Jews and Arabs in the Same Region in Israel Exhibit Major Differences in Dietary Patterns1–3

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Abstract

The Jewish majority and Arab minority populations in Israel exhibit disparities in nutrition-related chronic diseases, but comparative, population-based dietary studies are lacking. We evaluated ethnic differences in dietary patterns in a population-based, cross-sectional study of Arab and Jewish urban adults (n = 1104; age 25–74 y). Dietary intake was assessed with an interviewer-administered, quantified FFQ. We used principal-component analysis to identify 4 major dietary patterns: Ethnic, Healthy, Fish and Meat Dishes, and Middle Eastern Snacks and Fast Food. The Ethnic and Healthy patterns exhibited major ethnic differences. Participants in the top Ethnic intake tertile (97% Arab) had modified Mediterranean-style Arabic dietary habits, whereas those in the bottom Ethnic tertile (98% Jewish) had central/northern European-style dietary habits. The Arab participants with less strongly ethnicity-associated dietary habits were younger [OR for 10-y decrease = 1.42 (95% CI: 1.21–1.68)] and male [OR = 2.23 (95% CI: 1.53–3.25)]. Jews with less strongly ethnicity-associated dietary habits were less recent immigrants [OR = 8.97 (95% CI: 5.05–15.92)], older [OR for 10-y decrease = 0.80 (95% CI: 0.69–0.92)], had post-secondary education [OR = 2.04 (95% CI: 1.06–3.94)], and reported other healthy lifestyle behaviors. In relation to the Healthy pattern, Arabs were less likely than Jews to be in the top intake tertile, but the magnitude of the difference was less in diabetic participants. Participants reporting other healthy lifestyle behaviors were more likely to have a high intake of the Healthy pattern. Substantial differences were found between Arabs and Jews in dietary patterns and suggest a need for culturally congruent dietary interventions to address nutrition-related chronic disease disparities. J. Nutr. 142: 2175–2181, 2012.

Introduction

Dietary habits and their socio-demographic correlates may play an important role in chronic disease morbidity and mortality as well as in health disparities within populations (1–5). Dietary patterns have been used to explore these associations, because they account for the complexity of foods consumed together rather than the intake of individual foods or nutrients (1–12).

There are disparities in chronic disease morbidity and mortality between the Jewish majority and Arab minority populations in Israel. In the early 2000s, the coronary heart disease mortality rates of Arab men and women were 1.6 and 2.4 times higher than those of Jewish men and women and diabetes mortality rates were 2.3 and 3.4 times higher, respectively (13).

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3 Supplemental Tables 1–3 are available from the “Online Supporting Material” link in the online posting of the article and from the same link in the online table of contents at http://jn.nutrition.org.
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These 2 populations are characterized by demographic, socioeconomic, and ethno-cultural differences that may differentially affect their dietary exposures to chronic disease risk. The vast majority of Jews in Israel are first- to third-generation immigrants from many parts of the world. Their dietary habits are shaped by immigrant dietary traditions, which include substantial European/Western influence (14). Arabs are a historically agrarian, indigenous minority group who constitute 20% of the Israeli population (15). Their dietary habits are shaped by the foods they traditionally produced (e.g., wheat, olives, legumes, vegetables, fruit) (16,17); however, since the establishment of Israel in 1948, they underwent major lifestyle changes due to the loss of land resources and a rapid process of urbanization (16,18,19). In addition to the language, cultural, and religious differences between these populations, Arabs are characterized by a lower socioeconomic level than Jews (15,20). For the most part, these population groups live in separate communities, although most employed Arabs (men, especially) work in the Jewish sector (15). In this study, we explore the differences between these populations in dietary patterns and associations with socio-demographic characteristics, because differing dietary habits may underlie existing health disparities.
Materials and Methods

Sample and study procedures. The study sample and interviewing procedures have been described in detail elsewhere (16,19). Briefly, a randomly selected, population-based sample was drawn from the Hadera district urban population registry and stratified equally across gender, ethnicity (Arab or Jewish), and 10-y age-group categories (range, 25–74 y). Both Jews and Arabs in the Hadera District (90%) are predominantly urban. A considerable proportion of the district’s Jewish population are first-generation immigrants. Of those born in Israel, the majority are second-generation immigrants (21). The Arab population of the district is Muslim (as is 80% of the Arab minority in Israel) and its socio-economic characteristics are similar to the means for the country’s total Muslim population (19). As an indigenous population with negligible immigration, national and regional statistics on birth place are not published. The total sample included 1318 individuals, of whom 1104 consented to participate in the study (84% response rate).

The original study questionnaire in Hebrew was translated into Arabic and Russian and home interviews were conducted in the participant’s native language by trained interviewers from 2002 to 2007. Data on socio-demographic characteristics, body weight and height, diet, physical activity, smoking, and chronic disease prevalence were collected (16,19). The study was approved by the institutional ethics committee (Helsinki Committee) of Sheba Medical Center. All participants provided written informed consent.

Dietary assessment. Information on habitual dietary intake and change in dietary habits was collected using a 2-step quantified FFQ developed for the multi-ethnic Israeli Jewish population and used in numerous observational studies (22,23). Common Arabic foods and dishes were added for the current study, resulting in a food list of 240 items (19). Prior to the administration of the FFQ, participants were asked if they had made any dietary changes over the past 20 y (or if younger than 40 y, since the age of 20 y) and, if so, they were asked about the reason for and type of change. Participants were subsequently asked for detailed information about their intake of each item in the FFQ food list over the past year, including frequency of consumption, number of portions consumed, and portion size using life-sized, color pictorial aids. They were then asked if their intake of the item had changed over the past 20 y. If so, the time of the change and details about their intake before the change (frequency, number of portions, portion size) were recorded in a parallel set of columns. Participants could also add items that were not present in the food list.

Nutrient database. The database used to calculate nutrient values was based primarily on the UK food composition database (24) supplemented with data from international (25,26), Israeli (27), and Palestinian Arab (28) food composition tables, local manufacturers, and representative local recipes.

Socio-economic and health-behavior covariates/variables. Participants’ years of education were categorized as 0–8, 9–12, and ≥13 and their employment status at the time of the interview was expressed as a dichotomous variable (employed, unemployed). Smoking status was characterized as never smoked, current smoker (>1 cigarette/d), and past smoker. Leisure physical activity was dichotomized as being below the recommended level (<2.5 h moderate-intensity activity/wk) or meeting the recommended level (≥2.5 h/wk). The reason given for self-reported dietary change was categorized as: 1) no change reported; 2) no reason given for reported change (at food-item level); 3) health-related reason (including change expressly made for chronic disease management or health awareness reasons); or 4) non-health-related reason (including reasons such as immigration to Israel, differences in food availability/food environment, and changes in marital/family status).

Health status variables. Self-reported weight and height were obtained from all participants and measured weight and height (without shoes, in lightweight clothing) were obtained for 68% of the participants. BMI (kg/m²) was calculated from measured weight and height where available or was predicted using gender-specific linear regression equations based on participants’ self-reported weight and height, age, and ethnicity (16).

Obesity was defined as BMI ≥30.0 kg/m². The status of participants’ diabetes and hypertension was determined from self-reported physician diagnosis and/or use of disease-specific medications (19).

Statistical analysis. The calculation of nutrient intakes was adjusted for seasonality. Food items were collapsed into 46 groups based on similarity of nutrient content, common usage, and ethnic origin (3,29,30). Supplemental Table 1 contains a detailed description of the food groups. Consumption of each food group was expressed as the percentage of total daily energy intake. We used principal component analysis to identify dietary patterns. The factors were rotated by an orthogonal transformation (Varimax rotation) to obtain a simpler, more interpretable structure. We examined factor solutions ranging from 2 to 9 factors and chose the 4-factor solution based on all factors having eigenvalues >1.0, examination of the scree plots, and factor interpretability. Food groups with an absolute factor loading >0.35 were used to characterize the dietary patterns. In additional analyses of the Ethnic and Healthy dietary patterns, participants’ factor scores on each pattern were saved and used to categorize them into intake tertiles. Consumption of the pattern was then dichotomized as high (third tertile) compared with medium-low (first and second tertiles).

Associations between ethnicity and participant socio-demographic, behavioral, and health-status characteristics were tested in binomial or multi-nominal logistic regression models for categorical variables and linear regression models for continuous variables, controlling for age and gender. Associations between consumption of the dietary patterns and selected characteristics (including ethnicity) were explored in univariate analyses using chi-square or Fisher’s exact tests for categorical variables and the Wilcoxon’s test for continuous variables. Separate, multivariate, logistic regression models were used to explore associations between a high intake of the dietary pattern and the socio-demographic, behavioral, and health-status explanatory variables. The variables associated with a high intake of the dietary pattern at a level of P < 0.20 in univariate analysis were entered into a backward elimination procedure, except for ethnicity, gender, age, and educational level, which were forced into the multivariate models. The least significant variables were sequentially eliminated from the model until all remaining variables were significant at a level of P < 0.05. Second-order interactions between ethnicity and the other explanatory variables in the models were tested and considered significant at a level of P < 0.05. To evaluate the fit of the multivariate models for predicting dietary pattern consumption levels, we calculated the area under the Receiver Operating Characteristic (ROC) curve (c-index) and its 95% CI. All analyses were performed using SAS (version 9.2, SAS Institute).

Results

Table 1 presents selected characteristics of the study sample by ethnicity and gender. Approximately 60% of the Jews were first-generation immigrants. Of those born in Israel, the majority were second-generation immigrants from either Asia/Africa (46.1%) or Europe/USSR/America (29.7%), whereas 24.2% were immigrants of the third generation or greater. Fewer than 2% of the Arabs were immigrants. Education and employment levels were lower among Arabs (and particularly among Arab women) than Jews. The proportion of current smokers was highest among Arab men and lowest among Arab women. Fewer Arabs than Jews met the recommended leisure-time physical activity level. Overall, 35% of the participants responded positively to the general question about having made dietary changes during adulthood and gave a reason for making the changes. The majority of these, both among Jews and Arabs, gave health-related reasons that were primarily related to having developed a chronic condition. Only 6% of the total sample gave “health awareness/disease prevention” reasons for making a dietary change and the proportion was higher among Jews than Arabs (9 vs. 2%; P < 0.001). More Jews than Arabs gave non-health-related reasons, particularly related to immigration. Obesity and diabetes prevalence were higher among Arabs than Jews (Table 2).

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TABLE 1  Selected characteristics of study participants by ethnicity and gender1

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Jews (n = 276)</th>
<th>Women (n = 277)</th>
<th>Arabs (n = 274)</th>
<th>Women (n = 277)</th>
<th>P2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>51.2 ± 14.3</td>
<td>51.3 ± 14.4</td>
<td>50.6 ± 14.3</td>
<td>50.4 ± 14.4</td>
<td>0.40</td>
</tr>
<tr>
<td>Immigration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born in Israel, %</td>
<td>41.5</td>
<td>37.9</td>
<td>99.3</td>
<td>96.4</td>
<td>&lt;0.0013</td>
</tr>
<tr>
<td>Area emigrated from6, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia/Africa</td>
<td>18.2</td>
<td>18.8</td>
<td>0.0</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Europe/USSR/America</td>
<td>40.4</td>
<td>43.3</td>
<td>0.0</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Palestinian territories (West Bank, Gaza Strip)</td>
<td>0.0</td>
<td>0.0</td>
<td>0.7</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Time since immigration4, y</td>
<td>25 (12–51)</td>
<td>15 (11–41)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.0013</td>
</tr>
<tr>
<td>0–8 y</td>
<td>10.2</td>
<td>13.7</td>
<td>50.2</td>
<td>65.6</td>
<td></td>
</tr>
<tr>
<td>9–12 y</td>
<td>41.5</td>
<td>34.3</td>
<td>29.7</td>
<td>26.5</td>
<td></td>
</tr>
<tr>
<td>≥13 y</td>
<td>48.4</td>
<td>52.0</td>
<td>20.2</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Currently employed, %</td>
<td>80.6</td>
<td>69.4</td>
<td>62.7</td>
<td>14.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Leisure-time physical activity ≥2.5 h/wk, %</td>
<td>37.3</td>
<td>40.1</td>
<td>26.6</td>
<td>15.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Reason given for making dietary change, %</td>
<td>No change reported</td>
<td>30.8</td>
<td>30.0</td>
<td>46.4</td>
<td>44.4</td>
</tr>
<tr>
<td>Reason given for reported change</td>
<td>31.9</td>
<td>26.4</td>
<td>27.7</td>
<td>23.1</td>
<td>&lt;0.0017</td>
</tr>
<tr>
<td>Health-related reason</td>
<td>26.8</td>
<td>29.6</td>
<td>23.4</td>
<td>29.6</td>
<td>0.0032</td>
</tr>
<tr>
<td>Non-health–related reason</td>
<td>10.5</td>
<td>14.1</td>
<td>2.6</td>
<td>2.9</td>
<td>&lt;0.0017</td>
</tr>
<tr>
<td>Smoking status, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never smoked</td>
<td>39.9</td>
<td>69.3</td>
<td>19.3</td>
<td>93.1</td>
<td></td>
</tr>
<tr>
<td>Current smoker</td>
<td>30.8</td>
<td>18.1</td>
<td>56.6</td>
<td>6.2</td>
<td>0.22</td>
</tr>
<tr>
<td>Past smoker</td>
<td>29.4</td>
<td>12.6</td>
<td>24.1</td>
<td>0.7</td>
<td>0.002</td>
</tr>
<tr>
<td>Obesity, %</td>
<td>23.3</td>
<td>34.1</td>
<td>28.9</td>
<td>54.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes, %</td>
<td>10.5</td>
<td>11.6</td>
<td>18.3</td>
<td>21.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hypertension, %</td>
<td>30.4</td>
<td>30.0</td>
<td>25.2</td>
<td>29.2</td>
<td>0.410</td>
</tr>
</tbody>
</table>

1 Values are means ± SD, medians (IQR), or percentages of participants. 
2 P values for age- and gender-adjusted comparisons between Jews and Arabs. 
3 P value from binary logistic regression model using “born in Israel” (yes/no) as the outcome variable. 
4 The number of Arab immigrants (2 men and 8 women) was too small to provide a meaningful evaluation of the significance of the differences between Jews and Arabs or reliable estimates of the median (IQR). 
5 P value for the difference between Jews and Arabs in the log odds of ≥13 vs. ≤12 y of schooling. 
6 Employed at time of interview, among men ≥65 y (n = 433) and women ≥65 y (n = 388). 
7 P value from multinomial logistic regression model. 
8 BMI ≥30.0 kg/m2. 
9 Self-reported, based on physician diagnosis and/or disease-specific drug therapy. 

Supplemental Table 2 presents the 4 dietary patterns, which together explained 24% of the variation in dietary intake in the sample. Factor 1, the Ethnic pattern, explained 12% of the variation in intake. Arabic foods loaded positively on this pattern [e.g., pita bread (predominantly white flour), olive oil, Arabic mixed meat or vegetable/legume dishes, Arabic whole grains, Arabic full-fat dairy products, and Arabic nonstarchy vegetables]. Foods more commonly consumed by central/northern European populations loaded negatively on this pattern [e.g., vegetable oil (excluding olive oil), loaf bread, starchy vegetables, preserved fish, processed meat, high-fat pastries]. Factor 2, the Healthy pattern, explained 5% of the variance in intake and was characterized by a high intake of nonstarchy vegetables, fruits, low-fat dairy products, and whole grains used in central/northern European populations (e.g., pearl barley, oats, buckwheat) and a low intake of French fries, pita bread, and sweetened soft drinks. The remaining 2 factors each explained 3–4% of the variation in the dietary intake of the sample. Factor 3, the Fish and Meat Dishes pattern, was characterized by a high intake of fresh fish, mixed meat and starchy dishes, and oil used for frying/sautèing and a low intake of desserts. Factor 4 was characterized by a high intake of typical Middle Eastern snacks and fast food, such as nuts and seeds, and savory cheese and starchy fast food (e.g., non-meat pizza, savory cheese-filled phyllo dough or puff pastry), and a low intake of poultry. Figure 1 presents the distribution of scores for each dietary pattern by ethnicity. Scores on the first 2 (Ethnic and Healthy) dietary patterns showed clear differences by ethnicity and were thus used in further analyses to explore major sources of variation between Jewish and Arab participants in dietary habits and associated covariates.

Univariate analysis corroborated the significant ethnic differences in intake of the Ethnic and Healthy dietary patterns (Supplemental Table 3). In the Ethnic pattern, the highest intake tertile was 97% Arab, the lowest intake tertile was 98% Jewish, and the middle tertile was mixed (Fig. 1). In the Healthy pattern, Arabs accounted for fewer than one-quarter of those in the top intake tertile and over 60% of those in the lower 2 tertiles (Supplemental Table 3).

In a multivariate logistic analysis of the Ethnic pattern, Arabs were more likely than Jews to be in the highest intake tertile and men and younger participants were less likely to be in the top intake tertile (Table 2). The c-index indicated good model fit [c = 0.90 (95% CI: 0.88–0.92)].
dietary habits had moved away from ethnic traditions. We thus conducted subgroup analyses using logistic regression models stratified by ethnicity (Table 3). Among Arabs, men and younger participants were more likely than women and older participants, respectively, to be in the middle/lowest intake tertiles of the Ethnic pattern. Among Jews, participants who were older, had $\geq 13$ y compared with $0–8$ y of education, and reported meeting the leisure physical activity recommendation ($\geq 2.5$ h/wk) were more likely to be in middle or highest tertile of the Ethnic pattern (Table 3). Although the study was not originally powered to explore subgroup differences within the Jewish population, the proportion of immigrants from the most recent major immigration wave from the former USSR (beginning in 1989) was sufficiently large (28% of the Jewish sample) to compare with Jews from earlier immigration waves (including second- and third-generation immigrants). Long-time immigrants (from all immigration waves prior to 1989) were more likely than those from the most recent major wave of immigration to be in the middle and top intake tertiles of the Ethnic pattern. The c-indices of the subgroup analysis models indicated adequate model fit.

In a multivariate logistic analysis of the Healthy pattern, Arabs were much less likely than Jews to be in the highest intake tertile (Table 2, OR for ethnicity is for nondiabetics). The difference in odds was attenuated among diabetics but remained substantial lower for Arabs than Jews [OR = 0.38 (95% CI: 0.18–0.83)]. Men and younger participants were less likely than women and older participants to be in the highest Healthy Pattern intake tertile. However, participants who had $\geq 13$ y of education, reported meeting the recommended leisure physical activity level ($\geq 2.5$ h/wk), and were past smokers rather than current smokers were more likely to be in the highest intake tertile of the Healthy pattern. Participants with prevalent diabetes were more likely than those without to be in the highest intake tertile of the Healthy pattern, but the difference was greater among Arab diabetics and nondiabetics [OR = 5.00 (95% CI: 2.92–8.55)] than among Jewish diabetics and nondiabetics [OR = 2.00 (95% CI: 1.01–3.95)]. The c-index indicated good model fit [c = 0.87 (95% CI: 0.84–0.89)].

### Discussion

This study revealed major differences in dietary patterns between Jews and Arabs living in the same region. A high proportion of participants adhered to ethnic dietary traditions. The proportion of Jews who adhered to a classic, Western-style healthy dietary pattern was higher than that of Arabs.

The greatest source of variation in dietary intake in the study sample derived from the dietary habits that characterized the extreme tertiles of the Ethnic pattern. Those who scored in the top tertile of this pattern (almost exclusively Arabs) had a high intake of the foods historically produced by the rural Arab population, with modifications that reduced the healthy properties of the traditional Arab diet (e.g., replacement of whole grains with refined grains, increased consumption of meat dishes/animal fat). Those who scored in the bottom tertile (almost exclusively Jews) had a high intake of starchy, processed, and fatty foods, similar to the dietary patterns identified in central/northern Europe countries in the EPIC study (31).

Studies of dietary patterns in multi-ethnic populations have commonly identified distinct ethnic and mainstream dietary patterns (1,3,10,17,20,30,32). In our study, however, the predominant ethnic dietary habits differentiating Arabs and Jews emerged as opposite poles of a single factor, and this finding persisted across the range of factor solutions explored. This unique factor solution indicates that a higher consumption of ethnic Arabic foods meant an avoidance of their mainstream ethnic Jewish counterparts and vice-versa (e.g., loadings for pita bread and loaf bread were 0.72 and $-0.57$, respectively). In contrast, in a study among U.S. Hispanic and non-Hispanic women, consumption of ethnic Mexican foods was largely unrelated to consumption of their mainstream counterparts (e.g., loadings for “Mexican refined grains” and mainstream “refined grains” on the Native Hispanic factor were 0.71 and 0.14, respectively) (30). The more diametrical partition of dietary habits by ethnicity found in our study may reflect the larger cultural, political, and socio-economic milieu in Israel, which is characterized by Jews and Arabs living in separate communities/ethnic enclaves and having limited cross-exposure (33).

Nevertheless, consistent with the findings of other studies among multi-ethnic populations (34–36), we found indications of diminished ethnic differences in dietary patterns between Arabs and Jews where cross-exposure was greater (e.g., among younger and male Arab participants who may work/study in Jewish towns; among Jewish participants who were born in or had a longer period of residence in Israel). These findings are suggestive of processes of acculturation that occur when immigrants adopt the food choices of the host country (e.g., for the Jewish population) or ethnic minorities assimilate the majority’s dietary habits (e.g., for the Arab population) (34). For many Jewish (first- to third-generation) immigrants, the Israeli food environment is richer in fresh fruit, nonstarchy vegetables, and olive oil than their countries of origin (14), so acculturation may improve their diet quality. However, for Arabs, assimilation of the majority group’s more Westernized dietary habits and deterioration of their traditional Mediterranean-style dietary habits (driven by the loss of the traditional agricultural lifestyle, urbanization, and access to subsidized refined grains) may decrease the health quality of their diet. Similar changes have occurred in other Mediterranean basin countries and have reduced the protective properties of traditional Mediterranean diets (37–40).
The Healthy pattern, which explained the second largest proportion of variance in dietary intake in the sample, resembles the healthy/prudent dietary patterns identified in other populations both in its content and its association with sociodemographic characteristics and other healthy lifestyle behaviors (2,3,6–8,10,11,41). We characterized it as a Western-style healthy pattern, because many of the healthy foods that loaded highest on this pattern are more typically consumed by central/northern European and modern Western populations (e.g., pearl barley, oats, buckwheat, brown rice, low-fat dairy products). These foods distinguish it from the healthy Mediterranean elements, typical of the traditional Arabic diet, found at the positive pole of the Ethnic pattern (e.g., olive oil, wheat-based whole grains such as burgul, legumes, and wild and cultivated nonstarchy vegetables).

Arabs were less likely than Jews to be in the highest tertile of the Healthy pattern and our data suggest that the driving factor behind Arab adoption of this dietary pattern (which nevertheless remained quite low) was prevalent diabetes. Several studies have observed that ethnic minority group members are under-represented in the highest intake levels of classic, Western-style healthy dietary patterns (1,4,10,32), perhaps due to cultural or economic factors. Our findings suggest that in the Arab population, the promotion of healthy dietary habits for chronic disease prevention and management may be more effective if it is based on preserving and/or renewing the healthy components of their historic Mediterranean-style diet rather than encouraging the adoption of a Western-style healthy pattern.

There are clearly large socioeconomic disparities between the Jews and Arabs (20). Thus, interventions must address the socioeconomic barriers to adopting healthier dietary and lifestyle patterns among Arabs. Further research is needed to better understand the spectrum of factors (e.g., socioeconomic, environmental, cultural) that impede the adoption of healthier lifestyles in this minority population at high risk for cardiovascular disease.

Our study has a number of limitations. Due to its cross-sectional design, no causal inferences can be drawn from the findings. The dietary change and dietary intake data are self-reported and the intake data suffer from the limitations of measurement error common to the FFQ method. However, in the present study, the FFQ was interviewer-administered rather than self-administered, which has been shown to provide better quality data (42). Principal component analysis involves a number of subjective decisions, including the food groups and factor solutions selected. Our food groupings were based on our aim of exploring ethnic differences in dietary patterns and followed general guidelines suggested in the literature (3,29) and the food group coding method reported by Murtaugh et al. (30) in a study of U.S. Hispanic and non-Hispanic women. We chose a 4-factor solution and the factors that emerged in this solution (particularly the Ethnic and Healthy factors) remained very stable across the range of factor solutions explored.

Major strengths of this study include the population-based sample and the high response rate. In addition, the extensive food list of the FFQ used was developed particularly for the ethnic populations studied and thus included group-specific marker foods that were key to elucidating differences between Jews and Arabs in dietary patterns; this may be useful for

**FIGURE 1** Distribution of participant scores for the Ethnic (A), Healthy (B), Fish, Meat Dishes, and Poultry (C), and Middle Eastern Snacks and Fast Foods (D) patterns across tertiles by ethnicity (n = 1104). Single-axis graph where the x-axis represents the dietary pattern score. Circles in vertical columns represent number of participants at specific data point.
hypothesis generation regarding associations between diet and chronic disease in these populations (9).

In conclusion, Jewish and Arab adults in this population-based sample had major differences in dietary patterns. Prospective studies are needed to evaluate the associations of dietary patterns and dietary acculturation with diet quality and chronic disease incidence among Jews and Arabs in Israel. Such research can provide a basis for developing more effective interventions to improve public health and reduce ethnic health disparities.

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Literature Cited


