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Factors contributing to the provision of complementary food by fathers to improve the growth of children aged 6-24 months: a cross sectional study

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ABSTRACT

Introduction: Providing complementary foods to children aged 6-24 months has many obstacles that have an impact on the child's growth. So far, the mother has played the most role, fathers tend to pay less attention in giving complementary food. The purpose of this study was to analyze the factors that contribute to the provision of complementary foods by fathers to improve the growth of children aged 6-24 months.

Methods: A cross-sectional approach on 366 children aged 6-24 months who were recruited using simple random sampling. The variables consisted of children age, gender, father's age, father's education, father's job, mother's age, mother's education, mother's job dan father's role and the growth of children age 6-24 months. Data was analysis binary logistic regression.

Results: The study showed positive father involvement (72%) and normal growth (76.5%). The multivariate analysis show that father's education, father's job, mother's age, mother's education, mother's job and father's role have a significant relationship with the growth chart. Father's role is the most dominant variable because its OR is the highest (p = 0.001; OR = 2.128; CI = 1.263-3.433), which means that a supportive or better father's role will make the provision of complementary food better and improve the child's growth chart.

Conclusions: Fathers play an important role to give complementary feeding in children aged 6-24 months. This study is expected to be applied with a wider range of areas in order to obtain comparisons with research that has been done.

Keywords: children, complementary food, father's role, growth

Introduction

One of the efforts to achieve good growth and development is to provide complementary foods to children, especially those aged 6 months to 24 months (Lutter, Grummer-Strawn and Rogers, 2021). Providing complementary foods to children aged 6-24 months has many obstacles that have an impact on the child's growth (Masuke *et al.*, 2021). Providing complementary foods is very important in maintaining the health of babies aged 6-24 months, because healthier babies and children will reduce the number of children morbidity and mortality, and improve the quality of the human resources concerned (Hendriyani *et al.*, 2020). Food intake is related to the nutritional content contained in the food consumed (Mkhize and Sibanda, 2020). The food intake consumed by children aged 12-24 months consists of breast milk and complementary food (Clegg *et al.*, 2021). Complementary food for breast milk is food or drink containing nutrients given to babies aged 6 months to meet nutritional needs other than breast milk (Al-Jawaldeh, Taktouk and Nasreddine, 2020). This is because breast milk is only able to fulfill two-thirds of the baby's needs at the age of 6-9 months, at the age of 9-12 months it fulfills half of the baby's needs, and at the age of 12-24 months it only fulfills one-third of the baby's needs (Neri *et al.*, 2022). World Health Organization in

2020 states several things that must be considered when giving complementary food for breast milk, including frequency, number of doses, texture and types (Hendriyani *et al.*, 2020). The texture of food must be adjusted to the condition and age of the baby so that it can be digested easily and malnutrition does not occur (Ekelund *et al.*, 2021).

So far, the mother has played the most role, fathers tend to pay less attention to nutritional intake and good food diversity for children compared to mothers. So, it is very necessary for parents to have an active role that is balanced between father and mother (Tello *et al.*, 2022). Child growth really requires father involvement in providing complementary food for breast milk. The problem that is often encountered is the lack of father's role in providing complementary food for breast milk to children (Kostecka, Jackowska and Kostecka, 2020). Surabaya is Indonesia's largest urban patriarchal city area, with notably lower levels of father involvement in Indonesia, in addition, phenomenon in Surabaya show mother tended to taking care all of trajectory rather than father role to their children under five (Rezaeizadeh *et al.*, 2024). Data obtained from an integrated healthcare center in Surabaya with a total of 500 toddlers found that in the last 6 months of 2023, the average number of toddlers who did not gain weight and height was around 22% of the 500 toddlers who came. The number of children aged 6-24 years in the Surabaya health center is recorded to be around 500 children. The role of fathers in providing complementary foods to breast milk is in the sufficient category at 55% and does not play a role at all at 45%.

Based on Friedman's theory, it shows that in child development, a balanced parental role is needed, fathers and mothers together provide care for children to maintain normal growth and development. Based on family systems theory, in the context of Indonesia, mothers traditionally take the primary caregiving role, which includes preparing and feeding complementary foods to their babies (Roshita, Schubert and Whittaker, 2012). They carefully monitor food safety and hygiene practices, observe how their babies respond to new foods, and create a comfortable eating environment that fosters positive eating habits. Fathers contribute through their traditional roles as providers, protectors, and role models. As providers, they ensure families have access to quality ingredients and nutritious foods. In their protective capacity, they help maintain the safety of food and eating utensils (Hook and Wolfe, 2012; Régnier-Loilier, 2015). As role models, they demonstrate healthy eating behaviors that their children can emulate. While these traditional gender roles are still common in Indonesia, there is a growing shift towards more active father involvement in complementary feeding practices, but in practice evidence, this phenomenon is reported to be contradictory and unknown (Starkweather *et al.*, 2021; Herman, Mansur and Chang, 2023). Thus, this phenomenon underlines that in the Indonesian context, the role of fathers has a context of gap that tends to be shown in those who focus on how to fulfill and shadow their "father's task framework" rather than involving themselves in their children's needs directly.

In role in providing complementary foods and changes in toddler growth charts, Parents' feeding patterns for children will also influence eating habits (Eshete *et al.*, 2021). Mothers tend to provide more emotional support to children in providing food, so that children like and enjoy food more, this is the opposite of what fathers do. Father's involvement is very necessary and influences the nutritional status and development of children (Bimpong *et al.*, 2020). The mother's role is very dominant in caring for and educating children so that they grow and develop into quality children. However, it would be even better if fathers also supported feeding patterns for toddlers (Isaacs, Neve and Hawkes, 2022). Having a husband's support can increase nutritional awareness behavior in the family. The roles of mothers and fathers both determine the optimal fulfillment of toddlers' nutritional needs, so it is necessary to optimize the role of fathers' participation in providing food to toddlers (Pradanie, Diyan Rachmawati and Cahyani, 2020). Family support is a motivating factor for mothers in feeding toddlers (Basri and Hadju, 2020). Based on the concept of Friedman, the power structure in the family plays an important role in influencing family members. Parents have influence to influence their children to eat healthy and nutritious food. Current research focuses mostly on the mother's role in feeding toddlers and there is still limited research examining fathers' participation in toddler feeding patterns (Allotey, Flax, A. Ipadeola, *et al.*, 2022k). Fathers, as husbands and fathers to their children, play essential roles as breadwinners, educators, protectors, and providers of security. They serve as heads of the family, active members of their social groups, and participants in their community. Research discussing the role of fathers in children's food consumption is still limited. The role of fathers is very important because apart from being parents, fathers are also role models for their children. Fathers have less responsibility than mothers for children's consumption, monitor children's consumption less, and rarely eat with children (Hadi *et al.*, 2020; Eshete *et al.*, 2021).

The growth chart card is a vital tool for monitoring children's nutritional development, particularly focusing on complementary feeding practices where fathers play a crucial role with fact a less attention on the patriarchal sub-culture. This card tracks a child's normal growth curve based on gender-specific anthropometric indices, encouraging fathers to understand and participate in their child's nutritional journey (Bimpong et al., 2020). Fathers' involvement in complementary feeding is essential as they can actively monitor their child's growth

through the growth chart card. This card serves as a comprehensive health and nutrition report that enables fathers to track their toddler's development (Isaacs, Neve and Hawkes, 2022). The card features colored lines indicating the toddler's health status, as a shortcurt help encouraging fathers to understand and respond tend to their child's nutritional needs (Allotey, Flax, A. Ipadeola, et al., 2022). When fathers actively participate in monitoring their child's growth chart, they can better contribute to identifying growth disorders or nutrition risks early on. This enables them to take preventive measures quickly and precisely, working alongside mothers to ensure optimal nutrition through appropriate complementary feeding practices (Banerjee et al., 2021; Kosasih et al., 2022).

The integrated healthcare center supports fathers' involvement by providing guidance on complementary feeding and growth monitoring for infants aged 6-24 months. This includes regular weighing activities where fathers can participate and learn about their child's nutritional needs. Furthermore, thus situations are still unknown. The center emphasizes the importance of both parents' roles in monitoring growth and addressing early growth disorders through proper complementary feeding practices respectively. Growth monitoring, with active father participation, is crucial pivotal moment in their child development through their nutrition improvement programs. It involves regular assessment of toddlers through monthly weighing, recording, and evaluation of results based on the growth chart. This systematic approach helps fathers understand their role in providing appropriate complementary foods and ensuring optimal child growth(Banerjee *et al.*, 2021; Kosasih *et al.*, 2022). From the statement above, the aimed of this research was to analyze the factors contributing in providing complementary breast milk with the growth of the card chart towards health in toddlers aged (6 – 24 months).

Materials and Methods

Study Design

This study used quantitative study focus with the design was correlational analytical research with a cross-sectional approach aims to reveal the relationship between Contributing to the Provision of Complementary Food by Fathers to Improve the Growth of Children Aged 6-24 Months. This research was conducted at the integrated health service center in East Surabaya city with 4 health centers, namely Kalijudan Health Center, Mulyorejo Health Center, Mojo Health Center and Keputih Health Center. This study was carried out in Surabaya between June-September 2024.

Population, Sample and sampling

The study population consists of families with children aged 6-24 years who still have complete parents, both biological father and mother. A total of 366 respondents have been obtained by using simple random sampling technique. Sample selection using simple random sampling was carried out by recording data on all families with children aged 6-24 months from 4 health centers, then the researcher selected randomly using a shuffling system to ensure that the sampling was carried out randomly. The inclusion criteria in selecting the sample are toddlers who come from Nuclear Family because researchers hope that the provision of complementary foods will not be influenced by the involvement of other family members, especially grandparents, not a Single Parent, parents able to good communication and cooperative.

Variable and Instruments

The independent variable in the research were children age, gender, father's age, father's education, father's job, mother's age, mother's education, mother's job dan father's role and the dependent variable was growth of children age 6-24 months. The independent variables in the research were children's age, gender, father's age, father's education, father's job, mother's age, mother's education, mother's job and father's role and the dependent variable was growth of children aged 6-24 months. The data collection used a questionnaire for demographic data for the characteristics of children aged 6-24 months (children's age and gender), father's characteristics (father's age, father's education, and father's job) and mother's characteristics (mother's age, mother's education, and mother's job). While the father's role variable was measured using a questionnaire with indicators of paternal engagement, paternal accessibility and paternal responsibility which had been adjusted to the conditions of the respondent's characteristics and had been tested for validity and reliability and declared valid (t count = 0.523-0.998) and reliable (Cronbach alpha = 0.911), with the final interpretation being a positive role (points 33-64) and a negative role. The total number of questions is 16 questions with a rating scale of always = 4, often = 3, sometimes = 2 and never = 1. Meanwhile, the growth variable was measured using observation of the weight and height of children aged 6-24 months. Weight measurement using a baby scale and height was measured using a meter. The final interpretation of weight and height was determined by the interpretation of increasing or not increasing.

Procedure

The study was conducted after the researcher obtained ethical approval and research permit from the health research ethics committee. Prospective respondents were given information about the purpose, benefits, and procedures of the study and were given informed consent incognito, then prospective respondents agreed to give their consent. After the respondents gave their consent, the respondents were given a questionnaire on demographic data and the role

of the father, while their children aged 6-24 months were observed for their growth with a meter and baby scales. The researcher conducted the study independently and was not assisted by anyone else. After all the data was obtained, the researcher processed the data and maintained the confidentiality of the respondents' data properly.

Data Analysis

Descriptive analysis will be presented using data frequency and percentage. Binary logistic regression test is used to determine what factors are related and the strongest factors in increasing the growth graph of toddlers aged 6-24 months. In all cases, a p-value of ≤0.05 was considered statistically significant. Statistical package for social sciences (SPSS, version 21.0) was used for all the statistical analyses.

Ethical Clearance

This research has obtained ethical approval from the Health Research Ethics Commission with the ethical certificate number 0524050036/KEPK/STIKES-PEMKAB/JBG/V/2024. Researchers also pay attention to ethical principles in health research, especially maintaining the confidentiality of research respondents and children who are vulnerable groups in the study.

Results

Table 1 shows that the age of most Under-Fives is 15-17 months (22,95%), with male gender (61,20%). The father's age is mainly in the 32-33 year age range (23,22%), with the father's job being in the private sector (54,92%) and his highest education being senior high school (53,55%). The mother's age is 27-28 years old (23,22%,) with the mother's job most often being a housewife (34,97%,) and the mother's most recent education being senior high school (53,55%). The father's role in complementary food showed a positive rate of 72.13%, with 76,50% of toddlers having increased body weight and 76,50% having normal height.

Table 2 shows that all variables significantly affect the growth chart of children under five (age 6-24 months). The father's role factor shows the most significant result, namely a positive role (p = 0.001; OR = 2.128; CI = 1.263-3.433). The most dominant father's age factor is at the age of 38-39 years (p = 0.032; 0.228; CI = 0.256-0.999), while the most dominant mother's age factor is 23-24 years (p = 0.017; OR = 1.223; CI = 1.712-3.229). The most dominant father's occupation factor is a farmer (p = 0.022; OR = 0.197; CI = 0.521-1.545), but for the mother, the most dominant occupation is a private employee (p = 0.003; OR = 1.576; CI = 1.876-4.522). The most dominant factor of father's education was university (p=0.013; OR=0.599; CI=0.121- 1.345), and the most dominant factor of mother's education was also university level (p=0.010; OR=1.011; CI=1.296- 1.887), respectively.

Discussions

The results of the study showed that the most dominant factor in influencing the growth chart of children under 5 years (age 6-24 months) is the role of the father in providing complementary foods to the child, especially the positive role of the father. Our study

Table 1. Demographic Characteristics of Respondents (n=366)

Characteristics	n	%
Under-fives Age		
6-8 Months	40	10,93
9-11 Months	45	12,30
12-14 Months	60	16,39
15-17 Months	84	22,95
18-20 Months	52	14,21
21-23 Months	18	4,92
24 Months	67	18,31
Gender		
Man	224	61,20
Woman	142	38,80
Father's Age		
28-29 Year	14	3,28
30-31 Year	82	22,40
32-33 Year	85	23,22
34-35 Year	67	18,31
36-37 Year	68	18,58
38-39 Year	35	9,56
40-41 Year	17	4,64
Father's Education		
Elementary	13	3,55
Junior high school	68	18,58
Senior high school	174	53,55
University	89	24,32
Not School	0	0,00
Father's Job		
Civil Servant	65	17,76
Privat employee	201	54,92
Self-employed	82	22,40
Farmer	18	4,92
Not-working	0	0,00
Mother's Age		
23-24 Year	12	3,28
25-26 Year	82	22,40
27-28 Year	85	23,22
29-30 Year	67	18,31
31-32 Year	68	18,58
33-34 Year	35	9,56
35-36 Year	17	4,64
Mother's Education		
Elementary	13	3,55
Junior high school	68	18,58
Senior high school	196	53,55
University	89	24,32
Not School	0	0,00
Mother's Job		
Civil Servant	51	13,93
Privat employee	83	22,68
Self-employed	96	26,23
Farmer	8	2,19
House Wives	128	34,97
Father's Role		
Positive	264	72,13
Negative	102	27,87
Weight		
Go on	280	76,50
Not up	86	23,50
Height		
Normal	324	88,52
Short	42	11,48

Table 2. Model of binary logistic regression between demographic factors, father's role, and growth chart for Under-Fives 6-24 Months

Factors	Children Growth		B	P Value	OR (CI 95%)
	Normal	Short			
Father's Age					
28-29 Year	14 (5,00)	1 (1.16)	0,325	0,033	0.412 (0.133-0.966)
30-31 Year	80 (28,57)	2 (2.33)	0,379	0,038	0.456 (0.201-0.874)
32-33 Year	69 (24,64)	16 (18.60)	0,356	0,036	0.459 (0.121-0.865)
34-35 Year	50 (17,86)	17 (19.77)	0,337	0,034	0.422 (0.324-0.660)
36-37 Year	56 (20.00)	12 (13.95)	0,329	0,033	0.149 (0.654-0.976)
38-39 Year	10(3.57)	22 (25.58)	0,321	0,032	0.228 (0.256-0.999)
40-41 Year	1 (0.36)	16 (18.60)	0,401	0,040	0.219 (0.567-1.002)
Father's Education					
Elementary	0 (0.00)	13 (15.12)	0,571	0,026	0.212 (0.334-1.320)
Junior high school	60 (21.43)	30 (34.88)	0,512	0,025	0.198 (0.122-1.323)
Senior high school	136 (48.57)	38 (44.19)	0,499	0,025	0.576 (0.675-1.230)
University	84 (30.00)	5 (5.81)	0,485	0,013	0.599 (0.121-1.345)
Father's Job					
Civil Servant	60 (21.43)	5 (5.81)	0,433	0,037	0.312 (0.339-1.552)
Privat employee	149 (53.21)	52 (60.47)	0,432	0,039	0.201 (0.144-1.353)
Self-employed	68 (24.29)	14 (16.28)	0,445	0,031	0.476 (0.875-1.287)
Farmer	3 (1.07)	15 (17.44)	0,529	0,022	0.197 (0.521-1.545)
Mother's Age					
23-24 Year	4 (1.43)	8 (9.30)	0,554	0,017	1.223 (1.712-3.229)
25-26 Year	67 (23.93)	15 (17.44)	0,527	0,021	1.015 (1.771-4,012)
27-28 Year	71 (25.36)	14 (16.28)	0,487	0,025	0.997 (0.225-1.092)
29-30 Year	51 (18.21)	16 (18.60)	0,502	0,023	0.876 (0.122-1.298)
31-32 Year	51 (18.21)	17 (19.77)	0,543	0,019	1.211 (1.799-3.456)
33-34 Year	25 (8.93)	10 (11.63)	0,499	0,027	0.234 (0.234-1.223)
35-36 Year	11 (3.93)	6 (6.98)	0,457	0,032	0.442 (0.729-1.423)
Mother's Education					
Elementary	1 (0.36)	12 (13.95)	0,623	0,018	1.122 (1.334-4.122)
Junior high school	29 (10.36)	39 (45.35)	0,598	0,011	1.012 (1.225-2.334)
Senior high school	170 (60.71)	26 (20.23)	0,556	0,012	1.122 (1.328-1.889)
University	80 (28.57)	9 (10.47)	0,527	0,010	1.011 (1.296-1.887)
Mother's Job					
Civil Servant	48 (17.14)	3 (3.49)	0,612	0,005	1.299 (1.567-3.227)
Privat employee	61 (21.79)	22 (25.58)	0,660	0,003	1.576 (1.876-4.522)
Self-employed	82 (29.29)	14 (16.28)	0,599	0,007	1.772 (1.221-3.287)
Farmer	2 (0.71)	6 (6.98)	0,546	0,005	1.335 (1.101-3.116)
House Wives	87 (31.07)	41 (47.67)	0,512	0,012	1.998 (0.996-2.229)
Father's Role					
Positive	254 (90.71)	10 (11.63)	0,887	0,001	2.128 (1.263-3.433)
Negative	26 (9.29)	76 (88.37)	0,766	0.002	1.978 (1.077-2.976)

showed that positive father involvement significantly improved the results of children's weight. Our study tends to be the most predictor is father's role. Studies show that in societies with more egalitarian gender roles, fathers tend to have more contact with their children compared to societies with traditional gender roles. Research findings indicate that in countries where fathers actively participate in childcare, they maintain stronger involvement with young children. This suggests that intensive fatherhood practices have a lasting positive impact on fathers' relationships with their children, even after parental separation (Cabrera *et al.*, 2008; Nixon, Greene and Hogan, 2012). One potential reason is that expectations for fathers' interactions with their children are higher when fathers have more education. Thus, father's education serves as the second predictor. Moreover, there appears to be a generational pattern, with more fathers likely embracing the culture of "new fatherhood" (McGill, 2014; McMunn *et al.*, 2017). It is known that the father's role in providing complementary breast milk is mostly positive. Having a husband's support can increase nutritional awareness behavior in the family (Fernandes *et al.*, 2023). The roles of mothers and fathers both determine the optimal fulfillment of toddlers' nutritional needs, so it is necessary to optimize the role of fathers' participation in providing food to toddlers (Kaur *et al.*, no date). This is in accordance with Friedman's theory, the father as husband of wife and children, plays the role of breadwinner, educator, protector and provider of security, as head of the family, as a member of his social group, and as a member of the community from his environment (Bogale, Cherie and Bogale, 2022; Fadilah, Muniroh and Atmaka, 2023). Research discussing the role of fathers in children's food consumption is still limited. The role of fathers is very important because apart from being parents, fathers are also role models for their children (Edelblute and Altman, 2021). Fathers have less responsibility than mothers for children's consumption, monitor children's consumption less, and rarely eat with children. Based on the concept of Friedman, the power structure in the family plays an important role in influencing family members (Ajike *et al.*, 2020).

The Impact of Father's Role in Child Nutrition and Family Support is Direct Involvement in Feeding Practices, fathers who actively participate in feeding their children can positively influence meal time routines and schedules, food choices and dietary diversity, creating and positive eating environments (Urkia-Susin *et al.*, 2024). Father can also Decision-Making and Resource Allocation to financial resources for nutritious food, access to healthcare and nutrition services, household food security and investment in child nutrition education. Emotional Support and Family Dynamics are also provided by fathers to increase mother's confidence in child feeding practices, family cohesion during mealtimes and stress reduction for primary caregivers (Banerjee *et al.*, 2021; Shrestha, 2021). Father involvement in complementary feeding and family support is crucial for optimal child nutrition outcomes. A comprehensive approach that addresses barriers while promoting positive father engagement can significantly improve child feeding practices and overall family health (Kaur *et al.*, no date; Hadi *et al.*, 2020).

The next factor that contributes significantly to increasing the growth of toddlers aged 6-24 months is the age of the father, with the most dominant age being 38-39 years, while the mother's age ranges from 23-24 years. The results of the study showed that the father's age requires an increasingly mature age to provide full support to the mother in the complementary food process, on the contrary, the mother's age is actually an age that is still considered a young mother. Fathers with increasingly mature ages and more experience have a good impact on the readiness to maintain their families, including in providing care for children. In contrast with previous studies, the current study showed that the majority of father roles contribute positively. This might be explained by family principles encouraging members to gather at one table during mealtimes, despite fathers' busy work schedules (Tello *et al.*, 2022). The majority of fathers work as private employees; this phenomenon is connected with their age and education level, as most graduated from senior high school. Their income is typically equivalent to the minimum standardized wage in Indonesia. This income factor is associated with how well fathers can participate in providing food to toddlers, a phenomenon reflected in the father's role in giving complementary food to their children, especially those under five years old (Hadi *et al.*, 2020). Most mothers are between 18–27 years old, categorized as young adults and generally younger than their husbands. This age difference is associated with their educational level, with the majority having middle education (senior high school) like their husbands. These backgrounds influence both parents' roles in fulfilling the nutritional needs of children under five years old (Eshete *et al.*, 2021; Allotey, Flax, A. Ipadeola, *et al.*, 2022). Children's demands typically fall under the mother's responsibilities as household managers, creating an interesting phenomenon where the provision of complementary food during children's developmental milestones is primarily facilitated by mothers. This suggests that fathers, as major co-supporters, need to enhance their roles beyond the traditional wife-household dynamic that follows Indonesian patriarchal cultural considerations (Pradanie, Diyan Rachmawati and Cahyani, 2020; Isaacs, Neve and Hawkes, 2022).

Father and mother educations based on the results showed that the strongest that influence to children growth are in university level education. Knowledge is the result of a person's knowledge of objects through the senses they have, namely the sense of hearing, sense of smell, sense of sight, sense of smell and sense of touch. Knowledge is influenced by one factor, the level of education, the level of education is an effort to improve a person's character so that the person can have good abilities (Kostecka, Jackowska and Kostecka, 2020). This education influences a person's attitudes and behavior to mature through teaching. Knowledge can be obtained from education, both formal and non-formal (Januarti and Hidayathillah, 2020). The level of education will influence a person's knowledge so that it makes a person have a broad view, think and act rationally because the higher the respondent's level of education, the better the level of knowledge, so that the respondent can easily accept information and the more knowledge they have. Respondents who have a high level of education tend to have a good or sufficient level of knowledge (Martin *et al.*, 2021; Wolkanto *et al.*, 2023). Apart from education and difficult sources of information, in this study age also influenced the level of knowledge. One of the negative roles of non-formal education for fathers is holding an education program to increase complementary foods for breast milk for fathers in the integrated health center area (Allotey, Flax, A. F. Ipadeola, *et al.*, 2022).

The positive correlation found between father involvement in education and children's weight provides strong support for Kalmijn's theoretical framework regarding paternal engagement across different cultural contexts. Specifically, this relationship validates the fundamental assumption that fathers residing in societies characterized by traditional gender role expectations tend to have substantially reduced interaction and engagement with their children when compared to fathers in societies that embrace more egalitarian gender roles. The educational background of fathers emerges as a crucial determinant in this dynamic, serving as a transformative force that shapes not only individual paternal attitudes and behaviors, but also influences broader societal perspectives and cultural expectations surrounding the role of fathers. This educational influence extends beyond personal development to impact institutional frameworks and social policies that define modern fatherhood perspective

taking care forward their child grow and development (McMunn *et al.*, 2017). In addition, mother's education is in line with the second predictor as third predictor. Thus supported by the previous study about high maternal education was positively associated with child growth (Rezaeizadeh *et al.*, 2024). Furthermore, maternal education positively impacts child weight-for-height (WHZ), an indicator of current malnutrition, and is linked to better child health and nutrition. Mothers with higher education are more likely to have access to and utilize better healthcare services, including prenatal care. They are also better informed about nutrition and childcare practices, which influences how both they and their spouses feed their children (Cabrera and Tamis-LeMonda, 2013; McMunn *et al.*, 2017). A negative association exists between children's weight and factors such as children's age, father's age, and gender. Our findings suggest these variables are not aligned due to demographic factors affecting contact frequency in children's eating patterns. This contradicts the general observation about children's eating patterns in father-child relationships, as suggested by previous studies (Régnier-Loilier, 2015). In these domains, age and gender have less influence on children's weight than expected, though early childhood remains crucial for contextual factors in the father-child relationship, particularly regarding the duration of positive father engagement, as our results indicate. Future research should examine these variables and analyze fathers' engagement behaviors before and after separation from their children (Aquilino, 2006; Hook and Wolfe, 2012).

Previous studies have shown that when both parents work, there is a higher likelihood of weight gain among their children (Zozaya, Oliva-Moreno and Vallejo-Torres, 2022). The strongest determining factor is fathers working as farmers, which relates to the cultural and geographical context of participants from Indonesia as an agricultural country. The socioeconomic and environmental factors that correlate with daily household food consumption and children's meal preparation are characteristic of middle-class families. This phenomenon appears connected to the father's role as a farmer, where fathers are responsible for managing household needs, including providing for children and preparing their meals. This represents a unique aspect of Indonesia's patriarchal system and its benefits for children (Rahmah, 2020; Zozaya, Oliva-Moreno and Vallejo-Torres, 2022). Mothers who work as private employees and contribute significantly to household income show an interesting pattern. Their labor participation has been linked to increased weight in children. However, contradictory findings suggest that when mothers serve as primary caregivers, they have a more positive influence on children's weight and lifestyle choices compared to fathers in the same role (Rahmah, 2020). The rationale of our findings correlates with mothers' awareness and educational background. Recently in Indonesia, even when mothers are employed, they consistently maintain regular child feeding practices such as indirect breastfeeding and providing complementary foods. They tend to balance childcare needs with their work commitments. This paradigm shift aligns with Indonesian mothers' increasing awareness about providing proper care for their children. In addition, mothers' familiarity with various formula milk brands and low dietary diversity have led to increased assessment of child health and nutrition knowledge among urban middle-class mothers in developing countries. Future studies should analyze and compare how mothers in urban and rural areas support their children's developmental milestones (Roshita, Schubert and Whittaker, 2012).

The majority of children's growth and development milestones, measured by their height and weight, have resulted in normal values. Recent studies show that these children are categorized as having low nutrition risk (Januarti and Hidayathillah, 2020; Bukit, Keloko and Ashar, 2021). Previous research indicates that this low nutrition risk condition is highly influenced by the father's role, which helps improve children's emotional regulation, prevent malnutrition, and promote healthy eating behaviors. Maintenance behavior may also be associated with protective influences from the father's involvement (Banerjee *et al.*, 2021; Susanti *et al.*, 2022). This aligns with previous research by Holey et al. that found children are more likely to consume vegetables with greater consideration and enthusiasm when encouraged by their fathers. A good eating schedule habit influences children's developmental milestones, contrasting with earlier studies that primarily focused on mothers as the "gatekeepers" of the household (Boswell, 2021; Fernandes *et al.*, 2023). Cognitive development, social development, emotional development, especially a child's physical development, will be influenced by their nutritional status. Body weight is one of the most frequently used indicators for assessing children's nutritional status. Changes in body weight can indicate changes in the child's nutritional status. Therefore, it is important for parents to know the nutritional status of their children, because from the nutritional status parents can find out how well the child is growing and developing (Allotey, Flax, A. F. Ipadeola, *et al.*, 2022). It is known that height per age between 6-24 months was normal (83.3%), height per ages among 6-24 months was short (16.7%). Children who are vulnerable to experiencing near or very short nutritional status are children who are still developing between the ages of 12 - 59 months, toddlers who are in their growth period and need balanced nutrition or food. Height per age measurements can be used to see past nutritional status. The impact on height due to nutritional deficiencies lasts

for a very long time, it can describe past nutritional conditions (Phua, Razak and Shukri, 2020).

Complementary Food is an important stage in the development of infant nutrition. Although traditionally the role of providing Complementary Food is more often associated with the mother, the involvement of the father has a significant impact on the child's development (Shinsugi and Takimoto, 2024). However, various factors such as culture and time constraints can influence the father's participation in this process. Cultural factors have a strong influence in shaping the role of the father in providing Complementary Food. Some cultures tend to view childcare, including feeding, as "women's work." This can create psychological and social barriers for fathers who want to actively participate in the Complementary Food process (Saaka *et al.*, 2023; Ukoji and Fayehun, 2023). In addition to cultural factors, time constraints are also a significant barrier to fathers' involvement in providing Complementary Food. Workload and long working hours cause fathers to have limited time to participate in the feeding routine. The imbalance in parental leave policies tends to give fathers less time to be with their babies (Cook *et al.*, 2021). Fatigue after work can reduce the motivation and energy of fathers to be involved in the Complementary Food process. The results of the study are supported by a study that examined 250 families in Indonesia and found that only 32% of fathers were actively involved in providing Complementary Food. The Javanese and Sundanese cultural factors that still strongly influence the perception that the role of feeding is the mother's responsibility (Nguyen *et al.*, 2021; Kosasih *et al.*, 2022). Fathers with higher levels of education tend to be more involved in complementary feeding. This qualitative study explored the experiences of 15 fathers in urban Indonesia in providing complementary feeding. The results showed that although fathers were willing to participate, time constraints due to long working hours were a major barrier (Kaur *et al.*, no date; Bimpong *et al.*, 2020). The study also identified a lack of knowledge about complementary feeding as a limiting factor. A comparative study of families in Japan and Indonesia found that Indonesian fathers spent an average of 15 minutes less per day on feeding activities than fathers in Japan. Cultural factors and a lack of policies supporting work-life balance were associated with this difference (Ekelund *et al.*, 2021). A longitudinal study of 180 families in several Southeast Asian countries over a one-year period found a positive correlation between father involvement in complementary feeding and children's cognitive and social development. Time constraints due to work were a major limiting factor in all countries studied (Ukoji and Fayehun, 2023). This new study explores the strategies of modern families in Indonesia in overcoming cultural and time barriers. Approaches such as weekend meal prep and the use of technology to monitor children's eating patterns while fathers are at work were found to be effective in increasing father involvement in complementary feeding (Fadilah, Muniroh and Atmaka, 2023). Although cultural factors and time constraints remain significant barriers to father involvement in complementary feeding, recent research suggests positive changes. With the support of appropriate policies, education, and changes in cultural mindset, father involvement in the Complementary Food process can be increased, which will ultimately contribute to more optimal child development.

Conclusion

The strongest factor in contributing to weight chart in toddlers aged (6 – 24 months) is the role of the father. The father's role in providing complementary breast milk is positive. The growth chart on the road to health in toddlers aged (6 – 24 months) is increased weight and normal height per age. There is a relationship between the role of fathers in providing complementary breast milk with the growth of the card chart towards health in toddlers aged (6 - 24 months) at integrated health center of Surabaya City. The research has theoretical implications, namely contributing to understanding paternal involvement in child nutrition, expanding knowledge about family dynamics in feeding practices, providing insights into gender roles in childcare responsibilities and enhancing understanding of factors affecting toddler growth patterns. Practically, the implications provided are informs parenting education programs and interventions, guides healthcare providers in family-centered nutrition counseling, supports policy development for paternal involvement in childcare and helps design more effective nutrition education materials. This research is a longitudinal study on long-term impact of father involvement, cross-cultural comparisons of paternal feeding practices, investigation of barriers to father participation in feeding and analysis of father-specific nutrition education programs.

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Availability of data and materials

The data and materials that support are however available from the authors upon reasonable request and with permission of the authors. All methods were performed in accordance with relevant guidelines and regulations.

Authors' contributions

The authors of this study have contribution to finished the manuscript. Nur Mukarromah contributed in Conception, Drafting, Analysis. Wiwi Septa Hakim Masruro contributed to Study conception and design. Septian Galuh Winata conduct Data Analysis and Ethical Consideration, Abdul Aziz Alimul Hidayat do the Abdul Aziz Alimul Hidayat. Diah priyantini contributed to Study conception and design; study supervision; critical revisions for important intellectual content. Chlara Yunita Prabawati and Erfan Rofiqi conducted to revision the manuscript.

Declaration of Interest

The authors declare no competing interests in the preparation, writing, and publication of this manuscript. This research was conducted independently and without any financial, personal, or professional relationships that could be construed as influencing the work presented here. All authors have reviewed and approved this declaration of interest statement.

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