Determinants of Self-Rated Health in Tehran, from Individual Characteristics towards Community-Level Attributes

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Abstract

Introduction: It is generally believed that the attributes of shared environment affect health of residents beyond the individual risk factors. This study investigates some individual and neighborhood characteristics that may affect self-rated health (SRH) in Iran.

Methods: Questions were asked about the social capital, economic status and SRH of 1,982 citizens from 200 randomly selected locations in Tehran. The neighborhood characteristics were assessed by an observational checklist. A multilevel model was designed.

Results: SRH was significantly different between neighborhoods (*P*-value < 0.001) and between economic groups (*P*-value < 0.001). At the individual level, social capital (SC) and being married had a positive association with SRH, while age, being female and bad economic statuses were negatively associated with SRH. At the neighborhood level, neighborhoods with higher average education were positively association with SRH, and living in neighborhoods under construction had a negative association with SRH.

Conclusions: These findings highlight the importance of shared social and physical environment, as well as individual characteristics on health, although the mechanisms may still be controversial.

Keywords: Iran, multilevel analysis, residence characteristics, social capital

Introduction

Health inequalities and the determinants of health in different places have been the topic of many studies in recent years.[1–3] Some researchers have shown that the shared social and physical environment of neighborhoods affects the health of residents.[4,5] However, the components and mechanisms,[6] as well as the contextual (resulting from differences in the shared social and physical environments) or compositional (due to the characteristics of the residents) nature of the effect are still a subject of debate.[7]

David defined social capital as features of social organizations such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions.[8] This topic is frequently discussed in many studies, both at individual and community level.[9–11] Social capital may affect health either directly or indirectly by facilitating the distribution of health information, adoption of healthy behavior, social control over health-related behavior, improving access to neighborhood facilities, and providing psychosocial support.[4] Positive impacts of social capital on health have been observed in studies from many countries, mostly in western societies.[12,13] The majority of articles on social

capital and health that indexed in the "Web Of Science" have been originated from a few countries and a small proportion of Eastern Mediterranean region, where Iran is located. Asia is hosting over 60% of the world population with a variety of cultures and social characteristics contributes to less than 10% of articles in this field.

Some researchers believe that many demographic, social and environmental factors such as gender, ethnicity and neighborhood quality may mediate or confound the observed association between social capital and health.[4,10,14–17] Engström[10] stated that the association between contextual social capital and self-rated health (SRH) is not affected much in different socio-demographic subgroups. This association has been observed in some studies even after controlling of individual level attributes of social capital.[7] In a cross-national study, Mansyur, et al.[18] stated that social capital and economic status had significant compositional effects on SRH, but contextual effects varied in different countries. Different aspects of social capital as well as intra and extra-neighborhood network are also shown to affect SRH.[19]

Social and environmental characteristics of neighborhoods are believed to affect the health of residents in many different ways.[20,21] Characteristics of the residents, quality of buildings and roads, green area, availability of services and many other variables have been suggested to play important roles.[22–24] These community-level attributes may vary in different socio-cultural settings and affect the association of health and individual level characteristics such as social capital. Identification of these attributes can provide a better understanding of mechanisms through which the health of residents has been affected.

Tehran, the capital of Iran, is a metropolitan city with a complex social and cultural context where traditional social resources are rapidly modified and replaced with new modern ones. Iran and

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many other countries in the eastern Mediterranean region share many attributes such as Islamic culture and norms, oil-based economy and improvement in many of the health indicators in recent decades.[25] Health statistics have been improved in these countries. Iran has a higher improvement rate in most of the health indicators than other countries in the region.[26,27] Despite the overall improvement in health indicators, a previous study in Tehran has documented inequality in SRH in economic subgroups and the effect of demographic variables on SRH.[28] To determine the underlying reason for this inequality and assess the effect of a shared social and physical environment on SRH, this multilevel cross-sectional study was designed. In this study, the association of SRH and individual factors such as social capital, as well as the role of some community-level attributes and neighborhood characteristics were investigated. We have also intended to evaluate how do these associations change in a socio-cultural setting with a rapid improvement of public health indicators, high emphasis on spiritual health, coexisting of traditional and modern social life, fast growth of the city population and high immigration rate.

We have measured health status by means of SRH. Many studies have shown the ability of SRH as a subjective measure of health to predict mortality in different cultures and age groups,[29–31] although socio-demographic factors can modify its predictive ability.[32–34] SRH is generally accepted as a highly reliable and valid predictive measure of mortality as well as other health outcomes in epidemiological studies.[11,35,36]

Methods

Tehran City has 22 districts and approximately nine million permanent residents.[37] We selected 200 neighborhoods in Tehran. These neighborhoods were randomly selected within each district in a way that the number of locations in each district was proportional to the permanent population announced by municipality. In each neighborhood, the researcher invited ten individuals from the southeast corner of the neighborhood to participate in the study. The participants were chosen in a simple, systematic pattern that aimed to balance the number of male and female respondents who had to be over 18 years old. The participants agree to contribute in the study, be a permanent resident of the neighborhood, and be able to comprehend the questions. Guests and other temporary residents were excluded.

Study tools

We used the Persian version of the modified social capital integrated questionnaire (SC-IQ) to assess SC. The modified SC-IQ has 14 questions in three scales (groups and networks, trust and solidarity, and social cohesion and inclusion). Minor modifications were made to customize the questionnaire to our culture. The reliability and validity of the Persian version had been evaluated previously.[38] The average percentage of these three scales was used as the measure of social capital, ranging from 0 to 100%.

A set of questions was added to the questionnaire to evaluate the economic status of the respondents. These questions consisted of the number of rooms in the house, the area of the house, income, and the availability of twelve assets (separate kitchen, bathroom, computer, washing machine, freezer, dishwasher, vacuum cleaner, personal car, mobile phone, color TV, video or DVD player, and telephone).[28] These questions were summarized in a single wealth index and later the participants were divided into five quantiles.

SRH was evaluated by a single question, where people rated their health status in five categories ranging from very bad to very good. Additionally, the respondents were asked about the duration of their residence in the present neighborhood and city.

A trained observer visited every neighborhood to complete an observation checklist of the health-affecting aspects of neighborhoods that had already been tested for reliability and validity.[39] The checklist was developed based on literature review, interviewing residents and expert panel. It consisted of 22 items in four main scales: general characteristics, public green area, access to services, and undesirable features. To cover other aspects of neighborhood characteristics, some information was gathered on accidents, fires, per capita green areas, construction rates, and average household size from other resources such as Tehran city municipality website.[37] A neighborhood under construction was defined as a location that has the highest decile rate of construction. Neighborhoods where the average education of the samples was 13 years or more were considered as "having a high education level" (general education is twelve years in Iran).

Data analysis

MLwiN software (version 2.23) was used to perform the analysis. Estimations were calculated using Markov Chain Monte Carlo (MCMC) techniques. The ANOVA technique was used to evaluate differences in the socio-demographic subgroups. The Chi-square test was used to compare categorical variables and t-test was used to test the difference in quantitative variables. Independent variables with univariable P-value of less than 0.2 were included in the multilevel regression model. Different models were constructed and the choice was made based on the deviance information criterion (DIC).

Results

Out of 1,982 participants with complete data, 51.1% were female. The age of the participants ranged from 18 to 93 years (median = 39). The participants had between 0 to 25 (median = 12) successful years of education. Among these participants, 64% were married, 28% were single, 1% were divorced, and 7% were widowed.

Only 0.4% of the participants did not answer the question on SRH. Based on their rating, respondents were categorized into two groups: the "suboptimal health" group (13.4 per cent) consisted of those who rated their health as very bad or bad, and the "optimal health" group (including mediocre, good and very good health). Distribution of this binary variable was significantly different between the neighborhoods (P-value < 0.001).

According to Table 1, the distribution of binary SRH was also significantly different in the wealth categories (P-value < 0.001), with the two lowest quantiles (poor and very poor people) having similar and significantly lower SRH than the three wealthiest quantiles. Based on these findings, we recoded wealth into two categories, with lower than 40% as the cut-off point.

We observed 200 neighborhoods in the city. The desirable attributes of the neighborhood ranged between 40% for construction and reconstruction in the area and 99% for access to groceries and supermarkets. The distribution of neighborhoods with desirable conditions is presented in Table 2. The average education of the neighborhoods ranged from 3 to 15 years. Out of 200 neighborhoods, 21 neighborhoods (10.5 percent) were observed with an

Table 1. Distribution of suboptimal health in gender, economic, marital, age, education and social capital subgroups

	Number	Suboptimal health Number (Percent)	*P*-value
Gender	1975	267 (13.5)	0.003 *
Female	1011	159 (15.7)	
Male	964	108 (11.2)	
Economic Status	1947	260 (13.4)	< 0.001*
Very low economic status	415	90 (21.7)	
Low economic status	400	75 (18.8)	
Mediocre economic status	392	39 (9.9)	
Good economic status	380	32 (8.4)	
Very good economic status	360	24 (6.7)	
Marital status	1972	267 (13.5)	< 0.001*
Married	1266	173 (13.7)	
Single	544	34 (6.2)	
divorced	16	6 (37.5)	
widowed	146	54 (37)	
Age	1975	267 (13.5)	< 0.001*
18 – 25	547	28 (5.1)	
26 – 35	345	27 (7.8)	
36 – 45	297	31 (10.4)	
46 – 55	315	59 (18.7)	
56 – 65	232	53 (22.8)	
66 +	239	69 (28.9)	
Education years	1975	267 (13.5)	0.001 *
0	205	66 (32.2)	
1 – 6	385	74 (19.2)	
7 – 12	918	102 (11.1)	
13 +	467	25 (5.4)	
Social Capital	1801	236 (13.1)	< 0.001*
lower tertile	600	105 (17.5)	
Middle tertile	600	78 (13.0)	
Higher tertile	601	53 (8.8)	
*Based on Chi-square Test			

Table 2. The neighborhood condition in the observed neighborhoods based on a checklist

Scale	Item	Number of neighborhoods with desirable conditions	Percent
General characteristics	General sanitary condition of the street	174	87%
	Structure of the street	138	69%
	Trees along neighborhood streets	134	67%
	Unattended land or buildings	128	64%
	Noise	88	44%
	Threat of traffic to pedestrians	158	79%
	Appearance of the buildings	130	65%
	Road traffic	136	68%
Public green area characteristics	exercise facilities	116	58%
	playgrounds	122	61%
Access to services	Park	130	65%
	Press selling points	126	63%
	Health facilities	184	92%
	Drugstore	170	85%
	Bank	162	81%
	Mosque or other religious facilities	184	92%
	Grocery and supermarket	198	99%
	Restaurants, fast foods, café	182	91%
	Public transport	164	82%
Absence of undesirable features	Construction and reconstruction	80	40%
	Beggars, working/street children and the homeless	168	84%
	Distance from commercial centres	142	71%

Table 3. The odds ratio (OR) of the variables included in the final model in the univariate and multilevel analysis

	OR (95% CI)	
	Univariate Analysis	**Multilevel Analysis**
Individual level	- - -	- - -
Gender (female)	0.7 (0.5–0.9)*	0.7 (0.5–0.9)*
Age	0.96 (0.95–0.97)*	0.96 (0.96–0.97)*
Social Capital (10% increase)	1.5 (1.3–1.8)*	1.5 (1.2–1.7)*
Economic Status (not wealthy)	0.4 (0.3–0.5)*	0.7 (0.5–0.9)*
Marital status (being married)	1.1 (0.8–1.4)	1.5 (1.1–2.1)*
Neighborhood level	- - -	- - -
High neighborhood education	1.9 (1.3–2.4)*	2.4 (1.1–5.4)*
under- construction neighborhood	0.5 (0.1–0.9)*	0.4 (0.2–0.8)*
P-value < 0.05		

average education of 13 years or more.

The SC of the respondents ranged from 7.7% to 77.7%, with the average of 41 and SD of 9.5. According to Table 1, the SC was also significantly different between the two SRH categories (P-value < 0.001), and between the neighborhoods (P-value < 0.001). On average the respondents acquired 18% of the total available scores on the groups and networks scale, 53% on the trust and solidarity scale, and 52% on the social cohesion and inclusion scale.

The final multilevel model consisted of the individual and the neighborhood levels. The individual level variables were gender, social capital, age, marital status, and wealth. The neighborhood level variables were average education, years in the neighborhood, and locations under construction, as demonstrated in Table 3.

Discussion

The effect of social environment on health varies between populations.[40] This study was carried out in a Middle-Eastern setting where rapid changes are taking place in the social situation. The society is experiencing the transition from traditional structures to different modernized themes, while many traditional social resources (traditional and religious groups and networks, tribal connections, etc.) are still available. High immigration and emigration rate in the region provide a special opportunity for residents to face different norms, expectations and social networks. The overall improvement in public health status accompanied by the observed inequality has highlighted the need to explore underlying reasons and suggest interventions to reduce the inequality.

Findings of this study provide some evidence regarding the effects of community-level attributes, as well as the effect of individual characteristics on health. An individual's "social capital" was one of the characteristics associated with the health of the residents. In our model 10% increase in social capital score will improve the odds of having a desirable health status by as much as 1.47. Similar associations have been observed between health and social capital in many previous studies in the UK,[41] Ireland,[42] Chile[43] and the US.[44] Our study is performed in a very different social and cultural setting. Such association may be a result of better access to health information, resources and emotional support.

Gender and age were two other individual level attributes. In our model a woman has a greater chance of being dissatisfied about her health than a man with the same level of individual and neighborhood characteristics. This difference has been also observed in other studies in Tehran.[33] Findings regarding the predicting ability of SRH in the genders are inconsistent.[45] According to some stud-

ies, the ability of SRH to predict mortality is almost the same for men and women.[46] However, due to differences in health status, life expectancy, perception of health, and health knowledge, many studies report a gender difference in the association of SRH and mortality.[47] Stafford, et al. argue that the effect of neighborhood environment on SRH is greater in women,[17] but this difference was not observed in our study.

Individual economic status was another important variable in our model, which was already observed in previous studies in Tehran[28] as well as other parts of the world. Dowd, et al. stated that the mortality predicting ability of SRH varies in different socioeconomic subgroups and a poor health rating is a stronger predictor of mortality in higher education or income groups.[48] Singh-Manoux, et al.[31] observed a weaker predictive ability of SRH in middle-aged participants with higher socioeconomic status compared to their counterparts with lower SES. However, Subramanian and Ertel[49] believe that SRH can be used in evaluating social inequality in health. Economic status impact on the health in many ways, and governments can reduce the impact by planning various interventions. Policy makers in Iran have targeted this inequality through various interventions. To reduce the gap in health status between the economic subgroups, the effectiveness of interventions should be evaluated.

This study also highlights the compositional effect of neighborhood on SRH, as seen in other studies.[11,14–15] In our model, there are two community level variables including high construction rate and average neighborhood education. A neighborhood with higher average education has a positive effect on SRH after controlling for other variables such as gender, age, wealth, marital status, and neighborhood under construction. Therefore, characteristics of the residents (such as having a university education) may affect their own health-related behavior as well as their neighbors' behavior and health status. Individual education was eliminated from our model after controlling for the effect of other individual and community level variables. Other studies from Tehran have documented a positive effect of education on SRH, although they did not assess the community level attributes.[28, 33]

High construction rate of the neighborhood was another community level attribute in our model, which was negatively associated with SRH. This negative association can be explained by the fact that these neighborhoods are usually new developing areas of the city of Tehran, where many civil infrastructures are not available yet. Living in these neighborhoods can be an indicator of the residents' socioeconomic status; and the association we have observed might be a result of individual socioeconomic status, rather than contextual effect of the location.

Using SRH instead of objective measures of health is a limitation of this study, because there is not enough literature on the accuracy of SRH in predicting mortality in different socio-demographic subgroups in the Iranian population, although it has been documented in many studies from other parts of the world.[50] Due to the developmental programmes of the municipality in recent years, the characteristics of neighborhoods have been changed in Tehran. These changes are expected to affect the health of the residents of these locations after a certain time span. We could not detect these effects due to the cross-sectional design of our study, which probably weakened the observed association.

In conclusion the findings of this study highlight the importance of a shared social and physical environment as well as individual characteristics for people's health, although the influencing mechanisms are still controversial. Monitoring the changes in the social capital of the residents and encouraging interventions that may have a positive effect on it can benefit society in many ways. Further work needs to be done to design interventions for improving health by community level attributes.

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