Obesity: an Emerging Health Issue in Kanchanaburi Demographic Surveillance System[1], Thailand

Varachai Thongthai[2]

Abstract

Obesity, which has been a public health concern in developed countries, is also observed in many developing countries. Using data from the Kanchanaburi Demographic Surveillance System, Thailand, the paper analyzes the situation of obesity and overweight and examines the factors affecting them. It hypothesizes that prevalence of obesity and overweight is higher in urban areas and among females. As observed, it is much higher among females than males. Age has positive correlation with obesity and overweight. Being married has a tendency to become obese and overweight. Working in non-agriculture sector indicates tendency to be overweight. Urban residents have more chance to be obese and overweight than rural residents. People with bad eating habit, consuming sweets and greasy food, also contributes to becoming obese and overweight. Multinomial logistic regression analysis supports two hypotheses that living in urban areas and being female have higher chance of becoming obese or overweight.

Introduction

Plumb or slightly overweight was once considered as a sign of wellbeing in the ancient time. It is so because there was always shortage of food due to drought. This perception faded when foods were more available due to agricultural development. Nowadays, overweight and obesity have become a public health concern in most developed countries. The obesity epidemic also spreads to developing countries, especially in urban areas.

With high growth rate of urbanization in Thailand, it is expected that overweight and obesity would be observed. Therefore, it is interesting to know the situation of this phenomenon and its determinants.

Objectives

1. To describe the prevalence and patterns of obesity and overweight.
2. To study the determinants of obesity and overweight.

Body Mass Index

Body Mass Index (BMI) is an index of weight-for-height that is used to classify underweight, normal weight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters. Normal weight ranges between 18.50 to 24.99, those below 18.50 are considered underweight, and those over 25.00 are overweight. Obesity is classified as a BMI of 30.00 or more (WHO, 2000). Obesity is a kind of sickness preceded by being overweight. Therefore, overweight and obese are considered poor health status.

---

[2] Institute for Population and Social Research, Mahidol University

Factors affecting overweight and obesity

Age has positive relationship to overweight and obesity, as age increases, the prevalence of overweight and obesity increase.

Since overweight and obesity are largely dependent on life style, which varies with marital status, married persons tend to have healthy life style as compared to other groups. Therefore, married persons are less likely to become overweight or obese.

Education attainment has negative correlation with overweight and obesity. Besides knowledge in health practice, education reflects economic status.

Urban residents tend to have less activity in daily life. This life style promotes overweight and obesity.

Overweight and obesity are caused by lack of regular exercising. Therefore, persons with regular exercising are less likely to become overweight and obese.

Consumption of unhealthy foods is also the cause of overweight and obesity. Hence, persons with bad eating habit, i.e. consume sweet food, instant noodle, greasy food, and snack, have a tendency to become overweight and obese.

Hypotheses
1. Females tend to be overweight or obese than males.
2. Urban residents have higher chance to be overweight or obese than rural residents.

Data source

The study used data from the fifth round census of the Kanchanaburi Demographic Surveillance System (KDSS) in Thailand. Kanchanaburi is a province in the central region. The census was conducted by the Institute for Population and Social Research, Mahidol University in the period 1st July – 28th August 2004. Respondents consisted of 12,439 households in 100 villages/census blocks, with a total population of 42,938 (Guest et al. 2007). The communities covered both urban and rural areas. Besides household census, all persons aged 15 years old and over were interviewed which consisted of 28,254 respondents.

Weighing scale and measuring tape were used to measure weight and high of all respondents. Besides demographic and socio-economic characteristics, respondents were asked about their health and consumption behavior, i.e. doing exercise and eating habit.

Findings

While there was no age difference between male and female, there were more female than male respondents with estimated sex ratio of 83. The mean age of male was 41.2 years, while mean age of female was 41.5 years. Seven out of ten respondents were currently married, nearly one-fifth were single and one-tenth were ever married (widowed, separated, or divorced). There was higher proportion of single male than single female. On the contrary, higher proportion of female was in ever married category than male (see Table 1).

The majority of respondents had at least primary education, while 45 percent had below primary or no education, and around 14 percent had completed high school or higher. Males were more educated than females. On the one hand, proportion of males who had completed high school was higher than females. On the other hand, proportion of males who had no education was less than females (see Table 1).

Table 1 Percent distribution of population aged 15 and over by characteristics and sex, 2004

Characteristics	Male	Female	Total
Age			
15-19	9.9	8.8	9.3
20-29	17.1	17.1	17.1
30-39	22.4	23.2	22.8
40-49	21.6	21.6	21.6
50-59	13.8	13.9	13.9
60+	15.2	15.4	15.4
Total	100.0	100.0	100.0
(N)	(12,808)	(15,446)	(28,254)
Marital status			
Single	20.1	15.2	17.4
Currently married	73.5	69.0	71.0
Widow/divorce/separate	6.4	15.8	11.5
Total	100.0	100.0	100.0
(N)	(12,808)	(15,446)	(28,254)
Education			
No education	11.7	19.2	15.8
Below primary	27.0	30.8	29.1
Primary	45.1	36.5	40.4
High school	16.2	13.5	14.7
Total	100.0	100.0	100.0
(N)	(12,797)	(15,438)	(28,235)
Occupation			
Agriculture	37.9	29.9	33.5
Employ in agriculture	13.6	11.5	12.5
Non-agriculture	34.4	27.1	30.4
Looking for work	9.3	11.6	10.5
Housewife/student	4.8	20.0	13.1
Total	100.0	100.0	100.0
(N)	(12,808)	(15,446)	(28,254)
Residence			
Urban	19.8	21.3	20.6
Rural	80.2	78.7	79.4
Total	100.0	100.0	100.0
(N)	(12,808)	(15,446)	(28,254)

Nearly half of respondents worked in agricultural sector, less than one-third worked in non-agricultural occupation, one-tenth were looking for work, and slightly more than one-tenth were student or housekeeper. Higher proportion of males was working as one-fifth of females were housewife or student (see Table 1). In terms of residence, only one-fifth of respondents resided in urban areas.

In sum, the respondents were slightly more females, who were in their middle ages. Majority of respondents was married, had primary levels of education, worked in agricultural sector, and lived in rural areas.

Prevalence and patterns

The majority (62%) of population was classified as normal weight. About 15% of them was in underweight category, while 18% was in overweight and 5% was in obesity categories. Although the prevalence of obesity was still low, it was still higher than Japan and South Korea, which had only 3.2% of obesity in both countries (NationMaster 2007).

Higher proportion of females was overweight as compared to males (22% versus 14%). This was exhibited in every age group. The same pattern was also observed for obesity in which 7% of females are obesity as compared to only 3% of males. Age had positive relationship to overweight and obesity, with the exception of the elderly (see Table 2).

Table 2 Percentage distribution of population by BMI, age and sex, 2004

Age	Under weight	Normal	Over weight	Obese	Total	(N)
Male						
15-19	36.3	57.6	4.9	1.3	100.0	(1,263)
20-29	14.8	70.9	10.7	3.7	100.0	(2,183)
30-39	9.7	72.3	15.2	2.8	100.0	(2,865)
40-49	12.0	66.6	18.3	3.1	100.0	(2,755)
50-59	12.5	65.0	18.9	3.5	100.0	(1,763)
60+	23.6	63.8	11.1	1.6	100.0	(1,923)
Total	16.2	67.1	14.0	2.8	100.0	(12,752)
Female						
15-19	31.3	60.3	6.2	2.3	100.0	(1,359)
20-29	17.9	63.0	14.2	5.0	100.0	(2,633)
30-39	9.1	59.7	23.5	7.7	100.0	(3,571)
40-49	6.6	56.0	28.3	9.1	100.0	(3,335)
50-59	10.6	53.5	27.2	8.6	100.0	(2,139)
60+	21.6	52.4	20.4	5.5	100.0	(2,318)
Total	14.1	57.6	21.5	6.8	100.0	(15,355)

Married people had highest proportion of overweight (20%), followed by those who were widow/divorce/separate (18%). Only 10% of single people was in overweight category. However, the proportions of obesity were not much different

among them. Obesity was observed in only 5% of married people, 5% of widow/divorce/separate population, and 4% of single people (see Table 3).

Table 3 Percentage distribution of population by BMI and characteristic, 2004

Characteristic	Under weight	Normal	Over weight	Obese	Total	(N)
Marital status						
Single	25.4	61.3	9.6	3.6	100.0	(4,905)
Currently married	12.1	62.5	20.1	5.3	100.0	(20,003)
Widow/divorce/separate	17.8	58.5	18.3	5.4	100.0	(3,199)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)
Education						
No education	19.9	61.5	14.5	4.1	100.0	(4,404)
Below primary	11.0	61.0	21.9	6.2	100.0	(8,182)
Primary	16.3	62.0	17.1	4.6	100.0	(11,360)
High school	14.6	63.6	16.9	4.9	100.0	(4,143)
Total	15.1	61.9	18.1	5.0	100.0	(28,089)
Occupation						
Agriculture	13.0	64.9	18.0	4.1	100.0	(9,456)
Employ in agriculture	17.4	66.0	12.9	3.7	100.0	(3,516)
Non-agriculture	10.7	61.4	21.7	6.2	100.0	(8,573)
Looking for work	22.9	55.8	16.1	5.1	100.0	(2,857)
Housewife/student	22.2	55.8	16.2	5.8	100.0	(3,705)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)
Residence						
Urban	11.7	59.3	22.1	7.0	100.0	(5,794)
Rural	15.9	62.5	17.0	4.5	100.0	(22,313)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)

There was no clear pattern of overweight or obesity in term of educational attainment. Respondents who had no schooling had the least proportion of overweight and obesity (14% and 4%, respectively). But the highest proportion of overweight (22%) or obesity (6%) was observed among those who had below primary education. For respondents who had at least primary education or who had high school diploma or higher, the proportions of overweight were 17% and 18%, respectively, while the proportion of obesity was the same at 5%.

In terms of occupation, proportion of overweight was highest among those who were in non-agriculture sector (22%) and lowest among employees in agriculture (13%). The proportion of overweight ranged between 16% to 18% for those respondents who were housewife/student, looking for work or in agriculture sector. The pattern of obesity was the same as overweight. The highest was among non-

agriculture sector (6%) and lowest among employee in agriculture (4%), while other groups were in between.

It is clear that urban residents tend to be overweight and obese as compared to rural residents. The urban residents had higher proportion of overweight and obese (22% and 7%, respectively). On the contrary, only 17% of rural residents was overweight and 4% was obese.

Determinants

Personal behavior, such as exercising and eating habit, is certainly a determining factor of being overweight or obese. Exercising was not the norm of the population, as only 12% of population exercised regularly. Larger number of males exercised more than females (18% for males and 8% for females). Younger people exercised more than older people, especially people aged 15-19 years old in which 41% exercised regularly. As age increased, fewer people exercised regularly. There was less than 10% of people aged above 30 years old who exercised on a regularly basis. Nevertheless, the proportion of overweight and obesity were lower for those who exercised regularly, as compared to those who did not do exercise (see Table 4).

Table 4 Percentage distribution of population by BMI and habit, 2004

Habit	Under weight	Normal	Over weight	Obese	Total	(N)
Exercise						
Yes	17.9	64.2	13.6	4.3	100.0	(3,480)
No	14.7	61.5	18.7	5.1	100.0	(24,627)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)
Sweet						
Yes	15.1	60.9	18.1	6.0	100.0	(5,363)
No	15.1	62.1	18.1	4.8	100.0	(22,744)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)
Instant noodle						
Yes	18.6	63.1	13.7	4.6	100.0	(3,073)
No	14.6	61.7	18.6	5.1	100.0	(25,034)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)
Greasy food						
Yes	14.2	61.2	18.7	6.0	100.0	(4,497)
No	15.2	62.0	18.0	4.8	100.0	(23,610)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)
Snack						
Yes	20.3	61.1	13.9	4.7	100.0	(4,800)
No	14.0	62.0	18.9	5.1	100.0	(23,307)
Total	15.1	61.9	18.1	5.0	100.0	(28,107)

Less than one-fifth of population reported that they had habit of eating sweet food, instant noodle, greasy food or snack. These eating habits were reported by equally proportion of males and females. Sweet food and snacks were the most popular food, as 18% of population reported of consuming them regularly. About 16% of population consumed greasy food and about 11% of them had a habit of consuming snacks.

People who had a habit of eating sweet had a tendency to be obese. Those who consumed grease food regularly also had a tendency to be overweight and obese. However, people consuming instant noodle and snack regularly tended to be underweight instead (see Table 4).

Multivariate analysis

The results of multinomial logistic regression seem to confirm the above observations. All variables included in the model were statistically significant contributing factors of becoming overweight or obese, except exercising and eating snacks.

As seen in Table 5, age had positive relationship with overweight and obesity, except at the very old age (60+). Female tended to be overweight and obese than male and married people had higher odds of becoming overweight.

People with primary education tended to be overweight and obese than people with high school. Those who had below primary level of education also tended to be obese than high school graduates. However, people who never attended schooling tended not to become overweight but underweight.

Although exercise had no correlation with overweight and obesity, urban residents tended to be overweight and obese than rural residents.

Eating sweet and greasy foods increased the chance of becoming overweight and obese, but eating snack had no effect on overweight and obesity. However, people who were regularly eating instant noodle were statistically less likely to become overweight as compared to those who did not eat.

In sum, the two hypotheses were accepted. Urban residents had 1.2 times higher than rural residents in becoming overweight and 1.4 times higher in becoming obese. At the same time, females had nearly twice the chance of becoming overweight and nearly three times the chance of becoming obese as compared to male counterparts.

Table 5 Odds ratio of multinomial logistic regression of underweight, overweight, and obesity compare to normal weight, 2004

Variables	Underweight	Overweight	Obesity
Age (ref: 15-19)			
20-29	0.5842**	1.7405**	2.5583**
30-39	0.3767**	2.7422**	3.4869**
40-49	0.3955**	3.6875**	4.4878**
50-59	0.5112**	3.7667**	4.7015**
60+	0.8855	2.7678**	2.6428**
Female (ref: Male)	0.9079*	1.8835**	2.8952**
Marital status (ref: Divorce/widow/separate)			-
Single	1.3333**	0.9044	1.1964
Married	0.8609*	1.2341**	1.1746
Education (ref: High school)			-
No schooling	1.2635**	0.7874**	0.9198
Below primary	0.9746	1.0795	1.2820*
Primary	0.9460	1.1591**	1.2441*
Occupation (ref: Housewife)			
Agriculture	0.7110**	0.8479**	0.6364**
Employee in agriculture	0.9097	0.6520**	0.5916**
Non agriculture	0.6895**	1.1169	0.9934
Looking for work	0.9874	0.9656	1.1143
Urban (ref: Rural)	0.7621**	1.2159**	1.4002**
Exercise (ref: Not exercise)	0.7742**	0.9637	1.0754
Eat sweet food (ref: Not eat sweet food)	1.0228	1.0933*	1.3388**
Eat instant noodle (ref: Not eat instant noodle)	1.0776	0.8618*	0.9119
Eat greasy food (ref: Not eat greasy food)	0.9513	1.1147*	1.2683**
Eat snacks (ref: Not eat snacks)	1.1826**	0.9777	1.0613

*   significant at 0.05

**   significant at 0.01

Conclusion

The population in KDSS had more females than males who were in their middle age. The majority of them were married, had primary education, living in rural areas, and working in agricultural sector.

Prevalence of overweight and obesity was higher among females than males. Age had positive correlation with overweight and obesity. Being married had a tendency to become overweight and obese. Working in non-agriculture sector indicated tendency to be overweight. Urban residents had more chance to be overweight and obese than rural residents.

Since only one-fifth of population doing exercise regularly, therefore it had no effects on BMI. However, bad eating habit, consuming sweets and greasy food regularly, indicated increased the chance of becoming overweight or obese. The hypotheses that living in urban areas and being female have higher chance of becoming overweight or obese were accepted.

As urban population is increasing, it should be expected that overweight and obesity would become public health problem in the future. Therefore, the program promoting healthy life style should be encouraged, especially among females and in urban areas.

References

Guest, Philip, Sureeporn Punpuing, and Aree Jampaklai, eds. 2007. *Report of Round 5 Census (2004).* Kanchanaburi Project, Institute for Population and Social Research, Mahidol University.

NationMaster. 2007. *Health Statistics: Obesity by country.* http://www.nationmaster.com/graph/ hea_obe-health-obesity. (accessed 30th March 2007).

World Health Organization (WHO). 2000. *Obesity Preventing and Managing the Global Epidemic.* Report of WHO Consultation on Obesity.