

## The Relationship of Supplementary Feeding, Breast Milk (MP-ASI) to Infants with The Event of Diarrhea

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### ABSTRACT

Diarrhea is one of the causes of death in toddlers, and one of the factors that causes diarrhea is MP-ASI. Based on the most significant proportion of diarrhea sufferers at the Baros Health Center in the last three months of October, November, and December 2021, 87 infants aged 0-12 months and 29 infants aged 12-24 months, respectively, and 31 infants aged 25-60 months. This research aims to determine the relationship between complementary feeding and the incidence of diarrhea in infants aged 3-12 months in the Baros Public Health Center, Sukabumi City, Indonesia. This research used a cross-sectional population, and the total sampling was 48 infants aged 3-12 months. The analysis of data used Chi-Square. The inappropriate provision of complementary feeding to infants aged 3-12 months, 26 respondents (54.2%), and the appropriate ones were 22 respondents (45.8 %), the incidence of diarrhea in infants aged 3-12 months who had diarrhea as many as 28 respondents (58.6%) and who did not have diarrhea as many as 20 respondents (41.7%). The result shows a relationship between giving complementary feeding to infants aged 3-12 months and the incidence of diarrhea with a value of 0.00 (<0.05). There is a relationship between the provision of complementary foods for breast milk (MP-ASI) and the incidence of diarrhea in infants aged 3-12 months. Giving MP-ASI is one of the essential needs, but what needs to be considered by the mother is the appropriate age of the baby. Providing information related to MP-ASI knowledge to mothers is the key to preventing diarrhea in infants.

**Keywords:** Supplementary Feeding, Breast Milk, Diarrhea, Midwives, Role



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## 1. INTRODUCTION

Diarrhea is a process of excessive defecation characterized by a mushy or liquid consistency, usually occurring in children aged 0-12 months or adults (Koppen et al., 2016; Sheikh et al., 2018). 1.9 million children under five die from diarrhea yearly, the second highest contributor to death for children under five years of age in the world, with a percentage of 16%. 1.7 billion cases of diarrhea in children cause 760,000 children to die yearly (Acharya et al., 2018; Fonseca et al., 2014; Mesagan & Adeniji-Ilori, 2018).

The target of The Integrated Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea (GAPPD) is to reduce the death rate from diarrhea to 1 per 1000 live births (Hosangadi et al., 2019; Masanja et al., 2019) in 2025 (Girma et al., 2022). The diarrhea morbidity rate in Indonesia in

2020 is 1,637,078, while the diarrhea morbidity rate in West Java in 2020 is 64.53 per 1000 population. The proportion of infant mortality in West Java in 2020 is 3.6/1000 live births (RI, 2020).

Based on data from the Sukabumi City Health Office report in 2019, there were 79,982 and 179 infant deaths due to diarrhea, in 2020 there were 82,506 and 202 infant mortality rates due to diarrhea. Death due to diarrhea in the work area of the Sukabumi City Health Office is the Baros Health Center. In 2019 there were 876 and 43 infant deaths due to diarrhea, in 2020 there were 894 and 54 infant deaths due to diarrhea (Kemenkes RI, 2020).

Based on the largest proportion of diarrhea sufferers at the Baros Health Center in the last three months, namely October, November, December, the 0-12 month age group was 87 babies, the 12-24 month age group was 29 babies, the 25-60 month age group was 31 babies. This difference, of course, needs to be seen from several factors (Kemenkes RI, 2020).

Factors that affect diarrhea are infectious factors consisting of two kinds of general infections. 1) Gastrointestinal tract infections which are the leading cause of diarrhea in children (Reisinger et al., 2005; Schlenker & Surawicz, 2009), and 2) parenteral infections are infections outside the digestive tract of food, malabsorption factors (absorption disorders) such as carbohydrate absorption disorders (in infants and children) (Thiagarajah et al., 2018). The most common is lactose intolerance. During bathing and gargling, diet factors contract between source and host can occur through water, incredibly raw drinking water. Contact germs in feces can be transmitted directly to other people if they are attached to the hands and then put into the mouth to hold food. Contamination of cutlery and kitchenware is also a source of diarrhea transmission and psychological factors such as fear and anxiety (Gallo et al., 2020; Yao et al., 2022).

Factors that influence diarrhea are risk factors for mothers and toddlers (Demissie et al., 2021; Takele et al., 2019). Maternal factors include age, level of knowledge, education level, employment status, and economic status, while toddler factors (children) include age, exclusive breastfeeding, measles immunization, and nutritional status (Kananura, 2022; Kelkay et al., 2020).

In general, diarrhea can be caused by various things. It is easier to classify the causes of diarrhea into two, namely diarrhea due to infection and diarrhea not due to infection, including diarrhea due to infection including bacteria, viruses, and worms (Hodges & Gill, 2010; Khurana et al., 2021). Non-infectious diarrhea includes allergies to certain foods, indigestion, food or drink poisoning, certain types of food and drink, nutritional deficiencies, psychological or psychiatric conditions, medications, intestinal diseases, and intestinal obstruction (Broder, 2016; Wang & Fang, 2021).

In the first three years of life, a child will experience 1-3 times acute episodes of severe diarrhea (Chao et al., 2019). Infants who are not exclusively breastfed have a 60% risk of death due to infectious diseases, including diarrhea (Acácio et al., 2019). The diarrhea attacks children aged 7-24 months (Saeed et al., 2015). It happens because this 7-month-old baby gets other food outside of breast milk where the risk of germs in other food is high (especially if sterilization is lacking) (Lynch & Hurrell, 2020). Milk production begins to decrease, which also means Antibodies that enter with breast milk are reduced (Atyeo & Alter, 2021).

Complementary foods for breast milk (MP-ASI) are one of the causes of diarrhea because too early administration can lead to various diseases. Complementary feeding is started at six months because the digestive development system has just started but has not been able to absorb protein (Alifariki et al., 2020). The cleanliness of the food eaten by the baby and the MP-ASI given are not following the baby's age, such as instant food for two years of age, which is given to babies under one year of age.

The pattern of breastfeeding is a physiological process to provide optimal nutrition to infants (Gombert & Codoñer-Franch, 2021). Nothing is more valuable in a child's life than getting quality nutrition early in life. Mother's milk is an ideal nutrient for babies' optimal health, growth, and development. Infants are recommended to be breastfed fully (exclusively) for the first six months of life (Mexitalia et al., 2022; Perrella et al., 2021; Verduci et al., 2021). Protection against infection is most significant during exclusively breastfed infants' first few months of life (Pandolfi et al., 2019). The longer the baby gets breast milk will provide the more substantial the protective effect against various diseases, one of which is diarrhea.

One of the risk factors for diarrhea is not exclusive breastfeeding and inappropriate complementary feeding (MP-ASI) (Pandolfi et al., 2019). Complementary foods for breast milk (MP-ASI) that are not appropriate are given MP-ASI before the time, namely at six months (Manurung & Bakara, 2019). Breast milk can meet infants' nutritional needs at 0-6 months, while at six months and over, babies need additional food or complementary foods to meet their nutritional needs (Appiah et al., 2021; Tampah-Naah et al., 2019).

Protecting children from diarrhea and all-cause mortality is the most cost-effective way. Breast milk is uniquely suited to human infants in its composition of nutrients and non-nutritive bioactive factors that promote healthy survival and development. Based on Sasongko's (2012) research, there is a relationship between complementary feeding and the incidence of diarrhea. Giving MP-ASI at an early age is considered natural by mothers because they feel that if the baby cries, it is caused by hunger and not enough breast milk. Afriyanti et al., (2014) stated that there was a relationship between

complementary feeding behavior and the incidence of diarrhea in infants aged six months to 1 year in the work area of the Mangkang Health Center. The provision of MP-ASI is often watery, and the porridge is too gravy, so it makes the stomach full. However, the provision of nutrients is less than in breast milk, and the risk of diarrhea increases because the additional food is not as clean as breast milk.

Another study by Wright et al., (2017) stated that diarrhea-related deficits in relative weight were significantly exacerbated in non-breastfed girls aged 6 and 8 months. Importantly, in infants <6 months, breastfed and diarrhea was still associated with greater relative weight compared to those who were not breastfed and diarrhea-free. Breastfeeding appears to be a vital contributor to relative body weight in younger infants (<6 months), while diarrheal illness strongly contributes to relative weight deficits in older infants (6-12 months). These findings underscore the importance of breastfeeding to promote infant nutritional status in infants with or without diarrhea from birth to 12 months. Sasongko & Huriah (2012) showed that mothers gave MP-ASI to infants 0-6 months when the baby cried, it meant the baby was hungry and needed to give MP-ASI because of the mother's assumption that breast milk alone was not enough for the baby's needs. The diarrhea incidence in Ngaren village from the chi-square obtained a p-value of 0.00, meaning there is a relationship between complementary feeding and diarrhea incidence.

Based on the background of this study, it aims to provide information about the relationship between the provision of complementary feeding (MP-ASI) to infants and the incidence of diarrhea in the Baros Health Center Work Area, Sukabumi City, Indonesia.

## 2. METHOD

The design of this study used an analytical survey or research that explores how and why phenomena can occur. The type of research that the researcher will use is quantitative analysis with bivariate analysis. The research design used a questionnaire method with a cross-sectional (Amaliah et al., 2022).

The population in this study were all mothers who had babies in January 2022, with as many as 48 mothers. The sampling method used in this research is total sampling (Rokhmatul Hikmat et al., 2022). The inclusion criteria in this study were: (1) Mothers who have babies, (2) Willing to be respondents (3) Mothers who can read and write. The exclusion criteria in this study were: (1) Mothers who cannot read and write, (2) Mothers who have diarrhea with other indications of disease, (3) Mothers who have babies with lactose intolerance and absorption disorders, (4) Mothers who have babies with poor nutrition.

Primary data in this study were obtained from a questionnaire about the provision of MP ASI. Secondary data is the incidence of diarrhea at the Baros Public Health Center. The Chi-square test with a 95% confidence degree ( $p < 0.05$ ) determines the relationship between the two variables. If the analysis results obtained a p-value  $< 0.005$ , then statistically, it is said to be significant or there is a relationship, and if the p-value is  $> 0.05$ , then the calculation results are said to be not meaningful, or there is no relationship.

## 3. RESULTS AND DISCUSSION

### 3.1 Results

**Table 1.** Frequency distribution of the description of complementary feeding of breast milk (MP-ASI) to infants aged 3–12 months

Giving MP-ASI	Total	Percentage (%)
Appropriate	22	45.8
Not appropriate	26	54.2
Total	48	100.0

**Table 2.** Distribution of the frequency of diarrhea in infants

Diarrhea incidence	Total	Percentage (%)
Diarrhea	28	58.3
No diarrhea	20	41.7
Total	48	100.0

**Table 3.** The relationship between complementary feeding of breast milk (MP-ASI) to infants and the incidence of diarrhea

Provision of MP ASI	Diarrhea		Total	P-Value
	No Diarrhea	Diarrhea		

	N	%	N	%	N	%	
appropriate	17	77.3	5	22.7	22	100	
Not appropriate	3	11,5	23	88.5	26	100	0.00

### 3.2 Discussion

Table 2 shows that the Baros Public Health Center, Sukabumi City, it was found that the provision of Complementary Foods for Mother's Milk (MP-ASI) to infants aged 3-12 months from 48 respondents who were not appropriate, 54.2% (26 respondents). In contrast, the appropriate ones are 45.8% (22 respondents). This research found that 54.2% of complementary feeding was inappropriate, including mothers who gave MP-ASI before six months and had given bananas to their babies. Mothers gave MP ASI not according to the number of servings of baby food. Most portions the mother gives are too many because the mother feels sorry if the baby is hungry. The texture the mother gives is not according to the baby's age, like a 6-month-old baby who has been given relatively solid food because the soft one was given at three months.

MP-ASI is additional food for babies. This food must be a complement and can meet the needs of babies. MP-ASI helps cover the lack of nutrients contained in breast milk. Thus, it is clear that the role of additional food is not as a companion to breast milk but to complement or accompany breast milk. Babies under six months do not yet have an optimal digestive tract, so giving MP-ASI. Especially those rich in fiber, such as bananas, can make the intestines experience intussusception and blockage. In addition, giving solid food at an early age can also cause diarrhea. Babies who are given MP-ASI prematurely cause nutritional deficiencies. Because the consumption of MP-ASI can make the baby complete and not drink breast milk, the baby's nutritional needs are not met even though the nutritional content of breast milk tends to be more complex or a lot of the food made. Breast milk consists of water, protein, carbohydrates, fats, vitamins, minerals, antibodies, and various enzymes, which are said to reduce the baby's risk of certain diseases, such as diarrhea, upper respiratory tract infections (ARI), pneumonia, asthma, obesity, and diabetes. In addition, it can cause diarrhea. After all, the baby's digestive system is not ready to receive MP-ASI. The baby's intestines have not been able to process nutrients because the baby's digestive enzymes have not been produced optimally and can trigger anemia. The introduction of MP-ASI too early can affect iron absorption from breast milk, which can cause the baby to become anemic. MP-ASI that is not given at the right time and amount can reduce the nutritional status. (Marimbi, 2010).

The texture of the food given is not appropriate. Some babies still get a mashed texture when babies should be given soft food (Blossfeld et al., 2007). The theory of MP-ASI should be introduced at six months (Alifariki et al., 2020) because it is a critical period for infants to gradually be introduced to solid foods as stimulation of oral motor skills (Harris & Mason, 2017). The frequency of giving MP-ASI is appropriate for his age. However, suppose the frequency of giving MP-ASI is not adjusted to his age. In that case, if his nutritional needs are not met, as well as the frequency of excessive food, the result is that the process of breaking down food juices is not perfect so the baby can become obese.

The research by Pelealu et al. (2017) with the title "description of breastfeeding complementary feeding in the working area of the Kalawat Public Health Center, Kolongan District, North Minahasa Regency". The study results show that the appropriate age for giving MP-ASI was 11.8%, and 88.2% were not. The frequency of the appropriate complementary feeding was 92.5%, and the inappropriate was 7.5%. The number of appropriate complementary feeding was 71.0%, and 29.0% not appropriate. The texture of appropriate complementary feeding is 87.1%, and 12.9% is not appropriate. The variation of appropriate complementary feeding was 1.1% for infants and 98.9% not appropriate.

Hariyanti's (2017) research results with the title "Overview of Complementary Breastfeeding (MP-ASI) in Toddlers Age 6-24 Months at Moyudan Health Center Sleman Yogyakarta". In the Moyudan Health Center area, the frequency and 39 number of complementary feeding showed that most were sufficient, namely 32 respondents (49.2%). According to the Ministry of Health (2014), the frequency and amount of complementary feeding according to the Ministry of Health (2014), at the age of 6-8 months, the frequency of eating 2-3x / day can be given 1-2x interlude, starting with 2-3 tablespoons/time with the number of times eating a cup of mineral water packaging (=125ml). Age 9-11 months eating frequency 3-4x/day, can be given 1-2x interlude with the number of times eating to cup (=125-175ml). Age 12-23 months eating frequency x / day, can be given 1-2x interlude with the number of times eating to 1 cup (175-250 ml).

Based on Table 3, the results of research on infants at the Baros Public Health Center, Sukabumi City, it was found that the incidence of diarrhea in infants aged 3-12 months was diarrhea as much as 58.3% or 28 respondents, while those without diarrhea were 41.7% or 20 respondents. Analysis of the research showed that 58.6% of infants who had diarrhea were over six months, as many as 46.4%. Under six months of age, as many as 53.6% and the most at the age of 5 months, several infants experienced recurrent diarrhea in infants. Infant respondents experienced diarrhea for a maximum of 3 days, as many

as 14 respondents (13.7%). It is due to the food factor given, especially if it is given at the age of under six months.

Diarrhea is one of the infants' most common health problems (Asfaha et al., 2018; Waqas et al., 2018). Some cases of diarrhea in infants can heal by themselves. However, babies are also at risk of dangerous complications if their diarrhea is not treated quickly and appropriately. Various things can cause various causes of diarrhea in infants. Including Gastroenteritis and intestinal infections due to viruses, bacteria, and parasites, Food poisoning, especially in infants who already consume complementary foods, consume too much fruit juice, allergies to certain foods or drugs, and intolerance to the cow. Babies who have started consuming complementary foods and are experiencing diarrhea are advised to avoid oily, high-fiber, high-sugar, and cow's milk foods. It is because these types of foods and beverages can worsen the symptoms of diarrhea in infants.

*Pathophysiology diarrhea* is the primary mechanism that causes diarrhea (Camilleri et al., 2017). Osmotic disturbances (food that cannot be absorbed will cause osmotic pressure in the intestinal cavity to increase. So there is a shift of water and electrolytes into the intestinal cavity, and excessive intestinal contents result in diarrhea), which causes impaired secretion. Toxins in the intestinal wall increase, then diarrhea occurs, and Hyperperistaltic Intestinal Motility Disorders will result in reduced opportunities for the intestine to absorb food, causing diarrhea. On the other hand, decreased intestinal peristalsis will cause bacteria to overgrow, which can then cause diarrhea.

Diarrhea is the discharge of stool that is not normal and liquid, and it can also be defined as bowel movements that are abnormal and liquid with more frequency than usual. Babies are said to have diarrhea when they have defecated more than three times, while neonates are said to have diarrhea when they have defecated more than four times. These foods or drinks can increase intestinal peristalsis resulting in a decreased opportunity to absorb food which then causes diarrhea. The theory of Dewi (2010) Strengthened that diarrhea can be caused by various factors, including infection, food, allergic, psychological, and other factors.

Sasongko's (2012) research with the title: "the relationship between giving MP-ASI with the incidence of diarrhea in infants in Ngaren village 2012". Showed that infants aged 0-6 months experienced diarrhea as much as 86.6% because mothers gave MP-ASI is plentiful and provides early MP-ASI, the incidence of diarrhea in Ngaren village is high for infants under six months of age.

Table 3 shows bivariate analysis statistical test results obtained P value = 0.00 means P-value < 0.05 then H<sub>0</sub> rejected, and the hypothesis is accepted. It means there is a relationship between breastfeeding Complementary Foods and the incidence of diarrhea in infants in the Baros Public Health Center, Sukabumi City working area.

The analysis of researchers from infants who were given early complementary feeding, only 6 people did not experience diarrhea out of 21 babies who were given early complementary feeding, this is because the baby's immune system is relatively high, hygienic and clean food and places to eat must be considered again that adequate maternal nutritional intake will increase milk production for their babies the more often mothers give breast milk to their babies, the more milk will be produced, breast milk alone is actually enough for babies 0-6 months but most mothers are worried that their breast milk is not enough for their babies so that the mother gives early MP-ASI which causes the baby to have diarrhea, because the baby's digestion is not ready to accept it When it comes to foods other than breast milk, mothers should pay attention to the mother's nutritional intake first and eliminate the worry that breast milk alone is not enough, thus exclusive breastfeeding will be successful and babies aged 0-6 months are protected from diarrhea, from the results of the study there are babies who are suitable but experienced diarrhea at the age of 3 months and 4 months this was caused because the mother gave formula milk to replace breast milk and some were not appropriate but did not have diarrhea at the age of 7, 10 and 11 months due to non-compliance with MP ASI only in the frequency of food and food interludes so it was not too risky to cause diarrhea.

Wright et al. (2017) stated that the diarrhea-related deficit in relative weight was significantly exacerbated in non-breastfed girls aged 6 and 8 months. Importantly, in infants <6 months, breastfed and diarrhea was still associated with greater relative weight compared to those who were not breastfed and diarrhea-free. Breastfeeding appears to be a vital contributor to relative body weight in younger infants (<6 months), while diarrheal illness strongly contributes to relative weight deficits in older infants (6-12 months). These findings underscore the importance of breastfeeding to promote infant nutritional status in infants with or without diarrhea from birth to 12 months.

Begum & Absar (2016) stated that the average age of children was 11.6 with SD ±5.29 months, ranging from 1 month to 23 months. Exclusive breastfeeding was 51.3%, breast milk plus formula milk was 39%, and exclusive formula milk was 9.4%. Single attacks of diarrhea occurred in 72.7%, 40.7%, and 28.6% of children in exclusive breastfeeding, breast milk plus formula, and exclusive formula milk, respectively. Frequent attacks of diarrhea occurred in children 27.3%, 59.3%, and 71.4%.

Setyaningrum (2020) study that there was a relationship between formula feeding and the incidence of diarrhea in infants aged 0-6 months showed a significant relationship. significant (p= 0.000

OR 14.1 CI = 2.9 - 66.4). Giving formula milk to infants aged 0-6 months has a relationship with the incidence of diarrhea. Infants who are given formula milk have a 14.1 times risk of diarrhea exposure compared to infants who are not fed formula milk. Based on the results of the analysis in this study shows that respondents who give formula milk to their babies are at risk of having diarrhea. Diarrhea in formula-fed infants is because infants under six months have an immature digestive system. The baby's age contributes to the reduced frequency of defecation, which indicates the growing water-conserving capacity of the intestines.

The level of risk of diarrhea in infants that those who received partial breast milk nutrition had a higher likelihood of developing diarrhea compared to infants who were fully breastfed in the first 2-6 months of life (Bhutta et al., 2008; Lopez-Alarcon et al., 1997; Yamakawa et al., 2015). The occurrence of feeding behavior other than breastfeeding in infants is also caused by early weaning (Thompson, 2012). The number of babies suffering from diarrhea is caused by stopping breastfeeding, both when they are 1-4 months old or 5-6 months old.

The incompatibility of giving MP-ASI to infants dramatically affects the process of child growth and development. In addition, the incompatibility of giving complementary feeding to infants also affects the fulfillment of toddlers' needs, which can cause disease in toddlers, one of which is diarrhea. Most of the respondents with inappropriate complementary feeding experienced the incidence of diarrhea, 23 respondents. Supported WHO (Aritonang et al., 2021) stated that the provision of MP-ASI aims to increase the energy and nutrients needed by infants because breast milk cannot meet the needs of infants continuously, thus additional food is given to fill the gap between the total nutritional needs of children. The amount obtained from breast milk, but if the complementary feeding is too early, it can result in many babies experiencing diarrhea. The problem of growth disorders in early childhood in Indonesia is strongly suspected to be related to the number of babies who have been given complementary feeding since one month, even before. The results of this study can be concluded that the accuracy of giving MP-ASI has a higher risk of babies getting diarrhea. Therefore it is essential to know the impact of giving MP-ASI to avoid toddlers getting diarrhea and reduce morbidity for toddlers due to diarrhea.

#### 4. CONCLUSION

Most babies in the Baros Public Health Center, Sukabumi City working area received MP-ASI, which was inappropriate for the baby's age. There is a significant relationship between complementary feeding and the incidence of diarrhea in infants. Giving MP-ASI is one of the essential needs, but what needs to be considered by the mother is the appropriate age of the baby. Providing information related to MP-ASI knowledge to mothers is the key to preventing diarrhea in infants.

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