

Health-enhancing physical activity among Saudi adults using the International Physical Activity Questionnaire (IPAQ)

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Abstract

Objectives: To describe the physical activity profile of Saudi adults living in Riyadh, using the International Physical Activity Questionnaire (IPAQ) short-version telephone format.

Methods: Physical activity was assessed using the official Arabic short form of IPAQ, intended for use in telephone interview. The instrument asks for times spent in walking, moderate- and vigorous-intensity physical activity of at least 10 min duration. The sample consisted of 1616 Saudis, between 15 and 78 years of age, living in Riyadh. Participants were drawn from a list of names in the telephone book using a simple random method. Telephone interviews were administered during the spring of 2003 by trained male interviewers.

Results: The final sample size was 1064 Saudi males and females (response rate of 66%), with males comprising about 66% of the respondents. Over 43% of Saudis did not participate in any type of moderate-intensity physical activity lasting for at least 10 min. More than 72% of the sample did not engage in any type of vigorous-intensity physical activity lasting for at least 10 min. The proportion of Saudis who walked for 150 min or more per week was 33.3%. Females were engaged more in moderate physical activity than males, whereas males participated more in vigorous activity compared with females. Activity levels did not show significant relationships with education level or job hours per week. Based on the three activity categories established by IPAQ, 40.6% of Saudis were inactive, 34.3% were minimally active and 25.1% were physically active. Physical inactivity increased with advancing age.

Conclusion: The data suggest that the prevalence of physical inactivity among Saudis adults is relatively high. Efforts are needed to encourage Saudis to be more physically active, with the goal of increasing the proportion of Saudis engaging in health-enhancing physical activity.

Keywords
Physical activity
Inactivity
Exercise
Health promotion
Public health
IPAQ

Non-communicable diseases are rapidly emerging to replace communicable diseases in developing countries¹. It is believed that reducing the burden of non-communicable diseases depends on controlling several modifiable risk factors, including physical inactivity². Indeed, physical inactivity is considered a major risk factor for a number of chronic diseases, including cardiovascular diseases, diabetes mellitus, obesity, osteoporosis and certain types of cancer^{2–5}. Lack of physical activity is also linked to premature mortality⁶. Quantitative estimates at global level indicate that sedentary living causes about 22% of ischaemic heart disease cases and about 10–16% of cases each of diabetes mellitus and breast, colon and rectal cancers². Physical activity, on the other hand, is associated with numerous health benefits, including cardiovascular risk reduction^{3,7,8}. Consequently, monitoring physical activity levels in society is increasingly becoming a public health priority^{9,10}.

Previous physical activity assessment conducted in Saudi Arabia indicated that physical inactivity is becoming

more prevalent among the Saudi population^{11–14}. Such high prevalence of inactivity in Saudi Arabia represents a major public health burden, as evident by the high population-attributable risk of physical inactivity compared with many industrial countries¹⁵. Early physical activity reports in Saudi Arabia had primarily focused on leisure-time physical activity with little emphasis on other components of physical activity, i.e. occupational, transport and household/yard physical activity¹³. Moreover, the physical activity pattern of females was not assessed in previous local surveys^{12–14}.

Recently, the International Physical Activity Questionnaire (IPAQ) was developed by a group of researchers from various countries, with support of the World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC)¹⁶. The unique feature of IPAQ is that it assesses all believed health-related physical activities that can take place in different settings. There are two versions of IPAQ (a long form and a short form). In each version,

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there are two formats: self-administered and telephone or face-to-face interview. It was developed as an instrument for cross-national monitoring of physical activity and inactivity. IPAQ was subjected to a reliability and validity study carried out in 14 centres in 12 countries during the year 2000, which demonstrated that IPAQ instruments have acceptable measurement properties for monitoring population levels of physical activity among 18- to 65-year-old adults in diverse settings¹⁶. Therefore, the purpose of the present paper is to report the physical activity profile of Saudi adults living in Riyadh, using the short version of IPAQ intended for use in telephone interview.

Materials and methods

Study sample

The sample in the present study comprised 1616 Saudis aged between 15 and 78 years living in Riyadh. Riyadh is the capital of Saudi Arabia and includes people from all regions of the country. The subjects were drawn from names listed in the telephone book using a simple random method. The selected participants were contacted and interviewed via telephone by trained male interviewers during March and April of 2003. The interviewers were trained in how to introduce themselves and the subject to the participants and how to properly execute the telephone interview. Out of 1616 people who were originally selected and contacted, we were able to interview 1064 persons (about 66% response rate). Those who were not interviewed either refused to participate in the study (12.5% of males and 24.0% of females) or could not be reached after three attempts to reach them on three separate occasions (no answer or not found at home).

Physical activity assessment

Physical activity was assessed using the official Arabic short-version telephone format of IPAQ, which is available at www.ipaq.ki.se. The short form of IPAQ that was used in the present study has seven items providing information on time spent walking, in vigorous- and moderate-intensity physical activities and in sedentary activity during the previous seven days. IPAQ defines moderate physical activities as those that produce a moderate increase in respiration rate, heart rate and sweating for at least 10 min duration. This is equivalent to 3–6 metabolic equivalents (MET) based on the compendium of physical activity¹⁷. Vigorous physical activities are defined as those producing vigorous increases in respiration rate, heart rate and sweating for at least 10 min duration. The metabolic equivalent value is above 6 MET¹⁷. In addition to physical activity questions, IPAQ includes some other questions on age, education years, employment and job hours. Participants are asked to refer to all domains of physical activity including occupational, transport, household, yard/garden and leisure/sports. The questionnaires were

translated and adapted to Arabic language, and then subjected to back-translation.

Data analysis

After inspecting the data, they were entered into a personal computer and checked again for outliers, according to the guidelines from IPAQ (www.ipaq.ki.se). Data were then analysed using the SPSS program, version 10.0 (SPSS Inc., Chicago, IL, USA). Frequencies and percentages were computed for each demographic characteristic, as well as for all levels of walking, moderate and vigorous physical activities. Chi-square statistics were calculated for both males and females by activity status. Levels of physical activity were examined across age groups. The relationships between activity levels and each of age group, years of education and job hours per week were tested using Spearman's Rho correlation. In additions, MET-min per week for each of walking, moderate- and vigorous-intensity activities were calculated as follows: walking = $(3.3 \times \text{walking minutes} \times \text{walking days})$; moderate activity = $(4.0 \times \text{moderate activity minutes} \times \text{moderate activity days})$; vigorous activity = $(8.0 \times \text{vigorous activity minutes} \times \text{vigorous activity days})$. Furthermore, sufficient vigorous activity was computed on the basis of 3 or more days of vigorous-intensity activity of at least 20 min per day. Likewise, sufficiently moderate and walking activities were computed based on 5 or more days of moderate-intensity and walking of at least 30 min per day. Physical activity levels were also classified into three categories: inactive, minimally active and health-enhancing physically active, according to the scoring system provided by IPAQ (www.ipaq.ki.se).

Results

Demographic characteristics of the sample are shown in Table 1. Almost 66% of the participants were males. Two-thirds of the non-respondents were female. There was no significant difference between the mean age of males (38.7 ± 14.9 years) and females (36.7 ± 11.1 years). In general, males were more educated than females. About two-thirds of males and one-fifth of females were working. The average working hours per week were much higher for males than for females (36.8 ± 11.0 vs. 29.1 ± 7.1 h week⁻¹). Among the whole group, there was a significant negative relationship ($r = -0.26$; $P < 0.01$) between age and education level. Table 2 shows the proportions of the sample that were engaging in walking, moderate- and vigorous-intensity physical activities, based on the number of days per week. Roughly, 20% of males and 27% of females in Riyadh were not walking for at least 10 min at a time on any single day of the week. However, over 31% of males and 25% of females were walking regularly every day. Moreover, about half of the males and more than a quarter of the females were not participating at all in any type of

Table 1 Demographic characteristics of the participants ($n = 1064$)

Variable	Males	Females
Number of participants	702	362
Age distribution (%)		
15–29 years	32.7	29.3
30–44 years	29.5	44.0
45–59 years	26.5	23.8
60–78 years	11.3	2.9
Education level (%)		
0 years	3.7	15.4
6 or more years	87.5	68.3
12 or more years	45.0	30.0
16 or more years	9.6	4.0
Employment (%)		
Employed	63.0	19.3
Job hours per week (%)		
20 or less	11.6	35.7
21–40	63.3	61.4
41–60	17.6	2.9
> 60	7.5	0.0

moderate-intensity physical activity lasting for at least 10 min. A greater proportion of females (39.8%) than of males (5.6%) were doing moderate physical activity on a daily basis. With regard to vigorous activity, there were more females (87.7%) than males (63.8%) who were not engaging at all in vigorous-intensity physical activity lasting for at least 10 min.

The distribution of walking, moderate and vigorous physical activities based on the number of minutes per week is shown in Table 3. Males in general spent more time in walking activity than females. The percentage of males (37.8%) who walk for 150 min or more per week was much higher than for females (28.5%). Further, there were more males (51.9%) than females (27.5%) not engaging at all in any amount of moderate physical activity, whereas more females (88.3%) than males (64.4%) were not taking part at all in any amount of vigorous-intensity physical activity. The proportion of females (57.1%) who were participating in moderate-intensity physical activity for 150 min or more per week was much higher than of males (15.2%). On the

other hand, there were more males (13.1%) than females (2.5%) engaging in vigorous physical activity for 150 min or more per week.

The findings of the present study showed that the proportion of Saudi adults from Riyadh who were sufficiently vigorously active, based on 3 or more days of vigorous-intensity activity of at least 20 min per day, was 11.3% (15.6% for males and 2.8% for females). Furthermore, the percentage of the Saudis in this study who reported sufficient moderate and walking activities, based on 5 or more days of moderate-intensity activity and walking of at least 30 min per day, was 52.8% (47.1% for males and 64.1% for females). Table 4 summarises the physical activity profile of the Saudi males and females, based on three activity categories. More than 40% of the Saudis were inactive, whereas about 34% and 25% were minimally active and active, respectively. Inactivity was slightly higher in males. Females were engaging more than males in health-enhancing physical activity.

Figure 1 shows the proportions of Saudi adults from Riyadh who were participating in health-enhancing physical activity according to age group. Physical activity increased slightly from 28.4% at age 15–29 years to reach 29.1% at age 30–44 years. After that, there was steady drop in activity levels with advancing age to reach a low of 11.2% at age 60–78 years. Activity category was positively related to age group ($r = 0.14$; $P < 0.01$). There was a significant negative correlation between age and the proportion of sufficiently vigorous activity ($r = -0.22$; $P < 0.01$). This means that the younger the participant the more likely he or she would be to engage in sufficiently vigorous activity. Educational level and job hours per week did not exhibit any significant relationship with activity levels. Finally, physical inactivity among Saudi adults according to age group was calculated and is shown in Fig. 2. The proportion of inactive Saudis was lower in the younger age categories (36.3% and 36.4% for age groups 15–29 and 30–44 years, respectively). Inactivity then increased steadily with advancing age to reach the highest level (57.3%) at age 60 years and above.

Table 2 Proportions (%) of Saudi adults who are engaging in walking, moderate and vigorous physical activity for at least 10 min at a time, based on the numbers of days per week

Number of days per week	Walking			Moderate activity			Vigorous activity		
	All	Males	Females	All	Males	Females	All	Males	Females
0	22.3	19.9	26.9	42.6	51.1	26.3	71.7	63.8	87.7
1	9.8	7.8	13.6	11.4	14.4	5.7	8.2	9.8	4.9
2	9.2	9.7	8.3	11.7	12.7	9.5	6.4	8.3	2.6
3	9.9	10.0	9.6	9.3	9.6	8.7	6.3	8.7	1.4
4	4.1	4.0	4.2	2.6	2.7	2.2	2.5	3.9	0.0
5	13.0	14.5	10.2	4.3	2.9	7.0	2.0	2.4	1.1
6	2.4	2.6	2.0	0.9	1.0	0.8	0.9	1.0	0.6
7	29.3	31.5	25.2	17.2	5.6	39.8	2.0	2.1	1.7
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Walking: $\chi^2 = 20.5$; two-sided level of significance = 0.005.

Moderate activity: $\chi^2 = 221.7$; two-sided level of significance = 0.000.

Vigorous activity: $\chi^2 = 75.1$; two-sided level of significance = 0.000.

Table 3 Proportions (%) of Saudi adults who are engaging in walking, moderate and vigorous physical activity, based on the number of minutes per week

Number of minutes per week	Walking			Moderate activity			Vigorous activity		
	All	Males	Females	All	Males	Females	All	Males	Females
0	23.5	21.3	27.9	43.6	51.9	27.5	72.3	64.4	88.3
10–30	10.8	11.5	9.4	10.1	13.3	4.1	5.5	6.4	3.8
31–60	10.8	10.5	11.4	8.1	9.7	4.8	6.0	7.5	2.8
61–149	21.6	18.9	22.8	9.5	9.9	6.5	6.6	8.6	2.6
150–299	14.1	17.1	12.3	9.1	8.6	12.3	5.8	8.9	1.2
300 or more	19.2	20.7	16.2	19.6	6.6	44.8	3.8	4.2	1.3
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Walking: $\chi^2 = 3.2$; two-sided level of significance = 0.021.

Moderate activity: $\chi^2 = 32.1$; two-sided level of significance = 0.000.

Vigorous activity: $\chi^2 = 71.6$; two-sided level of significance = 0.000.

Discussion

The present study is the first to report on the physical activity profile of Saudis using the short-version telephone format of IPAQ. IPAQ is an international project supported by WHO and CDC. The main finding is that not many Saudi adults living in Riyadh were sufficiently vigorously active, based on 3 or more days per week of vigorous activity for at least 20 min or more per day. However, nearly half of the population was sufficiently moderately active, based on 5 or more days per week of moderate and walking activities for at least 30 min or more per day. In addition, inactivity prevalence among both sexes averaged 40.6%, while the proportion of people meeting so-called health-enhancing physical activity levels was only 25.1%. A previous survey estimated the prevalence of inactivity in Saudi Arabia to range from 43.3% to as high as 99%¹³. Elsewhere, not many studies have reported physical activity data based on IPAQ. A Brazilian survey using the IPAQ short-form instrument found inactivity prevalence of 41.1% among Brazilian adults aged 20 years and above¹⁸.

Although differences in survey sampling and assessment methods make the task of comparing inactivity prevalence across countries extremely difficult, the current estimate of

inactivity level found in the present study appears similar to that reported from previous research using different measures of physical activity. Data from the Behavioral Risk Factors Surveillance System (BRFSS) in the USA indicated that the majority (54%) of US adults were not physically active enough to meet the current recommendations of at least 30 min of moderate-intensity activity on most days of the week¹⁹. In another report analysing 1988–2002 BRFSS data in the USA, it was revealed that leisure-time physical inactivity decreased especially after 1996 in both men and women²⁰. However, the US national health objectives for 2010 call for a reduction in the prevalence of no leisure-time physical activity to 20%²¹.

The present investigation indicated that the proportion of men and women who walked for 150 min or more per week was 37.8% and 28.5%, respectively. Brisk walking is a popular moderate type of aerobic activity. The cardiovascular benefits of brisk walking have been demonstrated in middle-aged and older women²². In the Women's Health Initiative study, walking briskly for at least 30 min on 5 days per week was associated with a 30% reduction in cardiovascular events over 3.2 years of follow-up²². In the USA it has been found that 33.7% of the

Table 4 Physical activity profile of the Saudi adults (%)

Activity category	All	Males	Females
1. Inactive*	40.6	43.7	34.3
2. Minimally active†	34.3	36.5	30.1
3. Active‡	25.1	19.8	35.6

$\chi^2 = 31.9$; two-sided level of significance = 0.000.

* Not meeting criteria for minimally active or active.

† Meeting any of the following conditions: (1) participating in 3 or more days of vigorous-intensity activity for at least 20 min per day, or (2) participating in 5 or more days of moderate-intensity activity or walking for at least 30 min per day, or (3) participating in 5 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum of at least 600 MET-min per week (MET = metabolic equivalent).

‡ Meeting either of the following criteria: (1) vigorous-intensity activity on at least 3 days achieving at least 1500 MET-min per week, or (2) taking part in 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum of at least 3000 MET-min per week.

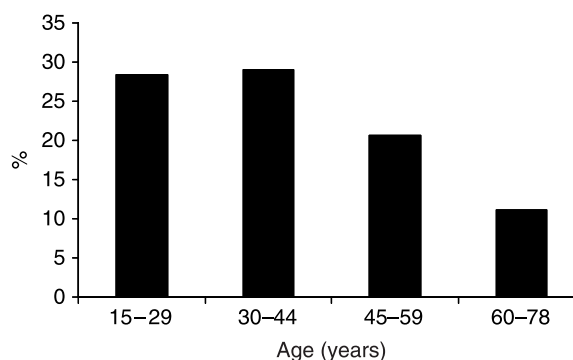


Fig. 1 The proportion of Saudi adults who are sufficiently active in health-enhancing physical activity according to age (participating in vigorous-intensity physical activity on at least 3 days achieving at least 1500 MET-min per week, or taking part in 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity physical activities achieving a minimum of at least 3000 MET-min per week; MET = metabolic equivalent)

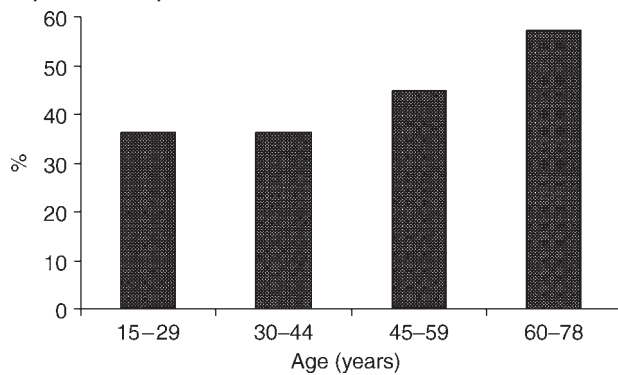


Fig. 2 Prevalence of physical inactivity among Saudi adults according to age

population were regular walkers, 45.6% occasional walkers and 20.7% never walkers²³. Males were more regular walkers than females²³. In the present study, the percentage of never walkers was 22.3%, and more males were regular walkers than females.

The finding in the present report that females were more moderately active than males deserves some comment. The IPAQ instrument assessed all components of physical activity, including moderate-intensity activities done at home, such as carrying loads (e.g. babies), scrubbing floors, sweeping and vacuuming. These types of physical activity are more likely to be performed by female respondents, especially when considering that more than 80% of the females in our sample were not working. Another factor that might have contributed to the increased proportion of females doing more moderate activities than males is the fact that females in Saudi Arabia are more likely than males to use stationary exercise machines at home. The preceding discussion, however, cannot rule out overreporting of moderate-intensity physical activity by the female respondents in the present study. A recent study in Belgium using IPAQ found some overreporting of moderate physical activity²⁴. Moreover, in the EUPASS (European Physical Activity Surveillance System) project, several physical activity measures, including IPAQ, were compared. The results showed that physical activity scores as well as overall caloric expenditure of IPAQ appeared rather high compared with previous studies and public health recommendations²⁵. However, the IPAQ scoring used in the present study is the one that has been modified recently and therefore is unlikely to be the reason for the high levels of moderate physical activity reported by the females. When moderate-, walking and vigorous-intensity physical activities were combined, females in the present study seemed to be more active than males. This was evident in the proportion of females who were classified into activity categories 2 and 3 (Table 4). However, most previous studies have shown that men are more active than women^{18-20,26,27}. Indeed, men usually report greater levels of total and vigorous physical activities, whereas

women tend to report participating in low to moderate activities³.

Contrary to the findings of the present study, several previous reports have shown that leisure-time physical inactivity is inversely associated with socio-economic status^{26,28}. In the USA, inactivity was shown to be more prevalent among less-educated people²⁹. It is very likely that the disagreement between the present findings and the above cited studies may have resulted from the fact that previous reports assessed leisure-time physical activity. However, the IPAQ short-version telephone format, used in the present investigation, addresses all four components of physical activities, and is not limited to leisure-time physical activity. IPAQ short form, though, does not distinguish the pattern of physical activity behaviours based on such components.

The finding that physical inactivity increased in the older age group is not surprising. Age-related decline in physical activity has been described in the literature^{20,30}. Data from the recent BRFSS study in the USA indicated that physical inactivity increased steadily with advancing age from 18-29 years to 70+ years in both sexes²⁰. However, a study conducted on a population of Nigerian civil servants found no significant physical activity trend across age between 20 and 64 years²⁶. A previous report on physical activity levels of Saudi males between the ages of 19 and 68 years found a curvilinear relationship between inactivity prevalence and age¹⁴. In that study, inactivity prevalence reached its highest level in the age group of 30-49 years, and the lowest level at age 60 and above. Again, the majority of the above-mentioned studies assessed mostly leisure-type physical activity and this may partially explain the seemingly different results reached regarding inactivity rates and age.

Finally, the present study is subject to the following limitations. First, this report used the short form of IPAQ intended for telephone interview. Thus, as is the case with any questionnaire, the respondents could have suffered from recall bias as well as social desirability bias. Second, the sample in the present study was randomly drawn from telephone book lists. However, a small percentage of the people in Riyadh city may not have telephone lines. Third, the sample distribution showed that there were more male than female respondents to the survey. The female/male ratio in the present sample is not in accordance with female/male census statistics for Saudis living in Riyadh. Having male interviewers may have partially contributed to the low female turn-out in this study.

From the findings of the present study, we can conclude that the prevalence of physical inactivity among Saudis living in Riyadh is relatively high, and that inactivity rate increases with age. Such high prevalence of inactivity represents a major public health concern. Therefore, public policies are needed to encourage active living and discourage sedentary habits. Health-care providers have an important role in promoting physical activity among the

population. Furthermore, there is a need for a national study with a representative sample to address the issue of physical activity/inactivity in Saudi Arabia at large.

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