Subject:

A Comparative Analysis for the purpose of Examining the Correlations Between Gender and Socio-Economic Status and the Smoking Rates Among Both ultra-Orthodox Jews And Jews Who are Not ultra-Orthodox, In Israel

{Title Page: This should list the title of the article and the full names and institutional addresses for all authors. Each author's highest academic degree should follow his/her name. The e-mail address of the corresponding author should also be included}

# background

Ultra-Orthodox Jews comprise 9.7% of the Jewish population aged 20 and older(1) in Israel.  This group maintains a meticulous religious lifestyle, has distinctive cultural elements(2) that separate them from the general population, is characterized by a well-known hierarchy and by their obedience to rules set forth by rabbinical authority(3) which also affect their healthcare attitudes and behavior.(4) The ultra-Orthodox population has a relatively low awareness of health issues and behavior that promotes health.(5) (6)

The ultra-Orthodox society in Israel is characterized as having a low economic status.(7)

Previous studies, for example, a meta-analysis of 93 publications around the world, it was found that smoking is more prevalent among groups with low socioeconomic status.(8)

However, it should be noted that a reverse trend was discovered in some countries. During the years 2002-2004 WHO conducted research that included 48 states, from around the world, of low to medium socioeconomic levels, in order to evaluate the prevalence of smoking by household capital. The results showed that, for most countries, smoking was more prevalent among the poor. Nevertheless, in some states, such as Georgia and Mexico men of higher status were found to smoke more than those of low socioeconomic status. A similar trend was observed among women from Kazakhstan, Mexico and South Africa.(9)

Previous studies conducted in Israel demonstrated smoking rates among the ultra-Orthodox were lower compared to those found in non-ultra-Orthodox society. In a study conducted by the Israeli Center for Disease Control during the years 2008-2009 the rate of smoking among ultra-Orthodox men was 19.5% and 2.6% among the ultra-Orthodox women.(10) In another study conducted in 2010-2011 among 782 ultra-Orthodox Jewish men in Israel, smoking rates of 12.8%(11) were found. These rates are low compared to the data concerning smoking in the general population in Israel, which, according to the social-survey, conducted by the Central Bureau of Statistics for the year 2017, found that 31.5% of the men and 14.7% of the women were smokers.(1) Studies carried out in various countries, also found low rates of smoking among religious populations in comparison to the general society.(12)(13)(17)

Over the past few decades the tendency towards geographic segregation of the ultra-Orthodox population has expanded, creating ultra-Orthodox neighborhoods and cities.(14)

This research set out to perform a comparative analysis to examine the correlations between the degree of ultra-Orthodoxy and the socioeconomic status and the smoking rates among the residents of two neighboring cities in Israel, who are aged 50 and older.  One city is characterized by the homogeneity of its residents who are mostly ultra-Orthodox while the neighboring city's residents are mostly secular.

# Methods

The current study utilized the databases of Maccabi Healthcare Services (MHS), the second largest insurer and healthcare provider in Israel, serving about 25% of the Israeli population. Two towns were selected for the study, an ultra-Orthodox and a secular town which share a border, both located within the geographical and economical center of Israel.

According to the data provided by Central Bureau of Statistics (2014), one city is characterized by the homogeneity of its residents who are mostly ultra-Orthodox. These data are based on the results of the vote for the 19th Knesset elections in 2013, where over 70% of the residents of 130 out of 163 streets of the ultra-Orthodox city and also more than 50% of the remaining residents voted for ultra-Orthodox parties. On the other hand the neighboring city is characterized as non-ultra-Orthodox, according to the results of the vote for the 19th Knesset elections, when less than 10% of the residents of the city's streets, voted for ultra-Orthodox parties.

In 2017, ~195,000, and ~154,000 residents inhabited the ultra-Orthodox and secular towns respectively, with 8% and 21% aged 65 years or older. Almost half of the residents in both towns were enrolled with MHS (47.5% and 46.9% of the ultra-orthodox and secular town residents, respectively).(15)

Data retrieved from MHS databases included birth year, sex, socioeconomic status and religious homogeneity of the neighborhood, and smoking status.

The socioeconomic status and degree of probability of of being ultra-Orthodox was retrieved from the database using a commercial index developed by Points Location Intelligence (<http://www.points.co.il>).   The socioeconomic status variable is assigned a score of 1 (lowest) to 10 (highest) according to place of residence, where each statistical area is scored according to various financial measures (credit card use information, housing prices, etc.).

The probability of an individual who participated in the research, being ultra-Orthodox was determined using a scale divided into four categories: Without, Medium, High and Very high, based on the place of residence, where each statistical area is scored according to various financial review measures (the results of the municipal and national elections, characterization of the educational institutes, the Mikva'ot [ritual public bath houses], areas where the roads are closed down over the Shabbat and more).

The points index is highly correlated with the SES index provided by the National Bureau of Statistics, with less occurrences of missing data (MHS internal information).

The socioeconomic distribution in both cities led us to eventually constructing an additional variable "the socioeconomic status relative to the residential location".

In the ultra-Orthodox city the socioeconomic status relative to the residential location was established in the following manner: a socioeconomic status of 2-3 was defined as a low status; a socioeconomic status of 4 was defined as a medium status; and a socioeconomic status of 5-6 was defined as a high socioeconomic status relative to the residential location.

In the non-ultra-Orthodox city the socioeconomic status relative to the residential location was established in the following manner: a socioeconomic status of 5-6 was defined as a low status; a socioeconomic status of 7 was defined as a medium status; and a socioeconomic status of 8-10 was defined as a high socioeconomic status relative to the residential location.

Ultra-Orthodoxy was defined as a dichotomous variable (ultra-Orthodox/non-ultra-Orthodox) depending on the likelihood of being ultra-Orthodox. Participants who resided on streets with a medium to high degree of probability were defined as being ultra-Orthodox. In reality, this division is identical to the division based on the city where the participants reside.

The smoking status was measured as a dichotomous variable: active smoker/non-active smoker.

# Statistical Analysis

Data were analyzed using SPSS version 24.0. We included age, gender, socio-economic status, probability of being ultra-Orthodox and the city of residence as covariates in the analysis.

Data regarding, age, gender, socioeconomic status, degree of probability of being ultra-Orthodox and the city of residence were complete, while the smoking status variable was missing for 1,784 (5.9%). To avoid missing-values biases in the multiple regression models, we used pairwise methods.

The first analysis examines the distribution of all study variables for the total sample and stratified by the city of residence.

Next, we examined the distribution of smoking status by **socio-demographic characteristics** among the total population and separately for the residents of the cities, the ultra-Orthodox city alone and the secular city alone.

In the third stage we employed multivariate binary logistic regression models to examine the associations between **socio-demographic characteristics** and smoking status**among the population of each city,** separately**.**

Model Number 1 examined the relationships among residents of the ultra-Orthodox city while model number 2 examined the residents of the non-ultra-Orthodox city.

The Odds Ratio (OR) in model 1 and in model 2 was adjusted for age, and these models included the variables for gender, age, and socioeconomic status relative to residence.

In the fourth stage we employed multivariate binary logistic regression models to examine the associations **between**residing in an ultra-Orthodox/non-Ultra-Orthodox city andthe smoking status **among** the total population using 3 models (models number 4-6). The Odds Ratio in model 4 was adjusted for age; in model 5 for age and gender; in model 6 for age, gender and socioeconomic status.

It is important to note that for this model, the socioeconomic status was measured as a continuous variable.

 To avoid missing-values biases, we used pairwise methods. Significance level for all analyses was set to <0.05.

# RESULTS

Using the database with unidentified people for the years 2015-16 listing 30,170 Maccabi policy holders aged 50 years or older, including 11,509 listed as residing in the ultra-Orthodox city and 18,891 residing in the secular city.

Examining the population distribution (Table no. 1) a number of distinct differences were found with regard to the distribution by gender, age, socioeconomic status and level of ultra-Orthodoxy

It was found that the number of male policy holders in the ultra-Orthodox city was higher in comparison to the number in the secular city (50.3% vs 45.4% respectively).

It was found that in the secular city the average age of the policy holders of 65.9 (SD=10.97) was higher than the average age of 64.74 (SD=10.10) in the ultra-Orthodox city.

All the residents of the ultra-Orthodox city , and none of the residents of the non-ultra-Orthodox city resided on streets defined "without ultra-orthodox homogeneity ". Therefore we chose to continue utilizing the differentiation of residing in an ultra-Orthodox city vs. residing in a non-ultra-Orthodox city as the indicator of ultra-Orthodoxy, when analyzing the results of the research.

38.8% of the residents of the ultra-Orthodox city  and none of the residents of the non-ultra-Orthodox city were ranked with a low socioeconomic status 1-3. On the other hand, 78.6% of the residents of the non-ultra-Orthodox city, and not one of the residents of the ultra-Orthodox city were ranked with a high socioeconomic status between 7-10.

 These differences in the distribution of the socioeconomic status in the selected cities led us to continue the analysis by socioeconomic level relative to the place of residence.

Residents of the ultra-Orthodox city in comparison to residents of the non-ultra-Orthodox city (11.7% vs. 25.2%, respectively) (Graph 1)

 [Table 1 about here]

An analysis of the distribution of smoking among residents in each one of cities separately, based on the socio-demographic variables (Table 2) in both cities, the ultra-Orthodox and the non-ultra-Orthodox, higher rates of smoking were found among males. In the ultra-Orthodox city the disparity between men and women was (17.5% vs 6.1% respectively) while in the non-ultra-Orthodox city the smoking disparity between the genders was narrower ( 27.5% vs. 23.3% respectively).

In both cities were higher rates of smoking were found among the relatively younger age groups.

 [Table 2 about here]

Examination of the distribution of smoking according to the socioeconomic status, in the ultra-Orthodox city showed lower rates of smoking among those with a lower socioeconomic status compared with the situation among people with a medium socioeconomic status (8.3% vs.14% respectively); while the smoking rates for people of higher socioeconomic status were slightly lower than the rates for people with a medium socioeconomic status (12.7% vs. 14.7% respectively).

The situation in the non-ultra-Orthodox city showed higher smoking rates for people with a lower socioeconomic status than for those with a medium socioeconomic status (26.1% vs. 28.7% respectively), and the levels of smoking for people with a medium socioeconomic status was higher than for people with a high socioeconomic status (26.1% vs. 20.1% respectively).

It would appear that in the non-ultra-Orthodox group people with a high or medium socioeconomic status smoked less than individuals with a relatively low socioeconomic status. While within the ultra-Orthodox group the findings showed the opposite trend (Graph no. 1).

 [Graph 1about here]

These differences between the groups led us to perform a separate analysis for each group using multivariate  binary logistic regression models (Table 3).

Model no. 1 examined the residents of the ultra-Orthodox city separately. After adjusting for age and gender, lower rates of smoking were found among the lower socioeconomic class relative to residence (OR=0.61, 95%; CI=0.51, 0.73), when compared with the findings among the residents with a higher socioeconomic status. When comparing between smoking rates among residents with a medium socioeconomic status and those with a high socioeconomic status no significant disparity was found (OR=1.18, 95%; CI=1.00, 1.38)

Model no. 2 examined the residents of the non-ultra-Orthodox city separately. After adjustment for age and gender, higher rates of smoking were found among the lower socioeconomic class relative to residence (OR=1.63, 95%; CI=1.47, 1.81), when compared with the findings among the residents with a higher socioeconomic status. Similarly, a higher rate of smoking was found when comparing smoking rates among residents with a medium socioeconomic status and those with a high socioeconomic status (OR=1.45; CI=1.33, 1.58)

As stated, higher smoking rates among men were found in both the secular and the ultra-Orthodox cities. However in the ultra-Orthodox city, even after standardization for age and socioeconomic status the disparity between the genders was far higher (OR=3.27, 95% CI=2.86, 3.73) in comparison to the findings in the non-ultra-Orthodox city (OR=1.25, 95% CI=1.17, 1.34)  (this interaction was found to be significant).

 [Table 3 about here]

The previous analyses were followed by a unified multi-variable analysis of the residents of both the ultra-Orthodox city and the non-ultra-Orthodox city to examine the connection between the place of residence, the socioeconomic status as a continuous variable and gender. (Table 4)

According to model no. 6, after adjustment for age, gender and socioeconomic status as a continuous variable, it would appear that the rate of smoking among those aged 50 years or older in the ultra-Orthodox city was comparatively lower (OR=0.25, 95%; CI=0.22, 0.28) than the rate of smoking for the non-ultra-Orthodox city.

 [Table 4 about here]

This multi-variable analysis indicates that among the variables that were examined: gender, age, socioeconomic status and residence which represents the element of being ultra-Orthodox (Yes/No), the variable of being ultra-Orthodox or not was found to be the most significant and strongest predictor of smoking.

# Discussion:

This study presents three major conclusions. The first conclusion, is that rates of smoking are lower among the ultra-Orthodox population when compared to the numbers in the general population. The second conclusion, is that the disparity between the rates of smoking for the different genders is greater within the ultra-Orthodox population compared to the findings for the general population. And the third conclusion, indicates a different directional correlation between differing socioeconomic status relative to the place of residence and smoking. An inverse correlation between the socioeconomic status relative to the place of residence and smoking was found among the non-ultra-Orthodox population, while the ultra-Orthodox population showed lower rates of smoking by those in the lower socioeconomic in comparison with those of medium or high socioeconomic status.

The first finding, indicating lower rates of smoking in ultra-Orthodox population in comparison to the non-ultra-Orthodox population even after adjustment for age, gender and the socioeconomic status, fits the findings of other studies carried out among the ultra-Orthodox population in Israel (10) (11) and among other religious societies (12)(13)(17). It needs to be noted that one of the commandments of the Jewish religion is the commandment to maintain ones health. Setting aside the issue of religious commandments of religion, several different models were presented that attempted to explain the relationships between religion and health. For example:

Religion and Bio-Psycho-Social Health.(16)

A conceptual model respectively linking three dimensions of religious experience (religious practices, spiritual beliefs, and faith community) with three dimensions of health (biological, psychological, and social)

It is therefore possible that being religious is linked to low smoking rates through various psychological mechanisms.

On the other hand, this finding is not consistent with the relatively low level of cognizance of health and health promoting behaviors found within the ultra-Orthodox population.(5) (6)

The second finding indicating that the disparity between the rates of smoking for the different genders is greater within the ultra-Orthodox population in comparison to the findings for the general population, also fits the results of former researches. (18)

According to the WHO data, it has been found that globally smoking is more common among men. (18) The disparity of smoking rates when comparing men and women is higher in developing countries and lower in more developed countries. (19) A correlation has been found between the degree of empowerment of women and the smoking rates among women.(20)

The relatively large disparity in smoking rates by gender in the ultra-Orthodox society in comparison with the the finding in the general society are a better fit to the disparity found in developing countries compared to those found in more developed countries.(19) We can suppose that in light of the high fertility rates among the ultra-Orthodox population and by keeping the devout traditional rules, the status of the pious woman is less empowered within the ultra-Orthodox society, which connects in the previous research to the findings of lower smoking rates among women.(20)

We could not find literature supporting the current research's third finding , which indicates a different directional correlation between differing socioeconomic status and the smoking rates depending on different levels of religiosity or for neighboring cities in the same country.

Similar to the findings in other countries(8) higher rates of smoking were found within the secular population among members of lower socioeconomic status when compared with rates of smoking among members of higher socioeconomic status. On the other hand, smoking rates within the ultra-Orthodox population went in the opposite direction i.e. the lower smoking rates were among those with lower socioeconomic status. This trend was detected among women and men alike. This orientation of the correlation is unusual, and appeared also in the countries Georgia and Mexico (9).

We wish to present a number of explanations for these differences.

The ultra-Orthodox society is poorer than the general population, and the poor among the ultra-Orthodox are poorer than the poor among the non-ultra-Orthodox. Perhaps at this poverty level there is no room in the budget for the purchase of cigarettes.

It is possible that individuals with a lower socioeconomic status within the ultra-Orthodox society are more religious – or that the individuals with a higher socioeconomic status within the ultra-Orthodox society are more open, share workplaces with the secular society which impacts their smoking habits. This explanation appears to fit the results of the research conducted by Kopel, E et al.(11) that found lower rates of smoking among men who were full time yeshiva students compared with the smoking rates among men who were either employed by others or were self-employed.

# The Research Limitations

Several limitations of our study should be taken into account when interpreting the results. Since the study utilized cross-sectional data, we could not infer any causality or establish the causal direction of the associations.

Another limitation lies in the fact that this research was conducted based on utilization of administrative data and we do not have the ability to validate their findings.

The disparity in the socioeconomic status between the residents of the ultra-Orthodox city and those residing in the non-ultra-Orthodox city resulted in our measuring the socioeconomic status relative to the city of residence and not in an absolute manner.

We lacked information concerning the resulting variable – active smoking – for 1,784 (5.9%) participants which could impact the research results.

The participants in this study are Maccabi HealthCare policyholders who comprise about half of the residents of the two cities. We have no data about the non-policyholders (of Maccabi HealthCare), and we have no ability to examine the differences between the cities, in the characteristics of those insured with the various healthcare providers.

# Implications of the Research Results

The results of this research indicate that religiosity is a social-cultural factor that may be associated with different aspects of smoking.

Indeed, it appears that the correlations between the socioeconomic status and smoking rates may differ for different populations in the same country, which intensifies the need to research these issues.

It appears that carrying out actions to raise awareness of the risk of smoking among ultra-Orthodox with high socioeconomic status is warranted.

This research was conducted among those who are aged 50 years or older. Expanding this investigation for a wider variety of age ranges is highly indicated.

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