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Determinants of health behavior inequalities: a cross-sectional study from Israel

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Summary

Health behaviors are shaped by the opportunities people have; and the choices they make according to these opportunities. Inequality in economic, cultural and social resources causes disparities in health and health behaviors. Jerusalem has a multiethnic structure, mainly made up of Jews and Arabs. Arabs and Ultra-Orthodox Jews are disadvantaged in terms of socio-economic and health indicators. The purpose of this study is to determine the factors associated with three health behaviors: physical activity (PA), fruit and vegetable consumption, and smoking. This cross-sectional study was conducted among 1682 adults from a stratified sample by age, sex and neighborhood from 2011 to 2015, in accordance with the Healthy Cities project. Univariate analyses were conducted by Chi-square test of independence; and multivariate analyses by logistic regression models. Of the total population, 12% do adequate amounts of PA; 17.6% consume adequate amounts of fruits/vegetables; and 19.4% are current smokers. Multivariate analyses indicates for both genders: ethnicity/religion and education level is associated with doing PA; ethnicity/religion, education and income level is associated with fruit/vegetable consumption; and ethnicity/religion, and age is associated with smoking. However, gender significantly modifies the effect of ethnicity/religion for all the three health behaviors. Gender disparities regarding health behaviors are higher among Arabs and Ultra-Orthodox Jews. In similar economic, cultural and social circumstances, men and women have similar health behaviors; and unequal opportunity to education and income creates a vicious gender inequality cycle. Therefore, to reduce health behavior inequalities, besides economic and cultural inequalities, social and gender inequalities should also be reduced.

Key words: Israel, health behavior, healthy cities, ethnic, gender

INTRODUCTION

Today, health is shaped by the *chances or opportunities* people have; and the *choices* they make according to these *chances* (Sen, 1993; Weaver *et al.*, 2014). Life chances and choices are determined by the social structure and the resources available (Weaver *et al.*, 2014). Bourdieu classified these 'resources' into three: *economic resources* refers to money and material assets; *social resources* refers to an individual's social ties and relationships with others; and *cultural resources* refers to an individual's skills, knowledge, educational qualifications and cultural properties (Bourdieu, 2011). The unequal distribution and interaction of these resources play a role in social and health inequalities (Bourdieu,

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2011; Thurman and Harrison, 2017). We may broadly group the factors determining health behaviors as: *supply-side* and *demand-side* factors. In this regard, Levesque *et al.*'s concept of 'access' (Levesque *et al.*, 2013) can be a helpful guide to address health behaviors. As such, to obtain a healthy behavior, the providers or institutions should be: (1) approachable, (2) acceptable, (3) available, (4) affordable and (5) appropriate; and the users should have: (1) ability to perceive the need for the health behavior, (2) ability to seek out services, (3) ability to reach the services, (4) ability to pay and (5) ability to engage in the services (Levesque *et al.*, 2013). In this article, we will be focusing on the determinants of health behavior inequalities in this context.

Jerusalem has a population of around 850 000; 63% of which is Jewish and 37% is Arab (ICBS, 2015b). The Arabs and Ultra-Orthodox Jews are disadvantaged in terms of health and socio-economic indicators (ICBS, 2005, 2015a; Kalter-Leibovici *et al.*, 2007; Choshen *et al.*, 2013). The majority of the Arab population is Muslim (96%), with a small percentage of Christians (4%) (Choshen *et al.*, 2013). The Ultra-Orthodox Jews are a minority group with unique characteristics, compromising around 30% of the Jews in Jerusalem (Choshen *et al.*, 2013). The social structure of Ultra-Orthodox Jews is intensely closed and distinguished by a hierarchical social system bound by religious values (Werner *et al.*, 2003). Their lives are mostly guided by the community leader, the rabbi or other Jewish spiritual leaders. They have weak ties with other Jews; and generally avoid watching television and listening to secular radio broadcasts (Werner *et al.*, 2003).

To overcome health inequalities, an understanding of the health issues and their determinants are needed. Once the nature of the inequities are understood, the proper interventions can be implemented (WHO, 2010b). Jerusalem, as a 'Healthy City' prepared a 'health profile' which provides a snapshot of the state of health and its determinants, focusing on health inequalities. From the health profile of Jerusalem, this study focuses on inequalities regarding PA, fruit/vegetable consumption and smoking.

Physical inactivity is the fourth leading risk factor for global mortality; which causes 6% of all global deaths (WHO, 2009). Regular PA reduces the risk of coronary heart disease and stroke, diabetes, hypertension, colon cancer, breast cancer and depression (WHO, 2010a). For the adult population, World Health Organization (WHO) recommends at least 150 min of moderate-intensity, or 75 min of vigorous-intensity aerobic PA weekly; or an equivalent combination of both (WHO, 2010a).

Fruits and vegetables are vital components of a healthy diet and sufficient daily consumption could help prevent non-communicable diseases (NCDs). The World Health Report indicated that low fruit and vegetable intake is estimated to cause about 31% of ischemic heart disease and 11% of stroke globally (WHO, 2002). It is estimated that 2.7 million lives could be saved yearly if fruit/vegetable consumption was sufficiently increased (WHO, 2004). WHO recommends 400 g (five portions of 80 g) of fruits and vegetables per day (excluding potatoes and other starchy tubers) for prevention of chronic diseases such as heart disease, cancer, diabetes and obesity; and also to prevent and diminish micronutrient deficiencies (WHO, 2003).

The tobacco epidemic is one of the biggest global public health threats currently responsible for over 5 million deaths caused by first-hand smoking and about 600 000 deaths by second-hand smoking (WHO, 2015). Almost all organ and systems in the body are adversely affected by smoking. Many respiratory diseases, some cancers, especially lung cancer, and colorectal, prostate and breast cancers have been proven to be associated with smoking. Smoking is a major cause of premature death and shortens life much more than most other risk factors causing premature death (NCCDPHP, 2014).

The purpose of this study is to determine the factors associated with health behavior inequalities in Jerusalem, to stimulate appropriate interventions, promote health and reduce the health inequalities.

STUDY POPULATION AND SAMPLING METHODS

The study population was selected by the Israel Central Bureau of Statistics (ICBS) in 2011. The population was stratified by residential areas, age and sex. Households were sampled from the population and from each household one person was selected to interview.

Sample size calculation revealed a sample of 1500; however, 2200 households were selected (to allow for non-response). A total of 33 of the addresses were not households, 26 were incorrect and 8 were empty or businesses. In total, 2133 households were included in the sample and 1682 people responded to the interviews (79% response rate).

The data was collected with a questionnaire through face to face interviews between 2011 and 2015. The questionnaire included a wide range of indicators, however, only the relevant variables related to health behaviors included in this study.

METHODS OF STATISTICAL ANALYSES

Statistical analyses were performed using SPSS software. Descriptive statistics were presented in tables of

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frequencies. Univariate analyses were done with the Chi-square test of independence. Multivariate logistic regression analyses were run using the health behavior as the dependent variable; and the possible factors identified with the univariate analyses as the independent variables. In situations where a statistically significant interaction between gender and ethnicity/religion existed, two separate logistic regression models, for men and women, were developed. A *p*-value of less than 0.05 was considered as statistically significant.

The adequate amounts of PA was defined as doing 150 min/week or more of any kind of leisure time PA. The adequate amounts of fruit/vegetable consumption was defined as consuming 5 or more portions/day. A 'smoker' was defined as a person who currently smokes (past-smokers were included in 'non-smokers'). Religiosity was defined as the self-rated response to a Likert type question; however, all Ultra-Orthodox and Zionist-Orthodox Jews were considered very religious. We didn't include religiosity and residential area in the logistic regression models because of high collinearity with ethnicity/religion.

RESULTS

Jerusalem is a multi-ethnic and multi-religious city with unique characteristics. The east is mostly inhabited by Arabs (86.2%); the south by Other Jews (84.9%); the west by Other Jews (64.6%) and Ultra-Orthodox Jews (35.1%); and the north by almost equal distribution of each (33%). Some socio-demographic characteristics of the population is given in Table 1.

Table 1: Sociodemographic characteristics of the study population by gender and ethnicity/religion

		Ethnicity/religion						Total
		Ultra-orthodox Jews		Other Jews		Arabs		
		Male $n = 193$	Female $n = 199$	Male $n = 332$	Female $n = 448$	Male $n = 251$	Female $n = 247$	
Age group (years)	22–44	62.8	56.0	46.7	43.9	70.6	70.8	57.4
	45–64	27.1	31.7	31.0	31.3	23.1	22.7	27.7
	65+	10.1	12.3	22.3	24.7	6.4	6.5	14.9
Education (years)	0–11	2.2	1.5	4.2	8.0	36.3	36.1	17.1
	12	79.7	74.9	52.8	46.1	29.5	30.6	46.5
	13–15	6.0	11.8	18.6	15.7	6.8	6.7	11.8
	16+	12.1	11.7	24.4	30.2	27.4	26.6	24.6
Income (Shekels/month)	4000 or less	33.8	28.3	10.8	14.4	33.2	42.9	25.2
	4001–7000	46.0	49.2	28.6	41.1	47.4	36.9	39.9
	7001–15 000	16.1	19.1	38.8	33.0	18.4	18.6	26.4
	15 000 +	4.1	3.5	21.8	11.5	1.0	1.5	8.6
Work	Work	29.0	47.1	72.6	64.1	80.6	18.6	55.7
	Don't work	71.0	52.9	27.4	35.9	19.4	81.4	44.3
Religiosity	Very religious	100.0	100.0	0.0	0.0	4.9	6.5	23.9
	Religious	0.0	0.0	8.1	6.4	79.7	79.0	34.7
	Not so religious	0.0	0.0	45.9	43.0	9.2	9.4	20.7
	Not religious	0.0	0.0	45.9	50.6	6.1	5.1	20.8
Marital status	Married/live together	84.6	88.8	70.4	54.5	66.2	71.2	68.9
	Divorced + separated	2.0	0.9	5.0	8.6	0.4	3.0	4.0
	Widow	1.3	4.3	1.7	12.3	2.3	5.7	5.3
	Single	12.1	6.0	23.0	24.6	31.1	20.1	21.9
Immigration status	Israeli born	78.2	74.8	64.4	57.4	99.2	97.2	77.3
	Immigrated before 1990	7.8	11.9	21.6	24.9	0.5	0.4	12.4
	Immigrated since 1990	14.0	13.3	14.0	17.8	0.3	2.5	10.3
Region	South	7.7	7.7	44.6	46.7	6.2	5.4	24.0
	East	8.9	12.4	5.2	5.3	72.8	74.5	31.4
	West	45.0	38.4	33.0	32.6	0.0	0.4	22.4
	North	38.4	41.5	17.2	15.4	21.0	19.7	22.2
Total		49.8	50.2	45.8	54.2	50.3	49.7	

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There is a significant difference in education, income, and work status between the different ethnicities/religions ($p < 0.01$). The highest proportion of lowest education level is among the Arabs (36.2%). The majority of Ultra-Orthodox Jews (77.3%) completed high school and stopped further education. Other Jews are the most educated group. Similarly, the income level of 80.2% of Arabs and 78.6% of Ultra-Orthodox Jews fall into the lowest two income levels. However, more than half of the Other Jews (52.5%) are in the highest two income levels. While the majority of Other Jews (68.3%) work, only 38.2% of the Ultra-Orthodox Jews, and half of the Arabs work ($p < 0.001$). There is an interaction between gender and ethnicity/religion regarding working status. A total of 80.6% of Arab men, and 18.6% of Arab women work; the majority of Other Jewish men (73.3%) and women (64.2) work. In contrast, Ultra-Orthodox Jewish women (47.4%) work more than men (29.1%).

Health behaviors

A total of 12% of the population do the adequate amounts of PA; 17.6% consume the adequate amounts of fruits and vegetables; and 19.4% currently smoke (Table 2).

Physical activity

Univariate analyses (Table 2) show that the rate of doing the adequate amounts of PA is higher among men, other Jews, those who are employed, who have higher education and income levels and who are aware of the health effects of PA compared with their counterparts. There is no statistical difference between different age, marital status and immigration groups. Among both the Jews and Arabs, there is a negative association between religiosity and doing PA.

Furthermore, gender modifies the effect of ethnicity/religion (Figure 1 in Table 3). Within each population group the rate is higher among men ($p = 0.05$), however, the disparity is higher between the men and women of Arabs and Ultra-Orthodox Jews. Therefore, we did separate multivariate analyses for men and women (Table 3). We found that, for both genders, ethnicity/religion and education level is significantly associated with doing PA. For men, the odds among Arabs and Other Jews is more than 5 times higher than of the Ultra-Orthodox Jews; and around 9 times higher among the highest education level compared with the lowest. For women, the odds among Arabs is not significantly different than Ultra-Orthodox Jews, however, among the Other Jews is 6 times higher than among Ultra-Orthodox Jews. Also, the odds among the highest education level is 4 times higher compared with the lowest.

We also found that, 46.5% of the population want to do more PA. Among them, the majority (57%) reported to have no time for doing more PA; 11.6% reported lack of suitable facility available; 10.5% reported it is expensive; and very small percentages of other causes.

Fruit and vegetable consumption

Univariate analyses (Table 2) show that the rate of consuming adequate amounts of fruits/vegetables is higher among middle aged, younger people, Arabs, those who are Israeli-born, who are employed, who have higher education and income levels, and who are aware of the health effects of nutrition compared with their counterparts. There is no statistical difference between men and women, and between different marital status groups.

The rate of consuming adequate amounts of fruits/vegetables is higher especially among Arabs and it is about 3 times higher than that of the Jews ($p < 0.001$). Gender modifies the effect of ethnicity/religion (Figure 2 in Table 3). For Arabs, the rate is higher among men; however, for the Jews it is higher among women. Therefore, we did separate multivariate analyses for men and women (Table 3). We found that, both for men and women, consumption of fruits/vegetables is associated with ethnicity/religion, education and income level.

For men, odds of fruit/vegetable consumption among Arabs is 16 times higher than Other Jews (no significant difference between Ultra-Orthodox and Other Jewish men). Also, the odds is around 4 times higher in the highest education level compared to the lowest; and 6 times higher among the highest income level compared with the lowest. For women, the odds among Arabs is more than 4 times higher than Other Jews (no significant difference between Ultra-Orthodox and Other Jewish women). Also, the odds is more than 2 times higher in the highest education level compared with the lowest; and more than 3 times higher among the highest income level compared with the lowest.

Smoking

Univariate analyses (Table 2) show that the rate of smoking is higher among men, younger people, Arabs, those who are Israeli-born, and who are employed compared with their counterparts. There is no significant association between smoking and education, income level, and awareness to the health effects of smoking. There is also a significant association between the rate of

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Table 2: Rate (per 100) of the health behaviors by selected characteristics

	Adequate amounts of physical activity		Adequate amounts of fruit and vegetable consumption		Smoking	
	(*N* = 1662)		(*N* = 1571)		(*N* = 1641)	
Variable/category	%	*p*-value	%	*p*-value	%	*p*-value
Gender		0.050		0.877		<0.001
Man	13.9		17.5		31.7	
Women	10.3		17.8		8.0	
Age group (years)		0.564		0.047		<0.001
22–44	11.3		17.3		23.2	
45–64	13.1		20.8		16.9	
65+	12.7		12.9		9.6	
Ethnicity/religion		<0.001		<0.001		<0.001
Arabs	8.2		28.1		27.0	
Ultra-Orthodox Jews	2.8		9.1		9.4	
Other Jews	19.0		11.9		17.3	
Marital status		0.182		0.145		<0.001
Married/live together	10.8		19.4		17.0	
Divorced/separated	10.3		16.4		19.9	
Widow	12.0		15.2		6.9	
Single	15.2		13.1		29.7	
Immigration status		0.592		0.044		0.043
Israeli born	11.4		18.8		21.1	
Immigrated before 1990	13.7		16.1		14.7	
Immigrated since 1990	12.9		10.7		14.0	
Work status		<0.001		0.023		<0.001
Work	15.1		19.9		26.0	
Don't work	8.1		15.0		10.8	
Education level (years)		<0.001		<0.001		0.049
0–11	4.6		21.9		23.5	
12	5.0		11.3		18.2	
13–15	15.3		14.1		26.9	
16+	28.0		30.6		16.7	
Income level (shekels/month)		<0.001		<0.001		0.282
Up to 4000	6.4		10.8		18.4	
4001–7000	9.2		13.8		18.5	
7001–15 000	15.9		24.7		24.2	
Above 15 000	36.7		18.6		15.8	
Awareness to the health effects of the behavior		<0.001		<0.001		0.107
Not aware	3.2		1.6		24.7	
Aware	14.1		20.5		18.7	
Total	**12.0**		**17.6**		**19.4**	

smoking and religiosity; the lowest rate is among very religious people.

The highest rate of smoking is among Arabs (27%) and the lowest rate is among Ultra-Orthodox Jews (9.4%). There is an interaction between gender and ethnicity/religion regarding smoking (Figure 3 in Table 3). While among Other Jews, there is a two-fold higher rate of smoking, men compared with women; it is 7-fold among Ultra-Orthodox Jews and Arabs. Also, while among men there is no linear association between smoking and education, and smoking and income level; among the women there is a more linear, positive association.

Therefore, we did separate multivariate analyses for each gender (Table 3). We found that smoking is

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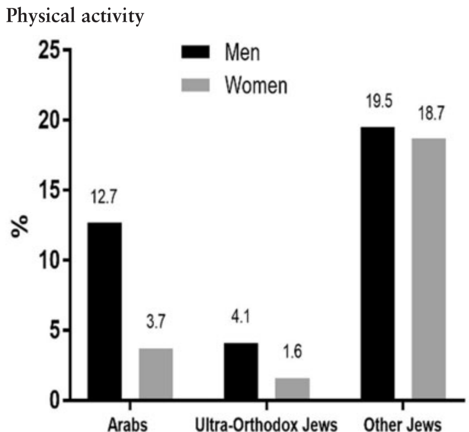
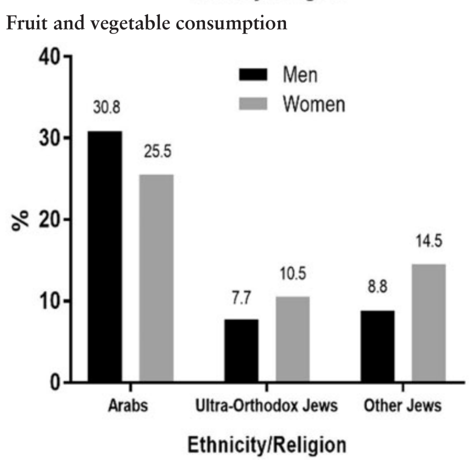
Table 3: Factors associated with doing adequate amounts of PA; consuming adequate amounts of fruit and vegetables; and smoking, for men and women

Unadjusted rates among men and women by ethnicity/religion	Multivariate logistic regression, last models			
	Variable	Categories	Men OR[a] (95% CI[b])	Women OR (95% CI)
Physical activity 	Ethnicity/religion	Ultra-Orthodox Jews	1	1
		Arabs	5.25 (1.417–19.436)	1.23 (0.211–7.203)
		Other Jews	5.37 (1.5–5-18.529)	6.09 (1.335–27.758)
	Education level (years)	0–11	1	1
		12	1.52 (0.498–4.647)	0.70 (0.213–2.298)
		13–15	5.45 (1.572–18.900)	1.38 (0.392–4.880)
		16+	8.89 (3.245–24.358)	4.00 (1.402–11.428)
	Income level (Shekels/month)	Up to 4000	1	1
		4001–7000	2.01 (0.810–4.975)	0.84 (0.352–1.986)
		7001–15 000	1.87 (0.677–5.155)	1.53 (0.651–3.600)
		Above 15 000	2.62 (0.811–8.481)	2.96 (0.756–11.602)
	Awareness to the health effects of PA	Not aware	1	1
		Aware	4.34 (0.956–19.724)	7.58 (0.984–58.360)
			p-value < 0.001	p-value < 0.001
			Nagelkerke $R^2 = 0.268$	Nagelkerke $R^2 =0 .321$
Fruit and vegetable consumption 	Ethnicity/religion	Other Jews	1	1
		Ultra-Orthodox Jews	1.83 (0.686–4.886)	1.27 (0.717–2.264)
		Arabs	16.11 (6.476–40.080)	4.53 (2.736–7.494)
	Education level (years)	0–11	1	1
		12	1.03 (0.429–2.462)	0.89 (0.499–1.578)
		13–15	1.15 (0.303–4.379)	1.05 (0.500-2.191)
		16+	3.93 (1.693–9.116)	2.46 (1.407–4.313)
	Income level (Shekels/month)	Up to 4000	1	1
		4001–7000	2.01 (0.757–5.331)	1.80 (1.071–3.029)
		7001–15 000	16.59 (5.473–50.269)	4.64 (2.597–8.305)
		Above 15 000	6.61 (1.705–25.606)	3.50 (1.446–8.494)
			p-value < 0.001	p-value<0.001
			Nagelkerke $R^2 = 0.339$	Nagelkerke $R^2 = 0.165$

(continued)

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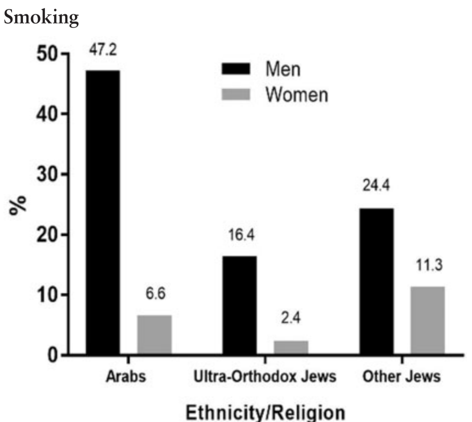
Table 3: (Continued)

Unadjusted rates among men and women by ethnicity/religion	Multivariate logistic regression, last models			
	Variable	Categories	Men OR[a] (95% CI[b])	Women OR (95% CI)
Smoking 	Age groups	65+	1	1
		45–64	1.48 (0.775–2.847)	3.34 (1.366–8.166)
		22–44	2.42 (1.328–4.409)	3.51 (1.482–8.300)
	Ethnicity/religion	Ultra-Orthodox Jews	1	1
		Other Jews	2.01 (1.050–3.862)	4.89 (1.641–14.570)
		Arabs	5.54 (2.764–11.109)	2.57 (0.790–8.357)
	Education level (years)	16+	1	1
		13–15	3.61 (1.725–7.550)	1.17 (0.490–2.811)
		12	1.95 (1.075–3.536)	0.78 (0.371–1.625)
		0–11	1.93 (1.035–3.600)	0.52 (0.171–1.589)
			p-value < 0.001	p-value < 0.001
			Nagelkerke $R^2 = 0.163$	Nagelkerke $R^2 = 0.071$

[a]Odd ratio.
[b]Confidence interval.

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associated with age and ethnicity/religion. For men, the odds of smoking among young adults is around 2.5 times higher; and among middle-aged adults is around 1.5 times higher than among the elderly. Also, the odds is 5.5 times higher among Arabs; and 2 times higher among Other Jews compared with Ultra-Orthodox Jews. For women, the odds of smoking among young and middle aged adults is around 3.5 times higher than among the elderly. The odds is around 2.5 times higher among Arabs; and around 5 times higher among Other Jews compared with Ultra-Orthodox Jews. While among men there is a negative association between smoking and education, there is no association among women.

DISCUSSION

This study provides important information about the determinants of health behaviors. We found that age, gender, ethnicity/religion, education and income levels are associated with health behaviors.

Physical activity

Consistently with our findings, previous studies have also shown that Jews are physically more active than Arabs; men are more active than women and a large disparity exists between Arab men and women (Baron-Epel *et al.*, 2005; Merom *et al.*, 2012); also, both secular Jews and Muslims are physically more active than their religious counterparts (Baron-Epel *et al.*, 2005). A qualitative study conducted among Arab Israelis in 2008 (Shuval *et al.*, 2008) found that Arab women typically prefer to do PA at times that they wouldn't be noticed by neighbors and were not permitted to exercise without a male companion. It was stated that, despite the popular belief, PA is supported by the Islamic scripters. However, particularly very religious participants felt that life expectancy is determined by God and adopting a healthier lifestyle is useless. The participants of the study suggested designated women-only facilities would enable women to do more PA.

A previous study (Werner *et al.*, 2003) shows that while secular Jews participate in a wide range of activities such as swimming and fitness, Ultra-Orthodox Jews participate almost only in walking and exercise. The researchers concluded that since the Ultra-Orthodox Jewish women are supposed to dress modestly, they might avoid participating in activities like swimming and fitness; or since they have a lower socio-economic status they might avoid relatively more expensive activities such as swimming and fitness which might require membership to clubs. However, the reasons why Ultra-Orthodox Jewish men are also physically inactive is not explored in the literature.

A previous study conducted in Israel (Baron-Epel *et al.*, 2005) shows that people with higher education levels engaged in more PA. Similar association was seen in Europe as well (van der Wilk and Jansen, 2005). However, we found that the awareness to the health effects of PA, while controlled for education level, is not associated with PA.

Previous studies found that older Jews (Baron-Epel *et al.*, 2005), and single people in Israel (Rütten and Abu-Omar, 2004) are physically more active. However, we found no significant differences between age groups and marital status groups.

Conclusively, Ultra-Orthodox Jewish men and women; Arab women, and low-educated people are at higher risks for physical inactivity. Particularly for Ultra-orthodox Jews and Arab women, acceptability and affordability can be barriers for doing more PA. Therefore, cheaper and more acceptable facilities; natural forms of physical activities such as walking can be promoted in these groups. Promoting brisk walking has been proven to be one of the most practical methods to reach the recommended amounts of PA (Hillsdon and Thorogood, 1996; Bull *et al.* 2010). Furthermore, offering worksite PA programs can be an efficient strategy to increase PA among those who work (Proper *et al.*, 2003). As awareness to the effects of PA was not associated with PA, rather than raising awareness, other health promotion approaches might be supported.

Fruit and vegetable consumption

Consistently with our findings, it is previously shown that the Arabs consume more fruits/vegetables than the Jews (Abu-Saad *et al.*, 2012). As a result of being first to third generation immigrants, the dietary habits of the Jews are influenced by the dietary traditions of European or other Western countries (Shahar *et al.*, 2003; Abu-Saad *et al.*, 2012). Although today's Jews are mostly Israeli-born, their dietary habits may have been transmitted across generations. The dietary habits of the local Arab population are shaped by the foods they traditionally produced, such as wheat, olives, vegetables and fruits (Abu-Saad *et al.*, 2012). However, evidence suggests that cross-exposure of Jews and Arabs diminish ethnic differences (Abu-Saad *et al.*, 2012). These outcomes are suggestive of processes of acculturation that happen when immigrants adopt the dietary habits of the host country; or ethnic minorities assimilate the dietary habits of the majority (Satia, 2010). As for many Jews,

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acculturation may improve the quality of their diet; however, assimilation of the Arab population to more westernized dietary habits may decrease the quality (Abu-Saad *et al.*, 2012).

Both for men and women, consumption of fruits/vegetables was more prevalent among those who are highly educated. It is suggested that individuals with higher education levels may consume more fruits/vegetables because of their greater knowledge, health considerations and higher income compared with those with less education (Turrell and Kavanagh, 2006; Bere *et al.*, 2008).

As previously found (Middaugh *et al.*, 2012), dietary intake of fruits and vegetables is directly associated with income level. It might be more affordable for people in higher income levels to buy fruits/vegetables. Although in the past, Israelis were consuming adequate amounts of fruits and vegetables, in recent years, there is a decrease particularly among low-income groups (Shavit and Kachal 2011). However, cost is not the only factor affecting fruit/vegetable consumption. Popular thought is that, food choice decisions are made at the grocery store based on price, however in reality, the decisions are made at home by preference or taste (Middaugh *et al.*, 2012). That is why many people complain that fruits and vegetables spoil before they eat them (Middaugh *et al.*, 2012). Taste has been found to strongly influence food choice (Glanz *et al.*, 1998; Bowman, 2005). Also, especially in urban areas, shortage of time can be an obstacle for fruit/vegetable consumption. It takes time to plan, shop and prepare healthful meals; for that reason, consumers may choose fast-food, which are generally lower in fruits/vegetables (Aube and Marquis, 2011).

A review conducted by WHO (Pomerleau *et al.*, 2005), found that especially face to face counselling, is an effective approach to increase consumption of fruits/vegetables; however, is not a feasible approach for the whole population. An alternative approach is printed, customized information and computer-based information programs; however, the unique characteristics of Ultra-Orthodox Jews, who avoid using computers or watching television, should be considered. Also, small promotional budgets and lack of sustained funding for social marketing from the health sector or the fruit and vegetable industry remain as a barrier to produce long-term changes in intake (Pomerleau *et al.*, 2005).

Smoking

Consistently with previous studies, we found that smoking is associated with gender, ethnicity and age; but generally not with education and income level. The health survey of Israel in 2009 (ICBS, 2013) found that smoking was more prevalent among younger people than the elderly; and among Arabs (24.6%) than Jews (19%). Also, smoking was more prevalent among Arab men than Jewish men; however, more prevalent among Jewish women than Arab women (ICBS, 2013). These patterns of smoking can be related to their ethnic or religious culture. Smoking is an acceptable social norm for men in the Arab community (Baron-Epel *et al.*, 2010) and similar disparities are seen in neighboring Arab countries such as Jordan (Belbeisi *et al.*, 2009) and Saudi Arabia (Abdelwahab *et al.*, 2016). Disparity between men and women is lowest among the Other Jews. Since the Other Jewish women have higher economic and cultural resources, they might have adopted smoking as a sign of empowerment and independence from traditional gendered patterns of smoking (Amos and Haglund, 2000; Oncini and Guetto, 2017). Studies also show that while smoking among the Jews have been decreasing during the last decade, it is increasing among Arabs (Baron-Epel *et al.*, 2010). This might be because of inappropriate tobacco control measures, or fewer interventions in this community (Baron-Epel *et al.*, 2010).

A study from 1985 (Friedlander *et al.*, 1985) also found that smoking was more prevalent among secular Jewish men (38–41%) than Orthodox Jewish men (28%); and more than 2 times more prevalent among secular Jewish women than Orthodox Jewish women. Most of the interpretations suggested for the smoking behaviors of Ultra-Orthodox Jews are based on their religiosity. One of the suggestions is that, influential Jewish lawmakers did not prohibit smoking until the 1980s, since the direct health effects of smoking were not clearly proved. However, in recent decades the increase in medical knowledge proving smoking as harmful and life threatening, encouraged many in rabbinic circles to prohibit smoking (Gotfried, 2009). Yet, a study conducted in 2012 demonstrated that the majority of the smokers in this population didn't follow the Rabbinate leadership's advice on smoking (Kopel *et al.*, 2013). It is also suggested that, in small and homogeneous groups, where strict moral values exist, there is a tendency to obey social guidelines of the 'right' behavior that may influence their smoking habit (Kopel *et al.*, 2013). On the other hand, the 'religious reason' may lead to underreporting of smoking behavior, in the form of social desirability bias (Tourangeau and Yan, 2007; Kopel *et al.*, 2013).

Another study conducted in Israel (Baron-Epel *et al.*, 2004), after adjustments, found that age, gender, education level, ethnicity, religiosity, immigration status and

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marital status were associated with smoking. However, after adjustments, we found no association between smoking and immigration or marital status.

Conclusively, Arab men, Other Jewish women and young adults should be taken into account in anti-tobacco policies. Also, the significantly high proportion (33.5%) of the smokers who consider quitting smoking within 1 or 6 months should be supported.

LIMITATIONS, STRENGTHS, FUTURE STUDIES

The main limitation of this study is social desirability bias. Since the participants of this study were generally aware of the health effects of the behaviors, they might have over-reported the healthy behaviors.

The main strength of this study is that it has a big and representative sample which covers adequate numbers of people from different population groups, regions in the city, and socioeconomic subgroups. Therefore, the results can be generalized to the total adult population of Jerusalem.

Future studies may particularly focus on exploring the needs of Ultra-Orthodox Jews and Arab women by semi-structured interviews, to find out what can be done to improve their health behaviors. This customized approach will increase the chance of implementing the right interventions in these communities.

CONCLUSION

Health behaviors are determined by individual characteristics; such as age, ethnicity/religion, economic and cultural resources, and social structure. Gender as a determinant of inequality in health is culturally/ethnically dependent. In similar economic, cultural and social circumstances, men and women have similar health behaviors; and unequal opportunity to education and income creates a vicious gender inequality cycle. Therefore, to reduce health behavior inequalities, besides economic and cultural inequalities, social and gender inequalities should also be reduced.

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