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Food Security and Management of Nutritional Program for Children under Five Years on Post Volcano Eruptions in Indonesia

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Abstract

One of the most significant problems in the world is the lack of food security, therefore, food security is addressed in the Sustainable Development Goals (SDGs). This term of food security has several components of 1) food availability, 2) food access, and 3) utilization. Moreover, in the crisis situation of disaster for the vulnerable group especially of children less than five years, who is in the cognitive development stage will be most affected by poor health and nutrition from disastes. Indonesia lies between three continually moving plates of the Earth, the Indo-Australian plate, the Eurasian plate and the Pacific plate which causes the Indonesian territory to be very risky towards volcanic eruptions.

The management of volcano eruption involves pre eruption, during eruption and post eruption. This article addresses moving on post eruption due to this phase is the recovery stage for improving health. Post volcano eruptions in Indonesia had been giving such destructive impact towards food security, especially for children under five since they are the most vulnerable groups affected by its emergency situation. This article aims to revisit the concept of food security, volcanic eruptions in Indonesia, management of nutrition program on volcanic eruptions in Indonesia, significance of food and nutrition among children under five, and offering further suggestions on nutrition program of children under five years on post volcano eruption in order to respond to the need of the children under five in affected areas.

Keywords: Food security, nutritional program, children under five,volcano eruption

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Introduction

As Indonesia is one of the many countries most vulnerable to natural disasters of the volcano eruption, this is undeniable natural threats that Indonesia has to face in. As an archipelago country located in the "Pacific Ring of Fire" with a total of 129 volcanoes or 21% of all the volcanoes in the world that are located in Indonesia (Whelley, Newhall, & Bradley, 2015; Hawajri, 2016; Suppasri, Imamura, &Koshimura,2012). This is what causes the Indonesian territory becomes very risky towards volcanic eruptions.

The impact from volcano eruption was damage to environment (Suppasri et al., 2012; Aburizaiza, Zaigham, Nayyar, Mahar, Siddiq, & Noor, 2013; Oppenheimer, 2003) and public health issues such as nutritional problems, water supply problems, environmental sanitation, infectious diseases and stress/psychiatric disorders (Christia, 2012; Watson & Tabor, 2015). The lava and volcanic ash cultivate the agricultural land and food shortage becomes developed. Therefore, the volcano eruption reduces the availability of food, access to food, and food consumption, thus disrupting food security for a long time (Aburizaiza, et al., 2013; Oppenheimer, 2003). Moreover, when consider in health, the immediate effects on physical such as injuries, diseases and deaths, while in the other effects are mental illness such as stress or trauma occurred. In the long term effects, since impaired food security can decrease food intake which then affects to nutritional status (Christia, 2012; Watson & Tabor, 2015; Clements & Casani, 2016).

The management of volcano eruption involves pre eruption, during eruption and post eruption. This article address on post eruption due to this phase is at the recovery stage for improving health. Moreover, the essential to do so is that the people at risk would be independently well prepared of themselves when they got useful preparation about what should they do in response towards post-disaster, because that is the time when more problematic challenges arise (Brinkman & Hendrix, 2011). Therefore, such post-eruption program need to be stressed out in order make the people in at-risk area is getting well prepared, in this case, especially on food security and management of nutrition for children under five.

The food was decreasing by eruption which impacts to population. Mother with children, the children, and the elderly are the vulnerable groups. This article emphasis on the children less than five years due to this is a stage of cognitive development (World health organization [WHO], 2017). The results in acute malnutrition in children and a lack of timely nutritional intervention may lead to long-term consequences such as stunting (United States Departementof Veteran Affairs, 2016). Several studies have shown that natural disasters have negative effects on the growth of children (FAO, & UNICEF, 2018. WFP & WHO, 2017; Poitevien & Tobin, 2011; Grantham-McGregor, Cheung, &Cueto, 2007; Datar, Liu, Linnemayr, & Stecher, 2013)in countries where the rate of underweight is already high, such events have further aggravated the risk of malnutrition in newborns and growing children.

In 2013, Indonesian national survey reported the prevalence of underweight in children under 5 years was 19.6%, that of stunting as 37.2%, which means that the problem of underweight in Indonesia is prospectively risk to approach to the level of high prevalence (Ministry of Health and National Institute of Health Research and Development,2014). In response, however, what Indonesia's government had been done so far are merely tends to focused on intervention with short-term impacts such as supplementary feeding and therapeutic care only (Aritonang, 2014). Those facts proved that there are some lack of implementations of the regulation of the Decree of the Ministry of Health Republic of Indonesia No. 145/2007 and the Management of Nutrition in Major

Emergencies of the WHO (2000), thus, the problems are in the field of improvement.

This article aimed to revisiting the conceptual of food security, volcano eruptions in Indonesia, management of nutrition program on volcano eruptions in Indonesia, significance of food and nutrition among children under five, and offering a further suggestions on nutrition program of children under five after volcano eruption in order to response the needs of the children under five in affected areas.

Definition of Food Security

Since the first time it's being introduced in 1986 by the World Bank, the concept of food security has been progressively defined in various perspectives. The concept of food security itself later was adopted into the leading wider concept of human security initiated by the UN Secretary General Kofi (2005) so called "In Larger Freedom" which consists of "freedom from fear and freedom from want". Food security is considered as part of human security threats including others categories such as health security, environmental security, personal security, community security, and political security (G□mez & Gasper, 2013).

In addition, Tadjbaksh & Chenoy (2007) indicated that "food security, defined as not only the availability of food, but also the capacity to gain access to it through livelihoods could also be in this category". In conclusion, FAO (2013) were proposed three dimensions of food security are covers: 1) availability, 2) accessibility, and 3) utilization. The components were explained in detail. First, food availability refers to the existence of sufficient quantities of food with appropriate quality, and supplied through domestic production or import. The major direct impact of natural disaster such as volcano eruption is expected to have food security is through food availability component due to changes in agricultural productivity (Hunter, 2003).

Second, food accessibility is considers as access to food that refers to the ability of individuals, communities and countries to purchase food insufficient quantities and qualities (Kovats, Edwards, Hajat, Armstrong, Ebi, & Menne, 2004). In cases of volcano eruptions, cause damage to buildings and road infrastructures to and from the market. Therefore, such damages on infrastructure disrupt access to food supplies (World Food Programme, 2017).

Third is food utilization that depends on how food is used, whether food has sufficient nutrients and whether diet can be maintained, and coverage of the individual or household capacity to consume and benefit from the food (Hall, 2011). In addition, food utilization also include safe drinking water and adequate sanitary facilities to avoid the spread of disease, therefore, in the situation of eruption food preparation and storage procedures need to be considered (Napoli, De Muro, & Mazziotta, (2011).

The significance of food security enables the poverty goal (SDG1), since it enhanced food and nutrition security which contribute to reduce poverty and eradicate extreme poverty. While, the issues of food quantity and food quality being pivotal, lack of energy is generally an issue only in highly food-insecure areas, micronutrient malnutrition is much more widespread and pervasive (Gillespie, 2009). As the problem of food security occurred in the crisis of volcano eruption, especially for the children less than 5 years, it is related to lower macro- and micronutrient intakes, lower intake of fruits and vegetables, and lack of diet diversity. These items contribute to higher prevalence of underweight and for the long term it affects to stunting and cognitive impairment. The prevalence of severe acute malnutrition during emergencies was 10-15% which higher than the global prevalence of 7.5% (The Johns Hopkins and the International Federation of Red Cross and Red Crescent Societies, 2015; The World Bank,

2015). Definition of food security and the consequence to health were illustrated in figure 1.

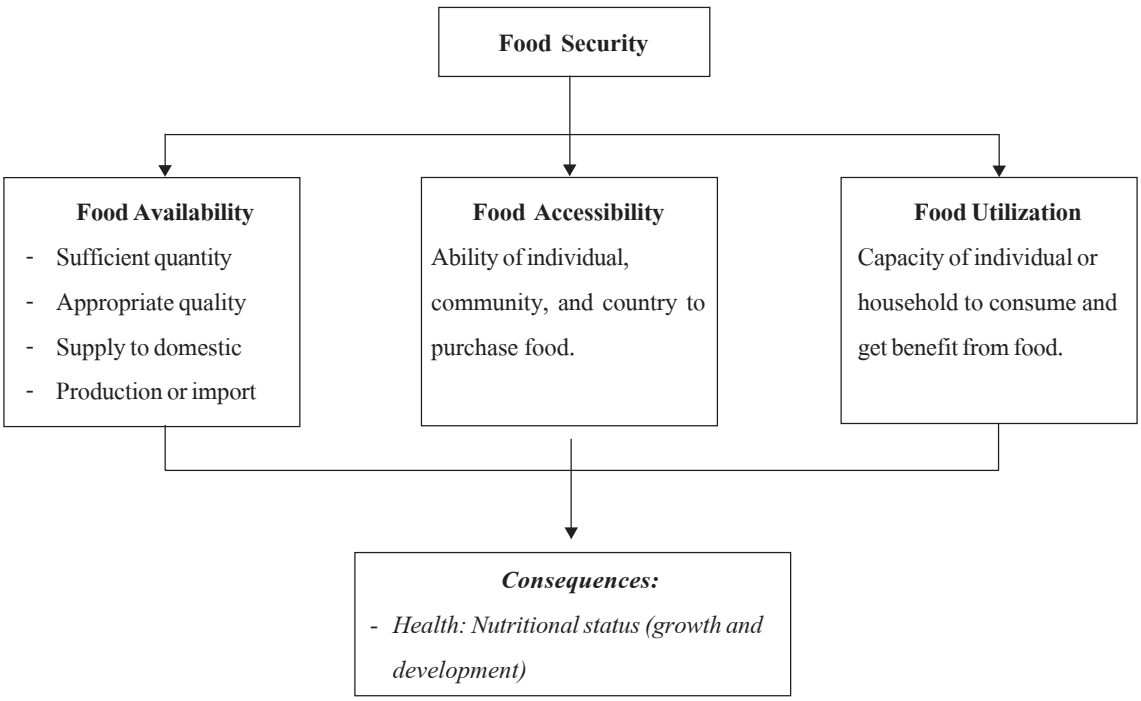

Figure 1 Definition of food security and its consequences

Volcano Eruptions in Indonesia: the undeniable natural threat towards food security

The disasters caused by volcano eruptions are very linkage toward the food security for the people in affected areas. The eruption causes damages most of the crops and food resources that grows around the volcano areas. When food crops were destroyed then the supply of food would be reduced. As a result, there will be food crisis because of the lack of food availability. The food crisis is often occurred at the disaster and evacuation locations. In relation, the refugee camp becomes a temporary shelter for disaster victims and needs immediate food (Tobin &Whiteford, 2002).

In the case of Mount Bromo eruption in 2010, showed that two years after the eruption, food security was still in food-prone conditions and the rest of volcanic ash and weather conditions because agricultural yields were not optimal and farmers did not earn income feasible, simultaneously, food security in the family level was getting low. Nationally, volcano eruptions which always tend to threaten the agricultural stability are causing such serious problem to towards the productivity of farming. Since the agricultural sector in Indonesia was one of the most dominant sectors compared to other sectors, therefore, such threats towards farming become serious problems (Rahmawati, Erliana, Habibie, & Harti, 2014). The consequences of food security impact to nutritional status of the people in affected area.

Management of Nutrition Program on Volcano Eruptions in Indonesia

The Indonesian government is actually has the blue print of guidance in managing the nutrition program for volcano eruption cases. The guidance was released and implemented by the Ministry of Health Republic of Indonesia. They were made a policy on the guidance for cooperative handling of health in the Decree of the Minister of Health No. 145/2007 which states that the guidance for handling are the pre-, during, and the post-disaster in the levels of central government, provincial government, district, and sub-district. This guidance model is actually adopted from the WHO blue print on "the management of nutrition in major emergencies" (WHO, 2000). Through the guidance of nutritional activities in disaster management mentions that nutrition activities in disaster management are a series of activities that started from pre-disaster and post disaster (Directorate General of Nutrition Development, and Maternal and Child Health, 2012).

Furthermore, the handling of nutrition in pre-disaster is basically the anticipation activity of disaster and reduces the risk of disaster impact. Activities undertaken include the socialization and training of health workers such as disaster nutrition management, the preparation of contingency plans of nutrition activities, breastfeeding counseling, preliminary data collection of disaster prone areas, provision of breastfeeding, technical coaching and assistance to health workers related to disaster nutrition management and other related activities (Directorate General of Nutrition Development, and Maternal and Child Health, 2012).

While during disaster, the nutrition management has five steps of focusing agendas. First, calculating nutritional needs (energy, protein, and fat) based on analysis of Rapid Health Assessment (RHA) outcomes. Second, preparing a menu based on the type of food available. Third, early anthropometry data collection (weight and height <-2 standard deviation), pregnant women and breastfeeding mothers (mid-upper arm circumference < 23.5 cm) were conducted. Fourth, the acute problems that relevant to health such as the incidence of diarrhea, measles, and dengue were analyzed. Finally, the fifth is carrying out supplements and nutritional supplements (Directorate General of Nutrition Development, and Maternal and Child Health, 2012).

On the post-disaster nutrition handling activities are basically implementing the monitoring and evaluation as part of surveillance. According to the program that conducted and lead by the Ministry of Health of Republic of Indonesia, there are three main concerns of the monitoring and evaluation that aims to make sure those aspects are already done, as follows: The technical development of post-disaster, the collection and improvement of nutritional status of the disaster victims, and needs assessment of the nutrition program on post-disaster. Also, on the phase of post disaster aims to identify the need assessment and to carry out nutrition development activities as a follow-up or response from information obtained in an integrated manner with public health service activities (Public health response) to improve and maintain the nutritional status and health of disaster victims (Directorate General of Nutrition Development, and Maternal and Child Health, 2012).

In the district level, for example, at the case of Mount Sinabung eruption, the implementation of the guidance program that had been conducted through the health services of the Karo District Health Office is Field of Nutrition. This agenda is focusing on the distribution of supplementary feeding of children under five, distribution supplementary feeding of pregnant women, protein distribution, and weighing children under five in every evacuation (Ministry of Health Republic of Indonesia, 2014).

However, there are some absences from the implementation of the guidance in the field. The weaknesses in the its implementation were less of healthcare providers who trained on disaster management, commitment from the regional government, ineffectiveness of inter-sectoral coordination, the immunization and surveillance activities did not meet the standard of emergency responsiveness, and the budget which was not allocated properly (Aritonang, 2014). According to above critical facts, it is true that the post-disaster management is tend to be more challenges to be exactly implemented in the field of volcano eruptions cases in Indonesia.

Therefore, enhancing the implementation of the nutrition program in volcano eruption in Indonesia, there are the rooms for improvements. First, the training for provide proper assistance to healthcare provider on emergency situation in the affected area. Second, family empowerment on health and nutrition education for specific community of children under five cares, will be better nutritious and healthy livelihood.

Significance of Food and Nutrition among Children under five: Malnutrition challenges on Post Volcano Eruption

Children are determinant assets of future generation. Therefore, they are expected to grow optimally and become adults who are physically, mentally, socially, and emotionally healthy. In consonant with the United National Children's Fund (1998), food security in the family level is an indirect factor that affect to the nutrition status of children under five. The early nutritional deficit is linked to long-term impairment in growth and health. In addition, such malnutrition during the first two years of life causes stunting, leading to the adult being several centimeters shorter than his or her potential height (Martorell, et al., 2010)

In the case of emergency situation such as volcano eruptions, the challenge is food insecurity which has negative impact on cognitive ability occurs not only in malnourished children (Severe underweight) but also in short children (Stunted) due to chronic malnutrition at an early age (P□rtner, 2010; Hoddinott & Kinsey, 2001). Studies in several countries have revealed that malnutrition at an early age affects children's physical growth and brain development (Martorell et al., 2010).

Suggestions on nutrition program of children under five years on post volcano

The provision of services and handling of nutrients are contributes towards determining success of the nutritional status of the children. However, those ideals are meeting various obstacles as public kitchen did not prepare a special menu for children under five (Aritonang, 2014).The purpose of post management regarding nutrition is to prevent malnutrition among the population affected by the eruption, especially children less than 5 years. It is necessary, to plan for the management of malnutrition that existed prior to the disaster or which have become acute, and will become evident during aid operations (WHO, 2017). Prior to management the nutrition program the healthcare provider and family empowerment need to be trained. The qualification of well-trained of healthcare providers are directly support by ensuring the nutrition facts and food hygiene, providing nutrition education, and reducing food insecurity. The nutrition program should be design coverage the concept of food security component, the management of resources and translate to be a program to practice (Table 1).

Table 1. Management of nutritional program according to food security component

Food security component	Management of community	Program
Food availability	Storage food in community (Food bank)	- General food distribution. - Supplementary feeding program. - Therapeutic feeding program. - Micronutrient fortification.
Food accessibility	Improving access to available food for households with children under 5 years of age.	- Improve infrastructures to and from the market. - Economic improvement program for disaster victims' families.
Food utilization	Community Kitchen.	- Nutrition education - Provide hygiene sanitation in community. - Practice good hygiene and proper food handling by (a) washing children's hands before food preparation and eating, (b) storing foods safely, (c) using clean utensils to prepare and serve food, and (d) avoiding the use of feeding bottles, which are difficult to keep clean.

The management of nutritional program can be applied the concept in table 1 as a guidance. First component that need to be addressed is food availability. An attempt that possibly effective is through food storage as a process that helps maintain food quality by retaining flavor, color, texture and nutrients, while reducing the chance of contracting a food-borne illness (Perez &Boozman, 2016). Management of community by food storage need to be recognize community trends, the vulnerability in the event of a disaster, and foods that are shelf stable. This process will be initiate by assess and evaluate the community's needs. A suggested list of food from The Federal Emergency Management Agency (FEMA) such as ready-to-eat canned meats, fruits, vegetables and a can opener, protein or fruit bars, dry cereal or granola, peanut butter, dried fruit, nuts, crackers, etc. For the children, the non-perishable pasteurized milk, high energy foods, vitamins, and food for infants-ready-to-feed formula need to be prepared. The quantity of food and milk should be calculate based on the population.

In the study of Wien & Sabaté (2015) suggested on evaluation the nutrient density using Drewnowski's naturally nutrient rich (NNR) score, this score was computed by the formula Σ% Daily Values 2000kcal/14. Moreover, all foods need to make sure for the appropriate storage that the food is preferably on high shelves. Keep track of the dates on the packages when placing them in food storage, and rotate products out periodically to be replaced with newer stock when distributed to the people in the community.

Second component is food accessibility in order to improve the food access for households with children under 5 years of age. Thus, the root factor of having well-access infrastructure plays a vital role in providing for basic needs, delivering essential services and supporting local economic development. Functioning infrastructure systems are also essential for delivering foods need to

and from a market quickly and efficiently. Therefore, the facts that the damage of the landscape such as road and other infrastructures in a post-disaster area has a direct impact on the lack of food accessibility. Having reconstruction program to improve the infrastructures can be done as fist attempt to connect people and the local market as the center of foods supply (Cantrell & Lewis, 2010). Reconstruction of infrastructures led to the positive progress of the disaster's victim's families to then re-manage their socio-economic activities. In relation with that, once the food becomes accessible, specifically, this improvement will reach out the disaster victim's families to help them recover their economic livelihood. Cantrell and Lewis (2010) also argued that at the end of this inter-related chains, the household who has children less than 5 years will benefit from those programs that gradually prevent the malnutrition threats.

Third component is food utilization, as it is closely associated with food security. Such prospective programs that can be done to address food utilization is through nutrition education. The importance of giving nutrition education is due to the problematic facts that people still facing, such as: food taboos, long-established dietary and snacking habits, agricultural production decisions, food distribution in the family, ideas about child feeding, misleading food advertising, ignorance of food hygiene, or negative attitudes to vegetables (Uccello, Kauffmann, Calo, & Streissel, 2017). As it has already been acknowledged as an essential catalyst for nutrition impact in food security, community nutrition, and health interventions.As nutrition education contributes to improving the capability dietary behavior and nutrition status of the people. Thus, this also implies with the people in an emergency situation like post-disaster settings. Giving nutrition education program to the disaster's victim will stimulate the long-term effects on the independent actions of an adult to look after the health of the children.

In addition, food utilization will also rely on how well enough the nutrition is absorbed into the human body. In relation with that, the availability and well managed of water, sanitation and hygiene (WASH) become important aspect towards food utilization. Since the post-disaster area has got many damages in their environment so that their WASH system becoming not feasible. As the result of poor WASH can contributes to causal health problems, such as: (1) continuous diarrhea lead to mal-absorption of nutrients, (2) soil transmitted helminthes infections or parasitic intestinal worms, due to lack of proper sanitation (3) through a condition called 'environmental enteropathy' characterized by increased gut permeability and nutrient mal-absorption (Humphrey, 2009; Ziegelbauer, Speich, M□usezahl, Bos, Keiser, & Utzinger, 2012). Those health problems are exactly threatening the life of disaster's victim even riskier. Continuously, when the disaster's victim lives with poor WASH system, so that they will not be able to have proper food utilization.Therefore, WASH program is essential to improve the food utilization post-disaster such volcano eruption.

Conclusion

Post volcano eruption is undeniable natural disaster threats against food security in Indonesia. As the focus case analysis, this paper argue that the most vulnerable groups affected by the eruptions are children under five who tend to be experiencing such malnutrition due to the emergency situation and the lack of food supply. Revisiting the understanding on the concept of food security is helping to be aware of any potential dynamic of the cases that happened in the field. This paper strongly suggest that in dealing with post-volcano eruption, such a long term interventions such as health and nutrition education is need to be done. This is urgent, since ensuring the fulfillment of nutrition needs of children under five is determining the future of generation.

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