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Domain-specific physical activity among indigenous overweight and obese communities in Sarawak

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Abstract

Background: Physical activity is important to maintain health and to prevent non-communicable diseases. Material/Methods: We evaluated physical activity in four domains (leisure time, occupational, domestic and transportation ones) and its sociodemographic correlates in 351 adult overweight and obese indigenous people in Sarawak, Malaysia. Physical activity was assessed using the Malay version of the International Physical Activity Questionnaire (IPAQ) long form. The data were analysed using SPSS version 20. Results: More than 40% of the respondents (43.5%) were obese. The overall median total MET-minutes were 6180.0 (IQR = 10229.0). A total of 53% of the respondents were moderately active with the majority of them being female (55.6%). The overall median total MET-minutes were low for leisure and transportation domains. Females were more active in the domestic domain, while males in the work and leisure-time domains of physical activity. Younger respondents (< 30 years) had the lowest level of physical activity. There is a significant positive relationship of gender with work, domestic and leisure-time domains of physical activity, and of occupation with work and leisure-time domains as well as all domains of physical activity. Conclusions: Studies on physical activity among overweight and obese adults should examine all domains in order to understand its relationship and weight problem.

Keywords

physical activity, correlates, domains specific, indigenous people, community, overweight & obesity

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ORIGINAL

Domain-specific physical activity among indigenous overweight and obese communities in Sarawak

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Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

abstract

Background Physical activity is important to maintain health and to prevent non-communicable diseases.

Material/Methods We evaluated physical activity in four domains (leisure time, occupational, domestic and transportation ones) and its sociodemographic correlates in 351 adult overweight and obese indigenous people in Sarawak, Malaysia. Physical activity was assessed using the Malay version of the International Physical Activity Questionnaire (IPAQ) long form. The data were analysed using SPSS version 20.

Results More than 40% of the respondents (43.5%) were obese. The overall median total MET-minutes were 6180.0 (IQR = 10229.0). A total of 53% of the respondents were moderately active with the majority of them being female (55.6%). The overall median total MET-minutes were low for leisure and transportation domains. Females were more active in the domestic domain, while males in the work and leisure-time domains of physical activity. Younger respondents (< 30 years) had the lowest level of physical activity. There is a significant positive relationship of gender with work, domestic and leisure-time domains of physical activity, and of occupation with work and leisure-time domains as well as all domains of physical activity.

Conclusions Studies on physical activity among overweight and obese adults should examine all domains in order to understand its relationship and weight problem.

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INTRODUCTION

This paper presents the level and correlatives of domain-specific physical activity of indigenous overweight and obese adults in Sarawak, a state of Malaysia. Physically inactive adults are at risk for diabetes, ischaemic heart disease, breast and colon cancers [1]. Regular physical activity is important to maintain adults' physical well-being [1] and mental health [2]. This level of health is attainable if adults have at least 150 minutes of moderate-intensity aerobic physical activity or at least 75 minutes of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, based on the WHO recommendation [1].

Although regular physical activit y is beneficial, not many Malaysian adults in Sarawak are active. In the Malaysian Adults Nutrition Survey (2002–2003) [3], out of 6,926 respondents, approximately 10% were adults from Sarawak. The study found that for Sarawak, 31.4% (95% CI = 26.2–37.1) reported they exercised and 14.0% (95% CI = 10.7–18.1) claimed that they had adequate exercise. In the same study, 31.1% (95% CI = 26.3–36.3) of the respondents were sedentary, 50.9% (95% CI = 45.6–56.3) moderately active, and 18% (95% CI = 14.3–22.3) active. Whether the mentioned study differentiated exercise from physical activities or not cannot be ascertained.

The term "exercise" should not be taken as equal to "physical activity". Physical activity involves bodily movement and is done as part of playing, working, active transportation, house chores and recreational activities and exercise is one of its subcategories [1]. The different types of physical activity are termed the domains of physical activity [4]. The frequency of each domain of physical activity varies between countries, as people in low- and medium-income countries perform more work, household and transport domains rather than leisure-time physical activities than their peersin high-income countries [5]. In addition, different studies also show different factors correlated with different domains of physical activity [6, 7].

There is a suggestion that high rates of obesity might be a contributing factor to low total physical activity [4]. However, another study suggests that obese adults who are metabolically healthy engaged in higher levels of total and recreational but not household or transportation physical activity [8]. Interventions to reduce physical inactivity should use evidence-based mediators to ensure success [4] and should especially target those who are overweight or obese. As there is no published literature regarding domain-specific physical activity and its correlates among adults in Sarawak, especially among overweight and obese adults, the present study was conducted to fill the gap.

MATERIALS AND METHODS

This cross-sectional study was conducted among 358 overweight and obese adults (response rate: 94.7%) residing in urban and rural areas of Kuching and Samarahan Division. Multistage sampling was used to recruit respondents from six villages each in rural as well as urban areas of these divisions. In the selected villages, promotion of the study was done through the head of the village. All adults (18–64 years old) were invited to attend a health screening session conducted at the village community hall. Respondents who were overweight (body mass index [BMI] 25–29.9 kg/m^2) or obese (BMI ≥ 30 kg/m^2),

physically capable and not intellectually challenged, were invited to participate in the study. The sample size was determined using the Power and Sample Size software version 3.0.43, with the anticipating percentage of positive changes of 15%, a total of 378 respondents were estimated. Ethical approval was obtained from the Ethics Committee of Universiti Sains Malaysia and all respondents signed a written informed consent form.

Height was measured using a stadiometer (SECA, UK) model 213. Each respondent stood underneath the body meter, and the measuring beam was pushed down to rest on top of the respondent's head. The visual display recorded the height to the nearest 0.1 cm. Respondents were weighed in their street clothing without shoes using a calibrated Seca weighing scale (Seca, JP). Weight was recorded to the nearest 0.1 kg. Both weight and height readings were used to calculate the body mass index (BMI). The classification of BMI was based on the WHO guidelines [9], where a BMI of 25 kg/m^2 and above is classified as overweight and a BMI of more than 30 kg/m^2 as obese. A Tanita Body Composition Analyzer (SC-240) was used to calculate body fat percentage. A face-to-face interview using a validated questionnaire was conducted to ensure uniformity as a large percentage of rural respondents claimed they were unable to read.

The translated Malay version of the International Physical Activity Questionnaires (IPAQ) long form (validated for Malaysia) [10] was used to assess the respondents' physical activity level. This questionnaire consists of 25 questions on four main domains: (a) leisure-time physical activity; (b) domestic and gardening (yard) activities; (c) work-related physical activity; (d) transport-related physical activity and two questions on time spent sitting. All questions ask for activities performed in the previous seven days. Each type of activity is weighed by its energy requirements defined in METs to yield a score in MET-minutes according to the IPAQ procedure [10]. The MET-minutes/week is computed based on IPAQ guidelines (2005) [11]. Respondents' socio-demographic data were included in the questionnaire.

DATA ANALYSIS

In line with the data processing rules of IPAQ [11], those respondents who had the sum total of all walking, moderate and vigorous time variables greater than 960 minutes were excluded from the analysis. Scores were computed for all activities (overall) as well as separately for walking, moderate-intensity and vigorous-intensity activities for each domain. Normality of the distribution of variables was tested using the Shapiro-Wilk W-test. The median and interquartile ranges were calculated separately for each domain and total MET-minutes according to the IPAQ procedure [11]. The Kruskal-Wallis ANOVA and the Mann Whitney U-testwereused to test differences according to socio-demographic characteristics. The level of significance for all analyses was set at $p < 0.05$. Statistical analyses were performed using SPSS version 21 software.

RESULTS

The final analyses were based on 351 respondents after removing the outliers. There was a slightly higher number of rural respondents (n = 183; 52.1%), more Iban (n = 129; 36.8%) with the mean age of 43.8 years (SD = 11.7). The majority were women (74.4%) and housewives (45.3%), and the mean in-

come was RM1 271.50 (SD = 1461.90). Table 1 presents the socio-demographic characteristics of the respondents.

Table 1. The respondents' socio-demographic characteristics and the weight status (N=351)

Socio-demographic characteristics	n (%)	Mean (SD)
Age (year)		43.8 (11.10)
Age		
≤30	52 (14.8)	
31-40	80 (22.8)	
41-50	101 (28.8)	
>51	118 (33.6)	
Sex		
Male	90 (25.6)	
Female	261 (74.4)	
Income (RM)		1271.5 (1461.90)
Area of residence		
Urban	168 (47.9)	
Rural	183(52.1)	
Race		
Malay	118 (33.6)	
Bidayuh	104 (29.6)	
Iban	129 (36.8)	
Occupation		
Employed	88 (25.1)	
Housewife	159 (45.3)	
Others	104 (29.6)	

More than 40% (n = 159, 43.5%) of the respondents were obese and 54.7% (n =192) were overweight. Table 2 shows the respondents' mean BMI by socio-demographic characteristics. The overall mean BMI was 30.5 kg/m^2 (SD = 4.49). Female respondents had significantly higher mean BMI than males, and being female, housewives had the highest mean BMI compared to those respondents who were employed or others (small-scale farmers, pensioners and unemployed). This difference was significant (Table 2).

Table 2. The respondents' body mass index by socio-demographic characteristics (N = 351)

Variable	BMI Mean (SD)	p-value
Total	30.5 (4.48)	
Gender		0.007[a]
Male (n =90)	29.1 (3.08)	
Female (n =261)	30.9 (4.80)	
Race		0.941[b]
Malay (n=118)	30.3 (4.3)	
Bidayuh (n =104)	30.4 (4.3)	
Iban (n =129)	30.8 (4.9)	
Residence		0.198[a]
Rural (n = 183)	30.8 (4.6)	
Urban (n=168	30.2 (4.4)	
Age		0.081[b]
≤30 (n =52)	31.3(5.1)	
31-40 (n =80)	31.6(5.6)	
41-50 (n =101)	30.2 (14.3)	
>51 (n =118)	29.6 (3.4)	
Occupation		0.026[b]
Employed (n=88)	30.2 (4.1)	
Housewife (n =159)	31.3 (5.2)	
Others (n =104)	29.4 (3.5)	

[a] Mann Whitney U-test, [b]Kruskal-Wallis test, significant at $p < 0.05$

Table 3 shows the categories of activity levels by socio-demographic characteristics. Only 25.1% (n = 88) reported to have a low activity level. The percentage distribution of men across the three levels of physical activity level was similar, while more women (55.6%) were reported to have a moderate physical activity level. Approximately 50% of respondents from all ethnic groups and 60% of housewiveshad a moderate level of physical activity. Only the respondents' residence and occupation showed a significant difference in the physical activity level.

Table 3. The respondents' physical activity level by socio-demographic data (N = 351)

Socio-demographic characteristics	Low n (%)	Moderate n (%)	High n (%)	p-value
Overall	88 (25.1)	186 (53.0)	77 (21.9)	
Sex				0.240
Male (n =90)	25 (27.8)	41 (45.6)	24 (26.6)	
Female (n =261)	63 (24.1)	145 (55.6)	53 (20.3)	
Residence				0.027*
Rural (n =183)	35 (19.1)	104 (56.8)	44 (24.0)	
Urban (n =168)	53 (31.5)	82 (48.8)	33 (19.6)	
Race				0.819
Malay (n=118)	32 (27.1)	61 (51.7)	25 (21.2)	
Bidayuh (n =104)	27 (26.0)	57 (54.8)	20 (19.2)	
Iban (n =129)	29 (22.5)	68 (52.7)	32 (24.8)	
Age				0.295
≤30 (n =52)	16 (30.8)	26 (50.0)	10 (19.2)	
31-40 (n =80)	24 (30.0)	35 (43.8)	21 (26.3)	
41-50 (n =101)	18 (17.8)	59 (58.4)	24 (23.8)	
>51 (n =118)	30 (25.4)	66 (55.9)	22 (18.6)	
Occupation				0.038*
Employed (n = 88)	27(30.7)	38 (43.2)	23 (26.1)	
Housewife (n =159)	38 (23.9)	96 (60.4)	25 (15.7)	
Others (n =104)	23 (22.1)	52 (50.0)	29 (27.9)	
Weight status				
Overweight	55 (28.6)	95 (49.5)	42 (21.9)	0.207
Obese	33 (20.8)	91 (57.2)	35 (22.0)	

chi-square test, *significant at $p < 0.05$.

Table 4 shows the MET-minutes for each activity domain and the total activity according to selected socio-demographic characteristics and the weight status. Overall, the transport domain of physical activities had the lowest median MET-minutes. Men had higher median MET-minutes in the work and leisure domains, while women had higher median MET-minutes in the domestic domain of physical activity. The difference was statistically significant. There was also a significant differencein median MET-minutes for the transport domain for race (Malay, highest). Rural respondents and those whose occupation classified as others reported higher median MET-minutes in the work and transport domains and in the total activity.In terms of occupation, those respondents whose occupation was categorised as others had significantly higher MET-minutes in the work and domestic domains as well as in the total physical activity compared to housewivesand those employed.

Table 4. MET-minutes of physical activity based on domains and total physical activity [median, IQR] by socio-demographic characteristics (N = 351)

Variable	Work MET-min (IQR)	Transport MET-min (IQR)	Domestic MET-min (IQR)	Leisure MET-min (IQR)	Total MET-min (IQR)
Overall	240.0 (6951.0)	165.0 (600.0)	1720.0 (3360.0)	198.0 (792.0)	6180.0 (10229.0)
Gender					
Male (n = 90)	3603.8 (9800.6)	198.0 (792.0)	930.0 (2244.4)	460.5 (1311.8)	7890.0 (12879.6)
Female (n = 261)	0 (5198.0)	120 (594.0)	2040 (3420)	99.0 (594.0)	5814.0 (8995.5)
p-value[a]	<0.001*	0.206	0.002*	<0.001*	0.105
Race					
Malay (n = 118)	90.0 (5970.0)	338.3 (940.5)	2270.0 (3713.8)	198.0(1165.5)	6644.8 (9865.0)
Bidayuh (n = 104)	0 (6870.0)	198.0 (693.0)	1710.0 (3195.0)	145.5(693.0)	5898.0(9740.6)
Iban (n = 129)	1314.0 (9701.3)	66.0 (321.8)	1680.0(3157.5)	99.0 (678.0)	6300.0(10666.0)
p-value[a]	0.235	<0.001*	0.500	0.563	0.968
Residence					
Rural (n = 183)	1980.0 (8160.0)	231.0 (720.0)	1800.0 (3195.0)	198.0 (693.0)	7374.0 (10548.0)
Urban (n= 168	0 (5688.0)	99.0 (396.0)	1500.0(3660.0)	167.3 (792.0)	4758.8(9514.5)
p-value[a]	0.048*	0.015*	0.121	0.439	0.009*
Age					
≤30 (n = 52)	0 (4980.6)	99.0 (618.8)	1286.3(2300.0)	328.5 (1561.5)	4738.5(8817.5)
31-40 (n = 80)	1609.5 (7890.0)	82.5 (659.3)	1935.0(3631.3)	106.0(594.0)	7935.0(11396.3)
41-50 (n = 101)	1272 (8077.5)	198.0(742.5)	1800.0 (3330.0)	231.0 (1264.5)	6846.0 (10209.0)
>51 (n = 118)	0 (5199.8)	189.0 (594.0)	1770.0 (3313.8)	99.0 (520.9)	5734.5 (9871.9)
p-value[b]	0.082	0.547	0.226	0.125	0.147
Occupation					
Employed (n = 88)	1810.0(8328.0)	99.0 (683.0)	960.0 (1946.3)	318.0 (1314.0)	532.0 (12207.8)
HW (n = 159)	0 (2097.0)	198.0 (693.0)	2760.0 (3990.0	99.0 (594.0)	5445.0 (6865.0)
Others (n = 104)	4710.0 (11835.0)	120.0 (462.0)	1316.3(3063.8)	132.0(773.3)	7828.5(13151.0)
p-value[b]	<0.001*	0.505	<0.001*	0.135	0.014*
Weight status					
Overweight	339.0(6784.5)	140.3 (585.0)	1650.0 (3290.0)	198.0 (706.3)	5846.3 (10856.6)
Obese	240 (7596.0)	198.0 (693.0)	1800.0 (3480.0	160.0 (792.0)	6450.0 (9277.0)
p-value[a]	0.785	0.546	0.531	0.933	0.264

[a] Mann Whitney U-test, [b]Kruskal-Wallis test
MET-min – MET minutes, IQR – Interquartile range, HW – Housewife
*significant at $p < 0.05$.

DISCUSSION

This study used IPAQ (Malay version, 5) to obtain the reported MET-minutes of physical activities for three ethnic groups of indigenous overweight and obese adults in Sarawak. More than 40% of the respondents were obese, which was higher than in a study conducted in Malaysia [12], where 36.7% out of 2304 adults with weight above the normal level were obese. Except for gender, the mean BMI was similar (ranging from 30.2 to 31.6) for respondents of different ethnicity, and for younger ones (aged ≤ 50 years old) irrespective of rural or urban residency. These findings showed that higher mean BMI was common across the board and congruent with the concern that obesity has reached an epidemic level in Malaysia [13]. With improved socioeconomic status, sedentary lifestyle and unhealthy dietary habits, rural population also faces the obesity problem [13, 14].

The findings of the present study using the IPAQ-long form (27 questions) for a mixed gender sample was comparable with one Malaysian study on 215 working women using the IPAQ-short form (7 questions),25.1% vs 28.8% for low, 53.0% vs 48.8% for moderate and 21.9% vs 22.4% for a high level of physical activity [15]. The prevalence of 25.1% of this study respondents who reported to have a low level of physical activity was lower than in the Malaysian Adults Nutrition Survey (2002–2003) [3] where 31.4 (95% CI =26.2–37.1) claimed that they exercised. A lower percentage of respondents in this study with a

low physical activity level could be attributed to the fact that IPAQ is able to capture four domains of activity rather than just exercise or leisure-time physical activity. Approximately 70% of overweight and 80% of obese adults in this study reported to have a moderate or high level of physical activity. This finding appears to contradict a suggestion that obesity may be a contributing factor to low total physical activity [4].

This study showed that the total physical activity of the respondents was 6180 MET-minutes per week, which is equivalent to approximately 150 minutes of vigorous or 300 minutes of moderate physical activity five days a week. Almost half of the respondents (53%) reported to have a moderate and 21.9% had a vigorous level of physical activity. This means that about three quarters of them achieved more than the minimum of at least 30 minutes of moderate physical activity five days a week to achieve health benefits [1]. Nevertheless, it is important to note that the higher physical activity of this study sample included the four domains (work, transport, domestic-garden and leisure), which might not be measured in other studies using different tools [16].

This study found the distribution of physical activity differed in each domain with the highest in the domestic and yard domain. This is expected as there were more female (74.4%) than male respondents (25.6%), and the result was congruent with another study [16]. Male respondents were also found to be significantly more active at work while women were more active in the domestic domain, which is expected from their roles [17, 18]. More male respondents were reported to be more active in the leisure-time domain than females,which is similar to another study in Malaysia [3]. Thus, these findings suggest that interventions to increase physical activity should vary according to gender.

A higher percentage of rural respondents had a moderate ora high level of physical activity compared to urban respondents, and the difference was significant. They had the highest overall MET-minutes of physical activity as well in the work and transport domains. In terms of occupation, those respondents whose jobs were categorised as others had significantly higher overall MET-minutes of physical activity as well in the work domain. These findings could be due to the fact that these respondents were mostly small-scale farmers who had to walk to their farms and did a high level of physical activity in farm works.

Overall, the transport and leisure time domains had the lowest MET-minutes in which other studies had found a positive correlation with health [19]. Unlike previous studies, which found the transport domain to be one of the most common types of physical activity in low-income and middle-income countries [5], this study found otherwise. This could be due to the fact that the majority of female respondents spent time on domestic duties that did not involve much walking or other means of transportation. Although this study found the level of leisure time activity to be low, it is important to note that all domains of physical activity are important to overall health [1].

Similarly to another study [16], younger respondents (< 30 years old) had the lowest overall physical activity as well in three other domains except the leisure domain. This could be due to their workplace lifestyle becoming more sedentary, which is a recent trend in the developed countries [20]. Although

these younger respondents reported the highest score in the leisure-time domain, this was insufficient to increase the total physical activity scores. Thus, strategies should focus on how to increase leisure-time as well as the domestic and yard domains of physical activity.

This study found there was a significant difference in the level and the domains of physical activity in relation to gender, residence and occupation. Perhaps more parameters should be included in the future, as suggested by one study [16], in order to identify the determinants of physical activities in this state of Malaysia more comprehensively. The suggested parameters are enjoyment of activities, knowledge of health benefits of physical activity, barriers to physical activity, social support [16] and built environment [4]. In addition, it is important to note that these respondents were overweight or obese with a high physical activity level. As such, future longitudinal research is recommended to investigate the long-term impact of a high level of physical activity on the physical health of overweight and obese adults.

LIMITATIONS

There are limitations for this study. Although the total physical activity of respondents in this study exceeded the recommended 150 minutes per week, yet they were either overweight or obese. This finding could be attributed to respondents having to recall activities performed in the past seven days in answering IPAQ. Some respondents might have engaged in a high level of physical activity in the past seven days related to seasonal farm works or activities in the yard or garden. In addition, this is a self-report questionnaire, thus, the possibility of self-report bias cannot be ruled out.

CONCLUSIONS

In conclusion, using IPAQ to capture the four domains of activity, this study found that overweight and obese adults in Sarawak were physically active. There was a significant difference in gender, residence and occupation in regard to the level and the different domains of physical activity. This is the first study using IPAQ to assess physical activity of indigenous people in Sarawak, thus, these preliminary findings can be used for further research. It is recommended that such studies should include more parameters to give a more comprehensive understanding of the pattern and the level of physical activity of overweight or obese individuals.

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