

Who are the Sedentary People in Israel? A Public Health Indicator

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Key words: physical activity, Jews, Arabs, sedentary lifestyle, Israel

Abstract

Background: Increasing physical activity and thereby reducing a sedentary lifestyle can lower the risk of chronic diseases. Raising the population's involvement in physical activity is a major challenge for public health and healthcare services.

Objectives: To identify subpopulations with a sedentary lifestyle and low levels of adherence to physical activity recommendations.

Methods: The Israel Center for Disease Control performed two national surveys during 2002–2003, interviewing 7,307 Jewish Israelis and 1,826 Arab Israelis over age 21. Respondents were asked if they engaged in physical activity lasting at least 20 consecutive minutes, and if so how frequently: less than once a week, once or twice a week, nearly every day or every day.

Results: Arab respondents were less physically active than Jewish respondents after adjusting for gender, age, level of religiosity, marital status, education, self-reported health, smoking, body mass index, and type of survey. Multiple logistic regression analysis run separately for Jews and Arabs found a more sedentary lifestyle, in both groups, among women, the less educated, those who were married and those with poor subjective health. Among Jews, younger age, increased religiosity, smoking and high BMI were associated with a sedentary lifestyle.

Conclusions: The Jewish population is in need of more targeted and specific interventions for lower adhering subpopulations, such as women, the less educated and those with other risk factors. In the Arab population a more thorough understanding of the benefits of physical activity is needed; however, it seems that a general intervention is required to decrease the prevalence of a sedentary lifestyle all round.

IMAJ 2005;7:694–699

A large body of research has established that physical activity reduces the risk of many diseases and raises quality of life [1]. However, in developed countries a sedentary lifestyle is common and leads to increased morbidity and mortality. By the same token, an increase in a sedentary lifestyle is characteristic of the adoption of a more western lifestyle. One of the major challenges in promoting health today, therefore, is to increase the population's involvement in physical activity.

Recently the committee for the promotion of physical activity appointed by the National Council for Health Promotion in Israel published a position paper and initial recommendations [2]. These emphasized the need for information on current physical activity in order to plan interventions for increasing

such activity in the community. Information on levels of physical activity are collected by self-reporting and depends on the measures used. There is no internationally agreed definition or measure of physical activity and many different self-reported measures exist [3]. During the last two decades several studies were conducted to estimate the level of physical activity in Israel. However, the self-reported questions on this activity were not always identical and the categories of being physically active differed, precluding comparisons between the various studies. Only the KAP (knowledge, attitudes and practices) survey run by the Ministry of Health during the 1990s and up to 2004 used the same measure of physical activity [4,5], which was also used in the present study.

The position paper and initial recommendation contains a summary of the surveys conducted in Israel during the last 6 years [2]. Generally, about 30% of the population in Israel is physically active more than twice a week. Comparing levels of activity in Israel to other countries is problematic because of differences in the way physical activity is measured and reported. In Europe in 2002 the percentage of adults who reported vigorous physical activity during the preceding 7 days ranged from 57% in the Netherlands to 28% in Spain [6]. Rutten and Abu-Omar [7] reported that in 2002 the mean number of days a week of vigorous activity was 1.49 and of moderate activity 2.7. There is a large difference between leisure-time activity and physical activity, when taking into account factors like the workplace, home and transport, and this may differ between various societies. In the United States in 2002, 32% of adults engaged in regular leisure-time physical activity (light-moderate physical activity for 30 or more minutes, five or more times a week) [8].

Today, evaluating national health promotion activities to promote physical activity can be achieved by surveys such as the ones reported in this study. Randomized control trials are not optional as control groups do not exist. Therefore, the first aim of this study was to identify a self-reported sedentary lifestyle in the Jewish and Arab Israeli population and in specific communities and compare it to past and future levels of activity. Best practices in health promotion suggest that targeting interventions for specific populations increases the chances of success. However, to do this we need information for characterizing these specific populations with specific needs. Therefore, the second aim of this study was to identify populations at risk

BMI = body mass index

for a sedentary lifestyle and so be able to follow these specific groups in the future.

Methods

Survey methodology

Two health surveys were performed in 2002 and 2003 at the Israel Center for Disease Control. Each survey had a different questionnaire depending on the aim of the survey, although certain parts of the questionnaires were identical. Both surveys were conducted by telephone.

The KAP survey (Knowledge, Attitudes and Practices survey)

The KAP survey was conducted during 2002 and respondents in this survey were above 18 years old. As most Israeli households (94.4%) have telephone lines [9], a random sample of telephone numbers was drawn from a computerized list of subscribers to the national telephone company. From these numbers the fax numbers, disconnected numbers, commercial numbers and households without a resident aged 18 or over were deleted, leaving 10,113 households in the telephone survey. Each household was contacted at least six times at different times of the day before they were considered lost to follow-up. Overall, 2,260 households (22.3%) could not be located, leaving 7,853 households that were contacted. A total number of 5,031 respondents in the telephone survey completed the questionnaire, giving a response rate of 64%. Non-responses due to refusal (36%) included outright refusals, partially completed interviews, and repeated postponements. The analysis was performed on 4,191 respondents after deletion of an over-sampling from the southern part of the country, respondents aged 18–20, and those not responding to the physical activity questions.

The EUROHIS

The EUROHIS (European Health Interview Survey) project, led by the World Health Organization Regional Office for the European region, is an international project to develop common instruments for health surveys for international comparisons of health data. The Israeli component of this survey was conducted during 2003–2004 at the Israel Center for Disease Control. More information regarding the conduct of the survey and development of the questionnaire can be obtained from the report [10]. Respondents were aged 21 or older. The survey was divided into four modules. This analysis is based on the first two modules conducted during 2003. The modules run during 2004 were not included in this survey so as not to add the factor of change over time. A random sample was obtained in the same way as the sample of the KAP survey. A total of 10,586 eligible households were included in the sample; 2,623 households (24.8%) could not be located, leaving 7,963 households that were contacted. A total number of 4,763 respondents, men and women, completed the questionnaire, yielding a response rate of 59.8%. Non-responses due to refusal (40.2%) included outright refusals, partially completed interviews and repeated postponements. The analysis was performed on 4,762 respondents after deletion of those not responding to the physical activity questions.

The questionnaire

The Hebrew questionnaires were translated into Arabic and Russian and back into Hebrew. Trained interviewers in Hebrew, Arabic, or Russian conducted the survey.

Physical activity was measured by self-reporting. Respondents were asked if they are generally physically active for at least 20 consecutive minutes – whether walking, running, swimming playing ball games or any other sports activities. Those answering positively were asked to report the frequency of activity, choosing one out of four categories: nearly every day or every day, once or twice a week, once or twice a month, less than once a month (see Appendix). The percent of active respondents was calculated from the total population. Around 50% of the respondents answered the first question that they were active, and about 60% of these reported being active nearly every day or every day, around 35% were active once or twice a week, and about 5% once or twice a month. Sedentary lifestyle was defined as activity less than once a week. The wording of the question was the same in both surveys.

Arabs described themselves as Arab Moslems, Druze, or Arab Christians. Immigrants were defined as respondents born in the former Soviet Union and immigrating to Israel after 1989. Education was assessed by respondents' answer to the question "How many years of schooling do you have?" There were three categories: 11 years or less of schooling, 12 years, and more than 12 years. Religiosity was determined by asking for a self-definition of the level of religiosity according to three categories: secular, traditional, or religious. Marital status was also a self-reported definition, with divorced, living separately, single or widowed combined to give a category of people without a spouse. Current smokers were defined as those answering "yes" to the question "Do you smoke?" Respondents also reported their weight and height, and their self-reported health which was categorized into four levels.

Statistical analysis

One database was compiled from the two surveys and included the above corresponding variables. Analysis sought to distinguish the characteristics of those who reported physical activity from those who did not. Two-tailed χ^2 analyses were conducted to identify bivariate associations between physical activity (once or twice a week and every day or nearly every day) or a sedentary lifestyle and the various demographic variables. Separate logistic regression models were run for Jews and Arabs, and the odds ratio and 95% confidence interval for reporting sedentary lifestyle were determined for each variable in the model. The models were adjusted for the differences between the surveys. The models included gender, age, education, religiosity, marital status, self-reported health, current smoking, body mass index, and type of survey. To compare between Jews and Arabs, logistic regression analysis was used including both ethnic groups. Statistical significance was established at $P < 0.05$. SAS software version 8.0 was used for the analyses.

Results

The large database of 9,120 respondents enabled characterizing those with low levels of physical activity. Table 1 presents the frequency of physical activity by respondents' age and gender according to three levels: every day or nearly every day, once or twice a week, and less than once a week. Jews reported being sedentary (active less than once a week) (46.0%) significantly less often ($P < 0.0001$) than Arabs (62.8%). Among Jews, 43–48% (men and women) were active less than once a week, 20% were active once or twice a week, and 36.6–31.8% every day or nearly every day. Among Arabs, the rates of physical activity were lower, particularly among Arab women, with 70.8% being active less than once a week. Generally, men engaged in significantly more physical activity than did women. Among Jews, age was associated positively with physical activity (every day or nearly every day). Among the younger age group (21–34 years), 27% of Jews were active every day or nearly every day compared to 41.8% of those 65 or older. Among Arabs, the younger respondents reported higher levels of physical activity (22%) and more often than did the older ones (15.5%). This phenomenon was observed in both men and women (data not presented).

Table 2 shows physical activity less than once a week for both ethnic groups by various variables. Both Arab and Jewish respondents who were less educated were more sedentary. Those married and defining themselves as religious were more sedentary in both groups. Veteran Jews were less sedentary than new immigrants from the former Soviet Union.

Self-reported health was associated with physical activity: 63.0% of Jews and 77.6% of Arabs reported being sedentary among those with poor health whereas among those reporting very good health only 40.4% and 54.0% respectively reported being sedentary. Overweight and smoking Jews were significantly more sedentary compared to the non-overweight and non-smokers. Among Arabs, non-smokers and those overweight were more sedentary than smokers and those not overweight [Table 2].

To identify the variables associated with low levels of physical activity or a sedentary lifestyle, logistic regression models were run for Jews and Arabs separately and for the whole

Table 2. Frequency of physical activity less than once a week by sociodemographic characteristics (% and no.)

	Jews	Arabs	P
Education (yrs)			
<12	58.3 (815)	74.7 (664)	<0.0001
12	46.7 (1078)	55.9 (266)	0.001
>12	40.7 (1444)	46.6 (212)	0.0009
P	<0.0001	<0.0001	
Marital status			
Married	47.0 (2388)	67.1 (924)	<0.0001
Not married	44.0 (971)	50.5 (222)	0.012
P	0.02	<0.0001	
Religiosity			
Secular	43.6 (1769)	51.7 (172)	0.0016
Traditional	47.1 (972)	61.6 (506)	<0.0001
Religious	52.6 (600)	70.4 (455)	<0.0001
P	<0.0001	<0.0001	
Immigrants from the former USSR			
Veterans	45.5 (2950)	-	-
Immigrants	50.4 (413)	-	-
P	0.008		
Health			
Poor	63.0 (301)	77.6 (121)	0.0002
Not so good	51.3 (829)	72.7 (240)	<0.0001
Good	42.4 (920)	65.3 (309)	<0.0001
Very good	40.4 (831)	54.0 (421)	<0.0001
P	<0.0001	<0.0001	
Smoking			
Not presently smoking	44.1 (2441)	64.1 (913)	<0.0001
Currently smoking	51.9 (920)	58.0 (231)	0.07
P	<0.0001	0.03	
BMI			
<30	43.6 (2573)	56.6 (716)	<0.0001
30+	57.1 (549)	68.5 (176)	0.002
P	<0.0001	0.0004	

population together [Table 3]. Arabs reported being sedentary significantly more often (OR 1.5, CI 1.45–1.97) after adjusting for all the other variables.

Among Jews, women were more sedentary than men (OR 1.23, CI 1.10–1.37); and respondents who were younger, less educated, married and religious were more sedentary. Those reporting poor subjective health were more sedentary. Smoking and overweight were associated with a sedentary lifestyle after the adjustment to all the other demographic variables.

Among Arabs, the odds ratio comparing men and women was higher than among Jews (OR 2.09, CI 1.59–2.73), suggesting that the difference between the genders is larger in the Arab than in the Jewish

OR = odds ratio
CI = confidence interval

Table 1. Frequency of physical activity by sociodemographic characteristics (% and no.)

	Jews			Arabs			P
	Every day or nearly every day	Once or twice a week	Less than once a week	Every day or nearly every day	Once or twice a week	Less than once a week	
Total	33.9 (2476)	20.1 (1468)	46.0 (3363)	20.8 (379)	16.4 (300)	62.8 (1147)	<0.0001
Gender							
Men	36.6 (1161)	20.0 (637)	43.4 (1377)	27.6 (211)	20.7 (158)	51.7 (395)	<0.0001
Women	31.8 (1315)	20.1 (831)	48.1 (1986)	15.8 (168)	13.4 (142)	70.8 (752)	<0.0001
P	<0.0001			<0.0001			0.002
Age (yrs)							
21–34	27.0 (510)	24.5 (463)	48.4 (914)	22.0 (150)	21.7 (148)	56.3 (384)	<0.0001
35–44	29.1 (367)	21.0 (265)	49.9 (629)	16.2 (78)	15.3 (74)	68.5 (330)	<0.0001
45–54	33.3 (491)	20.2 (298)	46.5 (685)	21.3 (54)	12.2 (31)	66.5 (169)	<0.0001
55–64	40.7 (461)	19.4 (220)	39.8 (451)	18.8 (30)	8.6 (14)	72.5 (116)	<0.0001
65+	41.8 (580)	12.5 (173)	45.8 (635)	15.5 (23)	5.4 (8)	79.0 (117)	
P		<0.0001			<0.0001		

Table 3. Factors associated with low physical activity among Jews and Arabs: logistic regression model, OR and 95% Confidence Intervals

Variables	Jews (n=5,741)			Arabs (n=1,332)			Total population (n=7,073)		
	OR	CI	P	OR	CI	P	OR	CI	P
Jews (0) vs. Arabs (1)	–	–	–	–	–	–	1.50*	1.45–1.97	<0.0001
Gender, men (0) women (1)	1.23*	1.10–1.37	0.0002	2.09*	1.59–2.73	<0.0001	1.35*	1.20–1.48	<0.0001
Age (by year)	0.99*	0.99–1.00	<0.0001	1.01	1.00–1.02	0.06	0.99*	1.00–1.00	0.0006
Religiosity, non-religious (0) religious (1)	1.12*	1.04–1.20	0.003	0.92	0.77–1.09	0.33	1.10*	1.01–1.17	0.005
Single (0) vs. married (1)	1.16*	1.03–1.31	0.01	1.57*	1.16–2.14	0.004	1.10*	1.01–1.27	0.0003
Education, Low (0) high (1)	0.76*	0.71–0.81	<0.0001	0.67*	0.58–0.78	<0.0001	0.69*	0.82–0.94	<0.0001
Self-reported health, poor (0) good (1)	0.78*	0.73–0.83	<0.0001	0.80*	0.70–0.91	0.0007	0.74*	0.88–0.98	<0.0001
Non-smoking (0) vs. smoking (1)	1.40*	1.23–1.72	<0.0001	1.08	0.82–1.50	0.50	1.18*	1.20–1.54	<0.0001
BMI ≥ 30, low (0) high (1)	1.48*	1.27–1.72	<0.0001	1.20	0.87–1.65	0.27	1.26*	1.19–1.62	<0.0001
Survey	0.98	0.93–1.04	0.54	0.78*	0.70–0.88	<0.0001	0.90*	0.96–1.07	0.01

**P* < 0.05

population. Those reporting poor health, less education and being married were more sedentary among Arabs. Smoking and overweight were not associated with a sedentary lifestyle among Arabs after the adjustment in the regression model, whereas in Jews these risk factors were associated with a sedentary lifestyle.

The type of survey was added to the regression models to eliminate any bias in the analysis due to the survey itself. From these two surveys it is possible to identify at-risk groups of people reporting less physical activity. The populations most in need of attention among Jews are the less educated, women, the religious, and those with other behavioral risk factors. It may be that the populations most in need of attention in the Arab community are Arab women and married Arabs.

Discussion

A sedentary lifestyle is quite frequent among Israelis, with some subpopulations being more sedentary than others. Interventions should therefore be targeted at both the general population and at specific highly sedentary groups. This study combined two different surveys that employed the same measure for assessing physical activity. Various questionnaires are used around the world to assess physical activity, ranging from long specific questionnaires that include type of activity, duration and intensity, to one-question measures assessing physical activity [11,12]. As recommendations of activity have changed along the years, so too have the definitions of physical activity in the measures used in various studies [13,14]. Most questionnaires measure energy expenditure, however in this study we only wanted an indication of the leisure-time physical activity levels of Israeli residents; therefore we think the limited measure used in this study was sufficient for this purpose. In this study, since we analyzed the frequency of a sedentary lifestyle, the exact definition of high levels of physical activity was less important. Physical activity less than once a week is regarded as a sedentary lifestyle by all recommendations for adequate physical activity. The frequency among those with a sedentary lifestyle may be higher depending on the definition of physical activity. This definition was used in our survey; and while it

may not be the ideal measure to monitor physical activity and energy expenditure it is important to consistently use the same measure for population monitoring purposes. Having been used several times in Israeli (mainly Jewish) national surveys since the 1990s, its continued use is helpful for monitoring trends over a long period. For example, in similar surveys in 1994, 1996, 1998, 2000 and 2002 using the exact same measure, 56%, 53%, 48%, 46% and 45% respectively of the Jewish population were sedentary [15]. This can be compared to the 46% of sedentary respondents found in this study. A decrease was noted in the percent of Israeli Jews reporting a sedentary lifestyle during the 1990s, but this decrease has come to a halt in the last 5 years. Even after this decrease nearly half of the adult population is sedentary.

This type of measure provides an indication of the percent of people who have adopted physical activity as part of their lifestyle, but it does not measure all-round physical activity and energy expenditure. Therefore, how respondents understand the question on physical activity is important when using the measure in various ethnic groups such as Jews and Arabs. Arabs may include in their perception of physical activity other activities as compared to Jews, not enabling comparisons between Jews and Arabs; this was also observed in other population groups [16]. Moreover, Arabs may be more active when including activity related to work, transportation, active living, etc. This may limit the conclusions we reach regarding the Arab population.

The analysis of both surveys together increases the statistical power of the study and permitted us to identify subpopulations with high levels of sedentary lifestyles. In these two surveys about 46% of the Jewish respondents reported physical activity less than once a week compared to about 63% of the Arab population. After adjusting for other factors associated with physical activity the odds of Arabs being sedentary was 1.5 times higher than Jews.

Characteristics associated with a sedentary lifestyle were only partly similar among Jews and Arabs. In both populations, women engaged in less physical activity than men and those with higher education in more physical activity than those with

less education. Van der Wilk and Jansen [3] reported that in Europe the less educated are generally more sedentary than the more educated. In both groups marriage was associated with a sedentary lifestyle: married respondents being more sedentary than the single respondents, and those with poor subjective health were also more sedentary. A similar association was reported in Europe where single people reported more physical activity [7].

Older Jews performed more physical activity; among Arabs this was not apparent as age was not associated with physical activity. In the U.S. Eyler et al. [17] found similar data regarding good subjective health as a predictor of physical activity, although the younger engage in more physical activity.

Secular Jews performed more physical activity than their religious counterparts; this was also not apparent among Arabs. These differences may be due in part to differences in the size of the sample, enabling higher statistical significance in the Jewish population, or due to different social norms related to physical activity in each culture and society.

Among Jews, physical activity seems to be part of a healthy lifestyle and is associated with other behavioral risk factors (smoking and obesity); the obese and the smokers performed less physical activity. This association is not apparent in Arabs. The difference in factors associated with a sedentary lifestyle among Arabs and Jews may be due to the different status that physical activity holds within the society and culture. Among Jews, adopting physical activity as part of a healthy lifestyle may be due to awareness of its health benefits. The Arab population may be in the process of westernization with the associated decrease in physical activity due to an increase in a technologically aided lifestyle, and have not yet adopted the "healthy lifestyle" now recommended for those sedentary in their daily life. The fact that smoking and obesity are not associated with physical activity among Arabs strengthens this point.

The change in lifestyle from a sedentary to a more active lifestyle is a major change affected by various factors such as attitudes, social norms, environment, availability of resources to perform physical activity and more. According to the diffusion of innovation theory, it may be that those engaging in physical activity are the "early adopters" who have adopted the behavior after acquiring knowledge about its importance [18]. Other studies report that early adopters are usually more educated and adopt other health behaviors too; our results correspond with this model – namely, the more educated, those with lower BMI, and non-smokers perform more physical activity among Jews. Additional strategies are necessary to convince the late adopters to embark on physical activity [18].

The major limitation of this study was the measure used for physical activity and its perception in the two population groups; it attains only a very narrow category of physical activity without the duration, intensity and type of activity that are also important in its evaluation. Therefore, it is preferable to look at the sedentary lifestyle that people report. Moreover, this measure may not represent the same thing among Arabs and Jews due to differences in the context in which the activ-

ity is performed. In Arab society more physical activity may be performed as part of daily life and not reported as "physical activity" – for example, walking to work among Arabs may not be regarded as physical activity. Therefore, the term "physical activity" may not represent the true amount of energy expenditure. However, according to other sources, Arab society is suffering from diseases typical of a sedentary lifestyle, such as diabetes and heart disease, which have increased in the last decade and are characteristic of societies in transition to a western lifestyle [19]. This corresponds with the higher rates of a sedentary lifestyle in the Arab population compared to the Jewish population in this study. Another limitation is the rate of non-respondents in the two surveys, diminishing the generalizability of the study, however there is no reason to believe that the non-responders differ in their levels of physical activity from the responders.

Conclusions

More research is needed to ascertain the levels of physical activity and energy expenditure, especially in Arab society, as well as levels of leisure-time activity in both populations. Moreover, we may conclude that different interventions are needed in the two populations. In the Jewish population this means more specific interventions aimed at subpopulations, such as the less educated and those with other risk behaviors; and in the Arab population, an all-round intervention to increase awareness of a healthy lifestyle.

Appendix

Physical activity measure:

Do you do any sports activity for at least 20 consecutive minutes, such as walking, running, swimming or ball games?

1 – No. 2 – Yes (if yes, how often)

1. Nearly every day or every day
2. Once or twice a week
3. Once or twice a month
4. Less than once a month.

References

1. U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.
2. The committee for the promotion of physical activity appointed by the National Council for Health Promotion. Position paper and initial recommendation for the promotion of physical activity in Israel. August 2004.
3. Van der Wilk EA, Jansen J. Life style-related risks: are trends in Europe converging? *Public Health* 2005;119:55–66.
4. Knowledge, Attitudes and Health Behaviors, 1996. Department of Health Education, Ministry of Health, Jerusalem, 1997.
5. Health Knowledge, Attitudes and Practices in the Arab Community, 1996. Department of Health Education, Ministry of Health, Jerusalem, 1996.
6. The European Opinion Research Group, Physical activity. Special Eurobarometer 183.6/Wave 58.2, Brussels; 2003. European Commission.
7. Rutten A, Abu-Omar K. Prevalence of physical activity in the European Union. *Soz-Praventivmed* 2004;49:281–9.
8. <http://www.cdc.gov/nchs/about/major/nhis/released200306.htm#7>.

- Early Release of Selected Estimates Based on Data From the 2002 National Health Interview Survey (Released 6/18/2003)
9. Central Bureau of Statistics. Statistical Abstract of Israel 2001. No 52, Jerusalem.
 10. National Health Survey in Israel. European Health Interview Surveys (EUROHIS). Module I: Women's Health. Publication # 237, Israel Center for Disease Control, Israel Ministry of Health, August 2004.
 11. Wendel-Vos WGC, Schuit AL, Saris WH, Kromhout D. Reproducibility and relative validity of the short questionnaire to assess health-enhancing physical activity. *J Clin Epidemiol* 2003; 56(12):1163-9.
 12. Pols MA, Peeters PH, Ocke MC, et al. Relative validity and repeatability of a new questionnaire on physical activity. *Prev Med* 1997;26(1):37-43.
 13. Patem RR, Pratt M, Blair SN, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;273:402-7.
 14. US Department of Health and Human Services and US Department of Agriculture. Dietary Guidelines for Americans. 6th edn. Washington DC: US Government Printing Office, January 2005.
 15. Knowledge, Attitudes and Health Behaviors, 2000-2002. Department of Health Education, Ministry of Health, Jerusalem, 2002.
 16. Young DR, He X, Harris J, Mabry I. Environmental, policy, and cultural factors related to physical activity in well-educated urban African American women. *Women Health* 2002;36(2):29-41.
 17. Eyler AA, Matson-Koffman D, Young DR, et al. Quantitative study of correlates of physical activity in women from diverse racial/ethnic groups: The Women's Cardiovascular Health Network Project summary and conclusions. *Am J Prev Med* 2003; 25:93-103.
 18. Rogers EM. A prospective and retrospective look at the diffusion model. *J Health Communication* 2004;9:13-19.
 19. Israel Center for Disease Control. The Health Status of the Arab Population in Israel. Publication 226. Tel Hashomer: Israel Center for Disease Control, 2005.
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