Malaysian Journal of Sustainable Environment
Vol.8.No.1 (2021) 75-90
doi: https://doi.org/10.24191/myse.v8i2.13237

A REVIEW ON SOCIO-DEMOGRAPHIC FACTORS INFLUENCING PHYSICAL ACTIVITIES

Nurain Mohd Talmizi[1], Nor Eeda Ali[2] & Suharto Teriman[3]
[1,2,3]Department of Town and Regional Planning,
Faculty of Architecture, Planning and Surveying,
Universiti Teknologi MARA,
Perak Branch, Seri Iskandar Campus

nuraintalmizi@uitm.edu.my
Received: 19 October 2020
Accepted: 20 November 2020
Published: 30 June 2021

ABSTRACT

Engagement in physical activity has been demonstrated by various studies as one of the ways to curb the prevalence of chronic disease that is related to deaths globally. Knowledge of how socio-demographic factors do influence physical activity can have a significant social and economic impact, both in the economic and family context. Thus, this article reviewed the existing literature on the nexus between socio-demographic factors and engagement in physical activity. Almost all evidences from the studies indicate that men tend to participate more frequently in physical activities than women. Individuals with higher educational and income background, the unmarried and the younger ones have high probability of engaging in physical activity. Identifying some of the socio-cultural factors that impede engagement of women in physical activities in most developing countries is recommended as it is a step towards enabling women to inculcate the habit of regular participation in physical activities. Besides, by improving an individual's education one can enhance knowledge on the relevance of physical activity on health and human wellbeing.

Keywords: *Physical activities, Socio-demographic*

INTRODUCTION

Physical activity is defined as "any body movement produced by skeletal muscle that results in energy expenditure" (Caspersen, Powell, & Christenson, 1985, p. 126) and includes a variety of activities, such as walking, exercising, swimming, and dancing (Koohsari et al., 2013). Physical activity can generally be categorized into several domains: recreation, employment, transportation, and household activities. This is becoming part and parcel of life in most developed nations due to its positive impact on Health-Related Quality of Life (HRQoL). Besides, physical activity can be undertaken within several domains of an individual's life, with work, travel and leisure-time. However, urbanisation and increasing dependence on motor vehicles have led to a reduction in the amount of physical activity (Shoham. et al., 2015). Thus, promoting physical activity has become a global priority in public health (Beaglehole et al., 2011; World Health Organization, 2010; Koohsari et al., 2013). Engaging in moderate and vigorous physical activity is linked to better respiratory and immune system function, lower body fat, lower cholesterol levels, greater sensitivity to insulin which is related to lower risk of diabetes and cardiovascular diseases (WHO, 2014). Physical activity equally influences mental health, increases self-esteem and reduces depressive symptoms (Shepard & Brawley, 2007). According to WHO (2015) physical inactivity is the fourth leading risk factor for worldwide mortality, leading to about 3.2 million deaths globally. In addition, it lacks physical activity and unhealthy dietary habits among the population, and has been identified as one of the main contributors to global burden of chronic diseases (Cheng & Holder, 2001).

In Malaysia, nearly two-third (71%) of all deaths in the country are chronic diseases related (WHO, 2010). In order to address this sharp rise, the government has increased the medical expenditure (Cheah, 2011; Lian et al., 2016). The reduction in body energy expenditure, which is attributed to low physical activity level, has also led to increase in the number of people living with obesity (Herna´ndez and Ramos-Iba´n˜ez, 2009). According to the authors, majority of the people appear to have opted for less active lifestyles such as motorized transport, trains, sub-ways, and use of mechanized equipment to perform domestic and occupational tasks that was hitherto done manually. It is a fact that physical activity is a major component of a balanced lifestyle, which enhances mental and physical

health and provides opportunities for social cohesion and integration (Social Report, 2010). Ragheb and Beard (1982) argued that one's willingness to engage in physical activities are predicated on attitude. If attitude towards physical activities is high, the tendency to participate will be high.

Additionally, research on physical activities has been increasingly focussed on the influence of physical environment and neighbourhood setting on individual's health and happiness (Hedayati et al., 2020). However, many studies have identified socio-demographic factors such as age, sex, income and education too do correlate with physical activity behaviour. This paper therefore, aims at reviewing existing literature on the influence of socio-demographic attributes have on physical activity.

METHODOLOGY

The literature review is categorized into socio-demographic themes. It covered studies conducted in both developed and developing nations.

LITERATURE REVIEW

Socio Demographic Attributes

Behavioural theories associate physical activity influence with multiple factors including intrapersonal (demography and psychology), interpersonal (social support), environmental (distance to the facilities), and policy (laws and regulations) (Vancampfort et. al., 2019). This is equally evident that socio-demographic characteristics play an important role in determining the rate of physical activity involvement among citizens. The influence of socio-demographic attributes on physical activities especially in Western countries have been examined in detail in existing literature (Lechner, 2009; Eberth & Smith, 2010). The following subsections, discuss six most notable socio-demographic factors that influence physical activities.

Gender

Many researchers have analysed the relationship between physical activity and gender across the various age brackets. The World Health Organization (2010) reported that physical activities level was lower among girls than boys. Other studies have equally found that males have a higher propensity or more likely to participate in physical activities compared with females (Barr et al., 2020; Rosseli et. Al., 2020; Cheah, 2011. In a study on the influence of socio-demographic factors on physical activity participation in a sample of adults in Penang, Malaysia, Cheah (2011) reported that gender was positively related with the likelihood of frequent participation in physical activity. Specifically, it was reported in the study that males participated in physical activity more frequently than females. Similarly, in a study in Ghana by Asiamah (2016) it was reported that females engaged less in physical activities possibly due to their domestic roles, relative weakness, unfavourable pregnancy conditions and childbirth. In Africa and some other developing countries, women are saddled with a lot of domestic works and the responsibilities of raising children, thus they have little or no time to engage in physical activities. However, Brown and Roberts (2011) found that females are less likely to engage in physical activities if they have children under the age five or older children. Steptoe et al. (1997) in their study found that gender differences were prevalent, with males more likely to engage in physical activities than females. In contrast to the earlier reported findings, a study by Muzindutsi (2016) on the effect of socio-demographic factors on physical activity among undergraduate students in South Africa, reported there was no significant difference in leisure attitude (participation in physical activity) among male and female students. However, in their study in Mexico, Herna´ndez and Ramos-Iba´n˜ez (2009), they reported that Mexican women tend to spend more time in moderate-intensity physical activities (ie those physical activities that require less rigour physical activity and energy), while men engage in more vigorous activities. The authors noted that the differences recorded between the genders in physical activities vary accordingly to other attributes such as age, economic status and size of town. For example, women in rural areas were less active than men in physical activities, whereas women in urban centres were more active than men. This result may be linked to gender roles. Men in rural areas are mainly engaged in agricultural occupations, while women spend most of

the time on household chores and other agricultural tasks that require less physical effort. On the contrary, in urban centres, men are employed in commerce and service sectors, while women perform the household tasks (Livingstone et.al. 2001).

Age

The effect of age on physical activity has also been established by studies conducted in both the developed and developing world. Macie et. al. (2017) examined socio-demographic factors, level of physical activity and health-related quality of life in adults from Sao Paulo Brazil. The study found that increasing age impacts negatively on physical activities in both sexes. Macie et. al. (2017) further argued that the association that exists between the increasing age and low participation in physical activity can be explained by the fact that advancement in age is accompanied with difficulties in locomotion, handling of instruments, maintenance and adaptation of postures in various tasks of daily life. Ageing also reduces engagement in physical activities because it is linked with conditions of being married with more responsibilities, and susceptible to chronic diseases (Asiamah, 2016). A study by Roselli et. al. (2020) found that physical activity levels decreases during old age, with sedentary lifestyle dominating the rest of life. This finding supports earlier study by Herna´ndez and Ramos-Iba´n˜ez, (2009) who opined that increased age is associated with a lower probability of engaging in physical activity. On the contrary, Cheah (2011) reported that age is positively associated with likelihood of engaging in physical activity frequently. According to Cheah, the older people tend to possess greater knowledge on health benefits accruing from participation in physical activity, thus their propensity to frequently engage in it. In a study on co-occurrence of chronic disease risk factors among immigrants in Australia, Sarich et al., (2015) found that middle age and older East Asian immigrants (majority of whom are Chinese) to Australia, participate less in physical activities than non-migrants (Australians). However, in their country of origin, Chinese older adults exhibit much higher levels of physical activities than older Australians (Barnett, 2016). The variations in the level of participation have been adduced in part to better efficient and better accessibility to public transport and destinations in Chinese than Australian cities (Boakye-Dankwa, 2019; Barnett, 2016). Some studies have also reported that the age group that participate in regular physical

activities is between 40-49 (Bell and Stephenson, 2014; Eagleman, 2013).

Income

There are an increasing empirical literature examining the association between economic resources and physical activity. Dolman and Lewis (2010), in their study on the impact of Socio-Economic Position (SEP) in sport participation among South Australian youth. They found that those with low SEP identified more barriers to participate than those with higher SEP. These barriers include high cost of access, transport availability, safety and limited access to facilities. Herna´ndez and Ramos-Iba´n˜ez (2009), in their study found that adults with very low socio-economic status dedicated more time to walking than their counterparts in medium and high socio-economic status. They further explained however, that no linear pattern of frequency or relationship was identified on moderate and intense physical activities based on socio-economic groupings.

Other studies have equally established the nexus between income and engagement in physical activity. For example, Asiamah (2016) reported that a significant relationship exists between income and engagement in physical activities. In this study, engagement in physical activity decreases with increasing income. According to Asiamah (2016), people with higher income are busier spending more time dedicated to their work, which likely resulted to their inability to engage in physical activity. Besides, Brown and Roberts (2011) in their study on the economic determinants for engagement in physical activity, reported that residing in areas with higher income disparities has a negative impact on participation in physical activities. Other studies have found a positive association between income and participation in physical activities (e.g. Farrell & Shields 2002; Lechner 2009; Cheah 2011). The authors opined that higher income group in the society are more enlighten, educated and can afford the time and resources that may be needed, thus the propensity to engage in physical activities is higher. In high income (Crespo, et.al, 1999; Varo et.al 2003), and medium income (Monteiro et.al 2003; Salles-Costa et.al, 2003) nations, studies have consistently shown that individuals with higher socio-economic status have a greater propensity of engaging in recreational activities. Cerin and Leslie (2008) noted that residents in lower-income housing areas with higher socio-economic positions (typically measured by education, employment,

and income) are more likely to participate in physical activities).

Occupation

The type of work an individual do may directly or indirectly affect participation in physical activities. Some people by virtue of the nature of their work, may in one way or the other be participating in physical activity. This is common with people who are engaged unskilled labour such as mailmen, and street sweepers/cleaners to name a few. In their study on socio-demographic factors that influence physical activities in Mexican adults, Herna´ndez and Ramos-Iba´n˜ez (2009), found that those engaged in agricultural and fishing related occupations spent most time walking , followed by those carrying out manual or domestic work. They noted that vigorous-intensity physical activity was engaged more often and for longer duration by those who are engaged in agricultural and fishing related occupations. In a study by Asiamah (2016), employment category was reported as one of the predictors of engagement in physical activity. It was also reported in the study that people with alternative employment were less likely to engage in physical activity. This condition increases the working hours of an individual. The sector in which an individual works determines involvement in physical activities. Physical activity was found to be the lowest among individuals working in private sector, while those working in public/government organizations had higher levels of participation. The reason for higher level of physical activities among public/government employees is because the government support work-related physical activities. They explained that workers in private sector in Ghana work under strict supervision, rigorous and stricter monitoring than their counterparts in public sector. Thus, they have little or no time to engage in physical activities. Other studies have equally showed that the sector in which an individual works influences the level of engagement in physical activities (e.g. Oliveira-Brochado et al., 2010; Sale, Guppy, & El-Sayed, 2000). However, Dembe et al. (2005) noted that individuals whose jobs are sedentary in nature with more working hours, do not have the opportunity to engage in physical activities. In another study, Barr et al., (2020) found that self-employed individuals were more likely to participate in physical activities compared with public and private employees, while the unemployed had low level of participation.

senior (second etc.) student, decreases the chances of participation in physical activities). The senior students may have more leisure time (physical activities) because of their familiarity with the campus environment and have thus developed strategies for managing their studies. Individuals with tertiary education have a higher probability of engaging in physical activities more frequently than those with lower educational qualification (Cheah, 2011). Those with higher educational qualification may be more aware of the health and social benefits of physical activities and thus are motivated to spend their leisure-time in physical activities, particularly if their work is sedentary (Barr et al., 2020; Mielke G.I. et al., 2015; Burton N. et al., 2003). On the contrary, other studies showed that increased is education is associated with reduced overall physical activities (Malambo P. et al., 2016; Assah F. et al., 2015).

Marital Status

Past studies have shown mixed results on the association between marital status and physical activities (Rapp & Schneider, 2013). A study by Pettee et. al., (2006) found that married men engage in more physical exercise compared to their single counterparts. Married individuals have higher propensity to take part in physical activities frequently (Humphreys and Ruseski, 2007). However, a number of studies have reported contrary outcome, showing a marked decrease in physical activity after marriage for both men (Rapp & Schneider, 2013; Eng et. al., 2005; Nomaguchi and Bianchi, 2004), and women (Rapp & Schneider, 2013; Nomaguchi and Bianchi, 2004; Salmon et. al., 2000). Similarly, it is also observed that the unmarried are better engaged in physical activities compared with those who are married (Asiamah 2016). Majority of unmarried persons are younger, had a smaller number of dependents and more time to spend on leisure and recreation (Oliveira-Brochado et al. 2010). According to Cheah (2011), household commitments often borne by married individuals could pose a restriction to frequently engage in leisure-time physical activities. Additionally, Rapp and Schneider (2013) concluded in their study that couples with young children tend to have their physical activity reduced as well.

Table 1. Summary Review of Other Related Findings

Author	Title of paper	Reported findings
Pinna & Murrau, 2018	Age Factor and Pedestrian Speed on Sidewalks	Age was found significantly influenced physical activity
Hand & Howrey, 2019	Associations Among Neighborhood Characteristics, Mobility Limitation, and Social Participation in Late Life	Age was found to have influenced participation in physical activities
Mandic, Hopkins, et al., 2020	Differences in parental perceptions of walking and cycling to high school according to distance	Age, and occupation as predictors
Adkins et al., 2019	Differences in social and physical dimensions of perceived walkability in Mexican American and non-hispanic white walking environments in Tucson, Arizona	Race influenced participation in physical activity
Gdańska et al., 2020	Effect of 12-Week Interventions Involving Nordic Walking Exercise and a Modified Diet on the Anthropometric Parameters and Blood Lipid Profiles in Overweight and Obese Ex-Coal Miners	Race and age are predictors
Efrossini D Patsou1 George T Alexias1 Fotios G Anagnostopoulos1 Michalis V Karamouzis2 , 2020 Leandro Fornias Machado de Rezende et.al 2014	Physical activity and socio-demographic variables related to global health, quality of life, and psychological factors in breast cancer survivors Sociodemographic and behavioral factors associated with physical activity in Brazilian adolescents	Income, and education identified as predictors
La¨mmle,. Etal. 2012	Socio-demographic correlates of physical activity and physical fitness in German children and adolescents	Age, social economic status of parents were significant predictors

(Source: Author)

CONCLUSION

Constantly engaging in physical activities has a plethora of health benefits including risk reduction of premature death (WHO, 2009; 2018). Physical activity is a vital component of any health promotion program and thus

citizens, should be encouraged by the government to engage in physical activities. Previous research indicated that changing lifestyles and dietary habits among citizens with various socio-economic background has contributed to increasing health consequences. This calls for serious interventions aimed at improving physical activity participation among the population. The review of existing literature done so far, shows that socio-demographic attributes of individuals have a strong influence on their engagement in physical activities. Among the socio-demographic attributes identified in the existing literature are gender, income, age, occupation, educational qualification and marital status. Majority of the studies consistently found that men have a greater probability of engaging in physical activities. In addition, income was found to positively affect participation in physical activities. Individuals with higher educational background are most likely to participate in physical activities. This could be attributed to their level of knowledge and awareness on health benefits inherent in physical activity. Some of the studies reported contradictory results on the effect of some socio-demographic attributes have on physical activities. This could be attributed to the setting (i.e. nation where the study was conducted, location whether rural or urban etc.). Other mediating factors could also influence the effect of socio-demographic attributes on physical activities. Exemplify the contribution of the study

ACKNOWEDGEMENT

The authors would like to thank to everyone who have participated in the preparation of this paper. Special appreciation also goes to the reviewers for their constructive comments and thoughtful ideas during the writing stage of this paper.

REFERENCES

Asiamah, N. (2016). Socio-demographic determinants of physical activity (PA): A working class perspective. *Cogent Medicine, 3*(1). https://doi.org/10.1080/2331205x.2016.1276037.

Assah F, Mbanya JC, Ekelund U, Wareham N, Brage S. (2015),

Patterns and correlates of objectively measured free-living physical activity in adults in rural and urban Cameroon. J*ournal of Epidemiol Community Health, 69*(7),700–7.

Barnett A, Cerin E, Zhang CJP, Sit CHP, Johnston JM, Cheung MMC, et al (2016). Associations between the neighbourhood environment characteristics and physical activity in older adults with specific types of chronic conditions: the ALECS cross-sectional study. I*nt J Behav Nutr Phys Act.* 13,53. https:// doi.org/10.1186/s12966-016-0377-7.

Barr, A. L., Partap, U., Young, E. H., Agoudavi, K., Balde, N., Kagaruki, G. B., Mayige, M. T., Longo-Mbenza, B., Mutungi, G., Mwalim, O., Wesseh, C. S., Bahendeka, S. K., Guwatudde, D., Jørgensen, J. M. A., Bovet, P., Motala, A. A., & Sandhu, M. S. (2020). Sociodemographic inequities associated with participation in leisure-time physical activity in sub-Saharan Africa: An individual participant data meta-analysis. *BMC Public Health, 20*(1), 1–13. https://doi.org/10.1186/s12889-020-08987-w.'

Beaglehole, R., Bonita, R., Horton, R., Adams, C., Alleyne, G., Asaria, P., Watt, J. (2011). Priority actions for the non-communicable disease crisis. *The Lancet, 377*(9775), 1438-1447.

Bell, N., and Stephenson, A. L. (2014). Variation in motivations by running ability:using the theory of reasoned action to predict attitudes about running 5K races. *J. Policy Res. Tour. Leis. Events* 6, 231–247. doi: 10.1080/19407963.2014.933227.

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

Boakye-Dankwa E, Barnett A, Pachana NA, Turrell G, Cerin E (2019). Associations between latent classes of perceived neighborhood destination accessibility and walking behaviors in older adults of a low-density and a high-Density City. *J Aging Phys Act*, 1–12.

https://doi.org/10.1123/japa.2018-0297.

Brown, Heather, and Jennifer Roberts (2011). Exercising choice: the economic determinants of physical activity behaviour of an employed population. *Social Science & Medicine*, 73,.383-390.

Burton N, Turrell G, Oldenburg B. (2003), Participation in recreational physical activity: why do socioeconomic groups differ? *Health Educ Behav, 30*(2),225–44.

Caspersen, C. J., Powell, K. E., & Christenson, G. (1985). Physical activity, exercise and physical fitness: definitions and distinctions for health-related research. *Public Health Reports, 100*(2), 126-131.

Cerin, E. and Leslie, E. (2008) How Socio-Economic Status Contributes to Participation in Leisure-Time Physical Activity. S*ocial Science and Medicine*, 66, 2596-2609.

Cheah YK (2011). Influence of Socio-demographic Factors on Physical Activity.

Crespo CJ, Ainsworth BE, Keteyian SJ et al. (1999) Prevalence of physical inactivity and its relation to social class in US adults: results from the Third National Health and Nutrition Examination Survey, 1988–1994. *Med Sci Sports Exerc,* 31, 1821–1827.

Dembe, A. E., Erickson, J. B., Delbos, R. G., & Banks, S. M. (2005). The impact of overtime and long work hours on occupational injuries and illnesses: New evidence from the United States. *Occupational & Environmental Medicine*, 62, 588–597.

Dollman, James, and Nicole R. Lewis (2010). The impact of socioeconomic position on sport participation among South Australian youth. *Journal of Science and Medicine in Sport,* 13,318-322.

Eagleman, A. N. (2013). Acceptance, motivations, and usage of social media as a marketing communications tool amongst employees of sport

national governing bodies. *Sport Management Review, 16*(4), 488–497. https://doi.org/10.1016/j.smr.2013.03.004.

Eng, P., Kawachi, I., Fitzmaurice, G., and Rimm, E. (2005). Effects of marital transitions on changes in dietary and other health behaviours in US male health professionals. *Journal of Epidemiology & Community Health,* 59, 56-62.

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

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

Koohsari, M. J., Badland, H., & Giles-Corti, B. (2013). (Re) Designing the built environment to support physical activity: bringing public health back into urban design and planning. *Cities*, 35, 294-298.

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

Livingstone M, Robson P, McCarthy S et al. (2001) Physical activity patterns in a nationally representative sample of adults in Ireland. *Public Health Nutr,* 4, 1107–1116.

Luis Ortiz-Herna´ndez and Norma Ramos-Iba´n˜ez (2009). Socio-demographic factors associated with physical activity in Mexican adults, *Public Health Nutrition, 13*(7), 1131–1138 doi:10.1017/S1368980010000261 mediacentre/factsheets/fs385/en/.

Maciel, N. M., De Conti, M. H. S., Simeão, S. F. A. P., Genebra, C. V. D. S., Corrente, J. E., & De Vitta, A. (2018). Sociodemographic factors, level of physical activity and health-related quality of life in adults from the north-east of São Paulo, Brazil: A cross-sectional population study. *BMJ Open, 8*(1), 1–11. Retrieved from: https://doi.org/10.1136/bmjopen-2017-017804.

Malambo P, Kengne AP, Lambert EV, De Villiers A, Puoane T. (2016), Prevalence and socio-demographic correlates of physical activity levels among South African adults in Cape Town and Mount Frere communities in 2008–2009. Archives of public Health, Archives belges de sante publique, 74:54.

Mielke GI, Malta DC, De Sa GB, Reis RS, Hallal PC. (2015), Regional differences and correlates of leisure time physical activity in Brazil: results from the Brazilian National Health Survey-2013. Brazilian *Journal of Epidemiology. 18*(Suppl 2):158–6.

Monteiro CA, Conde WL, Matsudo SM et al. (2003) A descriptive epidemiology of leisure-time physical activity in Brazil, 1996–1997. *Rev Panam Salud Publica*, 14, 246–254.

Muzindutsi, P. (2016). Socio-Demographic Factors Influencing Leisure Attitude Among Undergraduate Students At A South African University. *International Journal of Social Sciences And Humanity Studies, 8*(1), 1309-8063.

Nomaguchi, K. M., & Bianchi, S. M. (2004). Exercise time: gender differences in the effects of marriage, parenthood, and employment. *Journal of Marriage and Family*, 66, 413-430.

Oliveira-Brochado, A., Oliveira-Brochado, F., & Brito, P. Q. (2010). Effects of personal, social and environmental factors on physical activity behavior among adults. *Actividade Física*, 28, 7–17.

Pettee, K.; Brach, J.; Kriska, A.; Boudreau, R.,; Richardson, C.,; Colbert, L.,; Satterfield, S.; Visser, M.; Harris, T.,; Ayonayon, H., & Newman, A. (2006). Influence of Marital Status on Physical Activity Levels among Older Adults. *Medicine & Science in Sports & Exercise, 38* (3), 541-546.

Rapp, I., & Schneider, B. (2013). The impacts of marriage, cohabitation and dating relationships on weekly self-reported physical activity in Germany: A 19-year longitudinal study. *Social Science & Medicine,* 98 , 197-203.

Rosselli, M., Ermini, M., Tosi, B., Boddi, M., Stefani, L., Toncelli, L., &

Modesti, P. (2020). Gender differences in barriers to physical activity among adolescents. *Nutrition, Metabolism & Cardiovascular Diseases.* 30, 1582-1589.

Sale, C., Guppy, A., & El-Sayed, M. (2000). Individual differences, exercise and leisure activity in predicting affective wellbeing in young adults. *Ergonomics*, 43, 1689–1697. http://dx.doi.org/10.1080/001401300750004096

Salles-Costa R, Heilborn M, Werneck G et al. (2003) Gender and leisure-time physical activity. *Cad Saude Publica* 19, S225–S233.

Salmon, J., Owen, N., Bauman, A., Schmitz, M. K., & Booth, M. (2000). Leisure-time, occupational, and household physical activity among professional, skilled, and less-skilled workers and homemakers. *Preventive Medicin*e, 30, 191-199.

Sarich PE, Ding D, Sitas F, Weber MF (2015). Co-occurrence of chronic disease lifestyle risk factors in middle-aged and older immigrants: a cross-sectional analysis of 264,102 Australians. *Prev Med*., 81:209–15. Retrieved from:https://doi.org/10 1016/j.ypmed.2015.09.004.

Social Report (2010). *Social indicators for New Zealand*. Retrieved from: http://www.socialreport.msd.govt.nz .

Steptoe, A., Wardle, J., Fuller, R., Holte, A., Justo, J., Sanderman, R., and Wichstrom L., (1997). Leisure-time physical exercise: Prevalence, attitudinal correlates and behavioral correlates among young Europeans from 21 countries. *Preventative Medicin*e, 26, 845-854.

Vancampfort, D. (2019). Correlates of physical activity among 142,118 adolescents aged 12–15 years from 48 low- and middle-income countries. *Preventive Medicine*, 127, 105819.

Varo JJ, Martinez-Gonzalez MA, Irala-Estevez J et al. (2003) Distribution and determinants of sedentary lifestyles in the European Union. *Int Epidemiol* 32, 138–146.

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

World Health Organization (2018). *Physical Activity Factsheet*. Retrieved from. http://www.who.int/.

World Health Organization.(2009). *Global health risks: Mortality and burden of disease attributable to selected major risks.* Geneva: WHO; 2009.

World Health Organization.(2014). *Global recommendations on physical activity for health.*

World Health Organization.(2015). *Physical activity strategy for the WHO European Region 2016-2025*.