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Research Article
Socioeconomic Determinants of Obesity among Women Living in Indonesian Remote Islands, Raas and Sapudi

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Abstract

Background: Socioeconomic status (SES) has an important role in defining trend of obesity and it is believed that rich people of poor countries who live in urban areas show high rate of obesity. However, there is a controversy regarding the role of socioeconomic factors on overweight and obesity of people living in rural areas. **Objectives:** The aim of this study was to analyze the effect of socioeconomic factors on the prevalence of obesity in women living in Raas and Sapudi islands that represents Indonesian rural areas. **Materials and Methods:** A total of 376 housewives, living in remote Indonesian islands (Raas and Sapudi), took part in this cross sectional study. In this study, nutritional status measurements, interviews and observations done by trained enumerators. A student's t-test was used to compare differences of socioeconomic factors among women with and without overweight/obesity. **Results:** Distance to the food source and expenses to buy food were related to overweight/obesity ($p<0.05$). Additionally, overweight/obese women were married at a younger age compared to those women who were not overweight (16 ± 3 yo vs. 17 ± 6 yo, $p=0.008$). Economic status, such as monthly income and possession of the farm or ranch was not associated with overweight/obesity. However, women who work outside home were less likely to become overweight/obese (OR: 0.321; $p=0.001$). **Conclusion:** The prevalence of obesity in women living in those remote islands was at an alarming rate and socioeconomic factors also have an important role in the prevalence of obesity.

Key words: Social status, economic status, obese women, Indonesia, developing countries

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Socioeconomic status (SES) has an important role in the defining trend of obesity and it is believed that greater obesity rates in low income countries are seen in urban areas among the rich[1]. However, there is a new evidence showing the obesity rate is increasing among the poor as an implication of health inequalities[2]. It has been known that the shift of transportation mode, household food production and physical activity were responsible for the higher risk of overweight and obesity among people living in urban areas[3,4].

The worldwide prevalence of overweight and obesity is increasing tremendously. It has been reported that in 2008 about 1.5 billion adults were overweight or obese and it was predicted that the number will reach at 2.16 billion in 2030[5]. The increasing rate of obesity is not only seen in developed countries but also seen in developing countries like Indonesia. In 2013, The Ministry of Health reported nutritional status of adults in Indonesia, which stated the prevalence of obesity was 15.4%[6]. The report shown that women were more likely to become obese compare to men (32.9 vs. 19.7%, respectively). Interestingly, in 2013, the prevalence of obesity among women was 2.34 times higher than those in 2007 (13.9%)[6].

Based on a study in low income countries, women who live in urban areas were more likely to become overweight/obese compared to those who live in rural areas[1]. On the other hand, studies in Latin America, the Middle East and North Africa showed that rural women had higher rate in the prevalence of overweight/obesity compared to urban counterpart[1]. In Indonesia, there was limited evidence on the role of SES as the etiology of overweight and obesity especially in small islands. Awareness about the role of socioeconomic status (SES) in the prevalence of obesity is important in order to deliver an effective health promotion program to promote a healthy life.

The aim of this study was to analyze the role of socioeconomic factors and modern technology on the prevalence of obesity among women living in Raas and Sapudi islands.

MATERIALS AND METHODS

This observational study was carried out at Raas and Sapudi Islands from March-April, 2014. Raas and Sapudi islands are located in East Java province close to Madura Island. These islands were selected because they were most populated among other islands located in the same area. All types of measurements and interviews were conducted by trained enumerators. Purposive sampling method was used to collect the data. A total of 376 households, which include 376 female and 131 male was involved in this study. Ethical clearance was obtained from Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine Gadjah Mada University Yogyakarta (KE/FK/768/EC).

The present study assess the nutritional status of male and female population to compare the prevalence of obesity between different genders. Additionally, several questions regarding social and economic status information were asked to the female. It has focused on the association between social-economic status and overweight/obesity in women because this group was more vulnerable to obesity[6].

Nutritional status was defined by body mass index, which was calculated based on body weight and height. Body weight was measured by using a digital body mass scale (OMRON, Kyoto, Japan). Height was measured using microtoise for adults. Body mass index was calculated by the formula:

$$\text{Body mass index (BMI)} = \frac{\text{Body weight (kg)}}{\text{Height (m}^2\text{)}}$$

According to WHO expert panel[7], a person having BMI higher than 25 kg m^{-2} will be considered as overweight. All anthropometric measurements were done by trained enumerators using calibrated instruments (OMRON, Kyoto, Japan).

The interview was conducted to collect data on socioeconomic factors as determinants for obesity, including age at the first marriage, age at the first child delivery, family members, number of children, family tradition on dinning together with the rest of the family, distance to the closest food store, a source of food, monthly income, the amount of money spent to buy foods, the amount of money spent on health care, possession of farming field and possession of animal ranch.

Statistical analysis was done using GraphPad Prism version 5.00 for Windows, GraphPad Software, (San Diego, California, USA). Data was presented as Mean±standard deviation. Student's t-test was used to compare differences on socioeconomic factors among women with and without overweight/obesity. A Fisher exact test was used to analyze the relationship between socioeconomic factors and overweight/obesity. The odds ratio was calculated based on 2×2 contingency table. The association was significant when $p<0.05$.

RESULTS

Body weight and height of 507 men (n = 131) and women (n = 376) were measured to determine BMI and overweight status. The number of male subjects was lower than female because they were working while the study was conducted. As shown in Table 1, women had a higher prevalence of overweight/obese compared to men. The information was collected through a questionnaire. The questionnaire includes several parameters related to socioeconomic status, such as family, food, economy and working status (Table 2, 3). Those factors, then analyzed to evaluate their effect on the occurrence of overweight and obesity.

Table 2 shows the characteristics of women living in Raas and Sapudi islands. Analysis on the role of socioeconomic factor and overweight were done integrative and separated into two, Sapudi and Raas islands. As shown in Table 3, overweight women have younger age at the first marriage

Table 1: Characteristics of subjects from Raas and Sapudi Islands

	Raas (n = 194)		Sapudi (n = 313)	
Characteristics	Male (n = 53)	Female (n = 141)	Male (n = 78)	Female (n = 235)
Age (years old)	46.8±16.0	50.1±16.9	47.1±15.1	42.9±15.5
Body weight (kg)	53.6±7.7	49.4±9.2	54.3±10.8	52.2±10.9
Height (cm)	157.9±6.6	148.7±15.3	160.6±9.6	150.4±8.1
BMI (kg m^{-2})	21.5±2.5	22.7±5.8	21.1±3.7	23.1±4.4
Nutritional status				
Underweight (BMI<18.5 kg m^{-2})	5 (9.43%)	29 (20.57%)	21 (26.92%)	31 (13.19%)
Normal weight (18.5 <BMI <23 kg m^{-2})	46 (86.79%)	88 (62.41%)	41 (52.56%)	128 (54.47%)
Overweight (25 <BMI <30 kg m^{-2})	2 (3.77%)	9 (6.38%)	13 (16.67%)	32 (13.62%)
Obesity (BMI>30 kg m^{-2})	0 (0%)	15 (10.64%)	2 (2.56%)	44 (18.72%)

Table 2: Household characteristics of women living in Raas and Sapudi Islands

Characteristics	Raas Island	Sapudi Island
Age at marriage (years old)	23.0±5.3	15.2±2.9
Age at first delivery (years old)	25.5±5.5	18.8±4.0
Distance to the food source (m)	1.653±2.402	611.5±953.6
Expense on food (Rupiah/week)	64.616±51.606	57.231±39.859
Expense on health (Rupiah/month)	62.266±41.201	46.056±32.688
Family member (n)	3.1±1.5	2.2±0.7
Having a routine exercise habit		
No	103	192
Yes	31	30
Possession of farm		
No	61	124
Yes	80	111
Possession of ranch		
No	69	82
Yes	72	151
Daily food frequency		
Two times a day or less	59	124
Three times a day or more	77	89
Salary HH		
Less than Rp.1.000.000.-	116	230
Rp. 1.000.000.- or more	25	5
Fuel for cooking		
Gasoline	108	193
LPG	33	42
Having a tradition of having a meal together		
No	93	145
Yes	46	83
Vehicle to buy food		
By foot	78	167
Public transport	20	1
Motorcycle	43	59
Source of food		
Self-producing	54	119
Bought	53	55

Table 3: Relationship between socioeconomic status and obesity

	Raas Island (n = 141)				Sapudi Island (n = 235)				All (n = 376)			
Characteristics	Non-overweight	Overweight	OR	p-value	Non-overweight	Overweight	OR	p-value	Non-overweight	Overweight	OR	p-value
Age at marriage time (years old)	23±5	21±6	-	0.683	16±3	15±3	-	0.181	17±6	16±3	-	0.008
Age at first delivery (years old)	26±6	24±6	-	0.531	20±4	20±4	-	0.997	16±6	20±4	-	0.479
Distance to food source (m)	1.493±2.227	2.422±3.050	-	0.041	690.1±785.3	440.9±1.232	-	<0.001	1.024±1.603	925.6±2.019	-	0.085
Expense on food (Rupah/week)	71.906±3.050	23.947±20.654	-	<0.001	60.372±40.964	46.296±34.211	-	0.087	66.485±47.457	37.065±31.155	-	<0.0001
Expense on health (Rupiah/month)	61.226±43.267	67.273±30.444	-	0.274	44.490±28.362	49.545±41.286	-	0.995	53.186±37.639	55.455±38.474	-	0.683
Family member (n)	3.0±1.5	3.3±2.6	-	0.914	2.1±0.7	2.3±0.6	-	0.025	2.5±1.2	2.6±1.0	-	0.513
Possesion of farm												
No	47	14	0.480	0.117	90	34	1.611	0.095	137	48	1.068	0.816
Yes	70	10			69	42			139	52		
Possesion of ranch												
No	56	13	0.777	0.656	57	17	1.710	0.122	113	30	1.451	0.174
Yes	61	11			100	51			161	62		
Household income												
Less than Rp.1.000.000.-	95	21	0.617	0.569	157	73	3.226	0.332	252	94	0.670	0.519
Rp. 1.000.000.- or more	22	3			2	3			24	6		
Working status												
Do not have job	4	1	0.667	0.551	17	19	0.363	0.007	21	20	0.321	0.001
Have job	96	16			133	54			229	70		
Daily food frequency												
Two times a day or less	47	12	0.653	0.366	87	37	1.196	0.554	134	49	0.897	0.714
Three times a day or more	66	11			59	30			125	41		
Having tradition on having meal together												
No	76	17	0.671	0.479	91	54	0.571	0.079	167	71	0.623	0.083
Yes	40	6			62	21			102	27		
Source of food												
Self producing	43	11	1.144	0.817	77	42	0.568	0.161	120	53	0.682	0.218
Bought	41	12			42	13			83	25		

compared to non-overweight women (16±3 yo vs. 17±6 yo, p = 0.008). Other social factors such as a family member and tradition of dining together were not associated with overweight.

Monthly income and the amount of money spent in healthcare service was not associated with overweight/obesity (p>0.05). However, It was found that overweight/obese women spent less money to buy food compared to non-overweight women (p<0.05). Distance to the food source was associated with overweight but with different patterns in each island. Women who were working had a lower risk to become overweight/obese (OR: 0.321; p = 0.001). Possession of farm field and animal ranch were not related to overweight/obesity for women living in those islands (p>0.05).

DISCUSSION

The results of the present study revealed that women living in Raas and Sapudi islands had higher BMI compared to men. This study demonstrated the relationship between socioeconomic factors and overweight in women living in those islands. Working status, distance to food and expenses to buy food were associated with overweight. Interestingly, this study showed that overweight women were married at a younger age than their non-overweight counterparts.

The increasing rate of obesity in Indonesia has already reported by Roemling and Qaim[8]. Additionally, adults living in urban areas had higher BMI than adults living in rural areas. However, based on data between 1993 and 2007, it was observed that the BMI of adults in rural areas was increasing more than those in urban areas. Therefore, overweight/obesity is an emerging problem in rural areas and this is also supported by our study. This phenomenon was related to transformation in nutrition and physical activity among people living in rural areas[8]. Additionally, a history of stunting and under-nutrition during childhood have also been linked to greater risk of adulthood obesity[9,10].

The present study showed that women had higher BMI compared to men and this is also supported by Roemling and Qaim[8]. Women living in rural areas were more prone to become overweight or obese due to several factors. First, women biologically store more fat than men and estrogen has the ability to prevent fat breakdown (lipolysis)[11,12]. Second, there is cultural influence that prevent women from certain types of exertion and physical activity[13].

Working status was an important factor to induce obesity as women who have no job had a higher risk of obesity. This finding was supported by Roemling and Qaim[8] who stated that individuals with sedentary jobs and housekeeping job were more likely to become overweight or obese. This was due to the fact that the majority of jobs in those remote islands were related to farming which require more physical activity.

An addition to that, it is assumed that jobless women had increased risk of overweight because factors related to social issues within the family. Jobless women depend on the income of their husband or other family members and because women are responsible for serving meals in the family, their food choices will be prioritized to what is the best for the whole family members. This will, of course, limit their ability to choose foods that are healthy then. Jobless women also give no contribution to family income, thus will reduce the family's ability to buy goods. In Indonesia, healthy foods such as fresh fruits and vegetables are more expensive than cheap and unhealthy manufactured foods. Therefore, it is suspected that less ability to buy healthy foods lead those women to become overweight. This is supported by our finding which showed that overweight women had lower expenses for food compared to non-overweight women.

The role of socioeconomic status on the risk of overweight in women was seen in Raas and Sapudi islands. Monthly income cannot be used to describe socioeconomic status because most of the people living in those islands consume their own farming and fishing products. Interestingly, the data in this study supported that overweight/obese women spent less money on food compared to their non-overweight counterpart. It was argued that the lower expenses on food were due to the fact that they consume their own farming products.

Marital status was one of social factors that have been associated with increased risk of overweight in women. A study in Chinese population conducted by Tian *et al.*[14] showed that single women had lower BMI compared to married or divorced women. This study showed that overweight women got married in early age. It is suspected that because married women have a responsibility to take care of food preparation in their family therefore the longer period of marriage increased the risk of overeating.

There were some limitations of this study. The monthly income cannot describe the economic status of the subjects because most of the people living on those islands prefer to consume the food that they produced rather than selling it. In this study, economic status was measured using additional parameters including possession of farm and ranch.

CONCLUSION

It was concluded that women living in those Indonesian remote islands, Raas and Sapudi were more likely to become overweight than men. Lack of exercise and physical activity

was main cause to increase the risk obesity in those women. The prevalence of overweight in women living in those remote islands is alarming high and further action is necessary to prevent this trend. Therefore, health promotion programs are necessary with the objective to increase awareness among people living in remote islands about the dangerous effects of overweight on health. Development of physical activity program that customized with condition of people living in those islands is also warranted.

SIGNIFICANCE STATEMENT

This study discovers that the prevalence of obesity and overweight among women living on remote islands is unexpectedly high. This information can be beneficial for those who investigate the impact of the environment and social factors on obesity. This study will help the researcher to uncover the critical areas of social and cultural aspects of obesity among women that many researchers were not able to explore.

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