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Determinants of Overweight and Obesity in Adolescent Aged 13-15 Years Old in DKI Jakarta (Analysis of Riskesdas 2018 Data)

Determinan Gizi Lebih dan Obesitas pada Remaja Usia 13-15 Tahun di DKI Jakarta (Analisis Data Riskesdas 2018)

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ABSTRACT

Background: In 2018, the province of DKI Jakarta ranked first in obesity with a prevalence rate of 10% and second in overweight with a prevalence rate of 15.1% among adolescents aged 13-15 years. These figures exceed the national prevalence rate. Obesity has a negative impact on their quality of life. These effects include reduced mobility, academic performance, and various factors that can influence the occurrence of overweight and obesity in adolescents.

Objectives: The objective of this study is to determine the determinants of overweight and obesity among adolescents aged 13-15 years in DKI Jakarta.

Methods: This research design is a cross-sectional study that utilizes secondary data obtained from the 2018 Riskesdas (Indonesia basic health research) survey, with a sample size of 597 adolescent respondents aged 13-15 years. Bivariate analysis was conducted using chi-square, and multivariate analysis was performed using logistic regression.

Results: The results of the bivariate analysis show that maternal education (p=0.001) and energy drinks (p=0.036) have an influence on the occurrence of obesity in adolescents. In the multivariate analysis, it is revealed that the variable that most significantly and statistically affects the occurrence of obesity in adolescents is mother's education, with an odds ratio (OR) value of 1.895 and a CI 1.305-2.752.

Conclusions: The determinants of overweight and obesity among adolescents aged 13-15 years in DKI Jakarta are mother's education, with an ap value of 0.001 and an odds ratio (OR) value of 1.895. This means that mothers with lower education levels have a 1.895 times higher risk of having adolescents with obesity status.

INTRODUCTION

Riskesdas data (basic health research) in 2010 and 2013 indicated that the obesity rate in Indonesia among adolescents aged 13-15 years was 2.5% and in 2018 it showed an increase to 4.8%. DKI Jakarta Province ranked first in the prevalence of adolescents aged 13 - 15 years who are obese at 10%, where this figure exceeds the national prevalence figure[1]. In 2021, the World Health Organization (WHO) announced that more than one billion individuals in the world are overweight, including 340 million teenagers[2].

Prevention of obesity among adolescents has become one of the main concerns in society, because obesity has detrimental consequences for the quality of life of adolescents. The negative impacts include decreased ability to move, decreased academic achievement, and even experiences of social discrimination. During adolescence, parents play an important role in maintaining family health, both through providing healthy and nutritious food intake, providing support for teenagers to carry out regular physical

activity and providing examples of healthy living behavior[3]. A mother's education influences her understanding of nutritional needs to support optimal development and be an example for her child[4]. Apart from that, parent's work is also fundamental in providing good quality food ingredients in accordance with balanced nutrition[5].

Often, teenagers adopt unhealthy lifestyles in their daily lives, such as smoking and consuming risky foods. Risky foods are foods that can trigger excess weight, namely sweet, salty, fatty drinks and foods, instant noodles/instant food, soft drinks and energy drinks. According to the Ministry of Health, frequent consumption of risky foods can cause obesity[6]. Risky foods are foods that are often consumed by teenagers in this modern era, of which if consumed excessively can have a bad impact on teenager's health[7].

On research in DKI Jakarta, it was found that obese teenagers often consume foods high in fat and snacks that are high in calories but low in nutritional value[8]. Other research shows that teenagers who live in

urban areas often consume soft drinks and energy drinks[9]. Other research conducted in Unila Polyclinic it appears that there is a correlation between consuming risky foods and students body weight[10]. Other research also shows that there is a significant correlation between the frequency of the habit of consuming sweet drinks and sweet foods and nutritional status[11]. Research in Kalongan Ungaran Timur Village, Semarang Regency shows that teenagers were a group that often consume instant noodles[12]. This study aims to examine the determinants of overweight and obesity in adolescence, namely family socioeconomics, smoking behavior and the habit of consuming various types of risky foods such as sweet foods, fatty/fried foods, salty foods, sweet drinks, fizzy drinks, energy drinks and noodles. instant food or instant food which is still rarely researched using secondary data analysis. DKI Jakarta is a province where more of the population lives in urban areas, children who live in urban areas tend to be at higher risk of obesity due to unhealthy dietary behavior[9]. Research on the determinants of overweight and obesity in adolescents aged 13-15 years in DKI Jakarta was rarely carried out so researchers were interested in further research regarding the determinants of overweight and obesity in adolescents aged 13 - 15 years in DKI Jakarta.

METHODS

This study used a cross-sectional design, using a quantitative approach. The data used in this research is secondary data from the results of the 2018 Riskesdas. The research population was 805 teenagers aged 13 - 15 years in DKI Jakarta Province. The sample size in this study was calculated based on the hypothesis test formula with a difference of 2 proportions, which were 518 samples. With inclusion criteria Adolescents in the age range of 13 - 15 years who have 100% data completeness and the exclusion criteria are adolescents who have underweight nutritional status and a Z-Score in the extreme category.

Data on determinants of the incidence of obesity such as gender, age, adolescent smoking status, parent's education and employment levels and habits of consuming risky foods such as sweet foods and drinks, salty foods, fatty foods, soft drinks, energy drinks and instant noodles or instant food were collected. by interviews using household and individual data questionnaires belonging to Riskesdas 2018 and weight and height data obtained through anthropometric measurements. After receiving the variable data, the data is processed for each variable. For the sample age variable, it was classified into three, namely 13, 14, and 15 years, the sample gender variable was classified into male and female, the sample smoking status variable was classified into yes and no, the sample parent's education variable was classified as high (graduated from high school/equivalent and tertiary) and low (no schooling until graduating from junior high school/equivalent), the occupation of the sample parents was classified into working and not working, the risk food variable was classified into frequent (>1 time a day to 1-4 times a week) and rare (<3 times per month) and the nutritional status variable is classified into ideal and over-nourished by calculating BMI/U (body mass index/age).

This research data was described using univariate analysis to describe data on age, gender, adolescent smoking status, parental education, parental occupation, and consumption of risky foods. Apart from that, bivariate analysis was also carried out with the chi square test to determine the relationship between variables, and multivariate analysis was carried out with multiple logistic regression tests to identify significant factors and predict the probability of occurrence. This research had received ethical approval from the UPN "Veteran" Jakarta Research Ethics Commission with letter number: 200/V/2023/KEPK.

RESULTS AND DISCUSSION

Based on the frequency distribution of data in the table below, it can be seen that the majority of teenagers are 14 years old (33.8%) with the majority being male (50.9%). The proportion of teenagers who do not smoke is more than teenagers who smoke, 87.4%. Viewed parent's education level classified as high category with 63% and 57% respectively. Meanwhile, most fathers' employment status is working at 96%, and most mothers are not working (60%). The results of this study showed that most the sample, 170 (28%) teenagers, were classified as having over-nutritional status and obesity. The results of this study showed that most of the samples consumed sweet foods (92.9%), sweet drinks (94.7%), salty foods (70.2%), fatty/cholesterol/fried foods (88.8%), and instant noodles and instant food (83.3%.) with the frequent category. While most of the sample consumed soft drinks (78.1%) and energy drinks (92.6%) in the rare category.

Table 1. Frequency distribution of determinants of overweight and obesity

Variable	Frequency	
	n	%
Age		
13	194	32.5
14	202	33.8
15	201	33.7
Gender		
Girls	293	49.1
Boys	304	50.9
Nutritional status		
Not obese	427	71.5
Obesity	170	28.5
Smoking status		
Smoke	75	12.6

Variable	Frequency	
	n	%
Do not smoke	522	87.4
Father's education		
Low	220	37
Tall	377	63
Mother's education		
Low	258	43
Tall	339	57
Father's occupation		
Doesn't work	22	4
Work	575	96
Mother's job		
Doesn't work	358	60
Work	239	40
Sweet foods		
Often	554	92.9
Seldom	43	7.2
Sweet drinks		
Often	565	94.7
Seldom	32	5.4
Salty foods		
Often	419	70.2
Seldom	178	29.8
Fatty/cholesterol/fried foods		
Often	530	88.8
Seldom	67	11.2
Soft drink or carbonated drink		
Often	131	21.9
Seldom	466	78.1
Energy drink		
Often	44	7.3
Seldom	553	92.6
Instant noodles or instant food		
Often	498	83.3
Seldom	99	16.6

Table 2 shows that most teenagers aged 15 years old (35.3%) were experiencing overweight and obesity, the results of analysis using the chi square test show that the p value is 0.852, which means there was no significant correlation between age and overweight and obesity.These results are in accordance with the findings in Sukoharjo, which found that there was no significant correlation between age and the incidence of obesity[13]. As the teenagers, they have the freedom to manage their personal expenses and have the freedom to decide what type of food they want to consume. However, teenager minds are still in the process of development, so there is a risk of teenagers making inappropriate dietary choices[14].

Table 2. Determinants of overweight and obesity

Variable	Nutritional status				p value
	Obesity		Not Obese		
	n	%	n	%	
Age					
13	53	31.2	141	33	
14	57	33.5	145	34	0.852
15	60	35.3	141	33	
Gender					
Girls	79	46.5	214	50.1	0.475
Boys	91	53,5	213	49,9	
Adolescent smoking status					
Smoke	17	10	58	13.6	0.291
Do not smoke	153	90	369	86.4	
Father's education					
Low	52	30.6	168	39.3	0.056
Tall	118	69.4	259	60.7	
Mother's education					

Variable	Nutritional status				p value
	Obesity		Not Obese		
	n	%	n	%	
Low	55	32.4	203	47.5	0.001*
Tall	115	67.6	224	52.5	
Father's occupation					
Work	165	97.1	410	96	0.713
Not working	5	2.9	17	4	
Mother's job					
Work	67	39.4	172	40.3	0.918
Not working	103	60.6	255	59.7	
Sweet foods					
Often	160	94.9	394	92.3	0.541
Seldom	10	23.3	33	7.7	
Sweet drinks					
Often	159	93.5	406	95.1	0.576
Seldom	11	6.5	21	4.9	
Salty foods					
Often	117	68.8	302	70.7	0.719
Seldom	53	31.2	125	29.3	
Fatty foods					
Often	152	89.4	378	88.5	0.868
Seldom	18	10.6	49	11.5	
Soft drinks					
Often	40	23.5	91	21.3	0.630
Seldom	130	76.5	336	78.7	
Energy drink					
Often	6	3.5	38	8.9	0.036*
Seldom	164	96.5	389	91.1	
Instant noodles or instant food					
Often	135	79.4	363	85	0.124
Seldom	35	20.6	64	15	

*The p value is significant using the chi square test

The results of this study show that most sample is obese and male (53.5%) with p value=0.475 so it was concluded that there was no relationship between the gender of the sample and the incident overweight and obesity. The same results were also found in research in Serang where no correlation was found between gender and the frequency of obesity in students[15]. There are differences in energy storage between women and men. Female adolescents tend to store excess energy as body fat, while male adolescents use excess energy for protein synthesis[16]. The majority of obesity incidents in this study occurred in male adolescents, thought to be due to factors such as genetics and food consumption habits, male adolescents tend not to be selective in choosing food, like fried food, fast food and often consume snacks[17].

Table 2 also shows the results that 86.4% of teenagers who do not smoke, do not experience overweight and obesity with a p value of 0.233 so persumably there is no correlation between adolescent smoking behavior and incidenceand obesity. The results of this study are in accordance with research conducted in Tegal which showed that no significant correlation was found between the relationship between smoking behavior and obesity[18]. In individuals who smoke, the nicotine in cigarettes can reduce the sensation of hunger[13]. People who smoke and those who do not smoke are at risk of becoming obese because obesity can occur due to many factors, such as unhealthy eating

habits and lack of physical activity. So, although the nicotine in cigarettes has an impact on body weight, the risk of obesity does not only depend on smoking behavior[19].

Most of the samples who do not experience overweight and obesity have fathers with a high education level are 60.7%. However, there was no correlation between father's education and overweight and obesity in adolescents with p value=0.056. Whereas for mother with Higher education tends to have children who are undernourished and obese are 52.5% with a p value=0.001, it can be concluded that maternal education has a significant correlation with the incident overweight and obesity in teenagers. Research in China also found similar results, namely that there was no significant correlation between father's education and cases of obesity in adolescents, but the level of mother's education was significantly related to the incidence of obesity in adolescents[20].

Educated mothers tend to know and understand about health information. They may be better able to process information about healthy eating patterns, the importance of balanced nutrition and the implications of certain eating choices for their child's health. Parent's educational attainment has an impact on the child care methods they use. For example, children of highly educated parents are more likely to eat breakfast and consume fewer calories from snacks and sugary drinks[21]. Parental education is very important in determining the

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nutritional status of their children[22]. The father's education was not significant, it is suspected because the mother's behavior and care were aspects that indirectly influence the child's nutritional condition[23]. A mother is more motivated to pay attention to a child's consumption patterns than a father and a child is more likely to imitate the mother's eating behavior rather than the father's behavior[24].

Apart from parental education, this study also looked at parental employment. It can be seen in table 2 that the majority of samples who are overweight and obese have fathers who work are 97.1% while samples that were not overweight and obese had mothers who did not work are 59.7% with the respective significance values being 0.713 and 0.918, meaning there is no significant relationship between parent's work and cases of overweight and obesity. Another study conducted in Surabaya stated the same results that no significant correlation was found regarding parental employment and the incidence of obesity in adolescents[5]. The results of this study show that there was no significant relationship between parental employment and the incidence of obesity in adolescents, but it can be seen that mothers who do not work have obese adolescent children. Mothers who do not work are associated with families with low economic conditions. Parents with low economic status apparently lack knowledge about nutrition, in contrast to parents with high economic status who care about nutrition. This difference in nutritional understanding can affect parent's ability to provide healthy food for their children. Therefore, parent's work can not influence nutritional status independently but depends on their knowledge about nutrition[25].

Table 2 also shows the relationship between risky foods and obesity. The results of this study show that teenagers who frequently consumed sweet foods tent to be obese 94.9% with p value=0.541, it shows that consumption of sweet foods was not significantly correlated with the incidence of overweight and obesity in adolescents. There have been other previous studies showed the same results that there was no significant relationship between consumption of sweet foods and being overweight[17]. Sugar or sweet foods have a high glycemic index. Foods with a high glycemic index can cause an increase in blood glucose levels and increase insulin excretion. This causes an imbalance in the concentration of insulin to glucagon after eating, this can increase feelings of hunger and decrease energy expenditure[26]. There are many other factors that allow overweight and obesity to occur, such as lack of physical activity, economic conditions and excessive intake of macronutrients, especially fat[27].

This research also shows that teenagers who often consume sweet drinks experience an incidence of overweight and obesity are 93.5% with p value of 0.576, which means there was no significant relationship between consumption of sweet drinks and the incidence of overweight and obesity in adolescents. The same results were seen in the findings in Bandung in 2016 which stated that there was no relationship between sweetened drinks and the incidence of obesity with a p value=0.114[28].

Sweet drinks only contain calories and sugar, they do not contain many nutrients and micronutrients that the body needs[29]. Sweet drinks have a high calorie content but cannot make the individual who consumes them full, so the consumption of these sweet drinks is usually accompanied by food consumption so that the number of calories entering the body was excessive[30]. In this study, it was found that there was no link between the habit of consuming sweet drinks and the occurrence of excess nutrition and obesity. This may be because the consumption of calories in sweet drinks consumed does not exceed needs and there is regular physical activity among teenagers[31].

Apart from sweet foods and drinks, other risky foods studied are salty foods. The results show that 68.8% of teenagers often consume salty foods and experience overweight and obesity. The results of the analysis obtained a p value of 0.719, which means there is no significant relationship between consumption of salty foods and the incidence of overweight and obesity in adolescents. Previous research found the same results that there was no significant association between salty foods and the sample's body weight[32]. Consuming salty foods does not directly cause weight gain. However, consuming foods with a high salt content can trigger thirst, which ultimately leads to increased fluid intake[33]. The results of the analysis found that there was no correlation between salty foods and the incidence of overweight and obesity. This incident may be caused by the unclear mechanism that allows salty foods to increase excess body weight. Excessive intake of salty foods can only have an effect on increasing body weight in the short term due to an increase in extracellular water volume which causes an increase in body weight <1 kg[34].

This research shows that the results are 89.4% of teenagers consumed fatty foods and experienced overweight and obesity in the sample with values p of 0.868, so it can be said that there is no correlation between the habit of consuming fatty foods and the incidence of overweight and obesity in the sample. Similar to findings in Kalimantan 2021 which shows that there is no significant relationship between consuming fried food and being overweight[35]. The absence of this relationship is thought to be due to the types of fatty foods consumed in small quantities. Being overweight is not only caused by diet, but also by low levels of physical activity. Physical activity plays an important role in helping the body spend energy, therefore the more physically active, the more energy the body uses[36].

This research also shows that teenagers rarely consume soft drinks and do not overweight and obesity are 78.7%. There is no correlation between soft drink consumption and overweight and obesity p value 0.630.The results of this analysis are in accordance with the results of previous findings that there is no significant relationship between soft drink consumption and the incidence of obesity[37]. This lack of a clear correlation is thought to be a result of the fact that the problem of overweight and obesity is not only caused by the consumption of soft drinks and fizzy drinks. There are many other factors that also play a rolewhich were not examined in this study, such as genetic, sociodemographic and environmental factors[38].

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This research shows that samples who rarely consume energy drinks do not experience obesity are 91.1% by value p=0.036, so it can be concluded that there is a significant correlation between the habit of consuming energy drinks and the incidence of overweight and obesity in the sample. The results of this analysis are in accordance with previous finding who found that there was a significant association between the consumption of energy drinks and the incidence of obesity[39]. Energy drinks only contain sugar, stimulants and are high in caffeine, only containing a small amount of other micronutrients[40]. Glucose that exceeds daily needs will accumulate and be stored in the liver which will then form fat. If this condition continues to recur it will cause excess weight[41]. Energy drinks are often promoted during several sporting events that are of interest to teenagers, and this makes teenagers think that energy drinks can help improve their performance in sports. As a result, this may increase the potential consumption of energy drinks[42].

The last risky food studied was instant noodles and instant food. The results show that the proportion of teenagers who often consume instant noodles and other instant foods were overweight and obese 79.4% with a p value of 0.124 which states there was no correlation between consumption instant noodles and instant food with and over nutrition and obesity in the sample. Research in 2018 also found something similar[43]. The results of the analysis show that there is no relationship between the habit of consuming instant noodles and instant food with the incidence of overweight and obesity. This finding is thought to be due to the sample's habit when consuming instant noodles, they add eggs and vegetables as additional side dishes, thus increasing protein and fiber intake[44].

Based on the results of the bivariate test, it is known that there are four variables that meet the requirements (p value < 0.25), that it smoking status, father's and mother's highest education, energy drink consumption and instant noodle consumption. The results of the logistic regression show that the factor is dominant determinants of overweight and obesityis the mother's final education. Samples with mothers whose last education was in the low category had a 1.8 times risk of over-nutrition and obesity compared to respondents with highly educated mothers. Education has a significant relationship with a person's nutritional status. Parents generally hope that their children can get healthy and nutritious food to support their body's health. Parents who are highly educated will understand the importance and have a good understanding of fulfilling balanced nutrition to have good nutritional status. Less or more energy intake is greatly influenced by the role of parents in their ability to buy food, the availability of food ingredients in the market, food production, and their education and understanding about nutrition.

Table 3. Dominant factors of overweight and obesity

Variable	Crude Odds Ratio (COR)				Adjusted Odds Ratio (AOR)			
	p value	OR (*odds ratio*)	95% CI (*confidence interval*)		p value	OR (Odds ratio)	95% CI (*confidence interval*)	
			Lower	Upper			Lower	Upper
Mother's education	0.001	1,895	1,305	2,752	0.001	1,895	1,305	2,752

CONCLUSIONS

Based on the research results, it can be concluded that the determinants of overweight, which were maternal education and energy drinks were significantly related to the incidence of overweight and obesity in adolescents aged 13 -15 years in DKI Jakarta and the dominant factor was the mother's education.

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