

Weaning and nutritional status of under-three children

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Abstract

The duration of weaning can be influential to malnutrition in children. The proper weaning duration, supported with appropriate provision of solid food (in terms of the amount and types of food), contribute positively towards the children's growth and development. The present study was aimed to investigate the correlation of weaning duration and the determinants with infants' and under-three children's nutritional status in Siduan sub-district, Paguat district, Pohuwato regency. The research employed descriptive methods and involved the following variables: weaning duration, nutritional status, education level, sociocultural perspectives on weaning, and economic level. The purposive sampling technique was involved to acquire the sample of mothers with infants and under-three children undergoing weaning period; the samples consisted of 39 children: seven infants and 32 under-three children. The implementation and the duration of weaning in most samples in the research site were considered as appropriate in accordance to the WHO recommendation. The determinant factors of the weaning duration involved reasoning of weaning, sociocultural aspect, education aspect, level of economy, and mothers' activities. The children's nutritional status was described as follows: the percentage of infants having overweight, healthy weight, and underweight status were 28.6% each, while severely underweight infants 14.2%. Moreover, 25% of the under-three children had healthy weight, while 59.4% of the children were underweight and 15.6% were severely underweight. Proper weaning duration is not an absolute determinant factor of infants' and children's nutritional status. However, the appropriate implementation of weaning is proven useful to promote children's nutritional status.

1. Introduction

As a developing country, Indonesia still has some disadvantages and shortcomings compared to more advanced countries. For example, in the field of health, Indonesia still has to struggle against various infectious diseases and problems of malnutrition, which interact with each other and prevent a significant improvement in the health level of the Indonesian population.

Basic Health Research results for the period 2007-2018 showed that the prevalence rate of undernourished tended to be stable at 13% (Badan Penelitian dan Pengembangan Kesehatan, 2019). Likewise, according to Basic Health Research 2007 and 2013, the prevalence of malnutrition was approximately 5%. Meanwhile, in 2018, it had decreased and was at 3.9% (Badan Penelitian dan Pengembangan Kesehatan, 2019).

Data in Gorontalo Province presents that the prevalence of undernourished and malnutrition is above the national figure. In Gorontalo Province, Basic Health Research (Riset Kesehatan Dasar) in 2018 recorded that the prevalence of undernourished was 19.3% and malnutrition was 6.8% (Badan Penelitian dan Pengembangan Kesehatan, 2019). In addition, the proportion of exclusive breastfeeding in this province is quite low (38.9%). The high prevalence rate of malnutrition can adversely affect children's growth and development in the future.

If this problem is not resolved quickly, it might impact the nation's next generations negatively, because nutrition is one of the Human Resources (HR) determinants. Undernourished will cause the failure of physical growth and intellectual development, reduce productivity and endurance, slow down the process of

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wound healing, increase the risk of heart problems, and increase morbidity and mortality (Tsaousi *et al.*, 2019).

Several factors influence the causes of undernourished and malnutrition among children under five. One of them is the behavioral factor related to weaning time (Deepa *et al.*, 2019). The World Health Organization (WHO) recommends weaning time or children be introduced to foods other than breast milk when they are about six months old. Another recommendation is to continue giving breast milk until they are two years old or older (World Health Organization, 2020).

The right timing for feeding can support the process of maximum growth and development. On the other hand, improper weaning time and feeding inappropriate quantity and type of food can unfavorably affect children's nutritional status, decrease cognitive abilities, social development, and productivity (Kalamma and Gangadhar, 2018; Deepa *et al.*, 2019; Zielinska *et al.*, 2019). This study aimed to determine the weaning time and the factors that influence it and toddlers' nutritional status.

2. Materials and methods

This descriptive research study employed the cross-sectional approach. Mothers with infants aged 0-11 months and toddlers aged 12-35 months who are no longer breastfed involved as the research samples. The number of samples was 39 people, consisting of seven mothers with infants and 32 mothers with toddlers. The samples were selected using purposive sampling with the criteria of having equal access to health services and being immunized.

Data on nutritional status were obtained by measuring weight and length/height, then classified by nutritional status categories based on anthropometric standard (Menteri Kesehatan Republik Indonesia, 2010).

2.1 Nutritional status category

Data on weaning time was determined by looking at children's age when the breastfeeding is fully stopped, with objective criteria according to WHO recommendations (Table 1).

Table 1. Nutritional status category

Category	Standard Deviation Range
Severely wasted	<-3
Wasted	-3 to <-2
Normal	-2 to +1
Possible risk of overweight	>+1 to +2
Overweight	>+2 to +3
Obese	>+3

2.2 Weaning time category

Based on the data on the average per capita expenditure per month (Table 2), the respondents were divided into two categories (Badan Pusat Statistik, 2020).

Table 2. Weaning time category.

Category	Age Range
Good	24 months
Moderate	6-23 months
Poor	<6 months

2.3 Economic category

The respondents were divided into several economic category based on their level of incomes as described in Table 3.

Table 3. Economic category.

Category	Economy Range
Low economy	≤IDR 425,250 per capita per month
Good economy	>IDR 425,250 per capita per month

3. Results and discussion

3.1 Sample overview

3.1.1 Age

Table 4 shows the distribution of samples by their age group. Mother's age can contribute positively to appropriate complementary feeding practices. Mothers under 24 years of age tend to give their babies the first solid food under 4 months old (Edmunds and Green, 2017; Zielinska *et al.*, 2019). Thus, the average age of mothers in this study cannot be included in the age category at risk for early weaning on infants.

Table 4. Distribution of samples by age group

Age (year)	Head of family		Mother(s)	
	Total (n)	Percentage (%)	Total (n)	Percentage (%)
15 - 19	-	-	3	7.7
20 - 24	4	10.3	4	10.3
25 - 29	11	28.2	9	23.1
30 - 34	7	18.0	11	28.2
35 - 39	7	18.0	7	18.0
40 - 44	3	7.7	4	10.3
45 - 49	5	12.8	1	2.4
50 - 54	2	5.0	-	-
Total	39	100	39	100

3.1.2 Education level

Table 5 shows the sample distribution by education level. The element of maternal education affects the quality of childcare. Most of the malnourished children are cared for by uneducated mothers/caregivers. Children who are cared for by their mothers with love, education,

Table 5. Sample distribution by education level.

Education Level	Head of Family		Mother(s)	
	Total (n)	Percentage (%)	Total (n)	Percentage (%)
Illiterate	1	2.7	-	-
Primary School/Equivalent Graduates	14	35.9	15	38.5
Junior High/Equivalent Graduates	7	18	10	25.6
Senior High/Equivalent Graduates	15	38.5	11	28.2
University Graduates	2	4.9	3	7.7
Total	39	100	39	100

understand the importance of breastfeeding, the benefits of an integrated healthcare center, and cleanliness usually grow to be healthy children.

Most of the samples (mothers) have a primary school/equivalent education, causing a lack of good parenting knowledge. It has an impact on the increased risk of malnutrition in children. Maternal education is shown to be significantly correlated with the incidence of malnutrition (Manikam *et al.*, 2000; Gelana *et al.*, 2017).

3.1.3 Types of occupation

Table 6 shows the sample distribution by occupation. The mother's work status affects the parenting style of the child, such as the practice of feeding and the pattern of exclusive breastfeeding. Otherwise, working mothers often do not take good care of their children. Most of their time, children are entrusted to their grandmothers or caregivers, causing them to get less attention from their mothers. Other caregivers besides mother, tend to pay less attention to the child. As a result, food intake was influenced by the attention paid to food quantity and

Table 6. Sample distribution by occupation.

Occupation	Head of Family		Mother(s)	
	Total (n)	Percentage (%)	Total (n)	Percentage (%)
Laborers and Farmers	15	38.5	5	5.1
Entrepreneur	17	43.6	6	15.4
Civil Servant	5	12.8	4	10.3
Fishermen	2	5.1	-	-
Housewives	-	-	24	69.2
Total	39	100	39	100

quality so that it can affect the nutritional status of children.

In rural and village area setting where the research took place, most mothers do not have another occupation than as housewives. Mothers in such setting devote their whole time managing the family and households' chores. Despite having such free time, some of the mothers showed lack of care and affection towards the children. The phenomenon might be due to the number of dependent children the mothers have; the mothers were incapable to care for their infants or under-three children because they need to split their attention to manage all their children, not to mention the other household chores.

3.1.4 Weaning duration

Table 7 shows the distribution of samples based on classification of weaning duration and nutritional status. Breastfeeding a child for over 23 months is proven beneficial to promote the child's energy fulfillment. Breast milk composes up to 50% of the energy requirements in infants of 6-12 months old. Moreover, one third of the >12-24 months old children's energy requirements derive from breast milk (World Health Organization, 2020).

The long-term benefits of breastfeeding for 23 months or more involve: boosting intelligence quotient (IQ) score, promoting growth, lowering the risk of overweight or obesity in adult stage, and reducing the potential costs for healthcare (Victora *et al.*, 2016; World Health Organization, 2020). In addition, breastfeeding is considered as beneficial for the mothers. The practice of breastfeeding is known to prevent breast cancer and

Table 7. Distribution of samples based on classification of weaning duration and nutritional status.

Nutritional Status	Classification of Weaning Duration					
	Good		Moderate		Poor	
	Infant	Under-three children	Infant	Under-three children	Infant	Under-three children
Obese	-	-	-	-	-	-
Overweight	-	-	1	-	1	-
Possible risk of overweight	-	-	-	-	-	-
Normal	-	4	-	2	2	2
Wasted	-	11	-	6	2	2
Severely wasted	-	3	1	-	-	2
Total	-	18	2	8	5	6

ovarium cancer; on top of that, it acts as the natural contraception tool and to lower risks of type-2 diabetes mellitus (Victora *et al.*, 2016).

The varying results regarding the infants' nutritional status and weaning time can be associated with the quality and the quantity of provided breast milk replacements. The overweight infants were weaned before the appropriate period; the infants were also given breast milk replacements with excessive amount and frequency, ergo, the children became overweight. Based on the interview result, the overweight infants came from low economic family and middle economic family. Since the parents could not afford formula milk, the overweight infant from the poor family was given rice water as the breast milk replacement. On top of that, the infant was provided solid foods such as porridge and mashed banana. Meanwhile, the overweight infant coming from middle economic family was given formula milk and solid foods such as milk porridge and biscuits.

3.1.5 Factors influencing weaning duration

The duration of breastfeeding and weaning is influenced by the factors as follows: societal difference, social status, culture, demography, education level, knowledge level, mothers' age and occupation, numbers of dependent children, as well as the role of health workers in disseminating information regarding the correct breastfeeding and weaning practices (Edmunds and Green, 2017; Gelana *et al.*, 2017; Okafoagu *et al.*, 2017; Bewket Zeleke *et al.*, 2019; Deepa *et al.*, 2019). In particular, the determinant factors influencing the weaning duration of infants and under-three children in this research are further elaborated.

3.1.5.1 Reasoning of weaning

Based on the data in Table 8, one of the reasons of the weaning duration is that the parents felt that it was the right time to wean their children. The parents weaned their children by referring to the age limit of two years (24 months), as recommended by the WHO (2020). Although the majority of the samples weaned their children because it was time for them to be weaned

(46.2%), it cannot be said that the reasons for weaning were generally appropriate because it is still below the average (50%) of the entire population.

Meanwhile, some of the parents weaned their children because the mothers or the children have particular diseases. In some cases, mothers having communicable disease were suggested not to breastfeed their children to prevent the spread of the diseases or the side effects of the mothers' medications. In cases where the infants were weaned because they experienced a particular disease, the infants could also experience particular complications and thus found it difficult to suckle to their mother's breast. In these conditions, it is recommended, however, for the mothers to continue breastfeeding. This is based on the ground that breast milk is the most suitable food for infants that contains the highest nutritional contents compared to other commercial baby food or animal milk.

The third reason of weaning in the research site was that the mothers' breast milk quantity was insufficient. The production of breast milk is impacted by the presence of stimulus (in the form of suckling performed by the infant) towards the mammary gland. On top of that, another significant factor of breast milk production is the letdown reflex, i.e., the reflex stimulated by oxytocin hormone made by hypophysis gland as the response toward suckling. Oxytocin causes the myoepithelial cells nearby the alveoli to contract and stimulate the excretion of breast milk in the glands and the sinus. If the letdown reflex does not occur, the production of breast milk lowers in quantity (Australian Breastfeeding Association, 2020).

That said, the mother's success in breastfeeding the children is highly influenced by one's attitude and confidence. Some of the mothers were not confident in breastfeeding, therefore, the breast milk production rate lowers; a self-initiation is therefore required. In addition to that, the psychological factor is also considered significant to the breast milk production. Mothers with stressed or depressed condition will not have an optimal breast milk production. Moreover, the mother's breast milk production is also impacted by the food intake.

Table 8. Distribution of samples based on reason of weaning duration and nutritional status.

Reason of Weaning	Weaning Duration (months)					
	< 6		6-23		24	
	Total (n)	Percentage (%)	Total (n)	Percentage (%)	Total (n)	Percentage (%)
The mothers felt it was the proper time to wean	-	-	-	-	18	46.2
Mothers were sick	2	5.1	1	2.6	-	-
Children were sick	5	12.8	-	-	-	-
Insufficient amount of breast milk	4	10.2	6	15.4	-	-
Mothers are pregnant	-	-	3	7.7	-	-

Mothers are recommended to consume nutritious food during breastfeeding. On this ground, the intake of food (in terms of quality and quantity) is important; lack of food intake in quantity results in lowered breast milk volume. The interview results indicated that 8 from 10 mothers that weaned their children because of the insufficient breast milk volume came from low economic family. The state of poverty can lead to the lack of purchasing power of food. This condition will further result in less intake of nutritious food. Other factors hampering the lactation process is the absence of letdown reflex, impairment in the nipple, mastitis, swollen breast, and pain in the nipple.

In the research site, subsequent pregnancy also becomes a factor of weaning. During pregnancy, the progesterone and estrogen hormones, the hormones that function to maintain pregnancy, increase. Both hormones' performance causes the prolactin hormone that functions to encourage lactation to be inhibited. The increase of progesterone and estrogen suppresses the hormones of oxytocin and prolactin, thus, the breast milk production stops by itself. Therefore, during pregnancy, the mother automatically cannot breastfeed anymore.

3.1.6 Sociocultural condition and education level

The study observed the sociocultural condition in the form of customs/tradition/habit of the local community regarding the parenting style and the tradition of breastfeeding and weaning. Despite that high level of education is not the sole requirement of a good parenting approach, however, parenting style is highly correlated with the parents' education level. The parents' educational level is directly proportional to their knowledge and exposure towards health information. In this regard, the education level also influences the mothers' income, knowledge, attitude, and conducts. These aspects are considered influential to the implementation of weaning.

Most of the respondents performed weaning based on the hereditary guidance from their parents. The mothers were instructed to breastfeed their children until the age of two years old or 24 months. This is particularly related to the belief system of the local community regarding the children's mental development in the future.

3.1.7 Economic level

The parents' economic level is closely associated with ones' education level. If the family have good financial condition, the opportunity to access education is subsequently better. Both factors are seen as influential to the breastfeeding pattern. Poverty and low level of education result in poor parenting approach.

Therefore, the parents are incapable to provide optimal breastfeeding period to the children.

Table 9 shows the distribution of sample based on economic level. This study identified a difference between poor and non-poor families regarding the period of weaning. The percentage of poor weaning duration was higher in poor families than non-poor families. Based on the results of interview about weaning, it is suggested that the respondents with low economic level weaned their children not only because they felt it was the right time to wean, but also to save costs for buying baby food. The mothers relied on breast milk as the main food source for the baby to cut down the cost of purchasing baby food that was considered as expensive for the mothers.

Table 9. Distribution of sample based on economic level.

Classification of Weaning Duration	Economic Level			
	Poor		Not Poor	
	Total (n)	Percentage (%)	Total (n)	Percentage (%)
Good	8	44.4	10	47.6
Moderate	3	16.7	7	33.3
Poor	7	38.9	4	19.1
Total	18	100	21	100

In families that are not poor, there is a greater likelihood of buying baby food, making weaning easier. Therefore, it can be concluded that economic reasons can influence the timing of child weaning. This influence is in the form of the family's ability to provide complementary foods to breast milk. Henceforth, economic factor is considered as influential to the weaning duration in terms of the parents' capability of providing breast milk complementary foods.

3.1.8 Mothers' activity

The results of the interview suggested that most of the mothers were occupied at domestic works without another income-generating job, thus, the mothers have more time to care for their children. Meanwhile, most mothers who live in urban areas have another occupation to support the family income. As a result, the often could not carry out the responsibility of taking care of their children. Due to limited interaction with their children, the mothers could not breastfeed their children optimally, particularly from the age of zero months old until 24 months old. They tend to stop breastfeeding before the child reaches 24 months old and replace it by providing commercial baby food that is widely available in the market on the ground of practicality. Recently, there has been an increase in advertisements for artificial milk that are intensively marketing their milk products as a substitute for breast milk so that mothers are interested in

giving it to babies considering the practicality and benefits of these products (Zielinska *et al.*, 2019).

3.1.9 Weaning method

The practice of weaning must be conducted gradually. In addition, parents must replace breast milk with other foods whose nutritional content is close to the breast milk, such as protein, minerals, calcium, phosphorus, vitamin B, vitamin C, Fe, and other nutrients. During their development, the infants' nutritional requirements will begin to expand, and not all of which can be fulfilled solely by breast milk. If the breastfeeding process is immediately ended, or the period of weaning is conducted in an instant period, such conducts can cause the infant to feel irritated or experience pain. In addition to that, it can also affect the psychological and social development of the infant in the future. In this regard, the experts recommend that the process of weaning is implemented gradually by considering the infants' acceptance towards solid foods.

Table 10. Distribution of sample based on weaning method.

Method of Weaning	Total (n)	Percentage (%)
Immediately	10	25.6
Gradually	29	74.4
Total	39	100

Table 10 shows the distribution of sample based on weaning method. Based on the data in Table 10, 74.4% of the respondents implemented a gradual method of weaning, while the rest (25.6%) transitioned from breastfeeding to weaning in a short period. During the weaning period, the infant's diet changes from breast milk to the solid foods that are normally served by the family; the breast milk is treated only as a supplementary food. The onset of weaning is the beginning of a big change for both the infants and the mother. Therefore, it is of paramount significance to transition from breastfeeding to weaning in gradual manner. Such sudden transition can cause the baby to refuse the first solid food, making it difficult to feed it again. As based on the results, since most of the respondents conducted weaning gradually, the study concludes that the weaning method was good in overall. This is highly fundamental in reducing adverse impacts of improper weaning duration.

4. Conclusion

Although most of the samples weaned their children at the age of 24 months (46.2%), it cannot be said that the weaning time in Siduan Village, Paguat District, is considered good, as it is still below the average (50%). Due to the high number of undernourished and malnourished cases, several preventive and control

measures are needed. The most important prevention and control measures for infants and toddlers with poor to severe malnutrition are providing supplementary food to them, especially those from poor families, using locally available food sources in the area, and managing cases of severe malnutrition. To prevent this, it is necessary to weigh toddlers every month at the integrated health posts or the nearest health facility. Through the Healthy Growth Card, parents can early detect their child's health condition because the principle of using KMS is that a child is healthy if their weight increases with age. If the child's weight does not increase for two consecutive months, immediate action should be taken. This way, more severe conditions can be prevented early on.

Conflict of interest

The authors declare no conflict of interest.

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