

REVIEW ARTICLE

The Effect of Dietary Diversity on Nutritional Status in Indonesian Children: A Review

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ABSTRACT

Diversity in food consumption is a qualitative measure in food consumption and illustrates the household access to various types of food and is also an indicator of the quality of consumed food. The consumption of a variety of foods is expected to fulfill all the nutrients needed in everyday life, and is an important factor to determine the nutritional status. Nutritional problems experienced by children under five years old (toddlers) are the impact of malnutrition in everyday life of these children. The effect of nutrient deficiency due to low food variation was shown to cause low birth weight, under-nutrition, malnutrition, stunting and various other nutritional problems. So this review aimed to describe the relationship between dietary diversity and nutritional status in children under five years old in Indonesia.

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Introduction

A diversity in low quality food is one of the main causes of malnutrition in developing countries, especially for protein food sources, fruits, and vegetables (1). A secondary data analysis in 6 developing countries showed an increase in food energy availability that is most likely caused by an increase in vegetable consumption, oils and fats (2, 3). Several studies reported that the diversity in low quality diet is associated with the increased stunting in children (4, 5) and the double burden for malnutrition, cardiovascular risks (6), dyslipidemia (7), that the probability of a higher risk of metabolic syndrome (8). Based on the results conducted in 2018, it was found that the prevalence of toddlers with malnutrition was 3.9%, 11.5% for very short and 19.3% for short cases (9).

Indonesia is one country that has a wide variety of agricultural products that can be used as a food

substitute. The country has also abundant marine and livestock products as a source of animal proteins. However, the amount of agricultural and livestock products is inversely proportional to the nutrient deficiency number of cases (10). Based on the South East Asian Nutrition Survey (SEANUTS) study conducted in 48 cities in Indonesia, the prevalence of anemia in children under 3 years old was quite high, around 50-60%. This figure is categorized as heavy and is a public health problem for children under 3 years old (11). Micronutrient deficiencies can also occur due to the low intake of food micronutrients.

Increase in diet variation can be a kind of approach among children to reduce the burden of stunted growth and chronic malnutrition (12). The variety of food consists of 16 categories; including sources of carbohydrates, animal proteins, vegetable proteins, fats, vitamins, minerals, and fibers. Eating foods is required to be considered in quantity and types to

support the body needs (13). Giving the right amount and quality of food is important to cover the optimal children's growth and development. Therefore, there is a need to investigate the relationship between food diversity and nutritional status to support children's growth, development and to reduce nutritional problems that were the aims of this study.

Food Diversity

The diversity in food consumption is a qualitative measure that describes household access to several kinds of foods and an indicator for the quality of individual consumed food (14). One of the methods developed by the Food and Agriculture Organizations (FAO) to assess the quality of food consumption at the household level is the Household Dietary Diversity Score (HDDS) (15). Fulfilling the diversity of food consumption, apart from being related to the community health and nutritional status can be an illustration of achievements in the target indicators for the Millennium Development Goals (MDGs). The quality of food for some people still does not describe a balanced nutrition, and it can lead to an insufficient nutritional value (16).

Food diversity can be determined from variations of consumed foods or the sum of consumed food groups. Dietary Diversity Score (DDS) or food diversity score is one way to measure food consumption quality. The DDS method is a simple method that is easy to conduct, but is effective to measure the differences in diversity of consumed foods at the household and individual levels. The level of diversity in food consumption can be measured using several methods, including the use of the Individual Dietary Diversity Instrument (IDDI) by the Individual Dietary Diversity Score (IDDS) or the food consumption diversity score at the individual level (17). Assessment of food consumption is based on the scores given to each group of consumed food. The diversity of food consumption is based on 12 food groups (18), and the level of diversity in food consumption is grouped into three categories of low (≤ 3 consumed food groups), moderate (4-5 consumed food groups), and high (≥ 6 consumed food groups); while a higher score indicates more diverse consumption by the subject (8).

Children's Nutritional

Nutritional problems that occur in toddlers need special attention and as faced at this time, the problems include under-nutrition and over- or excess-nutrition situations. Under-nutrition is a condition where there is a lack of nutrients such as proteins, carbohydrates, fats, and vitamins that are needed by the body, while excess nutrition is

a condition in which the body has extra nutrients from the maximum limits needed by the body (19). It happens because of a nutrient imbalance. Malnutrition in the golden age of the first 1000 days of life can affect not only the physical development, but also the cognitive development, which impacts the level of intelligence and dexterity, as well as a further effect on work productivity (19, 20). Another impact of malnutrition at this time on health status is the risk of chronic diseases, like obesity, heart, and blood vessel diseases, stroke, and diabetes (21).

The population projections in 2018 showed that 30.1% or 79.55 million of the Indonesian population were children. It means that 1 in 3 residents were children (22). The golden period is critical which occurs once in a child's life, while more than 100 billion brain cells are ready to be stimulated to develop optimally intelligence (23). This period occurs in the first 1,000 days of life, from the pregnancy until the child becomes 2 years old, so this period is a crucial period that has an impact on the children's physical and cognitive development (24). Early growth and development in children will improve adulthood's health to have a better life (25). Children development in Indonesia needs a get serious attention, as growth retardation figures are still high including 5-10% of the general developmental showing that 2 out of 1,000 babies have impaired motor development and 3-6 of 1,000 infants suffer from hearing loss, and 1 out of 100 children experience low intelligence and speech delays (26, 27).

A total of 171 million children (167 million in developing countries) were reported to be stunted in 2010 (28), and if this trend continues, projections of 127 million children under 5 years old may be stunted by 2025 (29). According to WHO report, if the prevalence is 20% or more in children of under five years old, it can become a public health problem. The percentage of Indonesian children population under five years old in 2007-2018 for stunting is still high (30% dataset) and the health problem must be overcome (30). Stunting is a malnutrition problem caused by insufficient nutritional intake for a long period of time due to feeding without following their nutritional needs. The causes of stunting are divided into 2 groups of direct and indirect effects. Direct stunting is caused due to nutritional problems and by low nutritional intake and health issues, while these two factors can also influence each other. The indirect effect is the availability of food, parenting life styles, availability of clean drinking water, sanitation, and health services (31). The state of public nutritional health is dependent on the level of the quality of food. Nutritional quality emphasizes food diversity. The more diverse and the balanced the food is

consumed, the better the nutritional quality would be because there is no single type of food to have the complete and sufficient nutritional content in both quantity and quality (32). It was shown that there is a relationship between food consumption diversity and the nutritional status of Tinggi badan/umur (TB/U) = Height/Age (H/A) in children aged 6-23 months (33).

The results of Basic Health Research (Rikesdas) regarding the short posture in toddlers in Indonesia showed a prevalence of 37.2% in 2013 that decreased to 30.8% in 2018. Even though, there was a decrease of 6.4% within 5 years, the prevalence in 2018 was still very high (34). Prevention of short stature toddlers in Indonesia is still high and the health problem must be overcome (35, 36). Based on the nutritional adequacy rate (RDA), the adequacy rate of children aged 0-24 months old was demonstrated in Tables 1 and 2 illustrates adequacy rate of vitamins for children aged 0-24 months. Regarding mineral adequacy rate in children aged 0-24 months, the findings were presented in Table 3.

Scheme of Child Dietary Diversity

The factors causing malnutrition are the

imbalance of nutrients in foods and the infection. The indirect causes are food security, child care models, and health services. These factors are also correlated to the level of education, family knowledge and skills; as well as the level of family income (38). The nutritional adequacy factor of children is influenced by the adequacy of food consumption, while the children tend to be more active in choosing their favorite foods. Food consumption patterns in children have changed from traditional food to Western food patterns which are generally unhealthy as they have low nutritional content and are high in calories and fat (39).

Diet plan is important as it can affect children's growth and physical development (40). A good diet has an impact on a good nutritional status so that it can result in a good or an optimal development (41). Diet by selection of snacks can affect the nutritional quality of children too. The child's diet is also influenced by the parents' knowledge on nutritional fulfillment, so that good parental knowledge would create good habits of diet and would avoid nutritional deficiency in children (42). School-age children often experience a decrease in appetite, so there is no

Table 1: Adequacy rate of macro-nutrients in children aged 0-24 months.

Age group (Years)	Weight (kg)	Height (cm)	Energy (kcal)	Protein (g)	Fat (g)			Carbohydrate (g)	Fiber (g)	Water (mL)
					Total	Omega 3	Omega 6			
1-3	13	92	1350	20	45	0.7	7	215	19	1150
4-6	19	113	1400	35	50	0.9	10	220	20	1450

Nutritional Adequacy Rate, 2019 (37).

Table 2: Adequacy rate of vitamins for children aged 0-24 months.

Age group	Vit. A (RE)	Vit. D (mcg)	Vit. E (mcg)	Vit. K (mcg)	Vit. B1 (mg)	Vit. B2 (mg)	Vit. B3 (mg)	Vit. B5 (mg)	Vit. B6 (mg)	Folate (mcg)	Vit. B12 (mcg)	Biotin (mcg)	Choline (mg)	Vit. C (mg)
0-5 months	375	10	4	5	0.2	0.3	2	1.7	0.1	80	0.4	5	125	40
6-11 months	400	10	5	10	0.3	0.4	4	1.8	0.3	80	1.5	6	150	50
1-3 years	400	15	6	15	0.5	0.5	6	2.0	0.5	160	1.5	8	200	40
4-6 years	450	15	7	20	0.6	0.6	8	3.0	0.6	200	1.5	12	250	45

Nutritional Adequacy Rate, 2019 (37). Vit: Vitamin.

Table 3: Mineral adequacy rate for children aged 0-24 months.

Age group	Ca (mg)	P (mg)	Mg (mg)	Fe (mg)	I (mcg)	Zn (mg)	Se (mcg)	Mn (mg)	F (mg)	Cr (mcg)	K (mg)	Na (mg)	Cl (mg)	Cu (mcg)
0-5 months	200	100	30	0.3	90	1.1	7	0.003	0.01	0.2	400	120	180	200
6-11 months	270	275	55	11	120	3	10	0.7	0.5	6	700	370	570	220
1-3 years	650	460	65	7	90	3	18	1.2	0.7	1.4	2600	800	1200	340
4-6 years	1000	500	95	10	120	5	21	1.5	1.0	16	2700	900	1300	440

Nutritional Adequacy Rate, 2019 (37). Ca: Calcium, P: Phosphorus, Mg: Magnesium, Fe: Iron, I: Iodine, Zn: Zinc, Se: Selenium, Mn: Manganese, F: Fluoride, Cr: Chromium, K: Potassium, Na: Sodium, Cl: Chlorine, Cu: Copper.

balance between nutrient intake needed by the body (43). The diet of children in the era of globalization has led to a fast-food and it is necessary to know that fast foods contain a lot of calories and causes children to become obese so that current nutritional problems become doubled as under-nutrition and over-nutrition (44, 45). In an effort to meet nutritional needs and to optimize physical development, nutritional knowledge is important in parents to help them implement a good diet (46).

Food diversity is influenced by two factors; including the internal and external ones. Internal factors are influenced by food diversity; income, nutritional knowledge, culture, religion, and preferences. External factors are affected by production, availability, and distribution (47) of small meals (48). The study conducted on children aged 24-59 months in 33 provinces in Indonesia, it was found that the children's food consumption under five years old with normal nutritional status was more diverse than those of children under five years old with short nutritional status. They had energy and protein deficits. Another study revealed that children with short nutritional status had a deficit of micronutrients such as iron (Fe), calcium (Ca), and zinc (Zn) which are needed for children's growth, while the problem of stunting was one indicator of micro-nutrient deficiency (16). These results are reinforced by the results of the study in other regions with similar findings such as the studies in Nganjuk, Surabaya, Banten, and Pekanbaru that found children who were not stunted had higher food diversity than stunted children. However, they are still in the low category. The more diversity of consumed foods, the better the nutritional status would be (49-52).

Examples of Nutritional Problems in Children on Low Food Diversity

Nutritional problems experienced by toddlers are the impact of malnutrition in their life cycle and it is important to pay attention to the adequacy of received nutrients. Low birth weight and birth length are the risk factors for nutritional problems including stunting, and being under five years old with history of low birth weight (53). In line with the research of Ni'mah *et al.* (2015), there is a relationship between birth weight and the incidence of stunting (54). Birth length is another risk factor for stunting, which is 16.43 times greater than being toddlers with normal birth length (55). Low exclusive breastfeeding is one of the causes of nutritional problems in children under five years old, both in rural and urban areas. There is no significant relationship between breastfeeding up to 2 years old for occurrence of nutritional problems. However, complementary feeding of breast milk

is not optimal for the toddlers (56, 57). Adequate nutrition is required for growth to achieve optimal growth and development in all life cycles.

Diversity and quantity of food are related to nutritional status, especially indicators that reflect acute nutritional problems, so that this indicator can be used as an alternative predictor of malnutrition (58). A study conducted on 82 subjects aged 6-24 months showed that 74.5% of children with stunting status had consumed low food diversity. The subjects were rarely given animal or vegetable side dishes as well as fruits and vegetables (49). This situation can cause children to lack an intake of fat, proteins, vitamins, and minerals. The nutritional problems experienced by children under five years old, including stunting, are mostly caused by a lack of energy intake, macro-nutrients, and zinc. These results demonstrated a significant relationship between energy intake, macro-nutrients, and zinc with the incidence of stunting in children under five years old (59).

Furthermore, the study conducted by Farrapti (2019) on 49 toddlers in the Jatinangor sub-district showed that toddlers with normal growth were 82%, with over nutrition as 6%, at risk of over nutrition were 4%, with malnutrition as 4%, very poor nutrition as 2%, and with obesity as 2%. Based on the study using the Developmental Pre-Screening Questionnaire (KPSP), it was found that the development of children under five years old was 81.6% appropriate, 12.2% were doubtful, and 6.12% had deviations. So the toddlers had malnutrition with doubtful developmental and deviation so that further early detection and provision of appropriate nutrition are needed to support the growth status and to minimize the incidence of larger deviations (60).

Conclusion

Food is consumed not only in terms of quantity, but also for quality, while food quality is often influenced by the type and diversity too. Various foods are important for children under five years old to support their optimal growth and development to improve the quality of life of this young generation. The food variations are closely related to the adequacy and completeness of the macro- and micro-nutrients. So the more variation in consumed foods, the more complete would be the nutrients intake. Nutritional deficiency and imbalance in toddlers can result in decreased nutritional status, state of stunting, and various nutritional problems. Therefore, It is essential to do more in-depth researches or studies to clarify which nutrients are crucial and have the most influence on nutritional status, growth, and development.

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Conflict of Interest

None declared.

References

- 1 Ochola S, Masibo PK iny. Dietary intake of schoolchildren and adolescents in developing countries. *Ann Nutr Metab.* 2014;64:24-40. DOI:10.1159/000365125.
- 2 Popkin BM. The nutrition transition: An overview of world patterns of change. *Nutr Rev.* 2004;62:140-3. DOI:10.1301/nr.2004.jul.S140-S143.
- 3 Ng SW, Zhai F, Popkin BM. Impacts of China's edible oil pricing policy on nutrition. *Soc Sci Med.* 2008;66:414-26. DOI:10.1016/j.socscimed.2007.09.015.
- 4 Frank DA, Neault NB, Skalicky A, et al. Heat or Eat: The Low income home energy assistance program and nutritional and health risks among children less than 3 years of age. 1998. www.pediatrics.org/cgi/doi/10.1542/. Accessed August 29, 2021.
- 5 Labadarios D, Mchiza ZJR, Steyn NP, et al. Food security in south africa: A review of national surveys. *Bull World Health Organ.* 2011;89:891-9. DOI: 10.2471/BLT.11.089243.
- 6 Truthmann J, Richter A, Thiele S, et al. Associations of dietary indices with biomarkers of dietary exposure and cardiovascular status among adolescents in Germany. *Nutr Metab (Lond).* 2012;9:92. DOI:10.1186/1743-7075-9-92.
- 7 Li Y, Wedick NM, Lai J, et al. Lack of dietary diversity and dyslipidaemia among stunted overweight children: the 2002 China National Nutrition and Health Survey. *Public Health Nutr.* 2011;14:896-903. DOI:10.1017/S1368980010002971.
- 8 Mirmiran P, Azadbakht L, Esmailzadeh A, et al. Dietary diversity score in adolescents - A good indicator of the nutritional adequacy of diets: Tehran lipid and glucose study. *Asia Pac J Clin Nutr.* 2004;13:56-60. DOI:10.1079/PHN2005887.
- 9 Kementerian Kesehatan Republik Indonesia. Laporan Riset Kesehatan Dasar (Riskesdas) 2018 Nasional. 2018.
- 10 Badan Pusat Statistik. Statistik Tanaman Buah-buahan dan Sayuran Tahunan Indonesia 2018. Badan Pusat Statistik. 2018.
- 11 Ernawati F, Sandjaja N, Soekatri M. Status Vitamin A Dan Zat Besi Anak Indonesia. *Gizi Indones.* 2013;36:123.
- 12 Sié A, Tapsoba C, Dah C, et al. Dietary diversity and nutritional status among children in rural Burkina Faso. *Int Health.* 2018;10:157-62.
- 13 FAO (Food and Agriculture Organization). The double burden of malnutrition Case studies from six developing countries. 2006.
- 14 Kennedy G, Ballard T, Dop MC. Measurement of dietary diversity for monitoring the impact of food-based approaches. *Improv diets Nutr food-based approaches.* 2014;284-90. DOI:10.1079/9781780642994.0284.
- 15 Swindale A, Bilinsky P. Household Dietary Diversity Score (HDDS) for measurement of household food access: Indicator guide. *Food Nutr Tech Assist.* 2006;11.
- 16 Hermina dan Prihatini S. Gambaran Keragaman Makanan Dan Sumbangannya Terhadap Konsumsi Energi Protein Pada Anak Balita Pendek (Stunting) Di Indonesia. *Bull Heal Res.* 2012;39:62-73.
- 17 FAO (Food and Agriculture Organization). An Introduction to the Basic Concepts of Food Security. EC - FAO Food Secur Program. 2008;1-3.
- 18 FAO (Food and Agriculture Organization). Guidelines for measuring household and individual dietary diversity. *FAO.* 2010;1-60.
- 19 Vinod N, Swarnakanta L, Smita P, et al. Nutritional status and dietary pattern of underfive children in urban slum area. *Nat J Comm Med.* 2011;2:143-8.
- 20 Hanum F, Khomsan A, Heryatno Y. Hubungan asupan gizi dan tinggi badan ibu dengan status gizi anak balita. *J Gizi dan Pangan.* 2014;9:1-6.
- 21 Mahmudiono T, Sumarmi S, Rosenkranz RR. Household dietary diversity and child stunting in East Java, Indonesia. *Asia Pac J Clin Nutr.* 2017;26:317-25.
- 22 Kementerian Pemberdayaan Perempuan Perlindungan Anak. Profil Anak Indonesia 2019. 2019;1-378.
- 23 Sugeng HM, Tarigan R, Sari NM. Gambaran Tumbuh Kembang Anak pada Periode Emas Usia 0-24 Bulan di Posyandu Wilayah Kecamatan Jatinangor. *JSK.* 2019;4:96-101.
- 24 Kadi FA, Garna H, Fadlyana E. Kesetaraan Hasil Skrining Risiko Penyimpangan Perkembangan Menurut Cara Kuesioner Praskrining Perkembangan (KPSP) dan Denver II pada Anak Usia 12-14 Bulan dengan Berat Lahir Rendah. *Sari Pediatr.* 2016;10:29
- 25 Pem D. Factors Affecting Early Childhood Growth and Development: Golden 1000 Days?. *J Adv Pract Nurs.* 2015;01:1-7.
- 26 Tjandrajani A, Dewanti A, Burhany AA,

- et al. Keluhan Utama pada Keterlambatan Perkembangan Umum di Klinik Khusus Tumbuh Kembang RSAB Harapan Kita. *Sari Pediatr.* 2016;13:373.
- 27 Asnaniar WOS, Lasini MB. Hubungan Lingkar Kepala dengan Perkembangan Motorik Anak Usia 1-24 bulan di Rumah Sakit Ibu dan Anak Pertiwi Makassar. *J Ilm Kesehat Diagnosis.* 2016;9:227–31.
 - 28 De Onis M, Blössner M, Borghi E. Prevalence and trends of stunting among pre-school children, 1990-2020. *Public Health Nutr.* 2012;15:142–8. DOI:10.1017/S1368980011001315. PMID:21752311.
 - 29 Weise AS. Global Nutrition Targets 2025 Stunting policy Brief. *Can Pharm J.* 2014;122:74-6.
 - 30 WHO. WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: methods and development 2006. Available from: <https://www.who.int/publications/item/924154693X>. Accessed August 30, 2021.
 - 31 Kemenkes RI. Situasi Balita Pendek. Kementerian Kesehatan Republik Indonesia. 2016. ISSN 2442- (Hari anak Balita 8 April):1–10. moz-extension://ad3778c0-6424-48f2-aca6-89bee1bd466f/enhanced-reader.html?openApp&pdf=https%3A%2F%2Fpusdatin.kemkes.go.id%2Fresource%2Fdownload%2Fpusdatin%2Finfodatin%2Fsituasi-balita-pendek-2016.pdf. Accessed August 30, 2021.
 - 32 Wahyuningsih U, Anwar F, Kustiyah L. Kualitas Konsumsi Pangan Kaitannya Dengan Status Gizi Anak Usia 2-5 Tahun Pada Masyarakat Adat Kesepuhan Ciptagelar Dan Sinar Resmi. *Indones J Heal Dev.* 2020;2:1–11.
 - 33 Arimond M, Ruel MT. Dietary diversity is associated with child nutritional status: Evidence from 11 demographic and health surveys. *J Nutr.* 2004;134:2579–85.
 - 34 Kementerian Kesehatan RI. Laporan Riskesdas 2018 Nasional. 2018;
 - 35 IDAI | Mengenal Keterlambatan Perkembangan Umum pada Anak. Available from: <https://www.idai.or.id/artikel/seputar-kesehatan-anak/mengenal-keterlambatan-perkembangan-umum-pada-anak>. Accessed August 30, 2021.
 - 36 Solihin RDM, Anwar F, Sukandar D. Kaitan antara Status Gizi, Perkembangan Kognitif, dan Perkembangan Motorik pada Anak Usia Prasekolah. *J Chem Inf Model.* 2013;53:1689–99.
 - 37 Kementerian Kesehatan RI. Peraturan Menteri Kesehatan Republik Indonesia Angka Kecukupan Gizi. 2019. Available from http://hukor.kemkes.go.id/uploads/produk_hukum/PMK_No__28_Th_2019_ttg_Angka_Kecukupan_Gizi_Yang_Dianjurkan_Untuk_Masyarakat_Indonesia.pdf.
 - 38 Elisa AP. Determinan Status Gizi Pada Siswa Sekolah Dasar. *J Kesehat Masy.* 2012;7:122-6.
 - 39 Sambo M, Ciuantasari F, Maria G, et al. Hubungan Pola Makan Dengan Status Gizi Pada Anak Usia Prasekolah Correlation between Dietary Habits and Nutritional Status of Preschool Childern. *J Ilm Kesehat Sandi Husada.* 2020;11:423-9. DOI:10.35816/jiskh.v10i2.316.
 - 40 Anzarkusuma IS, Yudhya Mulyani E, Jus'at I, et al. Status Gizi Berdasarkan Pola Makan Anak Sekolah Dasar di Kecamatan Rajeg Tangerang. *Indonesian J Human Nutrition.* 2014;1:135.
 - 41 Sa'diya K. Hubungan Pola Makan Dengan Status Gizi Anak Pra Sekolah Di Paud Tunas Mulia Claket Kecamatan Pacet Mojokerto. *J Kebidanan Midwiferia.* 2015;1.
 - 42 Wirawan N, Rahmawati W. Ketersediaan dan Keragaman Pangan serta Tingkat Ekonomi sebagai Prediktor Status Gizi Balita. *Indones J Hum Nutr.* 2016;3:80–90.
 - 43 Octaviani P, Dody Izhar M, Amir A. Hubungan Pola Makan Dan Aktivitas Fisik Dengan Status Gizi Pada Anak Sekolah Dasar Di SD Negeri 47/ IV Kota Jambi. *J Kesmas Jambi.* 2018;2:56-66.
 - 44 Ningsih YA, Suyanto, Restuastuti T. Gambaran Status Gizi pada Siswa Sekolah Dasar Kecamatan Rangsang Kabupaten Kepulauan Meranti. *JOM FK.* 2016;3:1–12.
 - 45 Widyantari NMA, Nuryanto IK, Dewi KAP. Hubungan Aktivitas Fisik, Pola Makan, dan Pendapatan Keluarga dengan Kejadian Obesitas Pada Anak Sekolah Dasar. *J Riset Kesehatan Nasional.* 2018;2:214.
 - 46 Yulia A. Revitalisasi Pemberian Makanan Tambahan Dan Integrasi Pendidikan Gizi Berbasis Kearifan Lokal Di Sekolah Sebagai Upaya Perbaikan Gizi Anak Usia Sekolah. *Media Pendidikan, Gizi, dan Kuliner.* 2017;6:18–33.
 - 47 Suryana A. Penganekaragaman Konsumsi Pangan dan Gizi: Faktor Pendukung Peningkatan Kualitas Sumber Daya Masyarakat. *Dep Pertan RI.* 2009;52:1–16.
 - 48 Pangesti DP, Andadari S, Mahmudiono T. Keragaman Pangan dan Tingkat Kecukupan Energi serta Protein Pada Balita Dietary Diversity, Energy and Protein Adequacy in Children. Andadari dan Mahmudiono. *Amerta Nutr.* 2017;1:172–9. DOI : 10.2473/amnt.v1i3.2017.172-179.
 - 49 Wantina M, Rahayu LS, Yuliana I. Keragaman konsumsi pangan sebagai faktor risiko stunting pada balita usia 6-24 bulan. *J UHAMKA.* 2017;2:89–96.

- 50 Prakoso S, Ika S, Mulyana B. Keragaman Pangan dengan Status Kadarzi Keluarga di Wilayah Kerja Posyandu Sidotopo, Surabaya Dietary Diversity and Nutrition Concious Family (Kadarzi) Status among Household in Posyandu Sidotopo, Surabaya. *Amerta Nutr.* 2018;2:219–27. DOI :10.2473/amnt.v2i3.2018.219-227.
- 51 Sartika D, Nurmaliza S. Keragaman Makanan Terhadap Pertumbuhan Pada Balita Di Kota Pekanbaru Tahun 2017. *J Midwifery Sci.* 2018;2:55–9.
- 52 Nurmayasanti A, Mahmudiono T. Status Sosial Ekonomi dan Keragaman Pangan Pada Balita Stunting dan Non-Stunting Usia 24-59 Bulan di Wilayah Kerja Puskesmas Wilangan Kabupaten Nganjuk. *Amerta Nutr.* 2019;3:114. DOI: 10.20473/amnt.v3.i2.2019.114-121.
- 53 Mukhlis H, Yanti R. Prosiding Seminar Kesehatan Perintis E-ISSN : 2622-2256 Faktor-faktor yang berhubungan dengan Kejadian Stunting Pada Balita Usia 24 – 59 Bulan *Prosiding Seminar Kesehatan Perintis.* 2020;3:127–33.
- 54 Ni'mah Khoirun, Nadhiroh SR. Faktor Yang Berhubungan Dengan Kejadian Stunting Pada Balita. *Media Gizi Indones.* 2015;10:13–9.
- 55 Meilyasari F, Isnawati M. Risk Factors for Stunting in Infants Aged 12 Months in Purwokerto Village, Patebon District, Kendal District. *J Nutr Coll.* 2014;3:26–32.
- 56 Aridiyah FO, Rohmawati N, Ririanty M. Faktor-faktor yang Mempengaruhi Kejadian Stunting pada Anak Balita di Wilayah Pedesaan dan Perkotaan (The Factors Affecting Stunting on Toddlers in Rural and Urban Areas). *J Pustaka Kesehatan.* 2015;3.
- 57 Arifin Z. Gambaran Pola Makan Anak Usia 3-5 Tahun Dengan Gizi Kurang Di Pondok Bersalin Tri Sakti Balong Tani Kecamatan Jabon –Sidoarjo. *Midwiferia.* 2016;1:16.
- 58 Wirawan NN, Rahmawati W. Ketersediaan dan Keragaman Pangan serta Tingkat Ekonomi sebagai Prediktor Status Gizi Balita. *Indones J Hum Nutr.* 2016;3:80–90.
- 59 Ayuningtyas A, Simbolon D, Rizal A. Asupan Zat Gizi Makro dan Mikro terhadap Kejadian Stunting pada Balita. *J Kesehat.* 2018;9:445.
- 60 Damayanti R, Muniroh L, Farapti. Pemberian Asi Eksklusif Pada Balita Stunting Dan NonStunting. *Media Gizi Indones.* 2016;11:61–9.