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Socioeconomic inequality in physical activity among adults in western Iran: a cross-sectional study

Nikta Mohammadi[1], Amin Doosti-Irani[2,3] and Zahra Cheraghi[3,4*]

Abstract

Background We aimed to determine the prevalence of physical activity and socio-economic inequality among the adults of Hamadan city.

Methods This cross-sectional analytical study was conducted in Hamadan city between 2022 and 2023, involving a total of 591 adults aged 18 to 64 years. The research tool utilized in this study was the International Physical Activity Questionnaire, the results of the concentration index analysis reported at 95% confidence level. To determine socioeconomic inequalities in physical activity, the concentration index was employed.

Results The overall prevalence of low and moderate physical activity was 40.58%. No distinct inequality was noted in other physical activities, including transportation, Household and taking care of the family According to the subgroup analysis. The most striking disparity was observed in terms of physical activity arising from leisure time activities, with wealthier sectors of society exhibiting higher levels (Concentration index: 0.07, 95% CI: 0.01, 0.13), the highest inequality of physical activity arising from leisure time activities was observed among the age group of 60–75 years (Concentration index: 0.13, 95% CI: 0.04, 0.21), women (Concentration index: 0.28, 95% CI: 0.04, 0.53), illiterate individuals (Concentration index: 0.68, 95% CI: 0.32, 1.04) and single individuals (Concentration index: 0.10, 95% CI: -0.03, 0.22), however this relation was not statistically significant for marriage staus and education.

Conclusions The most striking disparity was observed in terms of physical activity arising from leisure time activities. The highest inequality was observed among the age group of 60–75 years, and women.

Keywords Socioeconomic inequality, Physical activity, Adults, Hamadan city, Cross-sectional study

*Correspondence:
Zahra Cheraghi
z.cheraghi@umsha.ac.ir
[1]Department of Health Management and Economics, School of public Health, Hamadan University of Medical Sciences, Hamadan, Iran
[2]Research Center for Health Sciences, Institute of Health Sciences and Technologies, Avicenna Health Research Institute, Hamadan University of Medical Sciences, Hamadan, Iran
[3]Modeling of Noncommunicable Diseases Research Center, Institute of Health Sciences and Technologies, Avicenna Health Research Institute, Hamadan University of Medical Sciences, Hamadan, Iran
[4]Department of Epidemiology, School of Public Health, Avicenna Health Research Institute, Hamadan University of Medical Sciences, Hamadan, Iran

Introduction

Physical activity plays a crucial role in determining overall health, as it has been shown to effectively reduce the risk of various health conditions, including obesity, type 2 diabetes, cardiovascular diseases, and mental illnesses such as dementia and depression. Engaging in regular physical activity promotes both physical and mental well-being, with increased life expectancy and decreased healthcare expenses as added benefits. Conversely, sedentary behavior has become a global pandemic, posing significant risks to health. It is a primary risk factor for chronic diseases, responsible for a considerable number of cases of cancer, diabetes, and heart diseases. Inactivity contributes to a substantial number of preventable deaths worldwide [1, 2].

Certain regions, including countries in the Eastern Mediterranean like Iran, have higher prevalence of physical inactivity. Globally, the level of inactivity remains consistently high, with approximately 27.2% of the population being inactive over a 10-year period [3]. To address this concerning trend, the World Health Organization (WHO) has set a goal of reducing global inactivity by 10% by 2025. The WHO initiated a comprehensive global action plan on physical activity for the years 2018–2030, providing updated recommendations for physical activity across all age groups [4].

The level of physical activity is influenced by various factors, although there is some discrepancy among studies regarding their impact. Some studies suggest an inverse relationship between factors such as age, smoking, education, female gender, income, and physical activity levels. Conversely, other studies indicate that variables such as socioeconomic status (SES), access to sports facilities, marital status, sunny weather, and better health status have a positive effect on physical activity levels [5].

Socioeconomic status is a significant determinant of health, as it shapes attitudes, habits, and exposure to risk factors. Lower socioeconomic status is associated with poorer health outcomes, including lower life expectancy and higher mortality rates. Health disparities exist across different socioeconomic strata, with higher infection rates, physical disabilities, and mortality observed in lower socioeconomic groups [6, 7].

The type and level of physical activity vary among different socioeconomic groups. Individuals with higher socioeconomic status tend to engage in more physical activity, while lower socioeconomic status is linked to higher levels of occupational activity [8, 9]. In Iran, 40% of adults have low levels of physical activity, with sedentary behavior being more common among women and older adults. Various factors influence physical activity levels in Iran, including age, gender, place of residence, socioeconomic status, breakfast consumption, dietary habits, lifestyle, pregnancy, education, exercise, marital status, social relationships, mental and cognitive disorders, physical performance, self-perception of physical condition, and communication technologies [5].

Given the lack of comprehensive studies on the prevalence of physical activity and inactivity and their association with socioeconomic factors and inequalities in Hamedan city, conducting such a study would provide valuable information about the current state of the community.

Methods and material

This cross-sectional analytical study was conducted in the city of Hamadan between 2022 and 2023, involving a total of 591 adults aged 18 to 64 years. The study aimed to investigate various factors related to the population's health and well-being. The inclusion criteria required participants to be within the specified age range, residents of Hamadan city, Iranian citizens. All participants gave written informed consent.

Pregnant women, individuals with physical or mental disabilities, and those with mobility-limiting diseases such as heart disease, stroke, or musculoskeletal problems were excluded from the study.

To obtain a representative sample of the population aged 18 to 64 in Hamadan, a cluster sampling method was employed. The urban health centers in the city were considered as clusters, and ten clusters were randomly selected from the entire pool. The sample size for each cluster was determined as a proportion of the total sample size, considering the population of each health center. Subsequently, individuals were randomly chosen from each selected center, and data were collected using a checklist administered via telephone contact.

The sample size calculation was based on the findings of a previous study conducted by Momenan et al., which reported a prevalence of sedentary behavior as 69.8% [10]. A significance level of 5% and a power of 80% were considered in the calculations. To account for the cluster sampling method and adjust the sample size using the design effect coefficient, a design effect of 1.5 was applied.

The research tool utilized in this study was the International Physical Activity Questionnaire (IPAQ), which has been validated for its reliability and validity by Moghaddam et al. in Iran. The IPAQ is a widely recognized instrument for assessing physical activity levels. It was developed collaboratively by the WHO and the Centers for Disease Control and Prevention in 1998, targeting individuals aged 15 to 69 years. Its reliability and validity have been assessed and confirmed in numerous studies [11]. The IPAQ is available in two versions: long and short. Depending on the research objectives, either version can be employed. In this study, the long form of the IPAQ was employed.

The long form of the IPAQ comprises 27 items and measures physical activity across four domains: work, leisure time, transportation, and household chores. Within each domain, the IPAQ assesses activities in terms of walking, moderate-intensity activity, and vigorous-intensity activity. Additionally, it includes a section to capture the amount of time spent sitting. The standardized protocol and scoring system of the IPAQ facilitate comparisons of physical activity levels across different studies and populations, enhancing its practicality and applicability.

Based on the IPAQ, individuals' levels of physical activity can be categorized into three distinct categories: light, moderate, and vigorous. Light activities encompass activities such as walking at a normal pace, while moderate activities include carrying light loads, moderate-speed cycling, regular walking, and similar activities. Vigorous activities entail tasks such as lifting heavy objects, engaging in aerobic exercises, high-speed cycling, running, and so on.

The calculation and classification of physical activity based on participants' completed questionnaires followed the IPAQ protocol. First, the metabolic equivalents (METs) for various physical activities were determined. For leisure-time walking, the MET value was 3.3, while vigorous-intensity leisure activities had a MET value of 8, and moderate-intensity leisure activities had a MET value of 4. Vigorous household activities were assigned a MET value of 5.5, while moderate household activities indoors and in the yard had MET values of 3 and 4, respectively. Walking for transportation purposes had a MET value of 3.3. Regarding work-related activities, vigorous work had a MET value of 8, moderate work had a MET value of 4, and work-related walking had a MET value of 3.3.

Next, these METs values were multiplied by the duration of each physical activity in minutes and the number of days per week the activity was performed. The resulting values were summed to calculate the total MET-minutes per week. These MET values were then used to categorize individuals based on their level of physical activity. The categories are as follows: Light: No reported activity or MET-minutes per week less than 600, Moderate: Individuals must meet one of the following conditions: engage in vigorous-intensity activities for at least 20 min per day on three or more days per week, engage in moderate-intensity activities or walking for at least 30 min per day on five or more days per week. A combination of all walking, moderate, and vigorous activities that sum up to at least 600 MET-minutes per week. Vigorous: Individuals must meet both of the following conditions, engage in vigorous-intensity physical activity on at least three days per week. A combination of all walking, moderate, and vigorous activities that sum up to at least 3000 MET-minutes per week. The MET-minutes per week values for each domain of the IPAQ were calculated by multiplying the metabolic equivalent coefficients with the duration of walking, moderate, and vigorous activities.

In order to determine the socio-economic status of the participants, the method of examining people's assets was used. Assets such as personal car (which is not used to earn money), personal computer, smart mobile phone, using the Internet, a refrigerator, dishwasher, washing machine, vacuum cleaner, microwave oven, and an LCD/LED TV were used to create a wealth index using principal component analysis (PCA). According to the PCA results, participants were classified into four groups based on the lowest to highest quarter of SES level.

To evaluate the inequality in socioeconomic status and its relationship with physical activity, the concentration index was utilized. The concentration index is a measure commonly employed to quantify income-related inequality in the distribution of a health variable. It provides a way to assess the degree of inequality across different income levels. The concentration index is derived by plotting the cumulative percentage of individuals, ranked by income or socioeconomic status, on the x-axis, and the cumulative percentage of the health variable on the y-axis. The resulting graph, known as the Lorenz curve, allows for visualizing the distribution of the health variable across different socioeconomic classes.

If the Lorenz curve lies below the diagonal line, it indicates a concentration of the health variable among the higher socioeconomic class, suggesting inequality favoring the higher socioeconomic group.

By employing the concentration index and analyzing the Lorenz curve, the study aimed to assess the level of inequality in socioeconomic status and its association with physical activity. Quantitative variables were reported as means and standard deviations, which provide information about the central tendency and variability of the data, respectively. Qualitative variables, on the other hand, were reported as frequencies and percentages, which describe the distribution of categories within the variable. To compare subgroups based on the level of physical activity, several statistical tests were employed. Independent t-tests were used to compare means of quantitative variables between two groups (e.g., comparing physical activity levels between two subgroups). Chi-square tests were utilized to examine associations between qualitative variables (e.g., examining the relationship between physical activity level and a categorical variable). Analysis of variance was employed when comparing means across multiple groups (e.g., comparing physical activity levels among different age groups).

Linear regression analysis was conducted to investigate the relationship between the level of physical activity and other independent variables. This analysis allows for examining the association between the dependent

Table 1 The comparison of prevalence of total physical activity (PA) in subgroups

Variables	Low PA *N* = 38 (6.44%)	Moderate PA *N* = 203 (34.41%)	Intense PA *N* = 349 (59.15%)	Total Number (%)	P_value*
Age					0.906
15–30 years	10 (7.3)	42 (30.7)	85 (62.0)	137 (23.4)	
30–45 years	16 (5.5)	105 (36.1)	170 (58.4)	291 (49.7)	
45–60 years	10 (7.6)	46 (35.1)	75 (57.2)	132 (22.5)	
60–75 years	2(7.7)	8 (30.8)	16 (61.5)	26(4.4)	
Gender					0.177
Male	15 (6.8)	66 (29.7)	141 (63.5)	222 (37.6)	
Female	23 (6.3)	137 (32.2)	208 (56.5)	369 (62.4)	
Marriage Status					0.038
Single	8 (5.5)	57 (39.0)	81 (55.5)	146 (24.7)	
Married	29 (6.7)	137 (31.9)	264 (61.4)	431 (72.9)	
Divorced/widow	1 (14.3)	8 (40.8)	3 (42.9)	12 (2.0)	
Education					0.123
Illiterate	1 (20.0)	3 (60.0)	1 (20.0)	6 (1.0)	
Elementary	6 (8.5)	16 (22.5)	49 (69.0)	71 (12.1)	
Middle-school	9 (6.0)	48 (32.0)	93 (62.0)	150 (25.5)	
Academic	22 (6.1)	135 (37.3)	205 (56.6)	362 (61.5)	
Job					0.001
Unemployed	3 (27.3)	4 (36.4)	4 (36.4)	12 (2.0)	
Employed	24 (6.7)	126 (35.0)	210 (58.3)	360 (60.9)	
Housekeeper	7 (5.4)	39 (30.2)	83 (64.3)	130 (22.0)	
Student	3 (4.9)	23 (37.7)	35 (57.4)	61(10.3)	
Retired	1 (3.6)	11 (32.3)	16 (57.1)	28 (4.8)	
SES					0.799
1th quantile	9 (7.3)	42 (34.2)	72 (58.5)	124 (21.0)	
2th quantile	7 (6.1)	42 (36.9)	65 (57.1)	114 (19.3)	
3th quantile	7 (4.2)	60 (31.9)	101 (60.1)	168 (28.4)	
4th quantile	15 (8.1)	59 (34.4)	111 (60.0)	185(31.3)	

*Based on chi-squared Test

variable and one or more predictor variables, controlling for potential confounding factors.

To determine socioeconomic inequalities in physical activity, the concentration index (CI) was employed. In this case, it used to assess inequalities in physical activity across different socioeconomic groups. The DASP package in Stata software was utilized for determining socioeconomic inequalities using the concentration index. Stata is a statistical software widely used for data analysis. The results of the concentration index analysis reported at a 95% confidence level, which indicates the level of confidence in the estimated values and their statistical significance.

Table 2 Comparison of average metabolic equivalents (METs) for the physical activity's dimensions

Types of physical activity	Metabolic Equivalents Mean ± SD	Concentration Index (95% CI)
Leisure time and exercise	1306.1 ± 1721.3	0.07 (0.01, 0.13)
Household and taking care of family	1562.6 ± 2022.5	0.003 (-0.03, 0.04)
Transportation	455.8 ± 864.5	-0.01 (-0.08, 0.04)
Job	1560.1 ± 3248.4	-0.07 (-0.16, 0.22)
Total physical activity	4913.9 ± 4515.6	0.02(-0.03, 0.04)

Results

A total of 591 participants, aged between 18 and 65 years, were included in the study. The participation percentage was obtained. The mean age of the participants was 38.11 ± 11.06 years. The majority of the participants were women (62.44%) and married (72.93%). Further details presented in Table 1.

In this study, the overall prevalence of low and moderate physical activity was 6.44% and 34.41%, respectively. The highest prevalence of low physical activity was observed among those aged 60–75 years (7.7%), males (6.3%), divorced and widowed marital status (14.3%), illiterate (20.0%), unemployed (27.3%) and in the highest socio-economic status quantile (8.1%). However, only for marital status and employment status were the differences statistically significant (Table 1).

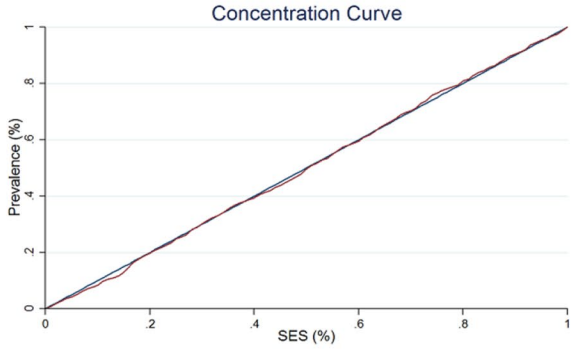
Additionally, the transportation (455.8 ± 864.5) and leisure time and exercise (1306.1 ± 1721.3) dimensions exhibited the lowest mean of metabolic equivalents (METs) for physical activity, highlighting a significant disparity. The analysis of inequality revealed that wealthier segments of society demonstrate higher levels of physical activity resulting from leisure time and exercise (Concentration index: 0.07, 95% CI: 0.01, 0.13) (Table 2).

Conversely, physical activity related to occupation was greater among less advantaged groups within society, however this relation was not statistically significant (Concentration index: -0.07, 95% CI: -0.16, 0.22) (Table 2). No distinct inequality was noted in other physical activities, including transportation, Household and taking care of the family (Fig. 1).

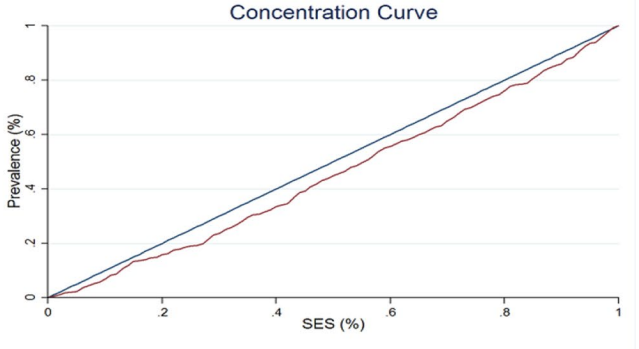
In the subgroup analysis comparing mean physical activity resulting from exercise, the lowest mean of metabolic equivalent of physical activity was found among women (1067.4 ± 1488.4 vs. 1702.4 ± 1992.2, $p < 0.001$), as well as widowed, divorced and single (1629.2 ± 1999.2, $p = 0.010$), illiterate (445.5 ± 70.0, $p = 0.025$), unemployed individuals (1702.4 ± 1992.2, $p < 0.001$), and along with those in the lowest economic quartile 1102.5 ± 1992.2, $p < 0.005$) (Table 3).

As the results of inequality were only statistically significant in relation to leisure time and exercise physical activity, the analysis of inequality within the subgroup

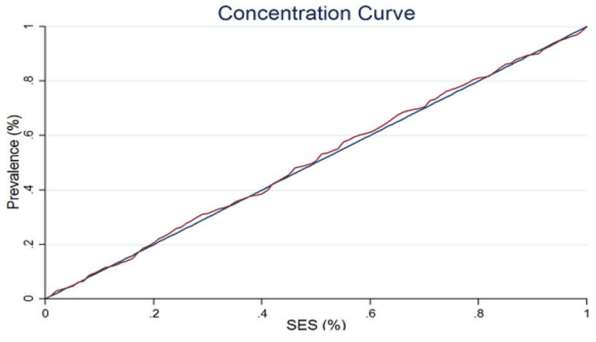
*T-Test for two group and ANOVA for more than two groups was used



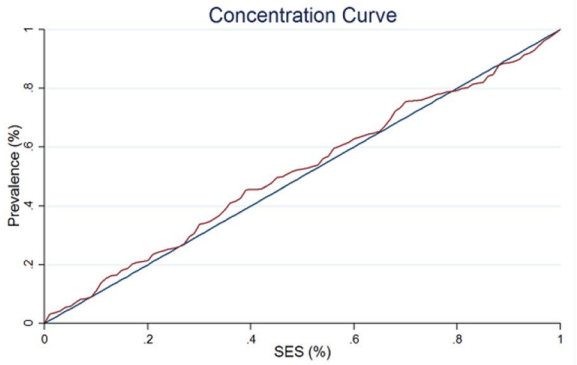
A: Total Physical Activity



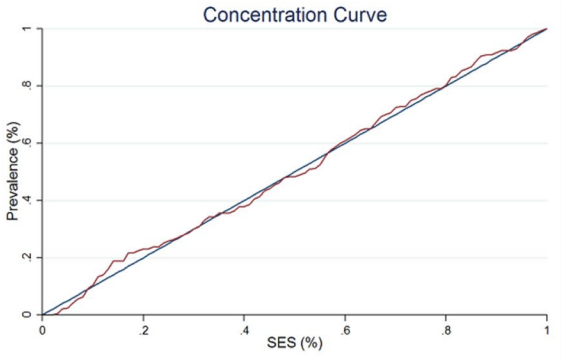
B: Physical Activity due to Leisure time and exercise



C: Physical Activity due Household and taking care of the family.



D: Physical Activity due to job



E: Physical Activity due to Transportation

Fig. 1 Lorenz Curve by types of physical activities

has only been conducted in relation to this aspect. The following outlines the results.

According to the subgroup analysis, the highest inequality of leisure time and exercise physical activity was observed among the age group of 60–75 years (Concentration index: 0.13, 95% CI: 0.04, 0.21), women (Concentration index: 0.28, 95% CI: 0.04, 0.53), illiterate individuals (Concentration index: 0.68, 95% CI: 0.32, 1.04) and single individuals (Concentration index: 0.10,

Table 3 Comparison of average metabolic equivalents (METs) physical activity in the leisure time and exercise

Variables	Metabolic Equivalents Mean ± SD	Total Number (%)	P_ value*
Age			0.106
15–30 years	1594.6 ± 1880.3	137 (23.4)	
30–45 years	1191.6 ± 1587.2	291 (49.7)	
45–60 years	1185.6 ± 1531.2	132 (22.5)	
60–75 years	1404.2 ± 2229.2	26(4.4)	
Gender			< 0.001
Male	1702.4 ± 1992.2	222 (37.56)	
Female	1067.4 ± 1488.4	369 (62.44)	
Marriage Status			0.010
Married	1188.8 ± 1552.0	431 (72.93)	
Divorced/widow/single	1629.2 ± 1999.2	158 (27.07)	
Education			0.025
Illiterate	445.5 ± 70.0	6 (1.02)	
Elementary	908.4 ± 2621.9	71 (12.05)	
Middle-school	1039.3 ± 1801.6	150 (25.47)	
Academic	2520.7 ± 2229.8	362 (61.46)	
Job			< 0.001
Unemployed	1590.5 ± 1907.5	12 (2.0)	
Employed	1387.4 ± 1876.5	360 (60.9)	
Housekeeper	920.03 ± 1334.8	130 (22.0)	
Student	1815.7 ± 2094.2	61(10.3)	
Retired	1155.6 ± 1659.3	28 (4.8)	
SES			0.005
1th quantile	1002.5 ± 1671.5	124 (21.0)	
2th quantile	1181.5 ± 1632.8	114 (19.3)	
3th quantile	1358.8 ± 1701.2	168 (28.4)	
4th quantile	1538.7 ± 1800.2	185(31.3)	

95% CI: -0.03, 0.22).). The statistically significant findings were limited to gender and age (Table 3; Fig. 2).

The results of the multiple logistic regression analysis on factors influencing "moderate to high" levels of physical activity reveal several key findings. Age was not significantly associated with physical activity levels, with an odds ratio (OR) of 0.99 (95% CI: 0.97, 1.02; P=0.808), indicating that each additional year of age had little effect on activity levels. Gender played a significant role, as females were less likely than males to engage in higher levels of physical activity, with an OR of 0.50 (95% CI: 0.34, 0.74; P=0.001). Education was positively associated with physical activity; for each additional year of education, the odds of engaging in higher activity levels increased by 52% (OR: 1.52; 95% CI: 1.14, 2.04; P=0.005). Employment status approached significance, with employed individuals being less likely than jobless individuals to participate in high activity levels (OR: 0.54; 95% CI: 0.28, 1.05; P=0.072). Among socioeconomic status (SES) categories, those in the third and fourth quartiles were more likely to achieve higher levels of physical activity compared to those in the first quartile, with ORs of 1.98 (95% CI: 1.14, 3.42; P=0.014) and 1.98 (95% CI: 1.13, 3.49; P=0.018), respectively. Marital status did not exhibit a significant effect on physical activity levels (OR: 0.83; 95% CI: 0.52, 1.32; P=0.431) (Table 4).

Discussion

In this study, the overall prevalence of intense physical activity was 59.15%. the recent systematic revue showed that highest prevalence of physical activity was for men in Sweden (77%), women in Denmark (81%), 12- to 15-year-old boys in Australia (74%) and <12-year-old girls (75%) in China. The countries with the lowest reported prevalence of physical activity were men in Brazil (4%), women in Saudi Arabia (2%) and Thailand (2%), and 17- to 18-year-old boys (0%) and 17- to18-year-old girls (0%) in Russia [12]. But the prevalence of medium to intense leisure time physical activity was 51.27%. The result of mention study indicated a high percentage (73.1%) of citizens of the E.U. who practice any kind of leisure-time physical activity. Also Overall, the prevalence of leisure-time physical inactivity declined significantly, from 29.8% in 1994 to 23.7% in 2004 among American population.

Our result showed the most striking disparity was observed in terms of physical activity arising from leisure time and exercise, with wealthier sectors of society exhibiting higher levels. Regular physical activity during leisure time can help reduce the risk of cardiovascular diseases, type 2 diabetes, certain cancers, depression and anxiety, obesity-related chronic diseases, osteoporosis, and arthritis. In addition, regular physical activity during leisure time may lead to improved sleep quality, enhanced immune system, and increased self-confidence and life satisfaction [13, 14]. Vega-Salas and et al. conducted a review study in Chile in 2021, which showed that individuals with low socioeconomic status had lower levels of physical activity during leisure time and higher levels of sedentary behavior [15].

Federico and et al. conducted a study in Italy in 2013, examining 5,000 adults. They found that all three components of socioeconomic status (including education, financial status, and gender) had a positive relationship with physical activity during leisure time [16]. In our study according to the subgroup analysis, the highest inequality for physical activity during leisure time was observed among the age group of 60–75 years), women, illiterate individuals and single individuals. Socioeconomic inequalities in physical activity, particularly in developing countries, are significantly influenced by gender-related factors such as access to facilities and cultural norms [17]. Women frequently confront socioeconomic disadvantages [18], which restrict their access to secure recreational areas due to inadequate infrastructure and societal constraints. Traditional roles and expectations may additionally impede women's mobility and

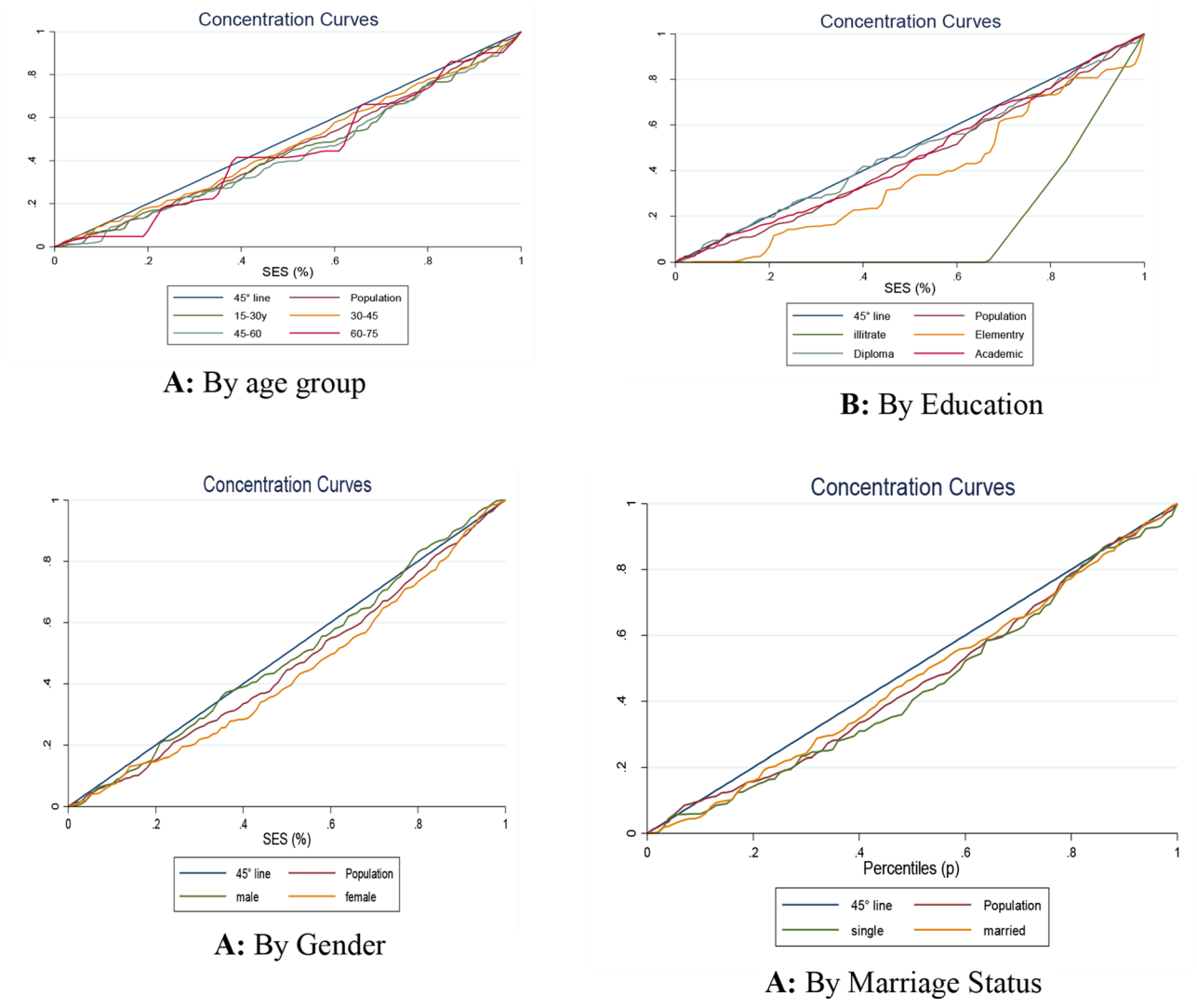


Fig. 2 Lorenz Curve of physical activity due to Leisure time and exercise by some demographic factors

Table 4 The role of some factors on "moderate to high" levels of physical activity (due to leisure time and exercise) using multiple logistic regression

Variables	Adjusted OR	95% CI	P_Value
Age (per year)	0.99	[0.97, 1.02]	0.808
Sex (female/ male)	0.50	[0.34, 0.74]	0.001
Marital Status (married/single)	0.83	[0.52, 1.32]	0.431
Education (per year)	1.52	[1.14, 2.04]	0.005
Employment Status	0.54	[0.28, 1.05]	0.072
Housekeeper/Jobless	1.08	[0.49, 2.33]	0.845
Retired/Jobless	0.68	[0.22, 2.14]	0.519
SES			
2th quartile/1th quartile	1.19	[0.66, 2.11]	0.556
3th quartile/1th quartile	1.98	[1.14, 3.42]	0.014
4th quartile/1th quartile	1.98	[1.13, 3.49]	0.018

involvement in public activities. Economic challenges may prioritize survival over health-promoting activities, resulting in decreased physical activity for both genders, but disproportionately affecting women [17].

In the study conducted by Brazo-Sayavera and et al. in Uruguay, they analyzed data from 3543 adults and discovered that over half of Uruguayan adults had low levels of LTPA (Leisure-Time Physical Activity). They observed that LTPA levels decrease with age and increase with improved socioeconomic status and higher levels of education [19].

In this study, no significant inequality was found regarding the prevalence of physical activity related to transportation, household chores, and caring for family members. However in some studies, such as the review study conducted by Werneck and et al. on 116,982 adults from six South American countries (Chile, Peru, Brazil, Argentina, Ecuador, Suriname), it was shown that the

prevalence of Transportation PA was lower among individuals with higher education compared to others [20].

The results show no statistically significant link between job status and leisure-time physical activity (LTPA). Manual and hands-on jobs typically involve more physical activity and are often held by economically and socially disadvantaged individuals, who have limited opportunities for regular physical activity during leisure time. Additionally, a study by Gudnadottir et al. found that individuals with the lowest levels of occupational physical activity were 2.40 times more likely to participate in sports than those with the highest levels of occupational physical activity [21]. Also Beehackers and et al. indicated that according to numerous studies, individuals with a higher socioeconomic status (SEP) generally engage in more leisure-time physical activity (LTPA) compared to those with a lower SEP. Conversely, individuals with a lower SEP tend to have higher levels of occupational physical activity (PA)(4).

One of the significant limitations of this study is that it relies on self-reporting to estimate individuals' assets. However, using assets as a method for assessing socioeconomic status has less bias. Additionally, there is a potential for underreporting or overreporting the extent of physical activities due to recall bias.

Conclusions

The most striking disparity was observed in terms of physical activity arising from leisure time and exercise, with wealthier sectors of society exhibiting higher levels. Conversely, physical activity related to occupation was greater among less advantaged groups within society. Also, the highest inequality was observed among the age group of 60–75 years, illiterate individuals and single individuals.

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Author contributions
Z.Ch. and A.DI and N.M. wrote the main manuscript text and Z.Ch. prepared Figs. 1-2. All authors reviewed the manuscript.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
This study (ID: 140104282894, IR.UMSHA.REC.1401.347) was approved by the research committee of the Hamadan University of medical sciences (UMSHA), Hamadan, Iran. All procedures performed were in accordance with the 1964 Declaration of Helsinki and its later amendments. All participants gave written informed consent.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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