Descriptive Study of Growth and Development of Toddlers Aged 2-4 Years as a Basis for Early Development Mapping at PAUD Vinolia Mojolangu

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Abstract.

Growth and development of children aged 2–4 years are critical indicators in determining long-term health outcomes and school readiness. This period is considered the golden age, as rapid brain development occurs, making early detection of growth and developmental disorders essential. However, developmental screening coverage in Indonesia remains suboptimal, and monitoring in early childhood education settings often focuses more on physical growth than developmental aspects. This study aimed to describe the growth and developmental status of children aged 2–4 years using the Maternal and Child Health (MCH) Handbook and the Denver Developmental Screening Test (DDST) at PAUD Vinolia Mojolangu. A descriptive observational design was applied to 23 children. Growth was assessed using height-for-age (HFA), weight-for-age (WFA), weight-for-height (WFH), and body mass index-for-age (BMI-for-age) indicators. Developmental status was evaluated using the DDST, which measures four domains: gross motor, fine motor, language, and personal-social skills. The results showed that most children were classified as having normal growth based on WFH and BMI-for-age indicators. In terms of development, the majority demonstrated age-appropriate outcomes, with one child categorized as "suspect" in the personal-social domain. These findings indicate that integrated monitoring using the MCH Handbook and DDST is effective in identifying children's growth and developmental conditions comprehensively. Strengthening early detection through collaboration among healthcare providers, early childhood educators, and parents is recommended to ensure timely and appropriate interventions.

Keywords: Growth; development; DDST; MCH Handbook and early childhood.

I.   INTRODUCTION

Early childhood growth and development are important indicators in determining the quality of human resources in the future. The age period of 2–4 years is considered the golden age due to rapid brain development, with approximately 80% of brain structure being formed before the age of five (World Health Organization, 2020). During this phase, optimal stimulation will support a child's cognitive, motor, language, and socio-emotional development, while undetected delays can have long-term impacts on a child's school readiness and quality of life. The Indonesian Ministry of Health (2024) emphasized that monitoring growth and development through the Maternal and Child Health Handbook (MCH) is an important strategy for early detection of developmental disorders.However, coverage of early detection of child development in Indonesia is still suboptimal. The Indonesian Ministry of Health (2022) reported that more than 30% of toddlers have not received routine developmental screening. Globally, 52.9 million children under five years of age experience developmental disorders, with the majority coming from low- and middle-income countries (World Health Organization, 2020). The United Nations Children's Fund (UNICEF, 2023) also noted that impaired motor development in toddlers remains a significant global problem. At the regional level, growth and development monitoring in East Java Province, in accordance with minimum service standards, has only reached 37.1% (Indonesian Ministry of Health, 2023), indicating a gap between policy and implementation on the ground.

A common problem is that monitoring in health facilities and early childhood education institutions still focuses on physical growth aspects such as weight and height, while developmental screening has not been systematically conducted using standardized instruments. This is despite the Denver Developmental Screening Test (DDST) being recommended as a screening tool to assess gross motor skills, fine motor

skills, language skills, and personal-social skills (Maulidiyah et al., 2025). Limited knowledge among parents and educators, as well as suboptimal cross-sector integration, are factors hindering the early detection of developmental delays.One approach that could provide a solution is Early Development Mapping (EDM), a method for systematically and continuously mapping children's growth and developmental milestones using standardized indicators (Pendidikan & Kemdikbud, 2018). This approach emphasizes integration between families, health workers, and educational institutions to ensure each child receives timely monitoring and intervention. With comprehensive mapping, the risk of delays that are only detected at school age can be minimized.Based on this description, this study was conducted to determine the growth and development of children aged 2–4 years using the KIA Handbook and DDST at Vinolia Mojolangu PAUD. This research is expected to provide benefits as a basis for early intervention planning, improve the quality of growth and development monitoring, and strengthen collaboration between parents, health workers, and educators in supporting optimal child development.

II. METHODS

This study uses a quantitative descriptive design with a cross-sectional approach, namely data collection is carried out at one time to describe the actual growth and development conditions of children aged 2–4 years.The study was conducted at Vinolia Mojolangu Early Childhood Education (PAUD), Lowokwaru District, Malang City, in February 2026. The population in this study was all 23 children aged 2–4 years registered at the PAUD. The sampling technique used was total sampling, so the entire population was used as the research sample.The data collected included child growth and development. Growth was assessed by measuring weight using a digital scale and height using a microtoise. These measurements were then calculated based on the Weight-for-Height (W/H) index and categorized using the WHO Z-score standard.

Development was assessed using the Denver Developmental Screening Test (DDST), which covers four aspects: gross motor skills, fine motor skills, language skills, and personal-social skills, with results categorized as normal, suspect, or untestable.Data processing was carried out through editing, coding, entry, and tabulation. Data analysis used descriptive analysis in the form of frequency distributions and percentages to describe the child's growth and development categories. The assessment results were then mapped using the Early Development Mapping (EDM) approach to group children into green (safe), yellow (alert), and red (at-risk) zones. This research has obtained ethical approval from the Research Ethics Commission of the Health Polytechnic of the Ministry of Health, Malang, as well as informed consent from the respondents' parents before data collection was carried out.

III. RESULT AND DISCUSSION

Table 1. Characteristics of Parents Accompanying Toddlers Aged 2-4 Years During Growth and Development Examination at Vinolia Mojolangu Early Childhood Education Center

Gender of Parents	Frequency	Presentation
Man	0	0.00%
Woman	23	100.00%
Total	23	100.00%
Parents' Age	Frequency	Presentation
Early Adulthood (26-35 Years)	19	82.61%
Late Adulthood (36-45 Years)	4	17.39%
Total	24	100.00%

Based on the results of a study of 23 parents who accompanied their children during growth and development checks at the Vinolia Mojolangu Early Childhood Education Center (PAUD), all of the companions were women (100%), in this case the children's mothers. This indicates that the primary role in monitoring child growth and development remains dominated by mothers as primary caregivers.Based on age, most mothers were in the early adulthood category (26–35 years), namely 19 people (82.61%), while 4 people (17.39%) were in the late adulthood category (36–45 years). There were no parents in the age category under

25 years.The dominance of mothers in the early adulthood category indicates that the majority of parents are of productive age and physically and psychologically mature. At this stage, individuals are generally better prepared to fulfill their parenting roles, including meeting nutritional needs, providing developmental stimulation, and taking their children for regular health checkups.The direct involvement of mothers in growth and development checkups is a positive factor, as they play a central role in daily care. However, the lack of father participation in these activities indicates that the role of support is not yet fully implemented collaboratively by both parents. Based on these results, researchers believe that the characteristics of parents, who are predominantly female and in early adulthood, are conducive to optimal monitoring of child growth and development. However, increased father involvement in child development activities remains necessary to support more comprehensive parenting.

Table 2. Characteristics of Respondents of Toddlers Aged 2-4 Years in Growth and Development Examination at Vinolia Mojolangu PAUD

Age Category	Frequency	Presentation
2-4 Years (24-48 Months)	23	100.00%
Total	23	100.00%
Child Gender Category	Frequency	Presentation
Man	12	52.17%
Woman	11	47.83%
Total	38	100.00%

Based on the results of a study of 23 children at the Vinolia Mojolangu PAUD, all respondents (100%) were in the 2–5 years (24–60 months) age group. There were no children in the 0–2 years age group. This indicates that growth and development screening activities primarily reach preschool-aged children, as children at this age range are already actively participating in early childhood education activities, making structured monitoring easier.The ages of 2–5 are a crucial period in a child's development, as this is the time when rapid motor, language, cognitive, and socio-emotional development occurs. Therefore, early detection in this age group is crucial to identify potential growth disorders or developmental delays early on.Based on gender, the distribution of children was relatively balanced, with 12 (52.17%) boys and 11 (47.83%) girls.

This difference in numbers was not significant and therefore did not affect the overall results of the study. This nearly equal distribution indicates that growth and development monitoring was conducted evenly, regardless of gender.In general, age and gender are not the primary determinants of a child's growth and development status, but both remain important characteristics in data analysis because they can influence variations in developmental outcomes in certain aspects. With a predominance of preschool-aged children and a balanced gender distribution, this study provides a representative picture of the growth and development of early childhood at Vinolia Mojolangu Preschool.

Table 3. Nutritional Status of Children Based on Weight to Height Index (BB/TB)

Child nutritional status according to weight/height	Frequency	Presentation
Good Nutrition (normal)	20	86.96%
At risk of overnutrition	2	8.70%
More nutrition	1	4.34%
Obesity	0	0%
Total	23	100.00%

Based on the table above, the majority of children at Vinolia Mojolangu PAUD have good (normal) nutritional status based on the weight/height index, namely 20 children (86.96%). This indicates that the majority of children have a weight proportion appropriate to their height.Two children (8.70%) were at risk of overnutrition, and one child (4.34%) was overweight. No children were found to be obese or underweight. Although the proportion of overweight children is relatively small, this condition still requires attention because it has the potential to increase the risk of obesity in school-age children if dietary and physical activity patterns are not monitored.Overall, these results indicate that the growth status of children at Vinolia Mo-

jolangu PAUD is good. However, regular monitoring and education on balanced nutrition are still needed to prevent a shift in nutritional status toward overnutrition or obesity in the future.

Table 4. Child Development Based on the Denver Developmental Screening Test

DDST Category	Frequency	Presentation
Normal	22	95.65%
Suspect	1	4.35%
Total	38	100.00%

Based on the results of a developmental screening using the Denver Developmental Screening Test (DDST), the majority of children at Vinolia Mojolangu Early Childhood Education Center (PAUD) are in the normal category, namely 22 children (95.65%). This indicates that the majority of children have reached age-appropriate developmental milestones in gross motor skills, fine motor skills, language skills, and personal and social skills. One child (4.35%) was classified as suspect. This category indicates a delay in one or more aspects of development, but cannot yet be directly concluded as a developmental disorder. Children with suspect results require further monitoring and more intensive stimulation to ensure optimal development. There were no children in the untestable category in this study, which shows that all children were able to cooperate well during the examination process. Overall, these results indicate that the development of children at Vinolia Mojolangu Early Childhood Education Center is in the good category. However, early detection and regular monitoring are still necessary to ensure each child receives appropriate stimulation and prevent developmental delays later in life.

Table 5. Growth Zone Status of Toddlers Based on Weight/Height

Child nutritional status according to weight/height	Frequency	Presentation
Normal (Green Zone)	20	86.96%
At risk (Yellow Zone)	2	8.70%
Overnutrition (Red zone	1	4.34%
Total	23	100.00%

The majority of children (86.96%) were in the normal weight/height category based on the weight-for-height index. This indicates that the majority of children have a weight-for-height ratio that is appropriate for their height. A total of 8.70% of children are in the at-risk category (yellow zone), and 4.34% are in the overweight category (red zone). While these numbers are small, these conditions still require attention as they can impact the risk of obesity in the future. These results are in line with the Indonesian Ministry of Health's (2021) report, which states that most preschool children in urban areas have normal nutritional status, but there is a tendency for an increase in cases of overnutrition due to a high-calorie diet and low physical activity. Researchers believe that the growth conditions of children at PAUD Vinolia Mojolangu are generally good, but regular monitoring is still needed to prevent shifts into the risk zone.

Table 6. Child Developmental Zone Status Based on the Denver Developmental Screening Test

DDST Category	Frequency	Presentation
Normal (Green Zone)	22	96.65%
Suspect (Yellow Zone)	1	4.35%
Total	23	100.00%

The results of the DDST examination showed that the majority of children (95.65%) were within the normal range. This means that their development in gross motor skills, fine motor skills, language skills, and personal-social skills was appropriate for their age. There was 1 child (4.35%) in the suspect category. This condition does not immediately indicate developmental delay, but requires further monitoring and more intensive stimulation. These results align with Putri's (2019) research, which showed that the majority of preschool-aged children were within the normal developmental category during the DDST. Handayani & Sari (2021) also noted that parental involvement in early stimulation plays a significant role in achieving child

development.According to researchers, the high proportion of children with normal development indicates that the parenting patterns and educational environment at Vinolia Mojolangu PAUD are sufficient to support optimal child development.

IV. CONCLUSION

Based on research on 23 children aged 2–4 years at Vinolia Mojolangu Preschool, it can be concluded that overall, their growth and development are in the good category. Most of the children are between 37–48 months old, with a relatively balanced gender distribution between boys and girls.Growth status based on the Weight-for-Height (BB/H) index shows that the majority of children (86.96%) fall into the normal category (green zone). However, a small number of children are still in the at-risk (yellow zone) and overweight (red zone) categories, requiring regular monitoring and nutrition education.Results of developmental screening using the Denver Developmental Screening Test (DDST) showed that nearly all children (95.65%) were in the normal development category (green zone). Only one child was in the suspect category (yellow zone), requiring further stimulation and monitoring to ensure no developmental delays.Overall, growth and development monitoring using an integrated approach indicates that children at Vinolia Mojolangu Early Childhood Education Center (PAUD) are achieving optimal growth and development. However, early detection and regular monitoring are still necessary to prevent nutritional problems and developmental delays from an early age.

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