
PUBLIC HEALTH RESEARCH

Prevalence and Socio-Demographic Determinant of Overweight and Obesity among Malaysian Adult

Ahmad Ali Zainuddin^{1,2*}, Mala A Manickam², Azli Baharudin², Rusidah Selamat³, Kee Chee Cheong⁴, Noor Ani Ahmad², Hatta Mutalip², Rashidah Ambak², Cheong Siew Man², Mohamad Hasnan Ahmad², Safiah Md Yusof¹ and Tahir Aris²

¹ Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, Selangor, Malaysia.

² Institute for Public Health, Ministry of Health, Kuala Lumpur, Malaysia.

³ Nutrition Divisions, Ministry of Health, Putrajaya, Malaysia.

⁴ Institute for Medical Research, Ministry of Health, Jalan Pahang, Kuala Lumpur, Malaysia.

*For reprint and all correspondence: Ahmad Ali Zainuddin, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, 42300 Puncak Alam, Selangor, Malaysia.

Email: ahmadali@moh.gov.my

ABSTRACT

Received	24 June 2015
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Introduction	Overweight and obesity is a major public health problem in Malaysia. This study aims to determine the prevalence of overweight and obesity among the Malaysian adult population and their association with socio-demographic characteristics (gender, ethnic, and age groups).
Methods	A total of 17,257 adults aged 18 years and older (8,252 men, 9,005 women) were assessed for BMI status, with a response rate of 97.8%, through a household survey from the National Health and Morbidity Survey (NHMS), conducted in all states of Malaysia in 2011.
Results	All socio-demographic factors were consistently associated with higher chance of being overweight (except gender and location) and obesity (except location and household income). The identified risk of overweight were Indian (aOR: 1.8, 95% CI: 1.2-2.8), aged 50-59 years (aOR: 2.8, 95% CI: 2.0-3.9), widower (aOR: 1.6, 95% CI: 1.3-2.0), subject with secondary education (aOR: 1.2, 95% CI: 1.0-1.4), Homemaker/unpaid worker (aOR: 1.3, 95% CI: 1.1-1.4), and with high household income group (aOR: 1.3, 95% CI: 1.2-1.6). The identified risk of obesity were women (aOR: 1.4, 95% CI: 1.2-1.6), Indian (aOR: 1.7, 95% CI: 0.9-3.2), aged 30-39 years (aOR: 3.6, 95% CI: 2.4-5.5), widower (aOR: 1.2, 95% CI: 0.9-1.6), subjects with primary education (aOR: 1.2, 95% CI: 0.9-1.6), Homemaker/unpaid worker (aOR: 1.3, 95% CI: 1.1-1.6), and with middle household income group (aOR: 1.3, 95% CI: 1.2-1.6).
Conclusions	Our data indicate a high prevalence of overweight and obesity in the population. Several sociodemographic characteristics are associated with both overweight and obesity. This study highlights the serious problem of overweight and obesity among Malaysia adults. Documentation of these problems may lead to research and policy agendas that will contribute both to our understanding and to the reduction of these problems.
Keywords	Overweight - obesity - adult - Malaysia.

INTRODUCTION

Overweight and obesity are common health conditions and their prevalence is increasing globally.^{1,2} During the past two decades, Malaysia has witnessed a dramatic increase in the prevalence of overweight and obesity, which has become a public health crisis.^{3,4} The national prevalence of overweight among Malaysian adult population has doubled from 16.6% in 1996 to 29.1% in 2006 but the rate of increment has slowed down to 29.4% in 2010.^{3,4,5} Compared with 1996, there was a 4-fold increase in the prevalence of obesity from 4.4% in 1996 to 14.0% in 2006. The series of NHMS studies are comparable as the same indicator, that is BMI and similar cut-off points have been used to report the magnitude of nutritional status.

Overweight and obesity is associated with an increased incidence of cardiovascular disease, type 2 diabetes mellitus, hypertension, stroke, dyslipidemia, osteoarthritis and some cancers.⁶ The burden of disease associated with overweight and obesity appears to be considerably higher among ethnic minorities and among individuals of lower socioeconomic status.⁷ With continued urbanisation and improved socioeconomic status, and adoption of more sedentary lifestyle and unhealthy dietary habits, obesity is now a leading public health concern even among the rural communities, replacing the traditional public health problems such as malnutrition and infectious disease.⁸ Evidence showed a greater risk for overweight and obesity among woman compared with men. Based on the highest-quality studies done in Malaysia, overweight and obesity levels were highest among adults 40-59 years old. Overweight level was highest among Indians, followed by Malays, Chinese and Aborigines, with less consistency across studies on the order of risk or obesity by ethnicity.⁹

This study was undertaken to determine the prevalence of overweight and obesity among the Malaysian adult population and their association with socio demographic characteristics (gender, ethnic and age group).

METHODS

Study design and sampling method

This cross-sectional population-based study employed a two-stage stratified sampling to select representative samples for Malaysian adults aged 18 years and older. The stratifications were performed by states and urban/rural localities. The Primary Sampling Units (PSUs) are Enumeration Blocks (EBs) provided by the Malaysian Department of Statistics (DOS) according to the 2010 census. A total of 794 EBs, which composed of 484 urban EBs and 310 rural EBs were systematically selected from the total EBs in Malaysia via probability-proportional-to-size sampling technique. Subsequently, 12 living

quarters (LQs) or Secondary Sampling Units (SSUs) were randomly selected from each selected EB and finally, all households and eligible household members within the selected LQ were included in the sample. A total of 9,528 LQs were selected through a two stage random sampling design proportionate to population size throughout all states in Malaysia to determine the nutritional status of individuals aged 18 years and older. A total of 17,257 individuals aged 18 years and older who resided in the selected LQs were successfully measured for body weight, and standing height based on a standard procedure¹⁰ by trained fieldworkers.

All eligible respondents had given their written consent for participation before they were interviewed. The study protocol (NMRR-10-757-6837) was approved by the Medical Review and Ethics Committee (MREC), Ministry of Health Malaysia.

Data Collection

The data collection was carried out by trained interviewers via face-to-face interview using a bilingual (Malay and English languages) pre-coded questionnaire from April 2011 to November 2011. A pilot study was carried out to test questionnaires, field logistics and central monitoring activities in three districts (Kelang, Sepang and Kuala Lumpur) were done two months prior to the actual nationwide survey to ensure its validity. All interviewers were trained at the central level. Repeated visits of up to three times were carried out to increase the response rate, both at the household and individual level. A non-responder was classified as a household member who did not respond to any question in the questionnaire. Written informed consent was obtained from all participants prior to the interview. The study protocol was approved by the Medical Review and Ethics Committee (MREC), Ministry of Health Malaysia.

The body weight of each subject was measured twice using an electronic digital weighing scale (TANITA 319). The subject was weighed barefooted with minimum clothing and weight was recorded to the nearest 0.1 kg. The height of the subject was also measured twice using SECA Bodymeter 208, to the nearest 0.1 cm. Both body weight and height were measured using the method as described in the technical manual of NHMS 2011.¹⁰ The reported body weight and height were the average values from two readings.

A study on reliability and validity of all anthropometric measurements was carried out to determine the precision of the instruments and measurements. Weight and height measurements were tested against the relative gold standard equipment, that is, the SECA beam balance.¹¹

Data Management and Analysis

Centralised data entry and data cleaning were carried out at the Institute for Public Health using a web-based system that allowed simultaneous multiple data entry. The SPSS version 19.0 with add-on complex sample analysis was used to analyse the data after the adjustment for stratification using post-stratified weights. Descriptive statistics was used to illustrate the prevalence of overweight and obesity by socio-demographic variables.

Household income was categorised based on income class for lower 40% (less than RM2300), middle 40% (between RM2300 to RM5599) and the high 20% (\geq RM5600) according of Tenth Malaysia Plan (RMK10) classification¹². Ethnically, the respondents were classified as Malay, Chinese, Indian, Indigenous (Aborigines, Iban, Kadazan, Dusun, Bidayuh, Melanau, Other Bumiputra Sabah, and Other Bumiputra Sarawak) and Others (Other Asian, European, American, African, and Australasian). Their age were categorised into 10 years intervals.

The BMI was calculated by dividing weight in kilograms by height in meters squared. The BMI cut-off point recommended by the World Health Organization¹ based on recommendation Expert Committee on Physical Status was used to determine overweight and obesity.

Simple logistic regression was applied to examine the associations between overweight, obesity status and the socio-demographic characteristics of the respondents. The respondents were divided into two groups according to whether the respondents are overweight ($\geq 25\text{kg/m}^2$) or not and obese ($\geq 30\text{kg/m}^2$) or not, then to draw a picture to those groups by testing the relationship between each of the demographic characteristics of the respondents and their overweight and obesity prevalence. Multiple logistic regression analysis was conducted using STATA v.11 and was adjusted for sample design, non-response and post-stratification by age, race and gender. All statistical tests were done at 95% confidence interval (CI) and the estimate was presented as adjusted odds ratio.

The study was funded by the Ministry of Health Malaysia and ethical approval was obtained from the Medical Research and Ethics Committee, Ministry of Health Malaysia.

RESULTS

A total of 17,257 adults aged 18 years and older (8,252 men, 9,005 women) were measured for BMI status, with a response rate of 97.8%. Four-

hundred-and-forty-seven who did not complete the measurement were excluded from the analysis. The characteristics of the NHMS 2011 respondents are shown in the Table 1. Majority of the subject were in the age group of 20 to 29 years (22.8%) and from Malay (56.7%) ethnicity. Most of them were married (68.4%), working in the private sector (35.2%), had a lower household income group (45.6%) and majority had secondary (46.4%) education. The estimated population from this survey was representative of the population of Malaysia in 2010.¹³

Overall, the prevalence of overweight did not differ among the males and females but obesity was more pronounced among females. Indians took the lead in being overweight and obese and followed by the Malays and the least being the Chinese. The prevalence of overweight and obesity increased until the age group of 50 to 59 years old before decreased in age group of 60 to 69 years old and above 70 years old. Overweight and obesity were more prevalent among the widower and divorcee and the lower education populations. The unpaid workers had higher prevalence of overweight, where else, homemakers, government employees, retirees and unpaid workers were obese.

The national prevalence of overweight and obesity among adults were 29.4% (95% CI: 28.4-30.4) and 15.1% (95% CI: 14.3-15.9) respectively.⁵ Table 2 presents the association between the prevalence of overweight and socio-demographic variables of respondents. Overall, the prevalence of overweight (BMI $\geq 25\text{kg/m}^2$) was 44.5% (95% CI: 43.2-45.7). There was no difference in the prevalence of overweight between gender and location. By ethnicity, the highest prevalence were among Indian (aOR: 1.8, 95% CI: 1.2-2.8) and Malay (aOR: 1.8, 95% CI: 1.2-2.7) as compared to others. The prevalence of overweight increased steadily with age until the age of 50 to 59 years, after which the prevalence declined. Malaysians had a higher risk of overweight (aOR: 1.5, 95% CI: 1.0-2.1) compared to non-Malaysians. With regard to marital status, widows/widowers/divorcees had a higher risk of overweight (aOR: 1.6, 95% CI: 1.3-2.0) compared to others. The odds ratios for being overweight were found to be higher among those with lower education. By occupational status, homemakers or unpaid workers had the highest prevalence of overweight compared to other occupation. Among the household income categories, prevalence of overweight was higher among high income group.

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Table 1 Demographic characteristic of Respondents

Characteristics	n (%)		
	Men (n=8252)	Women (n=9005)	Total (n=17257)
Ethnicity			
Malay	4697 (57.0)	5096 (56.6)	9793 (56.7)
Chinese	1609 (19.4)	1756 (19.5)	3360 (19.5)
Indian	631 (7.6)	764 (8.5)	1395 (8.1)
Other Bumiputra	756 (9.2)	864 (9.6)	1620 (9.4)
Others	564 (6.8)	525 (5.8)	1089 (6.3)
Age Group (years)			
18-19	398 (4.8)	368 (4.1)	766 (4.4)
20-29	1995 (24.2)	1933 (21.5)	3928 (22.8)
30-39	1643 (19.9)	1817 (20.2)	3460 (20.1)
40-49	1642 (19.9)	1902 (21.1)	3544 (20.5)
50-59	1394 (16.9)	1673 (18.6)	3067 (17.8)
60-69	802 (9.7)	785 (8.7)	1587 (9.2)
≥70	378 (4.6)	527 (5.8)	905 (5.2)
Location			
Urban	4732 (57.3)	5359 (59.5)	10091 (58.5)
Rural	3520 (42.7)	3646 (40.5)	7166 (41.5)
Citizenship			
Malaysian	7688 (93.3)	8465 (94.1)	16153 (93.7)
Non Malaysian	555 (6.7)	528 (5.9)	1083 (6.3)
Marital Status			
Single	2295 (27.8)	1825 (20.3)	4120 (23.9)
Married	5766 (69.9)	6034 (67.0)	11800 (68.4)
Widow/widower/divorcee	191 (2.3)	1142 (12.7)	1333 (7.7)
Education level			
None	328 (4.0)	956 (10.7)	1284 (7.5)
Primary	2008 (24.7)	2163 (24.3)	4171 (24.5)
Secondary	3990 (49.1)	3919 (44.0)	7909 (46.4)
Tertiary	1800 (22.2)	1870 (21.0)	3670 (21.6)
Occupation			
Government/Semi-government	1058 (14.0)	980 (12.1)	2038 (13.1)
Private	3325 (44.1)	2172 (26.9)	5497 (35.2)
Self-employed	2327 (30.9)	1197 (14.8)	3524 (22.6)
Homemaker/unpaid worker	99 (1.3)	2890 (35.8)	2989 (19.1)
Retiree	727 (9.7)	840 (10.4)	1567 (10.0)
Household income			
Lower	3529 (42.8)	4332 (48.1)	7861 (45.6)
Middle	3280 (39.7)	3220 (35.8)	6500 (37.7)
High	1443 (17.5)	1453 (16.1)	2896 (16.8)

Table 2 Prevalence of overweight by socio-demographic variables.

Variables	n	Overweight*		
		Prevalence (95% CI)	OR (95% CI)	aOR [#] (95% CI)
Overall	7903	44.5 (43.2-45.7)		
Gender				
Male	3559	43.6 (42.0-45.3)		1.0 ^r
Female	4344	45.4 (43.8-47.0)	1.1 (1.0-1.2)	
Ethnicity				

Malay	4879	49.8 (48.3-51.2)	2.7 (2.2-3.5)	1.8 (1.2-2.7)
Chinese	1249	37.3 (35.0-39.6)	1.6 (1.3-2.1)	0.9 (0.6-1.4)
Indian	721	51.3 (47.8-54.8)	2.9 (2.2-3.9)	1.8 (1.2-2.8)
Other Bumiputra	706	43.7 (39.4-48.0)	2.1 (1.6-2.9)	1.5 (0.9-2.3)
Others	348	26.6 (22.3-31.4)	1.0 ^r	1.0 ^r
Age Group (years)				
18-19	184	24.0 (20.3-28.1)	1.0 ^r	1.0 ^r
20-29	1295	32.7 (30.7-34.8)	1.5 (1.2-1.9)	1.4 (1.1-1.9)
30-39	1694	48.3 (45.9-50.7)	3.0 (2.4-3.7)	2.2 (1.6-3.0)
40-49	1945	55.0 (52.7-57.2)	3.9 (3.1-4.9)	2.7 (2.0-3.8)
50-59	1732	55.8 (53.4-58.1)	4.0 (3.2-5.0)	2.8 (2.0-3.9)
60-69	755	51.1 (47.6-54.5)	3.3 (2.6-4.3)	2.4 (1.7-3.5)
≥70	298	35.9 (31.3-40.8)	1.8 (1.3-2.4)	1.3 (0.9-1.9)
Location				
Urban	4625	44.7 (43.2-46.3)	1.0 (0.9-1.1)	
Rural	3278	43.8 (41.9-45.7)	1.0 ^r	
Citizenship				
Malaysian	7576	46.1 (44.9-47.3)	2.2 (1.8-2.8)	1.5 (1.0-2.1)
Non Malaysian	329	27.6 (23.5-32.1)	1.0 ^r	1.0 ^r
Marital Status				
Single	1240	30.4 (28.5-32.5)	1.0 ^r	1.0 ^r
Married	6027	50.3 (48.8-51.8)	2.3 (2.1-2.6)	1.4 (1.3-1.7)
Widow/widower/divorcee	633	49.9 (46.1-53.7)	2.3 (1.9-2.7)	1.6 (1.3-2.0)
Education level				
None	544	43.0 (39.4-46.7)	1.1 (0.9-1.3)	1.0 (0.8-1.3)
Primary	1957	45.1 (42.7-47.4)	1.2 (1.0-1.3)	1.1 (1.0-1.3)
Secondary	3748	46.2 (44.6-47.9)	1.2 (1.1-1.4)	1.2 (1.0-1.4)
Tertiary	1580	41.4 (39.1-43.7)	1.0 ^r	1.0 ^r
Occupation				
Government/Semi-government	1117	54.3 (51.1-57.5)	1.8 (1.6-2.1)	1.2 (1.0-1.4)
Private	2222	39.5 (37.7-41.4)	1.0 ^r	1.0 ^r
Self-employed	1688	47.4 (45.0-49.8)	1.4 (1.2-1.5)	1.1 (0.9-1.2)
Homemaker/unpaid worker	1641	52.7 (50.2-55.1)	1.7 (1.5-1.9)	1.3 (1.1-1.4)
Retiree	699	46.8 (43.1-50.6)	1.3 (1.1-1.6)	1.1 (0.9-1.3)
Household income				
Lower	3457	42.6 (40.9-44.3)	1.0 ^r	1.0 ^r
Middle	3094	45.8 (43.9-47.8)	1.1 (1.0-1.3)	1.2 (1.1-1.3)
High	1352	45.8 (42.8-48.8)	1.1 (1.0-1.3)	1.3 (1.2-1.6)

* Overweight defined as BMI $\geq 25\text{kg/m}^2$

^r Reference group

[#] Adjusted for all variables

Table 3 Prevalence of obesity by socio-demographic variables.

Variables	obese*			
	n	Prevalence (95% CI)	OR (95% CI)	aOR [#] (95% CI)
Overall	2750	15.1 (14.3-15.9)		
Gender				
Male	1021	12.7 (11.7-13.6)	1.0 ^r	1.0 ^r
Female	1729	17.6 (16.5-18.9)	1.5 (1.3-1.6)	1.4 (1.2-1.6)
Ethnicity				
Malay	1843	18.7 (17.7-19.9)	3.5 (2.3-5.2)	1.5 (0.8-2.7)
Chinese	324	9.7 (8.4-11.2)	1.6 (1.1-2.5)	0.7 (0.4-1.3)
Indian	282	20.5 (17.4-24.0)	3.9 (2.5-6.1)	1.7 (0.9-3.2)

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Other Bumiputra	210	12.7 (10.2-15.7)	2.2 (1.4-3.6)	0.9 (0.5-1.7)
Others	91	6.2 (4.3-8.9)	1.0 ^r	1.0 ^r
Age Group (years)				
18-19	75	9.9 (7.6-12.9)	1.7 (1.1-2.5)	2.3 (1.3-4.1)
20-29	501	13.0 (11.7-14.5)	2.3 (1.6-3.1)	3.1 (2.0-4.8)
30-39	631	16.4 (14.9-18.1)	3.0 (2.2-4.1)	3.6 (2.4-5.5)
40-49	650	17.4 (15.8-19.2)	3.2 (2.3-4.4)	3.5 (2.3-5.4)
50-59	598	18.2 (16.4-20.1)	3.4 (2.4-4.6)	3.4 (2.3-5.1)
60-69	232	15.5 (13.2-18.1)	2.8 (1.9-3.9)	2.7 (1.9-4.0)
≥70	63	6.2 (4.7-8.2)	1.0 ^r	1.0 ^r
Location				
Urban	1631	15.3 (14.3-16.4)	1.1 (0.9-1.2)	
Rural	1119	14.4 (13.3-15.6)	1.0 ^r	
Citizenship				
Malaysian	2644	16.0 (15.1-16.8)	2.9 (2.1-4.2)	2.6 (1.5-4.5)
Non Malaysian	85	6.1 (4.3-8.4)	1.0 ^r	1.0 ^r
Marital Status				
Single	479	11.9 (10.6-13.4)	1.0 ^r	1.0 ^r
Married	2044	16.3 (15.4-17.3)	1.4 (1.3-1.7)	1.1 (0.9-1.3)
Widow/widower/divorcee	225	17.2 (14.7-19.9)	1.5 (1.2-1.9)	1.2 (0.9-1.6)
Education level				
None	173	12.5 (10.3-15.2)	1.0 ^r	1.0 ^r
Primary	676	15.2 (13.7-16.8)	1.2 (1.0-1.6)	1.2 (0.9-1.6)
Secondary	1352	16.0 (14.9-17.2)	1.3 (1.1-1.7)	1.1 (0.8-1.4)
Tertiary	534	14.1 (12.6-15.7)	1.1 (0.9-1.5)	0.9 (0.7-1.2)
Occupation				
Government/Semi-government	408	20.1 (17.8-22.6)	1.7 (1.4-2.1)	1.3 (1.1-1.6)
Private	724	12.8 (11.6-14.0)	1.0 ^r	1.0 ^r
Self-employed	550	14.8 (13.2-16.6)	1.2 (1.0-1.4)	1.1 (0.9-1.3)
Homemaker/unpaid worker	667	20.9 (19.0-22.9)	1.8 (1.5-2.1)	1.3 (1.1-1.6)
Retiree	218	13.9 (11.8-16.3)	1.1 (0.9-1.4)	1.3 (1.0-1.7)
Household income				
Lower	1204	14.1 (13.0-15.2)	1.0 ^r	
Middle	1091	16.0 (14.7-17.3)	1.2 (0.9-1.3)	
High	455	15.4 (13.4-17.6)	1.1 (0.9-1.3)	

* Obese defined as BMI ≥ 30 kg/m²

^r Reference group

Adjusted for all variables

Table 3 presents the association between the prevalence of obese and socio-demographic variables of respondents. The prevalence was higher in women (17.6%) than in men (12.7%) (aOR: 1.4, 95% CI: 1.2-1.6). By ethnicity, the highest prevalence were among Indian (aOR: 1.7, 95% CI: 0.9-3.2) and Malay (aOR: 1.5, 95% CI: 0.8-2.7) compared to others. The age groups between 40-49 (aOR: 2.7, 95% CI 2.0-3.8) and 50-59 (aOR: 2.8, 95% CI 2.0-3.9) had the likelihood of being overweight in comparison with being obese which was seen mostly in the age group between 30-39 (aOR: 3.6, 95% CI 2.4-5.5) followed by age group 40-49 (aOR: 3.5, 95% CI 2.3-5.4) and 50-59 (aOR: 3.4, 95% CI 2.3-5.1). The odd ratio for being obese increased steadily with age until the age of

30 to 39 years, after which the prevalence declined. The Malaysian (aOR: 2.6, 95% CI: 1.5-4.5) had higher risk compared to non-Malaysian. With regard to marital status, widow/widower/divorcee had the higher risk of overweight (aOR: 1.2, 95% CI: 0.9-1.6) compared to others. The odd ratios for being obese were found to be higher among those with lower education. By occupational status, private worker were has inverse relationship with the prevalence of obesity. There was no difference in the prevalence of obesity between location and household income.

DISCUSSION

In general, all socio-demographic factors were associated with higher risk of being overweight (except gender and location) and obese (except location and household income). The prevalence of overweight did not differ among the males and females but obesity was more pronounced in the females. This finding was similar with several studies conducted globally. Studies in the middle-east found similar obesity dominance among females such as Saudi Arabia (24% in females and 16 % in males), Oman (23.8% in females and 16.7% in males) and Lebanon (18.8% in females and 14.3% in males).¹⁴ Another study in China was also exhibiting prevalence of overweight and obesity were 24.1% and 2.8% in men and 26.1% and 5.0% in women.^{15,16}

Indians took the lead in being overweight and obese and was followed by the Malays and the least being the Chinese. The high prevalence among Indians suggests that the genetics might be a prominent predictor of obesity but this does not exclude environmental factors, including behavioural and cultural influences on food preparation and consumptions.¹⁷ There were not many literatures to fall back on the theory but studies on the anthropological data should be conducted to have an in depth knowledge of one's culture and ethnicity specifically in South East Asia.

This study shows that the odd ratio for being obese increased steadily with age until the age of 30 to 39 years, after which the prevalence declined. It seems that weight increases at the reproductive age, post pregnancy in females and peaks through older age which might be due to menopause and retirement,¹⁸ declines in both overweight and obesity after age 59 years and above. One possible reason for the decline is the reduce in height and loss of muscle mass among the elderly. Waist circumference measurement would be a better indicators for obesity among the elderly.¹⁹ There is higher chance of survival for individual with lower BMI, where else overweight and obese individuals usually die earlier due to metabolic diseases related to obesity.²⁰ Findings from our study are in tandem with studies from the developed and developing countries.^{14,21,22}

Malaysians dominated in both overweight and obese categories. This could be explained from the multiracial religious festivals, open house ceremonies that take place all year round which always coincides with large preparation of high energy density and sugar laden food. The availability of 24 hours food stalls with minimum price, having people from all walks of life to afford and enjoy late night eating in addition to the decent day meals, sums up to the unhealthy weight gain.

In our study, overweight and obesity was noticed more among the widowers and divorcees.

In contrary, obesity and overweight was seen among married couples due to positive reinforcement among them to eat together and might relate to the effects of body weight on interpersonal attractiveness¹⁴ and selection mechanism in marriage protects against poor health and that healthier people might marry healthier counterparts.²³ In that context, married people have lower mortality and morbidity while divorced people have the highest morbidity and mortality. That summarises our finding that being widowed or divorced, delivers independence to unhealthy eating habits, and with low esteem towards lonely life gives no reinforcement to keep healthy.¹⁸

The lower education population had higher prevalence of both overweight and obesity. Being literate gives individuals to value life and live healthy in accordance; diet restriction, keeping fit physically and routine health screenings. Absence or minimal exposure to education deprives these individuals from good habits which in turn encourage unhealthy eating, sedentary lifestyles and to suffer from chronic illness. Similar study also supported our finding that obesity was seen in the lower education society and lower education contributed higher risk of obesity, suggesting lower level awareness on the risks and consequences of obesity.^{19,22,25,26} In our study, the unpaid worker had higher prevalence of overweight, where else, homemaker, government employees and retiree and unpaid workers were obese. These findings take to bidirectional reasoning. Similarly, employed women had less overweight and obesity incidences compared to housewives.²⁴ However, at the same time employed women reported more fast food consumptions. Housewives are accustomed to prepare good food for the entire family while those who are working usually grab food from the shops/ restaurants/ usually fast food and in fact buy back food after work for dinner as time gets limited to prepare food. Having low occupation increases stress level due to minimal wage; long hours and strenuous physical work. This should result as a protective factor towards overweight or obesity. While government jobs, which is more sedentary in nature yields weight gain.¹⁸ Where else employees in the private sector usually work long hours for accreditation, job satisfaction and rewards giving them no time for physical activities and time to cook healthy food. On the contrary, private workers demonstrated an inverse relationship towards overweight/obesity in our study.

Having low paid jobs, being retirees and those unpaid workers, gives way to buy affordable or cheap food that is laden with high calories, fat, sugar, junk, and usually processed and refined food²⁵ and minimal time in physical activities/sports.^{26,27} In addition, our study did not differ in the urban or rural indicating that obesity is

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not confined to high income, rich, but is also spreading fast to the rural with rapid urbanization, mushrooming of supermarkets, advertising and food media in promoting fast food outlets and highly processed food. This deviates from the traditional home cook containing healthy fibre along with fruits and vegetables.²⁷

The strengths of this study include its large nationally representative sample, use of an objective measure (body mass index) not subject to reporting bias and quality and consistency of data collection. However, the limitation to our study is the analysis is based on cross-sectional data which limits inferences on causal relationship between the identified factors and outcome.

CONCLUSION

Our data indicate a high prevalence of overweight and obesity in the population. Several sociodemographic characteristics are associated with both overweight and obesity. Increased prevalence of excessive weight is noted among all age, gender and racial/ethnic groups compared to the previous national.

Having overweight and obesity in the rise will eventually lead to an increase in chronic diseases like cardiovascular diseases, hypertension, diabetes, and cancers. This will in turn will jeopardise the productivity among the obese and affect the health care cost of the nation almost causing a vicious cycle.²⁸ This study highlights the serious problem of overweight and obesity among Malaysia adults. Documentation of these problems may lead to research and policy agendas that will contribute both to our understanding and to the reduction of these problems. Measures to improve the current national programmes to combat overweight and obesity should be looked into. Collaborative efforts and networking are usually difficult to sustain; hence, steps that are feasible and just to build on the current projects should be apt.

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