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Gaps in Maternal Behavior, Family Support, and Early Childhood Education Participation in the Development of Children Under Five Years: A Stratified Analysis of Urban vs. Rural Settings

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ABSTRACT

Background: The intensity and quality of developmental stimulation provided by mothers, families, and the early childhood education environment determine the developmental outcomes of children under five years of age. Place of residence influences the cultural practices surrounding child-rearing, access to healthcare services, and the availability of facilities that support child development. This study aims to examine maternal stimulation behaviors, family support, and participation in early childhood education on child development based on place of residence (urban vs. rural).
Subjects and Method: A cross-sectional study was conducted involving 200 respondents in urban areas and 200 in rural areas. Respondents consisted of mother-child pairs with children under five years of age, selected according to predetermined criteria. Data were measured using questionnaires and observation sheets (DDST II). Stratified tests were performed using STATA 13 software.
Results: In the rural group, positive maternal behavior and family support were significantly associated with improved developmental outcomes for children under five years of age (RR 1.94; 95%CI 1.31 to 2.87; p = 0.001 and RR 1.47; 95%CI 1.17 to 1.867; p = 0.001), while non-significant associations were found in the urban group (p = 0.256 and p = 0.069). In the urban group, children's participation in early childhood education programs was significantly associated with more optimal developmental outcomes (RR 1.59; 95%CI 1.04 to 2.43; p = 0.033), whereas a non-significant association was observed in the rural group (p = 0.546).
Conclusion: The factor of place of residence determines differences in maternal behavior, family support, and participation in early childhood education regarding child development. Health promotion intervention research aimed at enhancing maternal behavior and family support for child development needs to be designed with different methodologies based on the residential area.

Keywords: maternal behavior, family support, early childhood education, developmental stimulation, children under five

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BACKGROUND

Achieving optimal early childhood development quality is a priority objective of the Sustainable Development Goals (SDGs). The global situation indicates that many children under five years of age are at risk of not reaching their developmental potential due to exposure to stunting or extreme poverty (Gil et al., 2020). Children with developmental delays will experience a decline in the quality of human resources, resulting in reduced opportunities for earning a decent income and achieving well-being (Daelmans et al., 2021).

Efforts to enhance the quality of human resources can be done through the fulfillment of children's essential needs, which include integrated nutritional interventions, early learning, and positive parenting (WHO, 2020). The health and education sectors play a crucial role in promoting the care and upbringing of young children. The Indonesian goverment guarantees the optimal growth and development of young children through caregiving practices, stimulation, and monitoring of child development. According to the report by the Ministry of Health of the Republic of Indonesia in 2022, various risk factors for developmental disorders in children are still present, including a high prevalence of stunting among children under five years olds, which stands at 21.6% (Indonesian Ministry of Health, 2022). It was also found that not all children under five years of age are monitored for their growth and development (61.3%) and the participation rate in early childhood education (ECE) remains low (35.50%) (Indonesia's Ministry of Women's Empowerment and Child Protection, 2021).

Most early childhood education (ECE) programs are still attended by children aged four years and older (79%), while participation for children under four years of age is only 21%. This figure indicates that a significant number of children under five years olds have yet to engage in ECE programs and are instead cared for within the family at home. Consequently, child development is influenced by maternal behavior and family support in providing developmental stimulation (Nursanti et al., 2025).

Developmental stimulation will encourage children's fundamental abilities to develop optimally. Developmental stimulation is an integral part of quality caregiving practices, facilitated through warm, affectionate interactions between children and parents from an early age (Hirve et al., 2023). Quality caregiving has been shown to enhance children's development more optimally, as evidenced by the achievement of cognitive, language/speech, and socio-emotional skills, while also reducing the risk of developmental delays in neural functioning that occur during the early stages of life (Clark et al., 2020).

Quality caregiving is the responsibility of parents, as it constitutes an investment in supporting the optimal development of children. According to the report by the Ministry of Women's Empowerment and Child Protection in 2020, it is evident that a significant majority of parents in Indonesia remain unaware of the importance of quality caregiving, and the majority of caregiving responsibilities are predominantly assigned to mothers (Kemen PPPA RI, 2021). Several studies indicate that many mothers still do not engage in quality caregiving due to their young age, lack of knowledge, and low levels of education (Emmers et al., 2021; Saptarini et al., 2021).

Maternal behavior in child-rearing is influenced by the knowledge, motivation, and stimulation skills possessed by the mother (Nursanti et al., 2024). Furthermore, it is also influenced by the social

environment in which the family resides. Parents in urban areas perceive that an effective parenting style to be applied to their children is authoritative (autonomy). Children are regarded as individuals with abilities, skills, and potential in various domains that need to be developed from an early age to foster independence. In contrast, rural communities, which value collectivism, tend to adopt an authoritarian parenting style (conformity), emphasizing the importance of manners, obedience, and respect for parents by controlling children's behavior within the social environment (Kuntoro et al., 2017; Wiswanti et al., 2020).

Cultural values in urban and rural communities have been shown to influence child development outcomes. Children in urban areas tend to excel in literacy and numeracy development, while those in rural areas demonstrate greater strengths in physical and socio-emotional development. Children in rural settings have enhanced developmental opportunities when their mothers have better access to information, when play materials and books are available at home, and when they participate in early childhood education (ECE) programs (Afiq & Zafar, 2025).

Previous research by Wiswanti et al. (2020) indicates a cultural value difference between urban communities, which are characterized by individualism, and rural communities, which exhibit collectivism, both of which influence child development. A comparative perspective in the context of rural and urban settings underscores the necessity for the adaptation of health promotion strategies to enhance optimal early childhood development based on place of residence. This study aims to investigate the involvement of residential factors in the relationship between maternal behavior, family support, and participation in early childhood education (ECE) concerning the development of children under five years of age.

SUBJECTS AND METHOD

1. Study Design

This observational study employs a cross-sectional design to analyze research data based on residential areas in order to predict the factors of maternal behavior, family support, and participation in early childhood education (ECE) that influence child development. The study was conducted in Yogyakarta, Indonesia, from October 2024 to January 2025.

2. Population and Sample

The population in this study was mothers and their children under five years old living in Yogyakarta province. The sample comprised 400 mother-child pairs, with 200 pairs from urban (Yogyakarta regency) and 200 from rural (Bantul regency) areas. Respondents were selected purposively based on the following criteria: Mothers with children under five years old (aged 12-59 years) living with their husbands. Children were in good health without physical or mental disabilities, and were not twins. Mothers had maternal and child health books (KIA) and were willing to follow the research procedures.

3. Study Variables

The independent variables in this study were maternal stimulation behavior, family support, and participation in early childhood education. The dependent variable was child development.

4. Operational Definition of Variables

maternal behavior refers to the positive actions of mothers who routinely engage in developmental stimulation practices to accelerate the growth of preschool-aged children.

Family support refers to the encouragement provided in the form of informational, financial, instrumental, and emotional

assistance from family members to facilitate developmental stimulation for children.

Participation in early childhood education (ECE) refers to the status of children under five years olds registered as participants in an ECE program for a minimum of three months prior to the assessment of child development.

Child development was assessed based on the fundamental abilities of children under five years old, including: motor skills, language, and social independence, in accordance with their developmental stages.

5. Study Instruments

This research instrument used a questionnaire and an observation sheet. The questionnaire, developed by the researcher, was used to measure maternal behavior, family support, and early childhood education (PAUD) participation. The Denver Developmental Screening Test II (DDST II) observation sheet was used to assess child development. All questionnaires were tested on 20 respondents and were found to be valid and reliable. The results of the Cronbach's Alpha test for each variable were as follows: family support 0.85 and maternal behavior 0.91.

The maternal behavior questionnaire measured maternal practices in stimulating gross motor skills, fine motor skills, language/speech, and social/independence skills. The family support questionnaire measured family support in terms of informational, instrumental, financial, and emotional support. Participation in early childhood education (PAUD) was measured using a questionnaire and validated with a PAUD participation card. The DDST II form measured aspects of children's gross motor skills, fine motor skills, speech, and social skills according to their age.

6. Data Analysis

Univariate analysis of categorical data was described in the form of frequency distribution (n) and percentage (%). Bivariate analysis was conducted using stratification analysis with Stata 13 software. Stratification analysis is a stratified analysis based on residence (urban vs. rural) to examine associations, prevalence, risks, or outcomes that differ by type of residence. Stratification tests are used when there are observations of effect modification based on residence area, such as access to health services, socioeconomic differences, environmental exposures, and assessments in maternal and child health.

7. Ethical Clearance

This research used an informed consent form that guaranteed anonymity and confidentiality, and was carried out after obtaining ethical clearance from The Research Ethics Committee of the Universitas Jenderal Achmad Yani Yogyakarta No. Skep/KEP/KEP/II/2026.

RESULTS

1. Sample Characteristics

D.I. Yogyakarta is located in the central-southern part of Java Island and, administratively, consists of 5 regencies, 78 subdistricts, and 438 villages. Child health services for children under five years olds are provided by healthcare personnel in collaboration with cadres and early childhood education (ECE) teachers.

Table 1 shows that in both regions, the majority of mothers are aged ≥ 30 years, with a higher proportion of mothers with low educational attainment in rural areas (31.00%). Most mothers in urban areas are employed (51.50%), whereas the majority of mothers in rural areas are homemakers (61.50%). Furthermore, the majority of mothers in both regions have more than one child. The majority of families in both regions are nuclear families (urban 52.00% and rural 58.50%) and have an income categorized as sufficient (urban 63.00% and rural 56.50%). Most families are also

involved in child-rearing (urban 56.00% and rural 55.00%). In both urban and rural areas, the majority of children under five years olds fall within the children under five years old age group (58% and 65%), with a nearly balanced gender distribution between boys (50.50%) and girls (49.50%). Most children are of birth order ≥ 2 (59.50% and 59.00%).

Table 1. Demographics of Study Sample

Characteristic Variable	Place of Residence			
	Urban		Rural	
	n	%	n	%
Maternal Characteristics				
Maternal age				
20-30 years	72	36.00	70	35.00
>30 years	128	64.00	130	65.00
Maternal educational				
Junior High School	29	14.50	62	31.00
Senior High School and Higher Education	171	85.50	138	69.00
Maternal employment status				
Unemployed	97	48.50	123	61.50
Employed	103	51.50	77	38.50
Parity				
Primipara	60	30.00	79	39.50
Multipara	140	70.00	121	60.50
Caregiver				
Mother	88	44.00	90	45.00
Mother and other caregiver	112	56.00	110	55.00
Family Characteristics				
Household monthly income (the provincial minimum wage: 2.1 million rupiah)				
<2.1 million rupiah	74	37.00	87	43.50
≥2.1 million rupiah	126	63.00	113	56.50
Family type				
Nuclear family	104	52.00	113	56.50
Extended family	96	48.00	87	43.50
Child's Characteristics				
Child's age				
12-36 months	116	58.00	130	65.00
37-59 months	84	42.00	70	35.00
Child's gender				
Male	98	49.00	104	52.00
Female	102	51.00	96	48.00
Child's birth order				
First	81	40.50	82	41.00
Second subsequent	119	59.50	118	59.00

2. Univariate Analysis

The normality test results for the variables of stimulation behavior and family support were a normal data distribution, with family support showing p = 0.528 and maternal behavior showing p = 0.103. Consequently, the categorization of "good" and "less" for the variables of maternal behavior and

family support was based on the mean value. Consequently, the categorization of "good" and "less" for the variables of maternal behavior and family support was based on the mean value.

Table 2. The characteristic of the sample data on maternal behavior and family support

Variable	N	NID	Mean	SD	Min.	Max.	CR
Maternal behavior	400	10	14.44	3.21	7	20	0.10
Family support	400	11	7.27	1.78	3	11	0.53

Note: N= Total Respondent; n=200; NID= Number of Indicators; CR= Composite Reliability; SD= Standard Deviation

Table 3, the results of the frequency distribution analysis of the data by region indicate that the majority of children under five years of age exhibit rapid development, with 59.50% in rural areas and 63.00% in urban areas. Mothers in rural areas demonstrate a higher proportion of good stimulation practices (65.00%) compared to mothers in urban areas (58.00%). Families in rural regions provide more support in child-rearing (69.50%), and a greater number of children in rural areas have not participated in early childhood education (ECE) programs (70.00%).

Table 3. The characteristic of the research data

Variable	Place of Residence			
	Urban		Rural	
	n	%	n	%
Dependent				
Child development				
- Rapid	119	59.50	127	63.00
- Late	81	40.50	73	36.50
Independent				
Maternal behavior				
- Good	116	58.00	130	65.00
- Less	84	42.00	70	35.00
Family support				
- Good	122	61.00	139	69.50
- Less	78	39.00	61	30.50
Participation in ECE programs				
- Yes	70	35.00	60	30.00
- No	130	65.00	140	70.00

3. Bivariate Analysis

Stratified tests were conducted to examine the influence of each independent variable on the dependent variable based on region, with a confidence level of 95% (p = 0.05). The results of the stratified are presented in Table 4. Table 4 indicates that the stratified analysis based on place of residence reveals differences in the impact of maternal behavior, family support, and participation in early childhood education (ECE) on the development of children under five years of age. In the rural group, positive developmental stimulation behavior is significantly associated with faster child development (RR= 1.94; 95% CI= 1.31 to 2.87; p = 0.001), whereas in the urban group, this relationship is not significant (RR= 1.16; 95% CI=

0.90 to 1.48; p = 0.256). Good family support is significantly associated with child development in rural areas (RR= 1.47; 95% CI= 1.17 to 1.86; p= 0.001) and shows a meaningful trend in urban areas (RR= 1.25; 95% CI 0.98 to 1.59; p= 0.069). Participation in ECE programs is significantly associated with child development in urban areas (RR= 1.59; 95% CI= 1.04 to 2.43; p = 0.033), but does not show a significant association in rural areas (RR= 1.15; 95% CI= 0.73 to 1.80; p= 0.546).

Table 4. Results of the stratification test of the relationship between independent variables and dependent variables based on place of residence

Place of Residence	Variable	N	Child Development				RR	95% CI		p
			Rapid		Late			Lower limit	Upper limit	
			n	%	n	%				
Maternal behavior										
Urban	Good	200	73	62.93	43	37.07	1.16	0.90	1.48	0.256
	Less		46	54.76	38	45.24				
Rural	Good	200	71	77.17	21	22.83	1.94	1.31	2.87	<0.001
	Less		56	51.85	52	48.15				
	Family support									
Urban	Good	200	79	64.75	43	35.25	1.25	0.98	1.59	0.069
	Less		40	51.28	38	48.72				
Rural	Good	200	100	71.94	39	28.06	1.47	1.17	1.86	<0.001
	Less		27	44.26	34	55.74				
Participation in ECE programs										
Urban	Yes	200	40	66.67	20	33.33	1.59	1.04	2.43	0.033
	No		87	62.14	53	37.86				
Rural	Yes	200	49	70.00	21	30.00	1.15	0.73	1.80	0.546
	No		70	53.85	60	46.15				

Note: N= Total samples (400); n: 200; RR: Risk Ratio; 95% CI: Confidence Interval

DISCUSSION

Developmental stimulation behavior

Early stimulation provided with regular intensity will stimulate synaptic connections in nerve cells to build a robust brain architecture and enhance children's cognitive, language/speech, social, and emotional abilities (Sinani et al., 2022). Maternal behavior in providing developmental stimulation for children is influenced by the information, motivation, and practical skills related to stimulation that the mother possesses (Nursanti et al., 2024). The results of the stratified test indicate that the regional factor is associated with maternal behavior in developmental stimulation and the development of preschool-aged children. The proportion of mothers exhibiting good stimulation behavior and children demonstrating rapid development is higher in rural areas (77.17%) compared to urban areas (62.93%).

Maternal developmental stimulation behavior in rural areas is significantly associated with a higher likelihood of enhancing child development. In rural areas, the majority of mothers are homemakers and have more time to care for their children. The community life in rural areas predominantly adheres to Eastern cultural values, leading to a parenting style that tends to focus on controlling children's

behavior (authoritarian) (Wiswanti et al., 2020). They desire children who are disciplined, prepared to face environmental challenges, and obedient to parental guidance (Haslam et al., 2020; Puspitasari et al., 2020).

Maternal stimulation behavior in urban areas has the potential to enhance child development; however, it is not significantly associated with it. According to Riany, Meredith, dan Cuskelly (Riany et al., 2017), most parents in urban areas are employed, and they tend to adopt an authoritative parenting style, emphasizing efforts toward fostering children's independence and individualism. Urban parents are accustomed to sharing responsibilities and utilizing supportive resources in child-rearing, such as family members, household assistants, early childhood education (ECE) teachers, and childcare providers. This indicates that child development in urban regions is significantly influenced by factors beyond maternal behavior (Wiswanti et al., 2020).

Family support

The role of family support includes providing a nurturing caregiving environment, ensuring the availability of resources, and fostering a sense of responsibility to deliver quality caregiving (Kim et al., 2021; Riyadi et al., 2019). Child-rearing practices involving fathers, grandmothers, and older siblings, characterized by social interactions and early learning activities (such as reading, counting, drawing, and storytelling), have been shown to enhance cognitive, motor, and language development (Hirve et al., 2023; Hollowell et al., 2020; Jensen et al., 2021). The results of the stratified test indicate that the regional factor is associated with family support in child-rearing and the development of preschool-aged children.

The proportion of good family support for rapid child development is greater in rural areas (71.94%) compared to urban areas (64.75%). Family support in rural areas is significantly associated with a higher likelihood of enhancing child development compared to urban areas. Families in rural Indonesia prioritize a sense of kinship and togetherness, fostering mutual support among family members. Families not only assist in child-rearing and household tasks but also serve as a source of moral and material support (Riany et al., 2017).

Family support in urban areas enhances the likelihood of improving child development; however, it is not significantly associated. Urban communities generally adopt lifestyles and mindsets influenced by Western culture, which emphasizes individualism. In such individualistic societies, there is less attention given to maintaining harmonious and interdependent relationships with family members or relatives (Kuntoro, Peterson, dan Slaughter, 2017). This indicates that the roles of other caregivers, such as household assistants, caregivers in childcare centers or playgroups, and educators in early childhood education (ECE) settings, have a greater influence on the development of preschool-aged children compared to family support.

Participation in Early Childhood Education (ECE)

Participation in early childhood education (ECE) programs positively influences the developmental progress of preschool-aged children. Participation in early childhood education (ECE) programs has been shown to enhance children's self-regulation, social skills, and emotional competencies in early childhood (Johnstone et al., 2022). The results of the stratified test indicate that the regional factor is associated with children's participation in early childhood education (ECE) programs and the development of preschool-aged children. The proportion of participation in ECE programs and rapid

development in urban areas (66.67%) is not significantly different from that in rural areas (62.14%).

Participation in ECE programs in urban areas has a higher likelihood of enhancing child development and is significantly associated compared to rural areas. The participation of preschool-aged children in ECE programs is determined by household wealth, maternal education, and the quality of available services (Nakajima et al., 2019). According to the Early Childhood Education Statistics report for 2020/2021, the majority of quality early childhood education (ECE) programs with adequate resources are available in urban areas. The characteristics of mothers of children under five years olds in urban settings predominantly include higher educational attainment, a significant number working outside the home, and sufficient family income. Therefore, enrolling children in ECE programs is a prudent choice as an alternative solution to provide developmental stimulation for their children (Indonesia's Ministry of Education and Culture, 2021).

Participation of children in early childhood education (ECE) programs in rural areas is not significantly associated with the development of preschool-aged children. The development of children attending ECE programs is determined by the quality of the facilities provided, such as the availability of classrooms, teacher-child interactions, daily routines, and the safety of the environment (Brinkman et al., 2017; Brinkman, Hasan, Jung, Kinnell, Nakajima, et al., 2017). Early childhood education (ECE) programs in rural areas are often managed by community groups, with educators whose qualifications do not meet the required competencies and limited availability of supporting facilities. In addition to the scarcity of quality ECE programs, the majority of mothers in rural areas are homemakers, allowing them more time to interact with their children. The family type in rural areas also emphasizes togetherness and mutual assistance in child-rearing. Consequently, child development in rural regions is likely influenced more by other factors, such as maternal behavior, family support, or play with siblings and peers.

CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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