THE THIRD
NATIONAL HEALTH AND MORBIDITY SURVEY
2006
(NHMS III)

PHYSICAL ACTIVITY

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THE THIRD NATIONAL HEALTH AND MORBIDITY SURVEY 2006 (NHMS III)

PHYSICAL ACTIVITY

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MESSAGE FROM THE DIRECTOR GENERAL OF HEALTH MALAYSIA

Since independence, Malaysia has achieved remarkable progress economically and socially, notably in the health sector, through a well planned and comprehensive health care delivery system. However, Malaysia's health care system still has to grapple with many challenges, particularly the rising costs of health care and the increasing demands and expectations for quality care by our consumers. In this respect, the Ministry of Health formed the 'National Institutes of Health' to spearhead health research that will provide the body of evidence to help formulate health policies and create new tools to measure health impacts arising from the series of interventions made in the provision of health care. This will lead to an environment of better governance.

The first National Health & Morbidity Survey (NHMS) was conducted in 1986 by the Institute for Public Health (IPH) which is currently one of the research organizations under the umbrella of the National Institutes of Health (NIH). IPH was also given the task of conducting the second NHMS II in 1996 and the current NHMS III in 2006. Data and information gathered by these surveys are consistently and extensively been used by the Ministry of Health in formulating the Malaysian Health Plans and evaluating the intervention programmes.

The publication of the current NHMS III report would generate much interest amongst of all health care stakeholders in the country as well as international health organizations. It is my sincere wish that the data and information generated by NHMS III be fully distributed, discussed and utilized to enhance further the provision of health care in this country. The date generated on the national health and health- related prevalence would be useful in assessing the national health burden as well as allowing for international comparison of health systems achievements.

I would like to take this opportunity to congratulate all those directly involved in the conduct of the survey, namely members of the National Steering Committee, the Advisory Committee, Research Groups and the Working Committee for their untiring efforts in the planning and conduct of the survey as well as publication of the reports. I would like to specially place on record the Ministry's appreciation of the excellent work done by the Principal Investigator and his team and for their dedication and tenacious efforts in spearheading this project to fruition. The Ministry of Health is committed to conduct these National Health and Morbidity Surveys on a regular basis and hope that IPH will continue to provide the leadership in conducting future National Health and Morbidity Surveys in this country.

Thank you.

Tan Sri Datuk Dr Hj. Mohd Ismail Merican
Director General of Health, Malaysia.

MESSAGE FROM THE DEPUTY DIRECTOR GENERAL OF HEALTH (RESEARCH AND TECHNICAL SUPPORT)

The Research and Technical Support Programme of the Ministry of Health emphasizes the need for research in supporting decision making and planning the activities in the Ministry. Only then can we ensure that every decision made either in planning resources or providing services to the people is supported by evidence based information and ensuring better results and outcome. We would certainly prefer local expertise rather than depend on foreign experts to carry out local research.

Under the umbrella of the National Institutes of Health, the Institute for Public Health has actively been involved in conducting research in public health and the National Health and Morbidity Survey is one of the major research conducted by IKU. This is the third time IKU has been given the responsibility to conduct such a mammoth task. I am very pleased that a lot of improvement have been made in the way this survey was conducted based on the experience learnt during the first and second surveys. However, due to the nature of the community survey, not all diseases and health issues were able to be covered in this survey. The research teams had to conduct an extensive literature reviews for relevant and up to date information on the health status of the Malaysian population.

I believe that the information in these reports are extremely valuable to all decision makers at the National State and district levels as well as those interested in the health of the Malaysian population. It can be a tool in providing guidance in developing and implementing strategies for the disease prevention and control programme in Malaysia.

I would like to take this opportunity to congratulate the research team members who have successfully undertaken and completed this survey. I would also like to thank all individuals and agencies who directly or indirectly made the completion of this survey possible.

The Institute for Public Health again gained a feather in its cap by successfully completing the Third National Health and Morbidity Survey.

Datuk Ir. Dr. M. S. Pillay,
Deputy Director General of Health (Research and Technical Support).

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Datuk Ir. Dr. M. S. Pillay,
Deputy Director General of Health (Research and Technical Support).

MESSAGE FROM THE DIRECTOR OF INSTITUTE FOR PUBLIC HEALTH

This is the third time the Institute for Public Health (IPH) was given the task to conduct the National Health and Morbidity Survey. The frequency of the study is every 10 years and I am proud that the Institute is able to conduct the surveys successfully since it was first initiated in 1986.

I would like to take this opportunity to thank the Director-General of Health Malaysia, Tan Sri Datuk Dr. Hj. Mohd Ismail Merican, and the Deputy-Director General of Health (Research and Technical Support), Datuk Ir Dr.M.S. Pillay, whose invaluable support and guidance were instrumental in the successful completion of the third National Health and Morbidity Survey (NHMS III). Our appreciations are also extended to all members of the Steering Committee and the Advisory Committee of NHMS III.

I would like also to take this opportunity to congratulate the Principal Investigator and his Project Team Members in completing the NHMS III study and the publication of its report. The NHMS III was made possible through the collaboration of all agencies. The meetings, workshops and conferences that were organised, met their intended objectives and the hard work put up by the field staffs, ensured the three months data collection productive and successful.

My sincere gratitude also goes to Dr.Nirmal Singh, the former Director of the Institute for Public Health, Chairman of the Advisory Committee for his continuous support and guidance which contributed towards the successful completion of the study.

I hope the documentation of this report will be beneficial for future reference.

Finally, I would like to thank all those involved in the survey for a job well done, in making the NHMS III a success and finally producing the national report of this survey.

Dr. Yahya Baba,
Director, Institute for Public Health.

MESSAGE FROM THE PRINCIPAL INVESTIGATOR NHMS III

It is indeed a challenging task when the responsibility was given to me to conduct this survey. I learned the hard way and gained a lot of valuable experience in leading the survey. The survey also taught me lots of new techniques and how it should be addressed which is not available in the textbook. In doing so, I also learned the meaning of friendship and honesty, how to manage people involved and manage properly the given budget.

I would like to take this golden opportunity to thank the Director General of Health Malaysia, Tan Sri Datuk Dr. Hj. Mohd Ismail Merican, Chairman of the Steering Committee for giving me the confidence, valuable support and guidance for the success of this survey.

I would also like to thank the Deputy Director General of Health Malaysia (Research and Technical Support), Datuk Ir. Dr. M.S. Pillay as Co-chairman of the Steering Committee for his patience in seeing through the survey until its completion the production of the national report.

My sincere appreciation to current Director of Institute for Public Health (IPH), Dr.Yahya Baba and former Directors of IPH, Dr.Nirmal Singh, Dr.Sivashamugam and Dr.Sulaiman Che Rus for their trust in me to carried out this survey. Their support for the survey has resulted the smooth conduct and success of the survey.

Special thanks to all State Directors, State Liaison Officers, Field supervisors, Scouts, Data Collection Team members for their full cooperation and efforts to ensure the success of the data collection. My appreciation is also extended to the Assistant Principal Investigator, Dr.Mohd Azahadi Omar, Main Research Group members, members of the Working Committee, Data Management group members, Statistics Consultant, Research group members , Research Officers and Research Assistants for their patience and tolerance of my behaviour to ensure the success of the study. Nevertheless I acknowledge a lot more can be done in strengthening the study.

I believe this report will serve as a useful reference for future surveys and helps in improving the local data sources and also add new valuable information for the Ministry of Health to use in the planning process. I also would like to encourage all research members to participate in further analysis of the data and publish the findings in peer review journals.

Thanks to everyone.

Dr. Hj. Ahmad Faudzi Hj. Yusoff,
Principal Investigator, The Third National Health and Morbidity Survey,
Institute for Public Health.

AUTHOR'S STATEMENT

This volume is the culmination of several months of collaborative effort by the authors who have strived to ensure the integrity of this work.

The findings in this volume have adjusted for the differences in population composition of the survey sample and the 2006 Malaysian population.

The authors welcome any inquiries, comments and suggestions for further improvement of this volume.

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We, the authors, wish to express sincere gratitude and appreciation to the

- Third National Health and Morbidity Survey Steering Committee and Advisory Committee
- Directors of all State Health Departments
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- Director, Institute for Public Health
- Director, Institute for Health Behaviour Research
- Principal Investigator, Third National Health and Morbidity Survey
- All individuals who have been involved directly or indirectly in this research project.

Expertise and useful comments from reviewers and editors are gratefully acknowledged. However, any errors and omissions are those of the authors.

ABSTRACT

OBJECTIVE: To measure the prevalence and pattern of physical inactivity, in Malaysian adults aged 18 years and above.

METHODS: A cross-sectional population-based household survey with two-stage stratified sampling design involving a total of 33,933 subjects aged 18 years and above. Physical activity was conducted by face to face interview using the WHO-stepwise questionnaire focuses on a typical week of physical activity level. These questions were used to quantify the total amount of activity spent in three major life domains: working (including paid, unpaid and domestic work), travel and leisure time. Physical inactivity was defined as fewer than 150 minutes per week spent in moderate physical activities, fewer than 60 minute per week of vigorous physical activities and total MET minutes per week lesser than 600.

RESULTS: The prevalence of overall physical inactivity was 43.7%. The physical inactivity was higher in women, older age, urban residence and certain groups of occupation. The physical inactivity for the domain of working, travel and leisure time were 72.6%, 72.1% and 85.7% respectively. The average MET minutes per week of Malaysian adults involved in physical activity was 894 MET minutes per week which was above the average for health benefit (600 MET minutes per week) and it was contributed by a combination of physical activities in three life domains of working, travel and leisure time.

CONCLUSION: Almost half of the Malaysian adult population was physically inactive. Thus, it is recommended that health promotion on active lifestyle and intervention on physical inactivity should be targeted on population who were not active. Malaysian adults should be encouraged to be active in all three life domains in order to get the health benefit of physical activity.

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ABBREVIATIONS

CCT	Central Coordinating Team
CI	95% Confidence Interval
EB	Enumeration Block
HDL	High Density Lipoprotein
kcal/kJ	Kilocalories per kilojoules
LFS	Labour Force Survey
LQ	Living Quarters
MET	Metabolic Equivalent
NHMS	National Health and Morbidity Survey
WHO	World Health Organization

1. INTRODUCTION

Substantial increases in non communicable diseases including cardiovascular and stroke conditions, diabetes, cancers and respiratory problems have been observed in the developed and developing countries (World Health Organization (WHO) 2002). This is in line with concomitant increases in obesity and decreases in physical activity at the population level. Physical inactivity is associated with many of the leading causes of death, chronic morbidity and disability. Its role as a risk factor is at least as significant as hypertension, high cholesterol or unhealthy diet in contributing to non communicable diseases, major contributor to mortality and morbidity in Malaysia.

Physical activity protects against several cancers, reduces the risk of diabetes, improves mental health and may reduce the risk of falls and injuries in elderly. Physical activity of moderate intensity has been recommended for health and wellbeing since the time of Hippocrates (460 – 370 BC). Since the last two decades, there is a consistent epidemiological evidence identified that the physical activity is a major modifiable risk factor in the reduction of mortality and morbidity from many chronic diseases. The release in 1996 of the United States Surgeon General's report on physical activity and health (U.S Department of Health and Human Services 1996) gave physical activity an internationally recognized legitimacy as an important component of public health and wellbeing.

Participating in physical activity has important health benefits for the physical and mental health. In Malaysia, The Second National Health and Morbidity Survey 1996 (Institute of Public Health 1999) found that the prevalence of ever exercise and adequate exercise were 30.9% and 11.6% respectively. However, the study focused only on physical activity and exercise during leisure time whereby it did not reflex the true physical activity status in individual since other components of physical activity were not captured such as at work place and during travelling. Hence, a proper planning and the recommendation for intervention could not be done appropriately.

The aims of this study were to determine the status of physical inactivity in adult population which is comparable internationally, the pattern of the physical inactivity, and to recommend the appropriate intervention planning and program in order to reduce the mortality and morbidity related to physical inactivity

2. LITERITURE REVIEW

2.1 Epidemiology of physical inactivity

Physical activity is defined as the behaviours that result in 'any movement contributing to human total energy expenditure' (Caspersen & Stephens 1994). It includes all large muscle movement for whatever purposes, carried out throughout the day. 'Exercise' is a subset of 'total physical activity', being purposive and repetitive movements with the aim of improving measurable cardio-respiratory or other dimension of fitness. Exercise is usually comprised of more structured physical activities, often performed at vigorous intensity. The global estimate for the prevalence of physical inactivity among adults is 17%. Estimates for the prevalence of some but insufficient activity (<2.5 hours per week of moderate activity) ranged from 31% to 51% with a global average of 41% across the sub-regions (WHO 2002). The Singapore National Health Survey (1992) showed that about 64% of Singaporeans did not participate in any exercise in the past one month. Although 31% of Singaporeans took part in some form of exercise at least once a week, only 14% of them engaged in regular exercise.

At least 60% of the global population failed to achieve minimal recommendation of daily 30 minutes moderate intensity physical activity (WHO 2002). Data from the 2000 National Physical Activity Survey (Australia Institute of Health and Welfare 2000) showed that over 7 million Australians aged 18 – 75 years (54%) did not undertake sufficient physical activity to obtain a health benefit. Over 2 million of these (15% of people aged 18 – 75 years) were sedentary, that is they did not do physical activity in their leisure time. Overall, men and women were equally likely to participate at sufficient levels of activity for health benefit (46% and 45%). Younger people were more likely to undertake sufficient physical activity.

2.2 Impact of physical inactivity

Physical inactivity along with other key risk factors are significant contributors to the global burden of chronic diseases. People who do not do sufficient physical activity have greater risk of cardiovascular diseases, colon and breast cancer.

2.2.1 Ischaemic heart disease

The strongest evidence for the benefits of physical activity pertains to the reduction of risk of mortality and morbidity from cardiovascular diseases, particularly acute myocardium infarction and other forms of ischaemic heart disease (Powell et al. 1987, Berlin & Colditz 1990,). A number of studies have shown physical activity directly and indirectly reduces the effects of excess cholesterol and other atherosclerotic agents (Kramschel et al. 1981, Leon 1991, Durstine & Haskell 1994). Participation in physical activity could improve total blood cholesterol levels (McMurray et al. 1998) and improved high density lipoprotein (HDL) (Moore 1994). An increase in HDL is desirable because HDL transports cholesterol to the liver for elimination in bile, and thus has an 'anti-atherosclerotic' function. Physical activity had also been shown to increase the activity of lipoprotein lipase, which involved in the removal of cholesterol from the blood (Stefanic & Wood 1994)

Vigorous physical activity has been shown to decrease systolic and diastolic blood pressure (Arroll & Beaglehole 1992, Kelley & McClellan 1994, McMurray et al. 1998, Mensink et al. 1999). Moreover, there is some evidence that participation in more moderate-intensity activities may achieve similar or even greater effects than vigorous activity (Hagberg et al. 1989, Matsusaki et al. 1992, Marceau et al. 1993, Moreau et al. 2001). In general, studies show a decrease in the risk of ischaemic stroke with increasing levels of physical activity (Wannamethee & Shaper 1999, Elekjaer et al. 2000).

2.2.3 Type II diabetes mellitus

Both moderate and vigorous intensity physical activity reduce the risk of Type II Diabetes Mellitus in women (Hu et al. 1999), and the benefits appear also for males and in diverse populations (Folsom et al. 2000, Okada et al. 2000). In general, physical activity increases sensitivity to insulin, improve glucose metabolism, reduces atherosclerosis risk and reduces intra-abdominal fat distribution (Kelly & Goodpaster 2001)

2.2.4 Colon cancer

Numerous studies have shown the protective effect of physical activity on risk of colonic cancer (Colditz et al. 1997, Thune & Furberg 2001, International Agency for Research on Cancer 2002) and on the prevention of pre-cancerous polyps in the large bowel (Neugut et al. 1996, Slattery et al. 1997)

2.2.5 Breast cancer

Majority of studies report a reduction in the breast cancer among physically active women (Gammon et al. 1998, Latikka et al. 1998, Verloop et al. 2000). There is substantial evidence that discretionary-time and/or occupational physical activity is associated with approximately a 30% reduction in the risk of breast cancer in pre-, peri- and post-menopausal women (Thune & Furberg 2001)

2.2.6 Musculoskeletal conditions

Participation in physical activity throughout the course of life can maintain or reduce the decline on musculoskeletal health that generally occurs with ageing in sedentary people (Brill et al. 2000). Participation by older adults can help to maintain strength and flexibility, resulting in an ability to continue to perform daily activities (Simonsick et al. 1993, Huang et al. 1998, Brill et al. 2000). Furthermore, participations can reduce the risk of falling and hip fractures in older adults (Grisso et al. 1997, Lord 1995).

2.2.7 Osteoporosis and falls

The development of osteoporosis has been shown to be associated with physical inactivity (Drinkwater 1994). Cross-sectional studies show that participation in weight-bearing physical activity is positively associated with bone density (Gutin & Kasper 1992). Undertaking weight-bearing activity is particularly important in the development of peak bone density for adolescents (Welten et al. 1994) and for middle -aged women (Zhang et al. 1992). Participation in physical activity is likely to be beneficial through an increase in bone strength, muscle strength, balance and coordination (Gregg et al. 2000)

2.2.8 Depression

Observational studies demonstrate that participation in discretionary-time and/or occupational physical activity can reduce symptoms of depression and possibly stress and anxiety (Paffenbarger et al. 1994, Glenister 1996, Hassmen et al. 2000, Dunn et al. 2001)

2.2.9 Obesity

A large number of observational studies show that habitual physical activity over a lifetime can attenuate the increase in weight normally associated with increasing age, and participation in appropriate amounts of activity can lead to weight maintenance or even weight loss (Grundy et al. 1999). The latter is especially true if physical activity is combined with a restriction of dietary energy intake.

2.3 Tools in measuring physical activity

The measurement of physical activity and the factors influencing it is fundamental. The final selection of physical activity over physical fitness was based on several reasons. Firstly, physical fitness is primarily determined by patterns of physical activity, particularly activity undertaken in recent weeks or months (Blair et al. 2001). Secondly, there is a genetic contribution to physical fitness and genetic makeup is likely to account for less variation than the lifestyle behaviour (Bouchard 2001). Thirdly, assessment of physical fitness in large samples of adult populations is rare across the majority of countries and infrequent in those countries in which it has been under-taken. Moreover, studies of fitness often exclude adults with certain chronic conditions. Fourthly, most national and international recommendations specify public health targets in terms of reaching thresholds of physical activity and not the level of physical fitness.

Therefore, considering the scientific support, the availability of data and consistency with public health initiatives, physical activity was selected in preference to physical fitness as the measure of exposure. Given that protective benefits come from undertaking physical activity, from here on, the risk factor is specified as physical inactivity.

Traditionally, physical activity research has been interested in exercise defined as "planned, structures and repetitive bodily movement done to improve or maintain one or more components of physical fitness" (Caspersen & Stephens 1994). This interest focused attention towards certain types of exercise, mostly vigorous-intensity activities that were undertaken usually outside of work in recreational or discretionary time. In general terms, it was acknowledged that some occupational or work-related activities could reach the threshold of vigorous-intensity and thus could potentially qualify as exercise and be beneficial to health.

A shift away from solely focusing on exercise started after the results from several large prospective cohort studies were published in the late 1980s and early 1990s. These studies were significant because they identified the protective effects of less intense physical activity (Blair et al. 1989, Blair & Jackson 2001). By 1996, these findings were endorsed by several leading institutions and scientific organizations (Pate et al. 1995) and formed the primary focus of the U.S Surgeon General's Report on Physical Activity and Health (U.S Department of Health and Human Services 1996).

2.3.1 Treating physical (In)activity as a continuous variable

Minutes of activity can be presented as a continuous variable either as mean minutes per specified time frame (eg : per week or per day) or it can be used to derive an estimate of energy expenditure expressed as metabolic cost (metabolic equivalent, MET) or kilocalories per kilojoules (kcal/kJ). One MET represents the metabolic rate of an individual at rest and is set as 3.5 ml O_2/kg per minute or approximately 1 kcal/kJ per hour (Kriska & Caspersen 1997).

2.3.2 Treating physical (In)activity as a categorical variable

A current trend in analyzing population data on physical (in)activity is to collapse the continuous data on minutes of activity into a categorical variable and report the prevalence estimates of each category. The total of all activities can be calculated by summing all minutes of each activity or each category.

2.3.3 Definition

In balancing the need for a conceptual framework with global relevance, concordance with the epidemiological evidence, current public health recommendations, as well as the limited availability of national data, the following definitions of three level of physical activity were developed :

a) Level 1 : Inactive

Defined as doing no or very little physical activity at work, at home, for transport or during discretionary time

b) Level 2 : Insufficiently active

Defined as doing some physical activity but less than 150 minutes of moderate-intensity physical activity or 60 minutes of vigorous-intensity physical activity accumulated across work, home, transport or discretionary time.

c) Level 3 : Sufficiently active

Defined as at least 150 minutes of moderate-intensity physical activity or 60 minutes of vigorous-intensity physical activity a week accumulated across work, home, transport or discretionary time, which approximately corresponds to current recommendations in many countries.

3. OBJECTIVES

3.1 General Objective

To provide community-based estimates on the prevalence of physical inactivity in Malaysia to enable the Ministry of Health to review health priorities, program strategies and activities, and planning for allocation of resources

3.2 Specific objectives

3.2.1 To estimate the prevalence of physical inactivity among Malaysian adults aged 18 years and above.

3.2.2 To describe the physical inactivity distribution in Malaysia

3.2.3 To determine the prevalence of physical inactivity by life domains.

3.2.4 To estimate MET-minutes of physical activity among Malaysian adults aged 18 years and above.

3.2.5 To make recommendations for health program managers in strengthening physical inactivity related diseases prevention programme.

4. METHODOLOGY

4.1 Scope of the study

Research problems, scopes and main issues to be included in NHMS III were obtained from discussions and feedbacks from Ministry of Health state health managers, as well as experts from the local universities and individuals. The main research team members of the NHMS III reviewed and studied closely the feasibility and practicality of the suggested research topics for this community-based household survey. Extensive literature review was initiated. Technical and research experts in the field related to the identified research areas were consulted for further advise and comments. The main research group used the following criteria in considering the suggested scopes for this survey:

a) The issue/problem is current or has potential of high prevalence

b) The issue/problem is focused on disease/disorders associated with affluence, lifestyle, environment and demographic changes.

c) The issue/problem is causing physical, mental or social disability

d) The issue/problem has important economic implications

e) It is feasible to implement interventions to reduce the problem

f) The information related to the issue/problem is not available through the routine monitoring system or other sources.

g) The information is more appropriately obtained through a nation-wide community survey, and It is feasible to obtain through a nation-wide community-based survey.

4.2 Sampling Design and Sample Size

4.2.1 Sampling frame

The sampling frame for this survey was updated until 2004; an effort undertaken prior to the implementation of Labour Force Survey (LFS) 2004. In general, each selected Enumeration Blocks (EB) comprised of 8 sampled Living Quarters (LQ). The EBs was geographically contiguous areas of land with identifiable boundaries. Each contains about 80-120 LQs with about 600 persons. Generally, all EBs are formed within gazetted boundaries.

The EBs in the sampling frame was also classified by urban and rural areas. The classification into these strata was made up in terms of population of gazetted and built-up areas as follows:

Stratum	Population of gazetted areas and built-up
Metropolitan	75,000 and above
Urban Large	10,000 to 74,999
Urban Small	1,000 to 9,999
Rural	The rest of the country

For sampling purposes, the above broad classification was found to be adequate for all states in Peninsular Malaysia and the Federal Territories of Kuala Lumpur and Labuan. However, for Sabah and Sarawak, due to problems of accessibility, the rural stratum had to be further sub-stratified based on the time taken to reach the area from the nearest urban centre.

For the purpose of urban and rural analysis, Metropolitan and Urban Large strata are combined together thus referred to as 'urban' stratum, while for Urban Small and the various sub-divisions of the rural areas they are combined together to form to a 'rural' stratum.

4.2.2 Sampling design

A two stage stratified sampling design with proportionate allocation was adopted in this survey. The first stage sampling unit was the EB and within each sampled EB, the LQs were selected as second stage unit.

4.2.3 Sample size

In the course of sample selection, the following factors have been taken into consideration:

a) Expected prevalence rate

The prevalence rate of the health problems for Malaysia obtained from the National Health and Morbidity Survey 2 (NHMS2) were used to estimate the overall sample size. Using the previous finding of 10% prevalence rate, the initial sample size at the state level was calculated in order to come up with overall sample size. The size was further apportioned for each state using the probability proportionate to size (PPS) method.

b) Response rate of the NHMS2

The response rates, which ranged from 83% to 97% for the NHMS2 of each state, were taken into consideration in the course of the determination of sample size.

c) Margin of error and design effect

As the factors of precision and efficient of the survey are paramount, the decision reached for the targeted margin of error is 1.2 and the design effect valued at 2. These values were used at the initial stage of the calculation of the sample size of each state.

The survey findings answering to the specific objectives of this survey are expected to be used for state level programmed planning. Thus, the calculation for the sample size has taken into consideration that the data is to be analyzed at the state level.

In addition to the major factors mentioned earlier, the availability of resources, namely, financial and human resources, and the time taken to conduct this survey also become part of the process of the determination of sample size.

4.3 Preparation of field areas and logistic support

A number of state liaison officers were recruited in preparation for the survey proper. Strong networking with state liaison officers and District Health Officers (MOH and local authorities) from the areas sampled for the survey was established. Field scouts were mobilized from these areas to identify and tag the LQ's selected for the survey, as well as to inform the community and related government agencies of the importance and schedule of the planned survey. State liaison officers were also assisting Field Supervisors in the arrangement of transportation, accommodation and other logistics for the survey teams.

4.4 The questionnaire, house hold interviews and examination procedure

4.4.1 The questionnaire

A bi-lingual (Bahasa Malaysia and English) pre-coded questionnaire was designed, pre-tested and piloted prior to the survey. All research topics for the questionnaire are arrange into modules ranging from A to Z. Topics that a similar area are arranged into sub-modules under a particular module. Questions comprised of both close ended and open ended. The questions in each module were tailored to the target group.

Certain terminology and items in the questionnaire were also had been made available in the dialects or languages of the main ethnic groups in Malaysia, such as Hokkien and Cantonese for the Chinese and Tamil for the Indians. All versions were back translated to English by independent reviewers to ensure the accuracy of the translations.

The face-to-face interview (FI) questionnaire consisted of two subtypes, i.e, the household questionnaire (Orange) to be answered by the head of the household of the LQ selected, and the individual questionnaire to be answered by each number of the household. Two types of individual questionnaire were developed, to cater to the different age groups of 13 to less than 18 years old (Yellow) and 18 years old and above (Purple).

4.4.2 The interview

As far as possible, all adult members who qualify from the selected LQ's were interviewed by the data collection team members. Parents or guardians were expected to provide information for their children aged 12 years and below (primary school). Interviews commenced early in the morning and lasted till late in the evening. Where an interview had been unsuccessful due to the absence of the respondent at the selected LQ, repeat visits were conducted after leaving messages with neighbours or by other means for an appointment at a later date. A household member can only be classified as a non-responded after 3 unsuccessful visits.

For the first part of the interview which covers sections on general household, socio-demographic and economic profile, load of illness, health utilization and consumption cost, a trained non-medical or paramedical interviewer conducted the interviews. Sections pertaining to specific health problems and involving blood or other physical or medical examination were conducted by trained nurses.

4.5 Instrumentation

4.5.1 The questionnaires

All research topics for the questionnaire are arranged into modules ranging from A to Z. Topics that are similar area are arranged into sub-modules under a particular module. Questions comprised of both close ended and open ended. The questions in each module were tailored to the target group. Two types of questionnaires were developed i.e. face to face and self administered based on the requirements of the research subgroups and the research topics involved.

ii. Face to face interview questionnaire

The face to face interview questionnaires consisted of 2 subtypes, i.e., the household questionnaire (orange) to be answered by the head of the household of the LQ selected, and the individual questionnaire, to be answered by each member of the household. Four types of individual FI questionnaires were developed, to cater to the different age groups of less than 2 years old (pink), 2 to less than 13 years old (blue), 13 to less than18 years old (yellow) and 18 years old and above (purple).

For those aged below 13 years old, the child's parents or guardians were responsible for answering on his or her behalf. Those aged 13 years and above are required to answer their respective questionnaires directly through the interview.

All the FI questionnaires have a consent form to be read and signed by the respondent or parent / guardian of the respondent. The outside cover of all questionnaires had to be filled with a unique individual identification (ID) number by the enumerator. The enumerator also had to fill his or her ID as well as the code for the outcome of the interview as part of the quality assurance process.

4.5.2 Pilot study

A pilot study was conducted on a sample of EB's (not included in the NHMS III) about 2 months prior to the nationwide survey. It was conducted in three different areas in and around the Klang Valley, namely Sepang, Klang and Bangsar. The population in these locations comprised of three distinct socio-demographic strata that are rural, semi-urban and urban respectively. The pilot study focused on the following aspects of the survey:

a) Testing of the questionnaire
b) Testing of the field logistic preparation
c) Testing of the scouting activities
d) Testing of the central monitoring and logistic support

4.5.3 Training of data collection teams

A two weeks training course was held for field supervisors, team leaders, nurses and interviewers was to familiarize them with the questionnaire, develop their interpersonal communication skills and appreciate the need for good teamwork. Briefing on the questionnaire, mock interview in the classroom and individual practice under supervision was conducted during the training.

4.6 Quality control

Quality control procedures for the data collection were done at two stages, field and central. Please refer to NHMS III protocol for detail description

4.7 Data management

4.7.1 Data screening

The following data screening exercises were conducted at the field and central level prior to data entry:

a) Field data screened by each interviewers at the end of his/her interview
b) Field data screened for each question by peer interviewers through exchanging questionnaire booklets
c) Field data screened by team leaders and field supervisors
d) Central data screening of the questionnaire by the quality control team

4.7.2 Data entry

The data entry system was developed to record the information collected during the data collection phase. It is a web based system that allows multiple simultaneous accesses to the database. The NHMS III used a double manual data entry method and any discrepancy between both entries was verified by the supervisors. The data entry started simultaneously with data collection (first week of

April 2006) and was completed at the end of January 2007. The data entered was stored in the database according to the module. The databases were designed using Structured Query Language (SQL) which is a standard language for relational database management system

4.7.3 Data analysis

Data analysis was done by exporting the data into other analytical tools such as Microsoft Excel, SPSS and STATA. The data in database (text form) was exported to the Microsoft Excel form then to the SPSS and STATA. The raw data was cleaned and analysed according to the terms, working definition and dummy table prepared by the research groups. All the analytical process were monitored and advised by the NHMS III Statistics Consultant.

4.8 Definition of terms / variable

4.8.1 Physical inactivity

Physical inactivity was defined as fewer than 150 minutes per week spent in moderate physical activities, fewer than 60 minutes per week of vigorous physical activities and total MET minutes per week lesser than 600 minutes.

5. FINDINGS

The overall response rate for physical activity was 98.2% (33,933 respondents) from 34,539 eligible respondents which represented 12,923,504 adults aged 18 years and above.

Appendix Table 1 describes the characteristics of respondents answered the physical activity questions. 55.2% of respondents were female and 44.8% were male. 93.7% of respondents were Malaysian citizens. Malays (54.9%) formed the largest ethnic group, followed by the Chinese (20.3%), other bumiputra (11.5%), Indians (8.2%) and others (5.0%). 59.4% urban and 40.6% rural.

5.1 Prevalence of physical inactivity

Overall prevalence of physical inactivity was 43.7% which represented 5,545,891 Malaysian adults (Figure 5.1).

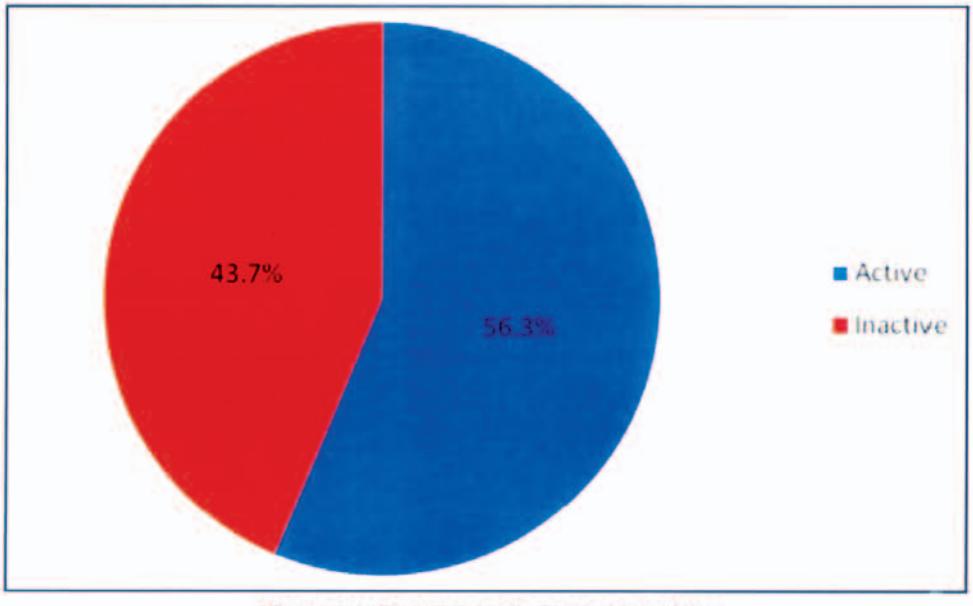


Figure 5.1: Prevalence of physical inactivity

5.2 Prevalence of Physical Inactivity by Socio-demographic Characteristics

5.2.1 Prevalence of physical inactivity by gender

Females were more inactive [50.5% (CI : 49.5 – 51.5)] compared to males [35.3% (CI : 34.3 – 36.3)] and the difference was significant statistically (Figure 5.2).

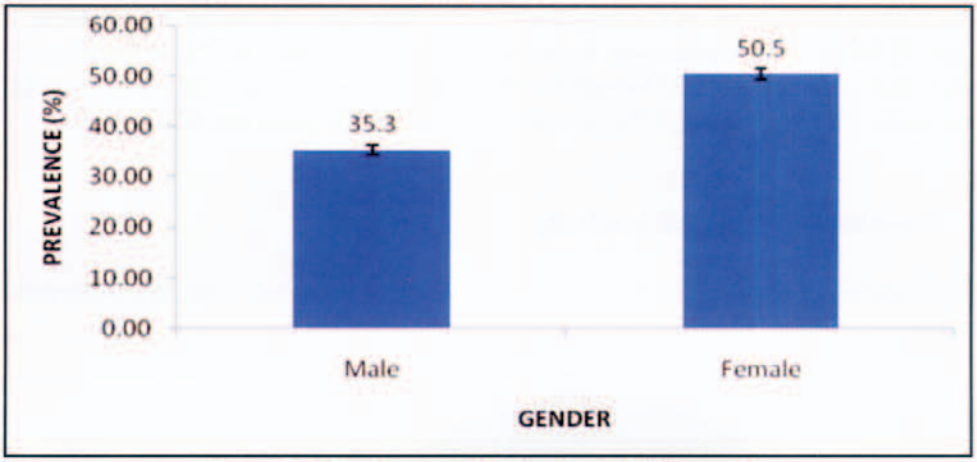


Figure 5.2: Prevalence of physical inactivity by gender

5.2.2 Prevalence of physical inactivity by age group

The physical inactivity increased by age. However, there was no significant difference in physical inactivity pattern for age group (Figure 5.3).

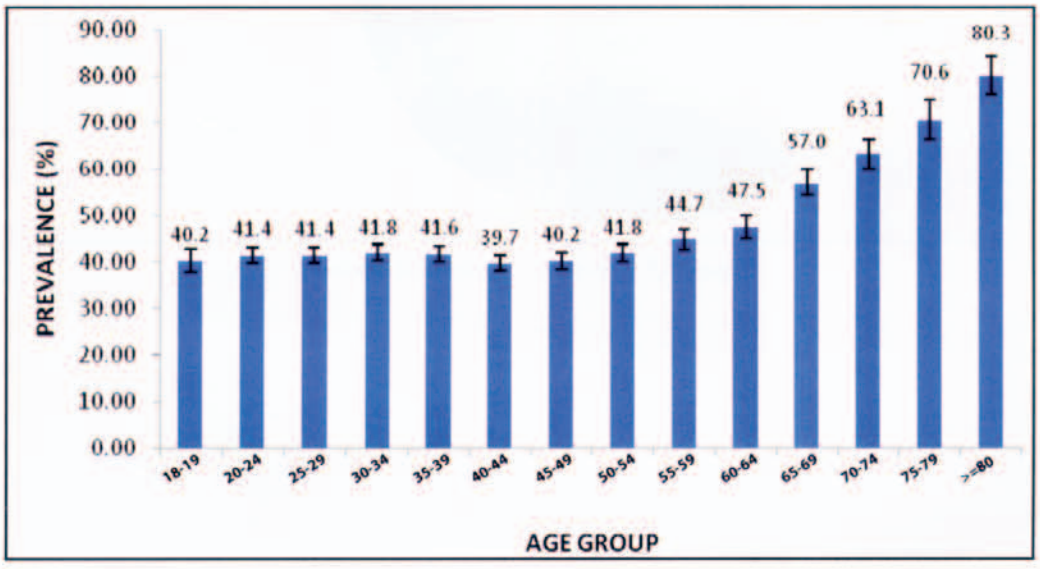


Figure 5.3: Prevalence of physical inactivity by age group

5.2.3 Prevalence of physical inactivity by state

Selangor had the highest prevalence of physical inactivity (52.1%), followed by Kuala Lumpur (51.8%) and the least were Pahang (31.4%) and Terengganu (32.3%) (Figure 5.4)

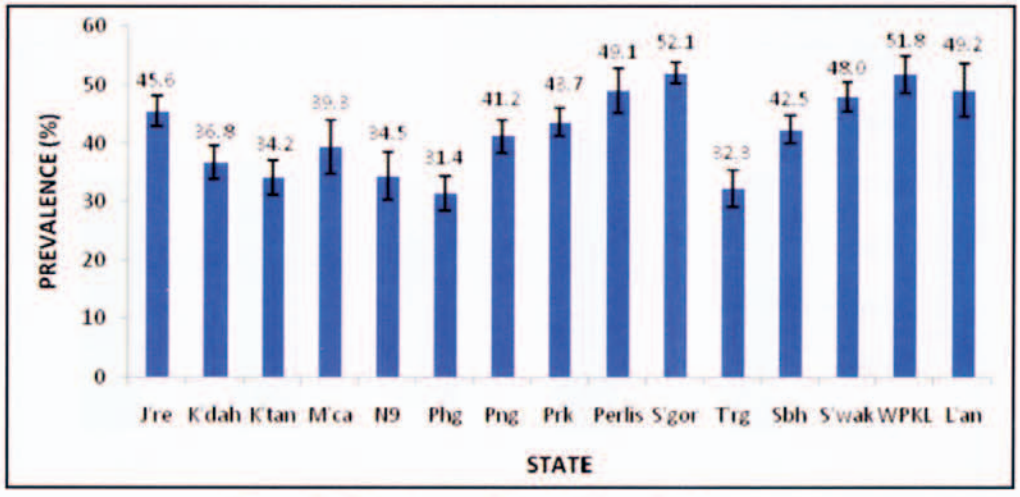


Figure 5.4: Prevalence of physical inactivity by state

5.2.4 Prevalence of physical inactivity by strata

Urban adults were found to be more inactive [45.6% (CI : 44.6 – 46.7)] as compared to rural adults [40.1% (CI : 38.9 – 41.4)] and it was significant statistically (Figure 5.5).

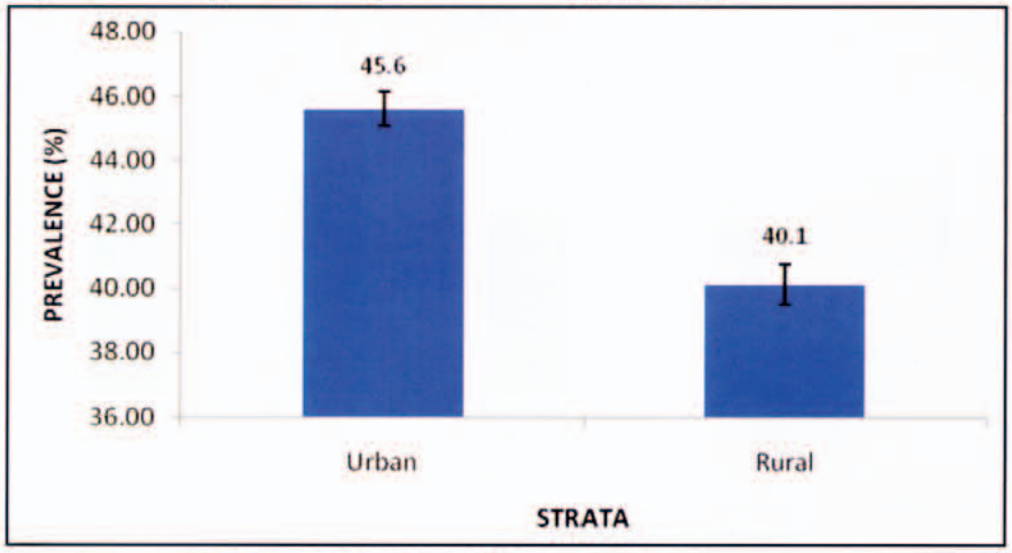


Figure 5.5: Prevalence of physical inactivity by strata

5.2.5 Prevalence of physical inactivity by ethnic group

The highest prevalence rate was observed among Chinese [47.1% (CI : 45.6 – 48.7)], followed by Indians [44. 5% (CI : 42.2 – 46.7)], others bumis [44.1% (CI : 41. 9 – 46.2)] and Malays [42.4% (CI : 41.3 – 43.4)] (Figure 5.6).

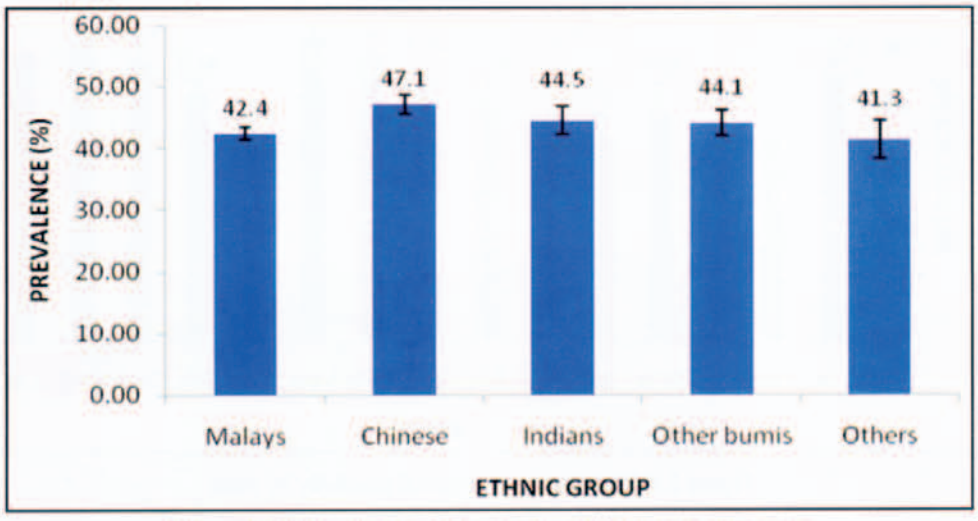


Figure 5.6: Prevalence of physical inactivity by ethnic group

5.2.6 Prevalence of physical inactivity by marital status

Widow/widower showed the highest prevalence for physical inactivity [58.6% (CI : 56.3 – 61.0)], followed by divorcee [53.9% (CI : 50.3 – 57.6)], married [43.6% (CI : 42. 7 – 44.4)] and not married [39.3% (CI : 37.9 – 40.7)] (Figure 5.7).

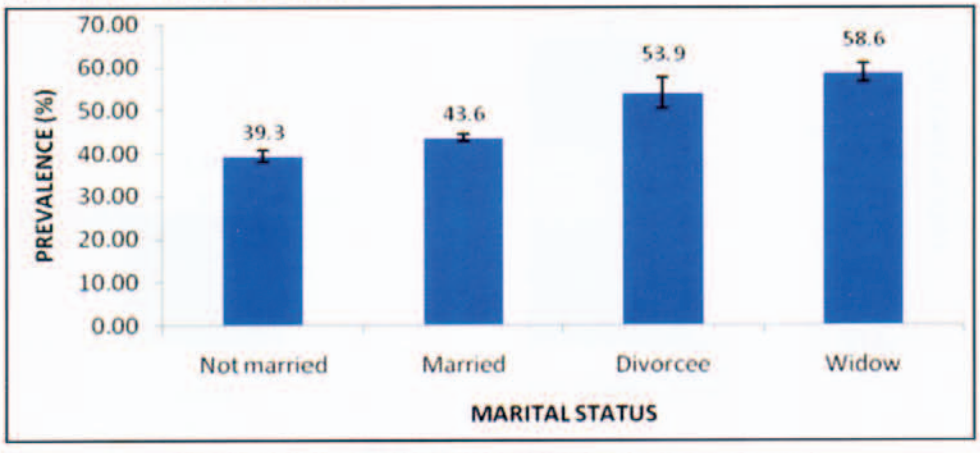


Figure 5.7: Prevalence of physical inactivity by marital status

5.2.7 Prevalence of physical inactivity by education level

The highest prevalence of physical inactivity was among respondents with no formal education with a prevalence of 57.4% (CI : 55.6 – 59.1) (Figure 5.8).

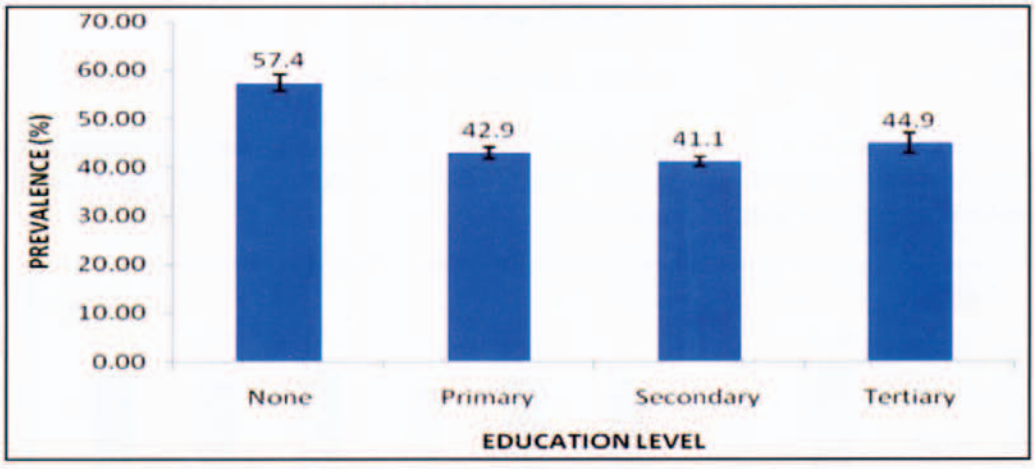
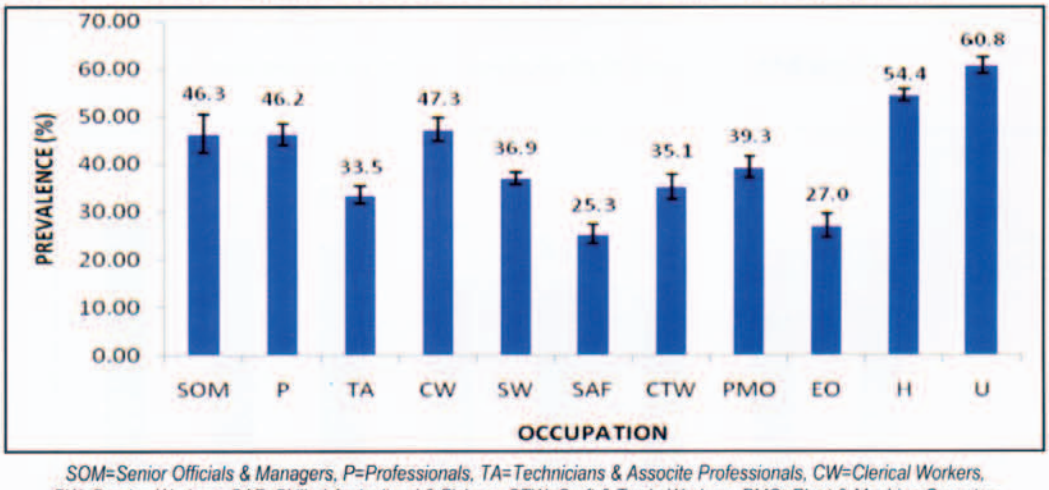


Figure 5.8: Prevalence of physical inactivity by education level

5.2.8 Prevalence of physical inactivity by occupation

The highest prevalence of inactivity were in unemployed group [60.8% (CI : 59.0 – 62.5)], followed by housewife [54.4% (CI : 53.16 – 55.7)]. The least of inactivity was skilled agricultural and fishery [25.3% (CI : 23.21 – 27.35)] and elementary occupations [27.02% (CI : 24.48 – 29.57)](Figure 5.9).



SOM=Senior Officials & Managers, P=Professionals, TA=Technicians & Associte Professionals, CW=Clerical Workers, SW=Service Workers, SAF=Skilled Agricultural & Fishery, CTW=Craft & Trade Workers, PMO=Plant & Machine Operator, EO=Elementary Occupations, H=Housewife, U=Unemployed

Figure 5.9: Prevalence of physical inactivity by occupation

5.2.9 Prevalence of physical inactivity by household income

There was no clear pattern of physical inactivity by household income with the highest was among income group of RM 5000 or more [46.6% (CI : 44.3 – 48.9)] and the lowest was among income group of RM 700 – RM 999 [41.2% (CI : 39.4 – 43.0)] (Figure 5.10).

5.2.10 Prevalence of physical inactivity by personal income

Generally, the prevalence of physical inactivity increased with increasing personal income with the highest prevalence was among the income group of RM 5000 or more [50.1% (CI: 45.7 – 54.5)] but the differences was not significant (Figure 5.11).

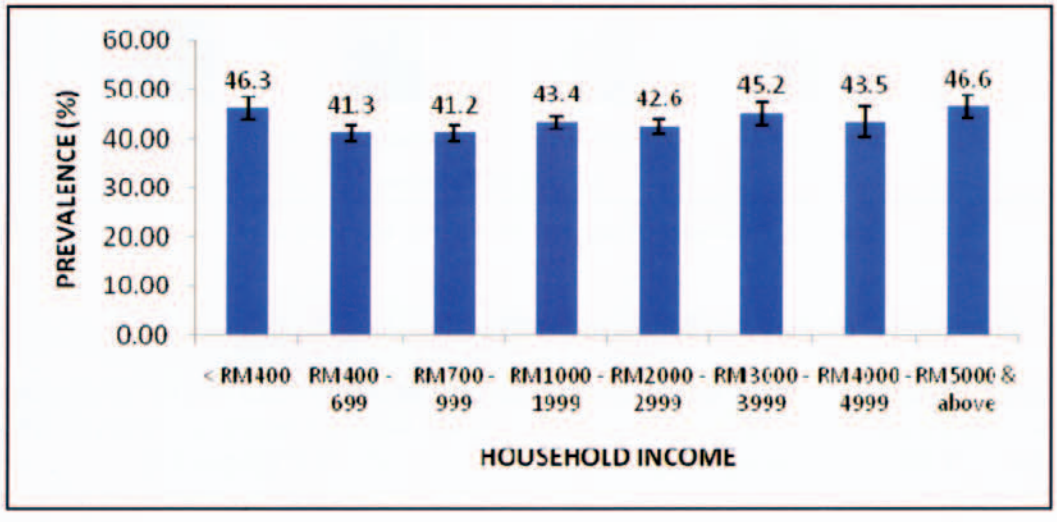


Figure 5.10: Prevalence of physical inactivity by household income

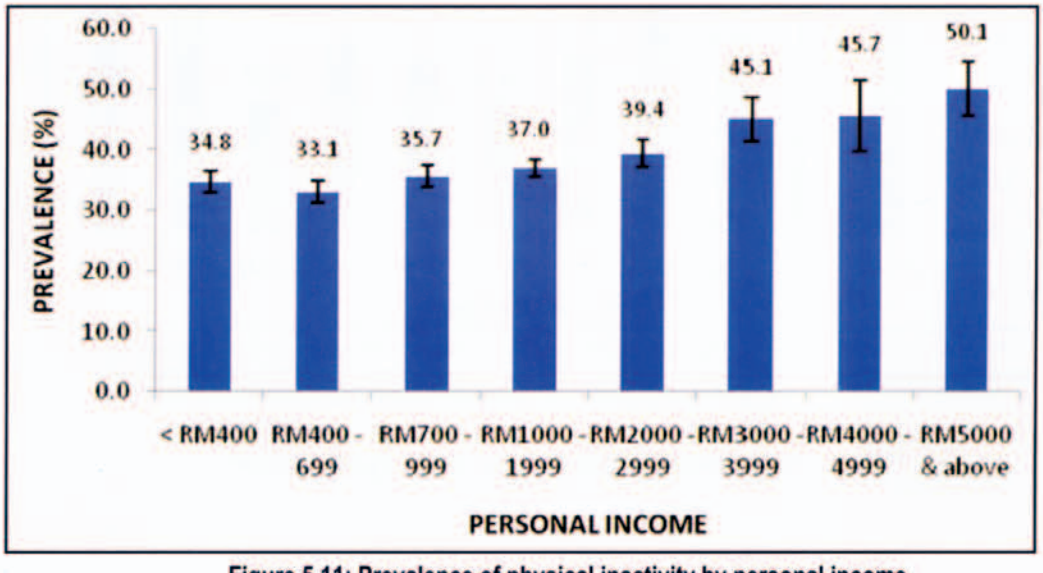


Figure 5.11: Prevalence of physical inactivity by personal income

5.3 Prevalence of physical inactivity by life domains

Study found the prevalence of physical inactivity was highest in leisure time domain compared to other domains and the difference was significant. 85.7% (CI : 85.2 – 86.2) of Malaysian adults reported inactive physically during leisure time, 72.6% (CI : 71.8 – 73.5) during working and 72.1% (CI : 71.3 – 72.8) during travelling (Figure 5.12).

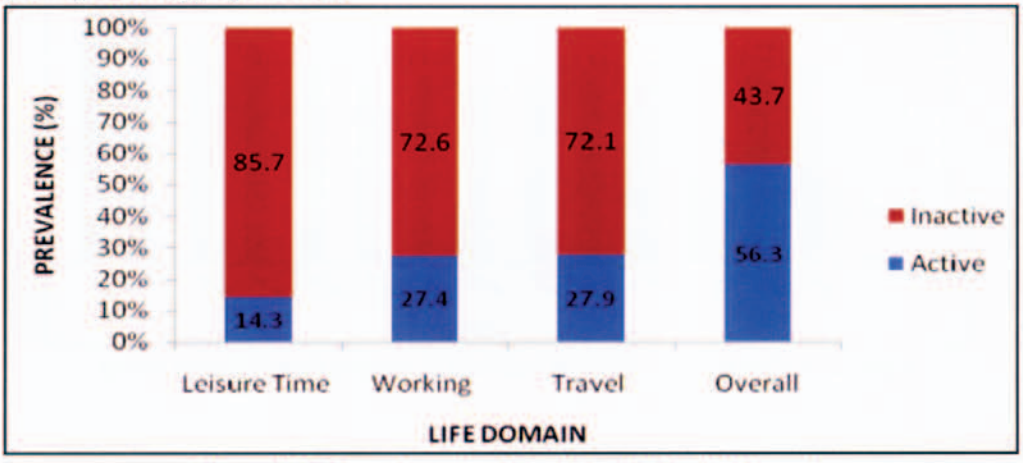


Figure 5.12: Prevalence of physical inactivity by life domain

5.4 Prevalence of physical inactivity in working domain

5.4.1 Prevalence of physical inactivity in working domain by gender

The prevalence was significantly higher among females [77.5% (CI : 76.5 – 78.4)] than males [66.8% (CI : 65.8 – 67.6)] (Figure 5.13).

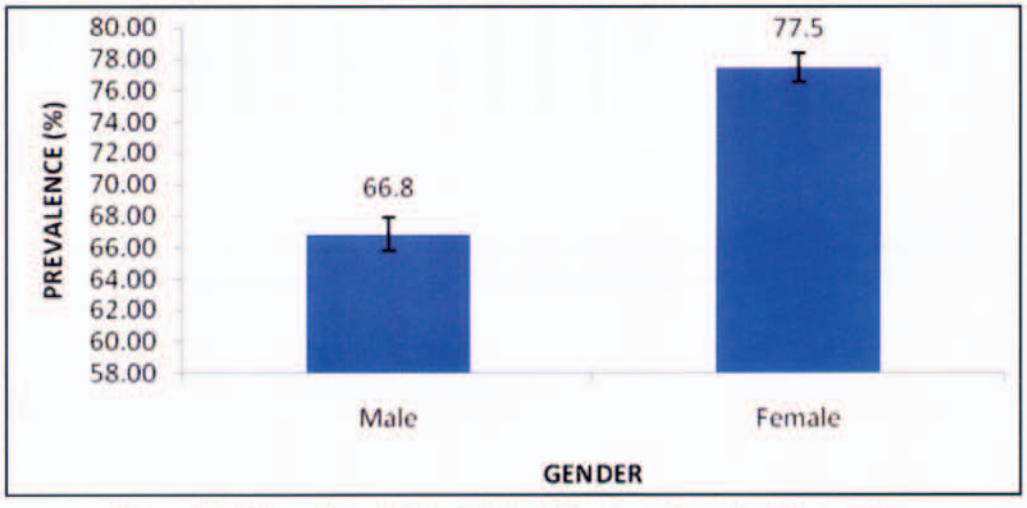


Figure 5.13: Prevalence of physical inactivity in working domain by gender

5.4.2 Prevalence of physical inactivity in working domain by age group

The prevalence of physical inactivity decreased with age until the age group of 45 – 49, then it showed an increasing trend with age till the age group of 80 years and above (Figure 5.14).

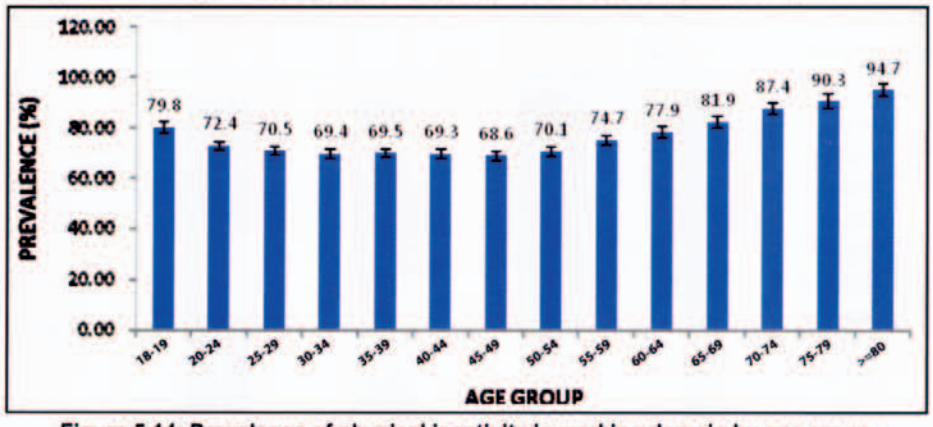


Figure 5.14: Prevalence of physical inactivity in working domain by age group

5.4.3 Prevalence of physical inactivity in working domain by state

The highest prevalence of physical inactivity in working domain by state was in Perlis [86.4% (CI: 82.4 – 90.4)] while the lowest prevalence was in Negeri Sembilan [50.8% (CI: 46.0 – 55.6)] (Figure 5.15).

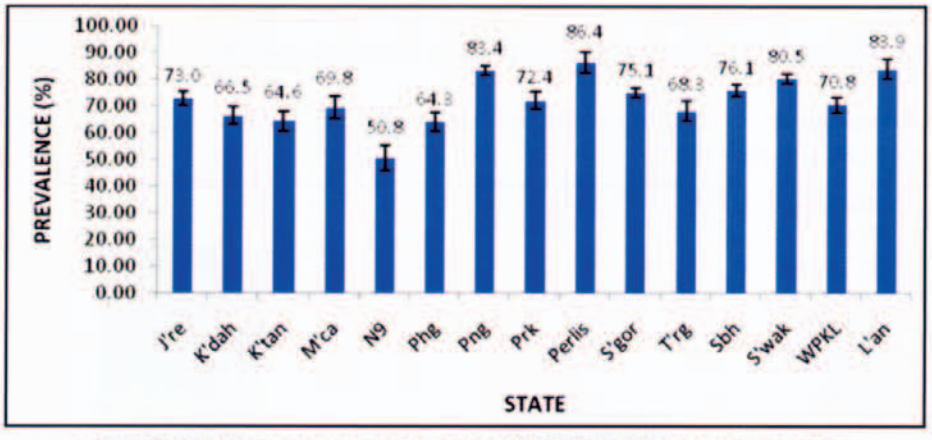


Figure 5.15: Prevalence of physical inactivity in working domain by state

5.4.4 Prevalence of physical inactivity in working domain by strata

The prevalence was higher in urban [73.4% (CI : 72.8 – 74.8)] than rural [70.5% (CI : 69.1 – 71.9)] (Figure 5.16).

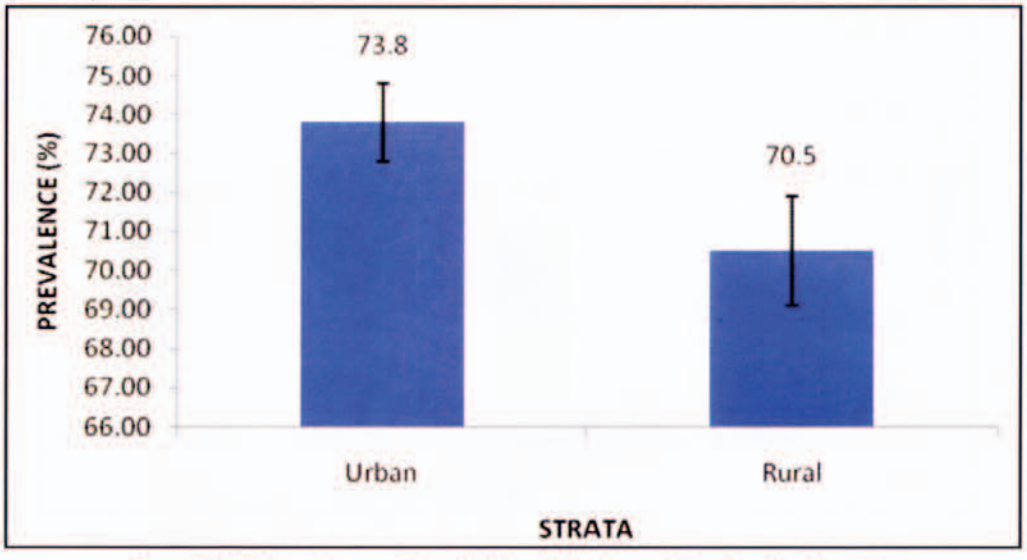


Figure 5.16: Prevalence of physical inactivity in working domain by strata

5.4.5 Prevalence of physical inactivity in working domain by ethnic group

Not much differences between ethnic group with the highest was among Other bumis group with a prevalence of 78.8% (CI : 76.9 – 80.7) (Figure 5.17).

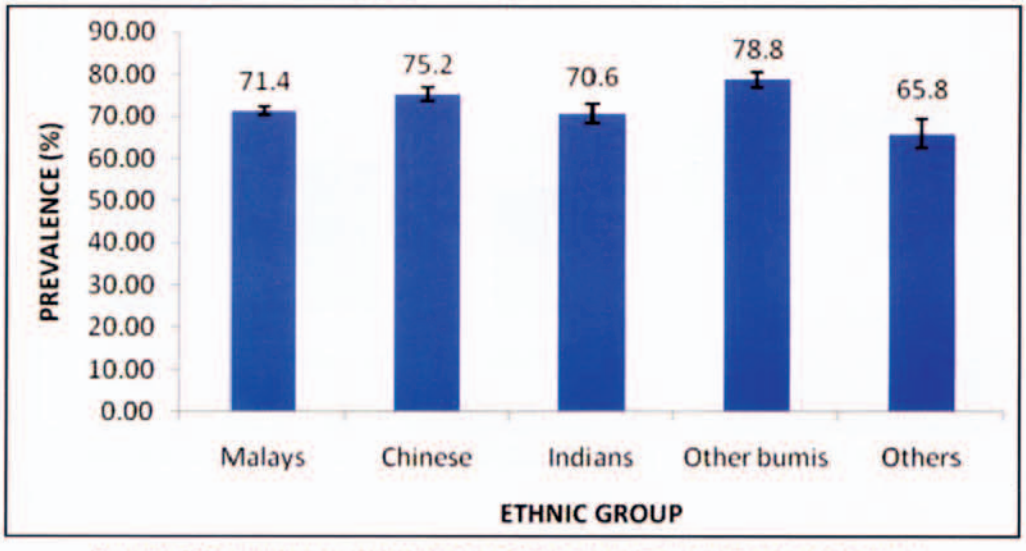


Figure 5.17: Prevalence of physical inactivity in working domain by ethnic group

5.4.6 Prevalence of physical inactivity in working domain by marital status

The highest prevalence was among the widow/widower [81.6% (CI : 79.7 – 83.6)] while the lowest prevalence was among the married respondents [71.7% (CI : 70.8 – 72.6)] (Figure 5.18).

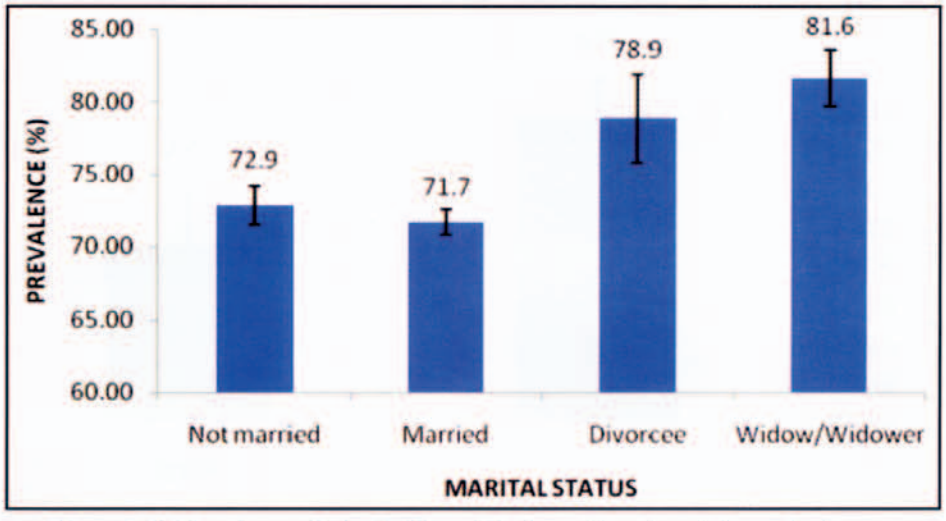


Figure 5.18: Prevalence of physical inactivity in working domain by marital status

5.4.7 Prevalence of physical inactivity in working domain by education level

The highest prevalence was among those with no formal education [80.6% (CI : 79.1 – 82.2)], followed by tertiary education [77.1% (CI : 75.4 – 78.8)] (Figure 5.19).

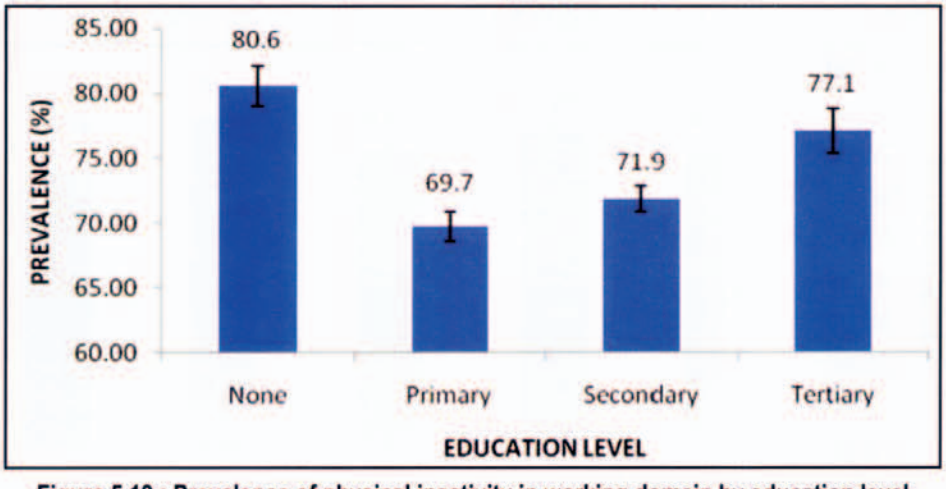
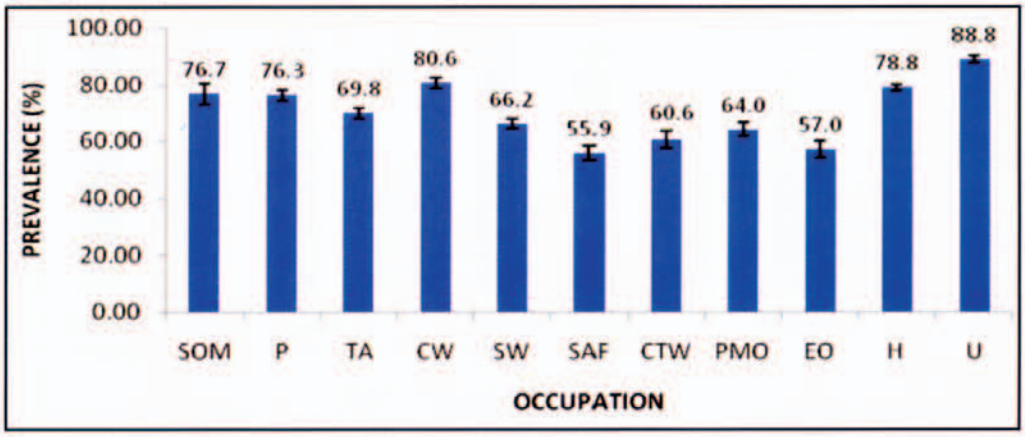


Figure 5.19 : Prevalence of physical inactivity in working domain by education level

5.4.8 Prevalence of physical inactivity in working domain by occupation

The highest prevalence of physical inactivity was among the Unemployed Group [88.8% (CI : 87.6 – 90.0)] while the lowest was among the Skilled Agricultural and Fishery Group [55.9% (CI : 53.4 – 58.4)] (Figure 5.20).



SOM=Senior Officials & Managers, P=Professionals, TA=Technicians & Associate Professionals, CW=Clerical Workers, SW=Service Workers, SAF=Skilled Agricultural & Fishery, CTW=Craft & Trade Workers, PMO=Plant & Machine Operator, EO=Elementary Occupations, H=Housewife, U=Unemployed

Figure 5.20: Prevalence of physical inactivity in working domain by occupation

5.4.9 Prevalence of physical inactivity in working domain by household income

No clear pattern of physical inactivity by household income was observed (Figure 5.21).

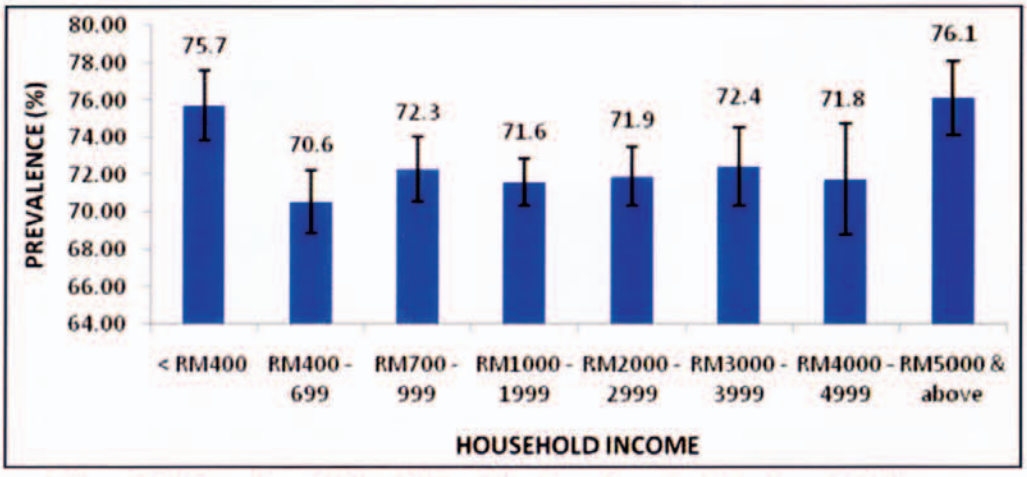


Figure 5.21: Prevalence of physical inactivity in working domain by household income

5.4.10 Prevalence of physical inactivity by personal income

Generally, physical inactivity increased with increasing personal income with the highest among respondents earning RM5000 and above [80.94% (CI : 77.30 – 84.58)] (Figure 5.22).

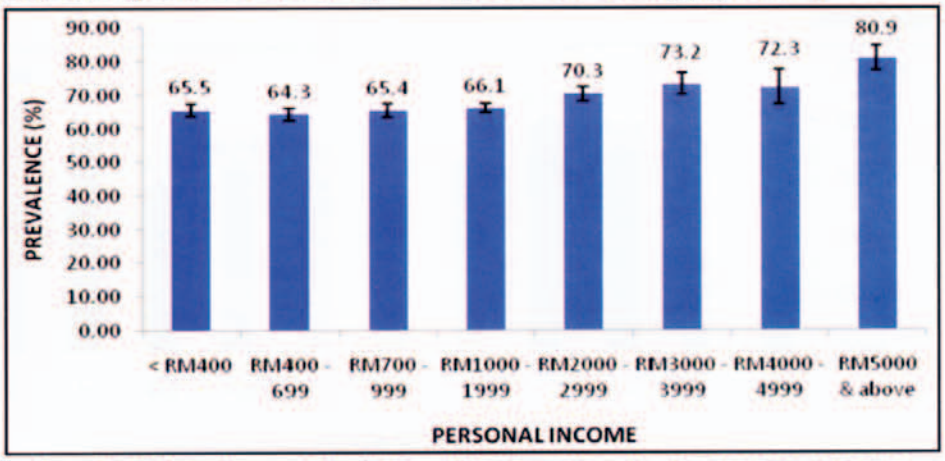


Figure 5.22: Prevalence of physical inactivity in working domain by personal income

5.5 Physical inactivity in travel domain

5.5.1 Prevalence of Physical Inactivity in Travel Domain by Gender

Females [74.1% (CI : 73.2 – 75.0)] were more inactive during travel than males [69.6% (CI: 68.6 – 70.6)] (Figure 5.23).

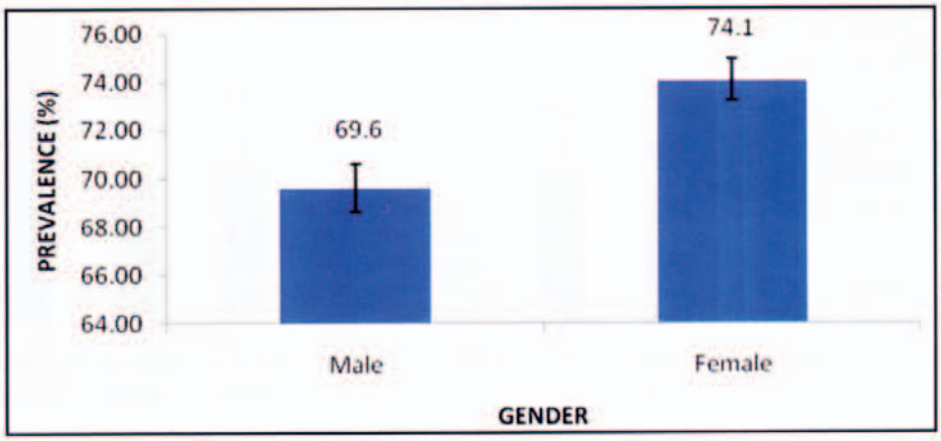


Figure 5.23: Prevalence of physical inactivity in travel domain by gender

5.5.2 Prevalence of physical inactivity in travel domain by age group

There was not much differences of physical inactivity until the age of 74. However, the prevalence increased after the age of 75 (Figure 5.24).

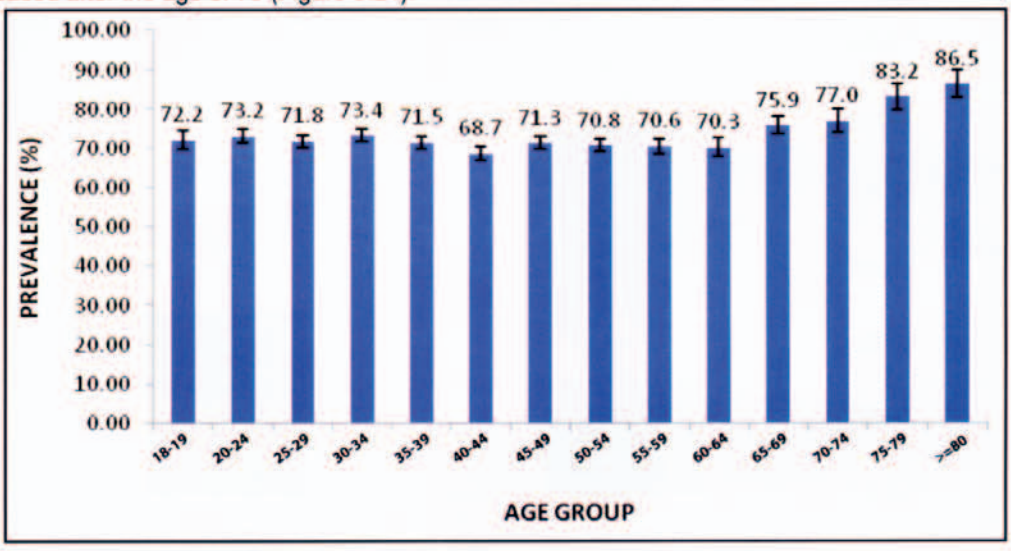


Figure 5.24: Prevalence of physical inactivity in travel domain by age group

5.5.3 Prevalence of physical inactivity in travel domain by state

The lowest prevalence was in Penang [58.3% (CI : 55.4 – 61.2)] while the highest was in Negeri Sembilan [83.1% (CI : 80.8 – 85.5)] (Figure 5.25).

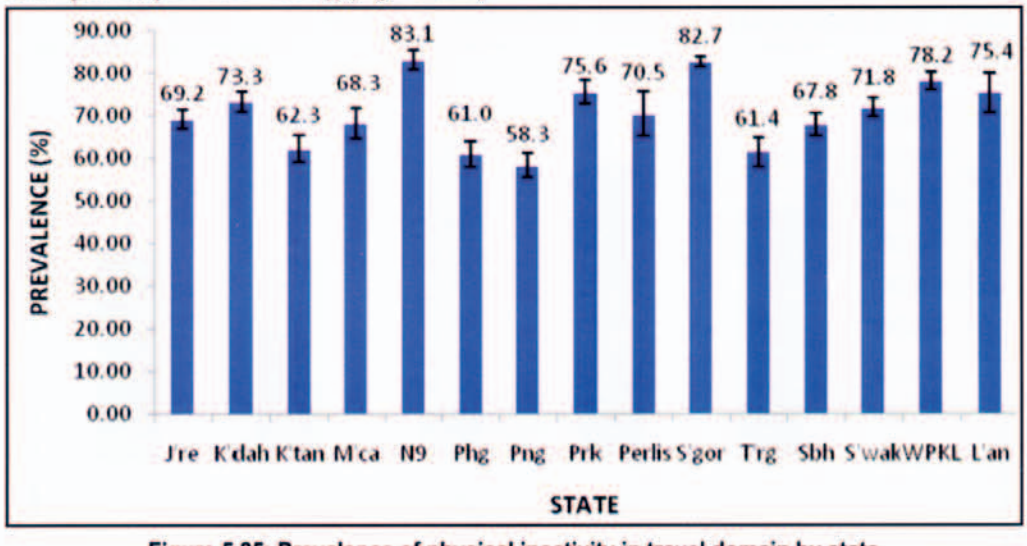


Figure 5.25: Prevalence of physical inactivity in travel domain by state

5.5.4 Prevalence of physical inactivity in travel domain by strata

Urbanites were more inactive [73.8% (CI : 72.9 – 74.8)] than the rural respondents [68.9% (CI : 67.6 – 70.1)] and the difference was significant statistically (Figure 5.26).

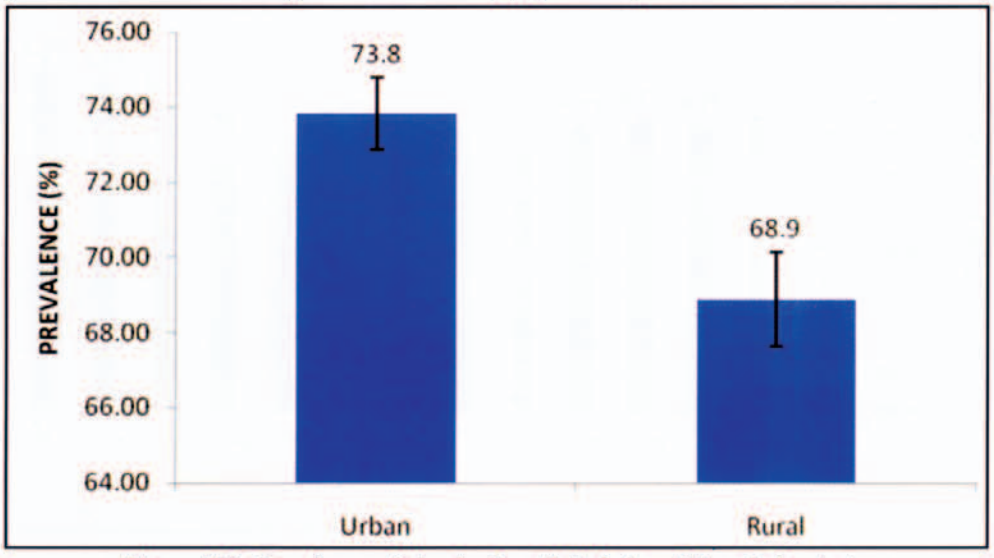


Figure 5.26: Prevalence of physical inactivity in travel domain by strata

5.5.5 Prevalence of physical inactivity in travel domain by ethnic group

The highest prevalence was among Indians [75.1% (CI : 73.1 – 77.0)], followed by Chinese [73.7% (CI : 72.2 – 75.1)] (Figure 5.27).

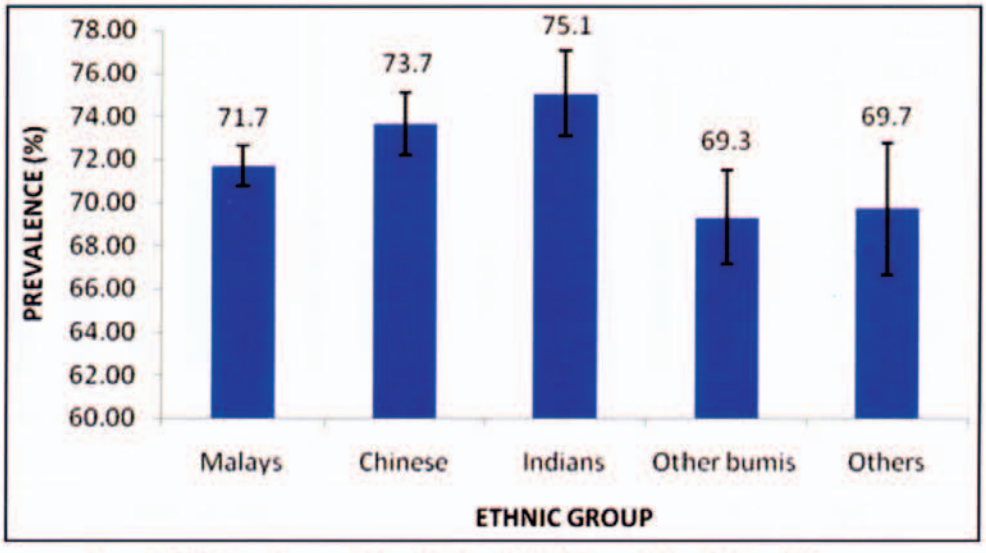


Figure 5.27: Prevalence of physical inactivity in travel domain by ethnic group

5.5.6 Prevalence of physical inactivity in travel domain by marital status

The highest prevalence was among the widow/widower [76.8% (CI : 74.8 – 78.7)], followed by divorcee [74.6% (CI : 71.4 – 77.9)] (Figure 5.28).

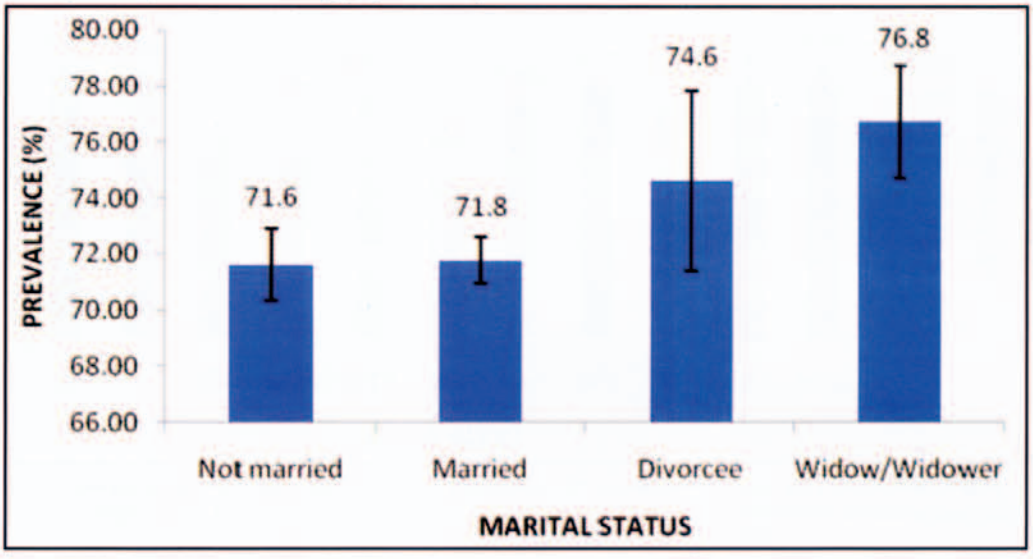


Figure 5.28: Prevalence of physical inactivity in travel domain by marital status

5.5.7 Prevalence of physical inactivity in travel domain by education level

The highest prevalence were found in the tertiary education [75.0% (CI : 73.4 – 76.6)] (Figure 5.29).

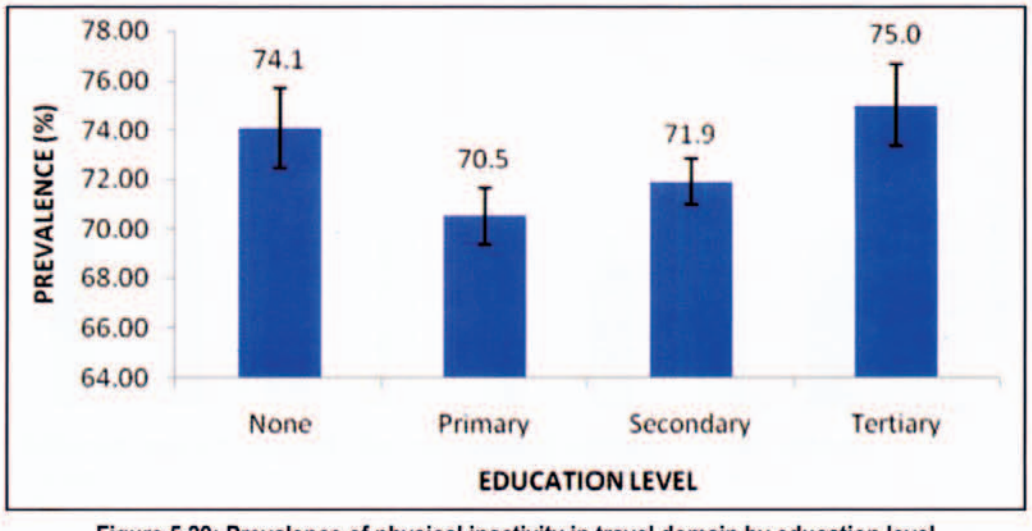
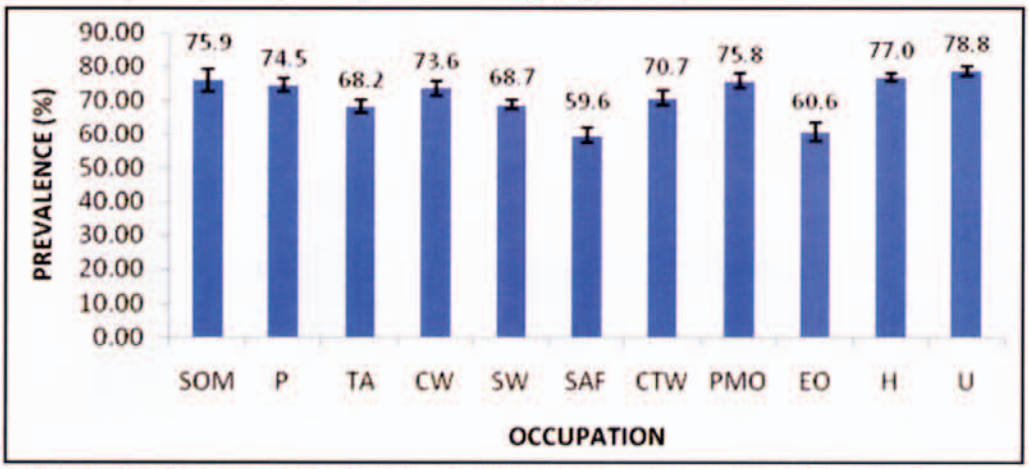


Figure 5.29: Prevalence of physical inactivity in travel domain by education level

5.5.8 Prevalence of physical inactivity in travel domain by occupation

The lowest two prevalence were among the Skilled Agricultural and Fishery [59.6% (CI : 57.3 – 61.9)] and Elementary Occupation [60.6% (CI : 57.8 – 63.4)] (Figure 5.30).



SOM=Senior Officials & Managers, P=Professionals, TA=Technicians & Associate Professionals, CW=Clerical Workers, SW=Service Workers, SAF=Skilled Agricultural & Fishery, CTW=Craft & Trade Workers, PMO=Plant & Machine Operator, EO=Elementary Occupations, H=Housewife, U=Unemployed

Figure 5.30: Prevalence of physical inactivity in travel domain by occupation

5.5.9 Prevalence of physical inactivity in travel domain by household income

Not much differences on the prevalence of physical inactivity by household income were found (Figure 5.31).

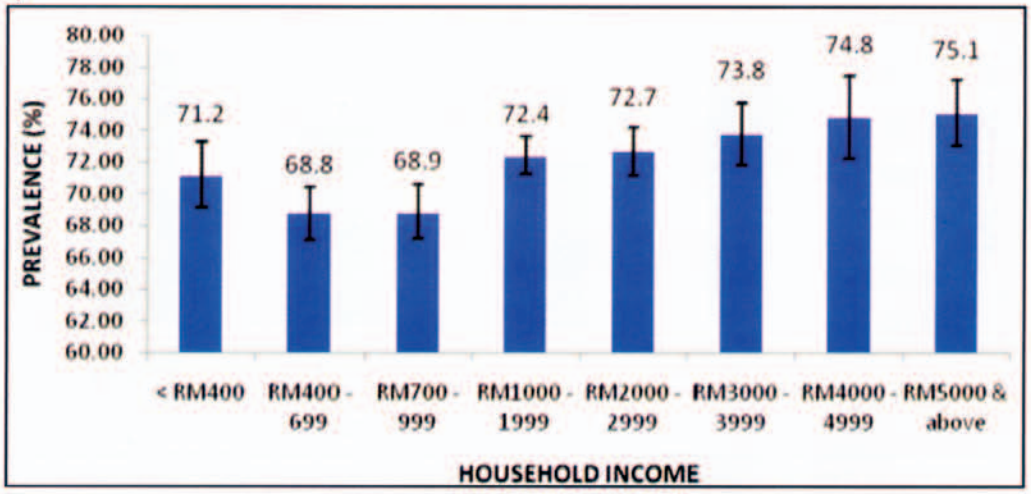


Figure 5.31: Prevalence of physical inactivity in travel domain by household income

5.5.10 Prevalence of physical inactivity in travel domain by personal income

The prevalence of physical inactivity increased with increasing personal income (Figure 5.32).

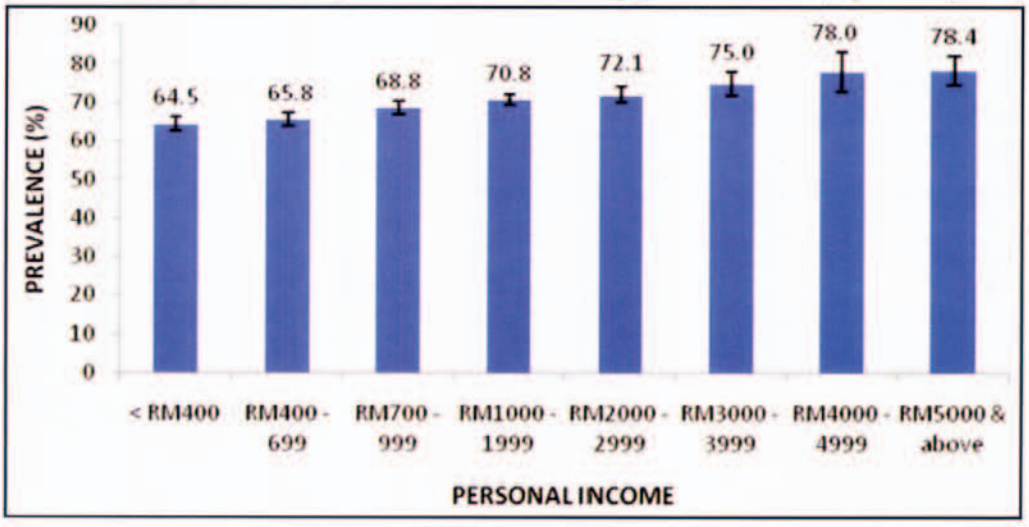


Figure 5.32: Prevalence of physical inactivity in travel domain by personal income

5.6 Prevalence of physical inactivity in leisure time domain

5.6.1 Prevalence of physical inactivity in leisure time domain by gender

Females [89.3% (CI : 88.7 – 89.8)] were more inactive as compared to males [81.3% (CI : 80.6 – 82.0)] (Figure 5.33).

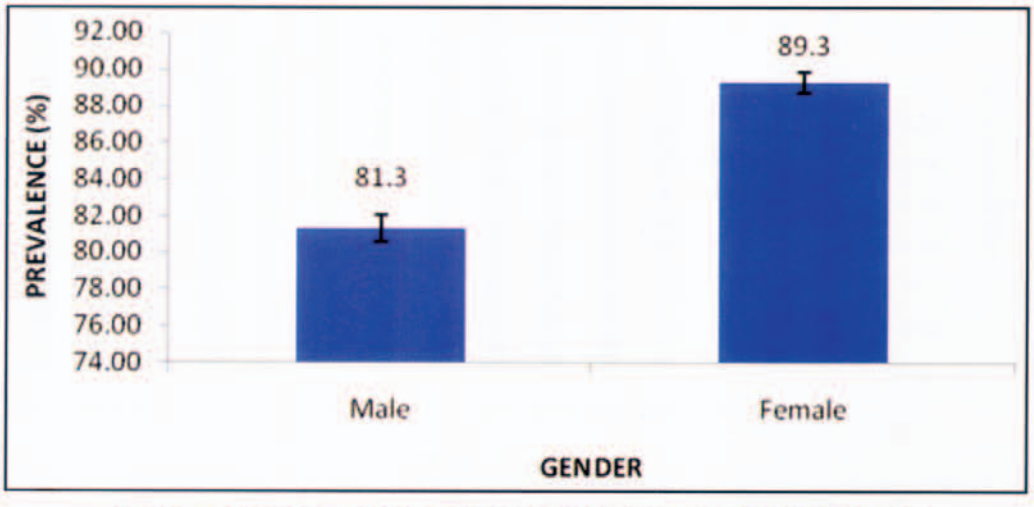


Figure 5.33: Prevalence of physical inactivity in leisure time domain by gender

5.6.2 Prevalence of physical inactivity in leisure time domain by age group

Generally, the prevalence increased with increasing age (Figure 5.34).

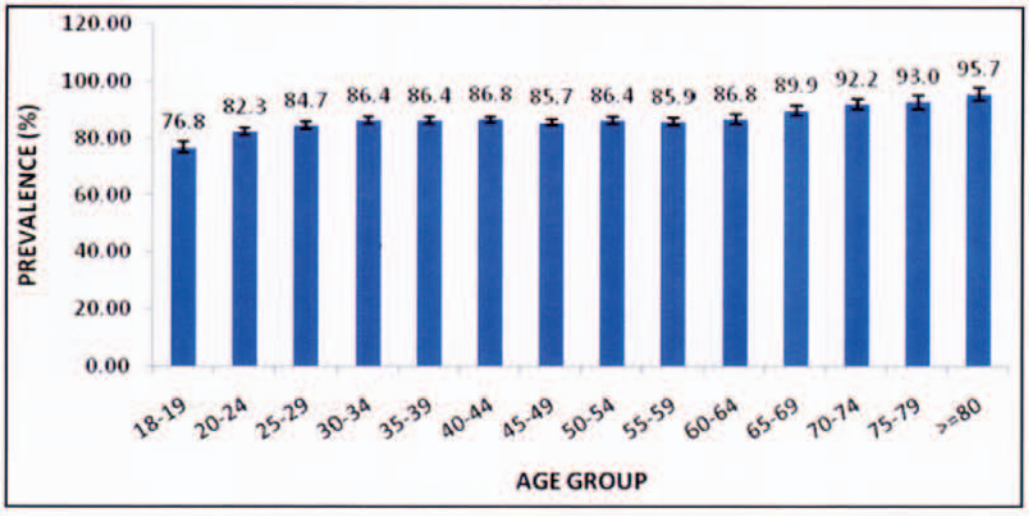


Figure 5.34: Prevalence of physical inactivity in leisure time domain by age group

5.6.3 Prevalence of physical inactivity in leisure time domain by state

The two highest prevalence were in Wilayah Persekutuan Kuala Lumpur [91.9% (CI : 90.3 – 93.4)] and Johor [90.5% (CI : 89.3 – 91.7)] (Figure 5.35).

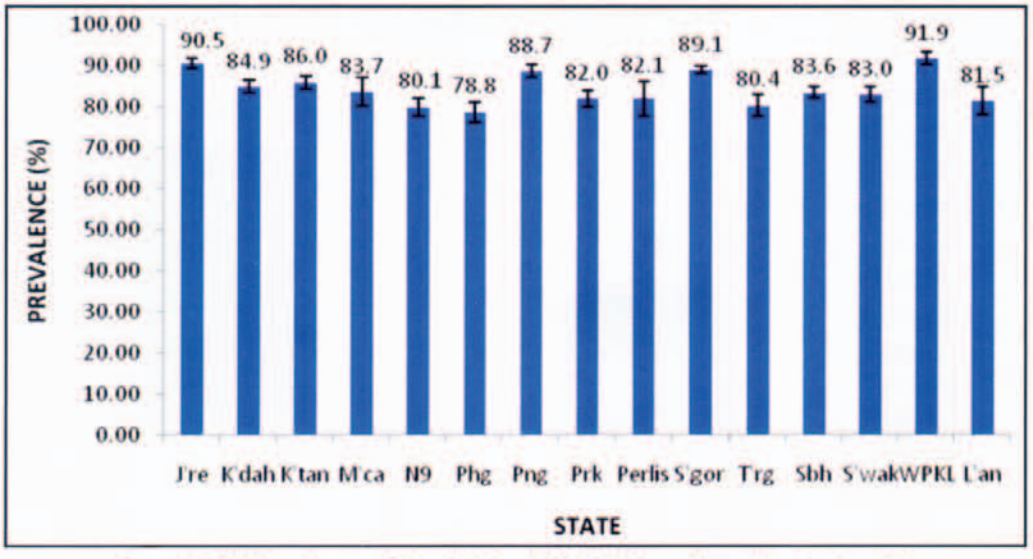


Figure 5.35: Prevalence of physical inactivity in leisure time domain by state

5.6.4 Prevalence of physical inactivity in leisure time domain by strata

Urban dwellers [87.1% (CI : 86.5 – 87.7)] were more inactive than rural residents [83.1% (CI : 82.4 – 83.9)] (Figure 5.36).

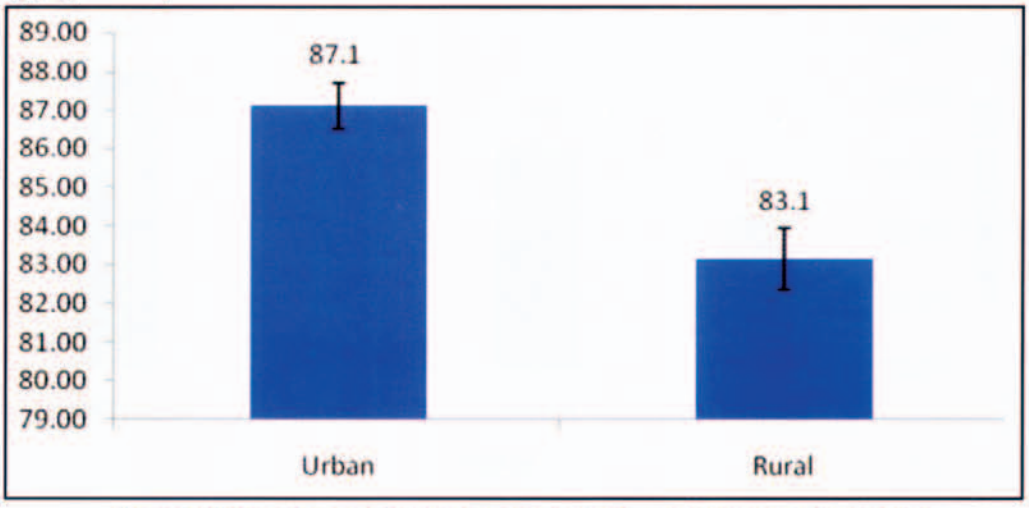


Figure 5.36: Prevalence of physical inactivity in leisure time domain by strata

5.6.5 Prevalence of physical inactivity in leisure time domain by ethnic group

The lowest prevalence was among the Other Bumis [83.1% (CI : 81.7 – 84.4)], followed by Malays [85.0% (CI : 84.3 – 85.6)] (Figure 5.37).

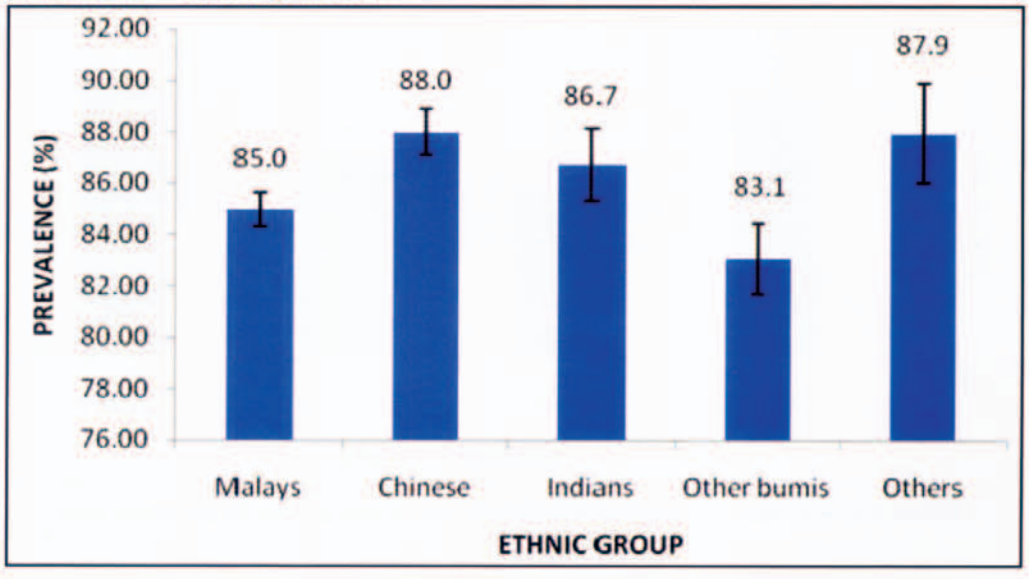


Figure 5.37: Prevalence of physical inactivity in leisure time domain by ethnic group

5.6.6 Prevalence of physical inactivity in leisure time domain by marital status

The highest prevalence was among the widow/widower [92.0% (CI : 90.7 – 93.3)] and the lowest was among the unmarried respondents [81.2% (CI : 80.2 – 82.3)] (Figure 5.38).

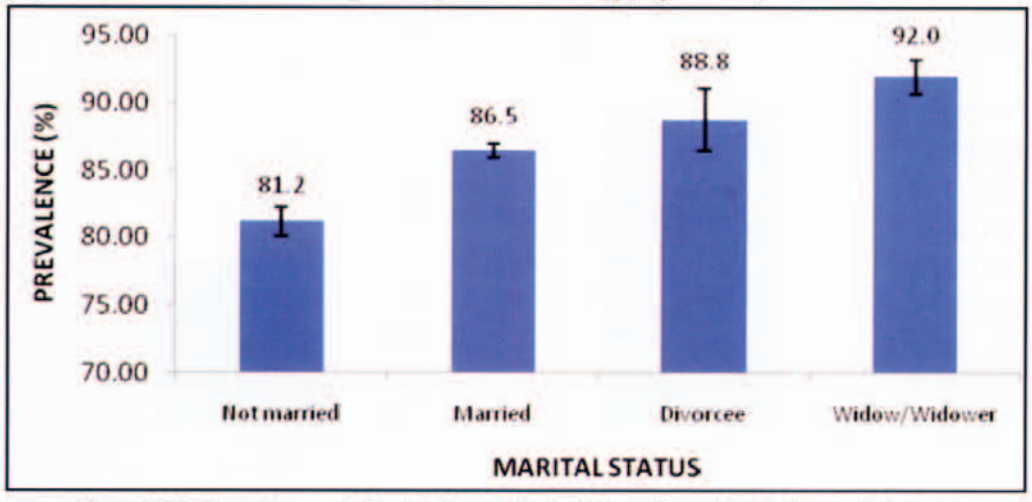


Figure 5.38: Prevalence of physical inactivity in leisure time domain by marital status

5.6.7 Prevalence of physical inactivity in leisure time domain by education level

No obvious pattern of physical inactivity by education level was observed (Figure 5.39).

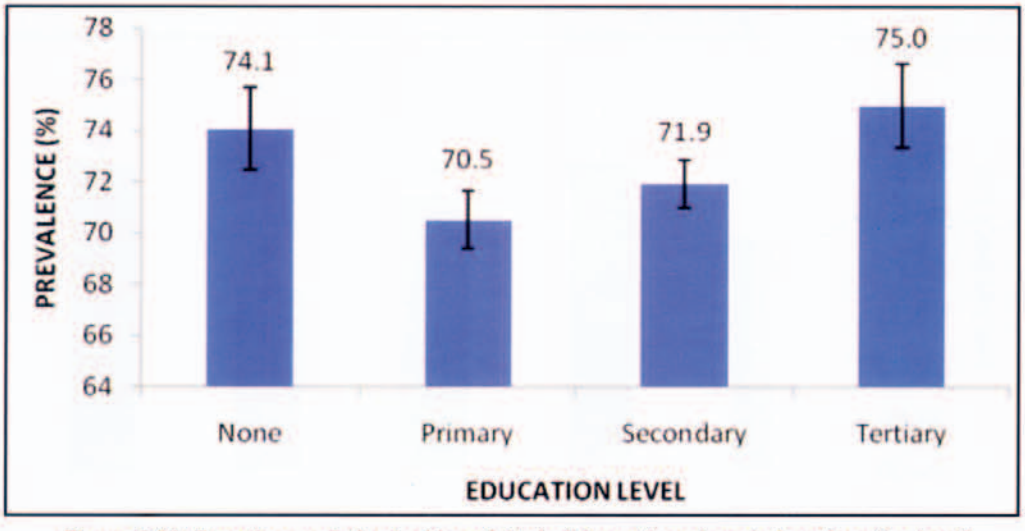
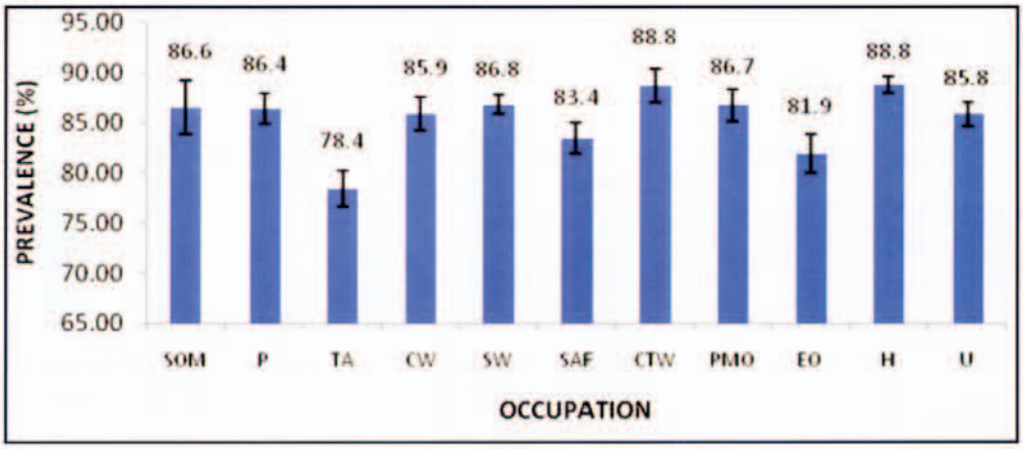


Figure 5.39: Prevalence of physical inactivity in leisure time domain by education level

5.6.8 Prevalence of physical inactivity in leisure time domain by occupation

Almost all the prevalence were more than 80% except for the Technical and Associate Professional with a prevalence of 78.4% (CI : 76.6 – 80.2)] (Figure 5.40).



SOM=Senior Officials & Managers, P=Professionals, TA=Technicians & Associate Professionals, CW=Clerical Workers, SW=Service Workers, SAF=Skilled Agricultural & Fishery, CTW=Craft & Trade Workers, PMO=Plant & Machine Operator, EO=Elementary Occupations, H=Housewife, U=Unemployed

Figure 5.40: Prevalence of physical inactivity in leisure time domain by occupation

5.6.9 Prevalence of physical inactivity in leisure time domain by household income

No clear pattern of physical inactivity by household income was observed (Figure 5.41).

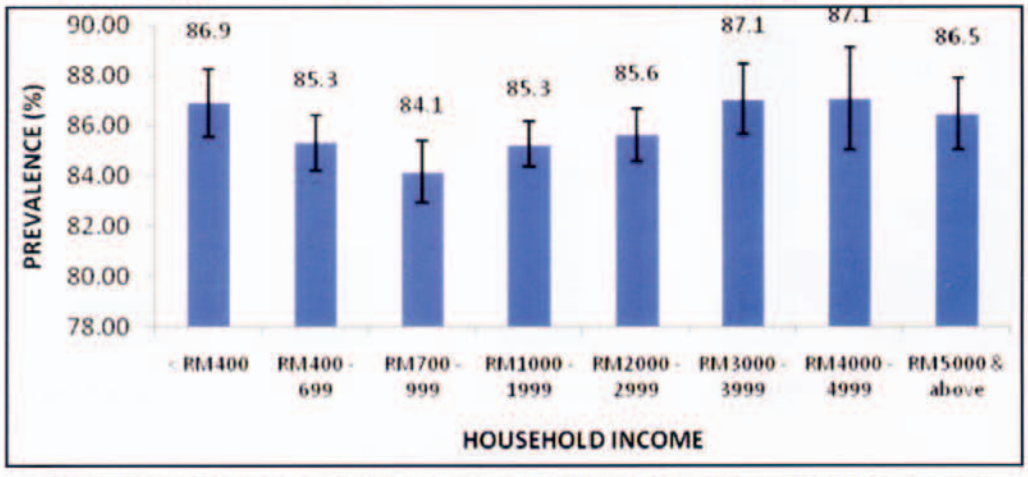


Figure 5.41: Prevalence of physical inactivity in leisure time domain by household income

5.6.10 Prevalence of physical inactivity in leisure time domain by personal income

There was also no clear pattern of physical inactivity by personal income (Figure 5.42).

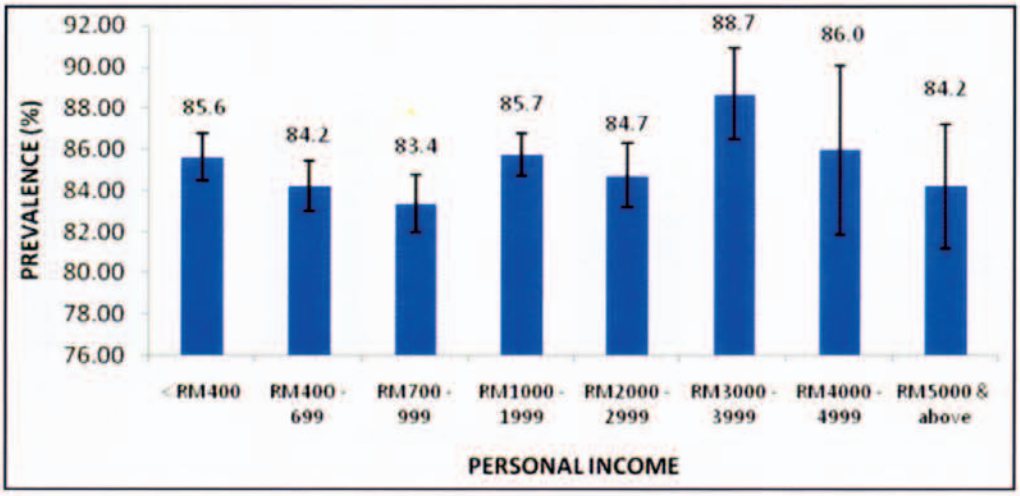


Figure 5.42: Prevalence of physical inactivity in leisure time domain by personal income

5.7 Physical activity MET-minutes

Overall MET minutes of total physical activity was 894 minute per week and it was above the recommended MET minutes for health benefit (600 MET minutes). By life domains, MET minutes was 518 (working), 288 (travel) and 135 (leisure time)(Figure 5.43).

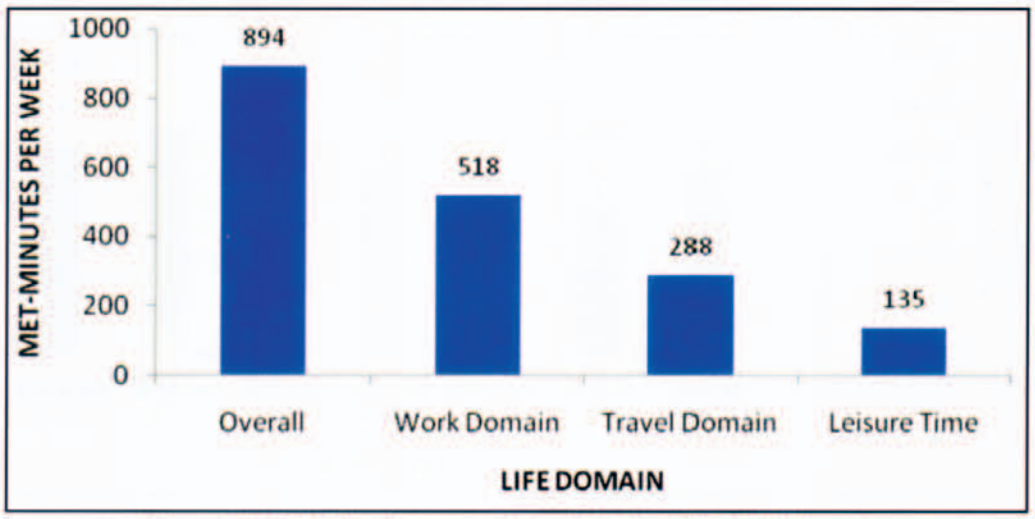


Figure 5.43: MET-Minutes per week of physical activity by life domain

6. DISCUSSION

6.1 Overall physical activity

The study indicated that about 5.5 millions of Malaysian adults were not physically active which represented 43.7% of adult population. In other word, there were about 44 out of 100 adults who were physically inactive. This proportion was comparatively lower when compared to other countries. In United States, the prevalence of physical inactivity was 52.9% while WHO reported more than 60% of adults did not engage in sufficient levels of physical activity which are beneficial to their health (World Health Report 2002). These comparisons need to be interpreted with causion by taking into consideration of the differences in the definition used as well as the age group in the respective studies.

Physical inactivity was more prevalent in women, older adults and higher socio economic group. The similar trend found among Malaysian adults in 1996 (Institute of Public Health 1999) and globally (World Health Report 2002; Deborah et al. 2007). Sedentary behavior with increasing age was also observed among the Australians, from 6% in people 18 – 29 years old to around 18% in those aged 45 years and above (Australian Institute of Health and Welfare 2000). Sallis (2000) hypothesized that age-related decline in the activity levels might partly be biologically based since activity levels decline with increasing age were observed across diverse population, as well as in animal models.

By state, Selangor had the highest prevalence of physical inactivity (52.1%), followed by Kuala Lumpur (51.8%) and the least was in Pahang (31.4%) and Terengganu (32.3%). The findings might be related to the locality of the respondents whereby urban residence found to be more inactive physically compared to rural residence.

The highest prevalence of physical inactivity was observed among Chinese followed by Indians, Others Bumiputras and Malays. This result was consistent with Malaysian Non Communicable Disease Surveillance 2005/2006 where the highest prevalence was among the Chinese (Disease Control Division 2006). It might be attributed by the quantification of physical activity level in three life domains and not purely on the leisure time.

Widow/widower had the highest prevalence for physical inactivity (58.6%), followed by divorcee (53.9%), married (43.6%) and not married (39.3%). Age and the occupation could be the confounding factors for these observations.

By occupation, the unemployed and housewife groups were found to be significantly inactive compared to the other occupation groups. The skilled agricultural and fishery (25.3%) and elementary occupations (27.0%) were the active working groups. There was no significant difference in physical activity status among the professional, the administrators or office related jobs. The finding might be related to the nature of working activity which contributed a lot to the status of physical activity of the individual.

The physical inactivity can also be reported based on the individual life domain and it would not reflect the actual physical activity status of the population. Therefore, the prevalence of physical activity in each domain found to be higher compared to overall prevalence of physical inactivity. By domains,

85.7% of Malaysian adults reported inactive physically during leisure time, 72.6% inactive during working and 72.1% during travelling.

6.2 Physical inactivity in leisure time domain

The prevalence of physical inactivity in leisure time seemed to be increased since 1996 (69.1%) (Institute of Public Health 1999). In comparison, Australian adults were found to be more active during leisure time activity whereby only 15% of Australian adults were reported to have no leisure time physical activity in 1999 (Australian Institute of Health and Welfare 2000).

This study found that the physical activity reduced with age. Similar trend was shown in China in which, younger adults, men, and southern residents were more likely to be physically active and to participate in work-related and leisure-time physical activities than older adults, women, and northern residents (American Journal of Public Health 2005). In Singapore, similar finding was found among elderly population whereby the regular leisure-time physical activity was practiced by 47.0% of men and 38.5% of women (Lian et al. 1999).

The highest prevalence rate of physical inactivity was observed among Chinese followed by Indians, Others Bumiputras and Malays. These results differed from the findings in 1996 whereby Chinese was the second most active ethnic group in Malaysia after Malays (Institute of Public Health 1999).

The prevalence of physical inactivity increased with the higher income. However, in 1996 study, higher prevalence of exercise observed among high income group (Institute of Public Health 1999).

6.3 Physical activity MET-minutes

It was found that the average of MET minutes of total physical activity for Malaysian adults aged 18 years and above was 894 minute per week. It was very interesting to find that the MET minutes per week was above the recommended value whereby in order to get health benefit, individual must do physical activity at least 600 MET minutes per week. Study showed that the average MET minutes was contributed by a combination of activities done in three major life domain ie working (518.5 minutes per week), travel (288.0 minutes per week) and leisure time (134.8 minutes per week).

6.4 Summary

The high rate of physical inactivity of 43.7% among adult populations implies that a large number of Malaysians are at risk to several major chronic diseases. Thus it is important to motivate Malaysian community to adopt healthy life style including being active physically. The practice of being active during working, traveling or leisure time should be inculcated into all Malaysian since childhood. Thus, health promotion and health education should be targeted to all Malaysian especially women, residence in urban localities, widow/widower and divorcee, higher income and older age groups. Much of the health gain is obtained through at least 30 minutes of cumulative moderate physical activity per day (World Health Organization 2002). This level of activity can be reached through a broad range of appropriate and enjoyable physical activities and body movements in people's daily lives such as walking to work, climbing stairs, gardening, car washing as well as a variety of leisure and recreational activities and sports.

7. CONCLUSION

The overall prevalence of physical inactivity was 43.7% with estimated 5,545,891 Malaysian adults aged 18 years and above were not active physically. They are at risk of developing chronic diseases.

The study showed that several factors contributed to physical inactivity such as women, older age group and residence in urban areas. Residence from Selangor and Kuala Lumpur gave the higher prevalence of physical inactivity. Skilled agricultural and fishery, and elementary occupation groups seemed to contribute to physical inactivity.

The survey also found that mean minutes of total activity (MET minutes per week) was higher than the level recommended for health benefits and it was contributed by a combination of physical activities in three life domains.

Thus, it is recommended that health promotion on active lifestyle and intervention on physical inactivity should be targeted on population who are not active. Malaysian adult should be encouraged to be active in all three life domains in order to get the health benefit of physical activity.

8. RECOMMENDATIONS

The findings indicated almost half of Malaysian adults were physically inactive and studies had shown that inactivity poses a risk to several major chronic diseases. Therefore, several measures should be taken to make Malaysians active such as:

8.1 Actions should be taken by government and concerned stakeholders to integrate physical activity promotion in health and social developmental strategies, policies and programmes.

8.2 Physical activity is not merely about individual behaviour. It is a societal problems and demands an integrated evidence based, population focus, equity driven, multisectoral and culturally relevant national policy and programme, supported by a clear and strong political commitment at all levels. Consequently, physical activities must be part of public policy with regulatory and legislative approaches balanced with education and health promotion.

8.3 There is a crucial need to raise the level of awareness in society about multiple benefits of physical activity and appropriate sports, particularly among policy and decision makers, local leaders and the public at large. Dissemination of relevant knowledge to all concerned sectors will improve collective awareness and facilitates policy support.

8.4 National physical activity programmes and initiatives should be adequately planned and coordinated with clear and realistic objectives (short term and long term) and approaches leading to an increase in population participation in physical activity. Such planning should be prepared within an integrated approach to the prevention of chronic diseases, health promotion and sustainable socioeconomic development.

8.5 Priority areas of action within multisectorial policies and programmes include:

i. Up-dating and dissemination in society of the knowledge on health, social and economic benefits of physical activity and sports as well as best practice.
ii. Promoting physical activity and sports among young peoples, in and out of school. Official programmes of quality physical education need to be strengthened in school.
iii. Designing regular physical activity programmes in health services with integrated intervention which include healthy diet and healthy lifestyles as part of prevention and rehabilitation measures.
iv. Developing relevant physical activity and sport programmes in the community (eg: periodic walking, cycling and leisure time sport campaigns) involving various population groups of all ages.
v. Promoting physical activity and related healthy behaviour at workplace.
vi. Promoting active transport initiatives (walking, cycling, greater use of public transport etc) and developing parks and open spaces where population can practice enjoyable physical activities with clean air and safe environment.

8.6 Further research

Further research needs to be carried out to improve existing strategies so that it provides further information that is useful in planning and designing appropriate strategy. This includes:

i. Determinations of factors influencing the community to engage in physical activities and factors that hinder those who are not exercising.

ii. The influence of certain occupations which involve heavy physical activity. Indicators and criteria should be developed to equate work with exercise such as occupations in the agricultural sector.

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APPENDIX

APPENDIX

Table 1: Characteristic of respondents

Sociodemography	Total Respondent	%
National	33949	59.9
State		
Johor	3,816	11.2
Kedah	2,561	7.5
Kelantan	1,981	5.8
Malacca	886	2.6
N. Sembilan	1,277	3.8
Pahang	1,829	5.4
Penang	2,113	6.2
Perak	2,565	7.6
Perlis	315	0.9
Selangor	5,868	17.3
Terengganu	1,393	4.1
Sabah	3,940	11.6
Sarawak	2,920	8.6
W.P. Kuala Lumpur	1,936	5.7
W.P. Labuan	549	1.6
Residence		
Urban	20,158	59.4
Rural	13,791	40.6
Gender		
Male	15,205	44.8
Female	18,744	55.2

Table 1: Characteristic of Respondents (continue)

Sociodemography	Total Respondent	%
Age Group		
18-19	1,675	4.9
20-24	3,817	11.2
25-29	3,686	10.9
30-34	3,542	10.4
35-39	3,593	10.6
40-44	3,833	11.3
45-49	3,490	10.3
50-54	3,039	9.0
55-59	2,472	7.3
60-64	1,654	4.9
65-69	1,411	4.2
70-74	883	2.6
75-79	484	1.4
80+	370	1.1
Ethnic Group		
Malay	18,693	55.1
Chinese	6,878	20.3
Indian	2,786	8.2
Other Bumiputra	3,888	11.5
Others	1,704	5.0
Religion		
Islam	22,049	64.9
Christian	3,112	9.2
Buddhist	5,934	17.5
Hindu	2,309	6.8
Others	506	1.5
Unclassified	39	0.1
Citizenship		
Malaysian	31,770	93.6
Non-Malaysian	2,156	6.4
Unclassified	23	0.1

Table 1: Characteristic of respondents(continue)

Sociodemography	Total Respondent	%
Education		
None	3,607	10.6
Primary	9,723	28.6
Secondary	17,010	50.1
Tertiary	3,348	9.9
Unclassified	261	0.8
Marital Status		
Not married	7,138	21.0
married	24,109	71.0
Divorcee	735	2.2
Widow/widower	1,840	5.4
Unclassified	127	0.4

Table 2: Prevalence of overall physical inactivity

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	Upper
National	14,687	5,545,892	43.7	42.9	44.5
Gender					
Male	5,280	1,997,956	35.3	34.3	36.3
Female	9,407	3,547,936	50.5	49.5	51.5
Age Group					
18-19	660	248,806	40.2	37.7	42.8
20-24	1,551	590,295	41.4	39.6	43.1
25-29	1,510	575,463	41.4	39.6	43.2
30-34	1,466	553,128	41.8	40.1	43.6
35-39	1,472	557,866	41.6	39.9	43.4
40-44	1,502	569,650	39.7	38.0	41.4
45-49	1,377	526,411	40.2	38.4	42.1
50-54	1,259	478,312	41.8	39.9	43.7
55-59	1,100	416,865	44.7	42.6	46.8
60-64	782	290,949	47.5	45.0	50.0
65-69	809	297,343	57.0	54.3	59.8
70-74	559	205,385	63.1	59.8	66.3
75-79	342	126,116	70.6	66.5	74.8
80+	298	109,303	80.3	76.3	84.4
State					
Johor	1,720	672,573	45.6	42.9	48.2
Kedah	938	337,815	36.8	34.0	39.6
Kelantan	674	224,516	34.2	31.2	37.1
Malacca	350	142,297	39.3	34.7	44.0
N. Sembilan	446	159,545	34.5	30.4	38.5
Pahang	571	220,626	31.4	28.5	34.4
Penang	876	310,962	41.2	38.4	44.1
Perak	1,124	469,342	43.7	41.3	46.2
Perlis	155	56,457	49.1	45.2	53.0
Selangor	3,046	1,261,109	52.1	50.3	53.9
Terengganu	451	153,144	32.3	29.2	35.5
Sabah	1,675	513,241	42.5	40.1	44.9
Sarawak	1,390	546,220	48.0	45.5	50.5
W.P. Kuala Lumpur	1,002	394,377	51.8	48.7	54.9
W.P. Labuan	269	83,665	49.2	44.7	53.6
Strata					
Urban	9,141	3,755,657	45.6	44.6	46.7
Rural	5,546	1,790,235	40.1	38.9	41.4

Table 2: Prevalence of overall physical inactivity (continue)

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	95% CI Upper
Ethnic Group					
Malay	7,811	2,927,035	42.4	41.3	43.4
Chinese	3,228	1,298,253	47.1	45.6	48.7
Indian	1,235	493,769	44.5	42.2	46.7
Other Bumis	1,711	572,697	44.1	41.9	46.2
Others	702	254,138	41.3	38.2	44.4
Marital Status					
Not married	2,759	1,054,205	39.3	37.9	40.7
married	10,404	3,923,074	43.6	42.7	44.4
Divorcee	392	149,306	53.9	50.3	57.6
Widow/widower	1,075	398,047	58.6	56.3	61.0
Unclassified	57	21,258	44.7	35.7	53.7
Education Level					
None	2,066	732,758	57.4	55.6	59.1
Primary	4,127	1,532,966	42.9	41.7	44.1
Secondary	6,899	2,641,989	41.1	40.1	42.1
Tertiary	1,478	593,641	44.9	42.9	46.9
Unclassified	117	44,538	46.1	39.6	52.5
Occupation					
Senior Officers & Managers	294	117,598	46.3	42.2	50.4
Professionals	1,026	407,041	46.2	43.9	48.5
Technical & Associate	873	338,408	33.5	31.6	35.4
Clerical Workers	853	331,479	47.3	44.8	49.8
Service Workers & Shop	2,026	777,288	36.9	35.5	38.4
Skilled Agricultural & Fishery	668	226,762	25.3	23.2	27.4
Craft & Related Trade Workers	683	264,614	35.1	32.4	37.8
Plant & Machine Operator	720	272,080	39.3	36.9	41.7
Elementary Occupations	414	150,042	27.0	24.5	29.6
Housewife	4,340	1,619,387	54.4	53.1	55.7
Unemployed	2,068	759,284	60.8	59.0	62.5
Unclassified	722	281,909	45.6	42.6	48.5

Table 2: Prevalence of overall physical inactivity (continue)

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	95% CI Upper
Household Income					
Less than RM 400	1,341	473,915	46.3	44.0	48.5
RM 400 - RM 699	2,021	716,761	41.3	39.6	43.0
RM 700 - RM 999	1,560	573,453	41.2	39.4	43.0
RM 1000 - RM 1999	3,828	1,442,641	43.4	42.2	44.7
RM 2000 - RM 2999	2,180	847,708	42.6	41.0	44.2
RM 3000 - RM 3999	1,167	463,921	45.3	43.0	47.5
RM 4000 - RM 4999	567	222,716	43.5	40.4	46.5
RM 5000 & above	1,343	544,714	46.6	44.3	48.9
Unclassified	680	260,062	49.6	46.5	52.7
Personal Income					
Less than RM 400	1,334	472,882	34.8	33.0	36.6
RM 400 - RM 699	1,304	484,147	33.1	31.4	34.8
RM 700 - RM 999	1,195	458,339	35.7	33.9	37.5
RM 1000 - RM 1999	2,149	836,357	37.0	35.6	38.4
RM 2000 - RM 2999	859	340,560	39.4	37.2	41.6
RM 3000 - RM 3999	350	141,789	45.1	41.5	48.8
RM 4000 - RM 4999	134	53,802	45.7	39.7	51.6
RM 5000 & above	275	113,657	50.1	45.7	54.5

Table 3: Prevalence of Physical Inactivity by Life Domains

Domain	n	Estimated Population	Prevalence (%)	95% CI Lower	95% CI Upper
Working Domain	23,932	8,961,148	72.6	71.9	73.4
Travel Domain	23,955	9,024,960	72.1	71.4	72.8
Leisure Time Domain	28,733	10,785,677	85.7	85.3	86.2

Table 4 : Prevalence of physical inactivity working domain

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	Upper
National	23,932	8,961,148	72.6	71.9	73.4
Gender					
Male	10,016	3,747,265	66.8	65.8	67.9
Female	13,916	5,213,883	77.5	76.5	78.4
Age Group					
18-19	1,311	487,198	79.8	77.6	81.9
20-24	2,714	1,018,456	72.4	70.7	74.1
25-29	2,558	963,899	70.5	68.9	72.2
30-34	2,401	897,000	69.4	67.6	71.1
35-39	2,426	904,770	69.5	67.8	71.2
40-44	2,585	969,054	69.3	67.6	71.1
45-49	2,321	873,756	68.6	66.8	70.3
50-54	2,064	777,634	70.1	68.3	72.0
55-59	1,773	670,314	74.7	72.7	76.6
60-64	1,238	460,625	77.9	75.6	80.2
65-69	1,080	399,117	81.9	79.7	84.1
70-74	729	269,543	87.4	85.1	89.6
75-79	412	151,942	90.3	87.6	93.1
80+	320	117,838	94.7	92.4	97.1
State					
Johor	2,719	1,061,572	73.0	70.2	75.7
Kedah	1,688	605,244	66.5	63.2	69.7
Kelantan	1,266	421,877	64.6	61.0	68.3
Malacca	600	248,277	69.8	65.6	73.9
N. Sembilan	581	209,411	50.8	46.0	55.6
Pahang	1,159	445,984	64.3	60.8	67.7
Penang	1,735	619,352	83.4	81.6	85.1
Perak	1,745	729,893	72.4	69.1	75.7
Perlis	270	98,499	86.4	82.4	90.4
Selangor	4,246	1,753,683	75.1	73.5	76.8
Terengganu	937	319,475	68.3	64.7	72.0
Sabah	2,947	904,254	76.1	73.8	78.4
Sarawak	2,242	873,510	80.5	78.7	82.3
W.P. Kuala Lumpur	1,347	530,166	70.8	67.9	73.6
W.P. Labuan	450	139,950	83.9	80.2	87.6
Strata					
Urban	14,491	5,910,063	73.8	72.8	74.8
Rural	9,441	3,051,084	70.5	69.1	71.9

Table 4: Prevalence of physical inactivity working domain (continue)

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	Upper
Ethnic Group					
Malay	12,896	4,794,001	71.4	70.4	72.4
Chinese	5,035	2,014,188	75.2	73.7	76.8
Indian	1,910	761,845	70.6	68.3	72.8
Other Bumiputras	2,985	993,449	78.8	76.9	80.7
Others	1,106	397,665	65.8	62.3	69.2
Marital Status					
Not married	5,145	1,937,765	72.9	71.6	74.2
married	16,734	6,259,516	71.7	70.8	72.6
Divorcee	558	210,137	78.9	75.8	81.9
Widow/widower	1,407	520,924	81.6	79.7	83.6
Unclassified	88	32,806	70.9	62.6	79.1
Education Level					
None	2,749	971,907	80.6	79.1	82.2
Primary	6,543	2,408,057	69.7	68.5	70.9
Secondary	11,936	4,512,480	71.9	70.9	72.9
Tertiary	2,538	1,007,008	77.1	75.4	78.8
Non Classified	166	61,697	65.7	59.4	72.0
Occupation					
Senior Officers & Managers	486	193,067	76.7	73.1	80.2
Professionals	1,694	665,405	76.3	74.3	78.4
Technical & Associate	1,828	700,982	69.8	67.8	71.8
Clerical Workers	1,462	562,888	80.6	78.6	82.5
Service Workers & Shop	3,648	1,380,904	66.2	64.6	67.7
Skilled Agricultural & Fishery	1,462	495,598	55.9	53.4	58.4
Craft & Related Trade Workers	1,184	453,206	60.6	57.7	63.5
Plant & Machine Operator	1,174	439,254	64.0	61.6	66.4
Elementary Occupations	877	312,430	57.0	54.0	60.0
Housewife	5,770	2,135,109	78.8	77.6	80.1
Unemployed	2,998	1,099,361	88.8	87.6	90.0
Unclassified	1,349	522,944	85.8	84.0	87.6

Table 4: Prevalence of physical inactivity working domain (continue)

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	Upper
Household Income					
Less than RM 400	2,136	751,582	75.7	73.8	77.6
RM 400 - RM 699	3,350	1,176,729	70.6	68.9	72.3
RM 700 - RM 999	2,677	975,405	72.3	70.5	74.1
RM 1000 - RM 1999	6,169	2,309,975	71.6	70.3	72.9
RM 2000 - RM 2999	3,624	1,398,552	71.9	70.3	73.5
RM 3000 - RM 3999	1,849	724,371	72.4	70.4	74.5
RM 4000 - RM 4999	921	360,691	71.8	68.8	74.8
RM 5000 & above	2,188	874,493	76.1	74.1	78.1
Unclassified	1,018	389,350	77.0	74.2	79.7
Personal Income					
Less than RM 400	2,507	876,919	65.5	63.6	67.4
RM 400 - RM 699	2,550	934,221	64.3	62.5	66.1
RM 700 - RM 999	2,206	833,867	65.4	63.5	67.4
RM 1000 - RM 1999	3,844	1,484,860	66.1	64.7	67.5
RM 2000 - RM 2999	1,543	603,955	70.3	68.2	72.5
RM 3000 - RM 3999	570	227,865	73.2	70.0	76.4
RM 4000 - RM 4999	211	84,365	72.3	67.1	77.5
RM 5000 & above	446	181,871	80.9	77.3	84.6

Table 5 : Prevalence of physical inactivity travel domain

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	Upper
National	23,955	9,024,960	72.1	71.3	72.8
Gender					
Male	10,336	3,881,284	69.6	68.6	70.6
Female	13,619	5,143,676	74.1	73.2	75.0
Age Group					
18-19	1,181	439,818	72.2	69.8	74.5
20-24	2,729	1,029,539	73.2	71.6	74.9
25-29	2,590	984,622	71.8	70.2	73.5
30-34	2,549	958,687	73.4	71.7	75.1
35-39	2,507	944,632	71.5	69.8	73.2
40-44	2,579	976,373	68.7	67.0	70.4
45-49	2,427	920,365	71.3	69.7	73.0
50-54	2,100	798,410	70.8	69.1	72.5
55-59	1,706	646,705	70.6	68.7	72.5
60-64	1,140	423,848	70.3	67.9	72.6
65-69	1,055	390,283	75.9	73.6	78.2
70-74	675	248,408	77.0	74.1	79.9
75-79	403	147,818	83.2	79.9	86.6
80+	314	115,452	86.5	82.9	90.0
State					
Johor	2,568	997,451	69.2	66.9	71.5
Kedah	1,852	666,288	73.3	70.8	75.9
Kelantan	1,220	405,133	62.3	59.1	65.4
Malacca	589	237,922	68.3	64.7	71.8
N. Sembilan	1,038	378,015	83.1	80.8	85.5
Pahang	1,099	422,745	61.0	57.9	64.0
Penang	1,229	437,142	58.3	55.4	61.2
Perak	1,922	806,485	75.6	72.8	78.4
Perlis	214	78,868	70.5	65.3	75.6
Selangor	4,806	1,986,717	82.7	81.5	83.9
Terengganu	847	288,222	61.4	57.9	64.9
Sabah	2,638	807,975	67.8	65.1	70.5
Sarawak	2,036	798,792	71.8	69.5	74.1
W.P. Kuala Lumpur	1,492	587,236	78.2	76.1	80.3
W.P. Labuan	405	125,967	75.4	70.7	80.1
Strata					
Urban	14,607	6,002,984	73.8	72.9	74.8
Rural	9,348	3,021,976	68.9	67.6	70.1

Table 5 : Prevalence of physical inactivity travel domain (continue)

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	95% CI Upper
Ethnic Group					
Malay	13,105	4,883,427	71.7	70.8	72.7
Chinese	4,990	2,010,613	73.7	72.2	75.1
Indian	2,060	824,119	75.1	73.1	77.0
Other Bumiputras	2,642	885,287	69.3	67.1	71.5
Others	1,158	421,514	69.7	66.7	72.8
Marital Status					
Not married	4,997	1,893,491	71.6	70.3	72.9
Married	16,945	6,379,061	71.8	71.0	72.6
Divorcee	536	203,618	74.6	71.4	77.9
Widow/widower	1,387	515,017	76.8	74.8	78.7
Unclassified	90	33,773	72.8	64.8	80.9
Education Level					
None	2,621	931,148	74.1	72.5	75.7
Primary	6,701	2,483,911	70.5	69.4	71.7
Secondary	11,984	4,559,988	71.9	71.0	72.9
Tertiary	2,464	980,798	75.0	73.4	76.6
unclassified	185	69,115	74.5	69.0	80.0
Occupation					
Senior Officers & Managers	476	190,786	75.9	72.5	79.4
Professionals	1,642	645,863	74.5	72.5	76.4
Technical & Associate	1,766	680,580	68.2	66.2	70.2
Clerical Workers	1,316	510,281	73.6	71.4	75.8
Service Workers & Shop	3,730	1,430,964	68.7	67.3	70.2
Skilled Agricultural & Fishery	1,539	524,406	59.6	57.3	61.9
Craft & Related Trade Workers	1,367	524,085	70.7	68.5	73.0
Plant & Machine Operator	1,367	516,535	75.8	73.7	78.0
Elementary Occupations	919	329,907	60.6	57.8	63.4
Housewife	6,059	2,266,077	77.0	75.9	78.2
Unemployed	2,656	972,321	78.8	77.3	80.3
Unclassified	1,118	433,156	71.6	68.9	74.2

Table 5 : Prevalence of physical inactivity travel domain (continue)

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	Upper
Household Income					
Less than RM 400	2,033	717,585	71.2	69.1	73.3
RM 400 - RM 699	3,333	1,172,837	68.8	67.1	70.5
RM 700 - RM 999	2,572	942,166	68.9	67.1	70.6
RM 1000 - RM 1999	6,316	2,372,094	72.4	71.2	73.6
RM 2000 - RM 2999	3,684	1,431,478	72.7	71.2	74.2
RM 3000 - RM 3999	1,884	748,321	73.8	71.9	75.7
RM 4000 - RM 4999	962	379,794	74.8	72.2	77.4
RM 5000 & above	2,149	866,989	75.1	73.0	77.2
Unclassified	1,022	393,697	75.9	73.3	78.6
Personal Income					
Less than RM 400	2,437	860,500	64.5	62.7	66.4
RM 400 - RM 699	2,583	946,410	65.8	64.1	67.5
RM 700 - RM 999	2,287	868,650	68.8	67.0	70.5
RM 1000 - RM 1999	4,078	1,582,482	70.8	69.4	72.2
RM 2000 - RM 2999	1,554	614,968	72.1	70.0	74.1
RM 3000 - RM 3999	579	232,579	75.0	71.9	78.2
RM 4000 - RM 4999	227	91,301	78.0	73.1	83.0
RM 5000 & above	428	175,729	78.4	74.7	82.1

Table 6 : Prevalence of physical inactivity leisure time domain

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	Upper
National	28,773	10,785,677	85.7	85.2	86.2
Gender					
Male	12,159	4,557,350	81.3	80.6	82.0
Female	16,614	6,228,327	89.3	88.7	89.8
Age Group					
18-19	1,256	468,150	76.8	74.6	78.9
20-24	3,083	1,162,883	82.3	81.0	83.5
25-29	3,066	1,162,134	84.7	83.4	86.0
30-34	3,031	1,135,151	86.4	85.2	87.7
35-39	3,068	1,149,260	86.4	85.2	87.6
40-44	3,297	1,236,034	86.8	85.7	87.9
45-49	2,942	1,107,813	85.7	84.4	86.9
50-54	2,605	981,746	86.4	85.1	87.7
55-59	2,112	794,611	85.9	84.5	87.3
60-64	1,431	528,506	86.8	85.1	88.5
65-69	1,267	465,950	89.9	88.2	91.6
70-74	811	298,005	92.2	90.4	94.0
75-79	450	165,202	93.0	90.7	95.3
80+	354	130,232	95.7	93.6	97.9
State					
Johor	3,405	1,322,111	90.5	89.3	91.7
Kedah	2,155	773,646	84.9	83.2	86.5
Kelantan	1,695	562,759	86.0	84.4	87.6
Malacca	725	295,080	83.7	80.3	87.1
N. Sembilan	1,006	365,769	80.1	77.9	82.3
Pahang	1,428	548,564	78.8	76.4	81.3
Penang	1,863	664,841	88.7	87.0	90.3
Perak	2,093	877,144	82.0	80.0	84.0
Perlis	258	93,753	82.1	77.8	86.4
Selangor	5,179	2,138,618	89.1	88.2	90.0
Terengganu	1,115	378,745	80.4	77.7	83.0
Sabah	3,260	1,001,885	83.6	82.2	84.9
Sarawak	2,386	931,474	83.0	81.2	84.9
W.P. Kuala Lumpur	1,762	693,506	91.9	90.3	93.4
W.P. Labuan	443	137,781	81.5	78.0	85.1
Strata					
Urban	17,405	7,109,179	87.1	86.5	87.7
Rural	11,368	3,676,498	83.1	82.4	83.9

Table 6 : Prevalence of physical inactivity leisure time domain (continue)

Sociodemography	n	Estimated Population	Prevalence (%)	95% CI Lower	95% CI Upper
Household Income					
Less than RM 400	2,514	880,935	86.9	85.6	88.3
RM 400 - RM 699	4,189	1,468,337	85.3	84.2	86.4
RM 700 - RM 999	3,178	1,161,648	84.1	82.9	85.4
RM 1000 - RM 1999	7,479	2,804,761	85.3	84.4	86.1
RM 2000 - RM 2999	4,374	1,691,631	85.6	84.6	86.7
RM 3000 - RM 3999	2,240	884,001	87.1	85.6	88.5
RM 4000 - RM 4999	1,126	442,017	87.1	85.1	89.2
RM 5000 & above	2,502	1,002,053	86.5	85.0	87.9
Unclassified	1,171	450,295	86.6	84.5	88.8
Personal Income					
Less than RM 400	3,301	1,152,250	85.6	84.5	86.8
RM 400 - RM 699	3,338	1,220,311	84.2	83.0	85.4
RM 700 - RM 999	2,789	1,059,210	83.4	82.0	84.8
RM 1000 - RM 1999	4,954	1,918,960	85.7	84.7	86.8
RM 2000 - RM 2999	1,845	724,687	84.7	83.2	86.3
RM 3000 - RM 3999	690	275,334	88.7	86.4	90.9
RM 4000 - RM 4999	249	99,959	86.0	81.9	90.0
RM 5000 & above	463	189,418	84.2	81.2	87.2

Table 7 : Means MET minutes Per week of physical activity

Domain	n	Estimated Population	Mean MET	95% CI Lower	95% CI Upper
Overall	33,943	12,698,154	894.2	871.6	916.8
Working Domain	30,912	11,535,987	518.4	499.0	537.9
Travel Domain	33,889	12,677,826	288.1	277.5	298.5
Leisure Time Domain	33,852	12,663,509	134.8	129.9	139.8