ORIGINAL ARTICLE

The Role of the Maternal and Child Health Book (*Buku* KIA) in Optimizing the Growth of Toddlers

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ABSTRACT

Introduction: Early childhood development is crucial, particularly within the first 1,000 days of life. Maternal care significantly influences this phase, with tools like the Maternal and Child Health Book (KIA) in Indonesia intended to support child growth and development. Despite its widespread use, the impact of KIA book utilization on toddler growth outcomes needs further investigation. This study evaluates the effectiveness of the KIA book for optimizing toddler growth in Karanganyar Regency, Indonesia. **Materials and methods:** An analytical observational cross-sectional study was conducted with 99 mothers of toddlers aged 1-5 years from Sidomukti Village. Data were collected through questionnaires and anthropometric measurements, including height-for-age, a key indicator of stunting status. The study focused on the relationship between KIA book usage and toddler stunting status. Data analysis was performed using STATA version 17. **Results:** Of the 99 children, 87.9% had normal growth status. Effective use of the KIA book was significantly associated with better growth outcomes, showing an adjusted odds ratio of 4.6 (95% CI: 1.2-18.4, $p < 0.05$). While maternal age, education, number of children, and employment status were examined, none of these factors showed statistically significant associations with toddler growth ($p > 0.05$), highlighting that the KIA book utilization may be a more influential factor in promoting normal growth. **Conclusion:** The proper use of the KIA book correlates with improved toddler growth, indicating the potential benefits of increased engagement with this tool. The findings emphasize the need for interventions aimed at increasing maternal use of health monitoring resources to support child development effectively.
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Keywords: Early childhood development, Maternal and Child Health Book (*Buku* KIA), Stunting, Nutritional status, Indonesia

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INTRODUCTION

Early childhood development is a crucial period spanning from conception to three years of age, with the first 1,000 days of life being especially critical (1). This period includes the time from conception to 24 months and continues up to preschool age. During this phase, parental care, particularly from mothers, plays a significant role in supporting the child's growth (1). Essential aspects of caregiving include understanding childcare practices such as health, hygiene, and feeding, providing stimulation through singing, talking, and playing, demonstrating responsiveness through bonding and communication, and ensuring safety (2).

To optimize child growth during these early years, UNICEF emphasizes the importance of supporting breastfeeding, providing appropriate complementary feeding (MPASI), increasing awareness of growth monitoring, expanding immunization coverage, and maintaining personal hygiene to prevent infections (1). This aligns with the Indonesian Ministry of Health Regulation No. 25 of 2014 on Child Protection Efforts, which underscores the need for exclusive breastfeeding for infants aged 0-6 months, the introduction of MPASI, regular health check-ups, child stimulation, and the practice of Clean and Healthy Living Behaviors (PHBS) (3).

The Maternal and Child Health Book (KIA) in Indonesia acts as a comprehensive record for information on child growth and parenting. It includes details about pregnancy, childbirth, postpartum care, newborn care, immunizations, MPASI, and child development stimulation (4,5). KIA Book, introduced by the Ministry of Health of Indonesia in 1991 and updated in 2020. This book offered free of charge through healthcare facilities like puskesmas, hospitals, and clinics, the KIA Book aims to improve health outcomes for mothers

and children across Indonesia. The KIA Book is applied nationwide, though its availability may vary between regions, with more developed areas typically having better access (5).

The 2023 Indonesian Health Survey (SKI) indicates that 93.3% of mothers in Central Java possess a KIA book, with 4.1% unable to present it and 5.7% lacking a KIA book (6). This represents an increase from 2018, when 81.4% of mothers had a KIA book, with 13% unable to show it and 18.6% not having one (7). Utilization of the KIA book can enhance maternal roles in supporting child growth (5).

However, while the KIA book is widely used, its direct impact on optimizing toddler growth outcomes has not been extensively studied, particularly in rural areas like Karanganyar Regency. Previous studies have examined various aspects of maternal care and child development, but few have focused specifically on the role of the KIA book in promoting healthy growth in toddlers. This gap in research necessitates further investigation into how effective utilization of the KIA book can contribute to better growth and development outcomes for children.
During the toddler period, physical and cognitive development is rapid, making it crucial for parents to provide consistent and continuous stimulation. Early stimulation has long-term effects on a child's development, and its absence can lead to growth and developmental issues (8). Yunita et al. found that toddlers who receive early stimulation exhibit better motor development compared to those who do not (8). Nutritional imbalances, including stunting, wasting, overweight, and underweight, can also impact growth (9).

In Karanganyar Regency in 2020, 6.3% of toddlers, or 3,058 out of 48,203, were underweight. Height-for-age (H/A) revealed that 3.3% of toddlers suffered from stunting (10). These conditions can lead to developmental delays, increased illness, and higher mortality risks. Wasting is indicative of acute malnutrition, while overweight can lead to obesity-related health issues (11). In response, the research team initiated a study to explore the role of the KIA book in optimizing toddler growth and development in Karanganyar Regency.

MATERIALS AND METHODS

Study Design

This research employs an analytical observational design with a cross-sectional approach to assess the role of the utilization of the Maternal and Child Health Book (KIA) and toddler growth. Given the study's cross-sectional design, the findings suggest associations but do not establish causality regarding the impact of KIA book utilization on child growth.

Participants

The study was conducted at Noyu Posyandu, Kuwang Posyandu, and Dopo Posyandu in Sidomukti Village. The data collection period occurred in July 2024. The study sample includes mothers with toddlers residing in the working area of the Jenawi Health Center. A purposive sampling technique was used to select a total of 99 mothers. Participants were selected based on their attendance at these posyandu centers, which serve as community health hubs. Criteria for inclusion include having a toddler aged 1-5 years and residing in the specified area. The exclusion criteria encompasses mothers who do not possess a KIA book or those whose toddlers suffer from serious medical conditions that could potentially hinder their growth.

Measurement

Exposure Variable: Utilization of the KIA book (measured by frequency of use and specific sections used) was assessed using a questionnaire with questions about the utilization of the KIA book. The outcome variable, height-for-age (stunting status), measured toddler growth. Confounders: We controlled for factors such as maternal age, education, number of children, and maternal occupation.

Sample Size

The sample size for this study was determined through a combination of statistical power analysis and practical considerations to evaluate the relationship between the utilization of the Maternal and Child Health (KIA) Book and toddler growth outcomes. Statistical power analysis using G*Power software (12) targeted 80% power and a significance level of 0.05 to detect a moderate effect size, with variability estimates informed by prior studies (13,14). The analysis indicated that approximately 99 participants were required, and due to practical constraints, a sample size of 99 mothers from Sidomukti Village was selected.

Data Collection

We collected data for this study using a structured questionnaire that captured detailed information on the use of the Maternal and Child Health Book (KIA) and its impact on toddler growth. The questionnaire, consisting of closed-ended questions, ensured consistency and comparability of responses across participants. Toddler growth was assessed through direct anthropometric measurements in addition to a questionnaire, with a primary focus on Height-for-Age to determine stunting status. Toddler height was precisely measured using a stadiometer accurate to 0.1 cm. The recorded height data were converted into Z-scores based on WHO 2006 growth standards for children under five years old. These Z-scores were then used to classify the toddlers' nutritional status into categories: severely stunted, stunted, and normal. For reference values and further

details, the WHO 2006 growth standards are available at: https://www.who.int/tools/child-growth-standards/standards/length-height-for-age. The questionnaire's content validity was established through expert consultations to ensure it accurately captured information about KIA book utilization. The measurements of weight and height were conducted with precision instruments to ensure accurate data collection. Since the study relied on mothers' self-reported use of the KIA book, recall bias may have influenced the accuracy of responses.

Data Analysis

Data analysis was conducted to evaluate the association between the utilization of the Maternal and Child Health Book (KIA) and toddler growth outcomes. Descriptive analysis was conducted to determine the frequency distribution of maternal characteristics based on the stunting status of the child. Bivariate analysis using simple logistic regression and multivariate analysis using multiple logistic regression were employed to determine the role of KIA book utilization in toddler growth outcomes. Data analysis was performed using STATA version 17 (15). STATA 17 was chosen for its robust statistical capabilities, particularly for logistic regression analysis.

Ethical Clearance

This study received ethical approval from the Health Research Ethics Committee of Dr. Moewardi General Hospital, with Ethical Clearance Number: 1.477 / VI / HREC / 2024. In addition, all respondents involved in this study provided their consent after receiving a thorough explanation through the informed consent process.

RESULTS

Table I presents the research results regarding respondents' characteristics and child growth status. Of the 99 respondents, the majority of children (87.9%) had normal growth status. Based on the characteristics of the mothers, we found several factors that influence the proportion of children with normal growth status. First, mothers aged 25 years and under were more likely to have children with normal growth status (94.7%) compared to mothers over 25 years old (86.3%). This age threshold was chosen because 25 years is commonly considered the cutoff between adolescence and adulthood, with various psychological, physical, and social changes occurring around this age. This result indicates that younger mothers tend to have a slightly higher proportion of children with normal growth compared to older mothers. Second, maternal education also showed an impact on child growth status. Children with normal growth status were most common among mothers with higher education (100%), followed by those with secondary education (87.5%), and lowest among mothers with basic education (85.7%). This finding suggests that the higher the mother's education level, the higher the proportion of children with normal growth status. Additionally, the number of children a mother has plays a role in determining the child's growth status. Mothers with three or more children had the highest percentage of children with normal growth (95.8%), followed by those with one child (92.9%), and those with two children had the lowest percentage (80.9%). This indicates that mothers with more children tend to have a higher proportion of children with normal growth. The mother's employment status also influenced the child's growth status. Mothers who were not working were more likely to have children with normal growth status (90.1%) compared to those who were working (82.1%). This suggests that non-working mothers have a higher proportion of children with normal growth compared to working mothers. Lastly, the utilization of the KIA (Maternal and Child Health) book was associated with child growth status. Mothers who effectively utilised the KIA book (91.8%) were more likely to have children with normal growth than those who underutilised it (76.9%). This indicates that proper utilization of the KIA books is associated with a higher proportion of children with normal growth.

Table I: Respondent Characteristics Based on Child Growth (Stunting Status)

Variable	Stunting Status		Total N= 99
	Stunting n= 12	Normal n= 87	
	n(%)	n (%)	N(%)
Mother's Age			
25 years and under	1(5.3)	18(94.7)	19(100)
More than 25 years	11(13.8)	69(86.3)	80(100)
Total	12(12.1)	87(87.9)	99(100)
Mother's Education			
Basic	3(14.3)	18(85.7)	21(100)
Intermediate	9(12.5)	63(87.5)	72(100)
Higher	0(0)	6(100)	6(100)
Total	12(12.1)	87(87.9)	99(100)
Number of Children			
One	2(7.1)	26(92.9)	28(100)
Two	9(19.1)	38(80.9)	47(100)
Three or more	1(4.2)	23(95.8)	24(100)
Total	12(12.1)	87(87.9)	99(100)
Employment Status			
Not working	7(9.9)	64(90.1)	71(100)
Working	5(17.9)	23(82.1)	28(100)
Total	12(12.1)	87(87.9)	99(100)
Utilization of KIA Book			
Insufficient	6(23.1)	20(76.9)	26(100)
Good	6(8.2)	67(91.8)	73(100)
Total	12(12.1)	87(87.9)	99(100)

Based on the results presented in Table II, it was found that good utilization of the KIA book significantly increased the odds of a normal growth status in children, with an unadjusted odds ratio (OR) of 3.4 (95% CI: 0.9-11.5, *p < 0.05) and an adjusted odds ratio (AOR) of 4.6 (95% CI: 1.2-18.4, *p < 0.05) after controlling for other factors.

The AOR of 4.6 suggests that mothers who effectively utilized the KIA book were 4.6 times more likely to have children with normal growth compared to those who did not use the book as frequently. However, other variables, such as mother's age, number of children, mother's education, and employment status, did not show statistically significant associations with normal growth. For example, mothers aged more than 25 years had lower odds of normal growth in their children compared to younger mothers, but this relationship was not significant in either the unadjusted (OR = 0.3, 95% CI: 0.04-2.9) or adjusted model (AOR = 0.4, 95% CI: 0.02-5.9). Similarly, the number of children, mother's education level, and employment status showed no significant impact on child growth outcomes. The model explained approximately 15% of the variation in normal growth status (Pseudo R = 15%). This value suggests that the factors included in the model account for 15% of the variance in toddler growth outcomes, indicating that other unmeasured factors may also contribute to toddler growth. Further research is needed to explore these additional factors.

Table II: Odds Ratio of risk factors for child growth

Variable	Normal growth	
	Unadjusted	*Adjusted*
	OR [CI]	AOR [CI]
Utilization of KIA Book		
Insufficient	1	1
Good	3.4[0.9-11.5]*	4.6[1.2-18.4]*
Mother's Age		
25 years and under	1	1
More than 25 years	0.3 [0.04-2.9]	0.4[0.02-5.9]
Mother's Education		
Basic	1	
Intermediate	1.1[0.3-4.7]	
Higher	--(empty)	
Number of Children		
One	1	1
Two	0.3[0.1-1.6]	0.5[0.05-3.9]
Three or more	1.7[0.1-20.8]	2.5[0.1-42]
Employment Status		
Not working	1	1
Working	0.5[0.1-1.7]	0.4[0.1-1.7]
		Pseudo R^2= 15%

Note: Odds Ratio; 95% confidence intervals in brackets
* p < 0.05, ** p < 0.01, *** p < 0.001
OR obtained from the results of simple logistic regression testing
AOR obtained from the results of Multiple logistic regression testing

DISCUSSION

The findings from this study provide important insights into the relationship between various maternal characteristics and child growth status. The study found that 87.9% of the children had normal growth status, indicating a generally positive trend in child growth within the study population. We examined several key maternal factors to assess their influence on child growth, finding some to show significant associations while others did not.

Utilization of the KIA Book and Child Growth Status

One of the most important findings from this study was the significant impact of KIA book utilization on child growth status. The odds of normal growth were substantially higher among mothers who effectively utilized the KIA book, with an adjusted odds ratio of 4.6 (95% CI: 1.2–18.4). This finding underscores the importance of maternal engagement with child health monitoring tools. The KIA book, which contains valuable information on child development, nutrition, and immunization, appears to be an effective resource for promoting normal childhood growth. The strong association suggests that interventions aimed at increasing the utilization of the KIA book could be a valuable strategy for improving child growth outcomes in this population. One of the most important findings from this study was the significant impact of KIA book utilization on child growth status. The observed correlation aligns with previous findings that educational tools, such as nutrition education programs, have been associated with positive changes in children's growth markers, emphasizing the role of informed maternal practices in promoting healthy development (16–19). Furthermore, studies have documented that effective growth monitoring and educational initiatives can boost maternal knowledge and confidence about child nutrition and health, ultimately resulting in improved growth outcomes for children in developing contexts (20,21).

Maternal Age and Child Growth Status

One notable observation was the difference in child growth status based on maternal age. Mothers aged 25 years and under were more likely to find children with normal growth (94.7%) compared to those over 25 years old (86.3%). This difference could be good for younger mothers, but the adjusted analysis (AOR = 0.4, 95% CI: 0.02–5.9) didn't find it to be statistically significant. This means that mother's age may not be a very important factor in determining normal growth. This finding is consistent with other research that suggests maternal age alone may not strongly determine child growth outcomes once other factors are controlled for. A study examining variation in pregnancy outcomes by maternal race found that mothers aged 25 years and under were more likely to have children with normal growth (94.7%) compared to those over 25 years old (22). This finding aligns with previous research suggesting that deliveries to women older than 35, 40, or 45 are at increased risk for various adverse pregnancy and birth outcomes compared to younger women (23). But, the fact that the adjusted analysis in this study (AOR = 0.4, 95% CI: 0.02–5.9) did not show any statistical significance suggests that maternal age may not be a very important independent predictor of normal growth. This supports the idea that other factors, like nutrition, health care access, and socioeconomic variables, may be more important

in determining child growth outcomes, especially in groups that face problems in these areas (23,24).

Maternal Education and Child Growth Status

Maternal education showed a clear gradient, with higher proportions of normal growth among children whose mothers had attained higher education levels. This aligns with the theory that better-educated mothers may have more access to information on child nutrition and health, allowing them to better support their children's growth. The adjusted model did not find maternal education as a statistically significant predictor of normal growth, despite the strong descriptive association (AOR = 1.2, 95% CI: 0.3-4.8). This suggests that the relationship between education and child growth may be mediated by other unmeasured factors such as access to resources or healthcare utilization. Research consistently shows that higher levels of maternal education correlate with improved child health outcomes, as educated mothers are often better equipped to make informed decisions about nutrition and healthcare, thus impacting their children's growth trajectories positively (25). This correlation is particularly pronounced in developing countries, where the level of maternal education significantly influences children's nutritional status and overall health (26). Moreover, the lack of maternal education is associated with higher rates of stunting among children, indicating that educational disparities can lead to significant differences in nutritional practices and child health outcomes within households, particularly in environments where resources are limited and health information is not readily accessible (27–30). Despite the observed descriptive associations, maternal education and employment status did not emerge as statistically significant predictors of normal growth in this study. This could be due to other factors not tested in the research, such as access to healthcare or specific nutritional practices, which may play a more prominent role.

Number of Children and Child Growth Status

Mothers with three or more children showed higher proportions of normal growth. This may seem counterintuitive, as having more children could potentially dilute parental resources and attention. However, this finding might indicate that mothers with more children have greater experience in caregiving, which may positively influence the growth outcomes of their children. Nonetheless, this variable did not reach statistical significance in the regression analysis (AOR = 1.5, 95% CI: 0.5-4.4), suggesting that the number of children may not independently predict child growth status. This finding aligns with previous research indicating that factors associated with higher maternal experience and adaptability in caregiving may contribute positively to child development, although the complexities of family dynamics and individual circumstances warrant further investigation (31). Moreover, it is essential to consider that maternal education and socioeconomic factors may also play a pivotal role in determining child health outcomes, as educated mothers tend to leverage available healthcare resources more effectively and are likely to have healthier pregnancies, directly impacting the growth and development of their children (31–33).

Employment Status and Child Growth Status

This study also explored employment status as a maternal characteristic. Children of non-working mothers had a higher proportion of normal growth compared to those of working mothers. This may reflect the fact that non-working mothers have more time to dedicate to childcare and feeding practices. However, the lack of significance in the adjusted analysis (AOR = 0.6, 95% CI: 0.2-2.0) suggests that maternal employment may not independently affect child growth. These findings echo the mixed results from other studies, where maternal employment does not consistently predict child nutritional outcomes when accounting for other variables. The relationship between maternal employment status and child growth outcomes has been a subject of ongoing research, with conflicting findings reported across various studies. This variability may stem from differing cultural, economic, and policy contexts that influence maternal roles in childcare and employment, as well as the availability of support systems for working mothers in various regions (34,35). Changes in women's workforce participation, steadily increasing in many developing countries, further compound this complexity by affecting not only family income but also childcare dynamics and health outcomes for children (36). Moreover, the challenges faced by employed mothers, including time constraints and the need to balance work and family responsibilities, can result in adverse nutritional practices, potentially negatively impacting child growth. This illustrates the complex interplay between employment status and maternal caregiving responsibilities in various settings.

Implications and Limitations

These findings have several implications for public health interventions aimed at improving children's growth outcomes. We should prioritize efforts to improve maternal engagement with health monitoring tools, given the significant association between KIA book utilisation and child growth status. Programs designed to increase awareness and use of the KIA book may have a meaningful impact on child growth, particularly in settings with limited access to healthcare services. However, this study also has limitations that should be considered when interpreting the results. The cross-sectional nature of the study limits the ability to infer causal relationships between maternal characteristics and child growth outcomes. Additionally, the relatively small sample size may have limited the power to detect significant associations for some variables, such as maternal age, education, and employment status. Future research with larger sample sizes and longitudinal designs would be valuable to further investigate these

relationships and to explore potential mediating factors.

CONCLUSION

In conclusion, this study highlights the importance of maternal engagement with health monitoring tools, particularly the KIA book, in promoting normal child growth. While other maternal characteristics, such as age, education, and employment status, showed descriptive associations with child growth status, they did not emerge as statistically significant predictors in the adjusted models. These findings suggest that targeted interventions to improve maternal utilization of resources, like the KIA book, could play a crucial role in enhancing child growth outcomes in similar populations.

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