

# Family Food Security with The Nutritional Status of Toddlers After The Eruption of Mount Bromo

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## ABSTRACT

**Background:** During Mount Bromo issued volcanic ash in December 2015 - February 2016, Tumpang and Poncokusumo areas (The eastern part of Malang Regency) feels the impact of volcanic ash. This reduces food availability, food access, and food consumption, thus disrupting food security over long periods of time. In emergency situations due to natural disasters of volcanic eruptions and conditions of food security disturbances, the most vulnerable groups have nutritional problems and health problems are under five years old (toddlers). **Objective:** The purpose of this study was to determine the relationship of family food security with the nutritional status of toddlers after the eruption of Mount Bromo in Malang regency. **Method:** This research uses observational design with cross-sectional approach. The sample used was 96 families with toddlers. Sampling technique using quota sampling. Instruments for measuring family food security using modified questionnaires from the USDA. While the data of nutritional status of toddlers obtained through "Kartu Menuju Sehat" (KMS). **Result:** More than half of respondents (76%) have high family food security and more than half of respondents (87.5%) have good nutritional status. Spearman correlation test results obtained  $p$ -value of  $0.04 < (\alpha 0.05)$ . **Conclusion:** There is a relationship of family food safety with nutritional status of toddlers with the correlation coefficient ( $r = 1,000$ ) means have strong relationship strength. **Keywords:** food security, nutritional status, toddlers

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## INTRODUCTION

Indonesia is an archipelago situated on the Pacific Ring of Fire where there are 129 volcanoes or 21% of all the volcanoes on earth located in Indonesia at risk of the eruption (BMKG, 2010; DeVore, 2010; Israel, 2010). The volcanic eruption caused damage by removing materials such as lava, volcanic ash, poisonous gas and causing acid rain (Spence & Gunesevara, 2008; NASA, 2013; Antwi, 2013). These materials can damage crops, soil, animals, infrastructure and cause health problems and climate change, thus reducing food availability, access to food and food consumption, thus disrupting food security over the long term (Antwi, 2013; WHO, 2013; Becker, Smith, Johnston, & Munro, 2001; Lebon, 2009). The interruption of these three components of food security (availability, access, and consumption of foodstuffs) decreases food intake which then affects nutritional status (WFP, 2010). On November 26, 2010, 17:40 pm, Mount Bromo erupted and issued volcanic ash that affects the 4 districts of Probolinggo, Malang, Pasuruan, and Lumajang. Signs of Bromo eruption again appear within the span of December 2015 - February 2016 disrupts many aspects of life. Volcanic ash Bromo disrupt health, so it is recommended the use of masks and glasses. Communities living around the Tengger caldera, which as large farmers/cultivators, were affected by the ash rain that covered the plants. Some airports had to stop their operations due to the ash rain (Anonymous, 2015). There are four areas affected by volcanic

ash in Malang Regency, among others, Ngadas Village in District Poncokusumo, Kemiri Village and Taji Village in District Jabung, and Village Duwet in District Tumpang. Continuous accumulation of volcanic ash causes the topsoil to become resistant to water, making crops difficult to grow, except long-rooted plants. This volcanic ash also has an impact on livestock (Lebon, 2009).

The eastern part of Malang Regency is now a supporting area of agriculture, not only in Poncokusumo sub-district but also in Pakis, Jabung and Tumpang sub-districts. Meanwhile, the area of Tumpang and Poncokusumo during Mount Bromo issued volcanic ash, these two areas are feeling the impact of volcanic ash. In addition to Apple threatened damaged by volcanic ash of Mount Bromo, it also threatens the production of other agricultural crops.

There are two types of food insecurity in the household that is chronic and transitory. Transitory food insecurity is a temporary decline in access to food, usually caused by natural disasters that result in instability in food prices, production, and income (Kartika, 2005). The most vulnerable groups experiencing nutritional and health problems are toddlers (WHO, 2013; The John Hopkins and IFRC Public Health Guide for Emergencies, 2000). Age under five years (toddlers) is the golden age. This period is very important as well as a critical period in the process of growth and development of both physical and intelligence. At the age of 1-2 years, the child must obtain nutritional intake in accordance with his needs to stimulate the size and chemical function of the brain (Soetjiningsih, 2005). The family is the beginning of life for children and other family members, especially in terms of food, nutrition, education, and adequate health then the individual will not be able to move well and productively economically. Based on a preliminary study conducted at Posyandu Balita Desa Ngadas in Poncokusumo Subdistrict, Kemiri Village and Taji Village in Jabung Subdistrict, and Duwet Village in Tumpang Sub-district of Malang Village Kemantren Village, Jabung Sub-District, Malang Regency got an interview conducted on 10 families with children under five years old (1- 5 years) found that 8 families found it difficult to get food after the eruption of Mount Bromo because many farms were damaged and 6 families said their toddler children lost weight due to lack of food consumption and suffering from a cough and cold. Based on the above description considering the most vulnerable groups experiencing nutritional problems during emergency and food insecurity is toddlers, it is necessary to research on "Family Food Resilience Relationship with Nutritional Status of Toddlers Post-Eruption of Mount Bromo in Malang Regency".

## **METHOD**

The research design used the design of observational design with cross-sectional approach that is cause and effect variable on the research object is measured and collected simultaneously, one time or one time at a time (Sastroasmoro, 2011). The population in this study were all families that have children under five in Posyandu namely Posyandu Balita Desa Ngadas in Poncokusumo Subdistrict, Kemiri Village (Tengo Village) and Taji Village (Dusun Umbut Legi and Taji Krajan) in Jabung Subdistrict, and Duwet Village in District Tumpang Malang Regency. The samples in this research are families with children aged under five and five years old children who were taken each of 30 people in each posyandu, the total sample of 120 respondents and who filled the questionnaire with a complete of 96 respondents taken using quota sampling technique. Inclusion criteria in this study are willing to be respondents, families with children aged under five (1-5 years), healthy family physically and mentally, and living in areas affected by the eruption of Mount Bromo.

Instruments in this study using family food security questionnaire. This questionnaire is a modification of the USDA questionnaire to measure family food security that contains questions about experiences of food insecurity in the past year (USDA, 2012). To determine

the nutritional status of under-five children using “Kartu Menuju Sehat” (KMS) which showed the result of weighing of children on KMS sheet then compared with standard reference table of nutritional status of girls and men 1-5 years old according to weight table and age according to WHO-NCHS. Data analysis used Spearman correlation test with SPSS at the significance level  $<(\alpha 0,05)$ .

## RESULT AND DISCUSSION

The research was carried out at Posyandu Ngadas Village in Poncokusumo Subdistrict, Kemiri Village and Taji Village in Jabung Subdistrict, and Duwet Village in Tumpang District of Malang Regency consisting of five villages included inclusion criteria such as Posyandu Desa Ngadas (Puskesmas Poncokusumo), Posyandu Desa Kemiri and Posyandu Taji Village (Dusun Umbut Legi and Taji Krajan) (Puskesmas Jabung), and Posyandu Desa Duwet Krajan (Puskesmas Tumpang). Each village consists of one nurse and midwife in charge of all posyandu in the village area. Posyandu activities are carried out one time in accordance with the specified monthly date and activities carried out in posyandu, among others, measurement of body weight and length of the body, supplementary feeding, immunization, examination of sick children, and examination of pregnant women. The location of research in the area affected by volcanic ash of Mount Bromo in December 2015 - February 2016. Based on the results of interviews of volcanic ash, among others, the destruction of plants due to covered volcanic ash resulting in farmers failing to harvest, in addition, volcanic ash also affects several children and toddlers Resulting in acute respiratory infections. The study was conducted in April-June 2017 and obtained 120 respondents and filled the questionnaire with a complete of 96 respondents.

Sociodemographic data of general characteristics of respondents based on father's age, father's last education, father's job, mother's age, mother's last education, mother's job, family/month income, a number of family members, toddler age and under five gender can be seen in Table 1.

Based on Table 1 it is known that the characteristics of father responders by age have an average age of 31.09 years, more than half (64.4%) of fathers respondents have last elementary education, and more than half (75%) of fathers respondents work as farmers. Characteristics of respondents of mothers by age have an average age of 25.71 years, more than half (61.5%) of respondents have primary education, and more than half (64.6%) of respondents work as housewives. Based on family income/month known to almost half of the respondents (40.6%)  $\geq$  Rp. 500,000 - 1,000,000 and most (88.5%) have family members of 3-4 people. Characteristics of under five years old respondents had a mean age of 23.72 months and more than half (51%) of female toddler respondents.

Based on the results of family food security research, family food security data obtained based on family food insecurity experience in the last one year can be seen in Tables 2 and 3.

**Table 1 Respondent's Sociodemographic Data at Posyandu Ngadas Village, Poncokusumo Subdistrict, Kemiri Village and Taji Village, Jabung Subdistrict, and Duwet Village Tumpang Subdistrict, Malang Regency 2017**

No.	Family Characteristics	N	n	%
1	Age of father 21 - 50 years (average 31.09 years)	96	96	100
2	Father's last education SD SMP SMA	96	62 24 10	64.4 25.0 10.4
3	Father's occupation Farmers Private entrepreneur Etc	96	72 14 4 6	75.0 14.6 4.2 6.3
4	Mother's age 17 - 45 years (average 25.71 years)	96	96	100
5	Mother's last education SD SMP SMA PT	96	59 32 3 2	61.5 33.3 3.1 2.1
6	Mother's job Housewife Farmers Private Etc	96	62 27 2 5	64.6 28.1 2.1 5.2
7	Income family / month <IDR. 500,000 ≥ Rp. 500,000 - 1,000,000 ≥ Rp. 1,000,000	96	37 39 20	38.5 40.6 20.8
8	Number of family members 3 - 4 people > 5 people	96	85 11	88.5 11.5
9	Age of toddler 1 - 60 months (average 23.72 months)	96	96	100
10	Gender of toddler Man Women	96	46 50	46.9 51

Based on Table 2 more than half of respondents (86.5%) had no difficulty in foodstuff supply and 13.5% of respondent households experienced difficulty in food supply within 1 - 6 months due to majority of respondents working as farmers and based on interviews impact of volcanic ash Mount Bromo causes plants that are mostly vegetables covered in volcanic ash and become damaged resulting in crop failures. More than half of respondents (59.4%) have a perception that the price of basic food (rice) is expensive but still affordable. This is supported by the results of the study that almost half of respondents (40.6%) had 1-2 species of variation and more than half of respondents (60.4%) had 1-2 varieties of livestock which the result was consumed by the family and sold so as to increase the purchasing power of food (59.4%) never replaced staple food (rice) and 40.6% of respondents never replaced

staple food (rice) with other ingredients such as maize/ processed and cassava/processed products.

**Table 2 Identification of Family Food Security at Posyandu Ngadas Village, Poncokusumo Subdistrict, Kemiri Village and Taji Village, Jabung Subdistrict, and Duwet Village Tumpang Subdistrict, Malang Regency 2017**

No.		Variable	n	%
1	Difficulty in food supply	1-6 months	13	13.5
		never	83	86.5
2	Perception of the price of staple food	Cheap and affordable	37	38.5
		Expensive but still affordable	57	59.4
		Expensive and unreachable	2	2.1
3	Changing staple food	yes	39	40.6
		no	57	59.4
4	Variations of plants	1-2 types	39	40.6
		> 3 types	35	36.5
		do not have	22	22.9
5	Variations of livestock	1-2 types	58	60.4
		> 3 types	1	1
		do not have	37	38.5
Total			96	100

Based on Table 3 of food insecurity experience in the past 1 year, most of the respondents never experienced food shortage or ran out of money to buy food (81.3%), able to buy complete foodstuffs: rice, vegetables, animal side dishes, vegetable side dishes, and fruits (82.3%), did not reduce the portion of the meal because of running out of food (91.7%), had no eating frequency less than 2 months with duration > 2 months (92.7%), did not reduce the frequency of eating due to out of food (92.7%), and still eat because of running out of food supplies (95.8%). The experience of family food insecurity in the last 1 year is mostly not experienced by the respondents because some families have crops or livestock are kept mostly in addition to self-consumption and sale. This can be seen in Table 5.2 where most respondents have variations of 1-2 species (40.6%) and 1-2 species (60.4%).

Based on the results of the study using a modified food modification questionnaire from USDA then family food security can be seen in Table 4 below.

**Table 3 Family Food Insecurity Experience at Posyandu Ngadas Village, Poncokusumo Subdistrict, Kemiri Village and Taji Village, Jabung Subdistrict, and Duwet Village Tumpang Subdistrict, Malang Regency 2017**

No.	Experience food insecurity		n	%
1	Run out of groceries or run out of money to buy groceries	yes	18	18.8
		no	78	81.3
2	Can not afford to buy full groceries: rice, vegetables, animal side dishes, vegetable side dishes, and fruit	yes	17	17.7
		no	79	82.3
3	Reduce the portion of the meal because it ran out of food	yes	8	8.3
		no	88	91.7
4	The frequency of eating is less than 2 months with duration > 2 months	yes	7	7.3
		no	89	92.7
5	Reduce the frequency of eating out of food	yes	7	7.3
		no	89	92.7
6	Not eating out of food supplies	yes	4	4.2
		no	92	95.8
Total			96	100

**Table 4 Family Food Security at Posyandu Ngadas Village, Poncokusumo Subdistrict, Kemiri Village and Taji Village, Jabung Subdistrict, and Duwet Village Tumpang District, Malang Regency 2017**

Family Food Security	n	%
High	73	76
Threshold/margin	3	3.1
Low	16	16.7
Very low	4	4.2
Total	96	100

Based on family food security analysis in Table 4 more than half of the respondents (76%) had high family food category. Factors affecting food security include age, income, and a number of family members (Susilowati, 2014). The first factor affecting food security is the age of the head of the household. In this study the average age of respondents 31.09 years old father who is the productive age in work. It is supported that more than half (75%) of the father's respondents work as farmers where a farmer relies on his or her workforce, the more productive the head of the household will eat the higher the food security. This is supported by research by Arene & Anyaeji which states that one of the dominant factors affecting food security is age (Arene & Anyaeji, 2010). The second factor affecting food security is the number of family members. Some relevant research results say that the number of family members has an influence on the amount of food consumed. In this study most of the respondents (88.5%) had a family member of 3 - 4 people (Table 1), meaning that the number of not-so-many members became one of the factors that increased family food security because the amount of food consumed relatively less than the number of members > 5 people. The third factor affecting food security is household income. Kenyes theory states that the higher the income received the higher the consumption so that the fulfillment of food consumption (food resistant). In this research, almost half of respondents (40.6%) have income  $\geq$  Rp. 500.000 - 1,000,000/month which is income below Regional Minimum Malang Regency in 2017 amounting to Rp. 2,358,610 per month. Although the income of the family

is still below the minimum wage level, it is also supported by some respondents who planted crops with varieties of 1-2 crops (40.6%) and raising livestock with variation 1-2 livestock (60.4%). The yields of harvested crops or livestock are used for family consumption and are sold so that most respondents (82.3%) are able to purchase complete foodstuffs of rice, vegetables, animal side dishes, vegetable side dishes, and fruit. Several studies that support, among others, mentioned that one of the dominant factors affecting food security is income per capita. This factor has a positive effect which means the higher one's income, the higher the probability of a household being included in the food-resistant category (Arene & Anyaeji, 2010; Halik, 2007).

Based on Table 4, there are still respondents who are categorized as non-food security, namely food security at the threshold/margin (3.1%), low (16.7%), and very low (4.2%). Factors affecting *the transitory* food insecurity is a decrease in access to food that is temporary, usually caused by natural disasters that result in the instability of food prices, production, and revenue (Kartika, 2005). This is related to the location of research located in the area affected by volcanic ash of Mount Bromo in December 2015 - February 2016 and impact on the destruction of crop yields resulting in crop failure. In addition, food access is also influenced by income where almost half of respondents (38.5%) have income <Rp. 500.000 per month and does not have 22.9% crops and 38.5% cattle. This is supported by the research of Rahmawati et al indicating that two years after the eruption of Mount Bromo, the food security of the community in the study area is still in vulnerable condition, food-resistant families as much as 41%, the rest food threshold (9%), food security Low (43%) and very low food security (7%) (Rahmawati, et al., 2014).

Based on the result of the research, it is found that the special characteristics of respondents based on the nutritional status of children under five years can be seen in Table 5.

**Table 5 Nutrition Status of Toddlers at Posyandu Ngadas Village, Poncokusumo Subdistrict, Kemiri Village and Taji Village, Jabung Subdistrict, and Duwet Village Tumpang Subdistrict, Malang Regency 2017**

Nutritional status	n	%
More	5	5.2
Good	84	87.5
Less	6	6.3
Bad	1	1.0
Total	96	100

Based on Table 5 it is known that more than half of under-fives respondents (87.5%) have good category nutritional status. Factors affecting the nutritional status of children under five consist of two factors: internal factors (food digestibility, health status, age, sex, physiology status, and body size) and external factors (education level, nutritional knowledge, family income, background, social culture, environmental hygiene, and the state of infection) (Supariasa, 2012). Internal factors that affect the nutritional status of children are age and health status. Age will affect the ability or experience that parents have in the provision of nutrition in children under five (Soetjningsih, 2005). In this research, the mean age of the respondent is 31.09 years old and the average age of the respondent is 25.71 years old (Table 1) which is the productive age so it will be easier in receiving the information related to the nutrition status of the toddler. According Soetjningsih infants and children whose health is bad and the presence of infection and fever status are very vulnerable because in this period of life nutrient needs are used for rapid growth (Soetjningsih, 2005). Based on interviews with the respondents, the mother stated that toddlers rarely suffer from illness only a few who suffer from coughing during the occurrence of volcanic ash. External factors that influence the nutritional status of children under five are education level, nutritional knowledge level,

family income, the number of family members. Nutrition education is a process of changing knowledge, attitude, and behavior of parents or community to realize good nutrition status (Soetjningsih, 2005). Based on the results of research more than half (61.5%) of maternal respondents have last elementary school. Although the level of education of maternal respondents is still relatively low but with good maternal knowledge on nutrition and good health and coverage of health services (posyandu) will facilitate access for families to obtain information on improving the nutritional status of children under five (Table 1).

Family income is one of the factors that influence the nutritional status of children. In this research, almost half of respondents (40.6%) have income  $\geq$  Rp. 500.000-1,000,000/month which is income below Regional Minimum Malang Regency in 2017 amounting to Rp. 2,358,610 per month. Although the income of the family is still below the minimum wage level, it is also supported by some respondents who planted crops with varieties of 1-2 crops (40.6%) and raising livestock with variation 1-2 livestock (60.4%). The yields of harvested crops or livestock are used for family consumption and are sold so that most respondents (82.3%) are able to purchase complete foodstuffs of rice, vegetables, animal side dishes, vegetable side dishes, and fruit.

The number of family members is also one of the factors that affect the nutritional status of children. Some relevant research results say that the number of family members has an influence on the amount of food consumed. The nutritional value of food is also obtained by the variation of crops or livestock kept by the family, increasing the purchasing power of the family (Table 3) and more than half of respondents (88.5%) have family members of 3 to 4 persons or enough to obtain food for toddlers.

Based on the results of the study, a small percentage of under-fives (6.3%) were categorized as underweight and the rest (1%) were categorized as malnourished. The condition of infection is one of the factors that affect the nutritional status of children (Supariasa, 2012). The occurrence of economic, political and social crises including natural disasters, which affect the imbalance between food intake and the presence of infectious diseases, which ultimately affects the nutritional status of infants (Soekirman, 2000). This is related to the location of research in areas affected by volcanic ash of Mount Bromo in December 2015 - February 2016. Based on the results of interviews of the volcanic ash, among others, the destruction of plants due to covered volcanic ash resulting in farmers failing to harvest, in addition, volcanic ash also have an impact on some children and toddlers who cause acute respiratory infections.

Analysis of data to determine the relationship of nutritional status of children with a family food security in this study using *Spearman* correlation test and can be seen in Table 6.

**Table 6 Results of *Spearman***

Variable	Nutritional status of toddlers	
Family food security	r	1,000
	p-value	<0.04
	n	96

Based on Table 6 shows the results of data analysis using *Spearman* correlation test was obtained *p-value* of 0.04  $<(\alpha$  0.05) so that  $H_a$  accepted, meaning that there is a relationship between food security of families with nutritional status of children with correlation coefficients ( $r$ ) = 1.000 means to have the strength of the relationship the strong one. According to UNICEF family food security is an indirect factor affecting the nutritional status of children under five. This is consistent with the research of Rohaedi et al. which states that there is a significant relationship between household food security level with nutritional status of under five ( $p$  <0.0001) and Natalia study which states that there is a

family-level food security relationship with nutritional status of toddlers  $P < 0.001$ ) (Rohaedi, Julia, & Gunawan, 2012; Natalia, 2013).

## CONCLUSION

Based on the research results can be drawn conclusions, more than half of respondents (87.5%) have good category nutritional status. more than half of respondents (76%) have high family food security categories. There is a relationship between the nutritional status of children under five with family food security using Spearman Rank test obtained p-value of 0.04  $< (\alpha 0,05)$  with the correlation coefficient  $(r) = 1,000$  means have strong relationship strength.

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## REFERENCES

- Anonymous. (2015). <http://geomagz.geologi.esdm.go.id/erupsi-bromo-desember-2015-februari-2016/>. Accessed May, 20th 2016.
- Antwi, A. (2013). Climate Change and Food Security: An overview about the issue.
- Arene & Anyaeji. (2010). Determinants of Foods Security among Households in Nsukka Metropolis of Enugu State, Nigeria. *Pakistan Journal of Social Sciences (PJSS)*, Vol. 30(1): 9-16.
- Becker, J., Smith, R., Johnston, D., & Munro, A. (2001). Effects of the 1995-1996 Ruapehu eruptions on communities in central North Island, New Zealand, and people's perceptions of volcanic hazards after the event. *The Australasian Journal of Disaster and Trauma Studies*.
- BMKG. (2010). Apakah Gempa bumi itu?. [http://inatews.bmkg.go.id/tentang\\_eq.php](http://inatews.bmkg.go.id/tentang_eq.php). Accessed May, 20th 2016.
- DeVore V. (2010). Extra feature story, Natural disaster are fact of life in Indonesia's ring of fire. [http://newshourtc.pbs.org/newshour/extra/features/world/julydec10/indonesia\\_11-1](http://newshourtc.pbs.org/newshour/extra/features/world/julydec10/indonesia_11-1). Accessed May, 20th 2016.
- Halik, A. (2007). Ketahanan Pangan Masyarakat Pedesaan (Studi Kasus di Desa Pammusureng, Kecamatan Bonto Cani, kabupaten Bone). *Jurnal Agrisistem*, Vol. 3(2).
- Israel, B. (2010). Indonesia's Explosive Geology Explained. <http://www.livescience.com/8823-indonesiaexplosive-geology-explained.html>. Accessed May, 20th 2016.
- Kartika. (2005). Analisis coping strategy dan ketahanan pangan rumah tangga petani di Desa Majasih Kecamatan Sliyeg Kabupaten Indramayu. (skripsi). Departemen Gizi Masyarakat dan Sumberdaya Keluarga, Fakultas Pertanian, IPB.
- Lebon, S.L.G. (2009). *Vulcanic Activity and Environment: Impact on Agriculture and Use of Geological Data to Improve Recovery Process*. University of Iceland Faculty of Earth Science.

- NASA. (2013). How Do Volcanic Eruptions Affect Society?, Accessed May, 20th 2016.
- Natalia, L.D. (2013). Hubungan Ketahanan Pangan Tingkat Keluarga dan Tingkat Kecukupan Zat Gizi dengan Status Gizi Balita di Desa Gondangwinangun Tahun 2012. Universitas Diponegoro Semarang. Not published.
- Rahmawati, et al. (2014). Ketahanan Pangan Keluarga Balita Pasca Erupsi Gunung Bromo, Kabupaten Probolinggo, Indonesia. Indonesian Journal of Human Nutrition. Volume 1, Edisi 1: 35-49.
- Rohaedi, S., Julia, M., dan Gunawan, I.M.A. (2012). Hubungan antara Tingkat Ketahanan Pangan Rumah Tangga dengan Status Gizi Balita pada Rumah Tangga di Daerah Rawan Pangan Kabupaten Indramayu. Jurnal Gizi dan Dietetik Indonesia. Vol. 2(2).
- Sastroasmoro, S. (2011). Dasar-dasar Metodologi Penelitian Klinis. CV. Sagung Seto: Jakarta.
- Soekirman. (2000). Ilmu Gizi dan Aplikasinya. Departemen Pendidikan Nasional. Jakarta.
- Soetjiningsih. (2005). Tumbuh Kembang Anak. Erlangga. Surabaya.
- Spence, R., & Gunsekara, R. (2008) Insurance Risks From Volcanic Eruptions In Europe. London: Willis Research.  
[http://www.willisresearchnetwork.com/assets/templates/wrn/files/WRN%20Insurance%20Risks%20from%20Volcanic%20Eruptions\\_Final.pdf](http://www.willisresearchnetwork.com/assets/templates/wrn/files/WRN%20Insurance%20Risks%20from%20Volcanic%20Eruptions_Final.pdf). Accessed May, 20th 2016.
- Supariasa, (2012). Penilaian Status Gizi. EGC. Jakarta.
- Susilowati, H. (2014). Faktor-faktor yang mempengaruhi Ketahanan Pangan Rumah Tangga Miskin di Kecamatan Srandakan Bantul. Universitas Negeri Yogyakarta. Not published.
- The John Hopkins and IFRC Public Health Guide for Emergencies. (2000). Chapter 6 Food and Nutrition. <http://www.adpc.net/upload...ifrc/food/and/nutrition>. Accessed May, 20th 2016.
- USDA. (2012). US Household food security survey module: Three-stage design, with screeners. Economic research service.
- WFP. (2010). Nutrition Security and Food Security in Seven Districts in NTT Province, Indonesia: Status, Causes and Recommendations. [http://www.un.or.id/documents\\_upload/publication//Nutrition%20Security%20and%20Food%20Security%20in%20Seven%20Districts%20in%20NTT%20Province%20Indonesia%202010.pdf](http://www.un.or.id/documents_upload/publication//Nutrition%20Security%20and%20Food%20Security%20in%20Seven%20Districts%20in%20NTT%20Province%20Indonesia%202010.pdf), . Accessed May, 20th 2016.
- WHO. (2013). Volcanic Eruptions-Natural Disaster Profile-Technical Hazard Sheet, <http://www.who.int/hac/techguidance/ems/volcanos/en/>. Accessed May, 20th 2016.