

Systematic Review on the Prevalence of Overweight and Obesity among Adolescents in Malaysia 1990-2014

Hazreen Abdul Majid^{1,2*}, Mohd Shahfiq A Abidin¹, Azimah Zamani¹, Tin Tin Su^{1,2} and Farizah Mohd Hairi¹

¹Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Malaysia

²Centre for Population Health, University of Malaya, Malaysia

***Corresponding Author:** Hazreen Abdul Majid, Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Malaysia.

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Abstract

Overweight and obesity among adolescents if not intervened early will cause adverse health problems once they enter into adulthood. The aim of this systematic review is to describe the trend from 1990 until December 2014 on the prevalence of overweight and obesity among adolescents in Malaysia. Articles from four databases: PubMed, Science Direct, ISI Web of Science and Cochrane Library were searched. The articles underwent two stages of screening using standardized five-score quality assessment forms which emphasized: sample size, sampling frame and selection techniques. As a result, 26 studies were reviewed with most sample size varying from 100 to 699. Only three studies had fulfilled the score 1 criteria with more than 1,000 respondents which employed a random selection technique. The age for adolescents involved in this review was between 7 to 19 years. The prevalence of overweight ranges between 4.5 to 69.0% and obesity ranges between 3.5 to 16.0% for both genders. Only five studies reported ethnic differences in the prevalence of overweight and obesity. It is recommended that action should be taken by all stakeholders to minimize the escalating trend of overweight and obesity among adolescents in Malaysia.

Keywords: Overweight; Obesity; Adolescent; Malaysia

Abbreviations: NHMS: National Health and Morbidity Survey; NCD: Non-Communicable Diseases; BMI: Body Mass Index; MeSH: Medical Search Heading

Introduction

Obesity has become a truly global problem. No longer is obesity simply a high-income country or adult problem. Obesity now impacts countries at all ages and economic levels, bringing with it a wave of ill health and lost productivity. With the increasing trend of obesity, the burden of this treatment of this problem has escalated [1].

The studies in this review highlighted various factors that have impacted the situational analysis on obesity such as it depends on the region, location, ethnicity, lifestyle choices and others. Overweight and obesity poses a serious health problem for both adults and adolescents across developed and developing countries [2]. In Malaysia, the National Health and Morbidity Survey III (NHMS III) (2006) showed that the overall prevalence of overweight children aged 7 to 13 years old was 6% [3]. In the United States, the American Heart Association showed that the prevalence of obesity among American children and adolescents aged 12 - 19 is continuously increasing from 5.0% in 1976-1980 to 18.2% in 2007-2010 [4]. And in China, prevalence of overweight children and adolescents increased from 6.4% to 7.7% between 1991 to 1997 [5]. The upward trend of obesity worldwide is quite alarming.

According to NHMS 2011 report, the prevalence of obesity among urban children aged 18 years old and below was 6.1% higher as compared to rural areas [6]. A study showed that urban Chinese males who are better socio-economic status, with overweight and/or

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have educated guardians showed higher prevalence of being overweight [7]. With the rapid economic growth and advancement in technologies, many Malaysians experienced a positive shift in their socioeconomic status in the past two decades. Thus, lifestyle and dietary patterns of the communities have also changed, which leads to more overweight and obese adolescents due to the obesogenic environment [2].

High prevalence of obesity among adolescents should be treated as a serious health problem as it can continue into adulthood if not intervened. Studies have shown that obesity can lead to metabolic syndrome, psychological and social disorders [8,9]. Those who are overweight and obese are more likely to develop non-communicable diseases (NCDs) if they are physically inactive, in comparison to their counterparts within the normal body mass index (BMI) range [10].

In Malaysia, the rate of diabetes, hypertension and hypercholesterolemia in adults rose from 8.3%, 33.0% and 5.0% in 1996 to 15.2%, 32.7% and 35.1% in 2011, respectively [3,6]. To mitigate health-related complications at a later age, it is crucial for health advocates and officials to highlight the need for policy intervention on childhood obesity across all levels of governmental organisations and ministries [11]. Some countries had even proposed taxes or portion size bans to reduce consumption of sugar-sweetened beverages [12]. This is considered to be one of the pro-active policies that may have a huge impact towards community health.

In view of the overweight and obesity problems worldwide, it would be interesting to investigate the prevalence of these problems among Malaysian adolescents. The aim of this review is to describe the trend from 1990 to the present on the prevalence of overweight and obesity among this segment of society in Malaysia. This information will provide evidence for future strategic intervention programs as well as policy improvement.

Materials and Methods

This article reviewed overweight and obesity studies among adolescents in Malaysia from 1990 until December 2014 from four databases: Science Direct, PubMed, ISI Web of Science and Cochrane Library. Using Medical Search Heading (MeSH) and keywords such as overweight - obesity - adolescent - Malaysia, the search yielded 558 potentially relevant articles from Science Direct (432 articles), PubMed (94 articles), ISI Web of Science (24 articles) and Cochrane Library (9 articles).

The collected articles then underwent two stages of screening. The first stage screened for studies with available full articles - which saw the number of articles being reduced to 47 articles. At the second stage, two independent reviewers adapted Khambalia and Seen's 2010 standardized five-score quality assessment technique to assess the articles on sample size, sampling frame and selection techniques [13]:

1. Score 1, the highest, was given to 'large sample size study that employed random selection technique'
2. Score 2 was for 'large, randomly selected sample study from an entire state in the country'
3. Score 3 was for studies which 'employed random selection techniques within a specified number of sampling units'
4. Score 4 was for studies with 'large sample sizes (> 1,000 persons) even though the samples were not randomly selected'; and
5. Score 5, the lowest, was for identified studies that had 'small sample size and non-randomly selected sample'.

As a result, only 26 articles were taken for the review as the rest of the studies did not provide data on overweight and obesity prevalence among adolescents in Malaysia.

Results

From the 26 studies reviewed (Table 1), sample sizes varied from 100 to 9,886 people. Thirteen studies had sample sizes varying from 100 to 699. Only three studies had fulfilled the score 1 criteria, with more than 1,000 respondents - which employed random selection technique (Figure 1) [3,6,44].

The age for adolescents from this review is reported between 7 to 19 years. A majority of the studies reported a combined gender prevalence of overweight and obesity and only about 50% of the studies had separate figures calculated for males and females. The

prevalence of overweight ranged between 4.5 to 69.0% [2,3,14,15,21,26-30,32-35,39,41,43] and obesity ranged between 3.5 to 16.0% [2,11,14,15,21,25, 28,32,34,35,41,43] for both gender.

Quality score*	Reference	Year	Sample size	Age (year)	Prevalence of overweight/obesity (%)		
					Both genders	Male (M)	Female (F)
1	[6]	2011	9886	10 to 16	14.5/13.4	13.8/16.7	15.2/10.2
1	[3]	2006	9199	10 to 18	5/-	-/-	-/-
1	[44]	2014	1361	13	15.4/8.5	15.6/10.7	15.3/7.2
2	[21]	2006	6555	11 to 15	19.4 Urban schools (U), 17.3 Rural schools (R)/-	21.9 (U), 17.7 (R)/-	16.3 (U), 16.9 (R)/-
2	[14]	1997	6239	7 to 16	6.0/3.5	6.6/4.3	5.3/2.7
2	[26]	2004	3620	11 to 17	5.7/-	-/-	-/-
2	[25]	2007	2152	15 to 19	-/6.5	-/7.2	-/5.8
2	[27]	2009	2050	11 to 15	34/-	33.2/-	35.0/-
2	[28]	2011	1430	9 to 12	17.9/16.0	18.9/21.6	17.1/12.1
3	[29]	2007	3333	13 to 17	8.2/-	10.6/-	6.0/-
3	[30]	2012	382	13 to 15	19.5	19.3	19.5
3	[2]	2011	360	13 to 14	10.3/10.0	14.7/10.4	6.6/9.6
3	[31]	2011	335	12 to 18	-	-/9.9	-/6.7
5	[32]	2006	699	11 to 12	14.6/7.2	24.4/8.9	18.9/5.3
5	[33]	2007	425	13 to 14	28.2/-	-/-	-/-
5	[34]	2007	382	13 to 16	12.3/8.6	-/-	-/-
5	[35]	2007	319	13 to 16	9.4/6.3	-/-	-/-
5	[36]	2004	291	14 to 17	-/-	-/-	8.5/N/A
5	[37]	2007	277	10 to 12	-/-	-/-	-/-
5	[38]	2013	237	12 to 19	-/-	20.2/-	17.4/-
5	[11]	2011	233	10 to 17	-/5.4	-/-	-/-
5	[39]	2004	199	12 to 19	4.8/-	8.1/-	2.2/-
5	[40]	2007	157	13 to 19	-/-	-/-	-/-
5	[41]	2007	128	10 to 12	16.4/2.3	-/-	-/-
5	[42]	1999	107	10 to 12	-/-	-/-	-/-
5	[43]	2005	100	11 to 14 14 to 17	29/13 69/12	-/-	-/-

Table 1: Prevalence of overweight and obesity among adolescents in Malaysia.

Footnote: Quality score 1: highest quality score and 5; the lowest quality score. (-) data is not available.

Only five studies reported ethnic differences in the prevalence of overweight and obesity [14,20,25,28,31]. The highest prevalence of overweight was among Chinese (8.9% to 23%), as compared to Indians (8.5% to 18.3%) and Malays (5% to 17.9%) [14,21]. Nevertheless, other studies reported different patterns on the overweight and obesity prevalence among different ethnic groups however the sample size for these studies were small and the study population age ranged are wide [26,29,32]. The respondents for adolescents from aged 15-19 were only 13% from the whole survey [29]. Only one study indicated the differences in overweight between urban and rural areas, where male adolescents were more overweight (21.9% in urban and 17.7% in rural) than female (16.3% in urban and 16.9% in rural) [21].

Compared to the prevalence of overweight and obesity in Peninsular Malaysia, lower prevalence was found in Sabah and Sarawak. The prevalence of overweight in Sabah was at 2.3% (95% CI: 1.7 - 3.0) in 2006 [3], whereas the prevalence of obesity in Sabah/Labuan was at 3.2% (95% CI: 2.3 - 4.6) in 2011 [6]. In Sarawak, the prevalence of obesity was at 2.7% (95% CI: 1.2 - 5.8) in 2011 [6]. In general, the prevalence of overweight is higher than obesity in this country.

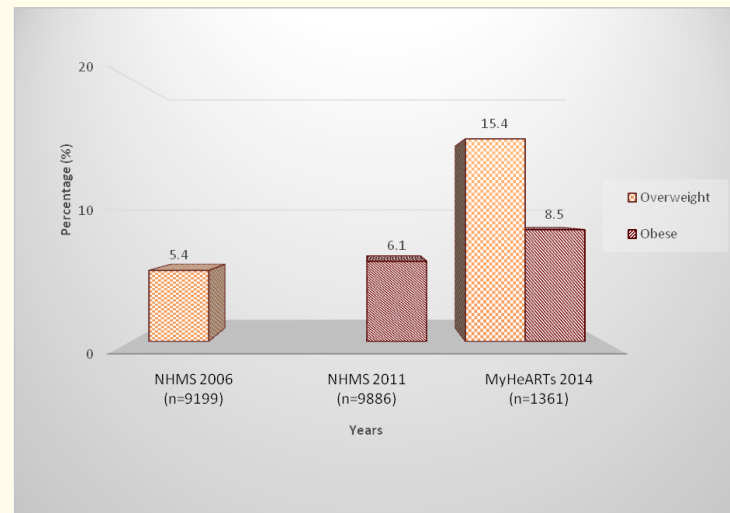


Figure 1: Prevalence of overweight and obese adolescents in Malaysia from the large sample size studies conducted (1990-2014). Note: Obesity was not reported in NHMS 2006 [3] and overweight was not reported in NHMS 2011 [6]. Both overweight and obesity were reported in MyHeARTs 2014 [44].

Discussion

Despite minor differences in the age categories in this review, the patterns of overweight and obesity is increasing among the adolescents over the past decade [14-16]. The prevalence of overweight and obesity for both genders as reported from 1990 until December 2014 lies within a very wide range, i.e. 4.5 to 69.0% and 3.5 to 16.0% respectively. This is probably due to the wide variation in the age group between the studies reviewed.

The focus of this review is to investigate the patterns of overweight and obesity among adolescents in Malaysia based on published studies and National Health and Morbidity Survey (NHMS) reports. From two large national studies done, NHMS 2006 and 2011 showed that the prevalence of overweight and obesity among boys are higher than girls [3,6]. Data in 2006 showed that prevalence of overweight is 6.0% for boys and 4.7% for girls [3], while in 2011 prevalence of obesity is 7.6% for boys and 4.6% for girls [6].

The minimal increase over the period could be due to different set of respondents that were screened or assessed every time the studies were conducted. In addition, the adolescents who gave consent for their weight and height to be taken could also be those who had normal body weight and those who were overweight and obese may not keen to participate. The design of the large scale studies were cross sectional and it is difficult to understand the causal effect of the overweight/obesity problem in Malaysian adolescents.

Few potential possibilities as to why boys are found to be overweight and obese is that most of the studies reported that boys are likely to spend more time watching television or playing computer games than girls [17]. A study conducted in Malaysia has also shown that screening time was positively associated with BMI-for-age Z-score and waist circumference [18]. It is recommended that more

green space should be built in the urban areas to encourage physical activity among the adolescents; as demonstrated by Richardson, *et al.* in their study that conducive environment is related to better cardiovascular health among the population who lived nearby [19].

From this review, only two studies were found looking at overweight and obesity between urban and rural adolescents [3,6,21]. Urban adolescents are more overweight and obese compared to their rural counterparts. This is a non-conclusive result, as only one study reported on this difference. However, a study in America has shown that those who are living in rural area are more prone to be overweight and obese compared to the urban group [20].

There are multiple factors that can lead to overweight and obesity, such as availability of space to do physical activity [2,19-21], protected time to do physical exercise sessions during school hours and also food accessibility to high energy dense food and drinks [2,11,12,20-22]. It is crucial to understand the adolescents' body composition because it will influence their fitness level. A study has shown there is an inverse association between heart recovery rate and BMI among adolescents [23] which highlights the importance of keeping these adolescents to be active to ensure they maintain their weight within the normal range.

This current review has several limitations. Almost 50% of the studies reviewed have a sample size of less than 700, i.e. rather small to be representative of the adolescent population. The number of adolescents in Malaysia is estimated to be about 5.5 million [23]. Malaysia's total population is approaching 29 million. About one-sixth (1/6) of our population is adolescent, so if our adolescents are not healthy, the impact affects not only the adolescents, but also their family, the society and the whole nation in the future.

Increased prevalence of overweight and obesity would be expected to increase the prevalence of non-communicable diseases, such as: Type 2 diabetes mellitus, cardiovascular disease, metabolic syndrome and cancers. This translates into requirement of more resources, and more trained health care personnel to curb these issues. Furthermore, the cost of health care and treatment will rise in the future.

Based on the reported studies, it is difficult to illustrate the magnitude of the problem, firstly the reported national studies initially were focused on obesity [3], and only recently both the data on overweight and obesity was reported [6]. Furthermore, most of the studies did not stratify their findings. It will be more meaningful if burden of the disease is classified by age group, gender and ethnic group. By combining or merging all these data, it will deceive the reader and provide a skewed perception on the findings of the study. For smaller Malaysian studies, the ethnic distribution depends on the location or study site. For example, if the study is conducted in highly dense ethnic minority schools, it will show a higher prevalence of overweight and obesity in that group [25] and this will be different if it is conducted in urban areas. Thus the finding of prevalence according to ethnicity is not accurate. In addition, different studies used different instruments to measure weight and height.

The trend of the overweight and obesity as health problems is increasing drastically in developing countries compared to developed countries. More active initiatives are needed to be advocated by the government such as recommending a healthy lifestyle by increasing physical activity and minimizing energy dense food [22]. School children and adolescents should be encouraged to be physically active and involved in their physical education classes at school, as well as at sporting entities in the community. They should also be encouraged to play outdoor physical games, rather than playing with technological gadgets and virtual games. Proposed taxes or portion size bans to reduce consumption of sugar-sweetened beverages [12] could also be suggested and implemented in Malaysia. Adolescents should be given more choices to buy healthy food in their school canteen and that such food items to be made more affordable. Prevention of overweight and obesity during the adolescent phase is an important strategy to reduce health risks later in life.

Conclusion

In conclusion, this systematic review highlights the increasing trend of overweight and obese adolescents in Malaysia from 1990 to the present. It is therefore imperative for all stakeholders to combine efforts in preventing health problems that may arise from being overweight and obese from escalating. Stakeholders include various sectors in society such as families, communities, schools, medical and health care providers, media and the food and beverage industries. Early education is a powerful force for adolescents in learning

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about positive dietary habits and in adopting a healthy lifestyle that can help in reducing or eliminating overweight and obesity. In fact, simple measures such as increasing the level of physical activity and healthy eating habits can lower the risk for the development of non-communicable (chronic) diseases. It is important to halt this problem early as young as adolescents, or even earlier, so that the country would not accumulate the economic burden to treat these diseases and their complications. Devising and implementing strategic intervention programs and policies are crucial and of high importance.

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