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Determinants of Early Childhood Health and Nutrition: an Evidence-Based Integrative Study to Strengthen Holistic Integrative Preschool Services in Soppeng District

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Abstract

Early childhood health and nutrition are the primary foundations for developing quality human resources, directly determining children's cognitive, physical, socio-emotional development capacity, and future productivity. This study aims to analyze the multidimensional determinants of early childhood health and nutrition, identify the current nutritional status and influencing factors, and examine the implementation and effectiveness of the Holistic Integrative Early Childhood Education (PAUD Holistik Integratif) approach in improving children's health and nutrition at Posyandu Apel, Pising Village, Donri-Donri District, Soppeng Regency. The research employed a qualitative descriptive approach adopting evidence-based integrative review principles, combining field data with comprehensive scientific literature analysis. Data were collected through participant observation, semi-structured in-depth interviews, and documentation during Posyandu activities, with thematic analysis involving source triangulation to ensure validity. Results show that most children have normal nutritional status based on BB/U and BB/TB indicators, but cases of undernutrition and stunting requiring serious attention were still found. Five key determinants identified include: (1) individual factors (low birth weight history and disease history); (2) family factors (parental nutrition knowledge and socioeconomic conditions); (3) environmental factors (sanitation and clean water access); (4) behavioral factors (dietary patterns and clean healthy behavior); and (5) service access factors (Posyandu participation and PAUD involvement). The Holistic Integrative PAUD approach proved relevant in integrating health, nutrition, education, and parenting services, but still faces challenges in cross-sector coordination, resource limitations, and uneven community participation. The study concludes that strengthening multisectoral synergy among families, Posyandu, PAUD institutions, and village government is the key strategy for stunting prevention and sustainable optimization of early childhood development.

Keywords Health Determinants; Early Childhood Nutrition; Stunting; Holistic Integrative PAUD; Posyandu; Evidence-Based Integrative Review

INTRODUCTION

Early childhood is the most crucial age group in the human life cycle. This period, known as the golden age, sees rapid physical, cognitive, linguistic, social, and emotional development. More than 80% of human brain development occurs during early childhood, so the quality of stimulation, health, and nutrition received during this period directly determines the quality of a child's future life (Georgieff et al., 2020; WHO, 2021). From a neuroscience perspective, the first 1,000 days of life—from conception to 24 months—represent the most critical window of opportunity for the formation of permanent brain architecture. Investing in early childhood health and nutrition is therefore not merely a social program, but a strategic investment in the development of fundamental human capital.

In Indonesia, the health and nutrition issues of early childhood remain a complex and multidimensional development challenge. The 2022 Indonesian Nutritional Status Survey (SSGI) recorded a stunting prevalence of 21.5%, still exceeding the WHO's public health emergency threshold of 20% (Ministry of Health, 2023). Meanwhile, UNICEF data (2023) shows that malnutrition in children under five in Indonesia remains a serious concern, with the problem being distributed unevenly between urban and rural areas. Soppeng Regency in South Sulawesi Province, as a semi-rural regency, faces similar challenges in improving the nutritional and health status of early childhood, particularly in villages with relatively limited accessibility. The determinants of early childhood health and nutrition are multidimensional and cannot be understood in isolation. UNICEF's (2023) conceptual framework identifies multiple causes, including direct causes (inadequate dietary intake and infectious diseases), indirect causes (family food security, parenting patterns, sanitation, and access to health services), and structural root causes (poverty, inequality, and weak governance). An integrative understanding of these multiple determinants is a key prerequisite for designing targeted, effective, and sustainable interventions. Disparate sectoral approaches have proven incapable of significantly impacting the complexity of child nutrition issues holistically.

In response to these challenges, the Indonesian government has developed the concept of Holistic Integrative Early Childhood Education (PAUD) as a service paradigm that places children at the center by meeting all their developmental needs in an integrated manner. This concept encompasses the integration of education,

health, nutrition, care, and child protection services into a single, coherent system (Kemendikbudristek, 2023). Holistic Integrative PAUD is based on the understanding that children's needs are comprehensive and interconnected, so interventions in one aspect will not be optimal without the support of others. Posyandu, as a community-based health service unit, is a critical component of the Holistic Integrative PAUD ecosystem.

The Posyandu Apel (Integrated Health Post) in Pising Village, Donri-Donri District, Soppeng Regency, is a community health service unit that actively monitors child growth and development. Pising Village, with its rural characteristics in the highlands of South Sulawesi, represents a typical semi-rural area with limited access to health services, varying sanitation conditions, and varying levels of parental nutritional knowledge. An in-depth study of the determinants of early childhood health and nutrition in this area can provide a representative picture of the challenges and opportunities for implementing Holistic and Integrative Early Childhood Education (ECE) in the Indonesian rural context.

An evidence-based integrative review is an appropriate approach to comprehensively understanding this issue. Prendergast et al. (2023) assert that an evidence-based approach allows for the systematic synthesis of various research findings to produce policy and practice recommendations with a strong empirical basis. Rahman et al. (2023) add that in the context of a low-middle-income country like Indonesia, an evidence-based review that combines field data with global literature produces more contextual and realistically implementable recommendations.

Although numerous studies have been conducted on early childhood health and nutrition in Indonesia, studies specifically integrating multidimensional determinant analysis with evaluation of the implementation of Holistic Integrative Early Childhood Education (PAUD) at the community-level Integrated Health Post (Posyandu) in Soppeng Regency are still very limited. This knowledge gap is the primary justification for this study. By combining field data from the Posyandu Apel in Pising Village with a synthesis of the latest scientific literature, this research is expected to yield a richer understanding and more contextual recommendations.

Based on the description, this study sets three specific objectives: (1) to analyze the multidimensional determinants of early childhood health and nutrition at Posyandu Apel, Pising Village, including individual, family, environmental, behavioral, and service access factors; (2) to describe the current condition of early childhood nutritional status and the factors that influence it based on anthropometric

data and field findings; and (3) to examine the relevance, implementation, and effectiveness of the Holistic Integrative PAUD approach in the local context of Pising Village. The results of this study are expected to provide theoretical contributions in enriching the literature on child health determinants, as well as practical contributions in strengthening the policy and implementation of Holistic Integrative PAUD in Soppeng Regency.

The significance of this research lies in its integrative approach, which not only describes conditions on the ground but also connects these findings to global theoretical frameworks and concrete policy implications. In the context of accelerating stunting reduction, a national priority for Indonesia (Bappenas, 2023), community-based research such as this has strategic value in providing an evidence base for more precise and effective program planning at the village and sub-district levels.

METHODS

Research Design and Approach

This study employed a qualitative approach with a descriptive design that adopted the principles of evidence-based integrative review. According to Creswell & Poth (2022), a descriptive qualitative approach aims to provide a comprehensive and in-depth picture of the phenomenon under study, based on the perspectives of participants in their natural context, without variable manipulation. The integrative dimension of this study reflects an effort to combine empirical field data with a synthesis of relevant scientific literature to produce a richer and more contextualized understanding. This approach was chosen because it captures the complexity of the determinants of early childhood health and nutrition, which are multidimensional and cannot be reduced to numbers alone.

Location, Time, and Context of the Research

The research was conducted at the Posyandu Apel, Pising Village, Donri-Donri District, Soppeng Regency, South Sulawesi Province. This location was chosen purposively because Posyandu Apel is a community health service unit that actively organizes routine child growth and development monitoring activities and serves as a center for public health services in the area. Pising Village, with its semi-rural characteristics in the highlands of South Sulawesi, represents a typical village facing child health challenges relevant to be studied in the context of the implementation of Holistic Integrative Early Childhood Education (ECE). Field data collection was

conducted during February–March 2025, coinciding with monthly Posyandu activities and intensive field visits.

Subjects and Sources of Research Data

The research subjects were selected purposively by considering the relevance of their knowledge and experience to the research focus. The main subjects consisted of: (1) early childhood children registered at the Posyandu Apel as objects of growth and development monitoring; (2) parents or guardians of children (especially mothers) as key informants regarding parenting patterns, eating habits, and children's health conditions; and (3) Posyandu cadres as program implementers and observers of children's development in the community's daily life. Data sources consisted of primary data (observation and interview results) and secondary data in the form of Maternal and Child Health Books (KIA), Health Cards (KMS), Posyandu activity records, and relevant reports from the Soppeng District Health Office.

Data collection technique

Data were collected through three complementary techniques. First, participant observation was conducted during Posyandu activities to directly observe the weighing and measuring of children, interactions between cadres and parents, the condition of Posyandu infrastructure, and the condition of the children's living environment. A structured observation guide was used to ensure consistency and completeness of observations. Second, in-depth semi-structured interviews were conducted with parents and Posyandu cadres to obtain information on parenting patterns, feeding habits, children's health conditions, economic factors, sanitation conditions, and perceptions and experiences related to Posyandu and PAUD services. Third, documentation was conducted by recording and analyzing data from the Child Health Card (KMS), Child Health Handbook (KIA), and available Posyandu activity records.

Data Analysis and Validity Assurance

Data analysis was conducted descriptively and qualitatively using an interactive thematic approach based on the Miles, Huberman, & Saldana (2020) model. The analysis process involved three iterative stages: data reduction (selection and abstraction of information relevant to the research focus from the collected data), data presentation (organizing the reduced information into a structured narrative and thematic matrix), and conclusion drawing (integrative interpretation linking field findings to the theoretical framework). Data validity was ensured through

source triangulation (comparing data from parents, cadres, and documentation), technical triangulation (comparing the results of observations, interviews, and documentation), and member checking with key informants to verify the accuracy of interpretations.

RESULTS AND DISCUSSION

General Overview of the Condition of Posyandu Apel and Regional Characteristics

The Posyandu Apel (Integrated Health Post) in Pising Village, Donri-Donri District, Soppeng Regency, is one of the active community health service units in the area. Posyandu activities are carried out routinely every month, involving trained cadres who are responsible for weighing, measuring height, distributing vitamins, and providing health education to parents. Pising Village, located in the highlands, is characterized by subsistence agriculture, with the majority of the population dependent on the agriculture and plantation sectors. This geographic condition contributes to uneven access to health services, with some households requiring considerable travel distances to reach first-level health facilities.

Based on field observations, the infrastructure of the Posyandu Apel is deemed adequate to provide basic growth and development monitoring services. Digital scales, height measuring devices, and regularly updated Health Card (KMS) registration forms are available. However, identified limitations include: the lack of complete anthropometric measurement tools (especially calibrated microtoises), limited access to engaging and up-to-date nutrition education media, and the lack of a digital recording system integrated with the Community Health Center's e-PPBGM system. These limitations impact the accuracy of the growth data collected and the speed of response to detected cases.

Nutritional Status of Early Childhood Education at the Apple Integrated Health Post (Posyandu Apel)

Observation and analysis of KMS data show that most children registered at the Apple Posyandu are in the normal nutritional status category based on the Weight for Age (BB/U) and Weight for Height (BB/TB) indicators. This condition indicates that in general, the calorie and macronutrient needs of children in this community are met quite well in their daily lives. The dominant diet includes rice as the main source of carbohydrates, complemented by side dishes from vegetable protein sources (tempeh, tofu, nuts) and occasional animal protein (fish, eggs). The

availability of relatively affordable local food is a protective factor in maintaining children's calorie adequacy.

However, a number of children still showed signs of malnutrition and stunting based on Child Health Card (KMS) data and field measurements. Identified stunting cases were characterized by height-for-age discrepancies, clinically indicating chronic malnutrition that had persisted for a significant period. This finding is consistent with the pattern described by Dewey (2021), who stated that stunting often goes undetected early because its symptoms are gradual and only become visually apparent at age 2 and above. A more concerning aspect is the finding of recurrent minor illnesses (coughs, colds, and diarrhea), which have the potential to worsen nutritional status through decreased appetite and impaired nutrient absorption.

Table 1. Distribution of Children's Nutritional Status at the Apel Posyandu, Pising Village, Soppeng Regency

Anthropometric Indicators	Category	Proportion	Information
BB/U (Underweight)	Normal (≥ -2 SD)	Majority	Calorie needs are met quite well
	Malnutrition (< -2 SD)	Fraction	Need intensive nutritional counseling and PMT
TB/U (Stunting)	Normal (≥ -2 SD)	Majority	Linear growth within normal limits
	Stunting (< -2 SD)	Some cases	Indication of chronic malnutrition; immediate intervention required
Weight/Height (Wasting)	Normal (≥ -2 SD)	Majority	Acute malnutrition in good condition
	Thin (< -2 SD)	The least	Immediate monitoring and intervention

Source: Results of KMS data analysis and field observations of Posyandu Apel, 2025; SD = Standard Deviation

Determinants of Individual and Family Factors

An analysis of birth histories recorded in the KIA (Child Health and Child Health) handbook identified that children with a history of low birth weight (LBW <2500 grams) are at higher risk of growth disorders. This finding is consistent with research by Rahman et al. (2023), which found that LBW increases the risk of stunting by 3.2 times due to lower nutritional reserves from birth and a weaker immune system. These early life conditions serve as a baseline that significantly determines a child's growth trajectory, so children with a history of LBW require more intensive monitoring and more proactive intervention.

Interviews with parents identified significant variations in nutritional knowledge and parenting practices. Some parents, particularly those with higher

education, demonstrated a good understanding of the importance of dietary diversity and regular meal schedules. However, others still relied on less diverse diets, dominated by carbohydrates and limited animal protein. Unresponsive feeding practices—such as forcing or ignoring children's hunger signals—were also identified in some families. Dewey (2021) emphasized that responsive parenting, in which parents appropriately respond to children's hunger signals with nutritious food, is a critical factor beyond mere food availability in determining children's nutritional adequacy.

A family's economic situation clearly correlates with dietary diversity. Families with limited income often rely on carbohydrate foods (rice, sweet potatoes, cassava) as their primary source of calories, with very limited side dishes. Higher-quality animal protein (meat, milk, eggs) is only occasionally accessible. This creates micronutrient gaps that are not always detected through routine weight monitoring but impact the quality of children's brain development and immunity in the long term.

Determinants of Environmental and Behavioral Factors

Observations of the environmental conditions of children in Pising Village identified significant variations in sanitation quality. Some households have access to adequate toilets and a guaranteed clean water source, while others still face limited access to clean water and inadequate sanitation conditions. The World Bank (2022) explains that environments with poor sanitation increase children's exposure to enteric pathogens that cause Environmental Enteric Dysfunction (EED)—a chronic inflammatory bowel condition that directly impairs nutrient absorption despite seemingly adequate food intake. This explains why some children in Pising Village exhibit growth stagnation despite their visibly adequate caloric intake.

From a health behavior perspective, handwashing with soap at critical times (before eating, after defecating, and after touching animals) has begun to be practiced, but consistency varies between families. The continued occurrence of diarrhea in some children indicates that the chain of fecal-oral transmission through contaminated hands and food has not been completely broken. This habit contributes to the infection-malnutrition cycle described by Black et al. (2022): repeated infections reduce appetite and impair nutrient absorption, which worsens nutritional status, which in turn weakens the immune system and increases susceptibility to subsequent infections.

Children's daily diets, while generally including staple foods and simple side dishes, still show deficiencies in food group diversity—particularly in a variety of

vegetables, fruits, and high-quality protein sources. The WHO (2022) dietary diversity score concept used to assess the diet quality of children aged 6–23 months classifies a diet that includes at least 5 of the 8 food groups as minimal quality. Based on field findings, some children at the Posyandu Apel may not have achieved this minimum dietary diversity standard.

Table 2. Identification of Determinants of Health and Nutrition of Early Childhood Education (AUD) at Posyandu Apel, Pising Village

Determinant Level	Specific Factors	Conditions in the Field	Implications of Intervention
Individual	History of LBW	Several cases of LBW were identified	Intensive monitoring from birth
	Recurrent infections	Cough, cold, periodic diarrhea	PHBS, sanitation improvement
Family	Maternal nutritional knowledge	Large variations; some are still low	Intensive practice-based nutrition counseling
	Economic conditions	Some are limited; food diversification is lacking	Local PMT, nutrition garden, BLT
Environment	Sanitation & clean water	Not evenly distributed; some are still lacking	STBM, infrastructure improvement
Behavior	PHBS (washing hands, etc.)	Starting to be implemented, not yet consistent	Continuing education, role modeling
	Children's eating patterns	Lack of diversity; carbohydrate dominance	MPASI counseling, cooking demonstration
Service Access	Posyandu Participation	Quite good, not yet completely even	Participation incentives, home visits
	Early Childhood Education Involvement	Not all children are involved	PAUD-Posyandu integration, outreach

Source: Results of observations, interviews, and field documentation of Posyandu Apel, 2025; STBM = Community-Based Total Sanitation

Implementation of Integrative Holistic Early Childhood Education: Realities and Challenges

A study of the implementation of Holistic and Integrative Early Childhood Education (ECE) in Pising Village reveals a gap between policy and practice—a phenomenon consistent with findings from policy implementation research in various regions in Indonesia. On the one hand, there is a genuine commitment from Posyandu (Integrated Health Post) cadres and most parents to the goal of monitoring child growth and development. The routine monthly activities of the Posyandu provide a strong foundation for developing more integrated services. On the other hand, the true integration of health services (Posyandu), education (ECE), and child protection remains partial and unsystematic.

One of the biggest challenges identified is suboptimal cross-sector coordination. Posyandu cadres and PAUD teachers in Pising Village often work in parallel—treating the same children but with separate agendas and without a structured information-sharing mechanism. The Ministry of Education, Culture, Research, and Technology (2023) emphasized that effective coordination between Posyandu, PAUD, and Community Health Centers (Puskesmas) is a key prerequisite for the success of Holistic and Integrative PAUD, but requires investment in coordination systems, human resource capacity, and leadership commitment at the village level. Without this investment, integration is largely administrative in nature, without substantial changes in service quality.

The capacity and competence of Posyandu (Integrated Health Post) cadres in integrating health, nutrition, and developmental stimulation into a coherent service still needs strengthening. Existing cadres are highly committed and dedicated, but their training is often limited to the technical aspects of anthropometric measurements and supplement distribution, without encompassing effective nutrition counseling skills, an understanding of child developmental stimulation, or persuasive behavior change communication strategies. Increasing cadre capacity through ongoing training that encompasses these aspects is a valuable investment in strengthening Holistic and Integrative Early Childhood Education (ECE).

Integrative Analysis: Reinforcing and Inhibiting Factors

An integrative analysis of all field findings identified several enabling and constraining factors that significantly determine the effectiveness of the early childhood health and nutrition program at the Posyandu Apel. Among the enabling factors, the most prominent is the strong social capital within the Pising Village community—a sense of mutual trust and mutual cooperation among residents that facilitates mobilization of participation in Posyandu activities. Dedicated Posyandu cadres who are well-known within the community are also invaluable social assets. Furthermore, the availability of diverse local foods (local fish, garden vegetables, seasonal fruits) offers the potential for affordable nutritional fulfillment if supported by adequate nutritional knowledge.

Among the inhibiting factors, the most critical is the low nutritional literacy of some parents, which prevents existing knowledge from always translating into optimal feeding practices. This gap between knowledge and practice—known in behavioral health science as the intention-behavior gap—requires interventions that not only increase knowledge but also build practical skills and motivation for change. Limited sanitation infrastructure in some rural areas, which increases the

risk of infection, is also a structural barrier that cannot be addressed through nutrition interventions alone without concurrent environmental improvements.

Table 3. Analysis of Strengthening and Inhibiting Factors in the Implementation of Integrative Holistic PAUD in Pising Village

Dimensions	Enabling Factors	Constraining Factors
Community	High social capital; dedicated cadres; mutual cooperation	Participation is not evenly distributed; some parents are passive
Resource	Diverse local food; productive yard land	Cadres are not yet holistically trained; facilities are limited
Knowledge	Some parents are aware of the importance of nutrition	Low nutritional literacy in some families; intention-behavior gap
Coordination	There is support from the local Community Health Center	Coordination between Posyandu-PAUD-PKK is not yet systematic
Policy	HI PAUD legal basis is strong; Bappenas supports it	Village implementation is not yet even; budget is limited

Source: Integrative analysis of field research results and literature review, 2025

Discussion: Theoretical Implications and Policy Recommendations

The findings of this study collectively strengthen and enrich the framework for child health determinants developed by UNICEF and WHO. Empirical validation of the five levels of determinants—individual, family, environment, behavior, and service access—in the context of the Posyandu Apel in Pising Village provides important local nuances for more precise program planning. Most notable among these findings is the confirmation that family-level determinants—particularly maternal nutrition knowledge and feeding practices—have the most proximal influence and are most modifiable through focused educational interventions.

From a policy implementation perspective, the gap between the ideals of Holistic Integrative Early Childhood Education (ECE) and the reality of on-the-ground implementation identified in this study is not unique to Pising Village—but rather reflects systemic challenges faced in many rural areas in Indonesia. The Ministry of Villages, Disadvantaged Regions, and Transmigration (MoVPD) (2022) in its stunting convergence guidelines recognizes that effective multisectoral coordination at the village level requires strong leadership from the village head, an institutionalized (not just ad-hoc) coordination mechanism, an accountable monitoring and evaluation system, and adequate village budget allocation for the stunting convergence program. These aspects serve as priority recommendations that can be implemented immediately in Pising Village.

The relevance of this research finding to the broader context of Soppeng

Regency lies in its implications for program replication. Successful approaches at the Posyandu Apel (Integrated Health Post) in Pising Village—such as leveraging community social capital, optimizing local food for PMT (Food and Nutritional Supplement), and practical demonstration-based nutrition education—can be adapted and replicated at other Posyandus in Donri-Donri District and the regency as a whole. Bappenas (2023), in its National Action Plan for the Acceleration of Stunting Reduction, emphasizes that learning from successful communities is the most relevant and contextual source of innovation for program replication in areas with similar characteristics.

The methodological implications of this study are also noteworthy. An evidence-based, integrative approach that combines qualitative field data with a synthesis of global literature has been shown to yield richer insights and more contextual recommendations than research relying solely on one of these two sources. Future research in Soppeng Regency could employ a similar approach by strengthening the quantitative measurement component (systematic anthropometric surveys) to generate more accurate prevalence data as a baseline for intervention programs.

CONCLUSION

This study yielded four main, complementary conclusions. First, the health and nutritional status of early childhood at the Apel Integrated Health Post (Posyandu Apel) in Pising Village, Soppeng Regency, generally showed good results, with a predominance of children in the normal nutritional status category based on weight-for-age and weight-for-height indicators. However, the presence of cases of malnutrition and stunting requiring serious attention indicates that chronic nutritional problems persist and require more proactive intervention, particularly through strengthened growth monitoring and early response to signs of weight faltering.

Second, the determinants of early childhood health and nutrition in Pising Village are multidimensional and layered, encompassing five interacting levels: (1) individual factors (history of low birth weight and recurrent infections); (2) family factors (maternal nutritional knowledge, parenting patterns, and economic conditions); (3) environmental factors (sanitation and unequal access to clean water); (4) behavioral factors (inconsistent PHBS and less diverse diets); and (5) service access factors (participation in Posyandu that is not yet fully equitable and suboptimal involvement of PAUD). Understanding these five levels simultaneously

is a prerequisite for designing targeted interventions.

Third, the Holistic Integrative Early Childhood Education (ECE) approach is highly relevant in addressing the complex determinants of early childhood health and nutrition in Pising Village. However, its implementation remains fragmented and faces challenges such as unsystematic cross-sectoral coordination, limited cadre capacity, and uneven community participation. There is a significant gap between the ideals of the Holistic Integrative Early Childhood Education (ECE) policy and the reality of implementation on the ground, requiring systemic attention and intervention.

Fourth, based on the findings and integrative analysis, this study recommends five priority strategies: (1) strengthening parental nutritional literacy through practical demonstration-based education and the use of community digital media; (2) increasing the capacity of Posyandu cadres holistically, including nutrition counseling, behavior change communication, and child development stimulation; (3) strengthening the Posyandu-PAUD-Puskesmas coordination mechanism through institutionalized regular meeting forums and a structured information sharing system; (4) advocacy to village governments for increased Village Fund allocation for stunting convergence programs, including sanitation improvements and local food-based PMT programs; and (5) developing a more accurate growth monitoring system integrated with the Puskesmas digital platform to enable faster responses to detected cases.

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