

Trends in overweight by socio-economic status in Vietnam: 1992 to 2002

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Abstract

Objective: To explore socio-economic factors associated with rising rates of overweight among Vietnamese adults.

Design: The study was based on three national surveys of socio-economic factors and health conducted over a 10-year period. The studies were: the Vietnamese Living Standard Survey 1992–1993 (11 982 participants); the Vietnamese Living Standard Survey 1997–1998 (15 975 participants); and the Vietnamese National Health Survey 2001–2002 (94 656 participants).

Subjects: Male and female adults > 18 years old were stratified by gender, age group, area of residence, occupation, education and relative food expenditures. Overweight was defined using body mass index (BMI) $\geq 25 \text{ kg m}^{-2}$.

Results: Overweight rates in Vietnam more than doubled between 1992 and 2002 (from 2.0 to 5.7%). Significant increases were observed for men and women, in urban and rural areas, and for all age groups. In univariate analyses, both age and higher socio-economic status were associated with higher rates of overweight. Using the most recent survey, urban populations were more likely to be overweight than rural ones (odds ratio (OR) = 1.79), white-collar workers were more likely to be overweight than manual labourers (OR = 1.95) and persons in the top level of food expenditures were more likely to be overweight than persons in the bottom level (OR = 4.96) after adjustment for other factors. Education was inversely associated with overweight after adjusting for covariates.

Conclusion: Economic growth and improved standard of living are associated with higher rates of overweight in nations in early stages of economic development. In Vietnam, higher rates of overweight were observed among the higher income and occupation groups.

Keywords

Vietnam
Overweight
Urban–rural differences
Socio-economic status
Developing countries
Food expenditure

Economic development brings about profound changes in lifestyles and diet composition^{1,2}. As nations industrialise and populations become more urban, the traditional plant-based diets are replaced by diets with more animal products and a higher proportion of added sugars and fats^{3–5}. This nutrition transition in the developing world has been associated with rapidly growing rates of overweight^{6,7}. However, the socio-economic determinants of overweight in developing countries are not always clear. Whereas some studies suggest that overweight in low-income nations is more common among groups with higher socio-economic status (SES)^{8–10}, other studies suggest that overweight is increasing faster among the poor^{7,11,12}.

The economic growth of Vietnam, linked to the Doi Moi economic reforms beginning in 1986¹³, has led to urbanisation, higher incomes^{14,15} and major shifts in diet composition, especially among the more affluent urban dwellers¹⁶. With a Gross National Product (GNP)

estimated at \$US 430 per capita in 2002¹⁷, Vietnam faces the dual challenge of continuing undernutrition and rising rates of overweight, especially among women.

The present analyses of cross-sectional surveys focused on social and economic variables associated with overweight in the adult Vietnamese population. The three surveys were conducted in Vietnam over a 10-year period (1992–2002) with support from the World Bank and the Swedish International Development Agency (SIDA)^{15,18,19}. Factors selected for this study were gender, age, area of residence (urban/rural), education, occupation and a scale measure of relative food expenditures. The goal was to track overweight rates over the 10-year period as they affected men and women, urban and rural dwellers, and diverse SES groups. One hypothesis, suggested by past research, was that stages of economic development have more of an impact on the body weight of women than the body weight of men^{20–22}.

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Methods

Survey design

The two Vietnamese Living Standard Surveys were multi-purpose surveys that focused primarily on general statistics of economic development^{15,18}. They were conducted in 1992–1993 (VLSS 1992–93)¹⁸ and 1997–1998 (VLSS 1997–98)¹⁵ by the General Office of Statistics of Vietnam with financial support provided by the World Bank. The Vietnamese National Health Survey was conducted in 2001–2002 (VNHS 2001–02) by the Ministry of Health of Vietnam with support from the World Bank and SIDA¹⁹. The key findings of these nationally representative surveys have been published before^{15,18,19}.

The VLSS were based on multi-stage random sampling methods, using the 1989 census. Sample frames were stratified into rural and urban areas and then households were selected randomly. Data were collected for each member of the targeted households, including children. The VLSS 1997–98 collected data from the same households as the VLSS 1992–93, plus an additional 1200 drawn from the 1995 Multi-Purpose Household Survey. The VLSS 1992–93 was based on 4800 households, and the VLSS 1997–98 was based on 6000 households. The total samples included 23 839 individuals in VLSS 1992–93 and 28 509 in VLSS 1997–98.

The VNHS 2001–02 sample frame was based on the 1999 census. Thirty-six thousand households were randomly selected from clusters derived from the 61 provinces and stratified by urban and rural areas. Data were obtained for each member of the household, for an approximate total of 158 000 individuals.

Key variables and statistical analyses

Height and weight were measured for all participants and body mass index (BMI, kg m^{-2}) values were calculated. Following the definition of the World Health Organization (WHO)⁵, overweight was defined as $\text{BMI} \geq 25 \text{ kg m}^{-2}$. Area of residence (urban/rural) was ascertained from the sampling frame. Data on gender, age, education, occupation and food expenditure were obtained through self-report. Only subjects over 19 years of age were included in this study. Age was categorised into three groups: 19–30 years; 31–50 years; and >51 years. Education was categorised into six groups according to the number of years of education: illiterate (0 year); <primary school (<5 years); primary school (5 years); secondary school (9 years); high school (12 years); >high school (>12 years). Occupation was categorised into three groups: white collar; manual labour; and other. Food expenditure, a proxy for income, was categorised into five expenditure levels (1 = lowest, 5 = highest). Participants selected the most appropriate level from the five choices (values were in Vietnamese Dong).

Statistical analyses were conducted with SPSS, version 12.0 (SPSS Inc.). Simple differences in overweight rates as

a function of gender, area of residence and age group were tested using chi-square statistics. Multiple logistic regression analysis was used to test the association between SES factors, independent of other factors in the analyses, and the prevalence of overweight within the VNHS 2001–02 dataset. Age standardisation used the direct method²³. Stata version 9 (StataCorp) was used to calculate odds ratios (OR).

Results

The three survey samples reflected the changing demographics of Vietnam during the period 1992 to 2002. Table 1 shows demographic data for all survey participants. In all three surveys, ~54% of participants were female. Over the 10-year period, the 31–50 years age group increased in size and there was a decline in the number of 19–30-year-olds. Between 1992 and 2002, the proportion of urban dwellers in the three survey samples rose from 23.1 to 35.1%. Illiteracy rates declined and the proportion of adults with high school education or above increased from 13.6 to 20.3%. The proportion of white-collar workers rose from 17.5 to 28.0%.

Table 2 shows the rising prevalence of overweight as a function of gender and age group. Women were more likely to be overweight than were men, an effect that was stronger among the older adults. There was a sharp increase in overweight prevalence between 1992 and 2002, in parallel with economic development. In 1992, the crude prevalence of overweight was 1.1% for men and 2.8% for women (age-standardised: 1.2 and 3.0%, respectively). By 2002, the crude prevalence had risen to 4.5% for men and 6.6% for women (age-standardised: 4.4 and 6.6%, respectively). These effects were significant after adjusting for unequal distribution of participants by age in the three surveys.

Table 3 shows the rising prevalence rates of overweight as a function of area of residence for each age group. In 1992, the prevalence of overweight was 1.2% in rural areas and 4.8% in urban areas. By 2002, overweight rates in rural areas tripled to 3.5%, whereas overweight rates in urban areas doubled to 9.6%. Although the prevalence remained highest for the urban groups, rural populations showed the sharpest rate of increase. The differences in overweight prevalence between urban and rural dwellers were most pronounced for older adults.

Figure 1 shows the relationship between overweight prevalence and food expenditure in the three surveys, for men and women. In this survey, food expenditure served as a proxy measure of income. Higher food expenditure (level 5) was associated with higher overweight prevalence. As the prevalence of overweight increased between 1992 and 2002, higher rates were progressively observed among all SES groups. Consistent with past observations, the trend to increased overweight prevalence was more

Table 1 A summary of participant data in three Vietnamese national surveys

| Data | Participants in surveys | | | | | |
|-------------------------------|-------------------------|----------|--------------|----------|--------------|----------|
| | VLSS 1992–93 | | VLSS 1997–98 | | VNHS 2001–02 | |
| | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> |
| Gender | | | | | | |
| Male | 45.3 | 5 425 | 45.7 | 7 307 | 46.8 | 44 254 |
| Female | 54.7 | 6 557 | 54.3 | 8 668 | 53.2 | 50 402 |
| Total | 100.0 | 11 982 | 100.0 | 15 975 | 100.0 | 94 656 |
| Age group (years) | | | | | | |
| 19–30 | 35.5 | 4 250 | 29.9 | 4 774 | 28.8 | 27 274 |
| 31–50 | 38.7 | 4 640 | 42.1 | 6 728 | 45.7 | 43 238 |
| 51+ | 25.8 | 3 092 | 28.0 | 4 473 | 25.5 | 24 144 |
| Total | 100.0 | 11 982 | 100.0 | 15 975 | 100.0 | 94 656 |
| Area | | | | | | |
| Rural | 76.9 | 9 212 | 68.9 | 11 010 | 64.9 | 61 421 |
| Urban | 23.1 | 2 769 | 31.1 | 4 961 | 35.1 | 33 235 |
| Total | 100.0 | 11 981 | 100.0 | 15 971 | 100.0 | 94 656 |
| Education | | | | | | |
| Illiterate | 13.6 | 1 628 | 10.9 | 1 743 | 8.2 | 7 757 |
| Literate | 22.7 | 2 714 | 22.1 | 3 524 | 18.3 | 17 301 |
| Primary school | 26.4 | 3 164 | 26.7 | 4 255 | 25.6 | 24 189 |
| Secondary school | 23.8 | 2 846 | 25.4 | 4 044 | 27.6 | 26 159 |
| High school | 7.7 | 923 | 10.7 | 1 701 | 10.7 | 10 145 |
| Above high school | 5.9 | 703 | 4.3 | 679 | 9.6 | 9 067 |
| Total | 100.0 | 11 978 | 100.0 | 15 946 | 100.0 | 94 618 |
| Occupation | | | | | | |
| White collar | 17.5 | 1 831 | 21.0 | 2 940 | 28.0 | 22 316 |
| Manual labour | 82.3 | 8 587 | 78.9 | 11 024 | 71.5 | 56 932 |
| Others | 0.2 | 20 | 0.1 | 10 | 0.5 | 422 |
| Total | 100.0 | 10 438 | 100.0 | 13 974 | 100.0 | 79 670 |
| Food expenditure level | | | | | | |
| Level 1 | 16.8 | 2 018 | 15.0 | 2 398 | 17.0 | 16 057 |
| Level 2 | 18.2 | 2 176 | 16.5 | 2 640 | 17.8 | 16 804 |
| Level 3 | 19.8 | 2 377 | 19.0 | 3 028 | 19.6 | 18 537 |
| Level 4 | 21.6 | 2 584 | 22.2 | 3 544 | 22.2 | 20 972 |
| Level 5 | 23.6 | 2 826 | 27.3 | 4 361 | 23.4 | 22 120 |
| Total | 100.0 | 11 981 | 100.0 | 15 971 | 100.0 | 94 490 |

VLSS 1992–93–Vietnamese Living Standard Survey 1992–1993; VLSS 1997–98–Vietnamese Living Standard Survey 1997–1998; VNHS 2001–02–Vietnamese National Health Survey 2001–2002.

pronounced for women than for men, especially among those with lower SES.

Figure 2 shows the relationship between overweight prevalence and food expenditure, in rural and urban areas. In 1992, the prevalence of overweight in rural areas was very low, regardless of income. However, overweight rates in both rural and urban areas increased sharply between 1992 and 2002. By 2002, the prevalence of overweight in urban areas was spreading to the lower SES groups. In contrast, in rural areas only participants in the top level of food expenditures had overweight prevalence in excess of 4% by 2002.

Table 4 shows the influence of SES factors on overweight prevalence in the VNHS 2001–02 data, as determined by a regression model before and after adjusting for covariates. There was a strong gender effect, with women more likely to be overweight than men, adjusting for age, area, education, occupation and food expenditure (adjusted OR = 1.31). Older adults (> 51 years) were more likely to be overweight than were

Table 2 Percentage of overweight (body mass index $\geq 25 \text{ kg m}^{-2}$) by gender and age group. Data from VLSS 1992–93, VLSS 1997–98 and VNHS 2001–02

| Survey | Age group (years) | Percentage of overweight and number of cases | | | |
|----------------|-------------------|--|-------|-------|-------|
| | | Men | | Women | |
| | | % | Cases | % | Cases |
| VLSS 1992–93 | 19–30 | 0.4 | 8 | 0.9 | 21 |
| | 31–50 | 1.3 | 27 | 4.1 | 103 |
| | 51+ | 1.8 | 24 | 3.5 | 60 |
| All age groups | Crude total | 1.1 | 59 | 2.8 | 184 |
| | Age-standardised | 1.2 | | 3.0 | |
| VLSS 1997–98 | 19–30 | 1.0 | 24 | 1.4 | 34 |
| | 31–50 | 4.1 | 126 | 7.1 | 260 |
| | 51+ | 3.6 | 69 | 7.3 | 189 |
| All age groups | Crude total | 3.0 | 219 | 5.6 | 483 |
| | Age-standardised | 3.1 | | 5.5 | |
| VNHS 2001–02 | 19–30 | 2.0 | 232 | 2.3 | 310 |
| | 31–50 | 5.6 | 1086 | 8.0 | 1762 |
| | 51+ | 5.1 | 496 | 8.8 | 1127 |
| All age groups | Crude total | 4.5 | 1814 | 6.6 | 3199 |
| | Age-standardised | 4.4 | | 6.6 | |

VLSS 1992–93–Vietnamese Living Standard Survey 1992–1993; VLSS 1997–98–Vietnamese Living Standard Survey 1997–1998; VNHS 2001–02–Vietnamese National Health Survey 2001–2002.

younger adults (adjusted OR = 3.37). Urban dwellers were more likely to be overweight than rural dwellers (adjusted OR = 1.79). White-collar workers were more likely to be overweight than manual labourers (adjusted OR = 1.95). Higher food expenditure, a proxy for income, was also associated with higher rates of overweight.

In the unadjusted model, higher education was associated with higher overweight prevalence. However, education levels in Vietnam are strongly correlated with urban residence and white-collar employment. After adjusting for the other variables, the relationship between

Table 3 Percentage of overweight (body mass index $\geq 25 \text{ kg m}^{-2}$) by area and age group. Data from VLSS 1992–93, VLSS 1997–98 and VNHS 2001–02

| Survey | Age group (years) | Percentage of overweight and number of cases | | | |
|--------------|-------------------|--|-------|-------|-------|
| | | Rural | | Urban | |
| | | % | Cases | % | Cases |
| VLSS 1992–93 | 19–30 | 0.5 | 18 | 1.1 | 11 |
| | 31–50 | 1.6 | 56 | 6.7 | 74 |
| | 51+ | 1.5 | 36 | 7.0 | 48 |
| | Total | 1.2 | 110 | 4.8 | 133 |
| VLSS 1997–98 | 19–30 | 0.6 | 20 | 2.6 | 38 |
| | 31–50 | 3.1 | 142 | 11.5 | 243 |
| | 51+ | 2.9 | 89 | 12.1 | 169 |
| | Total | 2.3 | 251 | 9.1 | 450 |
| VNHS 2001–02 | 19–30 | 1.6 | 262 | 3.3 | 280 |
| | 31–50 | 4.3 | 1,123 | 11.5 | 1275 |
| | 51+ | 4.3 | 631 | 13.0 | 992 |
| | Total | 3.5 | 2,016 | 9.6 | 2,997 |

VLSS 1992–93–Vietnamese Living Standard Survey 1992–1993; VLSS 1997–98–Vietnamese Living Standard Survey 1997–1998; VNHS 2001–02–Vietnamese National Health Survey 2001–2002.

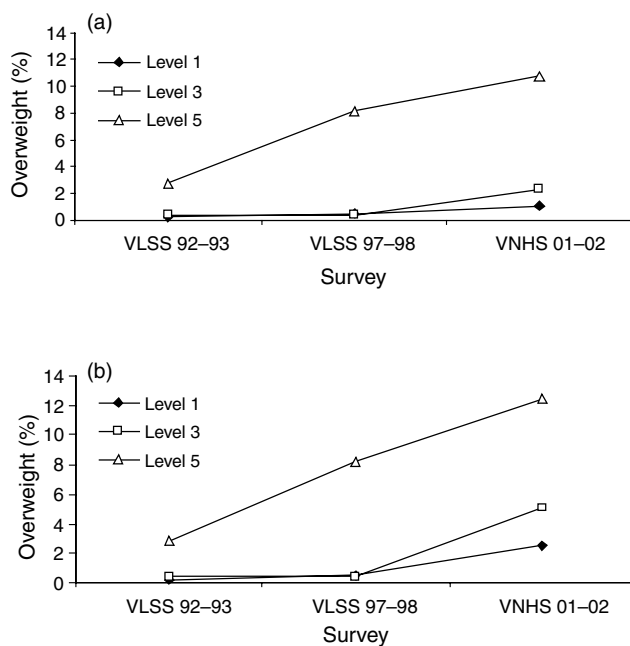


Fig. 1 Percentage of overweight (body mass index $\geq 25 \text{ kg m}^{-2}$) in the first, third and fifth food expenditure levels for men (a) and women (b). Data from the Vietnamese Living Standard Survey 1992–1993 (VLSS 1992–93), the Vietnamese Living Standard Survey 1997–1998 (VLSS 1997–98) and the Vietnamese National Health Survey 2001–2002 (VNHS 2001–02)

overweight and higher educational attainment became inverse, with an adjusted OR of 0.62.

Discussion

The prevalence of overweight in Vietnam more than doubled between 1992 and 2002 (from 2.0 to 5.7%). Significant increases were observed for men and women, in all age groups, and in both urban and rural areas. While the prevalence of overweight was substantially below that observed in middle-income developing nations, let alone the industrialised world, the rapid rate of increase is troublesome¹². It would appear from this and other studies^{6,9,24} that the rising rates of overweight are one undesirable consequence of economic development.

In Vietnam, higher rates of overweight were observed among the more affluent urban residents. In a classic study, Sobal and Stunkard reviewed obesity rates in 130 populations in developed countries and 14 populations in developing countries in relation to SES¹². They concluded that in low-income nations it was the more affluent who were obese, whereas in higher-income nations, less wealthy people were heavier¹². Other studies demonstrated that the socio-economic gradient was steeper and more consistent for women than for men^{6,24,25}. Most recently, Monteiro *et al.*²⁰ reported that in countries with per capita GNP less than \$US 2500, female overweight disproportionately affected the more affluent, whereas the reverse was true in countries with per capita GNP greater than \$US 2500.

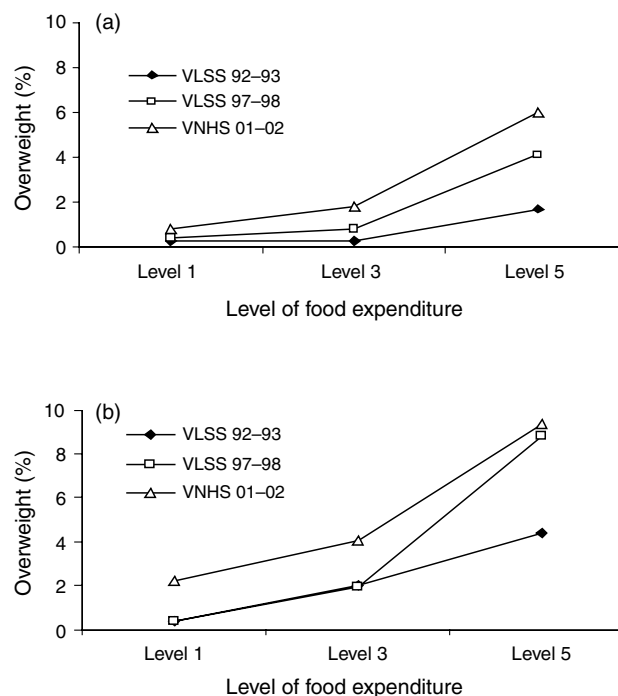


Fig. 2 Percentage of overweight (body mass index $\geq 25 \text{ kg m}^{-2}$) by food expenditure level in rural (a) and urban (b) areas. Data from the Vietnamese Living Standard Survey 1992–1993 (VLSS 1992–93), the Vietnamese Living Standard Survey 1997–1998 (VLSS 1997–98) and the Vietnamese National Health Survey 2001–2002 (VNHS 2001–02)

Higher rates of overweight in Vietnam were positively linked to a number of SES indices. High occupation status in developing countries is associated with higher prevalence of overweight and obesity^{9,24,26}. In Vietnam, white-collar workers were more likely to be overweight than manual labourers. Higher overweight prevalence among white-collar workers is consistent with parallel observations in other low-income developing countries^{7,12,25,27}. For example, in Ghana white-collar jobs were also associated with overweight²¹. Urban dwellers were more likely to be overweight than rural dwellers, after adjusting for other factors. These data are also consistent with numerous other studies, notably those conducted in Brazil^{3,28}.

In developing nations, higher education levels are associated with overweight^{9,24}. In developed nations the reverse is true^{29–31}. In Vietnam, education is highly correlated with white-collar profession, urban residence and higher income. When factors are held constant, education appeared to have a protective effect on overweight, making this finding in Vietnam consistent with what is found in developed nations. While not entirely collinear, education, urban residence and white-collar employment were correlated as is the case in nations at this level of development.

A country in early stages of economic development, Vietnam had a per capita GNP of \$US 430 in 2002¹⁷.

Table 4 Socio-economic factors and overweight in the VNHS 2001–02: a regression model

| Variable | n | Overweight | |
|------------------------|--------|------------------------|-----------------------|
| | | Unadjusted OR (95% CI) | Adjusted OR (95% CI)† |
| Gender | | | |
| Male | 44 254 | 1.00 (ref) | 1.00 (ref) |
| Female | 50 402 | 1.53* (1.44–1.62) | 1.31* (1.21–1.41) |
| Age group (years) | | | |
| 19–30 | 27 274 | 1.00 (ref) | 1.00 (ref) |
| 31–50 | 43 238 | 3.32* (3.03–3.65) | 3.03* (2.70–3.39) |
| 51+ | 24 144 | 3.51* (3.18–3.88) | 3.37* (2.96–3.84) |
| Area | | | |
| Rural | 61 421 | 1.00 (ref) | 1.00 (ref) |
| Urban | 33 235 | 2.93* (2.77–3.11) | 1.79* (1.64–1.95) |
| Education | | | |
| Illiterate | 7 757 | 1.00 (ref) | 1.00 (ref) |
| Literate | 17 301 | 1.62* (1.41–1.87) | 1.07 (0.89–1.30) |
| Primary school | 24 189 | 1.53* (1.33–1.75) | 0.89 (0.74–1.07) |
| Secondary school | 26 159 | 1.44* (1.25–1.65) | 0.70* (0.58–0.84) |
| High school | 10 145 | 1.99* (1.71–2.30) | 0.63* (0.51–0.77) |
| Above high school | 9 067 | 2.74* (2.37–3.17) | 0.62* (0.51–0.76) |
| Current occupation | | | |
| Manual labourer | 56 932 | 1.00 (ref) | 1.00 (ref) |
| White-collar worker | 22 316 | 3.65* (3.42–3.89) | 1.95* (1.78–2.13) |
| Food expenditure level | | | |
| Level 1 | 16 057 | 1.00 (ref) | 1.00 (ref) |
| Level 2 | 16 804 | 1.49* (1.28–1.74) | 1.42* (1.17–1.73) |
| Level 3 | 18 537 | 2.17* (1.88–2.50) | 1.81* (1.50–2.18) |
| Level 4 | 20 972 | 3.51* (3.07–4.00) | 2.71* (2.27–3.24) |
| Level 5 | 22 120 | 7.18* (6.33–8.16) | 4.96* (4.14–5.92) |

VNHS 2001–02 –Vietnamese National Health Survey 2001–2002; OR – odds ratio; CI – confidence interval; ref – reference category.

* Significant at $P < 0.001$.

† Adjusted for all other variables in the table.

In low-income countries (per capita GNP less than \$US 745), membership in lower SES groups provides protection against obesity⁷. In countries such as Thailand⁸, China⁹ and Morocco¹⁰ (GNP less than \$US 2500 per capita), higher rates of overweight were also observed among the more affluent groups.

However, between 1992 and 2002, the per capita GNP of Vietnam almost doubled from \$US 230 to \$US 430^{17,32}. As the national income rose, higher rates of overweight began to be observed even among lower-income women. These observations are consistent with a report by Monteiro *et al.* that the shift towards a higher prevalence of overweight at lower SES occurs at an earlier stage of economic development for women than it does for men⁷.

Higher levels of food expenditures were associated with higher rates of overweight. For each level of food expenditure, women were more likely to be overweight than were men, and urban dwellers had higher rates than rural dwellers. As the prevalence rate of overweight rose with time and as a function of economic development, higher rates began to be observed among the middle-income groups. These observations are consistent with past reports that the shift towards more overweight at lower incomes occurs first for women, as opposed to men^{7,11,21}.

Urbanisation is another index of economic development. As populations shift physically from rural to urban

settings, they alter their dietary and physical activity patterns^{25,33,34}. Parallel surveys conducted in Thailand, Malaysia, Taiwan and other countries have suggested that changes in diet composition and eating habits may be the underlying cause of overweight^{6,8,34,35}. Nutrition transition in developing countries has been associated with increased overweight rates^{8,11,20}. However, published reports suggest that the Vietnamese diet changed little during the 1990s¹⁶. Therefore a drop in physical activity levels may have been the primary cause of the increase in overweight. Lack of physical activity and sedentary lifestyles have been linked to overweight in both the developing and developed world^{6,8,9,31}.

Evidence suggests that the co-morbidities associated with obesity affect Asian populations at a lower BMI than Caucasian populations³⁶. Therefore the WHO Expert Consultation recommends that the definitions of overweight and obesity in Asian populations should be set lower, at BMI of 23.0 and 27.5 kg m⁻², respectively³⁶. However, the same group also recommends that each Asian country decides about these definitions based on evidence of increased co-morbidity risks within its population. In Vietnam evidence for a lower cut-off level has not been established, which led us to use the general international BMI cut-off level of ≥ 25 kg m⁻² for the definition of overweight. Following this higher cut-off

level resulted in a lower prevalence of overweight than if we had used 23.0 kg m^{-2} as the cut-off point. However, our results still successfully illustrated the picture of rising overweight prevalence in Vietnam over the last 10 years.

The dynamics of body weight increasing as a function of gender and SES in developing nations deserves further study. Gender inequalities may contribute to the higher prevalence of overweight in women^{8,9,24}. Undernutrition and overweight can be present within a single family³⁴, suggesting that allocation of family food resources may be an important factor. Qualitative studies conducted in Argentina suggest that low-income women worked longer hours than men, slept less, ate fewer meals, allocated nutritious foods to other family members, and consumed more sugar and bread²². It is possible to view the rising rates of obesity among women as a large-scale problem in women's health.

The present study had several limitations when it comes to assessing body weight, diet and health. First, the sampling methods for the three surveys were not identical. Second, dietary intake records were not available. Measures of physical activity and incomes were not included in either survey. However, the picture that emerges is clear. In Vietnam, the prevalence of overweight is rising among women and men. Currently, higher rates are observed among the higher SES (occupation and income) groups. However, as economic development proceeds, higher rates of overweight are also being observed at lower levels of SES. As Vietnam develops, public health officials should prepare to deal with diseases of both under- and overnutrition. Obesity is no longer a disease of affluence; it is increasingly becoming a global problem affecting the poor.

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