

Factors Associated with Underweight among Two Years Old Children in DKI Jakarta Province (Indonesian Family Life Survey 2014)

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Abstract

A good health status, cognitive development, and productivity cannot be achieved without good nutrition. Nutritional status and its fulfilment of two years old children will be shaping the health status in the next age period. Unfortunately, nutritional problems like underweight is still a significant health problem in Indonesia, especially Special Capital Region of Jakarta. This study used secondary data achieved from Indonesian Family Life Survey 5 data in 2014. This study used a cross-sectional study design with a total of 135 samples of two years old children using a total sampling. Accordingly, the chi square test was used to find factors associated with underweight among two years old children. The result showed that the prevalence of underweight among under two years old children in DKI Jakarta Province was 30,4%. This result showed that child characteristics such as gestational age (OR= 5,813; CI= 1,291 - 26,178), low birth weight (OR= 5,060; CI= 1,136 - 22,533), and frequency of eating sweets (OR= 3,5; CI= 1,118 - 10,962) were associated with underweight (p-value < 0,05). The result of the study suggests that government should involve more in order to increase the role of community such as health center staff and cadres on preventing, detecting, and handling underweight cases by providing education and solutions to this phenomenon.

Keywords: food frequency, low birth weight, nutritional status, premature, two years old

Abstrak

Status kesehatan yang baik, perkembangan kognitif, dan produktivitas tidak dapat dicapai tanpa gizi yang baik. Status gizi dan pemenuhannya terhadap anak usia dua tahun akan mempengaruhi derajat kesehatan pada periode usia berikutnya. Sayangnya masalah gizi seperti kekurangan berat badan masih menjadi masalah kesehatan yang serius di Indonesia, khususnya di ibu kota negara, DKI Jakarta. Penelitian ini menggunakan data sekunder dari data Indonesia Family Life Survey 5 tahun 2014. Penelitian ini menggunakan desain studi cross sectional dengan jumlah sampel sebesar 135 bayi dua tahun menggunakan total sampling. Uji chi square digunakan untuk mengetahui faktor-faktor yang berhubungan dengan berat badan rendah pada anak usia dua tahun. Hasil penelitian menyatakan bahwa prevalensi anak dengan berat badan rendah pada balita di Provinsi DKI Jakarta sebesar 30,4%. Hasil penelitian ini menunjukkan bahwa karakteristik anak seperti usia kehamilan (OR= 5,813; CI= 1,291 - 26,178), BBLR (OR= 5,060; CI= 1,136 - 22,533), dan frekuensi makan yang manis berhubungan dengan berat badan kurang pada balita (OR= 3,5; CI= 1,118 - 10,962) (p-value < 0,05). Hasil penelitian menyarankan pemerintah untuk lebih banyak terlibat untuk meningkatkan peran masyarakat seperti petugas puskesmas dan kader dalam pencegahan, pendeteksian, dan penanganan kasus anak dengan berat badan rendah dengan memberikan edukasi dan solusi pencegahannya.

Kata kunci: frekuensi makan, BBLR, status gizi, prematur, umur dua tahun

Introduction

Nutritional problems can affect society of all ages; however, infants and children are classified as the most vulnerable segments due to their high necessity on nutrient requirements in order to reach optimal growth and development. Correspondingly children under two years old, in particular, are group into a significant period called the first 1000 days of life which is often called the “window of opportunity” or the “golden age”. In this period, growth is rated higher than other periods, hence if the nutrients requirement at this period are not optimally fulfilled, it will lead to an irreversible growth failure leading to permanent impact between generations (1).

Accordingly, one of the nutritional problems in the first 1000 days of life is underweight. Underweight is defined as children’s weight for age < -2 standard deviations (SD) based on the WHO Child Growth Standards median (2). In the Millennium Development Goals (MDGs) final evaluation, the results showed that the underweight report for children has decreased globally from 25% in 1990 to 15% in 2015. However, this number of reduction was not evenly distributed in all regions of the world because the demographic data stated that 90% of underweight children are located in Southeast Asia and Sub-Saharan Africa (3). In Indonesia, particularly the numbers of underweight among children under two years old has been increasing significantly, reaching 14,9% in 2016. In 2016, the prevalence of underweight among children under two years old has also reached 12% in DKI Jakarta Province alone (4). Although this figure is still classified below the national prevalence, when compared to the cut-off issued by WHO, it is noted as a

medium prevalence level of the public health problems (2).

Furthermore, underweight affects several health problems. Whereas, the cases of underweight in children together with pregnant women resulted in about 3.5 million deaths with the burden of disease in children under five years old by 35% (5). A recent study estimated that about 53% of deaths in young children were caused by underweight (6). Based on these data, underweight in children under five years old might lead to stunted development and growth which further leads to stunting and wasting in children. Underweight could also lead to growth failure, delayed development, weakened immune system resulting in the body being prone to infectious diseases, chronic diseases, anemia, hair loss and thinning, poor wound healing and even death (7-11). To address this specific problem, this research was conducted in order to determine factors such as children, mothers and households’ characteristics related to underweight cases on two years old children in DKI Jakarta Province.

Operational definition used for the analysis should be explained in the methodology, if possible, need to have logical framework.

Methods

This study was a further analysis of publicly available secondary data. Data was obtained from the latest wave of Indonesian Family Life Survey which was fielded in 2014-2015 (IFLS 5) (12). The research uses cross sectional study design in order to see is there any relation between independent variable (children characteristic, maternal characteristic, and household characteristic) and dependent variable (underweight).

Children characteristic variable consist of gender (male and female), gestational age

(preterm < 37 weeks and a term \geq 37 weeks), birth weight (low birth weight < 2500 gram and not low birth weight \geq 2500 gram), basic immunization status (uncompleted and completed according to their age when surveyed), diarrhea (yes if diarrhea happens \geq 3 times a day and not diarrhea if it happens < 3 times a day), acute respiratory infection (yes if the kid having a fever accompanied by one of this symptoms such as cough, runny nose and out of breath and no if the kid not having a fever and the symptoms), exclusive breastfeeding (no if the babies being given food and drink other than breastmilk until they are 6 months old and yes if they haven't), frequency of foods consumption which categorized with low and high (low if the food consumption frequency is below the median and high if the food consumption frequency is above the median) also often and seldom (often if the food consumption frequency is above the median and seldom if the food consumption frequency is below the median) and anemia (yes if hemoglobin levels < 11 gram/dL and no if \geq 11 gram/dL).

Maternal characteristic variable consists of mother's nutritional status (underweight if the body mass index < 18,5 kg/m² and not underweight if the body mass index \geq 18,5 kg/m²) and education (low if mothers never went to school or graduated from junior high school or equivalent and high if mothers graduated from senior high school, university, or equivalent).

Household characteristic variables consist of spending on foods. Which are spending on carbohydrate, spending on animal protein, spending on plant protein, spending on vegetables and fruits, spending on milk, spending on fast-food, spending on cigarettes and spending on others. All the spending variables are categorized with low and high categories. Low if the spending is below the median and high if the spending is above the median.

The population of this study consists of all children (0-23 months) in DKI Jakarta

Province with a total of 135 children. Inclusion consists of children that have records on birth of date or age and were weight measured during the interview period. Exclusion criteria is children with extreme WAZ score (< -6 SD or > 5 SD), born with gestational age of < 24 weeks or > 42 weeks, and have very low birth weight or < 1500 gram.

Sampling was done using a total sampling method. Sampling using this method is usually done by taking all population members that meet the inclusion and exclusion criteria as respondent or sample. Data analysis is using a chi-square test with a 95% confidence level.

The IFLS has been approved by the Institutional Review Board of RAND Corporation in the United States, and the University of Gadjah Mada in Indonesia. The dataset has been de-identified by the RAND Corporation to preserve its anonymity of the respondents. However, additional ethical review has been approved by the ethical research committee, Faculty of Public Health, Universitas Indonesia 172/UN2.F10.D11/PPM.00.02/2020.

Results

Univariate analysis was performed to report the distribution of the variables studied. The overall N is 138, after cleaning up the data; then 135 samples of children were obtained, however there are several data variables that are missing. Univariate analysis is obtained in the following Table 1.

Underweight nutrition status identified using WAZ score indicator. The result shows 30,4% children in DKI Jakarta Province have underweight nutrition status, with an indication of a very high level of public health problem according to WHO. The samples have mean WAZ score of -1.19 + 1.29 SD and age of 12.03 + 6.98 months. The result of children characteristic shows that 78.5% of children have premature birth history (gestational age < 37 weeks), 6.6%

have low birth weight history and 62.8% of children are often consumed sweet foods. The result of maternal characteristics shows that 97.6% of mothers' nutritional status is not thin and 63% of mothers have a high education. The result of household characteristics is the spending on various foods shows a nearly balanced result between low and high on all foodstuffs.

Bivariate analysis was performed to determine differences in underweight on factors related to it. Categorical data analysis uses the chi-square test in order to see any significant differences in the two proportions. The result shows that there is no significant relation between maternal characteristic and household characteristic with the underweight incident with all p-value > 0.05 . Significant differences were found between the variable studied, indicating that there were significant differences in children characteristic such as premature birth history, low birth weight history, and the frequency of consuming sweet foods, with an increased risk of underweight with p-value 0.023, 0.034, and 0.051 respectively or p-value < 0.05 .

Discussion

Bivariate analysis of maternal characteristic (nutrition status and education level) or household characteristic (spending on various foods) on children in DKI Jakarta Province shows that there was no significant relationship between both characteristics with underweight incident on children in this study sample. Most of the mothers in this study have a nutrition status of not underweight. Only 16 children that have mothers with low education level and underweight, and there are 31 children have mothers with low education level and not underweight. All the data of spending on various foods shows protective OR which means there are no relation between the risk factor and underweight incident. Hypothesis shows maternal characteristic

and household characteristic are related to underweight incident on children but not in this study. The characteristic of mothers with low education level is not related to underweight associated with the current technological development that enables even mothers with low education level, easily access information from various media that later on improve their knowledge (13). Household characteristics such as spending on various foods do not show any significance that might cause by the unavailability of specific data that shows the allocation of spending on various foods for each family members, thus it cannot be ascertained that high spending on some foods over a particular food also make the high frequency of child's food consumption.

Bivariate analysis on several child characteristics such as premature birth history, low birth weight history, and the frequency of consuming sweet foods show significant relationship with underweight. This is in line with research by Christian et al and Amare et al with findings that premature born babies have the tendency to experience underweight compared to babies born a term or post term (14,15).

The situation of premature babies causes low levels of various nutrients such as fatty acids, glycogen, calcium, iron, zinc, and various other nutrients that can disrupt the growth and health of the baby after birth which then triggers the occurrence of nutritional problems such as underweight (16). The characteristic of child with a low birth weight history with underweight has also shows a significant relationship. In line with research by Mgongo et al and Madiba et al that states children born with weight over 2500 gram decrease the risk of underweight on children (17,18).

Low birth weight is associated with low maternal weight gain during pregnancy which reflects the inadequacy of maternal nutrition during pregnancy. Growth process of children with low birth weight history tends to be slow and increase the risk of

morbidity, mortality and disability. Babies with low birth weight history have a bigger

problem of intake and often referred to be taken care in the neonatal unit, shows the

Table 1. Socio-demographic profile of respondents (N=135)

Variables	n	Percentage (%)
Nutritional Status		
Underweight	41	30.4
Severely underweight	7	5.2
Underweight	34	25.2
Normal	94	69.6
Gender		
Male	62	45.9
Female	73	54.1
Gestational Age		
Preterm (< 37 weeks)	95	78.5
A term (\geq 37 weeks)	26	21.5
Birth Weight		
LBW (< 2500 g)	8	6.6
Not LBW (\geq 2500 g)	113	93.4
Basic Immunizations Status		
Uncompleted	54	22.9
Completed	16	77.1
Diarrhea		
Yes (\geq 3 times a day)	27	25.5
No (< 3 times a day)	79	74.5
Acute Respiratory Infection		
Yes	64	47.4
No	71	52.6
Exclusive Breastfeeding		
No	77	81.1
Yes	18	18.9
Rice Consumption Frequency		
Low (< 7x/week)	3	3.1
High (\geq 7x/week)	92	96.9
Egg Consumption Frequency		
Low (< 2x/week)	16	21.6
High (\geq 2x/week)	58	78.4
Fish Consumption Frequency		
Low (< 2x/week)	25	40.3
High (\geq 2x/week)	37	59.7
Meat Consumption Frequency		
Low (< 2x/week)	18	30.5
High (\geq 2x/week)	41	69.5
Dairy Products Consumption Frequency		
Low (< 7x/week)	7	8
High (\geq 7x/week)	81	92
Green Vegetables Consumption Frequency		
Seldom (< 5x/week)	39	54.2
Often (\geq 5x/week)	33	45.8
Fruits Consumption Frequency		
Seldom (\geq 2x/week)	4	66.7
Often (< 2x/week)	2	33.3
Fast-food Consumption Frequency		
Often (\geq 2x/week)	7	50
Seldom (< 2x/week)	7	50

Variables	n	Percentage (%)
Fried Food Consumption Frequency	24	66.7
Often ($\geq 2x/week$)	12	33.3
Seldom ($< 2x/week$)		
Sweets Consumption Frequency		
Often ($\geq 7x/week$)	44	64.8
Seldom ($< 7x/week$)	26	38.2
Anemia		
Anemia	31	68.9
Not anemia	14	31.1
Mother's Nutritional Status		
Underweight	3	2.4
Not Underweight	124	97.6
Normal	58	46.4
Overweight	45	36.0
Obese	19	15.2
Mother's Education		
Low	47	37.0
High	80	63.0
Spending on Carbohydrate		
Low ($< Rp9.400,-$)	52	49.5
High ($\geq Rp9.400,-$)	53	50.5
Spending on Animal Protein		
Low ($< Rp9.200,-$)	54	51.4
High ($\geq Rp9.200,-$)	51	48.6
Spending on Plant Protein		
Low ($< Rp4.000,-$)	51	48.1
High ($\geq Rp4.000,-$)	55	51.9
Spending on Vegetables and Fruits		
Low ($< Rp15.000,-$)	49	46.7
High ($\geq Rp15.000,-$)	56	53.3
Spending on Milk		
Low ($< Rp30.000,-$)	50	47.2
High ($\geq Rp30.000,-$)	56	52.8
Spending on Fast-food		
Low ($< Rp13.000,-$)	50	47.2
High ($\geq Rp13.000,-$)	55	51.9
Spending on Cigarettes		
Low ($< Rp42.000,-$)	49	46.7
High ($\geq Rp42.000,-$)	56	53.3
Spending on Others		
Low ($< Rp4.600,-$)	52	49.5
High ($\geq Rp4.600,-$)	53	50.5

Table 2. Relationship between child, maternal, and household characteristics with underweight among two years old children in DKI Jakarta Province, 2014

Variables	Underweight		Not Underweight		Total		P - value	OR	95% CI
	n	%	n	%	n	%			
Gender									
Male	17	27.4	45	72.6	62	100	0.618	0.771	0.367 – 1.619
Female	24	32.9	49	67.1	73	100			
Gestational Age									
Preterm	31	32.6	64	67.4	95	100	0.023*	5.813	1.291 – 26.178
A term	2	7.7	24	92.3	26	100			
Birth Weight									
LBW	5	62.5	3	37.5	8	100	0.034*	5.06	1.136 – 22.533
Not LBW	28	24.8	85	75.2	113	100			
Basic Immunizations Status									
Uncompleted	4	25	12	75	16	100	0.746	0.667	0.188 – 2.362
Completed	18	33.3	36	66.7	54	100			
Diarrhea									
Yes	10	37	17	63	27	100	0.598	1.432	0.571 – 3.593
No	23	29.1	56	70.9	79	100			
Acute Respiratory Infection									
Yes	22	34.4	42	65.6	64	100	0.439	1.434	0.687 – 2.994
No	19	26.8	52	73.2	71	100			
Exclusive Breastfeeding									
No	19	24.7	58	75.3	77	100	0.166	0.409	0.141 – 1.187
Yes	8	44.4	10	55.6	18	100			
Rice Consumption Frequency									
Low (< 7x/week)	0	0	3	100	3	100	0.551	1.46	1.271 – 1.677
High (≥ 7x/week)	29	31.5	63	68.5	92	100			
Egg Consumption Frequency									
Low (< 2x/week)	4	25	12	75	16	100	0.678	0.633	0.181 – 2.220
High (≥ 2x/week)	20	34.5	38	65.5	58	100			
Fish Consumption Frequency									
Low (< 2x/week)	9	36	16	64	25	100	0.809	1.33	0.452 – 3.911
High (≥ 2x/week)	11	29.7	26	70.3	37	100			
Meat Consumption Frequency									
Low (< 2x/week)	4	22.2	14	77.8	18	100	0.433	0.495	0.138 – 1.781
High (≥ 2x/week)	15	36.6	26	63.4	41	100			
Dairy Products Consumption Frequency									
Low (< 7x/week)	0	0	7	100	7	100	0.184	1.446	1.251 – 1.673
High (≥ 7x/week)	25	30.9	56	69.1	81	100			
Green Vegetables Consumption Frequency									
Seldom (< 5x/week)	9	23.1	30	76.9	39	100	0.42	0.525	0.188 – 1.468
Often (≥ 5x/week)	12	36.4	21	63.6	33	100			
Fruits Consumption Frequency									
Seldom (≥ 2x/week)	2	50	2	50	4	100	0.4	0.5	0.188 – 1.332
Often (< 2x/week)	2	100	0	0	2	100			
Fast-food Consumption Frequency									
Often (≥ 2x/week)	5	71.4	2	28.6	7	100	0.286	6.25	0.615 – 63.538
Seldom (< 2x/week)	2	28.6	5	71.4	7	100			

Variables	Underweight		Not Underweight		Total		P - value	OR	95% CI
	n	%	n	%	n	%			
Fried Food Consumption Frequency									
Often ($\geq 2x/week$)	10	41.7	14	58.3	24	100	0.727	1.429	0.335 – 5.083
Seldom ($< 2x/week$)	4	33.3	8	66.7	12	100			
Sweets Consumption Frequency									
Often ($\geq 7x/week$)	20	45.5	24	54.5	44	100	0.051**	3.5	1.118 – 10.962
Seldom ($< 7x/week$)	5	19.2	21	80.8	26	100			
Anemia									
Anemia	11	35.5	20	64.5	31	100	0.909	1.375	0.348 – 5.429
Not anemia	4	28.6	10	71.4	14	100			
Mother's Nutritional Status									
Underweight	1	33.3	2	66.7	3	100	1	1.243	0.109 – 14.150
Not Underweight	35	28.7	87	71.3	122	100			
Mother's Education									
Low	16	34	31	66	47	100	0.465	1.45	0.663 – 3.171
High	21	26.3	59	73.8	80	100			
Spending on Carbohydrate									
Low ($< Rp9.400,-$)	11	21.2	41	78.8	52	100	0.065**	0.409	0.172 – 0.970
High ($\geq Rp9.400,-$)	21	39.6	32	60.4	53	100			
Spending on Animal Protein									
Low ($< Rp9.200,-$)	10	18.5	44	81.5	54	100	0.012*	0.3	0.124 – 0.724
High ($\geq Rp9.200,-$)	22	43.1	29	56.9	51	100			
Spending on Plant Protein									
Low ($< Rp4.000,-$)	10	19.6	41	80.4	51	100	0.024*	0.339	0.142 – 0.814
High ($\geq Rp4.000,-$)	23	41.8	32	41.8	56	100			
Spending on Vegetables and Fruits									
Low ($< Rp15.000,-$)	10	21.3	37	78.7	47	100	0.081**	0.423	0.177 – 1.013
High ($\geq Rp15.000,-$)	23	39	36	61	59	100			
Spending on Milk									
Low ($< Rp30.000,-$)	12	24.5	37	75.5	49	100	0.301	0.584	0.249 – 1.366
High ($\geq Rp30.000,-$)	20	35.7	36	64.3	56	100			
Spending on Fast-food									
Low ($< Rp13.000,-$)	15	30	35	70	50	100	0.978	0.905	0.397 – 2.064
High ($\geq Rp13.000,-$)	18	32.1	38	67.9	56	100			
Spending on Cigarettes									
Low ($< Rp42.000,-$)	15	30	35	70	50	100	1	0.958	0.417 – 2.202
High ($\geq Rp42.000,-$)	17	30.9	38	69.1	55	100			
Spending on Others									
Low ($< Rp4.600,-$)	12	24.5	37	75.5	49	100	0.222	0.541	0.232 – 1.260
High ($\geq Rp4.600,-$)	33	37.5	35	62.5	56	100			

*p-value < 0.05

** p-value < 0.10

increased risk of inadequate nutrition intake that increases underweight incidents in children (19).

Aside from the intake problem, babies with a low birth weight history are more susceptible to infectious diseases which then become the direct cause of underweight. If this matter is not accompanied by sufficient health care and parenting, the child would grow as a toddler who has a deficiency in protein energy. If there was a prolonged imbalanced macronutrient such as protein this can increase the risk of underweight on children (20). Child characteristics with high frequency of eating sweet foods significantly related with the occurrence of underweight on children. This matter has been raised by the Dietary Guidelines for Americans (2015) that recommend children with age of 2 years old to limit the consumption of foods with added sugar to < 10% of total calorie intake. This limitation is recommended due to foods with added sugar especially on some time before the main meal eliminates the children's appetite to the main food which was already limited from the start. This causes children not optimally consuming the main food which causes to a decrease in nutritional intake and several other food groups that are recommended and needed by children with age of 2 years. This also then leads to a decrease in the percentage of children meeting the nutritional adequacy rate which is a direct cause of underweight (14).

Conclusion

The measurement of children's nutrition status based on the Weight-for-Age Z-score indicator shows that the underweight problem in children at DKI Jakarta Province is still classified as very high. Factors that show significant relation with underweight incidents showed that children's nutrition status can

be determined by child characteristics such as premature birth and have a low birth weight history that is also determined by maternal health during pregnancy. Furthermore, the frequency of eating sweet foods that often also leads to the inadequacy of children meeting nutritional needs. This study shows that it is necessary to optimize the utilization of the first 1000 days of life to prevent all the possible underweight risk factors. For that it is necessary to improve the quality of various levels of health services such as public health centers and integrated healthcare centers to educate and monitor the health of mothers and children.

Conflict of Interest

Author declares that there is no significant competing financial, professional, or personal interests that might have affected the performance or presentation of the work described in this manuscript.

Availability of Data and Materials

The data was obtained from the fifth wave of Indonesian Family Life Survey data that can access freely from their website at: <https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS/access.html>

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