

# The risk of inappropriate timing of complementary foods introduction is increased among first-time mothers and poor households

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## ABSTRACT

**Background:** Global recommendations suggest mothers provide the first complementary food to infants when they reach six months of age. Failure to introduce complementary foods promptly may put infants in adverse health and nutrition outcomes. **Objective:** This study aimed to analyze factors associated with inappropriate timing of complementary foods introduction in Kebumen Regency. **Methods:** This study used a cross-sectional design. A multistage cluster sampling was employed to select 355 mothers of children aged 6-23 months in Kebumen Regency. Our dependent variable was the timing of complementary food introduction. Meanwhile, independent variables included factors at the child, parental, and household levels. Univariate and multiple logistic regressions were performed in this study. **Results:** There was 39.15% of young children received inappropriate timing of complementary feeding. Being the second-born child or above (OR=0.56; 95%CI: 0.33-0.95) and coming from high-income households (OR=0.57; 95%CI: 0.36-0.90) were protective factors of inappropriate timing of complementary foods introduction. Other variables such as maternal age, maternal education, maternal occupation, father's education, and family support were not significantly associated with incorrect timing of complementary feeding. **Conclusions:** The proportion of inappropriate timing of complementary foods introduction in Kebumen Regency is alarming and is mainly explained by child's birth rank and household economic status suggesting the importance of targeting nutritional education to first-time mothers as well as poor households.

**KEYWORDS:** complementary food introduction; economic status; first-time mothers; infant and young child feeding

## INTRODUCTION

Globally, World Health Organization (WHO) recommends mothers to breastfeed their infant exclusively in the first six months and to begin complementary feeding when the infant reaches six months of age or 180 days of life while continuing breastfeeding up to two years of age (1). Nonetheless, the exclusive breastfeeding coverage was 40% in worldwide. Many children were provided with inadequate and unsafe complementary foods in which only <25% of infants who consumed diversified foods and were appropriately fed according to their age (2). In Indonesia, the most recent survey of Basic Health Research (*Riskesdas*) in 2018 revealed that the

coverages of early initiation of breastfeeding, exclusive breastfeeding, and dietary diversity were 58.2%, 37.3%, and 46.6%, respectively (3).

The introduction of complementary foods at an earlier age was associated with increased risks of food allergies (4-6), overweight and obesity (7,8), and several illnesses (9,10). Meanwhile, the late introduction of complementary feeding was linked to foods acceptance and feeding problems (10,11) and anemia (12). In addition, previous studies showed that both early and late initiation of complementary feeding was associated with childhood stunting (13-15). On the other hand, providing the first food to infants at six months of age

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may give benefits to their nutritional fulfillment and development (16).

Several factors have been associated with when to start complementary feeding introduction. Maternal factors that were shown to be the underlying factors included maternal age, educational attainment, perception, and nutritional status (17,19). Other factors that might be related were the child's sex, household income, and nationality (18,19).

To our knowledge, only a few studies were assessing the determinants of early introduction of complementary foods in Indonesia. Those studies took place in Sumatera Selatan (20), Riau (21), Gorontalo (22), and Pontianak (23), however, with limited sample size, study area, variables, or statistical methods. Based on Central Java Health Profile 2017, the proportion of infants aged 0-6 months who were exclusively breastfed in Kebumen was 50.7% (24) which was far below the national achievement of 61.3% (25) indicating the existence of infant and young child feeding problems in Kebumen Regency. Therefore, our study aimed to examine the determinants of incorrect timing of complementary feeding among young children in Kebumen Regency.

## METHODS

### Study design and participants

This study used a cross-sectional design which was conducted from February to May 2018 in Kebumen Regency, Central Java Province, Indonesia. We gathered information from 355 mothers regarding their 6-23 months old children data. Mothers of infants and young children acted as the respondents of this study and were asked for their consent. A multistage cluster sampling was used to select our study samples. At the beginning of this study, a list of children under the age of two years old was obtained from three clusters of primary health centres, namely Kebumen I, Kebumen II, and Kebumen III primary health centres. We then randomly picked numbers to choose six villages and selected our study samples proportionally to the village level. Finally, all infants and young children who registered at the *posyandu* within the villages and met the inclusion criteria of this study were recruited.

## Measures

*Complementary feeding introduction.* The main outcome in this study was the timing of complementary feeding introduction. Complementary feeding introduction was defined as when infants first received solid, semi-solid or soft foods because the energy and nutrients requirement exceeds what can be fulfilled by exclusive breastfeeding (26). We collected this data based on mothers' recall then categorized it into appropriate timing (at six months) and inappropriate timing (below or above six months) (13).

Independent variables included child's age (6-11 months or 12-23 months), birth order (having first or not first-child), parental age (<35 years or ≥35 years), parental education (high if completed senior high school or low if not completed senior high school), mother's occupation (working or not working), family support, and household economic status.

*Family support.* Family support was defined as supports given by either husband, mother, or mother in law of our study respondents which comprised four elements of supports (emotional, informational, instrumental, and appraisal) (27) regarding complementary foods. If the family support score was above the mean of family support scores of all participants, we classified it as having the support from families, otherwise not.

*Household economic status.* Household economic status was determined based on the average of total household monthly income before any deduction (28). We interviewed mothers as our participants and asked them to describe the monthly earnings of the total household members. After that, we compared it with the minimum regional wage which was 1,558,700 IDR (29). Households with family income less than or equal to the minimum regional wage (1,558,700 Indonesian rupiahs (IDR)) were categorized as poor while households with family income more than the minimum regional wage were considered as rich.

We used a structured questionnaire which allowed us to gather data on sociodemographic, timing of complementary foods, and family support aspects. This instrument had been tested for its validation and reliability. This study was ethically approved by the institutional review board of Alma Ata University number KE/AA/IV/512/EC/2018.

### Data analysis

Descriptive statistics were performed to analyse the distribution of the characteristics of our study samples and respondents and main variables. The association of each dependent variable and the independent variable was tested by univariate logistic regression. All variables with a p-value <0.25 in the bivariate analysis entered multiple logistic regression for further analysis. We set a level of significant of 0.05 to determine factors associated with the primary outcome. All of the analyses were done using Stata 14.2 version.

### RESULTS

**Table 1** shows that most of the children in our study were aged 12-23 months (61.13%) and born as the first child (75.77%). The majority of mothers and fathers of our study samples were 25-34 years old (62.54%) and ≥35 years old (48.87%), respectively. Almost 70% of mothers completed both junior and senior high schools whereas 46% of fathers completed senior high school. Approximately seventy-six per cent of mothers were not working while almost half of the fathers worked as in the private sectors. Both poor and rich households shared the same proportion around 50%.

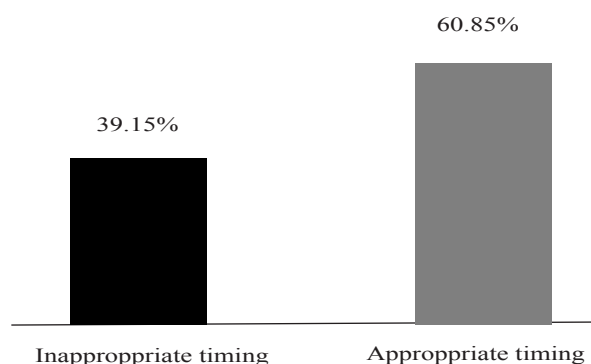
**Figure 1** presents the proportion of complementary feeding introduction. There was 39.15% of young children who had been given complementary foods inappropriately or only 60.85% of children had been fed their first complementary food exactly at six months old. Furthermore, we examined the determinants of inappropriate timing of complementary foods introduction as shown in **Table 2**.

In the bivariate analysis, factors associated with incorrect timing of complementary feeding included not being the first-born child (crude OR=0.59; 95%CI: 0.35-0.99) and being a child from richer families (crude OR=0.52; 95%CI: 0.34-0.81). In other words, children who born as the first child were 1.7 times more likely to receive inappropriate timing of complementary food compared to those who born as the second or more. Other variables such as mother’s age, mother’s education, father’s age, and family support were not related to the timing of complementary foods introduction. However,

all variables with a p-value <0.25 remained included in the multivariate analysis. These variables were birth rank, mother’s education, father’s education, and household economic status (**Table 2**).

**Table 1. Distribution of characteristics of young children, mothers, and households**

Characteristics	n	%
Age of children (months)		
6-11	138	38.87
12-23	217	61.13
Birth rank		
1 <sup>st</sup>	269	75.77
>1 <sup>st</sup>	86	24.23
Age of mothers (years)		
<35	276	77.75
≥35	79	22.25
Mother’s education		
Low	203	57.18
High	152	42.82
Mother’s occupation		
Not working	271	76.34
Working	84	23.66
Age of fathers (years)		
<35	182	51.27
≥35	173	48.73
Father’s education		
Low	161	45.35
High	194	54.65
Family support		
No	171	48.17
Yes	184	51.83
Household economic status		
Poor	187	52.68
Rich	168	47.32



**Figure 1. Proportion of complementary feeding introduction**

**Table 2. Bivariate and multivariate results of factors associated with inappropriate timing of complementary foods introduction**

Variables	Bivariate analysis			Multivariate analysis		
	COR	95% CI	p	AOR	95% CI	p
Birth rank						
1 <sup>st</sup>	Ref			Ref		
>1 <sup>st</sup>	0.59	0.35-0.99	0.046	0.56	0.33-0.95	0.033*
Mother's age (years)						
<35	Ref					
≥35	0.80	0.47-1.34	0.392			
Mother's education						
Low	Ref			Ref		
High	0.67	0.44-1.04	0.073	0.84	0.52-1.38	0.494
Maternal work						
Not working	Ref					
Working	0.84	0.50-1.40	0.499			
Father's age (years)						
<35	Ref					
≥35	0.90	0.59-1.38	0.629			
Father's education						
Low	Ref			Ref		
High	0.74	0.49-1.14	0.175	0.86	0.53-1.39	0.536
Family support						
No	Ref					
Yes	0.82	0.53-1.25	0.354			
Household economic status						
Low	Ref			Ref		
High	0.52	0.34-0.81	0.003	0.57	0.36-0.90	0.017*

\*p<0.05 = significant; COR = crude odds ratios; AOR = adjusted odds ratios; CI = confidence interval

Multivariate results in the **Table 2** showed that children who were born as the first child had twice greater risk to be fed in an inappropriate timing compared to those who were born as the second or more (p=0.033). Household economic status was also significantly associated with the timing of complementary feeding in which children coming from richer households had a protective effect against inappropriate timing of complementary foods (adjusted OR=0.57; 95%CI: 0.36-0.90). Conversely, mother's education (adjusted OR=0.84; 95%CI: 0.52-1.38) and father's education (adjusted OR=0.86; 95%CI: 0.53-1.39) were not significantly associated with the timing of complementary foods introduction.

## DISCUSSION

Young children in this study who were being fed in a timely manner were 60.9% of the total study

population. This proportion was lower compared to studies conducted in the Netherlands (78.6%) (17), Bangladesh (83.1%) (30), Ethiopia (83.0%) (31), and Bhutan (93.0%) (32), but higher than the study in Saudi Arabia (37.5%) (18). Although the indicator of timely initiation of complementary feeding had not been specified, the WHO/UNICEF 2018 stated the global target for achieving exclusive breastfeeding to 70% in 2030 (33). Rationally, if infants in the population reached the global target of exclusive breastfeeding up to six months of age, the proportion of timely introduction of complementary foods will be achieved. This relationship may apply in the other way around.

Incorrect timing of introducing complementary foods was associated with children who were born as the first child. The risk of being fed inappropriately was twice higher than those who were born as the second or more. The result was in line with previous studies conducted

in Nigeria (34). Being a first-born child or a child from a first-time mother had been associated with the poor understanding of WHO infant and young child feeding guidelines. Mothers who just had their first child tend to be influenced by external factors such as norms and peers as well as by internal factors related to their readiness of responsive feeding, thus preventing them to introduce complementary foods at the appropriate time (35).

Children who were born in high-income families had a lower risk to experience inappropriate timing of complementary foods introduction. The chance was half of those who were coming from low-income households. Previous studies conducted in Saudi Arabia (18) and Brazil (36) confirmed our result. Poor incomes limit the purchasing of health care in term of its accessibility, utility, and the quality of health care (37). It implies that children from poor families may face difficulties in accessing health care facilities and high-quality services such as nutrition counselling and monitoring from qualified health professionals in order to meet infants and young child feeding recommendations. Furthermore, a study among Chinese working women found that maternal return to work due to financial burden increased the risk of stopping breastfeeding below four months of age (38). For this issue, mothers may give breastmilk substitutes in the form of formula milk or solid foods before six months of age. On the contrary, mothers with low economic status may also delay the initiation of complementary foods due to financial restriction to purchase foods (39). Therefore, the low economic status may put infants to receive either early or delayed introduction of complementary foods.

Maternal education was among the factors which did not have a significant relationship with inappropriate timing of introducing complementary foods. Our finding was the opposite of an earlier study conducted among Chinese population in which maternal education was the only significant factor associated with the introduction of complementary food (40). However, high educational attainment does not always represent the desirable knowledge of infant and young child feeding (41). A study in Ethiopia (2019) suggested that maternal birth readiness, registering a child to regular growth check-up, and maternal skill in knowing the specific time to initiate complementary foods was positively associated

with appropriate complementary feeding initiation (42). As our study has shown the significant relationship between birth order and timing of complementary foods introduction, we assumed that first-time mothers were more likely unprepared to provide complementary foods in a timely manner.

Our study samples which were obtained from three primary health centres is a strength of this study that allowed us to generalize the results to a wider population representing Kebumen Regency or other areas which have similar settings and characteristics. The topic of this study was among a few studies conducted in Indonesia and was the first study conducted in Kebumen Regency which may give insights to infant and young child feeding practices in Indonesia, thus provide a better understanding in developing nutrition policies and programs. However, this study also had several limitations. A cross-sectional design used in this study restricted us to draw the cause-effect relationship between independent and dependent variables. The use of household income to determine household economic status might have some issues such as inaccurate knowledge of the exact income, not telling the true income, different family members who earned and shared their income, and the variability of income across times.

## **CONCLUSIONS**

The proportion of inappropriate timing of complementary foods introduction in Kebumen Regency is 61% and is significantly associated with the child's birth rank and household economic status. For departments of health, NGOs, and community health professionals and workers, this study results suggest the importance of targeting nutritional education to all pregnant women, especially those who are first-time mothers as well as coming from poor households. The program should cover interventions designed to improve maternal preparedness to appropriate complementary feeding practices are needed during and before pregnancy. For future researchers, studies analyzing determinants of complementary feeding practices should carefully consider other influencing factors such as social and cultural aspects.



### Declaration of conflicting interests

No potential conflict of interest was reported by the authors.

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