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[illegible] 2008 [illegible]

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[illegible] 2977 [illegible] 2008 [illegible] 54.2% [illegible] 41.6% [illegible] 39-30 [illegible] (OR = 2.25) [illegible] 40 [illegible] (OR = 0.58) [illegible] (OR = 0.18) [illegible] 30 [illegible] 40 [illegible]

ABSTRACT There is an increasing burden of obesity and obesity-related noncommunicable diseases in Gulf Cooperation Council countries, including Oman. This descriptive, epidemiological study assessed physical activity among 2977 Omani adults using a population-based household survey in 2008. Overall, 54.2% of men and 41.6% of women were physically active; the rate was higher in younger cohorts and varied significantly by region of residence. Physical activity related to the transportation (walking and cycling) domain was higher than in the leisure or work domains. Unmarried men aged 30–39 years were twice as likely to be physically active (OR 2.25) and unmarried women aged 40+ years were half as likely to be active (OR 0.58) than their married counterparts. Young women not working were less active (OR 0.18) than working women. Higher education was significantly associated with leisure activity for men aged 30+ years and women aged 40+ years. Further research to understand regional variations and to identify culturally appropriate strategies to promote physical activity is required.

Épidémiologie descriptive de l'activité physique chez des adultes omanais : enquête de 2008 à Oman dans le cadre de l'enquête sur la santé dans le monde

RÉSUMÉ Le fardeau de l'obésité et des maladies non transmissibles liées à l'obésité est en augmentation dans les pays du Conseil de Coopération du Golfe, notamment à Oman. La présente étude épidémiologique descriptive a évalué l'activité physique de 2977 adultes omanais à l'aide d'une enquête de population auprès des ménages en 2008. Globalement, 54,2 % des hommes et 41,6 % des femmes avaient une activité physique ; le taux était supérieur dans les cohortes plus jeunes et variait significativement en fonction de la région de résidence. L'activité physique liée aux déplacements (marche et vélo) était plus fréquente que l'activité physique professionnelle ou de loisir. Les hommes célibataires entre 30 et 39 ans étaient deux fois plus susceptibles d'être physiquement actifs (OR 2,25) alors que les femmes célibataires âgées de plus de 40 ans étaient deux fois moins actives (OR 0,58) que les femmes mariées. Les femmes jeunes sans emploi étaient moins actives physiquement (OR 0,18) que les femmes occupant un emploi. Un niveau d'études supérieur était nettement associé à une activité physique de loisir chez les hommes de plus de 30 ans et les femmes de plus de 40 ans. Des recherches plus approfondies pour comprendre les variations régionales et identifier des stratégies culturellement appropriées visant à promouvoir l'activité physique sont nécessaires.

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Introduction

There is an increasing burden of obesity and obesity-related noncommunicable diseases – diabetes, cardiovascular disease and some cancers – in Gulf Cooperation Council countries (1,2), including Oman (3–5). Calls for population-based strategies to prevent chronic disease by targeting modifiable risk factors such as tobacco use, dietary intake and physical activity have accelerated since the Political Declaration of the United Nations General Assembly on the Prevention and Control of Noncommunicable Diseases was adopted in 2011 (6). Physical inactivity (engaging in less than 150 minutes of moderate-intensity activity in a week) is one of

the leading risk factors for global mortality (7). Physically inactive adults are at an increased risk of obesity, type 2 diabetes and other nutrition-related noncommunicable diseases (8). In early 2015, the World Health Organization (WHO) launched the Global status report on noncommunicable diseases 2014 in which countries were urged to accelerate action on 9 voluntary global targets, including a 10% reduction of insufficient physical activity (7).

Given the rising prevalence of noncommunicable diseases in Oman and the country's commitment to the global targets, addressing physical inactivity is urgently required. Yet little is known about the epidemiology of physical activity in Omani adults. Two studies have reported on the prevalence of physical activity. A national survey reported that 67% of men and 59% of women met physical activity guidelines (9), while another survey, among college students, reported that 56.6% of men and 42.2% of women college students met these guidelines (10). Findings from the city of Sur in the east of Oman found that women were more active in the work domain compared with men, that men were more active in the transport and leisure domains, and that physical activity had an inverse association with the presence of metabolic syndrome (11). Here we report on the prevalence and correlates of domain-specific physical activity among Omani adults at the national level and consider the implications for the prevention of major noncommunicable diseases.

Methods

Study design and data source

This descriptive, epidemiological study involved secondary analysis of the Oman World Health Survey, a population-based household survey conducted in 2008. The objective of the WHO World Health Survey is to use a standard methodology to obtain comprehensive information on the health of a population (12). The Oman World Health Survey included the WHO STEPwise module for chronic disease risk factor surveillance (13). A multi-stage stratified cluster sampling design was used to select respondents aged 18 years and above. A total of 4717 Omani and non-Omani adults successfully completed the interview (response rate 86.3%) (14).

The Oman Ministry of Health research and ethical review committee approved the proposal for secondary analysis of the data from the Oman World Health Survey for physical activity.

Data collection

Data were collected at the household level and included the following variables: sex, age, place of residence (urban/rural; region), marital status (married/not married), educational level (illiterate, primary/preparatory, secondary, post-secondary), work status (currently working/currently not working) and wealth status (in quintiles, with quintile 1 being the lowest and quintile 5 being the wealthiest). Details of the study methodology have been published

elsewhere (14).

The epidemiology of physical activity was examined according to sociodemographic variables among all Omani adults aged 20 years and above for whom complete information was available for all variables. The physical activity variables were measured using the 16-item Global Physical Activity Questionnaire (GPAQ), developed by WHO and incorporated into the STEPwise instrument, and scored as per standard protocols (13). GPAQ measures physical activity (intensity, duration and frequency) in 3 domains: work (paid and unpaid work, including household work), transportation (walking and cycling) and leisure (recreational activity).

Physical activity was estimated by calculating energy expenditure using the metabolic equivalent of task (MET), with 1 MET equivalent to sitting quietly. Total MET-min/day was calculated for each domain by first multiplying MET values by reported minutes—with moderate-intensity and transport activities assigned a value of 4 MET and vigorous-intensity activities assigned a value of 8 MET—and then adding the total MET-min of vigorous- and moderate-intensity activities performed.

Physical activity variables did not follow a normal distribution; thus, binary variables were used to define each physical activity outcome examined. Participants were identified as being physically activity if they did at least 150 minutes of moderate physical activity per week (minimum total 600 MET-mins/week). A substantial portion of the respondents did no work, transport or leisure physical activity and therefore outcomes were examined as none versus any activity, since physical inactivity was of interest.

Data analysis

The data were analysed using the Stata statistical software package, version 11. Bivariate analysis and logistic regression using all sociodemographic variables was carried out to examine the prevalence of physical activity in Oman and to determine the associations of independent variables with physical activity; models were weighted to the population of Oman using the 2008 population. Due to multiple sex and age interactions, regression analysis was carried out segregated by sex and age cohorts (18–29 years, 30–39 years and 40 years and older) and included only the variables found to be significant in the bivariate analyses. The results are reported as odds ratios (OR) with 95% confidence intervals (CI).

Results

Of the Omani adults surveyed, 2977 (49.9% women; response rate 89.0%) had complete

information on physical activity and sociodemographic variables and were not pregnant. The age-standardized prevalence of meeting physical activity recommendations was higher in men (54.2%; 95% CI: 50.5–57.9%) than women (41.6%; 95% CI: 38.0–45.2%) and varied by region, with the highest rate in South Batinah and the lowest in Dhofar and Al Wusta (Figure 1). The prevalence of recommended physical activity decreased with age.

When analysed by domain of physical activity, activity related to transport (walking and cycling) was the most commonly reported domain-specific activity and was higher in men compared with women and higher in the younger age groups (Figure 2). A similar trend was seen for leisure-related activity but not work-related activity; for the latter the prevalence was similar between men and women and fell slightly for the oldest age group.

Bivariate analyses by sex and age cohorts

Bivariate analysis by sex and age cohorts indicated that a higher proportion of men were physically active than were women and that younger people were more active than older cohorts; the prevalence of meeting physical activity recommendations fell from 63.1% at age 18–29 years to 41.1% at age 40+ years among men and from 49.9% at age 18–29 years to 33.4% at age 40+ years among women (Table 1). Place of residence (region only) and marital status were significantly associated with physical activity for some age cohorts for both men and women. Among men aged 30–39 years, 56.5% of married versus 74.5% of unmarried men were adequately physically active ($P = 0.004$) (Table 1).

Work status was associated with physical activity for women, but only for the youngest cohort; among women aged 18–29 years 82.0% of working women versus 47.5% of non-working women met physical activity recommendations ($P = 0.018$).

Level of education and wealth quintile were not associated with meeting physical activity recommendations in men or women in any age cohort.

Logistic regression analyses

Only the variables found significant in bivariate analysis (region, marital status and work status) were used in the logistic regression analyses for age-specific models for men and women meeting physical activity recommendations.

Region was the only variable with significant associations across all models, consistent with the wide regional variations shown in Figure 1. The likelihood of meeting total physical activity recommendations was significantly greater for people living in most regions compared with people living in Dhofar region, the southernmost region of the country; the only common exception for all groups were people living in Al Wusta region, a sparsely populated area and a neighbour of Dhofar region. The odds ratios were at least 4 times higher for men and women in the younger age groups (18–29 years and 30–39 years) living in many of the other regions compared with Dhofar region.

Marital status was the only variable significantly associated with total physical activity by age cohorts; unmarried men aged 30–39 years were twice as likely to be active (OR 2.25; 95% CI: 1.25–4.06; P = 0.007) while unmarried women aged 40+ years were half as likely to be active (OR 0.58; 95% CI: 0.36–0.94; P = 0.027) compared with their married counterparts (Table 2).

Working status had a significant association with physical activity only for the youngest women; non-working women aged 18–29 years were less likely to meet physical activity recommendations (OR 0.18; 95% CI: 0.04–0.73, P = 0.017) compared with women who worked.

Regression analyses for domain-specific physical activity were also carried out for age- and sex-specific models (**Tables** 3 and 4). The associations with region were similar to those for meeting overall physical activity recommendations. Other associations of interest were education and marital status. Better educational attainment was associated with leisure activity for men aged 30–39 years (P for trend = 0.001), men aged 40+ years (P for trend = 0.001)); the highest odds ratio was seen in better educated men aged 30–39 years compared with their least educated counterparts (OR 21.69; 95% CI: 3.62– 129.83; P

Discussion

This study is the first to examine the epidemiology of physical activity in a national sample of Omani adults. It shows that 5 out of 10 men and 4 out of 10 women in 2008 were engaging in recommended levels of physical activity, with higher rates among the younger age groups. The prevalence of meeting physical activity guidelines observed in this study is in the mid-range for other countries in the Gulf Cooperation Council area, where prevalence ranges from 47.9% to 73% for men and 32.3% to 60.6% for women (7), but higher than in the Eastern Mediterranean Region as a whole (15). The sex differences, although much wider than in some developed countries (16,17), are similar to neighbouring countries (18). The physical and social environment of Oman – with its high dependency on cars, inadequate infrastructure, hot arid climate, employment of domestic workers and cultural norms placing a low value on physical

activity – inhibits engagement in physical activity, particularly for women and older adults (1,3,19,20).

The findings about regional variations are perhaps the most striking finding, since health-related studies in Oman are usually limited to the national context. It is unclear, however, how the geographical variations that we found affected physical activity. For example, people in coastal regions were not more active than those in land-locked regions, nor were people in mountainous areas more active compared with those in regions that are largely desert. These regional variations could therefore be attributed to a combination of differences in socioeconomic development, geography, economy and sociocultural context; however, any conclusions made at this point would be speculative given the limited evidence and potential complexity of the factors that may be influential. Thus, research examining regional variations in disease incidence and mortality and their relationship with physical activity and other factors is needed to guide local planning and evaluations of relevant initiatives. Experience from the community-based initiatives in Nizwa and Sur cities could be used to identify potential research foci (21,22).

Interestingly, unmarried men aged 30–39 years were twice as likely to be active, while unmarried women aged 40+ years were half as likely to be active, compared with their married counterparts. A study in Sur, Oman, found a similar association among men of all ages for the leisure domain only, but not among women (11). Similarly, young unmarried women in Saudi Arabia have been found to be less active than married women (23). Two key reviews noted that people who are married were less active than those who were not married (24,25); however, these reflect trends from developed countries. Further research would be useful to better understand the effect that key life events, such as marriage, having children and retirement, have on physical activity in Oman (26).

The Omani adult population was found to be least active in the leisure domain compared with the transport and work domains, a similar pattern seen in other developing countries (27,28). In the coming years it is likely that work activity will decrease and may not be replaced with active transport and leisure, a trend seen in both developed and developing countries (29). Evidence indicates that geography and the built environment influence activity in developed countries (30). Establishing mass public transportation and shaping the urban environment to encourage active living are among the 7 best investments for physical activity (31). The evaluation of the Nizwa Healthy Lifestyle Initiative in Oman suggested that provision of gender-segregated walkways could increase levels of physical activity for both men and women (21). However, further research is required to identify strategies to encourage transport and leisure activities that are gender-relevant and appropriate for the hot arid climate.

WHO encourages implementing mass campaigns for physical activity as one of the most cost-effective interventions ("best buys") to address physical inactivity (7). The evidence from our study suggests that physical activity campaigns need to target women, men and younger and older age cohorts differently according to the domain of activity. Targeting campaigns on the younger age groups is a particular priority since the Omani population is very young (66% are under the age of 30 years) (32). Although this study found a higher prevalence of physical activity among the youngest cohorts, it is likely that this will decrease unless efforts are made to promote physical activity, since the prevalence of physical activity is already low in adolescents (22.0%), especially among girls (15.4%) (33). Evidence indicates that campaigns need to be designed not only to raise awareness about the benefits of physical activity and provide examples of how to overcome common barriers (i.e. limited time, lack of social support) but also to address cultural norms that place a low value on physical activity and restrict women's and girls' participation in physical activity (19). Further research would be useful to identify the best strategies.

Our study had some limitations. First, sampling was designed for national representation, not regions; thus, further research is required to confirm the regional variations observed in this study. Second, although the GPAQ has been used in several Arab countries, it has not been validated for Arab populations (34). Third, it is possible that some people were misclassified and thus prevalence could be over- or underestimated. Fourth, the dataset used for this analysis was collected 7 years ago and it is likely that the situation has changed; fortunately, plans are underway to conduct a national survey by early 2016 which will be key for monitoring trends in physical activity.

In conclusion, the evidence from this study indicates that physical activity initiatives in Oman need to target women, men and age groups differently according to the physical activity domain. Raising broader public awareness through conducting mass communication campaigns and mobilizing support for addressing the built environment, and especially targeting younger people, is needed so that Oman can meet the voluntary global targets for physical activity sufficient for health benefits. Further research is required to understand regional variations and to identify culturally appropriate strategies.

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