

ASSOCIATION BETWEEN OVERWEIGHT/OBESITY AND DIET QUALITY AMONG WOMEN OF REPRODUCTIVE AGE IN AN URBAN DISTRICT AT HO CHI MINH CITY, 2024

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ABSTRACT

Aims: To determine the rate of overweight/obesity, and their correlation with diet quality among women aged 18-49 in an urban district at Ho Chi Minh City.

Methods: A cross-sectional study was conducted with 284 women aged 18-49 living in District 6, Ho Chi Minh City from March to April 2024. Data were collected through direct interviews with participants using a semi-structured questionnaire and directly measured anthropometric indexes. Overweight and obese were evaluated by using BMI according to the IDI-WPRO standard.

Results: The rate of overweight and obesity was 19,7% and 20,1%, respectively. Factors associated to overweight/obesity included age, religion, ethnicity, marital status, Global Dietary Recommendations (GDR) scores and GDR-Limit score.

Conclusion: The trend of overweight and obesity was increasing in the urban and it was associated with diet quality scores. Therefore, a comprehensive nutritional assessment and dietary intervention are needed for reproductive-aged women, along with further studies to improve diet appropriately.

Keywords: obesity, overweight, diet quality, women aged 18-49.

I. INTRODUCTION

The double burden of malnutrition, defined as the simultaneous manifestation of both undernutrition and overweight/obesity, is one of the most significant health problems among women in developing countries. Women of reproductive age, typically between 18 and 49 years old, are a group that requires considerable attention in terms of nutrition. All health and nutrition-related issues during this period can directly impact both the individual's health and the future health of their children. According to reports from the World Obesity Federation, overweight/obesity among women is a significant global issue, with 13% of women suffering from

obesity in lower-income countries in 2020 [1]. In Vietnam, studies indicate a double burden of malnutrition within this demographic. These trends highlight an increasing prevalence of overweight/obesity with age, while malnutrition remains a significant issue in the population [2]. Diet quality is closely linked to health outcomes in this group. Proper nutrition is essential for mothers to understand their nutritional needs more thoroughly and improve their overall health. For this reason, this study was conducted to determine the prevalence of overweight, obesity and their association with diet quality among women aged 18-49 in District 6, Ho Chi Minh City.

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II. METHODS

2.1. Study design and subjects

This cross-sectional study was conducted on women aged 18–49 living in District 6, Ho Chi Minh City from March to April 2024. The study received approval from the Ethics Committee in Biomedical Research of the University of Medicine and Pharmacy at Ho Chi Minh City

(Approval No. 428/HĐĐĐ – ĐHYD, dated March 7, 2024). All women voluntarily consented to participate. Exclusion Criteria: Women who are diagnosed with chronic diseases, pregnant or breastfeeding and have not fully completed the questionnaire.

2.3 Sample size and sampling method

The sample size was calculated using the formula for estimating a proportion:

$$n = Z_{1-\frac{\alpha}{2}}^2 \frac{p(1-p)}{d^2} \times \text{DEFF}$$

n is the required sample size; α is the type I error probability, set at 0.05, giving $=1.96$; d is the margin of error, set at 0.05; p is the proportion of overweight/obesity according to Pham Duc Hong et al. [2], which is 11.4%, set design effect (DEFF) is 1.5. The sample size is calculated to be 256.

Sampling method included 2 stages. Stage 1 Three clusters were randomly

selected from a list of 14 wards of district 6, using the simple random sampling method. The selected clusters were Ward 5, Ward 8, and Ward 10. Stage 2: A list of women aged 18–49 was generated for each ward using household registration records provided by the People's Committees. From this list, participants were randomly selected within each ward through the simple random sampling method. As a result, the study collected data from 284 women who met the criteria.

2.3. Data collection methods

Height (up to the nearest 1 mm using a stadiometer) and weight (up to the nearest 100g using weighing scales produced by Nhon Hoa company) were measured on all selected women. Anthropometric measurements were obtained directly at the participants' homes. Nutritional status was categorized based on the IDI & WPRO BMI scale: underweight ($< 18.5 \text{ kg/m}^2$), normal ($18.5\text{--}22.9 \text{ kg/m}^2$), overweight ($23\text{--}24.9 \text{ kg/m}^2$), and obese ($\geq 25 \text{ kg/m}^2$).

Data were collected through direct interviews with participants using a semi-structured questionnaire (including information on demographic characteristics and dietary intake over the past day).

The validated Diet Quality Questionnaire (DQQ) for Vietnam was adopted to assess women's diet quality through key indicators [3]. The Minimum Dietary Diversity for Women (MDD-W) evaluates the adequacy of daily micronutrient intake among women based on consumption from 10 food groups (whole grains, pulses, nuts and seeds, dairy, meat, poultry, and fish, eggs, dark green leafy vegetables, other vitamin A-rich fruits and vegetables, other vegetables, other fruits). A woman is considered to have "attained" the dietary diversity standard if she consumes items from at least 5 out of the 10 specified food groups. The NCD-Protect Score, ranging from 0 to 9, measures dietary factors

protective against non-communicable diseases (NCDs). It is based on consuming foods from 9 healthy food groups (whole grains, pulses, nuts and seeds, vitamin A-rich orange vegetables, dark green leafy vegetables, other vegetables, vitamin A-rich fruits, citrus, and other fruits). The NCD-Risk Score, also ranging from 0 to 9, assesses dietary risk factors for NCDs. It is calculated based on the intake of foods from 8 unhealthy food groups (soft drinks, baked/grain-based sweets, other sweets, processed meat, unprocessed red meat,

deep-fried food, fast food & instant noodles, packaged ultra-processed salty snacks). The Global Diet Recommendations (GDR) Score combines the NCD-Protect and NCD-Risk scores, with a range of 0 to 18, reflecting adherence to global dietary guidelines. These indicators provide a comprehensive evaluation of dietary patterns and their alignment with nutritional and health recommendations. Diet quality data were collected on-site at the participants' homes.

2.4. Statistical analysis

Data were entered using Epidata 3.1 and analyzed using STATA 17. Body mass index (BMI) was calculated as [weight (kg)]/ [height (m)²]. Nutritional status was categorized based on the IDI & WPRO BMI scale [4]. Prevalence ratio (PR) was utilized to estimate the strength of the association between

overweight/obesity as a dependent variable and demographic particulars, diet quality as an independent variable were tested using the Chi-square test. Fisher's Exact Test was used when > 20% of the cells have expected counts < 5. Statistical significance was considered when the p-value < 0.05, 95% CI.

III. RESULTS

Table 1. Nutritional status of participants based on BMI (n=284)

| Nutritional status | n | % |
|--------------------|-----|------|
| Underweight | 22 | 7.7 |
| Normal | 149 | 52.5 |
| Overweight | 56 | 19.7 |
| Obesity | 57 | 20.1 |

The study successfully recruited and assessed 284 women who met the eligibility criteria for inclusion. Table 1 shows the nutritional status of the study population.

Table 2 indicates the main indicators of diet quality, the proportion of participants who attained the MDD-W

was relatively high at 86.6%. However, the proportion of All-5 was notably low, at only 37%. The quality diet scores ranged from average to poor quality. The DDS score averaged 6.21 ± 1.58 , while the NCD-Protect score was 3.77 ± 1.65 . The NCD-Risk score had a median of 3 with an interquartile range of 2–4. The GDR score was 9.74 ± 2.28 .

Table 2. Indicators of diet quality (n=284)

| Characteristic | n | % |
|----------------|-------------|------|
| MDD-W | 246 | 86.6 |
| All-5 | 105 | 37.0 |
| DDS Score* | 6.21 ± 1.58 | |
| NCD-Protect* | 3.77 ± 1.65 | |
| NCD-Risk** | 3 (2-4) | |
| GDR Score* | 9.74 ± 2.28 | |

MDD-W (Minimum Dietary Diversity-Women), DDS Score (Dietary Diversity Score), NCD(non-communicable disease), GDR Score (Global Dietary Recommendation Score),

**Mean ± Standard deviation, **Median (interquartile).*

Table 3. Associations of overweight/obesity and socio-demographic (n=284)

| Characteristic | Overweight/obesity | | p | Prevalence ratio (95% CI) |
|--------------------------------|--------------------|-------------|-------|------------------------------|
| | Yes | No | | |
| Age | | | | |
| 18-29 | 32 (27.6%) | 84 (72.4%) | - | 1 |
| 30-39 | 39 (45.9%) | 46 (54.1%) | 0.008 | 1.66 (1.14-2.42) |
| 40-49 | 42 (50.6%) | 41 (49.4%) | 0.001 | 1.83 (1.27-2.64) |
| Religion | | | | |
| Buddhism | 39 (33.6%) | 77(66.4%) | - | 1 |
| Catholicism | 25 (35.2%) | 46 (64.8%) | 0.824 | 1.04 (0.70-1.57) |
| None | 49 (50.5%) | 48 (49.5%) | 0.014 | 1.50 (1.09-2.08) |
| Ethnicity | | | | |
| Kinh | 88 (40.2%) | 131 (59.8%) | 0.803 | 1 |
| Chinese | 25 (38.5%) | 40 (61.5%) | - | 0.96 (0.68-1.35) |
| Marital status | | | | |
| Single | 33 (28.0%) | 85 (72.0%) | - | 1 |
| Married | 63 (48.1%) | 68 (51.9%) | 0.002 | 1.72 (1.22-2.42) |
| Divorced/separated /widowed | 17 (48.6%) | 18 (51.4%) | 0.016 | 1.74 (1.11-2.72) |

Data express as n (%), p values were calculated for the difference between overweight/obesity group by Chi-square test and poisson regression

Table 3 indicates that factors such as age, religion, and marital status were significantly associated with overweight-obesity. The older women were the higher the rate of overweight and obesity

($p < 0,001$). Non-religious women and those ever married are more likely to be overweight or obese compared to Buddhists and unmarried women, respectively.

Table 4. Diet quality and its association with overweight and obesity (n=284)

| Characteristic | Overweight/obesity | | p | Prevalence ratio (95% CI) |
|----------------|--------------------|-------------|-------|------------------------------|
| | Yes | No | | |
| MDD-W | | | | |
| Attained | 98 (39.8%) | 148 (60.2%) | 0.966 | 1 |
| Not attained | 15 (39.5%) | 23 (60.5%) | | 1 (0.66-1.54) |
| All-5 | | | | |
| Attained | 42 (40.0) | 63 (60.0) | 0.956 | 1 |
| Not attained | 71 (39.7) | 108 (60.3) | | 1 (0.75- 1.36) |
| DDS Score | 6.15±1.55* | 6.25±1.61* | 0.651 | 0.97 (0.89-1.07) |
| NCD-Protect | 3.75±1.61* | 3.79±1.68* | 0.851 | 0.99 (0.91-1.08) |
| NCD-Risk | 3(2-5)** | 3(1-4)** | 0.022 | 1.08 (1.01-1.16) |
| GDR Score | 9.42±2.42* | 9.95±2.16* | 0.049 | 0.94 (0.88-0.99) |

Data expressed as n(%), *Mean ± Standard deviation, **Median (interquartile), p values were calculated for the difference between overweight/obesity group by Chi-square test.

Table 4 indicates the association between overweight/obesity status and NCD-Risk scores as well as GDR scores. Specifically, both NCD-Risk and GDR scores are higher in the overweight/obese

women compared to the non-overweight/obese women, with the differences being statistically significant ($p < 0,05$).

IV. DISCUSSION

The nutritional status based on BMI in this study was classified according to IDI & WPRO cut-offs because research in Asian population showed that it identified more risk factors with NCDs, therefore, could be considered for early warning of risk [4]. The study shows that 39,79% of participants are classified as overweight/obese. This prevalence is higher than the findings of Pham Duc Hong et al. is 11,4% and Nguyen Thi Thu Lieu on women aged 15–49 years in the northern midland and mountainous regions of Vietnam is 15,4% [2, 5]. A difference in nutritional status based on body mass index (BMI) is due to variations in BMI cut-off points. The study still shows a higher prevalence of

overweight/obesity than the study of Arnaud Laillou, which used the same BMI cut-off, at 20,0% [6]. Overall, the study findings indicate a relatively low prevalence of malnutrition but a significant increase in overweight/obesity, highlighting the ongoing dual burden of malnutrition in developing countries. The observed differences compared to other studies, both domestic and international, reflect variations in nutritional trends. These findings align with the current situation in Vietnam, where the rapid rise in overweight/obesity has become a double burden for the nation.

The DDQ is a low-burden tool for tracking dietary quality trends in

communities without requiring advanced technical expertise or quantitative food intake assessments. It helps researchers monitor key food group consumption to enhance dietary quality. Data from the DDQ can evaluate nutrient adequacy through metrics such as MDD-W, All-5, and the DDS score. It also identifies excessive food consumption trends, aiding in predicting diet-related non-communicable disease risks. According to data from a study conducted in 2021 on urban women in Hanoi, Vietnam, there were no significant differences in food group consumption patterns using the DDQ [7]. This finding highlights the utility of the DDQ in capturing dietary quality trends, offering valuable insights that can guide policymakers and nutrition experts in designing targeted and impactful intervention strategies.

The results indicate that advancing age correlates with an increasing prevalence of overweight and obesity. Among women aged 40–49 years, The risk of overweight or obesity increases by 34% with each additional decade of age (95% CI: 1.13–1.59). Similar trends have been observed in Vietnam, such as the study by Cao Thi Thu Huong et al. on women aged 20–59 in Hanoi, which found that the prevalence of overweight and obesity progressively increases across age groups [8]. This finding aligns with studies conducted in other developing countries. For example, research by Abdul-Aziz Seidu et al. in Mali, the prevalence of overweight and obesity in women aged 40–49 is higher compared to the 15–19 age group [9]. Women aged 30–49 experience many physical and mental changes. These include hormonal changes, which significantly impact metabolic processes and energy balance compared to younger

women. Additionally, women aged 30–40 years often experience more stable socioeconomic conditions, which may lead to changes in diet and reduced physical activity due to lifestyle changes. These factors, along with changes in diet and body composition, lead to higher rates of overweight and obesity in this age group.

The study also found that the prevalence of overweight and obesity was lower among Buddhists compared to Catholics and non-religious individuals. This can be explained by differences in dietary habits associated with religious rituals, lifestyle, and cultural practices, which collectively reduce the risk of overweight and obesity in the Buddhist group.

The results indicate that married women and those who are divorced/separated/widowed have higher rates of overweight and obesity 1.72 times (95% CI: 1.22–2.42) and 1.74 times (95% CI: 1.11–2.72), respectively, compared to unmarried women. This finding is in agreement with the results of the study from other developing countries. For example, Mathew Okoh et al. in 2013 on Nigerian women reported that married and widowed women had higher odds of obesity compared to single women, with odds ratios of 1.794 (95% CI: 1.180–2.726) and 2.111 (95% CI: 1.289–3.457), respectively [10]. Similarly, a cross-sectional survey in Bangladesh from 1999 to 2014 found that married women were 1.41 times (95% CI: 1.07–1.86) more likely to be obese than single women [11]. Lifestyle changes after marriage, such as increased consumption of unhealthy foods and reduced physical activity due to family responsibilities, contribute to this trend.

Married women are also more likely to have children compared to unmarried women, and the physiological and behavioral changes associated with pregnancy and childcare may lead to weight gain. These factors collectively contribute to the higher prevalence of overweight and obesity among married women.

The results show that the prevalence of overweight and obesity increases as the NCD-Risk score rises. This finding is consistent with a study conducted on women aged 15–49 in Ethiopia by Aklilu Abraham Roba et al., which revealed that for each additional unit of unhealthy food consumption (as measured by GDQS- or Global Dietary Quality Score for unhealthy foods), the likelihood of overweight and obesity increased by 30%

(95% CI: 1.05–1.61) [12]. Conversely, the prevalence of overweight and obesity decreased with higher GDR scores. This aligns with the findings of Heavenlight A. Paulo and colleagues, who utilized the Prime Dietary Quality Score (PQDS) tool to study women of reproductive age in Tanzania. They observed that women with the highest PQDS scores had a 24% lower prevalence of overweight and obesity (95% CI: 0.62–0.89) compared to those with the lowest scores [13]. The GDR score, derived from the DQQ, assesses dietary quality by measuring adherence to WHO's Global Dietary Recommendations designed based on research linking diet to NCDs. Therefore, the NCD-Risk score can be a valuable tool for evaluating nutrition-related NCDs within the Vietnamese population.

Strengths and limitations of the study

Anthropometric measurements of weight were directly assessed to ensure high accuracy and reliability. The study utilized the BMI and the DQQ standardized in Viet Nam, providing a comprehensive overview of nutritional status and diet quality in the community with low cost, minimal time consumption, simple questions, and a

short recall period. However, the sample size was not large enough to be representative of the target population in Vietnam, which could introduce information bias into the study. Assessing nutritional status based on BMI in comparison to other studies may show inconsistencies due to differences in BMI cut-off values.

V. CONCLUSION

The study conducted on women aged 18–49 in District 6, Ho Chi Minh City, highlighted the rising rates of overweight and obesity and most of diet quality scores are at a moderate-to-low level. The results also show that the prevalence of overweight and obesity increases as the

NCD-Risk score rises, while the GDR score, which reflects adherence to global dietary guidelines, is lower in women with overweight and obesity. The DQQ indices contribute to reflecting the diet quality, offering a rapid assessment tool for dietary patterns in the community.

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