<u>**ORIGINAL ARTICLE**</u>

THE ASSOCIATION BETWEEN CHILDREN'S SEX AND THEIR MOTHERS' OCCUPATION TO CHILDREN'S BODY MASS INDEX

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ABSTRACT

Issues related to double-burden malnutrition such as undernutrition and obesity problems in children are of great importance. This study aims to identify the relationship between mothers' culture, feeding practices, and other factors with their children's body mass index (BMI). This is a cross-sectional study that involved 219 mother-child dyads whose children were studying at public elementary schools in DKI Jakarta. The sample was selected by cluster random sampling. Univariate analysis was then used to describe the children's and their parents' characteristics. The bivariate analysis was then conducted to describe the correlation between the children's and parents' characteristics and obesity. The findings showed that mothers' culture and feeding practices were not significantly correlated to their children's BMI. However, there were several factors significantly associated with the children's BMI, namely, sex ($p = 0.009$; CI 95%) and mothers' occupation ($p = 0.026$; CI 95%). Girls are likely to have a higher BMI and mothers who work as entrepreneurs are likely to have children with higher BMI. Therefore, nurses should provide optimal education related to the prevention of malnutrition, including obesity in children.

INTRODUCTION

Indonesia is currently facing the double burden of malnutrition in children. It is a condition where some children would suffer from undernutrition (based on weight-for-height), while others would suffer from overnutrition (based on weight-for-height) or is overweight and obese (based on BMI-for-age). An individual is categorized as overweight based on the result from the measurement of BMI-for-age, that is, >1.0 - <2.0. Meanwhile, obesity is indicated by the result of >2.0 SD. According to Basic Health Research in 2013, children aged 5-12 years were more frequently found to be overweight, compared to children aged 13-18 years. The highest prevalence of overweight individuals by province was in Jakarta (30.1%), while the lowest was in East Nusa Tenggara (8.7%) (Kementerian Kesehatan Republik Indonesia, 2013). Both overweight and obesity occur due to several risk factors. According to Ferreira and Marques-vidal (2008) and Sartika (2011), these factors include the children's level of knowledge, family history of obesity, low and high birth weight, exercise habits and physical activity, as well as control of food intake. In this case, controlling the food intake is not only done by children, but also by parents, especially mothers. Therefore, mothers' perception towards their children's nutritional status plays an important role in determining whether they restrict their children to eat or encourage them to keep eating. When mothers think that their children are underweight, they will try to push and force their children to eat in accordance with the family culture and without controlling the children's nutritional status through BMI (Novitasari & Wanda, 2020; Quah et al., 2018; Webber, Hill, Cooke, Carnell, & Wardle, 2010). This feeding practice is considered to cause obesity as it encourages children to eat while placing no limitation on their weight. This would affect their children's nutrient intake and would lead to lack of control regarding fat and snack consumption. Thus, such a condition shows how crucial mothers' feeding practice is in causing obesity in children (Rodgers et al., 2013).

Unfortunately, obesity and overweight as indicated by the BMI score also predisposes the mothers' perception towards their children's condition in relation to overweight or obesity, and this might lead to other problems (Do et al., 2017; Quah et al., 2019). Overweight and obesity in children might lead to problems at the next stage of the children's life, such as problems related to their physical health and self-concept (Do et al., 2017) which further influence their confidence regarding their body image (Shin & Shin, 2008). A study conducted by Tatangelo et al. (2016) found that children under the age of 6 year could experience dissatisfaction with their body. Girls are more likely to experience dissatisfaction with their body compared to boys (Peralta, Marques, Sarmento, & Costa, 2017). Parents seem to play an important role in a child's dissatisfaction with their body, such as through limiting the food their child is allowed to consume because their child is overweight or obese (Quah et al., 2019). In Indonesia, not many studies have aimed to identify the association between the mothers' feeding practices and the incidence of obesity in children. Most studies have focused on the characteristics of the children themselves.

Therefore, this study was conducted to identify the relationship between children's and parents' characteristics to obesity in elementary school children. This paper will present the result of the first stage of a bigger study, which is the result from a quantitative approach. The following stage will be the qualitative result which focuses on obese children's self-concept.

METHOD

Study design
This was a quantitative study with a cross-sectional approach, therefore the independent and dependent variables were only measured one time simultaneously (Sastroasmoro & Ismael, 2014). The independent variable was obesity, and the dependent variables were the children's characteristics (including age, sex, eating frequency, breakfast habit, means of transportation, and phone ownership) and parents' characteristics (age, parents' occupation, and mothers' feeding practices).

Sample
The respondents of this study were 219 mother-child dyads who met the inclusion criteria, namely, the child was a student at a public elementary school in DKI Jakarta and the mother was able to read and write. Meanwhile, the exclusion criterion was elementary students who were absent during the data collection period. The sampling technique used was cluster random sampling. Two public elementary schools were chosen randomly from each part of DKI Jakarta as the cluster. In total, we collected data from ten public elementary schools. Then, the students were randomly selected using a website, random.org, based on their attendance list number.

Data collection
The data related to obesity were collected using an IMT/U instrument in a WHO application called Anthroplus, particularly the anthropometric calculator. The children's and parents' characteristics were measured using questionnaires. The mothers' feeding practice was assessed using the child feeding questionnaire (CFQ) and child eating behavior questionnaire (CEBQ) that were developed by Birch et al. (2001). The CFQ consists of 15 questions about restriction, pressure to eat, and children's eating supervision, while the CEBQ consists of 35 questions which describes the mothers' perception towards their children's eating habits. These questionnaires have been translated using the back translation process and have been tested for its validity and reliability with the Cronbach alpha value of 0.7 by Cerdasari et al. (2017).

During the data collection process, the children's height and weight were measured to determine their BMI score and to identify whether the child is obese or not. Then, the questionnaires for mothers were sent through the students, and the completed questionnaires would be submitted on the following day to their teachers.

Data analysis
The data analysis was conducted by univariate and bivariate analysis. The bivariate analysis was conducted to measure the correlation between the related variables (Notoatmodjo, 2010). In this study, the univariate analysis of the variables was presented by frequency and percentage of proportion. Meanwhile, the data to measure the correlation between demographic characteristics and obesity were done using the categorical scale, therefore the statistical tests used were the Chi Square test and the contingency coefficient.

Ethical consideration
This study has been approved by the Research Ethics Committee, Faculty of Nursing, Universitas Indonesia with the number: SK-217/UN2.F12.D1.2.1/ETIK.FIK.2019.

RESULTS

Description of Respondent Characteristics
The respondents in this study were mother-child dyads studying in elementary schools in Jakarta. The mean age of the children was 11.7 years with an age range of 9-14 years and most of the children were female (52.1%). Other characteristics such as eating frequency, breakfast intensity, means of transportation, and phone ownership are presented in Table 1. According to Table 1, most of the children sampled eat three times a day, rarely eat breakfast, walk to their school, and have their own mobile phone.

Table 1. Distribution of children's characteristics (n=219)

Characteristics	Frequency (f)	Percentage (%)
Eating frequency		
1	4	1.8
2	58	26.5
3	139	63.5
>3	18	8.2
Breakfast habit		
Never	6	2.7
Rarely	89	40.6
Frequently	60	27.4
Always	64	29.2
Means of transportation		
On foot	97	44.3
Motorcycle taxi	14	6.4
Public transportation	5	2.3
Other means	103	47
Phone ownership		
Yes	160	73.1
No	59	26.9

The mean age of the mothers involved in this study was 40.99 years with an age range of 21-71 years. The distribution of parents' occupation can be seen in Table 2. Most of the mothers were housewives and most of the fathers worked as private employees.

Table 2. Distribution of parents' occupation (n=219)

Parents characteristics	Frequency (f)	Percentage (%)
Mother's occupation		
Housewife	167	76.3
Civil servant	1	0.5
Private employee	30	13.7
Entrepreneur	21	9.6
Father's occupation		
Unemployed	14	6.4
Civil servant	6	2.7
Private employee	127	58
Entrepreneur	72	32.9

Mothers' Feeding Practice
Mothers' feeding practice was described by the mothers' perception towards their children's food acceptance and refusal. Food acceptance is indicated by the children's response to eating, which includes excessive emotional eating, enjoyment of eating, and desire to drink. The mothers' perception of food refusal is indicated by a feeling of fullness, slow eating, lack of emotion during eating, and fussy eating. Furthermore, mothers' feeding practice was also described by their control during the eating process. The descriptions of mothers' feeding practices are presented in Table 3.

Table 3. Mothers' feeding practice in Jakarta, 2019 (n=219)

Culture	Frequency (f)	Percentage (%)
Perception of child's food acceptance		
Low	170	77.6
High	49	22.4
Perception of child's food refusal		
Low	137	62.6
High	82	37.4
Control during eating process		
Low Control	168	76.7
High Control	51	23.3

From Table 3, the mothers' perception of their children's food acceptance remained low (77.6%) and the perception of children's food refusal was low (62.6%) as well. Meanwhile, in terms of feeding practice, most of the mothers had low control in their children's eating process (76.7%).

Body Mass Index (BMI) Description
The description of the children's BMI is presented in Table 4.

Table 4. Children's BMI in Jakarta, 2019 (n=219)

Children characteristics	Frequency (f)	Percentage (%)
BMI		
Extremely underweight	15	6.8
Underweight	20	9.1
Normal	123	56.2
Overweight	31	14.2
Obese	30	13.7

From Table 4, based on the BMI scores, more than half of the children (56.2%) were of normal weight and 13.7% of the children were obese.

Correlation between Respondents' Characteristics and Children's BMI
The correlation between children's and parents' characteristics and children's' obesity was analyzed and only two variables had a significant relationship with obesity, which were the children's sex (p value = 0.009) and mothers' occupation (p value = 0.026). The results of the statistical test for this significance are presented in Table 5. Other variables did not show any significant relationship, where the score ranged from 0.186 to 0.769 and the r value ranged from -0.087 to 0.074.

Table 5. Correlation between Children's BMI and Children Age and Mothers' Occupation in Jakarta, 2019 (n = 219)

Respondent characteristics	Extremely underweight	Underweight	Normal	Overweight	Obese	p value	R
Sex							
Female	1	11	69	16	17	0.009	13.514
Male	14	9	54	15	13		
Mother's occupation							
Housewife	13	18	94	24	18	0.026	0.147
Civil servant	0	0	0	0	1		
Private employee	1	1	17	3	8		
Entrepreneur	1	1	12	4	3		

DISCUSSION
The findings showed that most of the respondents were female. This phenomenon is not only found in this study, as most students in similar recent studies were female. In this study, children's sex has a significant correlation with the children's BMI, where the direction of the relationship is negative. It can also be concluded that female respondents showed higher BMI than male respondents. However, this correlation is categorized as weak. Nevertheless, these results are in line with Fossou et al. (2020) who found a significant correlation with BMI. Furthermore, Srdic et al. (2012) stated that women's BMI are higher than men. In addition, Shriver et al. (2015) also found that girls are more likely to experience being overweight than boys.

In terms of age, most of the girl students sampled are in the early adolescent period. Aliss et al. (2020) stated that girls in the early adolescent stage are more likely to suffer from obesity. In addition, girls tend to be more reluctant to do physical activities and instead spend more time watching TV or playing games, this makes them prone to obesity (Aliss et al., 2020). This was not in line with Sampasa-Kanyinga et al. (2020) who stated that boys are more likely to suffer from obesity. Pham et al. (2020) even stated that the prevalence of boys suffering from overweight and obesity are two times higher than girls during elementary school.

The more time students spend on social media, the less time they have to do other physical activities, and this might lead to the increase of obesity prevalence in children (Sampasa-Kanyinga et al., 2020). However, if they can partake in more physical activities, including activities at school, they could improve their bodily functions and their BMI will remain

normal (Allen, Telford, Richard, Telford, & Olive, 2019; Greguol, Gobbi, & Carraro, 2014).

Furthermore, this study has also identified the correlation between mothers' occupation and children's BMI. In this study, most of the mothers were housewives. Based on the bivariate analysis, mothers' occupation has a significant correlation to their children's BMI. The direction was positive, where mothers who work as entrepreneurs are likely to have a higher prevalence of having children with higher BMI. However, the correlation is weak. This might be because mothers that work as entrepreneurs have less time compared to housewife mothers to perform feeding practices responsively. Novitasari and Wanda (2020) also found that most mothers were less responsive when feeding their children. In addition, Quah et al. (2018) revealed a significant correlation between mothers' feeding practice and children's BMI. Housewife mothers tend to have more time to encourage their children to eat or control their child's eating frequency.

This study also found that most of the children did not have breakfast but still managed to eat three times a day. According to the literature, girls who are used to having breakfast at home showed a lower prevalence of obesity compared to boys (Pham et al., 2020). Children who are used to eating healthy food tend to have a normal BMI, but children who frequently eat fast food tend to be overweight (You et al., 2021). Furthermore, previous studies have found that eating frequency is also correlated to obesity, where children who have regular meal schedules are less likely to be obese (Beckers, Karssen, Vink, Burk, & Larsen, 2021; Vollmer, Adamsons, Gorin, Foster, & Mobley, 2015). Mothers who regularly schedule mealtimes, restrict, monitor, and encourage their children to eat will find that their children are more willing to eat together with the family. Therefore, their children's diet quality will be guaranteed (Mou, Jansen, Raat, Nguyen, & Voortman, 2021). However, in this study, breakfast habits and eating frequency do not have a significant correlation to children's obesity.

The limitation of this study was related to the selection of the children involved in this study. Due to the random sampling technique, we could not involve the same number of obese and non-obese children.

From these findings, girls are more likely to have a higher BMI. Moreover, mothers who work as an entrepreneur and only have a limited time to manage their children's meals are more likely to have children with higher BMIs. Therefore, as health professionals, nurses should take part as an educator and case manager and collaborate with other health professionals. Based on this study, it is suggested that nurses provide education for mothers in integrated health centers (*posyandu*) or during other events to control their children's anthropometrics regularly and bring awareness to mothers to pay more attention to their children's nutrient intake.

Nutrient intake is not only about providing food, but it is also about responsive feeding and taking more time, especially for working mothers, to pay attention to their child's nutrition. As a case manager, when finding obesity or undernutrition cases, nurses can encourage mothers to consult with a nutritionist or nutritionist doctor and check their child's growth and development to ensure that their children are growing and developing well.

CONCLUSION AND RECOMMENDATION

This study revealed that children's sex and mother's occupation have a significant correlation to their children's BMI, where the children's sex showed a negative correlation and the mother's occupation showed a positive but weak correlation. Therefore, girls are more likely to have higher BMI and mothers who work as entrepreneurs are more likely to have children with higher BMI. Nurses are therefore expected to provide education for parents related to responsive feeding and obesity prevention in children.

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