Mal J Nutr 17(3): 385 - 391, 2011

Short Communication

Influence of Socio-demographic Factors on Physical Activity Participation in a Sample of Adults in Penang, Malaysia

Cheah YK*

Faculty of Economics and Administration, University of Malaya, 50603 Kuala Lumpur, Malaysia.

ABSTRACT

Introduction: Given the importance of physical activity to health, this study investigated the socio-demographic determinants of physical activity participation in a sample of adults in Penang. **Methods:** Through convenience sampling, a total of 398 adults agreed to answer a prepared questionnaire on their socio-demographic background and physical activity participation. The data were analysed using the binary logit model. Frequent physical activity participation is defined as taking part more than 11 times in leisure-time physical activity such as swimming and jogging, each time lasting more than 15 minutes in a typical month, whereas participation that is less than the frequency and time duration specified above is referred to as infrequent physical activity. **Results:** Age, male, being Chinese, high educational attainment, self-rated excellent health status and presence of family illnesses are positively associated with the likelihood of frequent participation in physical activity. On the contrary, being married, having low income and residing in rural areas are inversely related with the propensity of frequent physical activity participation. **Conclusion:** The majority in this sample of adults do not participate in physical activity frequently, and the reasons given include lack of health awareness, limited leisure time, budget constraints, and lack of sports amenities.

Keywords: Physical activity participation, socio-demographic determinants

INTRODUCTION

Chronic diseases such as diabetes mellitus, cancer, obesity, hypertension and cardiovascular diseases have become increasingly more prevalent globally. Reports of the World Health Organization (2003; 2005) indicate that 60% of the mortality cases in the world are caused by chronic diseases and of the total death cases, 80% occurred in the less developed and developing countries. By the year 2020, it is predicted that about 75% of death cases globally will be related to chronic diseases (Disease Control Division, 2006).

It is well established that unhealthy dietary habits and lifestyle are the main factors contributing to these chronic diseases. As pointed out by Blair, Cheng & Holder (2001), physical inactivity is one of the major contributors to the global burden of chronic diseases. Likewise, others have shown that regular engagement in physical activity can reduce the risk of suffering from chronic diseases and mental health problems (Batty & Lee, 2004). Further, from

* Correspondence author: Cheah YK; Email: *cheahykang@gmail.com*

the economic point of view, frequent physical activity participation is claimed to lead to a reduction in healthcare costs (Downward & Rasciute, 2010).

Following the global rising trend, the prevalence of chronic disease in Malaysia has become a serious issue in the recent decades, whereby as much as two-thirds (71%) of all deaths in the country are related to chronic diseases (World Health Organization, 2010). In terms of monetary costs, there exists a problem of excess increment in medical expenditure in the country, given the sharp rise in chronic diseases. As the Institute for Public Health (2008a) revealed, Malaysia's per capita spending on health care has increased tremendously from RM379 in 1997 to RM555 in 2002.

It is estimated that nearly half (43.7%) of the Malaysian adult population are not physically active (Institute for Public Health, 2008b). Poh *et al.* (2010) reports that only 31.3% of the Malaysian population have ever-exercised, and a very small portion (14%) has adequate exercise.

The socio-demographic and lifestyle-behavioral determinants of physical activity have been well studied, especially in western countries (Lechner, 2009; Wicker, Breuer & Pawlowski, 2009; Downward and Rasciute, 2010; Eberth & Smith, 2010). This study aims to provide similar information among Malaysian adults.

METHODOLOGY

Based on convenient sampling, a structured bi-lingual (Malay and English) set of questionnaires was distributed to adults of various ethnic backgrounds encountered in public places in Penang such as shopping malls, offices and cafes. For those who agreed to fill the questionnaire, a brief explanation was provided upon giving out the questionnaires. The respondents were asked to indicate the frequency and time spent in physical activity in a typical month. In addition, details on respondents' socio-demographics, lifestyle and health background were also requested during the survey.

Model development

Following the measurement used in the study of Kaplan *et al.* (2001), individuals who participated more than 11 times in a month of leisure-time physical activity (e.g. swimming, jogging, exercise class, etc.) that lasts more than 15 minutes per session are classified as having frequent physical activity participation. Thus, leisure-time physical activity of 11 times or less in a month is described as infrequent.

Reviewing previous studies, the following variables were anticipated to have an impact on the likelihood of engaging in physical activity: (1) age; (2) gender; (3) ethnicity; (4) marital status; (5) income; (6) education; (7) residential area; (8) self-rated health status; (9) family health background (Table 1).

Statistical analysis

The dependent variable was measured as binary outcome (dummy variable), whereby the respondent who participates in physical activity frequently is coded as 1, otherwise 0. As such, the binary logit model fits the current study, as it can predict the probabilities that lie in the unit interval (Greene, 2007). Similarly, such a logit model has been applied by the study of Kaplan *et al.* (2001) to analyse the likelihood of frequent physical activity participation as well. Generally, the logit model is written as follows:

$$\log \frac{P}{1-P} = \alpha + \beta_i X_i + \varepsilon \tag{1}$$

where, P = the probability that a respondent participates in physical activity frequently; $1 - P$ = the probability that a respondent does not participate in physical activity frequently; $P/(1 - P)$ = the odds that a

Table 1. Definition of variables in the statistical model

Variables	*Definition*
Dependent variable	
Physical activity	Respondent who has frequent physical activity participation (1= yes, 0 = no)
Explanatory variables	
Age	Respondent's age (years)
Gender	Respondent is male (1 = yes, 0 = no)
Malay*	Respondent is Malay (1 = yes, 0 = no)
Chinese	Respondent is Chinese (1 = yes, 0 = no)
Indian / other	Respondent is Indian / other (1 = yes, 0 = no)
Marital status	Respondent is married (1 = yes, 0 = no)
Low	Respondent's monthly individual income is RM 0 – 999 (1 = yes, 0 = no)
Lower-middle	Respondent's monthly individual income is RM 1000 – 2999 (1 = yes, 0 = no)
Upper-middle	Respondent's monthly individual income is RM 3000 – 5999 (1 = yes, 0 = no)
High*	Respondent's monthly individual income is ≥ RM 6000 (1 = yes, 0 = no)
Tertiary	Respondent has tertiary education (1 = yes, 0 = no)
Residential area	Respondent lives in rural area (1 = yes, 0 = no)
Self-rated health	Respondent self-rated his / her health as excellent (1 = yes, 0 = no)
Family illness	Respondent has a history of family illness (1 = yes, 0 = no)

Note: *Refers to reference group.

Income: Monthly income is segmented into four groups based on the studies of Dunn & Tan (2010) and Tan *et al.* (2011): low (RM 0 – 999), lower-middle (RM 1000 – 2999), upper-middle (RM 3,000 – 5,999) and high (≥ RM 6,000).

Family illness: Family medical history is taken into account as 1 if individuals reported having a history of serious family illness (e.g. hypertension, diabetes, cardio-heart disease, stroke and sudden death) and 0 otherwise.

respondent participates in physical activity frequently; X = explanatory variables which are anticipated to explain or predict the probability of having frequent physical activity participation; β = coefficients for the explanatory variables; ε = error term.

RESULTS

Age, gender, ethnicity (Chinese), marital status, income (lower-middle and upper-middle), education, residential area, self-rated health and a history of family illnesses were statistically significant in affecting the probability of participation in physical activity frequently (Table 2). Specifically, being of old age, male, Chinese, high income, unmarried, well-educated, urbanite, excellent health and presence of history of serious family illnesses were associated with a higher propensity of having frequent physical activity participation. In contrast, being Indian or of other ethnicity, and a low income do not possess any notable impact on physical activity participation.

In order to test the goodness-of-fit of the model, the likelihood ratio (LR) test and Hosmer-Lemeshow tests were conducted. This result indicates that the model has a value of LR chi-square = 63.08 (12 degrees of freedom) at p< 0.0000. Hence, the null hypothesis is rejected, and one concludes that the model is good fit. Also, the Hosmer-

Table 2. Descriptive statistic of variables in the statistical model

Variables	*Self-reported frequent physical activity participation (N = 84)*		*Self-reported infrequent physical activity participation (N = 314)*		*Total sample (N = 398)*	
	Mean (%)[a]	*Std. Dev.*	*Mean (%)*	*Std. Dev.*	*Mean (%)*	*Std. Dev.*
Age	38.65	14.24	36	13.38	36.56	13.59
Gender	60	-	40	-	44	-
Malay	25	-	41	-	38	-
Chinese	57	-	37	-	41	-
Indian / other	18	-	22	-	21	-
Marital status	45	-	51	-	50	-
Low	40	-	30	-	32	-
Lower-middle	31	-	49	-	45	-
Upper-middle	17	-	20	-	19	-
High	13	-	2	-	4	-
Tertiary	74	-	62	-	65	-
Self-rated health	46	-	33	-	36	-
Residential area	83	-	25	-	21	-
Family illness	57	-	49	-	51	-

Note: [a] For continuous variables, the value refers to mean, whereas for binary variables, the value refers to percentage.

Lemeshow chi-square = 6.70 (8 degrees of freedom) is statistically insignificant at 1%, 5% and 10% levels. Thus, the null hypothesis cannot be rejected, and further confirms that the model is good fit (Table 3).

This model found age, gender, ethnicity, marital status, income, education, residential area, self-rated health and history of serious family illnesses to have significant effect on an individual's decision to engage in frequent physical activity. With regard to age, an increase of one year of age can lead to 0.0222 increase in log of the odds of frequent physical activity participation, while the odds ratio of frequent physical activity participation for an additional year of age is 1.0224.

The model further showed that the log of the odds and odds ratio of frequent physical activity participation for males were 0.8809 and 2.4132, respectively. In terms of ethnic background, given Malays as reference group, the log of the odds of participating in physical activity frequently for Chinese was 0.6089, whilst its odds ratio was 1.8384. Meanwhile, Indian / other ethnicity were found not to be significant in the study. Expectedly, married individuals possessed -0.6465 and 0.5239 of log of the odds and odds ratio of being physically active, respectively, in comparison with their single, divorcéd and widowed counterparts.

In terms of income, individuals who were in the lower-middle income group showed -1.3302 of log of the odds and 0.2644 of odds ratio of frequent physical activity participation compared to their reference group with high income. Likewise, those who belonged to the upper-middle income group had -1.7795 and 0.1687 of log of the odds and odds ratio of engaging in physical activity frequently, respectively. Comparatively, the low income cohort was found to have no significant impact.

As for education, individuals who had attained at least a tertiary education level

Table 3. Results for logit analysis of frequent physical activity participation

Variables	*Estimated Coefficient*	*Odds Ratio*	*Z-statistics*
Constant	-2.2864 (1.0263)	-	-2.23
Age	0.0222 (0.0133)	1.0224 (0.0136)	1.67*
Gender	0.8809 (0.2870)	2.4132 (0.6925)	3.07***
Chinese	0.6089 (0.3393)	1.8384 (0.6238)	1.79*
Indian / other	-0.0302 (0.4127)	0.9703 (0.4004)	-0.07
Marital status	-0.6465 (0.3348)	0.5239 (0.1754)	-1.93*
Low	-0.7379 (0.6593)	0.4781 (0.3152)	-1.12
Lower-middle	-1.3302 (0.6533)	0.2644 (0.1727)	-2.04**
Upper-middle	-1.7795 (0.6566)	0.1687 (0.1108)	-2.71***
Tertiary	0.7746 (0.3753)	2.1697 (0.8142)	2.06**
Residential area	-1.2431 (0.4441)	0.2885 (0.1281)	-2.80***
Self-rated health	0.6742 (0.2905)	1.9624 (0.5701)	2.32**
Family illness	0.5082 (0.2863)	1.6622 (0.4759)	1.77*
LR χ^2 (12)	63.08		
P > χ^2	0.0000		
Hosmer-Lemeshow χ^2 (8)	6.70		
P > χ^2	0.5690		

Note: Asymptotic standard errors in parentheses. Asterisks indicate significance at the ***1% , ** 5%, and * 10% levels.

showed 0.7746 of log of the odds for participating in physical activity more frequently than their lower educated counterparts. Besides, they also had a 2.1697 of odds ratio of frequent physical activity participation.

Individuals who reside in rural areas have -1.2431 and 0.2885 of log of the odds and odds ratio of frequent physical activity participation, respectively, in relative to their urbanite counterparts. With reference to self-rated health, individuals who perceive their own health as excellent are found to have 0.6742 and 1.9624 of log of the odds and odds ratio of frequent physical activity participation, respectively.

Last but not least, individuals who have a history of serious family illnesses have a 0.5082 of log of the odds and 1.6622 of odds ratio for frequent physical activity participation compared to their counterparts without such a family background.

DISCUSSION

As the results indicate, age is positively associated with the likelihood of being engaged in physical activity frequently. In essence, this is following the notion that frequent physical activity participation could bring about better health, thus the possession of greater health awareness among the older individuals would invariably result in a higher propensity toward physical activity participation. Nonetheless, others have found contradictory findings (Farrell & Shields, 2002; Scheerder, Vanreusel & Taks, 2005; Downward & Riordan, 2007).

The current results are in agreement with the findings of Humphreys & Ruseski (2007), Wicker *et al.* (2009) and Downward & Rasciute (2010), with respect to the significant effects of gender on physical activity participation. It is noted that Penang males are more likely to participate in frequent physical activity than females. The reason may be due to the multi-roles that women perform in the house that leaves them less time for physical activities.

Chinese adults are more likely than Malays to participate in frequent physical activity , perhaps, due to cultural influences. Married individuals are less likely to take part in physical activity as frequently as those who are single, divorced or widowed. This outcome is fairly consistent with the findings of Humphreys & Ruseski (2007) and Eberth& Smith (2010). Household commitments often borne by married individuals could pose a restriction to frequently engage in leisure-time physical activities.

Conforming to the earlier evidences posited by Farrell & Shields (2002) and Lechner (2009), income was found here to assert a positive association with the propensity for physical activity participation. Probably the higher income group, being more health conscious, tries to find time for physical activity. Likewise, individuals with tertiary educational attainment have a higher probability of taking part in physical activity more frequently than their counterparts with a lower education background. Individuals who self-perceive their health condition as excellent are more likely to have frequent physical activity participation than those who assess their own health as fair or poor. This is in line with the notion that unwell individuals facing diminishing health status are more prone to perceive constraints for taking part in physical constraint activities (Farrell & Shields, 2002; Eberth & Smith, 2010).

Rural dwellers are less likely to have frequent physical activity participation as compared to their urbanite counterparts. The reason for this is that physical activity settings such as leisure and sports facilities are commonly undersupplied in the rural areas, thus causing the dwellers to face more difficulty in physical activity participation (Scheerder, Vanreusel & Taks, 2005).

CONCLUSION

Health programmes aimed at increasing physical activity among adults should take into consideration the significant influence of several socio-demographic factors on physical activity as found in this study. Besides, having more community exercise and sports facilities and recreational parks are recommended to encourage people to be physically active.

LIMITATIONS OF STUDY

Given the time and budget constraints, a limitation of the present study is recognised. The survey data did not include certain variables found by previous studies to be significant in affecting physical activity participation, such as the presence of children in a family, smoking status, and the distance from workplace or home to a physical activity setting. Hence, future studies should take into consideration the impact of these variables.

ACKNOWLEDGEMENTS

The author is grateful to an anonymous reviewer and the journal's editor Prof. Dr. Khor Geok Lin for their insightful comments and suggestions on this manuscript. All remaining flaws are the author's responsibility and the usual disclaimer applies.

REFERENCES

Batty GD & Lee IM (2004). Physical activity and coronary heart disease. *Brit Med J* 328(7448): 1089-1090.

Blair S, Cheng YL & Holder JS (2001). Is physical activity or physical fitness more important in defining health benefits? *Med Sci Sport Exercise* 33(6): 379-399.

Dunn RA & Tan AKG (2010). Cervical cancer screening in Malaysia: Are targeted interventions necessary? *Soc Sci Med* 71(6): 1089-1093.

Disease Control Division (2006). Malaysia NCD Surveillance 2006: NCD Risk Factors in Malaysia. Ministry of Health, Malaysia.

Downward P & Rasciute S (2010). The relative demands for sports and leisure in England. *Eur Sport Manage Quart* 10(2): 189-214.

Downward P & Riordan J (2007). Social interactions and the demand for sport: An economic analysis. *Contemp Econ Pol* 25(4): 518-537.

Eberth B & Smith MD (2010). Modelling the participation decision and duration of sporting activity in Scotland. *Econ Modelling* 27(4): 822-834.

Farrell L & Shields MA (2002). Investigating the economic and demographic determinants of sporting participation in England. *J Roy Statistical Society* 165(2): 335-348.

Greene WH (2007). Econometric Analysis, 6th ed. NY: Prentice Hall.

Humphreys BR & Ruseski JE (2007). Participation in physical activity and government spending on parks and recreation. *Contemp Econ Pol* 25(4): 538-552.

Institute for Public Health (IPH) (2008a). The Third National Health and Morbidity Survey (NHMS III) 2006, Health Expenditure. Ministry of Health, Malaysia.

Institute for Public Health (IPH) (2008b). The Third National Health and Morbidity Survey (NHMS III) 2006, Physical Activity. Ministry of Health, Malaysia.

Kaplan MS, Newsom JT, McFarland BH & Lu L (2001). Demographic and psychosocial correlates of physical activity in late life. *Am J Prev Med* 21(4): 306-312.

Lechner M (2009). Long-run labour market and health effects of individual sports activities. *J Health Econ* 28(4): 839-854.

Poh BK, Safiah MY, Tahir A, Siti Haslinda MD, Siti Norazlin N, Norimah AK, Wan Manan WM, Mirnalini K, Zalilah MS, Azmi MY & Fatimah S (2010). Physical activity pattern and energy expenditure of Malaysian adults: Findings from the Malaysian Adult Nutrition Survey (MANS). *Mal J Nutr* 16(1): 13-37.

Scheerder J, Vanreusel B & Taks M (2005). Stratification patterns of active sport involvement among adults: Social change and persistence. *Int Rev Sociol Sport* 40(2): 139-162.

Tan AKG, Dunn RA, Samad MIA & Feisul MI (2011). Socio-demographic and health-lifestyle determinants of obesity risks in Malaysia. *Asia Pac J Publ Health* 23(2): 192-202.

Wicker P, Breuer C & Pawlowski T (2009). Promoting sport for all to age-specific target groups: The impact of sport infrastructure. *Eur Sport Manage Quart* 9(2): 103-118.

World Health Organization (2005). Preventing chronic diseases: A vital investment. (WWW document). URL *www.who.int* [Accessed 22February 2011].

World Health Organization (2010). The Impact of Chronic Disease in Malaysia. (WWW document). URL *www.who.int* [Accessed 22 September 2010].

World Health Organization (2003). World Health Report 2003: Shaping the Future. (WWW document). URL *www.who.int* [Accessed 22 February 2011].