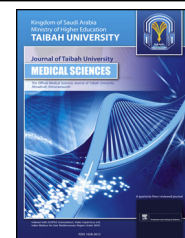




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Original Article

The prevalence of physical activity and its socioeconomic correlates in Kingdom of Saudi Arabia: A cross-sectional population-based national survey

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المخلص

أهداف البحث: تهدف الدراسة إلى تحديد مستوى النشاط البدني بين فئات المجتمع السعودي، وتقييم ارتباطه الاجتماعي والديموغرافي.

طرق البحث: تم الحصول على البيانات من خلال إجراء دراسة مقطعية مجتمعية لمسح وطني على ٤٧٥٨ مشاركاً بالمملكة العربية السعودية. اختيرت العينة بطريقة العينة العشوائية العنقودية الطبقة متعددة المراحل. وتم قياس مستوى النشاط البدني باستخدام النسخة الثانية من استبانة النشاط البدني العالمية وتم استخدام تحليل الانحدار اللوجستي لمعرفة المحددات وضبط العوامل المختلفة.

النتائج: بشكل عام، وجد أن نسبة الخمول وصلت ٦٦.٦٪ (مدى الثقة ٦٥.٣ - ٦٨٪) إجمالاً، ونسبة ٦٠.١٪ بين الذكور (مدى الثقة ٥٨.١ - ٦٢.١٪)، ونسبة ٧٢.٩٪ بين الإناث (مدى الثقة ٧١.١ - ٧٤.٧٪). وقد سجلت المناطق الشمالية والوسطى بالمملكة أعلى نسبة من الخمول في العمل والترفيه والنقل. وكان هناك علاقة إحصائية مهمة لعوامل الجنس والمنطقة الجغرافية وحالة العمل.

الاستنتاجات: هناك نسبة عالية من الخمول في مناطق وفئات المجتمع المختلفة بالمملكة العربية السعودية. ونحن بحاجة ماسة لبرامج اجتماعية لتحفيز النشاط البدني الترفيهي.

الكلمات المفتاحية: المسح الوطني؛ النشاط البدني؛ انتشار؛ المملكة العربية السعودية

Abstract

Objectives: To determine the levels of physical activity in the Saudi population and to assess its socio-demographic correlates.

Methods: The data were part of a cross-sectional representative national survey of 4758 participants conducted in Kingdom of Saudi Arabia. A multistage stratified cluster random sampling design was used. Physical activity was assessed using the Global Physical Activity Questionnaire (GPAQ) version 2.0. Logistic regression analyses were used to identify the determinants and were adjusted in relation to various factors.

Results: Overall, physical inactivity was found to be 66.6% (95% C.I.: 65.3%–68%), 60.1% (95% C.I.: 58.1%–62.1%) for males and 72.9% (95% C.I.: 71.1%–74.7%) for females. Leisure time physical inactivity was found to be 87.9%, 85.6% for males and 90.2% for females. The northern and central regions reported the highest prevalence of no physical activity at work, leisure and transportation. Gender, geographical location and employment status exhibited a statistically significant correlation.

Conclusions: There is a high level of physical inactivity in various regions and population groups in the Kingdom of Saudi Arabia. Population interventions are greatly needed, especially those focusing on physical activity in their leisure time.

Keywords: Adults; National survey; Physical inactivity; Prevalence; Saudi Arabia

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Introduction

Physical inactivity is a global health challenge. “Physical inactivity has been identified as the fourth leading risk factor for global mortality (6% of deaths globally)”.¹ The health benefits of physical activity have been demonstrated frequently in the literature. Physical activity has been shown to be associated with a lower risk of cardiovascular disease,² type 2 diabetes mellitus,³ stroke, obesity, depression,⁴ dementia,⁵ and benign prostatic hyperplasia.⁶ Leisure and non-leisure physical activity has been associated with a reduction in mortality.⁷ Changes in physical activity are associated with changes in mortality,⁸ weight, waist circumference, diastolic BP and, serum lipids.^{9,10} Physical activity reduces the risk of colon,¹¹ endometrial cancer¹² and breast cancer.¹³ Evidence suggests that physical activity has positive health effects on patients with osteoporosis, osteoarthritis, breast cancer,¹⁴ diabetes,¹⁵ and inflammatory bowel disease,¹⁶ as well as on mental and psychological health by reducing depression, anxiety and stress.¹⁷ Physical activity is positively associated with health related quality of life.¹⁸ Recognizing the effect of physical inactivity on population health, the World Health Assembly in 2004 recommended “that Member States develop national physical activity action plans and policies to increase physical activity levels in their populations”.¹ Many countries have developed national plans and guidelines for increasing their populations’ levels of physical activity.^{19,20}

The prevalence of physical activity varies widely by country, the highest being reported in Sweden and Denmark, and the lowest in Brazil, Thailand and Kingdom of Saudi Arabia.²¹ The prevalence of physical activity in the countries of the Gulf Cooperation Council was reported to range from 39.0% to 42.1% for men and 26.3%–28.4% for women.²²

A high rate of physical inactivity was reported in Kingdom of Saudi Arabia. A national population based cross-sectional study conducted from 1995 to 2000 reported an overall 96.1% prevalence of physical inactivity among Saudis aged 30–70 years. Other studies conducted in Riyadh, which included younger age groups, reported the prevalence of physical activity ranging from 19 to 25.1%^{23,24} (i.e., physical inactivity levels ranging from 81% to 74.9%). Still, detailed studies about physical activity are scarce in Kingdom of Saudi Arabia. Public health intervention programs require baseline data about the prevalence and socio-demographic distribution of the targeted phenomena.

For comparison purposes, standardized instruments were used in physical activity studies around the world. The Global Physical Activity Questionnaire (GPAQ)²⁵ is a widely used international standardized instrument. To the best of our knowledge, there has been no population-based national study in Kingdom of Saudi Arabia that used an

internationally standardized instrument and examined the various domains of physical activity. The aim of this study is to determine the physical activity levels in the Saudi population aged 15 years and older using the GPAQ and assess its association with socio-demographic factors.

Materials and Methods

Study population

The data is part of a cross-sectional nationally representative household survey of 4758 participants conducted in 2005 in Kingdom of Saudi Arabia. The survey utilized the methodology of the STEP wise approach to Surveillance (STEPS) promoted by the World Health Organization (WHO).²⁶ The detailed methodology of the Saudi STEPS survey was reported elsewhere.²⁷ Briefly, the study used a multistage stratified cluster random sampling design to obtain a representative sample of Saudi Arabian households. Stratification was based on the number of regional health authorities in the country (five major regions), age (five 10-year span age groups) and gender. Each region was assigned a sample proportionate in size to its population. A simple random sampling was used to select households from primary healthcare center coverage area (PHCC). Within the identified households, one individual was selected using Kish method. Only subjects between 15 and 64 years were included in the study. Selected participants were interviewed using the questionnaire and then given an appointment at a local PHCC for physical and biochemical measurements.

The protocol and the instrument of the study were approved by the Center of Biomedical Ethics at King Faisal Specialist Hospital.

Measures

Physical activity

The GPAQ version 2.0 instrument was used to measure physical activity in three domains: work, transportation and leisure, respectively. The original English version of the GPAQ was translated into Arabic, back translated and pilot-tested before its use in the main survey. Fifteen cores of the GPAQ were distributed as follows: 6 questions that assess work-related physical activity, 3 questions that assess transportation-related physical activity, and 6 questions that assess leisure time physical activity (LTPA). Participants were asked about the number of days in a typical week as well as the number of minutes/hours in a typical day that were spent in physical activity. Following the GPAQ analysis guide, the level of physical activity was classified as follows: high if a person reported vigorous-intensity activity on at least 3 days, with a minimum of 1500 MET-minutes/week or 7 or more days of any combination of walking or moderate- or vigorous-intensity activities, with a minimum of 3000 MET-minutes per week; moderate if a person reported 3 or more days of vigorous-intensity activity of at least 20 min per day or 5 or more days of moderate-intensity activity of at least 30 min per day or 5 or more days of any combination of walking, moderate- or vigorous-intensity activities achieving

a minimum of 600 MET-minutes per week; and low if the above criteria were not satisfied.²⁵

The GPAQ included a question assessing sedentary behavior which was: "How much time do you usually spend sitting or reclining on a typical day?" sitting in an office, reading, watching television, using a computer, or resting, but excluding sleeping.

The independent variables

The WHO data collection tool, STEPS instrument for non-communicable diseases risk factors (the core and expanded version 1.4), was used.²⁶ The age and date of birth of the subjects were self-reported. Age was categorized into 5 groups: 15 to 24, 25 to 34, 35 to 44, 45 to 54 and 55–64 years. Education was assessed in terms of the highest qualification obtained. Family income was self-reported and was divided into 3 categories based on the estimated annual or monthly income. Employment status was self-reported and divided into 5 categories: governmental employed, non-governmental employed, student, homemaker and retired/unemployed.

Analysis

The statistical analyses were performed using SPSS version 19.0 for Windows.²⁸ For the analyses, the significance level was set at p-value less than 0.05. Percentages were calculated for the socio-demographic variables stratified according to five main regions. The proportion of subjects achieving various levels of physical activity was calculated for each region stratified by gender. Because

of skewness, the median and inter-quartile range (IQR) were used to describe the sedentary time data, and the Kruskal-Wallis rank test was used to test the differences in sedentary time between the regions, education levels, age groups, occupations and family income levels.

Logistic regression analyses were conducted with physical inactivity (a low level was considered physically inactive, whereas the moderate and high levels were considered active) as the dependent variable and each of the sociodemographic variables as the independent variables. These analyses were performed for each of the genders separately and for the entire sample. The independent variables were entered in the logistic regression model if they had a significant association with physical activity in the bivariate analysis. The level of entry to the model was set at $p < 0.10$.

Results

There were 4758 participants in the study sample. The sociodemographic characteristics of the sample are presented in Table 1. They were stratified according to five regions of the country. Overall, the prevalence of physical inactivity was found to be 66.6% (95% C.I.: 65.3%–68%), 60.1% (95% C.I.: 58.1%–62.1%) for males, and 72.9% (95% C.I.: 71.1%–74.7%) for females.

The level of total physical activity, work related physical activity, transportation related physical activity and LTPA (each stratified by gender and region) are presented in Table 2. Low, moderate and high levels of physical activity were reported by 66.6%, 16.8% and 16.6% of the entire sample, respectively. The northern and central regions reported the highest proportion of no physical activity at

Table 1: Socio-demographic characteristics of the sample, stratified by regions of the country, Kingdom of Saudi Arabia, 2005.

	Central (n = 1139)		Eastern (n = 706)		Northern (n = 455)		Southern (n = 1001)		Western (n = 1457)		Total (n = 4758)	
	n	%	n	%	n	%	n	%	n	%	n	%
Gender												
Male	575	50.5%	351	49.7%	226	49.7%	494	49.4%	694	47.6%	2340	49.2%
Female	564	49.5%	355	50.3%	229	50.3%	507	50.6%	763	52.4%	2418	50.8%
Total	1139	100.0%	706	100.0%	455	100.0%	1001	100.0%	1457	100.0%	4758	100.0%
Age, Years												
15–24	233	20.5%	175	24.8%	81	17.8%	254	25.4%	333	22.9%	1076	22.6%
25–34	269	23.6%	181	25.6%	105	23.1%	229	22.9%	346	23.7%	1130	23.7%
35–44	320	28.1%	196	27.8%	111	24.4%	216	21.6%	324	22.2%	1167	24.5%
45–54	183	16.1%	99	14.0%	94	20.7%	182	18.2%	283	19.4%	841	17.7%
55–64	134	11.8%	55	7.8%	64	14.1%	120	12.0%	171	11.7%	544	11.4%
Education												
Low	308	27.2%	179	25.4%	167	36.8%	401	40.1%	619	42.5%	1674	35.2%
Medium	584	51.6%	430	60.9%	207	45.6%	465	46.5%	661	45.4%	2347	49.4%
High	240	21.2%	97	13.7%	80	17.6%	135	13.5%	176	12.1%	728	15.3%
Employment												
Governmental	380	33.5%	199	28.2%	143	31.5%	284	28.4%	365	25.1%	1371	28.9%
Non-governmental	96	8.5%	97	13.7%	23	5.1%	66	6.6%	172	11.8%	454	9.6%
Student	147	13.0%	92	13.0%	57	12.6%	143	14.3%	210	14.4%	649	13.7%
Homemaker	389	34.3%	241	34.1%	181	39.9%	372	37.2%	577	39.6%	1760	37.0%
Retired/Unemployed	123	10.8%	77	10.9%	50	11.0%	136	13.6%	132	9.1%	518	10.9%
Family income												
<5000	388	38.6%	323	47.2%	217	51.8%	597	60.4%	978	69.6%	2503	55.6%
5000–14,999	538	53.5%	313	45.7%	178	42.5%	357	36.1%	386	27.5%	1772	39.3%
≥ 15,000	80	8.0%	49	7.2%	24	5.7%	35	3.5%	41	2.9%	229	5.1%

work, at leisure, and in transportation. The highest proportion of participants achieving a high level of physical activity was reported in the southern region (23%).

Few differences in the median time spent in sedentary activities across the categories of the various risk factors were observed (Table 3). The participants from the southern region, those who are retired or unemployed, and people in the age group 55 to 64 are more likely to have more sedentary time.

Table 4 shows the results of the logistic regression analyses with physical inactivity as the dependent variable. Men from the central and northern regions are more likely to be physically inactive (OR = 2.57, 95%CI: 1.93–3.4 and OR = 2.2, 95%CI: 1.52–3.17, respectively). Men with medium education and those in non-governmental job are

less likely to be physically inactive (OR = 0.68, 95%CI: 0.53–0.88 and OR = 0.58, 95%CI: 0.42–0.78, respectively). Women from the central, eastern and northern regions are more likely to be physically inactive (OR = 2.31, 95%CI: 1.7–3.12 and OR = 2.02, 95%CI: 1.47–2.77 and OR = 5.42, 95%CI: 3.32–8.84, respectively). Women in the 25–34 years, 35–44 years and 45–54 years age groups are less likely to be physically inactive.

Discussion

Physical inactivity is one of the leading causes of death, disability and morbidity among non-communicable chronic conditions. This study showed that physical inactivity in the

Table 2: Level of total, work-related, transport-related and leisure time physical activity stratified by gender and country regions, Kingdom of Saudi Arabia, 2005.

		Central		Western		Eastern		Northern		Southern		Total	
		n	%	n	%	n	%	n	%	n	%	n	%
Level of Total Physical Activity													
Male	High	32	6.0%	156	23.2%	97	28.6%	22	9.8%	119	24.5%	426	18.9%
	Moderate	87	16.4%	179	26.6%	79	23.3%	36	16.1%	91	18.8%	472	21.0%
	Low	412	77.6%	337	50.1%	163	48.1%	166	74.1%	275	56.7%	1353	60.1%
		531	100.0%	672	100.0%	339	100.0%	224	100.0%	485	100.0%	2251	100.0%
Female	High	67	12.8%	133	17.8%	22	6.3%	7	3.1%	109	21.6%	338	14.4%
	Moderate	37	7.1%	108	14.4%	58	16.7%	14	6.2%	82	16.2%	299	12.7%
	Low	418	80.1%	507	67.8%	268	77.0%	206	90.7%	314	62.2%	1713	72.9%
		522	100.0%	748	100.0%	348	100.0%	227	100.0%	505	100.0%	2350	100.0%
Total	High	99	9.4%	289	20.4%	119	17.3%	29	6.4%	228	23.0%	764	16.6%
	Moderate	124	11.8%	287	20.2%	137	19.9%	50	11.1%	173	17.5%	771	16.8%
	Low	830	78.8%	844	59.4%	431	62.7%	372	82.5%	589	59.5%	3066	66.6%
		1053	100.0%	1420	100.0%	687	100.0%	451	100.0%	990	100.0%	4601	100.0%
Physical activity at work													
Male	Yes	42	7.8%	127	18.6%	111	32.5%	28	12.4%	110	22.4%	418	18.3%
	No	498	92.2%	554	81.4%	231	67.5%	197	87.6%	380	77.6%	1860	81.7%
	Total	540	100.0%	681	100.0%	342	100.0%	225	100.0%	490	100.0%	2278	100.0%
Female	Yes	105	18.9%	177	23.4%	47	13.2%	14	6.1%	184	36.4%	527	21.9%
	No	452	81.1%	580	76.6%	308	86.8%	215	93.9%	322	63.6%	1877	78.1%
	Total	557	100.0%	757	100.0%	355	100.0%	229	100.0%	506	100.0%	2404	100.0%
Total	Yes	147	13.4%	304	21.1%	158	22.7%	42	9.3%	294	29.5%	945	20.2%
	No	950	86.6%	1134	78.9%	539	77.3%	412	90.7%	702	70.5%	3737	79.8%
	Total	1097	100.0%	1438	100.0%	697	100.0%	454	100.0%	996	100.0%	4682	100.0%
Transport related Physical activity													
Male	Yes	159	28.2%	402	58.4%	177	50.6%	90	39.8%	213	43.3%	1041	44.9%
	No	405	71.8%	286	41.6%	173	49.4%	136	60.2%	279	56.7%	1279	55.1%
	Total	564	100.0%	688	100.0%	350	100.0%	226	100.0%	492	100.0%	2320	100.0%
Female	Yes	84	15.6%	571	75.3%	262	74.0%	46	20.1%	166	32.9%	1129	47.4%
	No	454	84.4%	187	24.7%	92	26.0%	183	79.9%	339	67.1%	1255	52.6%
	Total	538	100.0%	758	100.0%	354	100.0%	229	100.0%	505	100.0%	2384	100.0%
Total	Yes	243	22.1%	973	67.3%	439	62.4%	136	29.9%	379	38.0%	2170	46.1%
	No	859	77.9%	473	32.7%	265	37.6%	319	70.1%	618	62.0%	2534	53.9%
	Total	1102	100.0%	1446	100.0%	704	100.0%	455	100.0%	997	100.0%	4704	100.0%
Recreational activity													
Male	Yes	29	5.1%	96	14.0%	86	24.6%	20	8.9%	103	21.0%	334	14.4%
	No	537	94.9%	591	86.0%	263	75.4%	205	91.1%	388	79.0%	1984	85.6%
	Total	566	100.0%	687	100.0%	349	100.0%	225	100.0%	491	100.0%	2318	100.0%
Female	Yes	81	14.9%	96	12.7%	9	2.6%	4	1.8%	43	8.5%	233	9.8%
	No	461	85.1%	659	87.3%	340	97.4%	223	98.2%	463	91.5%	2146	90.2%
	Total	542	100.0%	755	100.0%	349	100.0%	227	100.0%	506	100.0%	2379	100.0%
Total	Yes	110	9.9%	192	13.3%	95	13.6%	24	5.3%	146	14.6%	567	12.1%
	No	998	90.1%	1250	86.7%	603	86.4%	428	94.7%	851	85.4%	4130	87.9%
	Total	1108	100.0%	1442	100.0%	698	100.0%	452	100.0%	997	100.0%	4697	100.0%

Table 3: Time spent in sedentary behaviors, Kingdom of Saudi Arabia, 2005.

	Median (min/day)	Interquartile range (IQR)	p-Value*
Region			
Central	240	180–360	<0.0001
Western	240	120–360	
Eastern	210	120–300	
Northern	240	120–360	
Southern	300	180–450	
Gender			0.008
Female	240	120–360	
Male	240	180–360	
Education			
Low	240	120–360	0.037
Medium	240	120–360	
High	240	150–360	
Occupation			
Governmental	240	150–360	<0.0001
Non-governmental	210	120–360	
Student	240	120–360	
Homemaker	240	120–360	
Retired/unemployed	300	180–480	
Age			
15–24 yrs	240	120–360	<0.0001
25–34 yrs	240	120–360	
35–44 yrs	240	120–360	
45–54 yrs	240	150–360	
55–64 yrs	300	180–480	
Family Income			
<5000	240	120–360	0.406
5000–14,999	240	150–360	
>= 15,000	240	180–398	

*p-value determined by Kruskal-Wallis test.

representative sample of the Saudi population was 66.6%. These findings confirm the high prevalence of physical inactivity among adult males, females and adolescents reported by previous studies^{23,24,29,30} This situation is comparable to other Arab Gulf countries in which, based on the best-available data, the prevalence of adults being physically active ranged from 39.0% to 42.1% for men and 26.3%–28.4% for women.²²

The level of physical inactivity reported in this study is better than the level reported in another previous national study (physical inactivity of 96.1%)²⁹ that was conducted in 1995–2000 on participants in the age group of 30–70 years. The difference might be due to the different age distribution or might simply reflect an improvement in the level of physical activity. The current study investigated physical activity in 3 domains, whereas the previous study appears to have focused on LTPA. Other studies from various regions in the country reported a wide range of physical inactivity of between 43.3% and 99.5%.³¹ Differences in the survey methodology, sampling strategies, sample population, assessment strategies and data collection instruments make comparison very challenging.

The high prevalence of sedentary behavior and physical inactivity among Saudi adults and adolescents is a major public health concern that requires urgent intervention as noted by previous investigators.^{31,32} According to the WHO,³³ 31% of adults worldwide aged 15+ were

insufficiently active (men 28% and women 34%) in 2008. Countrywide studies have reported wide variations of physical activity. The ranges of the prevalence of physical activity, the mode of data collection, and the determination of meeting a physical activity threshold vary markedly between countries.

Men from the central and northern regions and women from the central, eastern and northern regions were more likely to be physically inactive. The highest proportion of participants achieving a high level of physical activity was reported in the southern region. The southern region is mountainous, agricultural and less urbanized than the other regions, which may explain these findings. This interpretation is supported by the fact that southern region registered the highest level of work-related physical activity.

Our results indicate that physical inactivity is higher among women than men (72.9% vs. 60.1%, respectively). This finding is in accordance with previous studies in Kingdom of Saudi Arabia, other Gulf countries and other WHO regions, in which men are more active than women, with the biggest difference in the prevalence of physical activity between the two sexes being observed in the eastern Mediterranean region.^{22,29,33} The lower prevalence of physical activity among females is more likely caused by cultural and social variables rather than biological factors.^{34,35} Culturally, women are not expected to practice physical activities in public. Although walking-for-fitness is relatively acceptable for women living in cities, it may not be the case in rural regions.

This study showed that the population in the 55–64 year age group showed a higher prevalence of physical inactivity compared to the other age groups. This finding appears to be consistent with those from previous studies conducted nationally, regionally and internationally,^{21,22,24,29,36–39} which suggests a general pattern of negative association between age and physical activity.

Our results show that people with higher education are less active. This relationship disappears after adjustment for other factors that most likely indicate a confounding effect of age. Physical activity has been related to educational level in some but not all studies. Investigators in some studies observed that subjects with a lower level of education were more frequently physically inactive.^{40,41} Findings from Kingdom of Saudi Arabia,²⁹ other transitional countries⁴² and developed countries⁴³ showed that the occupational physical activity score decreased with increasing schooling level, whereas the LTPA score increased. The inconsistency of educational level and physical activity may have been confounded with other factors associated with education such as socioeconomic status.

Retired, unemployed and homemaker subjects in this study are more likely to be physically inactive compared to currently employed subjects, even after adjustment. The levels of physical activity have been shown to be related to occupational class or socio-economic status in other countries.^{44,45}

Income was not significantly associated with physical activity in this study. This finding does not conform to the findings in other studies, in which income was found to assert a positive association with the propensity for participation in physical activity.⁴⁶ Subjects in a higher income group are

Table 4: Logistic regression analysis between socio-demographic characteristics (independent variables) and physical inactivity (dependent variable).^a

	Men (n = 2251)				Women (n = 2350)				Both (n = 4601)			
	Unadjusted		Adjusted		Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.
Region												
Central	2.64***	2.01–3.47	2.57***	1.93–3.4	2.44***	1.85–3.24	2.31***	1.7–3.12	2.53***	2.09–3.08	2.51***	2.05–3.09
Western	0.77*	0.61–0.97	0.81	0.64–1.03	1.28*	1.01–1.62	1.31*	1.02–1.66	1	0.85–1.18	1.04	0.87–1.23
Eastern	0.71*	0.54–0.93	0.76	0.57–1.01	2.04***	1.5–2.77	2.02***	1.47–2.77	1.15	0.94–1.4	1.21	0.98–1.49
Northern	2.19***	1.54–3.1	2.2***	1.52–3.17	5.97***	3.68–9.68	5.42***	3.32–8.84	3.21***	2.44–4.22	3.24***	2.44–4.32
Southern	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Gender												
Female	–	–	–	–	–	–	–	–	1.78***	1.58–2.02	1.45***	1.18–1.78
Male	–	–	–	–	–	–	–	–	Ref.		Ref.	
Education												
Low	0.61**	0.47–0.81	0.85	0.61–1.19	1.25	0.94–1.66	1.03	0.69–1.52	0.97	0.8–1.17	0.87	0.69–1.11
Medium	0.57***	0.45–0.72	0.68**	0.53–0.88	1.48**	1.11–1.99	1.24	0.87–1.76	0.82*	0.69–0.98	0.85	0.7–1.04
High	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Occupation												
Governmental	0.91	0.71–1.16	0.8	0.61–1.04	0.52*	0.29–0.92	0.57	0.31–1.06	0.83	0.67–1.04	0.72**	0.57–0.91
Non-governmental	0.56***	0.42–0.74	0.58***	0.42–0.78	0.47	0.2–1.1	0.49	0.2–1.19	0.53***	0.4–0.69	0.54***	0.41–0.72
Student	0.74*	0.55–0.99	0.74	0.54–1.03	0.87	0.49–1.56	0.79	0.42–1.49	0.9	0.7–1.16	0.82	0.62–1.08
Homemaker	–	–	–	–	0.86	0.51–1.46	0.97	0.55–1.71	1.42**	1.14–1.77	1.06	0.79–1.43
Retired/unemployed	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Age												
15–24 yrs	0.85	0.64–1.13	–	–	0.73	0.48–1.1	0.68	0.4–1.15	0.91	0.72–1.14	0.93	0.68–1.27
25–34 yrs	0.87	0.65–1.16	–	–	0.6*	0.4–0.91	0.56*	0.35–0.89	0.88	0.7–1.11	0.76	0.58–1.0
35–44 yrs	0.91	0.68–1.21	–	–	0.61*	0.41–0.92	0.53**	0.34–0.83	0.9	0.72–1.12	0.75	0.58–0.98
45–54 yrs	1.02	0.76–1.38	–	–	0.61	0.4–0.94	0.58*	0.37–0.93	0.93	0.73–1.18	0.87	0.67–1.13
55–64 yrs	Ref.		–	–	Ref.		Ref.		Ref.		Ref.	
Family Income												
<5000	0.57**	0.39–0.85	0.72	0.47–1.1	1.1	0.71–1.71	1.01	0.62–1.64	0.81	0.6–1.09	0.89	0.65–1.21
5000–14,999	0.78	0.53–1.16	0.82	0.54–1.25	1.48	0.94–2.34	1.3	0.8–2.1	1.02	0.76–1.37	1.03	0.76–1.41
>= 15,000	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	

OR = Odds Ratio, C.I. = Confidence Interval; * association at $p < 0.05$; ** association at $p < 0.01$; ***association at $p < 0.001$.

^a Each factor is adjusted for other factors in the model.

most likely to be more health-conscious and might try to find more time for physical activity.

This study has many advantages. First, it is based on a national household survey, which is the only study reporting a national estimate for physical activity prevalence for the 2000s. Second, using the GPAQ questionnaire allows comparison with other local and international studies. Third, using the GPAQ allows us to estimate the level of total physical activity as well as the level in various domains.

Our study has some limitations. The estimation of the level of physical activity is based on a self-report questionnaire, which may lead to over- or under-reporting of physical activity in some groups. Objective measures of physical activity are available but would be more difficult to implement in a national survey.

Conclusions

Kingdom of Saudi Arabia has a high level of physical inactivity in various regions and population groups.

Recommendations

Population level interventions are highly warranted to combat this epidemic and to augment the efforts of preventing non-communicable diseases, such as diabetes mellitus, that show a high prevalence and an increasing trend in the country. Interventions focusing on LTPA are necessary, and these measures include the provision of facilities and supportive environmental factors.

Conflict of interest statement

The authors have no conflict of interest to declare.

Authors' contributions

AA drafted the manuscript and performed the statistical analysis. NA participated in the design and coordination of the study and reviewed the manuscript. AS helped to draft the manuscript and reviewed the literature. All authors read and approved the final manuscript.

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