Original Article

Food Security and Nutritional Status of Toddlers Post-Disaster in Palu City

Diah Ayu Hartini[1]*, Elvyrah Faisal[1], Mardiani Mangun[2], Bahja[1], Nikmah Utami Dewi[3], Ummu Aiman[3]

[1]Department of Nutrition, Poltekkes Kemenkes Palu, Palu, Central Sulawesi, Indonesia
[2]Department of Midwifery, Poltekkes Kemenkes Palu, Palu, Central Sulawesi, Indonesia
[3]Department of Nutrition, Universitas Tadulako, Palu, Central Sulawesi, Indonesia

(Correspondence author's email, diahayuhartini@ymail.com)

ABSTRACT

Palu City is the capital of Central Sulawesi Province which is prone to earthquakes because there is a fault in the earth's crust known as the Palu-Koro fault. There were 3 disasters at once in Central Sulawesi, namely the earthquake, tsunami and liquefaction in 2018. Natural disasters can have an impact on various kinds of losses experienced by the community, including nutritional disorders and disrupted components of food security. Toddlers are the group most vulnerable to nutritional problems and food insecurity in disaster situations up to post-disaster. This study aims to determine household food security and nutritional status of children under five after the disaster in Palu City. This research is a descriptive type of research using a cross-sectional by looking at the relationship between household food security and the nutritional status of children under five after the disaster in Palu City. The sampling technique used purposive sampling with a total sample of 101 respondents consisting of mothers and toddlers. The instruments used were the USDA questionnaire to assess food security and measurements of length or height and weight to measure the nutritional status of children under five. Data collection used a USDA questionnaire to assess household food security and the BB/U index was used to assess the nutritional status of children under five. There is no significant relationship between food security and nutritional status of children under five after the disaster in Palu City. This can happen because children under five with nutritional status of normal or abnormal weight 76.24% come from families with high food security scores. In addition, the existence of good food distribution in Palu City after the disaster occurred was also a cause of good food availability.

Keywords: Food Security, Nutritional Status, Toddlers, Post Disaster

INTRODUCTION

Indonesia is an archipelagic country located at the equator and surrounded by a ring of fire which is the line where the Asian Continental Plate meets the Indian Ocean Plate. Indonesia's position is located on the Pacific Ring of Fire, which is a 40,000 km long 'horseshoe' area that frequently experiences earthquakes and volcanic eruptions surrounding the Pacific Ocean basin. Approximately 90% of earthquakes that occur and 81% of the largest earthquakes occur along the Ring of Fire[1].

Palu City is the capital of Central Sulawesi Province which is prone to earthquakes because there is a fault in the earth's crust known as the Palu-Koro fault. This fault passes from Palu Bay into the mainland, cutting through the heart of the city to the Lariang River in the Pipikoro Valley[2]. In 2018, there were 3 disasters at once in Central Sulawesi, namely earthquakes, tsunamis and liquefaction. The impact of this disaster spread in Palu City 1703 people died, 171 people in Donggala, 366 people in Sigi, 15 people in Parigi Mautong and 1 person in Pasangkayu. A total of 1309 people are missing, 4612 people

are injured and 223,751 people are displaced at 122 points[3].

Natural disasters can have an impact on various kinds of losses experienced by the community, including economic losses, environmental damage, physical and mental disorders, and affect the welfare of the community[4]. Food availability, access, and consumption of foodstuffs are components of food security which can also be disrupted due to natural disasters and this can reduce food intake which in turn will affect nutritional status[5]. Disasters can also damage children's physical health such as nutritional disorders caused by food supply disruptions due to disasters[6].

Toddlers are the most vulnerable group to experience nutritional problems and food insecurity in disaster situations until post-disaster. Based on this, through a quantitative approach this study aims to determine household food security and nutritional status of children under five after the disaster in Palu City.

METHOD

This study is a descriptive type of research with a *cross-sectional* approach namely household food security with the nutritional status of children under five. The research site is a health center in Palu City, which is adjacent to the disaster-affected area in Palu City, Central Sulawesi Province, including the Bulili Health Center and Talise Health Center. The study was conducted from January to August 2022.

Subject of Study

Purposive sampling was used with sample criteria, namely mothers who have toddlers and are willing to be respondents in the study. The sample size was calculated using the formula:

$$n = \frac{Z\alpha^2 PQ}{d^2}$$

$$n = \frac{1,96^2 0,5 x 0,5}{0,1^2}$$

$$n = 96,04$$

From the above formula, a total sample of 96 people was obtained. However, to minimize data errors, the study sample was added to five samples so that 101 people were taken.

Research Instrument

The research instrument used a modified questionnaire from the USDA[7] household food security questionnaire to measure household food security and the tools used to measure nutritional status were weight scales, microtoise, baby scale and body length measurement (for infants).

Ethics Approval and Consent to Participate

This research has received ethical approval by the Health Research Ethics Commission of the Polytechnic of the Ministry of Health Palu under the number 0036/KEPK-KPK/V/2022. Written consent was obtained from the respondents after they received an explanation of the research objectives, design, and procedures. They were also informed that their responses were confidential and that they could withdraw their participation from the study at any time.

RESULTS

Total respondents in this study were 101 respondents consisting of mothers who have toddlers and are willing to be respondents and their toddlers whose weight and height were measured. Data on respondent characteristics can be seen in table 1 which includes maternal age, mother's education, mother's occupation, number of family members living together in one house, age of toddlers, gender of toddlers, nutritional status of children under five, and household food security status.

For maternal age, the most were between 21-30 years (58.5%). Most of the mother's education is in tertiary institutions (45.5%). Most of the mothers' occupations are in IRT (69.3%). The most number of family members in one house is in the category of 3-5 people (71.3%). Most toddlers are between 6-11 months (28.7%). The gender of the toddlers was mostly male (51.5%). The nutritional status of toddlers is mostly at normal weight (56.4%) and the most food security status is in the high

score category (76.2%).

Table 1. Data Characteristics of Respondents

Characteristics of Respondents	n	%
Mother's age		
21-30	59	58.5
31-40	32	31.6
41	10	9.9
Mother's education		
Elementary	7	6.9
school Junior	12	11.9
high school	36	35, 6
College	46	45.5
Mother's occupation		
Housewife	70	69.3
Entrepreneur	11	10.9
contract employee	10	9.9
Civil servant	8	7.9
College Student	2	2.0
Number of family members		
3-5 people	72	71.3
6-8 people	27	26.7
≥ 9 people	2	2.0
Age of under five years old		
0-5 months	26	25.8
6-11 months	29	28.7
12-23 months	27	26.7
24-59 months	19	18.8
Gender of toddlers		
Boys	52	51.5
Girls	49	48.5
Nutritional status of toddlers		
Very Underweight	15	14.9
Underweight	22	21,8
Normal weight	57	56.4
Risk of being overweight	7	6.9

Food security status		
High Score	77	76.2
Threshold Limit	7	6.9
Low	16	15.8
Very Low	1	1.1

The food security category in this study consisted of high, threshold, low, and very low scores[7]. For nutritional status, it is calculated based on indicators of body weight according to age in toddlers. The nutritional status category consists of very underweight, underweight, normal weight, and risk of being overweight[8].

The relationship between food security and nutritional status of children under five after the disaster in Palu City can be seen in table 2. The p value obtained is more than 0.05 (0.3) so it can be said that there is no relationship between food security and nutritional status of children under five. The results of this p value were obtained based on *chi-square* analysis to assess the relationship between the two variables.

Based on table 2, the category of nutritional status with very underweight is 11.9% under five, underweight 15.8% under five, normal weight is 41.6% under five, and the risk of being overweight is 6.9% under five. with a high score in the food security category. For respondents in the food security category at the threshold, there are 0.99% toddlers with very low body weight, 0.99% underweight toddlers, and 4.95% toddlers with normal weight. For the category of low food security, there are 0.99% toddlers with very low body weight, 4.95% toddlers with less weight, and 9.9% toddlers with normal weight. For the category of very low food security, 0.99% of children under five are underweight.

For total toddlers with food security in the high score category of 76.24%, toddlers with food security in the threshold category of 6.93%, toddlers with food security in the low category of 15.84%, and toddlers with food security in the very low category of 0 ,99%.

Table 2. Relationship between Food Security and Nutritional Status of Toddlers

Food security	Nutritional status								Total		p-value
	Very Less BB		Less BB		normal BB		More BB risk				
	n	%	n	%	n	%	n	%	n	%	
High Score	12	11.9	16	15.8	42	41.6	7	6.9	**77**	76.24	
Threshold	1	0.99	1	0.99	5	4.95	0	0	**7**	6.93	
Low	1	0.99	5	4.95	10	9.9	0	0	16	15.84	0.3
Very low	1	0.99	0	0	0	0	0	0	1	0.99	
Total	15	14.9	22	21.7	57	56.5	7	6.9	101	100	

The p value of resilience and nutritional status based on the chi-square test

DISCUSSION

Characteristics of Respondents

Characteristics of respondents are general descriptions of respondents, in this case respondents include mothers and toddlers. Based on the results of this study, the mother's age was mostly between 21- 30 years (58.5%). According to Sloan and Bennedict[9] in Winarsih[10], the ideal age for a woman to get pregnant and give birth is between 20-30 years where reproductive hormones are mature and functioning properly, thus the risk of pregnancy to the incidence of LBW in babies which is a nutritional problem can also be reduced. avoided.

The mother's education in this study was mostly in tertiary institutions (45.5%). The higher a person's education level, the easier it is to receive information so that the more knowledge they have. Mother's knowledge has a significant influence on the nutritional status of children under five[11]. Education is needed so that a person is more responsive to nutritional problems in the family and can take action as soon as possible.

For the most part, the mother's occupation is at IRT (69.3%). The natural disasters of the earthquake, tsunami and liquefaction that occurred in 2018 in Palu also caused many people to lose their jobs. More than half of the mothers under five in this study were domestic workers, so they spent more time taking care of the house and their toddlers. There are differences in parenting patterns between working mothers and non-working mothers. The growth of children in non-working mothers is quite good compared to working mothers because mothers who do not work have enough time to care for their children compared to mothers who work[12]. Other studies also show that there is a significant relationship between the mother's profession and child development[13].

CONCLUSION

There was no significant relationship between food security and the nutritional status of children under five after the disaster in Palu City. This can happen because toddlers with normal or abnormal weight nutritional status 76.24% come from families with high food security scores. In addition, the existence of good food distribution in Palu City after the disaster occurred was also a cause of good food availability.

The most number of family members in one house is in the category of 3-5 people (71.3%). The large number of family members is a factor that influences the pattern of food consumption diversification in realizing household food security[14]. Other studies have shown that the number of family members affects food security[15]. The number of family members has various influences, on the one hand the number of family members reduces food security because more family members are considered to increase the family's burden in meeting food needs.[16]. For the gender of the toddlers, the most were boys (51.5%) and the ages of the toddlers were mostly between 6-11 months (28.7%). At this age, toddlers have started eating complementary foods (MP-ASI).

Relationship between Food Security and Nutritional Status of Toddlers

Disaster is an extraordinary event that occurs beyond human control. The city of Palu has experienced natural disasters such as earthquakes, tsunamis and liquefaction in 2018. Post-disaster is a period that is prone to nutritional problems, especially for toddlers who are also at an age prone to nutritional problems. However, in this study, the nutritional status of children under five was mostly at normal weight (56.4%). However, the percentage of children under five with abnormal weight (very underweight, underweight, and overweight) when combined it is close to 50%.

This study is in line with the research conducted by Nasrul et al (2019) where the percentage of children under five with normal weight nutritional status is greater than that of children with abnormal nutritional status. However, when comparing the nutritional status of children under five before the disaster, post-disaster nutritional problems in infants increased. The factors for the occurrence of nutritional problems arise due to the lack of food ingredients whose nutritional value is guaranteed in the refugee camps, a less clean living environment, as well as upbringing and economic conditions caused by the lack of income of non-working parents[17]. Post-disaster nutritional status declines can also occur due to limited health services, interrupted food distribution channels and poorsanitation[18].

The most food security status is in the high score category (76.2%). Post-disaster

recovery in Palu City is included in the fast category. A lot of assistance was obtained by disaster affected residents as well as faster economic recovery. This economic recovery also has an impact on people's purchasing power for a variety of foods. Food security is an indirect factor that affects nutritional status. Similar research related to post-disaster food security has also been conducted with the result that the food security category is greater (66.67%) compared to less food security (33.33%)[19].

Based on the results of statistical analysis, there was no significant relationship between food security and the nutritional status of children under five (p = 0.3). This can be seen in table 2, food security with a high score category is the most food security category in each category of nutritional status. Toddlers with normal and abnormal weight nutritional status (very underweight, underweight, and at risk of overweight) 76.24% come from families with high food security scores. In addition, the existence of good food distribution in Palu City after the disaster occurred was also a cause of good food availability. This result is in line with other studies which found that there was no relationship between family food security and the nutritional status of children under five in farming families. This is because their livelihood as farm laborers makes the availability and access to food rather difficult[20].

Other research that discusses the relationship between food security and nutritional status shows that there is a significant relationship between household food security and the nutritional status of children under five. There are two factors that are directly related to nutritional problems, especially malnutrition or lack of nutrition, namely the intake of nutrients from food and infectious diseases. The two factors that influence each other are related to various indirect factors, namely food security and safety[21].

ACKNOWLEDGEMENT

REFERENCES

1. Mei Lin M, Henschke R. Gempa, tsunami dan likuifaksi: Rangkaian bencana di Palu yang perlu Anda ketahui. 2018; Available from: https://www.bbc.com/indonesia/indonesia-45832237

2. Febriani RT. Mengenal Sesar Palu Koro, Patahan Aktif di Sulawesi yang Berpotensi Timbulkan Gempa Bumi. 2018 Oct 1; Available from: https://travel.tribunnews.com/amp/2018/10/01/mengenal-sesar-palu-koro-patahan-aktif-di-sulawesi-yang-berpotensi-timbulkan-gempa-bumi

3. BNPB. Kerugian dan Kerusakan Dampak Bencana di Sulawesi Tengah Mencapai 13,82 Trilyun Rupiah [Internet]. 2018. Available from: https://bnpb.go.id/berita/kerugian-dan-kerusakan-dampak-bencana-di-sulawesi-tengah-mencapai-1382-trilyun-rupiah#:~:text=Sebarannya di Kota Palu 1.703,orang mengungsi di 122 titik.

4. UNISDR. Terminology on disaster. 2017;

5. FAO, UNICEF, WFP. Nutrition Security and Food Security in Seven Districts in NTT Province, Indonesia: Status, Causes and Recommendations for Response [Internet]. 2010. Available from: https://documents.wfp.org/stellent/groups/public/documents/ena/wfp236825.pdf

6. Kousky C. Impacts of Natural Disasters on Children. JSTOR [Internet]. 2016 [cited 2021 May 20];26(1). Available from: https://www.jstor.org/stable/43755231?seq=1

7. Blumberg SJ, Bialostosky K, Hamilton WL, Briefel RR. The Effectiveness of a Short Form of the Household Food Security Scale. Am J Public Health [Internet]. 1999;89(8). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1508674/pdf/amjph00008-0087.pdf

8. Kemenkes RI. PMK No. 2 Tahun 2020 tentang Standar Antropometri Anak. Vol. 21, Kementerian Kesehatan RI. 2020. p. 1–9.

9. Sloan PD, Benedict S, Mintzer M. The Complete Pregnancy Workbook. Jakarta: Mitra Utama; 1997.

10. Winarsih L. Hubungan Tingkat Pengetahuan, Paritas, dan Usia Ibu

Hamin dengan Kecemasan Menghadapi Persalinan di Rumah Sakit Bersalin Pemerintah Kota Malang. Kendedes Midwifery J [Internet]. 2017;3(1). Available from: http://jurnal.stikeskendedes.ac.id/index.php/KMJ/article/view/58

11. Pratama AR. Pengaruh Tingkat Pendidikan, Tingkat Pendapatan, Pengetahuan Ibu, Sikap Ibudan Perilaku Ibu Terhadap Status Gizi Balita di Kecamatan Kesamben Kabupaten Jombang. Swara Bhumi e-Journal Pendidik Geogr FIS Unesa [Internet]. 2013;2(1). Available from: https://jurnalmahasiswa.unesa.ac.id/index.php/swara-bhumi/article/view/942

12. Qomar UL, Sofiana J, Na'mah LU. Perbedaan Pola Asuh Terhadap Pertumbuhan Anak Usia 1-3 Tahun Pada Ibu Bekerja Dan Tidak Bekerja. J Ilm Kesehat Keperawatan. 2016;12(2):74–81.

13. Febrianita Titi Pratama Putri D, Studi Pendidikan Dokter P, Kedokteran dan Ilmu Kesehatan F, Muhammadiyah Yogyakarta U, Ilmu Kesehatan Masyarakat B. Perbedaan Hubungan antara Ibu Bekerja dan Ibu Rumah Tangga terhadap Tumbuh Kembang Anak Usia 2-5 Tahun Relationship between Working Mother and the Housewife with the Growth and Development of 2-5 Years Children. Mutiara Med. 2012;12(3):143–9.

14. Suyastiri NM. Diversifikasi Konsumsi Pangan Pokok Berbasis Potensi Lokal dalam Mewujudkan Ketahanan Pangan Rumahtangga Pedesaan di Kecamatan Semin Kabupaten Gunung Kidul. J Ekon Pembang Kaji Ekon Negara Berkembang. 2008;13(1).

15. Damayanti VL, Khoirudin R. Analisis Faktor - Faktor Yang Mempengaruhi Ketahanan Pangan Rumah Tangga Petani (Studi Kasus : Desa Timbulharjo, Sewon, Bantul). J Ekon Stud Pembang. 2016;17(2).

16. Pratiwi R. Analisis Tingkat Ketahanan Pangan Rumah Tangga Petani di Desa Konongorejo Kecamatan Bringin Kabupaten Ngawi. 2016;IV(1):1–6.

17. Nasrul, Candriasih P, N.A A. Status Gizi Anak Balita Pasca Bencana di Provinsi Sulawesi Tengah. Gizido. 2019;11(2):71–80.

18. Kemenkes RI. Pedoman Kegiatan Gizi dalam Penanggulangan Bencana. Jakarta; 2012.

19. Tambur A, Saputra IA. Ketahanan Pangan Masyarakat Nelayan Pasca Bencana di Kota Palu. Media Komun Geogr [Internet]. 2021 Dec 1;22(2):146. Available from: https://ejournal.undiksha.ac.id/index.php/MKG/article/view/32345

20. Safitri AM, Pangestuti DR, Aruben R. Hubungan Ketahanan Pangan Keluarga dan Pola Konsumsi dengan Status Gizi Balita Keluarga Petani (Studi di Desa Jurug Kabupaten Boyolali Tahun 2017). JKM J Kesehat Masy. 2017;5(3).

21. Rohaedi S, Julia M, Alit Gunawan IM. Tingkat ketahanan pangan rumah tangga dengan status gizi balita di daerah rawan pangan Kabupaten Indramayu. J Gizi dan Diet Indones (Indonesian J Nutr Diet [Internet]. 2016 Aug 30;2(2):85. Available from: http://ejournal.almaata.ac.id/index.php/IJND/article/view/290