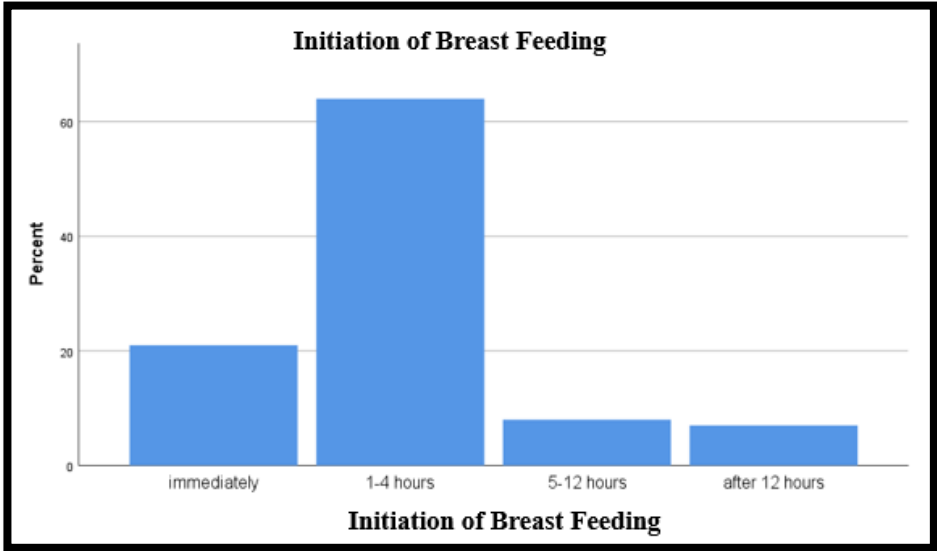


Figure 6: Initiation of Breast Feeding

4.1.7. Fluid supplementation other than breast milk among the study participants

Among 100 children under 5 years, 35% were given lactogen on the first day of their delivery itself while 65% were exclusively breast fed. Exclusive breast feeding is one of the key factors which determines proper growth and development of the child.

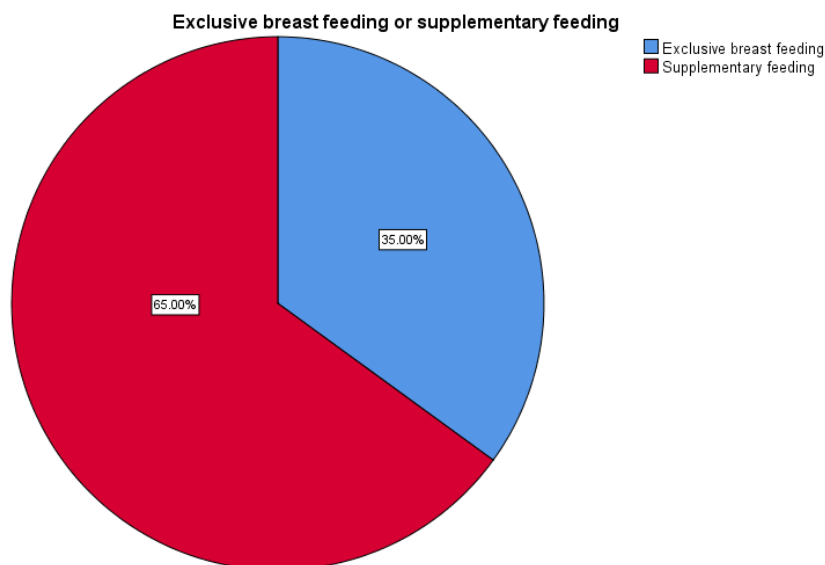


Figure 7: Exclusive breast-feeding or supplementary feeding.

4.1.8. Weaning age among the study participants

Out of a total of 100 children, 2% wean before 6 months, 48% wean after 6 months, and 50% continue to breastfeed. The average age at which weaning begins differs across India. The weaning solid foods include rice, rice with milk and ghee, biscuits, roti (unleavened bread), and boiled potatoes. 99% of women in urban areas and 89% of those in rural areas believe that human milk is better than commercial milk or animal milk.

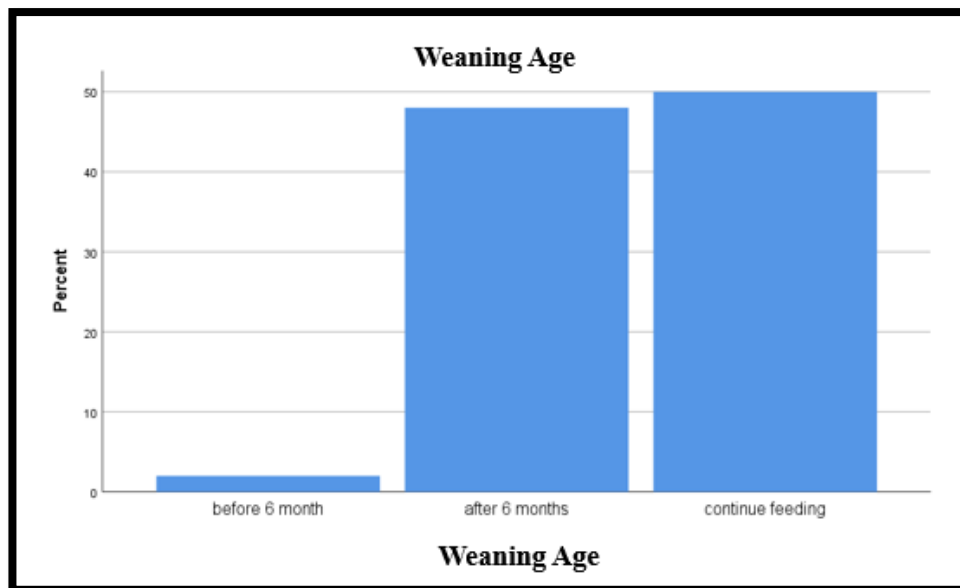


Figure 8: Weaning Age

4.1.9. Assessment of availing food subsidies from anganwadi among study participants

In a total of 100 samples taken, 15% did not get the subsidies while 85% of children received food subsidies from Anganwadi.

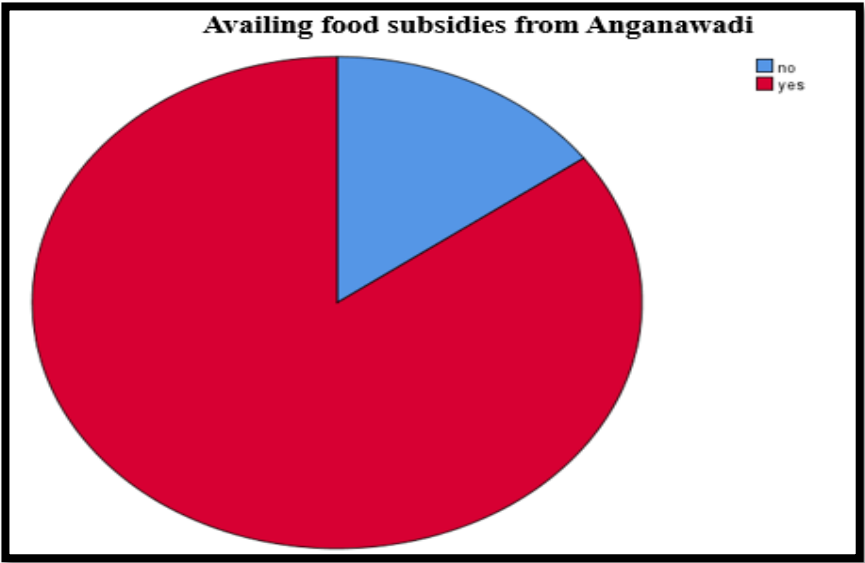


Figure 9: Availing Food Subsidies from Anganwadi

4.1.10. Developmental delay among study participants

Out of the 100 samples taken, 98% of the children did not have developmental delays, while 2% had developmental delays. We observed a 2–3% prevalence of developmental delay in children.

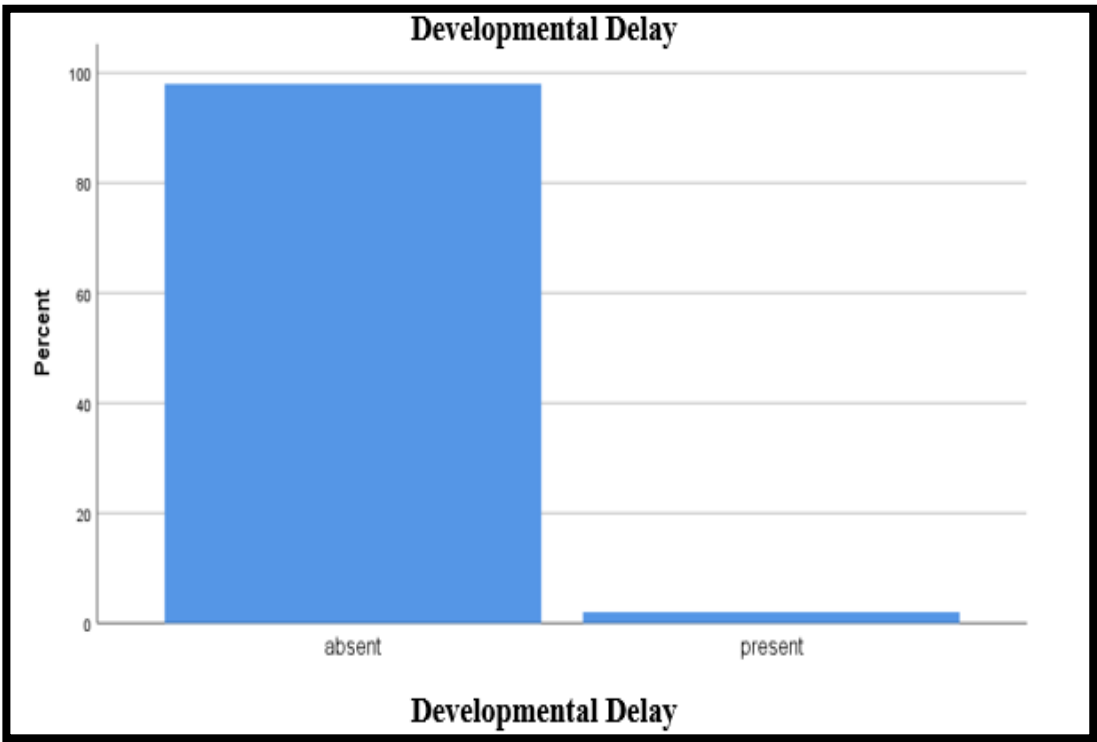


Figure 10: Developmental Delay

4.1.11. Grade of PEM among the study participants

The study revealed a prevalence rate of 17%. Kerala takes pride in its exceptional socioeconomic and health metrics. 17% of children under five suffer from malnutrition, which is a significant proportion. However, this figure is still lower than the overall data from India. The prevalence of under-5s at all India levels was nearly 30%, according to NFHS-5.

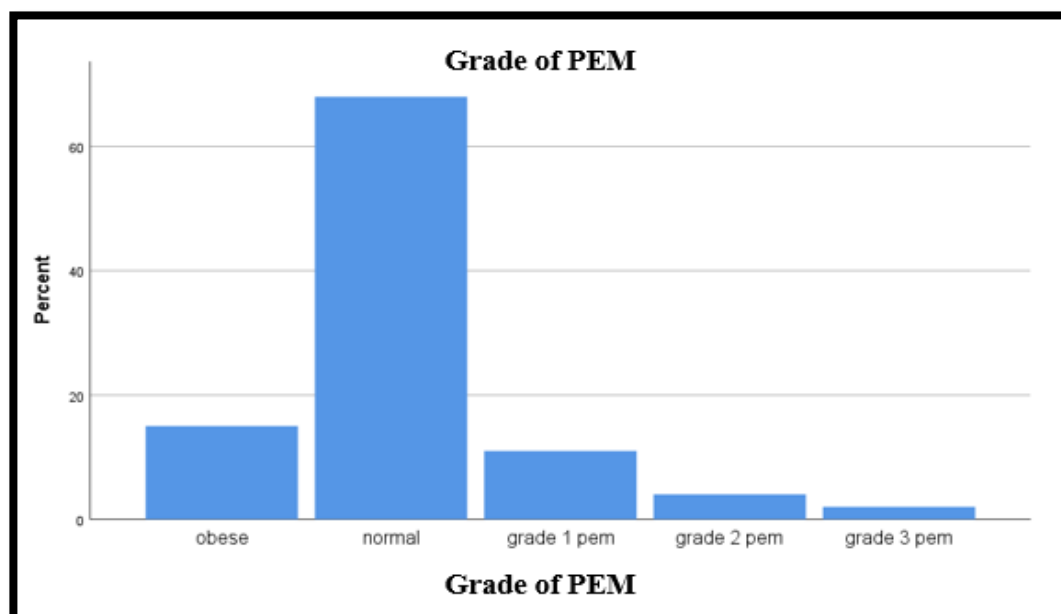


Figure 11: Grade of PEM

In a total of 100 samples taken, 15% of the children are obese, 68% are normal, 11% have grade 1 protein energy malnutrition, 4% have grade 2 protein energy malnutrition, and 2% have grade 3 protein energy malnutrition.

4.2. Hypothesis Testing

4.2.1. Association between antenatal complication and malnutrition

In this research, we found an association between complications and malnutrition during the survey, as per our hypotheses. The data were tested with chi-square, and the significance value (p) was less than 0.05 (i.e., $p \leq 0.05$) is shown below the table 2.

Table 2: Associations between malnutrition and complications

		Malnutrition			
		Normal	Obese	PEM	Total
Antenatal complication	No complication	29	6	5	40
	Hypertension	15	0	4	19
	Thyroid disease	15	1	4	20
	Gestational diabetes mellitus	8	7	2	17
	Anaemia	1	0	0	1
	Placental abnormality	0	0	1	1
	Polio	0	0	1	1
Total		68	15	17	100

Chi square

	Value	Df	Asymptomatic significance
Pearson chi square	24.311 ^a	12	0.018

From this research, we also observed that there is antenatal hypertension that causes significant mental diseases in offspring.

4.2.2. Assessment between term/preterm delivery and malnutrition

From this research, we also observed from table 3, a significant relationship between term or preterm delivery and malnutrition, with the significant values observed to be less than 0.05. Hence, preterm deliveries are an independent risk factor for malnutrition among children.

Table 3: Relationship between term/preterm delivery and malnutrition

		Malnutrition			Total
		Normal	Obese	PEM	
Term or preterm delivery	Term	60	15	5	80
	Preterm	40	0	12	20
Total		68	15	17	100

Chi square tests

	Value	Df	Asymptomatic significance
Pearson chi square	5.5059	12	0. 01895

4.2.3. Assessment between birth weight and malnutrition

From this research, we observed that there is no significant relationship between birth weight and malnutrition, with the values observed being 0.151. Therefore, there is no correlation between birth weight and malnutrition is below the table 4.

Table 4: Assessment of Birth weight and malnutrition

		Malnutrition			
		Normal	Obese	PEM	Total
Birth Weight	No birth complications	43	11	8	62
	Jaundice	25	4	8	37
	Meconium ingestion	0	0	1	1
Total		68	15	17	100

Chi-square tests

	Value	df	Asymptotic Significance
Pearson Chi-square	6.721°	4	0.151

4.2.4. Assessment between birth complications and malnutrition

From this research shown on table 5, we observed that there is no significant relationship between birth complications and malnutrition, with the values observed being 0.161. Therefore, there is no correlation between birth complications and malnutrition.

Table 5: Assessment of Birth Complications and Malnutrition

		Malnutrition			
		Normal	Obese	PEM	Total
Birth complications	No birth complication	41	10	11	62
	Jaundice	27	5	5	37
	Meconium ingestion	0	0	1	1
Total		68	15	17	100

Chi square

	Value	Df	Asymptomatic significance
Pearson chi square	6.721°	4	0. 161

4.2.5. Assessment between fluid supplementation other than breast milk and malnutrition

From this research, table 6 we observed that there is no significant relationship between fluid supplementation other than breast milk, with the values observed being 0.173. Therefore, there is no correlation between fluid supplementation other than breast milk and malnutrition.

Table 6: Fluid supplementation other than breast milk and malnutrition

		Malnutrition			
		Normal	Obese	PEM	Total
Fluid supplementation other than breast milk	Lactogen given	20	6	9	35
	Exclusive breast milk	48	9	8	65
Total		68	15	17	100

Chi-square Tests

	Value	df	Asymptotic significance
Pearson Chi-Square	3.504 ^a	2	0.173

5.DISCUSSION

In pursuit of understanding the prevalence of malnutrition within a rural community in Kerala, our study endeavored to identify the contributing factors affecting malnutrition among five-year-old children. Recognizing malnutrition as a significant impediment to proper child development, we sought to establish correlations between various factors and malnutrition, aiming to inform targeted interventions and nutritional surveillance within the community.

We selected a sample size of 100 children under the age of 5, with 43% males and 57% females. The study revealed that 95% of the sample had received full immunization, while 5% had received incomplete immunization, primarily due to disruptions caused by the COVID-19 outbreak. Maternal age emerged as a noteworthy factor, with 55% of mothers falling within the 25–30 age bracket and 37% between 18 and 24 years. This distribution highlights societal awareness regarding the risks associated with early marriage and its impact on maternal and child health.

In terms of birth characteristics, 40% of children were born preterm, while 60% were born full-term. Analysis indicated a significant relationship (p -value = 0.0183) between preterm birth and malnutrition. Maternal health during pregnancy had a significant influence on child nutrition, with antenatal complications showing a significant association (p -value = 0.018) with malnutrition. Birth weight distribution revealed 8% underweight, 33% normal weight, and 59% overweight infants, reflecting the influence of modern lifestyles on birth outcomes. However, the study found no significant association (p -value = 0.151) between birth weight and malnutrition.

Birth complications, such as jaundice and meconium ingestion, did not exhibit a significant association (p -value = 0.151) with malnutrition. Many cases of assisted Caesarean deliveries delayed immediate breastfeeding, but there was no significant association (p -value = 0.173) between breastfeeding patterns and malnutrition. Regarding breastfeeding duration, 2% weaned before six months, while 48% continued breastfeeding after six months, underscoring the importance of sustained breastfeeding for child development.

76% of children received dietary supplementation, and 85% of families used food subsidies from Anganwadi programs. Families recorded their COVID-19 history, with 84% reporting no cases and 16% indicating a history of COVID-19. The study classified malnutrition prevalence, revealing 15% obese, 68% normal, 11% with grade 1 protein-energy malnutrition (PEM), 4% with grade 2 PEM, and 2% with grade 3 PEM. Even though Kerala is a state that boasts very good health and socioeconomic indicators, the prevalence of malnutrition still exists. The immunization coverage is still not 100%. Mothers' awareness and the scientific tempers in society are also areas of concern.

6. CONCLUSION

The study, which involved a sample of 100 children under the age of 5, took place in the rural community of Nellanad Panchayath, Kerala, and revealed the following prevalence of malnutrition: 15% were obese, 68% were normal, 11% had grade 1 protein-energy malnutrition (PEM), 4% had grade 2 PEM, and 2% had grade 3 PEM. Our research underscored a significant association between antenatal complications and malnutrition (P -value = 0.018), highlighting the critical influence of maternal health on child nutrition. This underscores the importance of implementing

necessary interventions, such as health programs, in rural communities to ensure adequate nutrition for children.

Regular monitoring of children's weight, height, and growth is essential. We should educate mothers about maintaining proper nutrition for their children and encourage them to attend antenatal visits regularly, as they play a crucial role in ensuring child health. We need to effectively implement and assess government health programs, both at the national and state levels, to ensure their reach to those in need. We should give special attention to women during pregnancy and lactation to support their growth and development, thereby contributing to the reduction of malnutrition in society. By addressing antenatal complications and ensuring proper nutrition for both mother and child, we can make strides towards mitigating malnutrition in our communities.

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