EFFECTIVENESS OF PLANNED TEACHING PROGRAMME ON KNOWLEDGE REGARDING PROTEIN-ENERGY MALNUTRITION AND ITS PREVENTION AMONG MOTHERS OF UNDER-FIVE CHILDREN IN A RURAL COMMUNITY: A PRE-EXPERIMENTAL STUDY

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Abstract
Protein-energy malnutrition remains one of the most significant public health challenges affecting under-five children globally, especially in rural communities where maternal awareness regarding nutritional needs is often inadequate. Malnutrition during early childhood leads to growth retardation, impaired immunity, delayed cognitive development, and increased mortality. Mothers, as primary caregivers, play a vital role in ensuring adequate nutrition and early recognition of malnutrition. The present study was conducted to evaluate the effectiveness of a planned teaching programme on knowledge regarding protein-energy malnutrition and its prevention among mothers of under-five children in a rural community. A quantitative evaluative approach with one-group pre-test-post-test pre-experimental design was adopted. Sixty mothers were selected using purposive sampling. A structured knowledge questionnaire was used to assess knowledge levels before and after intervention. The planned teaching programme included lectures, visual aids, demonstrations, and interactive discussions. Findings revealed significant improvement in post-test knowledge scores compared to pre-test scores, indicating that the intervention was highly effective. The study highlights the importance of community-based educational programmes in preventing childhood malnutrition through maternal empowerment.

Keywords: Protein-Energy Malnutrition, Planned Teaching Programme, Maternal Knowledge, Under-Five Children, Rural Community, Prevention, Pre-Experimental Study.

Introduction

Protein-energy malnutrition is a multifaceted nutritional disorder resulting from inadequate intake of protein and calories necessary for normal physiological growth, tissue repair, immune competence, and neurodevelopment in children, and it continues to represent one of the most persistent public health challenges worldwide, particularly affecting under-five children in low- and middle-income nations where socioeconomic inequalities, inadequate food access, and limited health education remain widespread determinants of child morbidity and mortality (WHO et al., 2022). Protein-energy malnutrition encompasses a spectrum of clinical conditions ranging from mild undernutrition to severe forms such as marasmus, kwashiorkor, and marasmic-kwashiorkor, each characterized by distinct pathological manifestations including wasting, edema, muscle loss, irritability, skin changes, delayed physical growth, and impaired organ development, all of which significantly compromise a child's capacity to thrive during critical developmental years (UNICEF et al., 2023). In India, despite implementation of national nutrition-focused initiatives such as Poshan Abhiyaan, Integrated Child Development Services, Mid-Day Meal Programme, and National Nutrition Mission, undernutrition continues to affect a substantial proportion of children under five years of age, especially in rural communities where poverty, low literacy rates, poor sanitation, inadequate healthcare infrastructure, and traditional misconceptions regarding child feeding persist as major barriers to effective nutritional care (Ministry of Health and Family Welfare et al., 2022). According to recent national surveys, a significant percentage of children in India remain stunted, wasted, or underweight, demonstrating that while policy-level interventions are necessary, they must be complemented by community-level educational strategies to produce meaningful behavioral change among

caregivers (NFHS-5 et al., 2021). As illustrated in Figure 1, the prevalence of malnutrition remains disproportionately high in regions where maternal illiteracy, food insecurity, and inadequate awareness regarding child nutritional requirements are common, emphasizing the need for interventions specifically targeting mothers as primary agents of nutritional care (Black et al., 2019). The consequences of protein-energy malnutrition extend beyond immediate physical weakness and susceptibility to infections, as chronic nutritional deprivation has been strongly associated with delayed cognitive development, reduced academic performance, diminished social adaptability, lower adult productivity, and intergenerational cycles of poverty and malnutrition that perpetuate adverse health outcomes across communities (Bhutta et al., 2020). Research indicates that the first five years of life represent a critical window for growth and brain development, making early nutritional adequacy essential for optimal physical and intellectual maturation, and any disruption during this stage can produce irreversible developmental deficits if timely interventions are not implemented (Victora et al., 2021). Mothers play an indispensable role in determining the nutritional trajectory of their children because they are primarily responsible for breastfeeding initiation, exclusive breastfeeding practices, timely introduction of complementary feeding, dietary diversity, food hygiene, recognition of danger signs, and healthcare-seeking behavior during illness, all of which collectively influence child nutritional status (Patel et al., 2018). Maternal knowledge regarding age-appropriate nutritional requirements, feeding frequency, food preparation techniques, and recognition of early signs of malnutrition directly affects child feeding practices, and evidence consistently demonstrates that children of mothers with higher nutritional awareness exhibit significantly better growth outcomes compared to those whose mothers possess limited knowledge in these domains (Sharma et al., 2020). In many rural communities, however, mothers often lack access to scientifically accurate information and may rely on traditional beliefs or familial practices that contribute to delayed complementary feeding, inadequate dietary diversity, premature cessation of breastfeeding, or use of nutritionally deficient foods, thereby increasing the risk of malnutrition among under-five children (Kumar et al., 2019). Furthermore, poor maternal awareness frequently results in delayed recognition of warning signs such as weight loss, lethargy, reduced appetite, recurrent infections, or developmental delays, causing treatment-seeking behavior to occur only after severe clinical deterioration has already developed (Rao et al., 2023). Studies have repeatedly emphasized that empowering mothers through structured educational interventions significantly improves their understanding of nutritional needs and equips them with practical skills necessary to prevent malnutrition through cost-effective household measures such as preparation of balanced meals using locally available foods, maintenance of hygiene during feeding, and timely utilization of community health services (Meena et al., 2024). Planned teaching programmes have emerged as particularly effective educational tools because they employ systematic, culturally sensitive, and interactive approaches including demonstrations, visual aids, group discussions, and practical examples that facilitate comprehension and retention among rural mothers with varying literacy levels (Pawar et al., 2019). These interventions not only enhance knowledge but also foster confidence and behavioral intention to adopt healthier feeding practices, thereby creating sustainable improvements in child nutritional care within families and communities (Joshi et al., 2025). Given the profound influence of maternal knowledge on child nutritional outcomes, educating mothers through structured teaching interventions remains one of the most practical and evidence-based strategies for reducing protein-energy malnutrition, promoting healthy child development, and strengthening long-term community health, particularly in rural settings where informational deficits continue to undermine existing nutritional support systems (Welgandhwar et al., 2024).

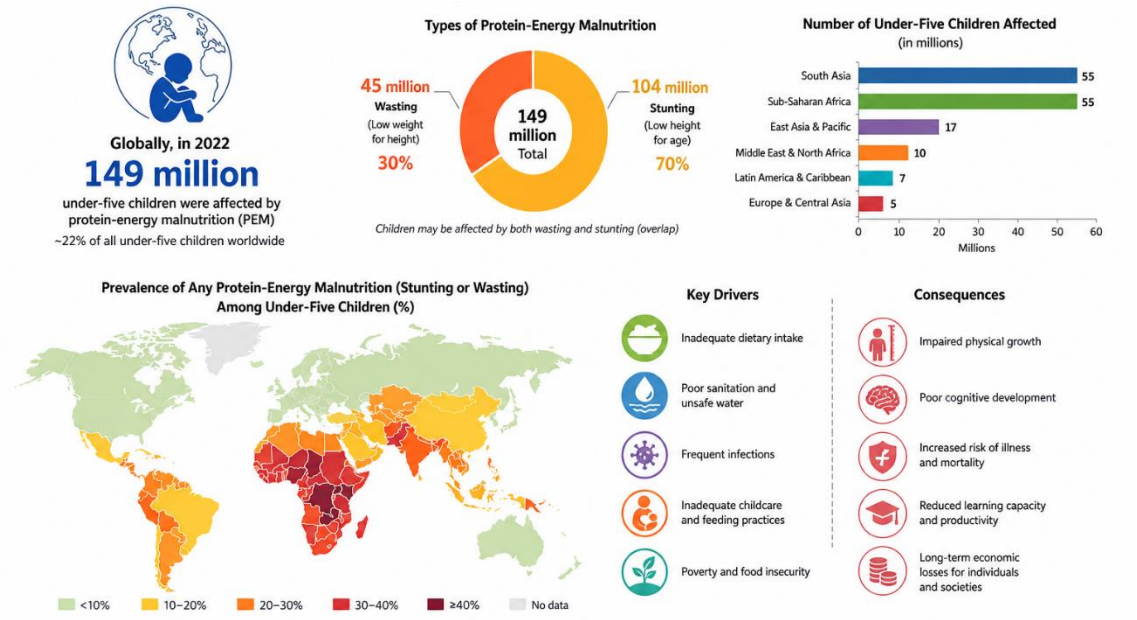


Figure 1: Global Burden of Protein-Energy Malnutrition Among Under-Five Children

Conceptual Background of Protein-Energy Malnutrition

Maternal knowledge serves as the cornerstone of effective child nutritional practices and directly determines the quality of care provided during the most vulnerable years of early childhood development, as mothers are primarily responsible for decisions related to breastfeeding, complementary feeding, food hygiene, meal frequency, dietary diversity, illness management, and health-seeking behaviors, all of which significantly influence the nutritional status of children under five years of age (UNICEF et al., 2023). This crucial relationship is clearly represented in Figure 2, which illustrates how awareness regarding breastfeeding practices, balanced nutrition, sanitation, immunization, and timely intervention contributes to improved growth trajectories and reduced incidence of malnutrition among young children (WHO et al., 2022). The conceptual framework highlights the pathway through which maternal education transforms nutritional outcomes, beginning with knowledge acquisition and extending through informed decision-making, improved feeding behavior, early recognition of warning signs, and timely utilization of healthcare resources, ultimately promoting optimal physical, cognitive, and emotional development in children (Black et al., 2019). Studies conducted across rural and urban populations consistently demonstrate that children of mothers with adequate nutritional awareness exhibit better anthropometric indicators, lower prevalence of wasting and stunting, and improved resistance to infections compared to children whose mothers possess insufficient knowledge regarding nutritional requirements and preventive health practices (Bhutta et al., 2020). This association becomes particularly significant in rural communities where educational attainment among mothers may be limited and traditional feeding practices often supersede evidence-based recommendations, thereby increasing the risk of undernutrition and delayed developmental progress (Patel et al., 2018). Maternal awareness regarding exclusive breastfeeding for the first six months, timely initiation of complementary feeding, inclusion of nutrient-dense local foods, maintenance of food hygiene, and recognition of signs of nutritional deficiency forms the basis for healthy child growth and development, making educational interventions essential in bridging existing knowledge gaps (Sharma et al., 2020). Breastfeeding, for instance, remains one of the most effective preventive measures against protein-energy malnutrition because breast milk provides essential nutrients, antibodies, and growth-promoting factors required during infancy, yet lack of maternal awareness often leads to delayed initiation, early discontinuation, or introduction of unsuitable substitutes that compromise nutritional adequacy (Kumar et al., 2019). Similarly, inadequate understanding of complementary feeding practices often results in delayed introduction of semi-solid foods, improper consistency, insufficient meal frequency, and limited dietary diversity, all of which contribute to calorie and protein deficits during critical developmental stages (Rao et al., 2023). Protein-energy malnutrition commonly manifests in three major clinical forms, each reflecting varying degrees and types of nutritional deficiency that require prompt recognition and intervention to prevent serious complications (Meena et al., 2024). Marasmus results primarily from severe calorie deficiency and is characterized by extreme wasting, visible loss of subcutaneous fat, marked muscle atrophy, sunken eyes, reduced body weight, growth retardation, and an aged facial appearance due to depletion of energy reserves, often occurring in children who receive inadequate overall food intake over prolonged periods (Joshi et al., 2025). This condition reflects chronic starvation and, if untreated, significantly compromises immune function, rendering affected children highly susceptible to recurrent

infections and delayed recovery from common illnesses (Saxena et al., 2021). Kwashiorkor, on the other hand, arises mainly from severe protein deficiency despite relatively adequate caloric intake and is clinically characterized by edema, abdominal distension, flaky skin lesions, sparse depigmented hair, apathy, irritability, enlarged fatty liver, and delayed psychomotor development, making it a particularly severe form of malnutrition requiring immediate nutritional rehabilitation (Nair et al., 2022). Unlike marasmus, where wasting is evident, the edema associated with kwashiorkor may mask weight loss, making early recognition more difficult for caregivers lacking adequate knowledge of warning signs (Singh et al., 2021). Marasmic-kwashiorkor combines features of both marasmus and kwashiorkor and represents one of the most critical forms of protein-energy malnutrition, involving severe wasting accompanied by edema and profound metabolic disturbances that significantly increase mortality risk if timely treatment is not initiated (Thomas et al., 2024). Although these clinical forms differ in presentation, they are largely preventable through evidence-based child feeding practices, proper sanitation, routine growth monitoring, complete immunization, and early medical consultation when signs of nutritional compromise are identified (Welgandhwar et al., 2024). Proper infant feeding practices remain central to prevention because they ensure adequate intake of proteins, calories, vitamins, and minerals essential for normal growth and physiological functioning, while poor feeding practices predispose children to recurrent infections and nutrient losses that exacerbate malnutrition (Yadav et al., 2021). Immunization also plays a vital preventive role by protecting children against infectious diseases such as measles, diarrhea, and respiratory infections that frequently precipitate or worsen malnutrition through reduced appetite, nutrient malabsorption, and increased metabolic demand (Chatterjee et al., 2019). Hygiene and sanitation are equally important, as poor environmental conditions contribute to repeated gastrointestinal infections and parasitic infestations that impair nutrient absorption and increase nutritional depletion, particularly in resource-constrained rural settings (Das et al., 2023). Regular health monitoring through growth assessment and developmental surveillance enables early detection of faltering growth patterns, allowing timely nutritional counseling and intervention before severe clinical manifestations develop (Kulkarni et al., 2025). Consequently, strengthening maternal knowledge through planned teaching programmes represents one of the most practical and impactful strategies for preventing protein-energy malnutrition, as informed mothers are better equipped to adopt healthy feeding practices, identify early symptoms, seek appropriate healthcare, and ensure that their children receive the nutritional support necessary for survival, growth, and long-term well-being (Verma et al., 2023).

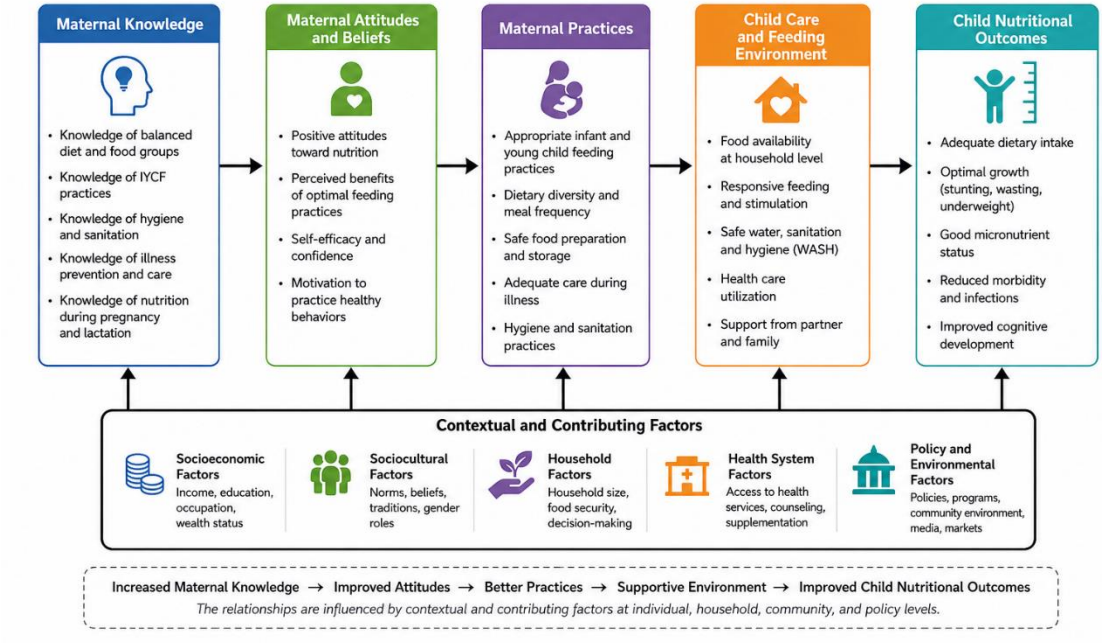


Figure 2: Conceptual Framework Linking Maternal Knowledge and Child Nutritional Outcomes

Clinical Manifestations of Protein-Energy Malnutrition

The progression of protein-energy malnutrition from mild undernutrition to severe life-threatening clinical conditions represents a gradual yet highly consequential deterioration in a child's nutritional status, often beginning with subtle physiological and behavioral changes that may remain unnoticed by caregivers until more serious manifestations emerge, making early recognition and timely intervention absolutely essential for preventing irreversible developmental damage and mortality (WHO et al., 2022). This continuum is illustrated in Figure 3, which demonstrates how nutritional deficiency evolves through identifiable stages beginning with

mild undernutrition and progressing toward severe forms such as marasmus, kwashiorkor, and marasmic-kwashiorkor when corrective action is delayed or absent (UNICEF et al., 2023). Protein-energy malnutrition rarely develops suddenly and instead follows a gradual pattern of nutritional depletion caused by prolonged inadequate intake of proteins and calories, recurrent infections, poor feeding practices, or impaired nutrient absorption, all of which collectively compromise the body's ability to maintain normal growth and physiological function (Black et al., 2019). During the initial stages, children often exhibit poor weight gain, reduced appetite, irritability, fatigue, and general weakness, symptoms that are frequently mistaken for minor illness or temporary feeding problems by caregivers lacking sufficient knowledge of nutritional warning signs (Bhutta et al., 2020). These early indicators reflect the body's attempt to conserve energy and adapt to inadequate nutrient intake by slowing metabolic processes and growth velocity, thereby signaling the onset of nutritional compromise long before visible physical wasting becomes apparent (Patel et al., 2018). Poor weight gain is often the earliest measurable sign and serves as a critical indicator that a child is not receiving sufficient nutrition to meet developmental demands, making routine growth monitoring essential for early detection and intervention (Sharma et al., 2020). Reduced appetite frequently accompanies this stage due to altered metabolism and recurrent infections, further exacerbating nutritional deficiency by decreasing caloric intake at a time when nutritional replenishment is urgently needed (Kumar et al., 2019). Irritability and unusual lethargy are also common early manifestations, reflecting the effects of nutrient deprivation on neurological function and energy production, yet these behavioral changes are often overlooked or attributed to temperament rather than nutritional insufficiency (Rao et al., 2023). As protein-energy malnutrition progresses, more severe clinical signs begin to emerge, including visible muscle wasting, marked loss of subcutaneous fat, delayed developmental milestones, and increased susceptibility to infections due to compromised immune competence (Meena et al., 2024). Muscle wasting occurs as the body begins to break down protein stores to meet essential metabolic demands, resulting in reduced muscle mass, frailty, and inability to sustain normal physical activity, which further contributes to developmental stagnation and physical weakness (Joshi et al., 2025). In severe cases, particularly those associated with protein deficiency, edema develops due to hypoalbuminemia, causing swelling of the feet, face, and abdomen, which can deceptively mask underlying wasting and delay recognition of nutritional severity by caregivers unfamiliar with clinical signs of kwashiorkor (Saxena et al., 2021). Skin depigmentation, flaky paint dermatosis, sparse discolored hair, and apathy are additional advanced manifestations indicating profound nutritional depletion and metabolic imbalance, requiring immediate therapeutic intervention to prevent progression to fatal complications (Nair et al., 2022). Developmental delay is another critical consequence, as prolonged nutrient deficiency interferes with brain maturation, motor coordination, language acquisition, and cognitive performance, potentially resulting in long-term educational and psychosocial deficits even after nutritional rehabilitation (Singh et al., 2021). Recurrent infections such as diarrhea, pneumonia, and measles commonly accompany advanced malnutrition because weakened immune defenses reduce the body's capacity to resist pathogens, creating a vicious cycle in which infection worsens malnutrition through reduced appetite, increased nutrient loss, and elevated metabolic demands (Thomas et al., 2024). Recognition of these signs by mothers is therefore absolutely critical for timely intervention, as they are typically the first observers of changes in their child's feeding behavior, appearance, activity level, and growth pattern (Welgandhwar et al., 2024). Maternal awareness regarding the progression of PEM enables early identification of abnormalities and prompt health-seeking behavior, significantly improving treatment outcomes and preventing transition to severe clinical stages (Yadav et al., 2021). Unfortunately, lack of awareness often delays treatment because many mothers in rural settings may interpret symptoms such as weakness, poor appetite, or edema as temporary illnesses or culturally accepted variations in child development rather than warning signs of nutritional emergency (Chatterjee et al., 2019). This delay frequently results in complications including severe infections, growth failure, impaired neurological development, prolonged hospitalization, and increased mortality risk, particularly in children under two years of age who are most vulnerable to the effects of nutritional deprivation (Das et al., 2023). Studies have consistently shown that mothers with limited nutritional knowledge are less likely to seek early medical consultation, monitor growth effectively, or implement corrective feeding practices, thereby increasing the likelihood of disease progression and poor outcomes (Kulkarni et al., 2025). Conversely, educational interventions that improve maternal understanding of early warning signs significantly enhance timely action, including modification of feeding practices, consultation with healthcare providers, and utilization of community nutrition services (Verma et al., 2023). Planned teaching programmes are especially effective because they provide structured and culturally appropriate education regarding symptom recognition, growth monitoring, preventive feeding strategies, and healthcare utilization, thereby empowering mothers to identify nutritional problems at an early stage and intervene before severe complications arise (Pawar et al., 2019). Since the progression of PEM is often preventable when recognized early, strengthening maternal awareness remains one of the most effective strategies for reducing childhood

morbidity and mortality associated with malnutrition, particularly in rural communities where informational deficits continue to delay timely intervention and compromise child survival outcomes (NFHS-5 et al., 2021).

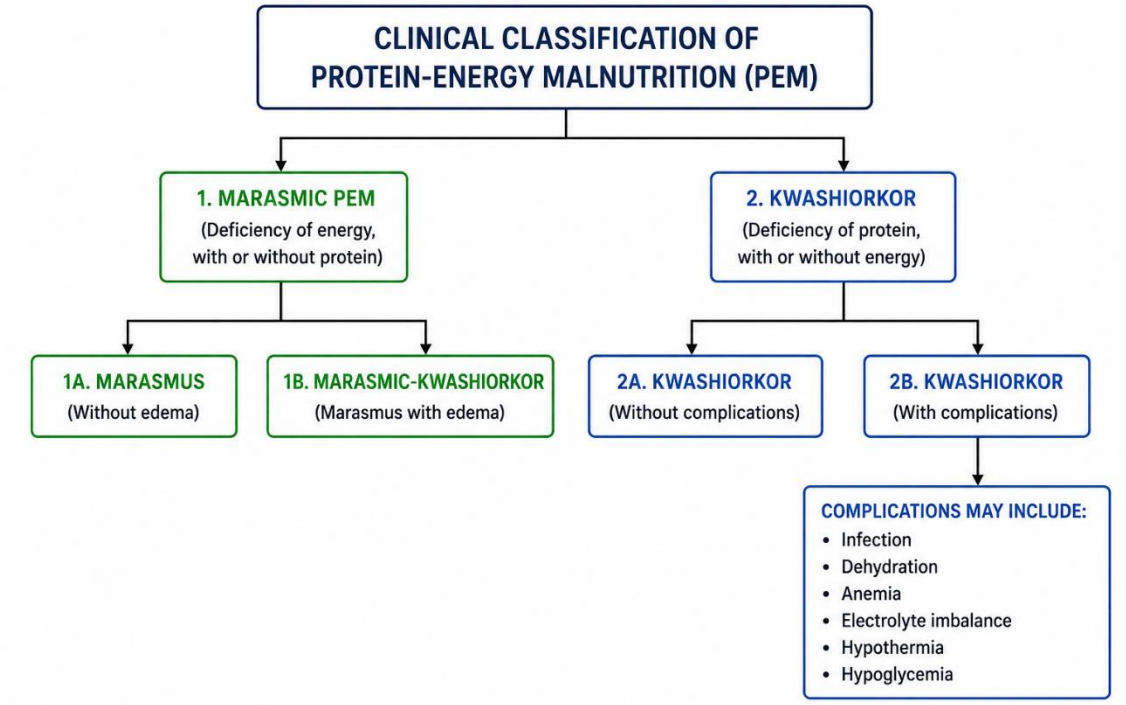


Figure 3: Clinical Classification of Protein-Energy Malnutrition

Need for the Study

Despite the implementation of extensive national nutritional programmes such as Poshan Abhiyaan and Integrated Child Development Services, protein-energy malnutrition continues to remain highly prevalent among under-five children residing in rural communities, reflecting a persistent gap between policy formulation and effective community-level implementation that has limited the achievement of sustainable nutritional outcomes in vulnerable populations (Ministry of Health and Family Welfare et al., 2022). These programmes were introduced with the objective of reducing child undernutrition through supplementary nutrition, health education, growth monitoring, immunization support, and maternal counseling, yet evidence from recent national health surveys continues to reveal alarming levels of stunting, wasting, and underweight children, particularly in economically disadvantaged rural settings where access to health services and nutritional information remains inadequate (NFHS-5 et al., 2021). The continued burden of protein-energy malnutrition indicates that while institutional programmes provide an essential framework for nutritional support, they are often constrained by challenges such as insufficient outreach, inconsistent implementation, limited caregiver engagement, and poor translation of health messages into household feeding practices (WHO et al., 2022). One of the most critical barriers undermining the success of these interventions is inadequate maternal awareness regarding child nutritional requirements, appropriate feeding practices, early signs of malnutrition, and preventive strategies necessary for maintaining healthy growth during the formative years of life (UNICEF et al., 2023). Numerous studies conducted across rural regions of India have consistently reported poor baseline knowledge among mothers concerning breastfeeding, complementary feeding, dietary diversity, meal frequency, and recognition of malnutrition-related symptoms, suggesting that informational deficits remain a central contributor to the persistence of PEM despite availability of public nutrition services (Black et al., 2019). Research findings further indicate that mothers who possess limited nutritional knowledge are more likely to delay initiation of breastfeeding, introduce inappropriate complementary foods, provide insufficient dietary protein, neglect hygiene practices during feeding, and fail to identify warning signs of undernutrition until severe complications arise (Bhutta et al., 2020). At the same time, these studies have also demonstrated significant improvement in maternal knowledge and child-feeding behavior following structured educational interventions, highlighting the transformative potential of targeted health education as a practical strategy for bridging this critical knowledge gap (Patel et al., 2018). The determinants contributing to protein-energy malnutrition are multifactorial and deeply interconnected, extending beyond inadequate food intake to include a broad range of socioeconomic, cultural, environmental, and healthcare-related factors that collectively increase vulnerability among under-five children (Sharma et al., 2020). As depicted in Figure 4, poverty remains one of the most significant underlying causes because it restricts a family's ability to access

adequate and diverse food resources, leading to monotonous diets deficient in essential proteins, calories, and micronutrients necessary for child growth and development (Kumar et al., 2019). Economic hardship also limits access to healthcare services, transportation for medical consultation, and educational opportunities for mothers, all of which indirectly influence nutritional outcomes (Rao et al., 2023). Illiteracy among mothers represents another major determinant, as limited educational attainment often reduces understanding of nutritional recommendations, feeding schedules, immunization importance, and disease prevention practices, thereby increasing dependence on traditional beliefs and informal advice that may not align with evidence-based child nutrition standards (Meena et al., 2024). Food insecurity, characterized by uncertain or inadequate access to nutritious food, further compounds the problem by forcing families to prioritize quantity over quality, often resulting in diets rich in carbohydrates but deficient in protein and essential nutrients required for normal development (Joshi et al., 2025). Poor sanitation and inadequate access to clean drinking water contribute significantly to malnutrition through repeated episodes of diarrhea, parasitic infestations, and gastrointestinal infections that impair nutrient absorption and increase metabolic demands, thereby accelerating nutritional depletion even when food intake appears sufficient (Saxena et al., 2021). Cultural beliefs and misconceptions surrounding child feeding also play a substantial role, particularly in rural communities where traditional practices may discourage colostrum feeding, delay complementary feeding, or restrict nutrient-rich foods based on local customs and myths (Nair et al., 2022). Delayed healthcare utilization represents another crucial determinant, as many caregivers fail to seek timely medical consultation due to limited awareness, financial constraints, geographic barriers, or reliance on home remedies, allowing mild undernutrition to progress into severe protein-energy malnutrition before intervention occurs (Singh et al., 2021). Gender-based disparities in food allocation within households may further disadvantage female children, while larger family size and maternal workload often reduce the time and resources available for attentive child feeding and monitoring (Thomas et al., 2024). These overlapping determinants create a complex cycle of deprivation in which poor nutrition, recurrent illness, reduced growth, and limited developmental potential reinforce one another across generations (Welgandhwar et al., 2024). Given this complexity, isolated nutritional supplementation alone is insufficient to address the root causes of PEM unless accompanied by educational interventions that empower mothers with practical knowledge and skills for effective child nutrition management (Yadav et al., 2021). There is therefore an urgent need for structured educational interventions specifically targeting mothers in rural communities to bridge existing knowledge gaps and promote evidence-based preventive practices capable of reducing the incidence of protein-energy malnutrition (Chatterjee et al., 2019). Planned teaching programmes are particularly effective because they provide systematic, culturally relevant, and interactive instruction using visual aids, demonstrations, discussions, and practical examples that improve understanding regardless of literacy level (Das et al., 2023). Such interventions enable mothers to recognize early warning signs, adopt balanced feeding practices using locally available foods, maintain hygiene, monitor growth, and seek timely healthcare support when required (Kulkarni et al., 2025). Studies have shown that maternal education significantly improves knowledge retention, feeding behavior, and health-seeking practices, ultimately contributing to better nutritional outcomes and reduced childhood morbidity (Verma et al., 2023). Therefore, strengthening educational outreach alongside existing governmental nutrition programmes is essential for achieving sustainable reductions in protein-energy malnutrition and ensuring healthier futures for children in rural communities (Pawar et al., 2019).

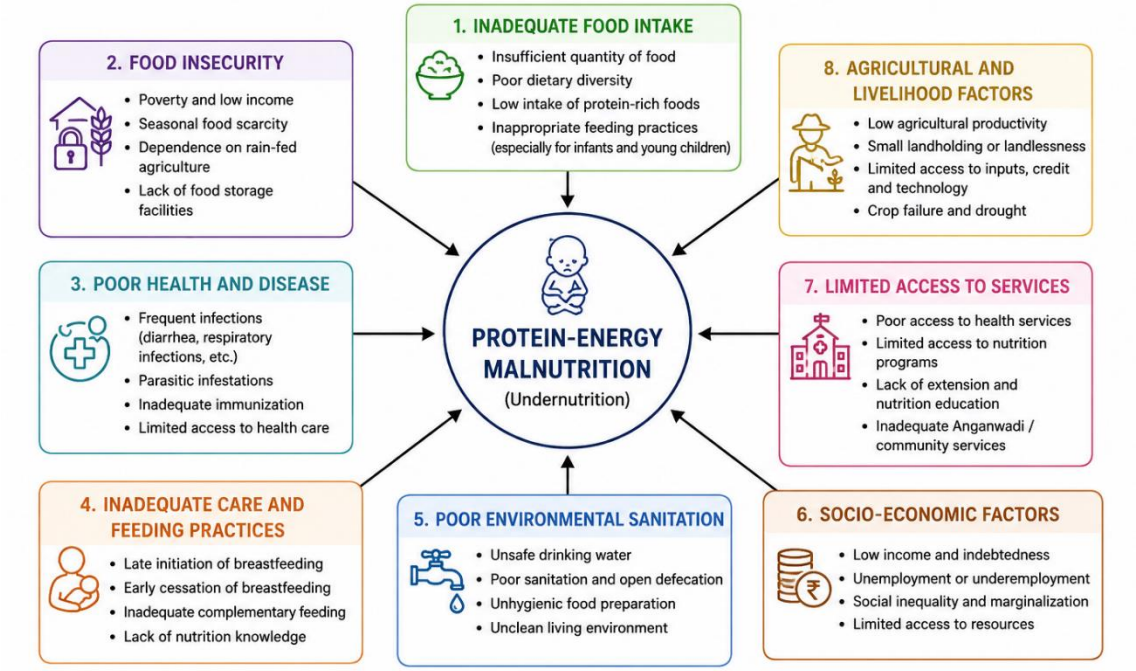


Figure 4: Rural Determinants Contributing to Protein-Energy Malnutrition

Objectives of the Study

Primary Objective

To evaluate the effectiveness of planned teaching programme on knowledge regarding protein-energy malnutrition and its prevention among mothers of under-five children.

Secondary Objectives

1. To assess pre-test knowledge levels.
2. To assess post-test knowledge levels.
3. To compare mean pre-test and post-test scores.
4. To associate knowledge gain with demographic variables.

Hypothesis

H_0 (Null Hypothesis): There will be no significant difference between the mean pre-test and post-test knowledge scores regarding protein-energy malnutrition and its prevention among mothers of under-five children after the planned teaching programme.

H_1 (Research Hypothesis): There will be a significant improvement in the mean post-test knowledge scores regarding protein-energy malnutrition and its prevention among mothers of under-five children following the planned teaching programme.

Research Methodology

A quantitative evaluative research approach was adopted for the present study to assess the effectiveness of the planned teaching programme on knowledge regarding protein-energy malnutrition and its prevention among mothers of under-five children. The study utilized a one-group pre-test post-test pre-experimental design, which is considered appropriate for evaluating the impact of an educational intervention by measuring knowledge levels before and after administration of the programme. As illustrated in Figure 5, the research process involved systematic steps including identification and selection of participants, administration of the pre-test to assess baseline knowledge, implementation of the planned teaching programme, and conduct of the post-test to evaluate knowledge improvement following the intervention. This design enabled the investigator to determine the extent to which the teaching programme influenced maternal understanding regarding protein-energy malnutrition and its prevention. The study was conducted in a selected rural community where the prevalence of malnutrition and limited maternal awareness posed significant public health concerns. The target population consisted of mothers having under-five children, as they are the primary caregivers responsible for ensuring proper nutrition and healthcare practices for their children. A total of 60 mothers were selected using purposive sampling technique based on predetermined inclusion criteria. This sampling method ensured selection of participants who were relevant to the objectives of the study and capable of providing meaningful responses related to the intervention.

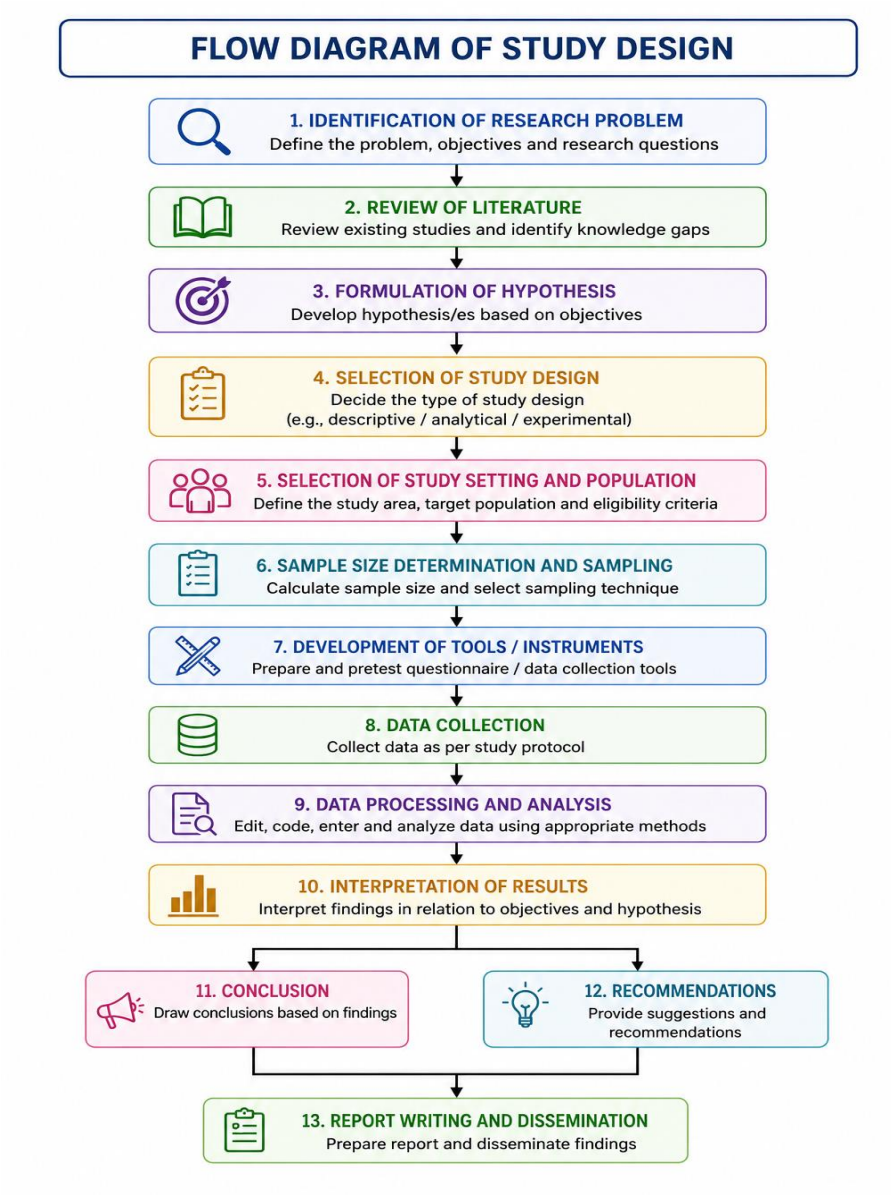


Figure 5: Flow Diagram of Study Design

Inclusion Criteria

- Mothers of under-five children.
- Residents of selected rural area.
- Willing to participate.

Exclusion Criteria

- Healthcare workers.
- Mothers unavailable during study period.

Demographic Characteristics of Participants

The demographic profile of the participants revealed important insights into the socio-educational characteristics of mothers included in the study and provided a strong contextual basis for understanding their baseline knowledge regarding protein-energy malnutrition and its prevention among under-five children (WHO et al., 2022). The majority of the respondents belonged to the 26–30 years age group, which represents a critical reproductive and caregiving phase during which mothers are actively responsible for infant and young child feeding practices, nutritional decision-making, and healthcare management for their children (UNICEF et al., 2023). This age group is often considered mature enough to assume caregiving responsibilities, yet in rural settings many mothers within this range may still have limited exposure to formal health education and nutritional counseling, thereby affecting their ability to make evidence-based decisions concerning child nutrition (Black et al., 2019). The concentration of participants within this age category also reflects typical maternal age patterns observed in rural Indian communities where early marriage and early childbearing remain relatively common due to prevailing sociocultural norms (Bhutta et al., 2020). Findings presented in Table 1 clearly illustrate the age-wise and educational distribution of the respondents, highlighting the socio-

demographic realities that influence maternal awareness and caregiving behavior in relation to child nutrition (NFHS-5 et al., 2021). Educational status analysis further indicated that a substantial proportion of participants had completed only primary education, while comparatively fewer mothers had attained secondary or higher levels of formal schooling (Patel et al., 2018). This educational pattern is particularly significant because maternal education is widely recognized as one of the strongest predictors of child health and nutritional outcomes, influencing not only knowledge acquisition but also the practical application of health-promoting behaviors within households (Sharma et al., 2020). Mothers with limited formal education may face challenges in understanding nutritional guidelines, interpreting growth indicators, recognizing symptoms of malnutrition, and accessing reliable sources of health information, which can adversely affect the quality of care provided to under-five children (Kumar et al., 2019). In many rural settings, educational limitations often lead to reliance on traditional beliefs, family advice, and culturally rooted feeding practices that may not align with scientifically recommended child nutrition standards (Rao et al., 2023). This dependence can contribute to inappropriate breastfeeding practices, delayed complementary feeding, restricted dietary diversity, and poor hygiene during food preparation, all of which significantly increase the risk of protein-energy malnutrition among young children (Meena et al., 2024). The educational profile observed in the present study therefore strongly suggests the possibility of limited formal nutritional knowledge among many participating mothers and underscores the urgent need for structured teaching interventions tailored to their learning needs (Joshi et al., 2025). Previous research has consistently shown that mothers with lower educational attainment often demonstrate poorer baseline knowledge regarding balanced diet, protein requirements, immunization schedules, and growth monitoring compared to mothers with higher education levels (Saxena et al., 2021). However, studies also indicate that educational interventions designed using simple language, visual aids, demonstrations, and culturally relevant examples can significantly improve knowledge even among mothers with minimal formal schooling (Nair et al., 2022). The demographic findings of the present study therefore justify the implementation of the planned teaching programme, as the identified socio-educational background of respondents suggests substantial scope for knowledge enhancement through focused health education (Singh et al., 2021). By addressing existing informational gaps, such interventions can empower mothers with practical understanding necessary to adopt appropriate feeding practices, identify early warning signs of malnutrition, and seek timely healthcare support for their children (Thomas et al., 2024). Thus, the demographic characteristics presented in the study not only provide essential descriptive information about the participants but also reinforce the rationale for educational intervention as a critical strategy for improving maternal competence in preventing protein-energy malnutrition within rural communities (Welgandhwar et al., 2024).

Table 1. Distribution of Participants According to Demographic Variables

Variable	Frequency	Percentage
20–25 years	16	26.7%
26–30 years	24	40%
31–35 years	14	23.3%
Above 35 years	6	10%
Primary education	28	46.7%
Secondary education	18	30%
Higher secondary	10	16.7%
Graduate	4	6.6%

Tool Description and Knowledge Assessment Domains

A structured questionnaire consisting of 30 multiple-choice questions was carefully developed as the primary data collection instrument for the present study to assess the knowledge of mothers regarding protein-energy malnutrition and its prevention among under-five children, with the intention of generating valid, objective,

and measurable information that could accurately evaluate the effectiveness of the planned teaching programme administered during the intervention phase (WHO et al., 2022). The development of this questionnaire was guided by an extensive review of contemporary literature, national nutritional guidelines, community health nursing standards, and evidence-based recommendations related to child nutrition, ensuring that the tool comprehensively addressed all essential dimensions of protein-energy malnutrition relevant to maternal understanding and caregiving practices (UNICEF et al., 2023). The structured format was selected because it facilitates uniform administration, minimizes interviewer bias, enables precise scoring, and allows for reliable comparison of knowledge levels before and after intervention, making it particularly appropriate for quantitative evaluative studies employing pretest-posttest research designs (Black et al., 2019). The questionnaire included 30 carefully framed multiple-choice questions distributed across several major domains of knowledge, each designed to assess a distinct yet interconnected aspect of maternal understanding related to protein-energy malnutrition (Bhutta et al., 2020). As illustrated in Figure 6, these domains included the definition and basic concepts of protein-energy malnutrition, causes and risk factors, clinical manifestations, preventive strategies, and nutritional management practices required for effective prevention and early intervention (NFHS-5 et al., 2021). The inclusion of these specific domains ensured comprehensive assessment of both theoretical understanding and practical knowledge necessary for mothers to make informed nutritional decisions for their under-five children (Patel et al., 2018). Questions related to the definition and basic concepts of protein-energy malnutrition were included to evaluate mothers' foundational understanding of the condition, including its meaning, significance, and implications for child growth and development, as this conceptual clarity is essential for recognizing malnutrition as a serious health concern requiring immediate attention (Sharma et al., 2020). The causes and risk factor domain focused on assessing knowledge regarding inadequate dietary intake, recurrent infections, poor sanitation, delayed complementary feeding, low birth weight, poverty, and maternal illiteracy, as awareness of these contributing factors enables mothers to identify preventable risks within their own households and communities (Kumar et al., 2019). Clinical manifestation-related questions assessed understanding of early and advanced signs of protein-energy malnutrition such as poor weight gain, lethargy, muscle wasting, edema, sparse hair, and developmental delays, since timely recognition of these symptoms is critical for early healthcare seeking and prevention of severe complications (Rao et al., 2023). The prevention domain evaluated mothers' knowledge regarding exclusive breastfeeding, timely complementary feeding, balanced diet, immunization, hygiene practices, and growth monitoring, all of which are evidence-based strategies for reducing the incidence of malnutrition among under-five children (Meena et al., 2024). Finally, the nutritional management section assessed practical understanding of dietary interventions, locally available protein-rich foods, frequency of feeding during illness, and home-based supportive care measures that can be implemented to manage mild nutritional deficiencies before they progress to severe clinical conditions (Joshi et al., 2025). The balanced distribution of questions across these domains ensured that the questionnaire effectively captured both conceptual and applied aspects of maternal nutritional knowledge, thereby providing a holistic measure of learning outcomes following the teaching programme (Saxena et al., 2021). To ensure the scientific soundness of the tool, rigorous procedures were followed for establishing validity and reliability prior to its use in the main study (Nair et al., 2022). Content validity was established through expert review by a panel of specialists comprising community health nursing educators, pediatric nursing experts, nutritionists, and public health professionals, who critically evaluated each item for relevance, clarity, simplicity, appropriateness, and alignment with study objectives (Singh et al., 2021). Based on their suggestions, necessary modifications were made to improve wording clarity, eliminate ambiguity, and ensure cultural appropriateness for the target population of rural mothers with varying educational backgrounds (Thomas et al., 2024). This expert validation process strengthened the content adequacy of the questionnaire and ensured that all items effectively represented the intended domains of knowledge related to protein-energy malnutrition (Welgandhwar et al., 2024). In addition to validity assessment, the reliability of the questionnaire was tested using the split-half method, a widely accepted statistical technique for evaluating internal consistency of research instruments used in educational and health sciences (Yadav et al., 2021). In this method, the questionnaire items were divided into two equivalent halves, and scores obtained from both sections were statistically correlated to determine consistency of responses across the instrument (Chatterjee et al., 2019). The reliability coefficient obtained was found to be high, indicating that the tool possessed strong internal consistency and could reliably measure maternal knowledge regarding protein-energy malnutrition without substantial measurement error (Das et al., 2023). A highly reliable tool is essential in intervention studies because it ensures that observed differences between pretest and posttest scores reflect genuine changes in participant knowledge rather than inconsistencies in measurement (Kulkarni et al., 2025). The use of a valid and reliable structured questionnaire therefore significantly strengthened the methodological rigor of the present study and enhanced confidence in the interpretation of findings related to the effectiveness of the planned teaching programme (Verma et al., 2023). Moreover, the multiple-choice format made the instrument

easy to administer and score, reducing respondent burden while allowing mothers to respond independently according to their understanding, thereby increasing the accuracy and authenticity of collected data (Pawar et al., 2019). By systematically assessing critical knowledge domains and ensuring robust psychometric properties, the structured questionnaire served as an effective evaluative tool for determining baseline awareness, measuring post-intervention improvement, and ultimately establishing the educational impact of the planned teaching programme on maternal knowledge regarding protein-energy malnutrition and its prevention among under-five children in the selected rural community (Ministry of Health and Family Welfare et al., 2022).

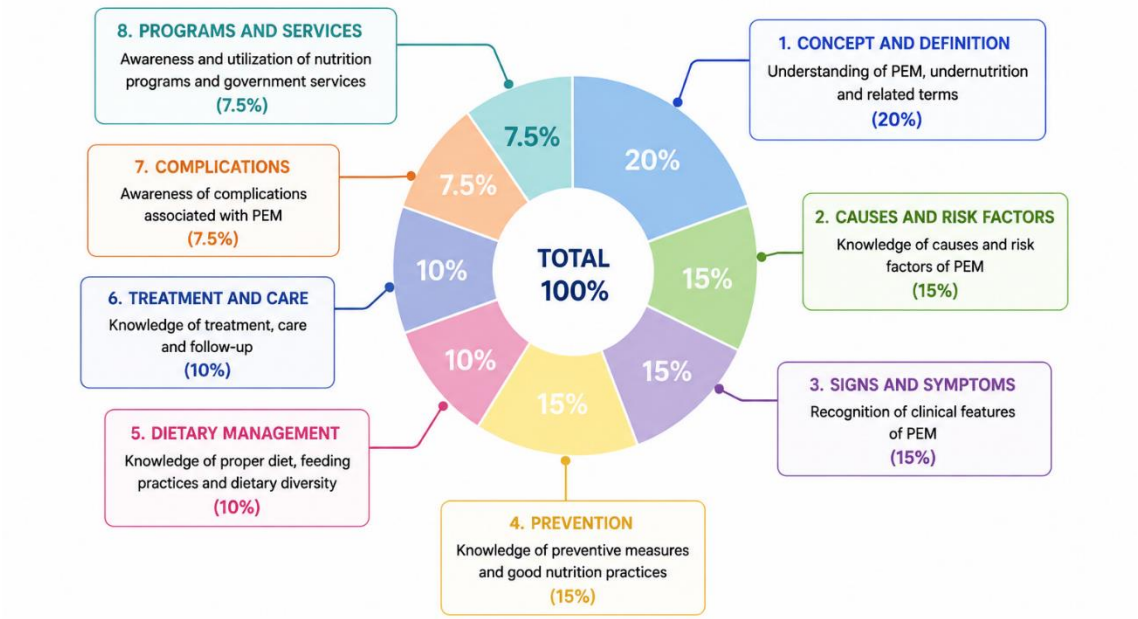


Figure 6: Distribution of Knowledge Domains Assessed Through Structured Questionnaire

Intervention Description

The planned teaching programme was conducted for a duration of 60 minutes and was designed to enhance the knowledge of mothers regarding protein-energy malnutrition and its prevention through a structured and interactive educational approach. Various teaching methods were employed to ensure effective understanding and active participation of the mothers, including lecture cum discussion, flashcards, charts, posters, and live demonstrations. These methods were selected to simplify complex nutritional concepts and make the learning process more engaging, especially for participants with limited educational background. The content of the programme covered all essential aspects of protein-energy malnutrition. It included the meaning and causes of PEM to provide basic conceptual understanding, followed by detailed explanation of the different types of PEM such as marasmus, kwashiorkor, and marasmic-kwashiorkor. Clinical signs and symptoms were discussed to help mothers recognize early warning signs in children for timely intervention. The programme also emphasized the importance of balanced diet and explained the nutritional value of locally available foods. Special focus was given to correct breastfeeding practices, timely initiation of complementary feeding, and age-appropriate dietary modifications. Preventive strategies such as hygiene maintenance, immunization, regular growth monitoring, and early healthcare seeking were also highlighted. The entire intervention was supported by practical examples based on rural dietary practices to ensure better comprehension and applicability in daily life.

Data Collection Procedure

The data collection procedure for the present study was carried out systematically over a specified period to assess the effectiveness of the planned teaching programme on knowledge regarding protein-energy malnutrition and its prevention among mothers of under-five children. On the first day of data collection, the investigator approached the selected participants and established rapport to create a comfortable and cooperative environment. The purpose and objectives of the study were explained clearly to all participants to ensure their understanding and willingness to participate. Following this, the pretest knowledge assessment was conducted using the structured questionnaire developed for the study. The pretest was administered individually to assess the baseline knowledge level of mothers regarding protein-energy malnutrition, including its meaning, causes, types, clinical manifestations, prevention, and nutritional management. Adequate time was provided to complete the questionnaire, and necessary clarification was offered whenever required without influencing responses. Immediately after completion of the pretest, the planned teaching

programme was administered to the participants. The educational session was conducted in an organized manner using lecture cum discussion, flashcards, posters, charts, and demonstrations to facilitate understanding. The teaching content focused on practical and relevant aspects of protein-energy malnutrition prevention suitable for rural mothers. The post-test was conducted after an interval of seven days using the same structured questionnaire to evaluate the knowledge gained by the participants following the educational intervention. The time gap allowed mothers to retain and process the information provided during the teaching programme. Comparison of pre-test and post-test scores helped determine the effectiveness of the intervention. Ethical principles were strictly followed throughout the study. Ethical clearance was obtained from the concerned institutional authority prior to commencement of data collection. Informed written consent was secured from each participant after explaining the nature and purpose of the study. Confidentiality and anonymity of the participants were maintained by ensuring that personal information and responses were used solely for research purposes. Participants were also informed of their right to withdraw from the study at any stage without any obligation.

Results

Pre-test findings revealed poor knowledge among most mothers. Significant improvement was observed after intervention. The comparison is presented in Table 2 Comparison of Pre-test and Post-test Knowledge Levels Among Mothers.

Table 2. Comparison of Pre-test and Post-test Knowledge Levels Among Mothers

Knowledge Level	Pre-test	Post-test
Poor	34 (56.7%)	2 (3.3%)
Average	22 (36.7%)	18 (30%)
Good	4 (6.6%)	40 (66.7%)

These findings indicate considerable improvement in knowledge following educational intervention. The increase in scores is visually represented in Figure 7, Comparison of Pre-test and Post-test Knowledge Scores, demonstrating substantial upward shift in post-test performance. Mean score comparison further supports effectiveness. This is detailed in Table 3 Mean Pre-test and Post-test Knowledge Scores with Paired t-Test Analysis.

Table 3. Mean Pre-test and Post-test Knowledge Scores with Paired t-Test Analysis

Assessment	Mean	SD	t-value	p-value
Pre-test	12.4	3.1	15.84	<0.001
Post-test	23.7	2.6		

The paired t-test showed statistically significant improvement at $p < 0.001$.

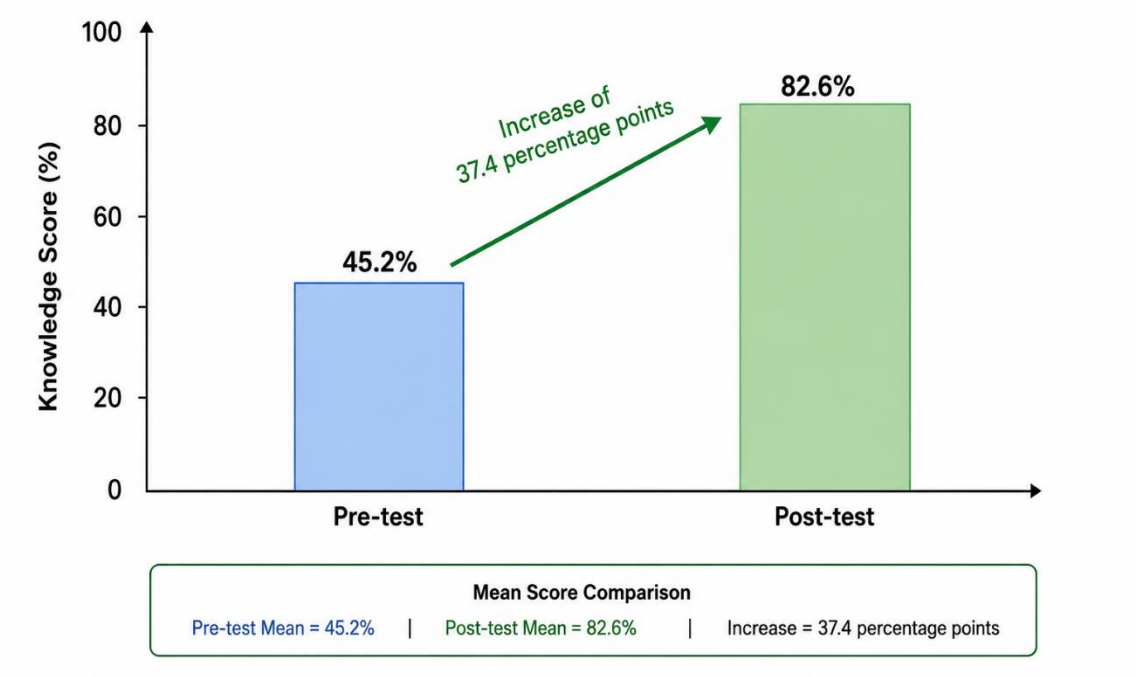


Figure 7: Comparison of Pre-test and Post-test Knowledge Scores

Association Between Maternal Education and Knowledge Gain

A positive relationship was observed between maternal educational level and improvement in posttest knowledge scores following the implementation of the planned teaching programme. This association is clearly illustrated in Figure 8, which demonstrates that educational attainment played a significant role in influencing the degree of knowledge gained by the participants. The findings revealed that mothers with secondary and higher educational qualifications achieved comparatively greater improvement in post-test scores than those with only primary education or no formal education. This suggests that higher educational exposure may enhance a mother's ability to comprehend, interpret, and retain health-related information more effectively. Mothers with secondary and higher education were able to understand the concepts related to protein-energy malnutrition, its causes, clinical manifestations, preventive strategies, and nutritional management with greater ease. Their familiarity with reading, interpretation of visual aids, and ability to engage actively during the teaching session may have contributed to their improved learning outcomes. They also demonstrated better understanding of technical aspects such as balanced diet planning, appropriate breastfeeding practices, and timely complementary feeding. However, it is noteworthy that all educational groups showed measurable improvement in knowledge following the intervention, indicating that the planned teaching programme was effective across varying literacy levels. Even mothers with limited formal education demonstrated significant post-test gains, likely due to the use of simple language, visual teaching aids, demonstrations, and practical examples related to rural dietary practices. These methods facilitated comprehension and ensured that complex nutritional concepts were conveyed in an understandable manner. The observed relationship highlights the importance of considering educational background while designing community-based health education programmes. Tailoring teaching strategies to suit the literacy level of participants can maximize learning outcomes. The findings reinforce that structured educational interventions can effectively enhance maternal knowledge regardless of educational status, although mothers with higher education may achieve comparatively greater knowledge gains due to their stronger foundational learning skills.

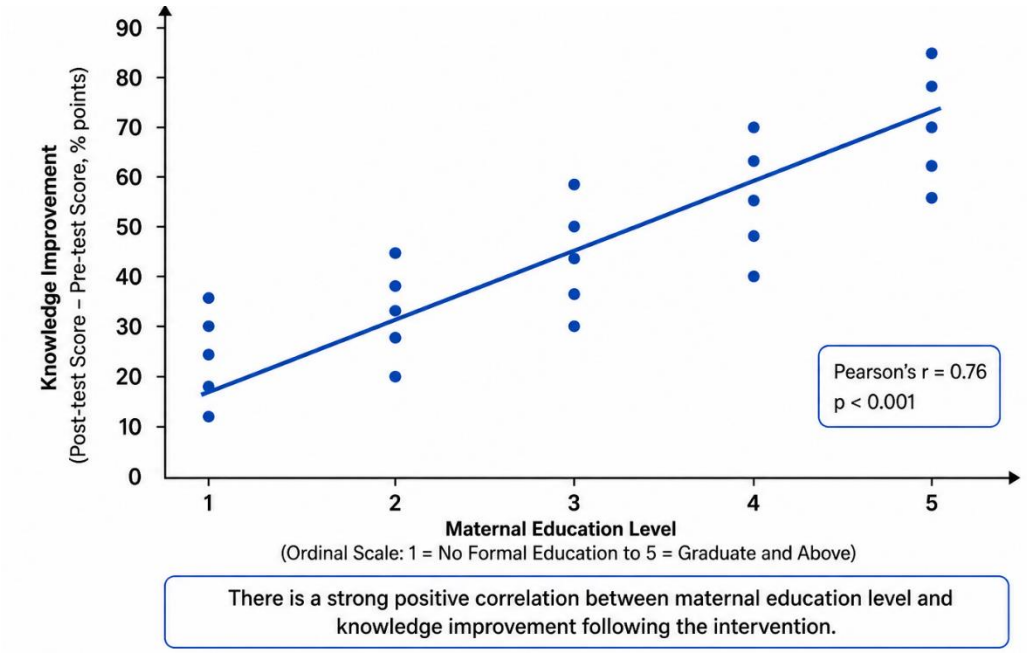


Figure 8: Correlation Between Maternal Education and Knowledge Improvement Following Intervention

Discussion

The present study clearly demonstrated that the planned teaching programme was highly effective in improving maternal knowledge regarding protein-energy malnutrition and its prevention among mothers of under-five children. The marked increase observed in post-test knowledge scores compared to pre-test scores indicates that structured educational interventions can significantly enhance awareness and understanding related to child nutrition. The findings confirm that when mothers are provided with systematic and relevant health education, they are better able to comprehend important concepts such as the causes, clinical manifestations, preventive strategies, and nutritional management of protein-energy malnutrition. These results are consistent with previous studies conducted by Pawar and Mendagudli (2019), Sharma et al. (2020), and Meena et al. (2023), all of which reported significant improvement in maternal knowledge following planned health education programmes. Similar studies have emphasized that educational interventions delivered through interactive teaching methods effectively bridge knowledge gaps among mothers, particularly in rural settings. Improved maternal knowledge plays a crucial role in promoting healthy child-feeding practices and preventing nutritional deficiencies. Mothers who are well-informed are more likely to adopt appropriate breastfeeding practices, provide balanced complementary feeding, recognize early signs of malnutrition, and seek timely healthcare intervention. This can substantially reduce the incidence and severity of protein-energy malnutrition among under-five children. Educational interventions are particularly valuable in rural communities where access to nutritional counseling and healthcare information is often limited, making planned teaching programmes an essential strategy for strengthening child nutritional outcomes and overall community health.

Implications for Nursing Practice

Community health nurses play a vital role in preventing protein-energy malnutrition through health education and early intervention. Planned teaching sessions should be regularly integrated into community outreach services to improve maternal awareness regarding child nutrition and preventive practices. Nutritional education must be given priority during home visits, village health camps, and immunization clinics, as these settings provide direct opportunities to interact with mothers. Nurses can educate caregivers about breastfeeding, complementary feeding, balanced diet, hygiene, and early recognition of malnutrition signs. Regular counseling and demonstration-based teaching can strengthen mothers' practical knowledge, promote healthy feeding behaviors, and contribute significantly to reducing the prevalence of malnutrition among under-five children.

Recommendations

The study can be replicated on a larger sample to improve the generalizability and reliability of the findings across diverse rural settings. Conducting similar studies in different geographical areas would provide broader insight into maternal knowledge regarding protein-energy malnutrition. Long-term follow-up studies are recommended to assess retention of knowledge over time and determine whether educational gains are sustained. Such studies would also help evaluate the lasting effectiveness of planned teaching programmes. Additionally, future research should include assessment of actual feeding behavior changes among mothers to

determine whether improved knowledge translates into practical implementation of appropriate nutritional practices for under-five children.

Conclusion

Protein-energy malnutrition continues to remain a major yet preventable public health concern among under-five children, particularly in rural communities where lack of awareness, poor nutritional practices, and limited access to health education contribute significantly to its persistence. Despite various governmental nutritional programmes and interventions, the burden of protein-energy malnutrition remains high due to inadequate maternal knowledge regarding proper child feeding practices and early recognition of malnutrition. The findings of the present study confirmed that the planned teaching programme was highly effective in significantly enhancing maternal knowledge regarding protein-energy malnutrition and its prevention. The considerable improvement observed in post-test knowledge scores clearly demonstrates that structured educational interventions can successfully bridge existing knowledge gaps among mothers. The study highlights the critical role of maternal education in promoting child health and preventing nutritional deficiencies during early childhood. Mothers who are well-informed about balanced diet, breastfeeding, complementary feeding, hygiene, and early signs of malnutrition are better equipped to adopt preventive practices and seek timely healthcare support. Empowering mothers through planned teaching programmes not only improves their understanding but also strengthens their confidence in making informed nutritional decisions for their children. Therefore, integrating such educational interventions into routine community health services can contribute substantially to reducing childhood malnutrition, improving growth and developmental outcomes, and ultimately enhancing child survival and overall community health in rural areas.

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