

Income Level Differences and Physical Activity Behaviour among Civil Servants: A Cross-sectional Study in Kota Bharu, Kelantan

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ABSTRACT

This study investigates the association between income levels and PA behaviour among civil servants in Kota Bharu, Kelantan, Malaysia. A cross-sectional survey was conducted among 357 civil servants (N=357) using the International Physical Activity Questionnaire Short Form (IPAQ-SF). Participants were stratified into three income groups namely the B40, M40, and T20 based on DOSM national income percentiles. PA was categorised into vigorous, moderate, and walking activities. A Chi-Square test was employed to evaluate the relationship between income and PA type, with significance set at $p < 0.05$. The analysis revealed a statistically significant association between income and PA type $\chi^2 (4, N=357) = 22.77, p = 0.00014$, with a Cramér's V of 0.178 indicating a small to moderate effect size. Vigorous PA was more prevalent among B40 individuals, while M40 and T20 respondents showed greater participation in moderate and walking activities. Income level significantly influences PA behaviour among civil servants, reflecting disparities in occupational demands, access to PA resources, and lifestyle choices. These findings underscore the need for income-sensitive public health strategies to promote equitable PA engagement. Future research should employ longitudinal designs and broader demographic sampling to explore regional and temporal patterns in PA behaviour.

1. INTRODUCTION

Physical activity (PA) plays a vital role in preventing non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, and obesity. Numerous studies affirm that regular PA significantly reduces the risk of these conditions and enhances overall well-being (Puciato et al., 2019). Nevertheless, global PA levels remain insufficient, with socioeconomic disparities playing a major role in this pattern (Tovar-García, 2021). Income level is a key determinant of PA behaviour, as it influences access to resources such as recreational spaces and fitness facilities. Research indicates that individuals with higher incomes are

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more likely to participate in leisure-time physical activities, whereas lower-income populations encounter barriers such as time constraints and unsafe environments (Kakinami et al., 2018). These inequities contribute to broader health disparities and intensify the burden of NCDs among disadvantaged groups (Dong & Liu, 2022).

In Malaysia, rapid urbanization has contributed to lifestyle changes, notably an increase in sedentary behaviour among working adults. A national study reported that nearly 65% of government employees were classified as sedentary, with inactivity strongly associated with obesity indicators such as body mass index (BMI) and waist circumference (Hazizi et al., 2012). Similarly, a study among civil servants in Perlis, Malaysia, found that 77.6% were sedentary based on step counts, despite overestimation from self-reported questionnaires (Saad et al., 2014). Civil servants, who comprise a significant segment of the national workforce, are particularly vulnerable due to the predominantly desk-based nature of their jobs. Prior research confirms a high prevalence of physical inactivity in this group, with income identified as a contributing factor (Ismail et al., 2014).

However, despite this evidence, the specific relationship between income level and PA behaviour among Malaysian civil servants remains understudied and poorly documented. This study aims to investigate the association between income and physical activity behaviour among civil servants in Kota Bharu, Kelantan. The findings are intended to support the development of public health interventions that promote equitable access to physical activity across all income groups.

2. LITERATURE REVIEW

2.1 Socioeconomic Status and Physical Activity

Income distribution is classified into three primary groups: B40 ($\leq$ RM4,850), M40 (RM4,851–10,970), and T20 ($\geq$ RM10,971) (Department of Statistics Malaysia, 2023). These categories are widely used in socio-economic research and policy targeting. Socioeconomic status (SES), particularly income level, is widely recognized as a fundamental determinant of physical activity (PA) behaviour. Individuals with higher incomes are consistently found to engage more in structured, leisure-time PA such as gym workouts, sports, and recreational walking primarily due to greater access to quality facilities, safer environments, and more flexible schedules (Stalling et al., 2024). Conversely, individuals from lower socioeconomic backgrounds face a multifaceted array of barriers, including financial constraints, unsafe neighbourhoods, and limited discretionary time due to demanding work schedules. These challenges often prevent regular participation in health-enhancing physical activities (George et al., 2018). Although lower-income groups may engage in occupational or transport-related PA, these forms are typically unstructured and provide fewer long-term health benefits compared to planned exercise routines. For instance, energy expended from walking to work or performing physically demanding labor may not offer the same consistency, intensity, or recovery advantages as recreational PA (Stalsberg & Pedersen, 2018).

2.2 Income Disparities in Physical Activity Intensity and Type

Income not only influences participation in PA but also determines its type, context, and intensity. Individuals in higher income brackets are more likely to engage in moderate to vigorous PA such as aerobics, swimming, or running often within organised, secure environments (Cheah & Poh, 2014). These activities are more sustainable over time and are associated with enhanced cardiovascular health, reduced stress, and improved social connectedness. In contrast, lower-income individuals often experience physical exertion through occupational activities such as manual labour. While high in intensity, these efforts are generally inconsistent in duration and lack the structure and recuperative benefits required for sustained health gains. In some cases, such exertion may even contribute to physical fatigue and increased injury risk (Lee et al., 2019).

2.3 Access to Physical Activity Resources

The built environment plays a critical role in shaping physical activity behaviour. Higher-income neighbourhoods are typically characterized by superior infrastructure, including well-maintained parks, pedestrian-friendly walkways, and accessible sports facilities. Such environments actively support the adoption of more active lifestyles (Matsushita et al., 2024). Conversely, residents of lower-income communities often contend with limited public amenities, deteriorating recreational spaces, and heightened safety concerns. These environmental deficiencies not only restrict opportunities for physical activity but also reinforce pre-existing health inequities (Ke et al., 2022).

2.4 Implications for Public Health Policy and Practice

Addressing socioeconomic disparities in physical activity requires comprehensive and targeted public health strategies. Interventions must go beyond individual behaviour change and tackle the structural and environmental obstacles that constrain PA access in disadvantaged communities. Effective approaches may include community-based fitness programming, subsidies for gym memberships, expanded public transit to recreational venues, and workplace initiatives that integrate active breaks during the workday (O'Donoghue et al., 2018). In addition, equitable access to enjoyable, culturally relevant physical activity options is essential for fostering sustained engagement, particularly in underserved populations. Research underscores the importance of inclusive policies that address income, education, and urban planning in reducing PA disparities and improving public health outcomes (Stinson et al., 2020).

3. METHODOLOGY

3.1 Research Design

This study employed a quantitative, cross-sectional survey design to investigate the relationship between income levels and physical activity (PA) behaviour among civil servants in Kota Bharu, Kelantan. Cross-sectional studies are widely used in public health to assess population-level behaviour at a single point in time, offering valuable insights into associations between health behaviour and demographic variables (Lavelle et al., 2019).

3.2 Study Population and Sampling Strategy

The study population comprised full-time civil servants employed in government departments across Kota Bharu. A convenience sampling approach was adopted, enabling access to participants based on availability and willingness to participate. The final sample included 357 respondents, a size determined using the Krejcie and Morgan (1970) sample size formula to ensure statistical power for correlational analyses. The inclusion criteria of this study were Malaysian civil servants aged 18 years or older, with at least one year of continuous government service. Individuals with diagnosed physical disabilities that prevented participation in physical activity were excluded.

2.3 Instrumentation

Physical activity levels were assessed using the International Physical Activity Questionnaire – Short Form (IPAQ-SF), a globally validated tool with demonstrated content validity, construct validity, and reliability across diverse populations (Benmaamar et al., 2024). The IPAQ-SF captures the frequency and duration of vigorous activity, moderate activity, walking, and sedentary behaviour over the past seven days. Participants also completed a demographic questionnaire including age, gender, and monthly income, which was categorised into three groups: B40 ($\leq$ RM4,850), M40 (RM4,851–10,970), and T20 ($\geq$ RM10,971) from the Department of Statistics Malaysia (2023) as benchmarks.

2.4 Data Collection Procedures

Data collection was conducted over an eight-week period using paper-based survey formats. Participants were approached at their workplaces, and participation was entirely voluntary. All respondents were provided with a clear explanation of the study's objectives and confidentiality measures, and informed consent was obtained prior to participation. Ethical approval was granted by the appropriate by UiTM research ethics committee, and all study procedures complied with the ethical principles outlined in the Declaration of Helsinki.

2.5 Data Analysis

All data were analysed using IBM SPSS Statistics Version 26. Descriptive statistics were used to summarize participants' demographic characteristics and physical activity levels. The Shapiro-Wilk test was applied to assess the normality of the data distribution. Chi-Square tests were used to assess the association between income and PA categories. Statistical significance was set at $p < 0.05$. Effect size was measured using Cramér's V.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

A total of 357 civil servants from Kota Bharu, Kelantan, participated in the study. The majority were male (63.3%) and fell within the 25–34 age group (40%). In terms of income, most respondents reported earning between RM 2,000 and RM 3,999 per month (42%). These demographic details provide context for interpreting the relationship between income and physical activity (PA) behaviour.

4.2 Statistical Findings

Chi-Square analysis yielded a significant relationship between income level and PA type $\chi^2(4, N=357) = 22.77, p = 0.00014$. Cramér's V = 0.178, indicating small to moderate effect size.

Table 1. Cross-tabulation of PA Level and Income Group

Income Group	Vigorous (N)	Moderate (N)	Walking (N)
B40	114	65	75
M40	20	37	40
T20	0	4	2

This study revealed a statistically significant association between income levels and physical activity (PA) behaviour among civil servants in Kota Bharu, Kelantan. The data indicated that individuals in the B40 income group exhibited higher participation in vigorous physical activity, while those in the M40 and T20 income brackets engaged more in moderate-intensity activities and walking. Although the strength of association was modest (Cramér's V = 0.178), the findings underscore how socioeconomic status (SES) remains a critical determinant of PA engagement, echoing broader global trends (Kari et al., 2015; Dong & Liu, 2022).

The higher prevalence of vigorous PA among B40 respondents may initially appear counterintuitive, given their typically constrained access to formal exercise facilities. However, this pattern likely reflects the physical demands of occupational or transport-related activities inherent to lower-income jobs. Previous studies support this notion, showing that individuals in low-SES groups tend to accumulate PA through labour-intensive work rather than leisure-based exercise (Stalsberg & Pedersen, 2018; Matus-Castillo et al., 2021). While such activities may satisfy energy expenditure guidelines, they are often unstructured, involuntary, and lack recovery time characteristics associated with poorer long-term health outcomes compared to voluntary, structured PA (Strain et al., 2020). In contrast, the moderate and walking-dominant activity profiles of the M40 and T20 groups may be attributed to increased access to supportive

environments, greater health literacy, and more flexible time schedules. These groups are more likely to engage in recreational activities such as walking, jogging, or gym-based exercises conducted in controlled environments, which are positively associated with physical and psychological well-being (Sallis et al., 2016; Matsushita et al., 2024). This aligns with evidence suggesting that higher-income individuals engage more frequently in health-promoting behaviour due to better resources and environmental support (Cheah & Poh, 2014; Stalling et al., 2022). Notably, the near absence of vigorous PA in the T20 group could reflect a lifestyle dominated by sedentary professional duties and convenience-based transportation, leading to a preference for low-impact, discretionary PA like walking. While walking remains beneficial and widely recommended (Warburton & Bredin, 2017), its predominance at the expense of more intensive PA among affluent individuals may not confer optimal cardiovascular benefits. Moreover, this sedentary tendency aligns with growing concerns about occupational inactivity among white-collar professionals (O'Donoghue et al., 2018; Pan et al., 2021).

These findings are also consistent with the social determinants of health (SDH) framework, which emphasizes how socioeconomic structures influence individual behaviour and health outcomes (Mackenbach et al., 2018). The observed disparities in PA types among income groups reveal how economic capacity intersects with occupational roles, urban planning, and recreational access to shape physical behaviour patterns. In this sense, income is not merely a background variable but an active agent influencing exposure to health-promoting or health-compromising environments. From a policy standpoint, these insights have practical implications. Interventions should not adopt a one-size-fits-all model but rather incorporate targeted strategies based on income stratification. For the B40 group, community-based programmed offering structured yet affordable exercise options, improved neighborhood safety, and accessible green spaces are crucial. For the M40 and T20 groups, workplace wellness programmed, sedentary behaviour reduction strategies, and time-management education can be more effective. Additionally, subsidising fitness memberships or organising government-led PA initiatives could bridge the gap in PA engagement across SES lines.

This study also emphasises the value of disaggregating PA data into intensity and type. Rather than treating PA as a homogenous variable, distinguishing between vigorous, moderate, and walking activities provides nuanced insights that can guide evidence-based intervention design (Warburton & Bredin, 2017; WHO, 2020). Furthermore, the findings validate the need for comprehensive public health surveillance tools that account for socioeconomic variables and environmental exposures to understand PA behaviour more holistically.

5. CONCLUSION AND FUTURE RECOMENDATION

While this study offers valuable insights into the relationship between income level and physical activity (PA) behaviour among civil servants in Kota Bharu, there are notable opportunities for future research to enhance the depth and breadth of these findings. First, adopting a longitudinal research design would enable a better understanding of how fluctuations in income influence PA behaviour over time. Longitudinal studies can reveal not only causal relationships but also patterns of behaviour adaptation in response to life-course changes, policy shifts, or economic transitions (Kari et al., 2015; Tovar-García, 2021). Moreover, the integration of mixed methods approaches such as combining surveys with qualitative interviews can provide contextual insight into the motivations, cultural norms, and barriers that underlie PA participation across socioeconomic groups (George et al., 2018).

Secondly, the geographic and demographic scope of future studies should be expanded beyond Kota Bharu. Including civil servants from various states and comparing urban with rural populations would yield a more comprehensive understanding of how regional disparities in infrastructure, work culture, and lifestyle affect PA behaviour. Prior research highlights that urban residents typically have greater access to recreational facilities and active transport options, while rural populations may engage in more utilitarian physical activity due to occupational demands (Ke & Lai, 2022; Matsushita et al., 2024). Capturing these contextual differences is essential for informing localised public health strategies that reflect the diverse

socioeconomic and geographic realities across Malaysia. By pursuing these research directions, scholars can contribute to a more nuanced and equitable public health discourse, enabling policymakers to design targeted interventions that are both data-driven and culturally responsive.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding the publication of this study. This research was conducted independently, and no financial, institutional, or personal interests influenced the study design, data collection, analysis, interpretation, or manuscript preparation.

AUTHORS' CONTRIBUTIONS

Kalam Azad Isa and Wan Muhammad Danish Daniel Wan Mohd Zulkifli conceptualised the central research idea, conducted the research, and were responsible for writing and revising the manuscript. Rozella Abd Razak and Azrisan Ahsan contributed to the development and refinement of the study methodology. Nur Atikah Mohamed Kassim performed the data analysis and contributed to the interpretation of results. All authors read and approved the final version of the manuscript.

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