PUBLIC HEALTH RESEARCH

Physical Inactivity and Its Associated Factors among Adults in Malaysia: Findings from National Health and Morbidity Survey (NHMS) 2019

Nazirah Alias,[1]* Chan Ying Ying,[2] Lim Kuang Kuay,[3] Ahzairin Ahmad,[4] Halizah Mat Rifin,[5] Nik Adilah Shahein[2] and Azli Baharudin[6]

[1] Centre for Burden of Disease Research, Institute for Public Health, National Institutes of Health, Malaysia.
[2] Centre for Family Health Research, Institute for Public Health, National Institutes of Health, Malaysia.
[3] Centre for Occupational Health Research, Institute for Public Health, National Institutes of Health, Malaysia
[4] Surveillance Unit, Disease Control Department, Ministry of Health, Malaysia.
[5] Centre for Non Communicable Diseases Research, Institute for Public Health, National Institutes of Health, Malaysia.
[6] Centre for Nutrition Epidemiology Research, Institute for Public Health, National Institutes of Health, Malaysia.

**For reprint and all correspondence: Nazirah Alias, Institute for Public Health, Block B5 & B6, National Institutes of Health, No. 1 Jalan Setia Murni U13/52, Seksyen U13 Setia Alam, 40170 Shah Alam, Selangor, Malaysia.*

Email: nazirah.alias@moh.gov.my

ABSTRACT

Introduction	Physical inactivity has been identified as the fourth leading risk factor for worldwide mortality with major implications towards general health. Monitoring the level of physical inactivity may reduce the burden of non-communicable diseases (NCDs) and their risk factors. This study aims to determine the prevalence of physical inactivity and its associated factors among adults aged 18 years and above in Malaysia.
Methods	Data was obtained from the National Health and Morbidity Survey (NHMS) 2019. It was a cross-sectional, population-based survey which employed two-stage stratified random sampling design. A total of 10,356 out of 10,472 respondents were interviewed using a short version of International Physical Activity Questionnaire (IPAQ).
Results	Overall, the prevalence of physical inactivity among adults aged 18 years and above in Malaysia was 24.6% (95% CI: 23.2, 26.1). Results from multivariable logistic model showed that Chinese ethnicity (aOR 1.32; 95% CI: 1.04, 1.67), urban dwellers (aOR 1.30; 95% CI: 1.07, 1.57), those who were single (including widow, widower and divorcee) (aOR 1.36; 95% CI: 1.14, 1.61), students (aOR 2.10; 95% CI: 1.30, 3.40), higher household income earners (aOR 1.34; 95% CI: 1.07, 1.68) and those with hypercholesterolaemia (aOR 1.25; 95% CI: 1.03, 1.51) were significantly more likely to be physically inactive.
Conclusions	Specific and appropriate intervention towards targeted group is in crucial need to increase the level of physical activity and to promote an active living towards an active and healthy Malaysia.
Keywords	Physical inactivity - IPAQ - NHMS 2019 - Malaysia.

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INTRODUCTION

Physical inactivity has been identified as the fourth leading risk factor for worldwide mortality with major implications towards general health, including increasing prevalence of non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, cancer and NCD risk factors such as raised blood pressure, raised blood sugar and overweight.[1] It is estimated that physical inactivity causes major NCDs with approximately 6% of coronary heart disease, 7% of type 2 diabetes, 10% of breast cancer and 10% of colon cancer, with 9% of premature mortality in 2008 worldwide.[2]

Globally, the prevalence of insufficient physical activity in adults aged 18 years and older were 27.5% (95% Uncertainty Interval (UI) 25.0 – 32.2); with 36.8% (95% UI 34.6 – 38.4) in high-income Western Countries, 39.1% (95% UI 37.8 – 40.6) in Latin America and Caribbean, and 17.3% (95% UI 15.8 – 22.1) in east and southeast Asia, doubling in high-income countries compared to low-income countries in 2016.[3] An International Prevalence Study on Physical Activity (IPS) showed that low physical activity ranged from 6.9% to 43.3% across 20 different countries.[4]

In Malaysia, the NHMS in 2011 reported the prevalence of physical inactivity among adults aged 18 years and above in Malaysia was 35.2%[5], while the same NHMS in 2015 reported a slightly reduction in the prevalence of physical inactivity with 33.1%.[6]

By monitoring the current level of physical inactivity and identifying the high-risk group among populations, effective and targeted strategies or programmes can be developed along with supporting evidence-based policy making by stakeholder. Therefore, this study aimed to determine the prevalence of physical inactivity and its associated factors among adults aged 18 years and above in Malaysia.

METHODS

Study Sample

This study was part of the National Health and Morbidity Survey (NHMS) 2019 which focused on the non-communicable diseases and their risk factors in Malaysia. It is a cross-sectional, population-based survey with complex study design using a two-stage stratified random sampling to select representative samples of adults aged 18 years and above in Malaysia. The stratifications were performed by including all states and federal territories in Malaysia as primary stratum and the urban/ rural localities as secondary stratum. The Primary Sampling Unit (PSU) are Enumeration Blocks (EBs) selected by Department of Statistics Malaysia according to updated National Population and Housing Census 2010. A total of 475 EBs were randomly selected across Malaysia by proportionate to population size in each state. Subsequently, Secondary Sampling Unit (SSU) which is a total of 12 Living Quarters (LQs) were randomly selected from each selected EB. Finally, all individuals aged 18 years and above residing in the selected LQs for at least two weeks prior to data collection were included in the sample. Institutional populations such as hotels, hostels, hospitals, old folk homes and others were not included in the survey. The detail methodology can be referred in National Health and Morbidity Survey (NHMS) 2019 Technical Report Volume I in http://iku.moh.gov.my/nhms-2019.[7]

Data Collection

The data collection was conducted via face-to-face interviews from July to September 2019 by trained interviewers.

All eligible respondents were provided with written person information sheet and consent form before any interview. This study protocol was approved by the Medical Review and Ethics Committee (MREC), Ministry of Health, Malaysia.

Instrument

For this survey, physical activity assessment was determined using a validated Malay version of short form International Physical Activity Questionnaire (IPAQ).[8]

Based on Guidelines for Data Processing and Analysis of IPAQ[9], intensity of physical activity was calculated using a Metabolic Equivalents (METs) score. One MET was defined as the energy cost of sitting quietly, which is relative to the resting metabolic rate, thus equivalent to a caloric consumption of 1 kcal/kg/hour. MET-minutes were calculated by multiplying the MET score of an activity (3.3 METs for walking, 4.0 METs for moderate- intensity physical activity and 8.0 METs for vigorous- intensity physical activity) with the minutes per sessions and number of days performed.[9] Total physical activity level of an individual was computed by summation of MET-minutes/week from walking, moderate-intensity and vigorous-intensity physical activity.

An individual with any combination of total score from walking, moderate-intensity physical activity or vigorous-intensity physical activity which is lower than 600 MET minutes per week was considered as physically inactive.

Variable Definitions

In this study, low household income group is the combination of Q1 and Q2 income groups while Q3 and Q4 is grouped together as the middle-income group. High household income is the Q5 income group.

The respondents were categorized into presence or absence of comorbidities according to their self-reported information as diagnosed by a doctor or health professional. The respondents were

asked to answer "yes" or "no" to this question, "Have you ever been told by a doctor or Assistant Medical Officer that you have diabetes, hypertension or hypercholesterolaemia?". If they answered "no", their status of comorbidities was classified according to their finger prick blood test. Respondents was classified as having diabetes when their fasting blood sugar (FBS) were 7.0 mmol/L or more or random blood sugar (RBS) were more than 11.1 mmol/L. Respondents were classified as having hypertension when their systolic blood pressure was 140 mmHg or more and/ or diastolic blood pressure of 90 mmHg or more. Respondents with hypercholesterolaemia had a total blood cholesterol of 6.2 mmol/L or more. For anaemia status, haemoglobin level was measured using HemoCue Hb201+. Anaemic respondents were classified based on 2011 haemoglobin cut-off by World Health Organization.[10] The Body Mass Index (BMI) were categorized into four categories as classified by WHO 1998; underweight (<18.5 kg/m^2), normal (18.5-24.9 kg/m^2), overweight (25.0-29.9 kg/m^2) and obese (≥30.0 kg/m^2).[11]

Data analysis

Data analysis was done using complex sample analysis. Multiple logistic regression analyses were performed to analyse the crude and adjusted odd ratios (ORs) with 95% confidence interval (CI). Any variable with *p*-value of less than 0.25 in the univariable analysis was included in the final multivariable logistic regression model. The statistical significance level was set at 0.05. All statistical analyses were performed using SPSS version 25.

RESULTS

A total of 10,356 out of 10,472 respondents aged 18 years and above answered the Physical Activity Module in this survey completely, giving a response rate of 98.9%.

Overall, the prevalence of physical inactivity among adults aged 18 years and above in Malaysia was 24.6% (95% CI: 23.2, 26.1). Table 1 shows that females were more physically inactive compared to male. Physical inactivity was higher among elderly aged 60 years and above. By ethnicity, Chinese population was the most physically inactive ethnic group. Urban dwellers were also more physically inactive compared to rural dwellers. Furthermore, physical inactivity was more prevalent among those with tertiary education compared to lower education level, and those who were single, unmarried, widow, widower or divorcee compared to married. Students tend to be the most inactive group compared to other occupation categories. According to household income, physical inactivity was the highest among the high household income group.

Physical inactivity was highest among adults with comorbidity. The prevalence of physical inactivity was higher among adults with diabetes, hypertension, hypercholesterolaemia and anaemia. By BMI status, underweight adults (BMI less than 18.5) were the most inactive group compared to other BMI categories.

Table 1 Prevalence of Physical Inactivity among Adults Aged 18 Years and Above in Malaysia (n= 10,356)

Variables	Estimated Population	Unweighted Count (n)	Prevalance (%)	95% CI		p-value
				Lower	Upper	
Overall	5,180,717	2,668	24.6	23.2	26.1	
Sex						<0.001
Female	2,870,486	1,558	27.9	25.9	30.0	
Male	2,310,232	1,110	21.5	19.8	23.4	
Age Group (Years)						<0.001
18-39	2,802,585	1,084	24.1	22.1	26.1	
40-59	1,198,892	698	19.0	17.3	21.0	
≥ 60	1,179,241	886	38.3	35.1	41.6	
Ethnicity						<0.001
Malay (including Orang Asli)	2,698,799	1,801	25.0	23.4	26.7	
Chinese	1,456,457	407	32.4	28.8	36.2	
Indian	315,178	177	25.5	20.8	30.8	
Bumiputera of Sabah or Sarawak	490,635	206	21.6	18.4	25.2	
Others	219,651	77	9.9	6.5	14.9	
Locality						<0.001
Urban	4,255,418	1,741	25.9	24.2	27.7	
Rural	925,300	927	20.1	17.8	22.7	
Education						<0.001
No Formal Education	313,585	234	29.3	24.2	27.7	
Primary Education	996,493	648	24.6	21.6	28.0	

Secondary Education	2,273,272	1,101	22.2	20.5	24.1	
Tertiary Education	1,564,013	668	28.1	25.5	30.9	
Marital Status						<0.001
Single/Widow(er)/ Divorcee	2,178,040	1,040	29.2	26.9	31.7	
Married	3,002,678	1,628	22.1	20.5	23.9	
Occupation						<0.001
Government employee	343,434	248	22.2	17.9	27.2	
Private employee	1,678,578	618	20.7	18.4	23.2	
Self employed	579,782	283	16.1	13.4	19.2	
Retiree	233,253	150	29.8	24.0	36.3	
Student	320,755	115	42.9	35.4	50.8	
Unpaid worker/ Homemaker/ Caregiver/ Not working (unemployed, health problem, old age)	2,021,502	1,253	32.6	30.1	35.2	
Household Income						0.004
Low	1,730,505	1,024	22.4	20.2	24.7	
Middle	1,848,980	856	24.4	22.2	26.7	
High	1,195,293	561	27.0	23.7	30.6	
Diabetes						<0.001
Yes	1,161,676	796	30.4	27.8	33.1	
No	4,011,371	1,869	23.3	21.8	25.0	
Hypertension						<0.001
Yes	1,782,426	1,175	28.3	26.3	30.5	
No	3,388,013	1,489	23.0	21.3	24.8	
Hypercholesterolaemia						<0.001
Yes	1,347,174	875	29.5	27.3	31.8	
No	3,825,873	1,790	23.3	21.7	25.0	
Anaemia						0.009
Anaemic	1,185,163	714	28.0	25.2	31.1	
Not anaemic	3,674,494	1,823	23.5	21.8	25.2	
BMI Status						0.032
Underweight	371,211	170	28.7	23.7	34.2	
Normal	2,012,392	906	23.5	21.4	25.9	
Overweight	1,261,081	724	21.1	19.1	23.2	
Obese	875,081	495	22.6	20.0	25.5	

Table 2 shows that according to age group, adults aged 40 – 59 years (aOR 0.72; 95% CI: 0.59, 0.88) were less likely to be inactive compared to age group 18 – 39 years old. Chinese (aOR 1.32; 95% CI: 1.04, 1.67) were more likely to be physically inactive compared to the Malays (including Orang Asli). Physical inactivity was significantly higher among urban dwellers (aOR 1.30; 95% CI: 1.07, 1.57), single adults including widow or widower and divorcee (aOR 1.36; 95% CI: 1.14, 1.61). Students (aOR 2.10; 95% CI: 1.30, 3.40) were the most likely to be inactive among the occupation category. Adults with high income which is in Quintile 5 income group were 1.34 times (aOR 1.34; 95% CI: 1.07, 1.68) more inactive compared to other income groups. Based on non-communicable disease status, adults with hypercholesterolaemia (aOR 1.25; 95% CI: 1.03, 1.51) were more likely to be physically inactive compared to non-hypercholesterolaemia adults. However, there is no significant association between physical inactivity and BMI status.

Table 2 Factors Associated with Physical Inactivity among Adults Aged 18 Years and Above in Malaysia (n= 10,356)

Variables	CRUDE OR	95% CI		p-value	ADJUSTED OR	95% CI		p-value
	OR	Lower	Upper		OR	Lower	Upper	
Sex								
Female	1.41	1.23	1.62	<0.001	1.14	0.94	1.37	0.177
Male	Ref				Ref			

Age Group (Years)								
18-39	Ref				Ref			
40-59	0.74	0.64	0.86	<0.001	0.72	0.59	0.88	0.001
≥ 60	1.96	1.65	2.32	<0.001	1.25	0.93	1.69	0.140
Ethnicity								
Malay (including Orang Asli)	Ref				Ref			
Chinese	1.44	1.19	1.75	<0.001	1.32	1.04	1.67	0.024
Indian	1.03	0.78	1.35	0.853	0.87	0.64	1.20	0.397
Bumiputera of Sabah or Sarawak	0.83	0.67	1.03	0.089	0.90	0.72	1.12	0.337
Others	0.33	0.21	0.53	<0.001	0.41	0.26	0.65	<0.001
Locality								
Urban	1.39	1.16	1.65	<0.001	1.30	1.07	1.57	0.008
Rural	Ref				Ref			
Education								
No Formal Education	1.06	0.78	1.43	0.704	0.88	0.59	1.32	0.539
Primary Education	0.84	0.68	1.04	0.102	0.89	0.68	1.17	0.414
Secondary Education	0.73	0.62	0.86	<0.001	0.85	0.70	1.03	0.091
Tertiary Education	Ref				Ref			
Marital Status								
Single/ Widow(er)/ Divorcee	1.45	1.26	1.68	<0.001	1.36	1.14	1.61	<0.001
Married	Ref				Ref			
Occupation								
Government employee	Ref				Ref			
Private employee	0.91	0.68	1.23	0.540	0.90	0.67	1.22	0.501
Self employed	0.67	0.48	0.95	0.023	0.71	0.50	1.01	0.056
Retiree	1.49	1.01	2.20	0.045	1.03	0.64	1.66	0.902
Student	2.63	1.74	3.99	<0.001	2.10	1.30	3.40	0.002
Unpaid worker/ Homemaker/ Caregiver/ Not working (unemployed, health problem, old age)	1.69	1.26	2.27	<0.001	1.32	0.95	1.83	0.096
Household Income								
Low	Ref				Ref			
Middle	1.12	0.94	1.34	0.218	1.19	0.99	1.45	0.070
High	1.28	1.03	1.61	0.028	1.34	1.07	1.68	0.011
Diabetes								
Yes	1.43	1.24	1.66	<0.001	1.21	0.99	1.47	0.058
No	Ref				Ref			
Hypertension								
Yes	1.32	1.15	1.51	<0.001	1.156	0.948	1.408	0.151
No	Ref				Ref			
Hypercholesterolaemia								
Yes	1.38	1.20	1.58	<0.001	1.25	1.03	1.51	0.023
No	Ref				Ref			
Anaemia								
Anaemic	1.27	1.06	1.52	0.009	1.04	0.85	1.27	0.737
Not anaemic	Ref				Ref			
BMI Status								
Underweight	1.31	1.00	1.71	0.053	1.29	0.98	1.70	0.068
Normal	Ref				Ref			
Overweight	0.87	0.75	1.01	0.069	0.93	0.79	1.09	0.363
Obese	0.95	0.78	1.16	0.615	0.93	0.75	1.15	0.501

DISCUSSION

The prevalence of physical inactivity among adults aged 18 years and above in Malaysia was 24.6%. By comparing to the other study which used the IPAQ among 18-65 years old, physical inactivity among adults in Malaysia was higher compared to China

(6.9%), India (23.4%), Hong Kong (15.3%; age 20-64 years); but lower compared to Japan (43.3%; age 18-39 years) and Taiwan (42.3%).[4]

In this study, there was no significant difference in physical inactivity between males and females which suggesting gender equity in physical activity. Gender equity practice fair allocation of resources and opportunities for both females and males, eliminate discrimination that are barrier of full participant of either gender and to provide all individuals with access and opportunity to almost all activities.[12] By age group, older adults aged 40-59 years old were less likely to be physically inactive compared to younger adults aged 18-39 years old. Total energy expenditure might decline significantly with age but the level of physical activity appears to be maintained from young adulthood until reaching upper- middle age suggesting our present environment is quite sedentary for young people or the physical activity is maintained throughout adulthood and retirement years before declining as ageing progress.[13] Physical activity in adolescent is an important contributing factor towards level of physical activity during adults and subsequently can affect adult's health.[14]

Chinese ethnic group was more likely to be physically inactive compared to other ethnicities, similar as reported by NHMS 2011.[5] A study by Lian et al showed that there was a significant negative relationship between the Chinese ethnic group and physical activity, indicating that the Chinese population have less engagement in physical activity compared to other ethnicities.[15] Their engagement in light, moderate and vigorous physical activity is very low compared to other ethnicities suggesting some normative aspects of Malaysian Chinese culture that discourage exercise.[15] Chinese origin among Asia were consistently found to have lower level of exercise than other origins as they considered exercise as play, thus less priority than studying hard and physical activity in educational policy.[16] By locality, urban dwellers showed a higher level of physical inactivity compared to rural dwellers because of stressful lifestyle[17] or high travelling cost for longer distance physical activity facility or setting[18], thus less devoted time and engaging in physical activity.

Those who were single were more likely to be physically inactive than the married adults. Family relationships posed an important role in motivating them to participate in physical activity.[19] Having children increases the probability of adults to be physically active, but decreasing about three to five minutes of time spent on physical activity for each additional child in the household.[20] Findings also showed that student (may referred to college students, university students, or anyone those further their study or advanced studies) were the most physically inactive groups. Studies showed that the rate of physical activity during college years was lower than the rate of physical activity during the high school years.[21] A study among 145 Canadian university undergraduates showed that 62.2% of the students were active during the last two months of their high school but decreasing to 44% in their first two months in university.[22]

Our study showed that the higher the level of household income, the less likely that persons to be physically active. Higher household income earners tend to substitute working for leisure-time physical activity, causing a more sedentary lifestyle.[23] A study using Behavioral Risk Factor Surveillance System (BRFSS) showed that a $10,000 increase in income per year associated with a decreasing of 8 to 41 minutes time spent in physical activity per week.[20,23] A study on relationship of income and physical activity using NHMS 2011 data showed that there is a reduction of 0.011 minutes per week in time spent in vigorous and moderate physical activity with an additional unit of income.[24] In Malaysia, all individual residents were eligible a maximum of RM2500 tax relief by Inland Revenue Board of Malaysia with purchase of sports equipment for any sports activity as defined under the Sports Development Act 1997 and payment of gym membership. This should encourage the higher income earners to do more physical activity, hence increasing their intensity and duration of doing it.

Physical inactivity was significantly higher among those with hypercholesterolaemia. A study among communities in Sarawak showed that there is an association between blood cholesterol with physical inactivity.[25] There is a reduction in physical activity associated with increasing numbers of chronic conditions including diabetes, heart disease and effects of a stroke.[26] The Medical Expenditure Panel Survey (MEPS) for the U.S. population showed that prevalence of moderate or vigorous physical inactivity were higher among diabetic adults; also a higher prevalence of physical inactivity among those with diabetes and hyperlipidaemia.[27] A systematic review showed that there is a weak to moderate evidence to support association of sedentary lifestyle and unhealth eating patterns with cardio-metabolic risk among Malaysian adolescents[28], which will subsequently indicate their future negative health consequences. Thus, intervention in adolescents/children are not only effective and cost effective, but also improve children's quality of life and may reduce lipid related risk to their health in adulthood.[29] A high level of physical fitness and/ or physical activity during adolescence and young adulthood can be predictive for a healthy cardiovascular risk profile later in life.[30]

These findings may be limited by the measurement of the METs that focusing on sports or exercise that may lead to underestimate or overestimate of level of physical activity. Females

always associated with habitual movements such as doing household chores or as a family care taker, with more time for home activity than physical activity.[23] Future study should be done by different objective measured, for example by assessing methods and analysis of energy expenditure to determine the intensity level rather than grouping into intensity group.

The self-reported physical activity also might introduce recall bias. However, this study provided the best nationally representative data on physical activity using validated tools.

CONCLUSION

There is a crucial need to create specific and appropriate intervention programmes towards specific targeted group such as Chinese, urban dwellers, adults who were single, students, higher income earners and those who have hypercholesterolaemia to increase their levels of physical activity. An active living for population good health and wellbeing should be promoted, towards an active and healthy Malaysia as vision in National Strategic Plan for Active Living (NASPAL) 2017 – 2025 in order to achieve targets by the Sustainable Development Goals (SDG) 2030.

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