

## **Ethnic inequalities in health between Arabs and Jews in Israel: the relative contributions of individual factors and the living environment**

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### **Abstract**

**Objectives:** Ethnic inequalities in health (EIH) are unjust public health problem that emerge across societies. In Israel, despite uniform healthcare coverage, marked EIH persist between Arabs and Jews.

**Methods:** We draw on the ecosocial approach to examine the relative contributions of individual socioeconomic status (SES), psychosocial and health behavioural factors and the living environment (neighbourhood problems, social capital and social participation) to explaining ethnic differences in self-rated health (SRH). Data were derived from two nationwide studies conducted in 2004-2005 of stratified samples of Arabs (N=902) and Jews (N=1087).

**Results:** Poor SRH was significantly higher among Arabs after adjustment for age and gender (odds ratio, 95%Confidence interval=1.94 (1.57-2.40)). This association was reversed following adjustment for all possible mediators: OR(95%CI)=0.70(0.53- 0.92). The relative contribution of SES and the living environment was sizable, each attenuating the EIH by 40%; psychosocial factors by 25%; and health behaviours by 16%.

**Conclusions:** Arabs in Israel have poorer SRH than Jews. Policies to reduce this inequality should mainly focus on improving the SES and the living conditions of the Arabs, which might enhance health behaviours and well-being.

## Introduction

Ethnic inequalities in health (EIH) represent a persistent, complex public health problem in many countries (Nielsen and Krasnik 2010). Racial or ethnic minority status is related to higher morbidity and mortality compared with majority groups (Bombak and Bruce 2012; Dinesen et al. 2011; Krieger et al. 2011; Williams and Collins 2001). From human rights perspective, EIH are unjust and it violates the basic right to health and should be eliminated (Braveman 2014). While countries strive to tackle EIH, policies have not always focused on improving minorities' health (Lorant and Bhopal 2011). Partly, this was due to earlier assumptions about what explains EIH—assumptions that pathologized ethnic minorities, stigmatized them by labelling them as sick, or blamed them for transmitting diseases (Nazroo 2003). Research in social epidemiology has shifted this discourse to focus on the social, economic and political determinants of minorities' health. Acknowledging the role of social and economic policies in shaping these determinants of health among minorities this encouraged the emergence of different approaches to studying EIH. Material approaches assume that socioeconomic status (SES) has a major role, as ethnic minority groups are often concentrated in low socioeconomic areas and live in poverty. Both institutional discrimination at the policy level and interpersonal discrimination limit the educational and work opportunities among minorities, which relegate them to poverty (Krieger et al. 2011). Psychosocial approaches assert that absolute income is not sufficient to fully explain health inequalities, and draw on a relative income approach; that is, considering income inequality and one's own income relative to others can elevate stress, while material resources and social support might be limited (Wilkinson and Pickett 2010). Based on this approach, higher exposure to stress and higher vulnerability among minorities adversely affect health (Krieger et al. 2011), both through biological, neuro-psychological mechanisms, and indirectly through risky behaviours like smoking (Mindell et al. 2014). Other approaches relate to the social and structural living environment, emphasizing the role of neighbourhood SES, community social cohesion (Daoud et al. 2016) and social capital (Daoud et al. 2017; Kawachi et al. 1999) in explaining health inequalities, although the role of social capital remains controversial (Uphoff et al. 2013).

The “ecosocial” approach (Krieger 1999) attempts to integrate insights from multiple perspectives on EIH, while emphasizing contextual root causes of the ethnic and racial inequalities in health. EIH are complex, socially constructed, and embedded in the historical, political and social determinants of health in a specific country context (Krieger 1999). Discriminatory policies situate minorities low in the social hierarchy (Krieger et al. 2011), creating deprived social and structural living environments that determine poor health (Williams and Collins 2001). Minorities in different countries experience these underlying causes at different levels, depending on their specific context (Krieger 1999). Thus, understanding country-specific EIH requires clarifying the mechanisms of inequality as they function in that context. Most research on the pathways to EIH has been conducted in North America and Europe (Moubarac 2013); less is known about these pathways in other societies.

In Israel, the historical–socio-political context and the ethno-cultural composition of Jewish majority and Arab minority, and the long-lasting Palestinian-Israeli conflict make Israel a setting of interest to study EIH. While in many countries minorities comprise mostly new immigrants, Arab citizens of Israel are native-born people who became a minority after the establishment of the state in 1948 (Ghanem 2002). This makes their profile unique compared with immigrant ethnic minorities, but similar to the context of indigenous populations, and their case can be examined without confounding by immigration. Arabs were under military administration for about 18 years after the establishment of the state of Israel, which had large tremendous effects on the economic

development of this population (Lewin-Epstien and Semyonov 1994) and hindered political and social integration (Ghanem 2002). This fostered economic and social enclaving, which helped them to survive, but also limited their financial prospects in the long term (Lewin-Epstien and Semyonov 1994). With few exceptions, Arabs and Jews are also enrolled in separate public education systems, with Arab schools suffering from discrimination in budgets and resources (Abu-saad 2004). In addition, land confiscations and changing social class among Arabs have been accompanied by social and lifestyle transitions that may have affected their health (Daoud et al. 2009b). Arabs now comprise 20.8% of the population (Central Bureau of Statistics 2016), but have lower SES compared with their Jewish counterparts: lower education (Abu-saad 2004), higher unemployment rates or employment in unskilled or low skilled professions, low income level (about 34% below the national average), and high poverty rates (54% compared with 19% of all families in Israel) (Institution for Social Security 2015). There are also huge gaps in living conditions between the groups, as Arab neighbourhoods are characterized by high poverty and neighbourhood problems, including crime, violence and road safety issues the inter alia related to reduced social cohesion and social capital (Daoud et al. 2017; Obeid et al. 2014).

The Jewish majority currently comprises 75% of the population, Israeli-born individuals, mostly descendants of immigrants or immigrants. During the first two decades after its establishment, Israel absorbed close to one million Jewish immigrants, many of them refugees from Europe and Arab countries (Shuval and Anson 2000). The state invested many resources in employment, housing and health for them (Shuval and Anson 2000). Over the years, fundamental transitions have taken place in the social and economic structures of Israel. It has been noted that Israel's economy developed rapidly, mainly due to advances in industry and technology, and mainly in the Jewish sector, suggesting elevating its standard of living (Shuval and Anson 2000).

The 1995 National Health Insurance Law aimed to reduce health inequalities among all Israeli citizens through universal health coverage was enacted. Every resident is now entitled to a uniform basic basket of services. Yet, because some require co-payment and other services or therapies are available only via supplemental insurance or privately, Arabs face more obstacles in accessing health care services. (Filc 2010) The health inequalities persist between the Arab and Jewish populations (Israel Center for Disease Control 2011). While life expectancy in the past two decades increased substantially among all Israeli groups, Arabs have lower life expectancy. The incidence of several chronic diseases (e.g., diabetes) has increased in recent years among Arabs more than among Jews (Israel Center for Disease Control 2011). Arabs have also reported poorer self-rated health (SRH) than Jews (Baron-Epel et al. 2005). However, less is known about the factors that explain EIH in Israel.

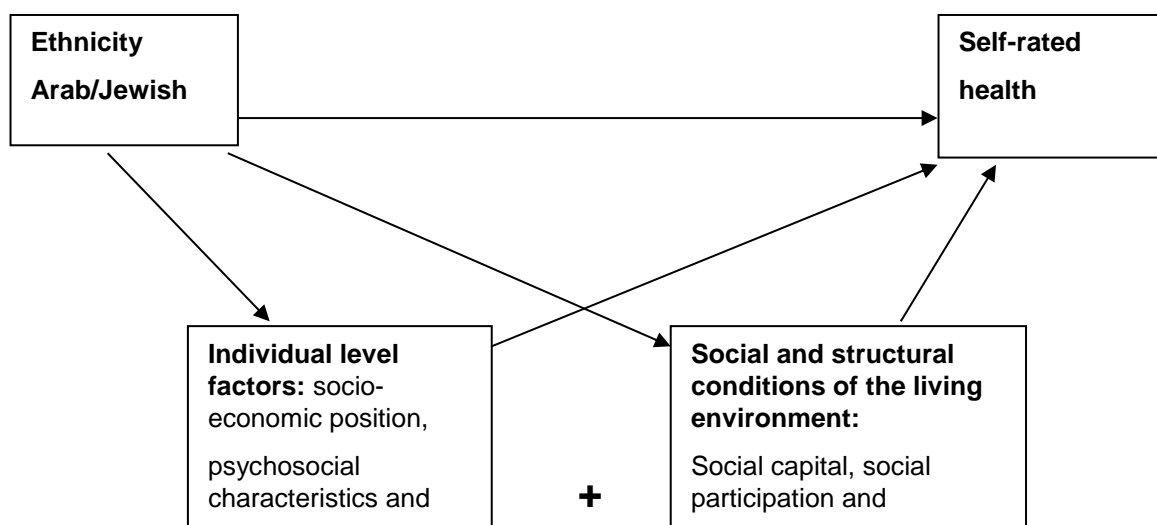
### **Conceptual framework**

Drawing on the ecosocial approach (Krieger 1999) we aimed to examine a combination of individual factors, as well as social and structural aspects of the living environment as a means of explaining EIH between Arabs and Jews in Israel.

Our conceptual framework (Figure 1) includes individual factors: material circumstances, represented by two SES measures (education and income); psychosocial factors reflecting higher stress (Krieger et al. 2011) and lower social support (Osman et al. 2017); and poorer health behaviours (Mindell et al.

2014). The social and structural conditions of the living environment were assessed by social capital (Daoud et al. 2017; Kawachi et al. 1999), social participation (Lindstrom et al. 2002), and neighbourhood problems (Steptoe and Feldman 2001) that were adapted to the Israeli context and included questions about crime and violence and safety problems. Neighbourhood variables were contextual and measured by direct questions and not aggregated data, and have been used in previous research in Israel (Baron-Epel et al. 2005; Daoud et al. 2009b; Obeid et al. 2014; Soskolne and Manor 2010).

**Figure 1: Conceptual framework of the pathways explaining the ethnic inequalities in self-rated health in Israel in the years 2004-2005**



## Methods

### Data

Data were obtained from two nationally representative samples of Jewish (Soskolne and Manor 2010), and Arab (Daoud et al. 2009a) populations in Israel. In each study, one adult aged 30-70 was selected from each sampled household, with a male and a female selected at alternate households. A similar sampling strategy and a core questionnaire were used in both studies, which were conducted in 2004–2005. Jewish participants were interviewed in Hebrew or Russian (for immigrants from the former Soviet Union (FSU)). The response rate was 68% (Soskolne and Manor 2010). For the current analysis, we excluded Jewish immigrants arriving after 1990 from FSU because they differ culturally from the “veteran” Jewish population, and their health status in the first decade after immigration was poorer, largely due to conditions in their countries of origin (Shuval and Anson 2000). The Jewish sample, therefore, included only Israeli-born or veteran immigrants (N=1104). Interviews with Arabs

were conducted in Arabic, reaching a response rate of 78%, with a total of 902 participants (Daoud et al. 2009a).

Both surveys were conducted within the “1948 borders” of Israel and included only localities of 5000 residents or more. The surveys are representative of the respective Jewish or Arab populations in Israel by gender, age, and education, except those living in small villages. More details are available elsewhere (Daoud et al. 2009b; Soskolne and Manor 2010). Both studies were approved by the Institutional Ethics Committee at Hadassah-Hebrew University Medical Centre, Jerusalem.

### ***Study measures***

***Self-rated health (SRH)***. The dependent variable of SRH, an important measure of health that is predictive of mortality in different communities (Idler and Benyamini 1997), including the Arab and Jewish populations in Israel (Baron-Epel et al. 2005), was measured using the question: “How do you rate your health in general?” (Idler and Benyamini 1997). Answer categories were dichotomized into Good (“Excellent”/“Very good”) and Poor (“Fair”/“bad”/ “Very bad”), as has been done in many studies (Idler and Benyamini 1997; Manor et al. 2001; Nielsen and Krasnik 2010).

***Ethnicity***: this primary independent variable was determined by the participant’s self-reported ethnic identity.

***Demographic control variables*** were gender and age (a continuous variable).

***Groups of potential explanatory variables***: The study included two groups of individual factors and social and structural factors of the living environment, presented in Appendix 1.

### ***Data analysis***

There are numerous ways of measuring social inequalities in health. We focused on evaluating the odds of poor SRH among the two ethnic groups. Our analytical approach involved examining the relative contribution of potential mediators in the association between ethnicity and SRH. These variables were grouped into the following: individual factors, including socioeconomic status (SES); psychosocial factors; health behaviours; and the social and structural living environment (social capital, social participation and neighbourhood problems), which were measured by direct questions and not aggregated data and present the participant’s perceptions of the neighbourhoods. The analysis was conducted in stages. First, we compared Arab and Jewish participants, examining associations between ethnicity, SRH and the explanatory variables. Then we examined potential interactions between ethnicity, SRH and age, and then between ethnicity, SRH and gender. We found no significant interactions. Our analysis was therefore based on the overall study sample, namely both genders and all age groups.

We focused on variables significantly associated ( $P < 0.05$ ) with ethnicity and/or SRH. We checked potential collinearity between these variables; none were correlated above our pre-specified threshold of 0.6. The three social capital variables (‘fairness’, ‘mutual help’ and ‘trust’) and ‘smoking’ were not associated with SRH or ethnicity and were excluded from the multivariate logistic regression modelling.

Our strategy of analysis for exploring potential mediators of the association between ethnicity and SRH has been used in previous studies on pathways to explaining inequalities in health (Skalicka et al. 2009; van Oort et al. 2005). We conducted different logistic regression models in the multivariate analysis. Initially, we examined “minimally adjusted odds ratio” for ethnic differences in poor SRH (model 1), adjusted only for age and gender. Subsequent models included groups of explanatory variables: SES (model 2); psychosocial factors (model 3); health behaviours (model 4); and the social

and structural environment (model 5). The final model included all variables (model 6). Each model was adjusted for age and gender. The reference group for ethnicity was Jews. The relative contribution (%) of each of the groups of variables to explaining EIH was calculated based on differences in the odds ratio (OR) between the unadjusted model (Model 1) and each of the ORs in the following adjusted models. Analyses were conducted using SPSS v23.

## Results

Poor SRH was higher among Arabs than Jews: 36.3% versus 28.9% ( $P \leq 0.001$ ). Arab participants had lower SES (education and income) compared with their Jewish counterparts (Table 2). We also found significant differences between Arab and Jewish participants for most of the study variables. Arab participants also had lower mean scores of social support and social participation, and higher chronic stress and stressful life events. Arabs were also less likely than Jews to report consuming a balanced diet or engaging in weekly physical activity, but did not differ in smoking behaviour. Regarding the living environment, Arabs reported lower levels than Jews in two of the measures of social capital ('trust' and 'mutual help'). Almost two-thirds of Arabs, and only one-third of Jews reported severe or serious neighbourhood problems (Table 1).

**Table 1. Distribution of study variables by ethnicity in a national sample of Arabs and Jewish populations in Israel in 2004-2005<sup>a</sup>**

	Arab (%) N=902 <sup>b</sup>	Jewish (%) N=1104 <sup>b</sup>	P
<b>Dichotomised Self-Rated Health (SRH)</b>			<b>&lt;0.001</b>
Very good/good	63.7	71.1	
Fair/bad/very bad	36.3	28.9	
<b>Age</b> (Range 30-71) Mean (SD)	44.9 (11.3)	48.0 (11.9)	<b>=0.001</b>
<b>Gender</b>			<b>&lt;0.001</b>
Women	42.2	54.9	
Men	57.8	45.1	
<b>Individual-level factors</b>			
<i><b>Socioeconomic position</b></i>			
<b>Education</b>			<b>&lt;0.001</b>
More than 12 years	18.4	41.9	
12 years or less	81.6	58.1	
<b>Income source</b>			<b>&lt;0.001</b>
From work or other sources	64.1	88.9	
Social security benefits only	35.9	11.1	
<i><b>Psychosocial factors</b></i>			
<b>Social support</b> (Range 1-5) Mean (SD)	3.19 (0.98)	4.07 (0.93)	<b>&lt;0.001<sup>c</sup></b>
<b>Chronic stress</b> (Range 0-2) Mean (SD)	2.91 (1.87)	2.23 (1.76)	<b>&lt;0.001<sup>c</sup></b>
<b>Stressful life events</b> (Range 0-2) Mean (SD)	1.46 (1.37)	1.27 (1.23)	<b>=0.001<sup>c</sup></b>

**Health behaviours****Consumes balanced diet** <0.001

Yes, balanced 67.1 76.4

Not so balanced 32.9 23.6

**Physical activity (exercise for 20 min.)** <0.001

Once a week or more 30.6 47.2

Less than once a week 69.4 52.8

**Smoking** =0.109

Never smoked 61.2 65.5

Ex-smoker 9.1 7.4

Current smoker 29.6 27.1

**Social and structural environments****Social capital (Trust)** <0.001

People can be trusted 11.9 64.4

People cannot be trusted or don't know 88.1 35.6

**Social capital (Fairness)** =0.965

People try to be fair 37.5 37.6

People take advantage or don't know 62.5 62.4

**Social capital (Mutual help)** <0.001

Yes, people help 16.3 60.1

No, people don't help 83.7 39.9

**Neighbourhood problems** <0.001

None/minor problems 36.7 67.6

Serious problems 63.3 32.4

**Social participation** (Range 0-2) Mean (SD) 0.62 (0.34) 0.87(0.37) <0.001<sup>c</sup><sup>a</sup> The Jewish population does not include new immigrants.<sup>b</sup> N varies slightly due to missing data.<sup>c</sup> Results of t-test; all other p-values are results of Chi-square test.

Table 2 presents the associations between the study variables and SRH. Poor SRH was higher among: women; participants with lower SES; and those with lower social participation or social support levels, higher chronic stress and neighbourhood problems. Poor SRH was also higher among participants who reported less physical activity and those who reported a less balanced diet.

**Table 2. Associations between study variables and self-rated health (SRH) in a national sample of Arabs and Jews in Israel in 2004-2005 (N=2006)**

Variables	Total sample	Good and very good health (N=1360)	Fair, bad or very bad health (N=646)	P
	N	(%)	(%)	
<b>Age</b> (range 30-71) Mean (SD)		(44.2, 10.9)	(51.77 ,11.65)	<b>&lt;0.001<sup>a</sup></b>
<b>Gender</b>				<b>&lt;0.001</b>
Women	987	63.5	36.5	
Men	1019	71.9	28.1	
<b>Individual-level groups of factors</b>				
<b>Socioeconomic position</b>				
<b>Education</b>				<b>&lt;0.001</b>
More than 12 years	627	83.3	16.7	
12 years or less	1374	60.8	39.2	
<b>Income source</b>				<b>&lt;0.001</b>
From work or other sources	1551	75.0	25.0	
Social security benefits only	446	43.0	57.0	
<b>Psychosocial factors</b>				
<b>Social support</b> (range 1-5) Mean(SD)		3.78 (1.02)	3.45 (1.08)	<b>&lt;0.001<sup>a</sup></b>
<b>Chronic stress</b> (range 0-8) Mean (SD)		2.47 (1.82)	2.69 (1.87)	<b>=0.010<sup>a</sup></b>
<b>Stressful life events</b> (range 0-7) Mean (SD)		1.32 (1.28)	1.45 (1.32)	<b>=0.030<sup>a</sup></b>
<b>Health behaviours</b>				
<b>Consumes balanced diet</b>				<b>&lt;0.001</b>
Yes, balanced	1446	71.9	28.1	
Not so balanced	556	57.2	42.8	
<b>Physical activity</b> (exercise for 20 min.)				<b>&lt;0.001</b>
Once a week or more	763	77.9	22.1	
Less than once a week	1164	60.3	39.7	
<b>Smoking</b>				<b>=0.068</b>
Never smoked	1272	67.8	32.2	
Ex-smoker	163	75.5	24.5	
Current smoker	565	65.8	34.2	
<b>Social and structural environments</b>				
<b>Social capital (Trust)</b>				<b>=0.280</b>
People can be trusted	1170	66.3	33.5	
People cannot be trusted or don't know	815	68.8	31.2	
<b>Social capital (Fairness)</b>				<b>=0.257</b>
People try to be fair	734	66.3	33.7	
People take advantage or don't know	1222	68.8	31.2	
<b>Social capital (Mutual help)</b>				<b>=0.229</b>
Yes, people help	800	69.3	30.8	
No, people don't help	1164	66.7	33.3	



<b>Neighbourhood problems</b>				<b>=0.017</b>
None/ minor problems	1077	70.1	29.9	
Serious problems	928	65.1	34.9	
<b>Social participation</b> Mean (SD) (range 0-2)		0.84 (0.37)	0.59 (0.35)	<b>&lt;0.001<sup>a</sup></b>

<sup>a</sup> Mann Whitney test; all other p-values are results of Chi-square test.

The relative contribution of groups of explanatory variables to the association between ethnicity and SRH is shown in Table 3. In Model 1, Arabs reported almost double the odds of poor SRH compared with Jews (Odds Ratio (OR) 1.94, 95% confidence interval (CI) 1.57,2.40). This OR was reduced in Models 2 through 6. Adjustment for SES (model 2) reduced the OR by 41% compared with Model 1, making the association non-significant (OR=1.15, 95%CI=0.91, 1.46). Psychosocial factors reduced the OR by 25%, but the association remained significant (Model 3 OR=1.44, 95%CI=1.14, 1.82). The effect of health behaviours was smaller: a reduction of 16% in the OR of Model 4 (OR=1.63, 95%CI=1.31, 2.03). A large attenuation of 42% occurred in Model 5 following adjustment for the social and structural environment variables of social participation and neighbourhood problems (OR=1.12, 95%CI=0.88, 1.43). In Model 6, after inclusion of all the variables, the association between ethnicity and SRH was reversed and was statistically significant (OR=0.70, 95%CI=0.53, 0.92).

## Discussion

This study found poorer SRH in the Arab minority compared with the Jewish majority in Israel. This inequality is consistent with results from studies on minorities in other countries: the UK (Mindell et al. 2014), USA (Krieger et al. 2011), European countries (Nielsen and Krasnik 2010), and Canada, Australia and New Zealand (Bombak and Bruce 2012), and confirms consistent findings of previous studies in Israel (Baron-Epel et al. 2005; Daoud et al. 2009a). Our study is the first we know of in Israel that integrates individual factors with living-environment factors that we considered underpin EIH. Our work revealed that the gap is completely attenuated, and even reversed, after adjustment for all of these explanatory variables. The relative contribution of SES and of social and structural living-environments was sizable: each attenuated the association between ethnicity and SRH by about 40%. The important contribution of SES to explaining EIH supports findings from different countries — for example, in England (Mindell et al. 2014)—as well as between native-born and immigrant citizens of Belgium (Lorant and Bhopal 2011) and Sweden (Lindstrom et al. 2002). This might be explained by high concentration of ethnic minorities in lower social classes (Chandola 2001), similar to the situation in Israel. Our result that SES explains Jewish-Arab inequality, might reflect long-term discriminatory policies in education (Abu-saad 2004) and work opportunities that have led to widening income inequality between Arabs and Jews. Others showed that discrimination is related to Arabs' health behaviours (Osman et al. 2017). While some assume that Arabs have gained protection from an ethnic enclave economy (Lewin-Epstien and Semyonov 1994), and despite some attempts to provide employment opportunities for the Arabs, our first recommendation for policy initiatives would be to invest in their education system (as Arabs have a separate public schools system) in vocational and professional training, and create better work opportunities in order to increase income as a means of reducing EIH.

**Table 3- Multivariable logistic regressions for the association between ethnicity and self-rated health<sup>a</sup> adjusted for groups of explanatory variables in different models in a national sample of Arabs and Jews in Israel in 2004-2005<sup>b</sup> (N=1896)**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>
Adjusted for:	<i>Unadjusted</i>	<i>Socioeconomic position</i>	<i>Psychosocial factors</i>	<i>Health behaviours</i>	<i>Social and structural environments</i>	<i>All variables</i>
	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>
<b>Ethnicity</b>						
Arab	1.94 (1.57, 2.40)	1.15 (0.91, 1.46)	1.44 (1.14, 1.82)	1.63 (1.31, 2.03)	1.12 (0.88, 1.43)	0.70 (0.53, 0.92)
Jewish	1	1	1	1	1	1
<b>Age</b>	1.07 (1.06, 1.08)	1.06 (1.05, 1.07) ***	1.07 (1.06, 1.08)	1.07 (1.06, 1.08)	1.07 (1.06, 1.08)	1.07 (1.06, 1.08)
<b>Gender</b>						
Female	1.74 (1.41, 2.14)	1.68 (1.35, 2.09) ***	1.80 (1.45, 2.22)	1.72 (1.39, 2.13)	1.54 (1.24, 1.91)	1.57 (1.25, 1.97)
Male	1	1	1	1	1	1
<b>Education</b>						
12 years or less		2.71 (2.08, 3.53) ***				1.94 (1.46, 2.56)
More than 12 years		1				1
<b>Income source</b>						
Social security benefits only		2.78 (2.15, 3.59) ***				2.25 (1.71, 2.95)
Work or other sources		1				1
<b>Social support</b>			0.75 (0.67, 0.84)			0.88 (0.78, 0.99)

<b>Chronic stress</b>		1.09 (1.02, 1.16)			1.07 (1.00, 1.14)
<b>Stressful life events</b>		1.06 (0.97, 1.15)			1.04 (0.95, 1.13)
<b>Balanced diet</b>					
Not so balanced			2.10 (1.67, 2.65)		1.91 (1.50, 2.45)
Yes, balanced			1		1
<b>Physical activity (exercise for 20 min.)</b>					
Less than once a week			2.25 (1.79, 2.82)		1.75 (1.37, 2.23)
Once a week			1		1
<b>Neighbourhood problems</b>					
Serious problem				1.36 (1.09, 1.71)	1.32 (1.04, 1.67)
None/ minor problems				1	1
<b>Social participation</b>				0.16 (0.11, 0.22)	0.33 (0.23, 0.47)
<b>Changes in the OR from Model 1</b>	<b>41%</b>	<b>26%</b>	<b>16%</b>	<b>42%</b>	<b>115%</b>

<sup>a</sup> Self-rated health (SRH) poor versus good.

<sup>b</sup> All models are adjusted for age and sex. Model 1—minimal adjustment for age and sex; Model 2—adjusted for socioeconomic status (SES); Model 3—adjusted for psychosocial factors; Model 4—adjusted for health behaviours; Model 5—adjusted for neighbourhood social and structural environments; Model 6—adjusted for all the above-mentioned variables.

The social and structural living-environments had a similar impact as SES in explaining EIH. Of the social factors, only social participation was associated with both SRH and ethnicity in our study. This might suggest that increased social participation among Arabs might reduce EIH. Social participation had been an important factor in explaining inequalities in SRH in different countries (Lindstrom et al. 2002), and was associated with improved SRH in previous studies in Israel (Daoud et al. 2009a; Soskolne and Manor 2010). It could be that those who are socially active are more likely to engage in activities that improve health and reduce stress (Lindstrom et al. 2002). On the other hand, since this is a cross-sectional study, we cannot determine if those who report good SRH are more likely or more able to participate.

In contrast, no association of the other measures of the social environment—that is, the three social capital measures (trust, mutual help and fairness)—with SRH was found. These measures were not associated with SRH at the bivariate level and were therefore excluded from the multivariate models. While this finding echoes the conclusion of one literature review that showed inconsistent results regarding the role of social capital in explaining social inequalities in health (Uphoff et al. 2013), further studies are recommended.

The other environmental factor that contributed significantly to explaining the reduction in OR of EIH was neighbourhood problems. Lack of investment in the infrastructure of Arab towns and villages (Daoud et al. 2017; Lewin et al. 2006) might underlie the higher proportion of Arabs reporting 'severe problems' in their neighbourhoods. For historical reasons, 85% of Arabs live apart from the Jews; there are only eight mixed towns in Israel. Despite the health benefits of the 'ethnic density effect' (Becares et al. 2009), which suggests a protective effect for minorities living in concentrated areas, neighbourhood segregation is fundamental to discrimination and a root cause of racial and socioeconomic inequalities in health (Daoud et al. 2016; Daoud et al. 2017; Williams and Collins 2001). Likewise, ward economic deprivation in the UK has been associated with poorer health among Pakistani, Bangladeshi and other minorities (Chandola 2001). Lower SES in Arab neighbourhoods was associated with higher neighbourhood problems, increased violence (Daoud et al. 2017) and lower safety (Obeid et al. 2014). Based on this, we believe that policies aiming to enhance living conditions in Arab neighbourhoods, reduce violence, and increase safety could also lead to reductions in EIH.

In our study, the psychosocial factors of stress and social support contributed less than SES and the living environment to explaining EIH but did attenuate the association. Chronic stress, such as that arising from work, family and social difficulties, was higher among Arabs and may reflect the consequences of their lower SES. However, while political conflict is probably a source of chronic stress for both groups, each population may still be affected differently by historical stressors. These may include the political status of Arabs, their trauma due to displacement (Daoud et al. 2012) and systematic or institutional discrimination (Lewin et al. 2006; Osman et al. 2017), and rapid changes in lifestyle that have likely affected their health (Daoud et al. 2009a). Jews, meanwhile, faced the horror or legacy of the Holocaust, repeated wars, and major cultural and social transitions following immigration, whether as refugees or otherwise (Shuval and Anson 2000). However, our findings suggest that the better SRH reported by Jewish participants might have been protected by their higher SES, higher social support, and lower chronic stress in recent decades (Soskolne and Manor 2010). Other factors include greater availability of, and better access to, social and health care services (Filc 2010).

The marked ethnic differences in health behaviours we found in our study are similar to those found in nationwide surveys on smoking, obesity, and physical activity (Israel Center for Disease Control 2011). Yet, the health behaviours made little contribution to explaining EIH. It may be that in Israel structural factors of SES and living environments are substantially more important than individual factors in causing ethnic inequalities in SRH. However, since other research has found marked gender differences in health behaviours within each of the ethnic groups (Israel Center for Disease Control 2011), these differences might have reduced the role of health behaviours in explaining the inequalities in SRH in our study. For example, while smoking is higher among Arab than Jewish men, it is much higher among Jewish than Arab women (Israel Center for Disease Control 2011). These differences would have minimized the effect of smoking in the current study. Since we did not stratify by gender, as we had a limited sample size, we suggest that future studies look specifically at the role of smoking in explaining EIH in Israel. The exclusion of smoking from the multivariate analysis in our study (due to the non-significant associations with ethnicity and SRH) might have affected our results. However, two previous studies in Israel found that the contribution of health behaviours to explaining social inequalities SRH within each of the ethnic groups (Arabs and Jews) was lower than the contribution of SES (Daoud et al. 2009a; Soskolne and Manor 2010). Furthermore, one study in England found that both SES and health behaviours are important explanatory variables for inequalities in SRH and chronic illness (Mindell et al. 2014). It might be that smoking is a more important mediator for explaining more 'objective' health outcomes, such as chronic disease. Although SRH has been associated with mortality and morbidity (Idler and Benyamini 1997), it is a more subjective health outcome (Daoud et al. 2009a).

Interestingly, in our final model, which included all factors, ethnic inequalities were reversed, suggesting that poor SRH was significantly higher among Jewish participants after adjustment for these various factors. While similar results have been found elsewhere (Mindell et al. 2014), this might indicate that the explanatory factors we studied fully explained EIH in SRH in Israel, and are likely to explain EIH in other health indicators, as SRH has been associated with mortality and morbidity in many studies (Idler and Benyamini 1997). This suggests that SRH of Arabs in Israel might be improved, or even surpass that of Jewish Israelis, if individual factors (SES, psychological factors and health behaviours), as well as social and structural environments are improved. This might also suggest that removing these barriers (individual SES and social and structural environments) might reveal resilience in the Arab community in Israel.

Some limitation can be noted regarding our study. First, due to the cross-sectional design, we cannot determine causality for the associations between ethnicity and SRH. Another limitation relates to sample size. We found no significant interactions between ethnicity and either age or gender, indicating that ethnic inequalities in SRH exist across these groups, and that there is no need to stratify our sample by age or gender groups. However, this might also indicate lack of power, as our sample might not be large enough to examine associations between ethnicity and SRH for different gender and age groups. Future research based on larger samples can examine the associations by age and gender groups. More research is also needed into social and structural environments, as our data on the neighbourhoods was contextual and not aggregated. A main strength of this study is its reliance on a conceptual framework and the use of nationally representative samples of non-institutionalized, general populations.

Finally, ethnic inequalities are persistent public health problem in many countries, including Israel. Our findings that socioeconomic status and social and structural environment mainly account for

these ethnic inequalities in Israel suggest that policies seeking to raise educational achievement in the Arab minority and increase work opportunities for this group might decrease the income gap and gradually reduce this health gap. Improving the structural and social living environment in Arab neighbourhoods is also a valuable policy objective, which might improve health behaviours and psychosocial factors, and could further reduce the unjust ethnic inequalities in self-rated health.

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**Appendix -1– Detailed description of the study potential explanatory variables and measures for the associations between ethnicity and self-rated health in Israel (years 2004-2005)**

<b>A-Individual factors</b>	
Included socioeconomic status (SES), psychological attributes and health behaviours. These variables were previously shown as contributing to inequalities in health.	
<b>a. Socioeconomic position</b>	Two main measures of <i>education and income</i> were included. <b>Education</b> was measured by the number of years of education and was dichotomised into low ( $\leq 12y$ ) and high ( $>12y$ ). The <b>income</b> variable was constructed from a question on sources of family income and included two categories: 'solely from social security benefits'/'from work' or 'other sources'.
<b>b. Psychosocial attributes</b>	<b>Social support:</b> The sum score of an adapted version of a six-item scale measuring three types of support (material, emotional, informational). A higher score indicates higher social support. Cronbach's Alpha was 0.87 in each of the Arab and Jewish samples. <b>Chronic stress:</b> The sum score of 10 yes/no questions representing past exposure to stressful situations (e.g., financial, social, family or work problems). Higher scores indicate higher stress. <b>Stressful life events:</b> The sum score of a list of yes/no questions on exposure to nine events during the previous year (e.g., death of close family member, unemployment, fired from work). Higher scores indicate higher stressful life events.
<b>c. Health behaviours</b>	We used three measures of health behaviours that show large differences between the two ethnic groups in Israel (Israel Center for Disease Control, 2011): <b>Smoking</b> was measured by a direct question: 'do you smoke?' (answer categories were: currently smokes, ex-smoker, and never smoked cigarettes); for <b>physical activity</b> , a direct question asked about the frequency of walking or sports or exercise for at least 20 minutes (every day, 1-2 a week, 1-2 a month, not at all, dichotomized into at least once a week versus less than that); and <b>consuming a balanced diet</b> was a direct question with five response categories ranging from "not at all" to "very balanced," dichotomized into balanced / unbalanced diet.
<b>B. Social and structural living environments</b>	
The social living environment was measured by social capital and social participation variables. These variables measure bonding social capital, which is important for community social cohesion and has been related to health in previous research (Uphoff et.al 2013).	
<b>a. Social capital</b>	Was measured by the sum of positive answers on three questions about trust, fairness and mutual help based on Kawachi et al. (1999). <b>Trust</b> was measured by the question 'Generally speaking would you say that most people: can be trusted, or you can't be too

	<p>careful in dealing with people or don't know.'</p> <p><b>Helpfulness</b> was measured by the question 'Would you say that most of the time people: try to be helpful, or just look out for themselves or don't know.'</p> <p><b>Fairness</b> was measured by the question 'Do you think most people would: take advantage of you if they got the chance, or would they try to be fair or don't know.'</p>
<b>b. Social participation:</b>	<p>Was measured by the sum score of positive answers to a nine-item scale about the frequency of participation in activities in formal or voluntary organizations (Ichida et al., 2013). For example, a course or a seminar, activities of various organizations (sports, social, volunteering, neighbourhood activity), meetings or activities of professional associations, political organization, retirement association or religious activity (in a synagogue for Jews, a mosque or church for Arabs), cinema, theatre or concert, party or entertainment activity, sport game, meeting with family members who do not live within your household, and meeting with friends. Response categories were: always, sometimes, or never. Higher scores indicate higher participation. Cronbach's Alpha was very close (0.72 and 0.69 in the Arab and Jewish samples, respectively).</p>
<b>C. Neighbourhood problems</b>	<p>The structural living-environment was measured by an index of the sum score of a 10-item scale based on neighbourhood problems scale of Steptoe and Feldman (2001) that included:</p> <ul style="list-style-type: none"> <li>Crime and violence problems</li> <li>Litter in the streets</li> <li>Smells and fumes</li> <li>Walking around after dark</li> <li>Problems with dogs</li> <li>Noise from traffic or other homes</li> <li>Lack of entertainment places (cafes, cinemas, pubs, etc.)</li> <li>Traffic and road safety</li> <li>Places to shop</li> <li>Vandalism</li> <li>Disturbance by neighbours or youngsters</li> </ul> <p>We categorized the scale according to the median score into 'no or minor neighbourhood problems' versus 'serious neighbourhood problems'.</p>