The role of family socioeconomic status on maternal weight gain during pregnancy

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Abstract

A woman gains weight during gestation as part of the normal physiology of pregnancy. Certain women have a high BMI during their pre-pregnancy stage, and during pregnancy, they gain excessive weight, resulting in adverse pregnancy outcomes. Several studies have noted that individuals with lower education or higher household incomes are more prone to being overweight or obese. Therefore, this study aims to investigate the relationship between the socioeconomic status of the family and the prevalence of a history of obesity among pregnant women living in the village of Karangduren, Pakisaji. The total sampling was 25 pregnant with a previous history of overweight or obese BMI. Explanatory research with cross-sectional design used questionnaire, including informed consent. The test is bivariate and descriptive, and the chi-square test was used to obtain the P value. All results from the logistic regression analysis were reported as odds ratios with a corresponding 95% confidence interval. In addition, the study said that their father and mother's education was significantly associated with their BMI status. Family income and FAS are related to BMI status. Familial wealth has no significant correlation with BMI. The study results demonstrate a relationship between family socioeconomic status and maternal weight gain during pregnancy that influences the BMI status. The mother's weight gain is significantly associated with the parents' employment status, income, and the FAS. This study highlights the importance of early intervention to reduce the adverse effects of adult overweight, particularly in families of lower socioeconomic status.

Keywords: socioeconomic status; BMI; maternal weight gain; pregnancy

1. Introduction

In recent decades, there has been a notable surge in the global prevalence of overweight and obesity, emerging as a substantial public health issue (1). Pregnancy induces physiological changes in women, contributing to weight gain as part of the natural gestational process. Some individuals exhibit elevated pre-pregnancy Body Mass Index (BMI), which subsequently leads to excessive weight gain during pregnancy, resulting in adverse pregnancy outcomes. The determination of optimal weight gain during pregnancy is predicated upon an individual's pre-pregnancy BMI, in accordance with guidelines promulgated by the Institute of Medicine (IOM). BMI is calculated by dividing an individual's weight in kilograms by the square of their height in meters (kg/m²). The World Health Organization (WHO) categorizes BMI into four distinct classifications: underweight (BMI <18.5 kg/m²), normal (18.5-24.9 kg/m²), overweight (BMI 25-29.9 kg/m²), and obese (BMI >30 kg/m²) (2). The recommendations advocate for weight gains of 12.5-18 kg for underweight women, 11.50-16 kg for women of normal weight, and 7-11.5 kg for obese women. A noticeable escalation in body weight has been observed, particularly in developed and developing nations, resulting in augmented healthcare expenditures (3). Maternal obesity is widely acknowledged as a significant obstetric risk factor, predisposing individuals to various conditions, including gestational hypertension, gestational diabetes, macrosomia, pre-eclampsia, preterm birth, and low birth weight (4).

Women who experience excessive weight gain during pregnancy and retain weight after delivery are at a significant risk of developing obesity at a later stage (5). The incidence of obesity in individuals aged over 18

years in Indonesia has risen. In 2013, obesity was 19.60% for men and 32.90% for women, compared to 26.60% for men and 44.40% for women in 2018. It is projected that more than 1 billion individuals worldwide, equivalent to 1 in 5 women and 1 in 7 men, will live with obesity by 2030. Women bear a more significant burden of obesity worldwide than men, whereas developing countries record the highest cases of obesity. These countries are grossly under-prepared, with ill-equipped systems to tackle the issue of obesity and its adverse effects effectively, especially with the double burden of malnutrition (6).

Childhood socioeconomic status (SES) may play a pivotal role in determining the propensity for future obesity, as evidenced by a study demonstrating that individuals with limited socioeconomic mobility exhibit consistently higher Body Mass Index (BMI) throughout their lives compared to those with elevated socioeconomic status (7). Another investigation revealed that individuals originating from families categorized as 'remaining in low income' or 'transitioning into low income' faced an elevated risk of experiencing overweight and obesity during adolescence. However, research into the influence of family income trajectories on undernutrition has been relatively sparse (8). Multiple studies have established an association between lower educational attainment and a heightened likelihood of obesity, while paradoxically, greater household incomes have also been correlated with an increased risk of being overweight or obese. Moreover, other investigations have revealed that obesity rates have risen across all socioeconomic strata during a similar time frame, with a more pronounced increase observed among individuals with lower socioeconomic status, albeit a slight decline observed in the high socioeconomic status group (9). onsequently, this study endeavors to explore the relationship between family socioeconomic status and the prevalence of a history of obesity among pregnant women residing in the Karangduren village of Pakisaji, within the Malang district.

2. Method

This research was conducted at Viandika Permana Independent Midwife Clinic in Karangduren Village, Pakisaji, Malang Regency, between June 2023 and August 2023. The sampling process started with an initial survey and continued until the data was complete. The data sampling process started with an interview to obtain information about the family's socio-economic status and the BMI history of the pregnant women during the first trimester, and the results of these interviews would indicate whether the women were overweight or obese. The study's results consisted of 25 pregnant women with a previous history of overweight or obese BMI, who constituted the entire sample. An explanatory study with a cross-sectional design was selected as the research type. Height was measured using a Microtoa with an accuracy level of 0.1 cm, and weight measurements were carried out at over ten weeks gestation. The WHO Asia-Pacific standard was used for the calculation of BMI. A questionnaire was used for other data collection, including all components of the research variables, including informed consent, to address sensitive questions such as income. The assessment of the level of education, occupation, income, and total burden on family members determined the family's socio-economic status. The data underwent statistical analysis. The test is bivariate and descriptive, and the chi-square test was used to obtain the P value. All logistic regression analysis results were provided as odds ratios (OR) with a 95% confidence interval (CI). The statistical significance level was determined at $p \leq 0.05$.

3. Result

The characteristics of the sample used in this study are shown in Table 1. The sample consisted of 25 subjects included in the study. The results show that before pregnancy, 64% of the mothers were classified as overweight and 36% as obese. The average BMI status in this study was 24.8 kg/m^2. The average Middle

Upper Arm Circumference (MUAC) was 27.88 cm and showed a significant correlation with the BMI status ($p<0.001$). The mean age of fathers was 32.0 ± 6.56 years, and the mean age of mothers was 28.5 ± 5.83 years. These ages were found to have a statistically significant effect on BMI status ($p<0.001$). However, no significant relationship was found between their father's work status and their BMI status ($p>0.05$). Most participants reported that their father had a job, with 64% employed and 36% unemployed. Regarding the mother's work, 52% were workers, and 48% were jobless, but there was no significant relationship with BMI status ($p>0.05$). In addition, 60% of the participants reported that their father had a high level of education, which was significantly associated with their BMI status. The mother's level of education was elevated in 60% of cases and low in 40% of cases, particularly in relation to BMI status. Regarding family income, 52% of participants earned between 1-3 million, with 48% making more significant than 3 million, which was also significantly related to BMI status. Approximately 52% of the respondents reported a high level of familial wealth, with the remaining 48% indicating a lower level. Conversely, there was no significant correlation between BMI and family wealth ($p>0.05$). Most participants (72%) scored high on the Family Affluence Scale (FAS), with significant findings related to BMI.

Table 1. The Characteristics of the Sample

Variabel	Over All	p value
Height (cm)	154,4 ± 4,48	0,000*
Pre-pregnancy weight (kg)	59,40 ± 7,71	0,000*
BMI (kg/m^2)	24,8 ± 2,16	
BMI status		
Obesity	9 (36,0)	
Overweight	16 (64,0)	
Mid Upper Arm Circumference (MUAC) (cm)	27,88 ± 2,79	0,000
Father's age	32,0 ± 6,56	0,000
Mother's age	28,5 ± 5,83	0,000
Father's work		0,401
jobless	9 (36,0)	OR = 2,35
worker	16 (64,0)	
Mother's work		0,688
jobless	13 (52,0)	OR = 3,22
worker	12 (48,0)	
Father's education level		0,009
Low	10 (40,0)	OR = 13,34
High	15 (60,0)	
Mother's education level		0,047
Low	10 (40,0)	OR = 3,90
High	15 (60,0)	
Family income		0,048
1-3 juta	13 (52,0)	OR = 3,22
> 3 juta	12 (48,0)	
Perceived Family Wealth		0,411
Low	12 (48,0)	OR = 2,13
High	13 (52,0)	
Family Affluence Scale (FAS)		0,039
Low	7 (28,0)	OR = 11,35
High	18 (72,0)	

* Height, pre-pregnancy weight, MUAC, father's age, and mother's age were compared with BMI using the T-Test. Mother's work, father's work, father's education level, mother's education level, family income, perceived family wealth, and FAS compared to BMI status using the Chi-Square test.

4. Discussion

The study results show a significant correlation between mid-upper arm circumference (MUAC) measurements and BMI status, with a moderate correlation also observed between BMI and MUAC. Technical abbreviations will be clarified when first used throughout the text. MUAC can be used as a substitute for BMI in resource-limited field settings where functional scales and stadiometers are unavailable. Furthermore, the ease of measuring MUAC and the fact that it requires no training or complex calculations make MUAC a viable alternative for determining nutritional status during pregnancy. MUAC does not need to re-calibrate (10).

The research findings revealed a correlation between parents' education levels and family affect scale (FAS) with BMI status. Compared to other developed nations like the USA, numerous developing countries have witnessed a more significant surge in the prevalence of obesity or overweight in recent times (11). Parents with higher levels of education are more likely to consume high-fat, high-sugar foods of their choice. This can lead to overweight and obesity (12). However, the less educated may have busier work schedules, need help with housework in their free time, and have fewer opportunities to engage in unhealthy habits such as lack of physical activity and eating fast food (13). Socioeconomic and lifestyle changes, such as sedentary (14)behavior or lack of physical activity, can significantly contribute to obesity or overweight issues (15). The FAS is currently a well-recognized measure of socioeconomic status. Indicators of parental educational attainment are frequently utilized to evaluate socioeconomic status's legitimacy and respectability (16). Family Affluence Scale (FAS), parental educational attainment, and perceived family wealth are typically employed as the primary indicators of assessing socioeconomic status in this study.

Nonetheless, the study's results suggest that BMI is not significantly influenced by perceived family wealth or worker status. The risk of developing central obesity is 1.1 times higher for the jobless than the worker. This is believed to be linked to physical activity and energy expenditure. Certain occupations call for higher energy expenditure while others require less. Those inactive, including those jobless, are more likely to have lower energy expenditure, which becomes a more significant issue, particularly if they habitually overeat, leading to body fat accumulation. Individuals whose occupation requires extended periods of sitting may experience heightened blood cholesterol levels due to declining insulin sensitivity and fat-digesting enzymes. It is advisable to avoid prolonged sedentary behavior and partake in physical activity to mitigate the risk of increased cholesterol levels (17). There was no correlation between overweight or obesity and perceptions of family wealth. This revelation may have public health implications. When studying the health habits of people with high socio-economic status, it is essential to consider how educational attainment may influence the prevalence of overweight or obesity (18). Longitudinal studies are needed to improve the effectiveness of interventions and better understand the causal relationship between socioeconomic status and BMI. It is vital to enhance public awareness of the risks associated with being overweight or obese to improve public health.

5. Conclusion

The study results demonstrate a relationship between family socioeconomic status and maternal weight gain during pregnancy that influences the BMI status. The mother's weight gain is significantly associated with the employment status of the parents, the income, and the Family Affluence Scale (FAS). This study

highlights the importance of early intervention to reduce the adverse effects of adult overweight, particularly in families of lower socioeconomic status.

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Disclosure of conflict of interest
The authors state that they have no financial or ideological conflicts of interest.
Statement of ethical approval
All authors provide that all trials in Karangduren Village, Pakisaji, Malang Regency were examined and approved by Viandika Permana Independent Midwife Clinic.
Statement of informed consent
All individual participants in the study gave their informed consent.

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