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Self-rated health disparities among disadvantaged older adults in ethnically-diverse urban neighborhoods in a Middle Eastern country

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Abstract

Objectives: This paper examines differentials in self-rated health (SRH) among older adults (aged 60+ years) across three impoverished and ethnically-diverse neighborhoods in post-conflict Lebanon and assesses whether variations are explained by social and economic factors.

Design: Data were drawn from the Older Adult Component (n=740) of the Urban Health Survey, a population-based cross-sectional study conducted in 2003 in a formal community (Nabaa), an informal settlement (Hey El-Sellom) and a refugee camp for Palestinians (Burj El-Barajneh) in Beirut, Lebanon. The role of the social capital and economic security constructs in offsetting poor SRH was assessed using multivariate ordinal logistic regression analyses.

Results: Older adults in Nabaa fared better in SRH compared to those in Hey El-Sellom and Burj El-Barajneh, with a prevalence of good, average, and poor SRH being respectively, 41.5%, 37.0%, and 21.5% in Nabaa, 33.3%, 23.9% and 42.7% in Hey El-Sellom, and 25.2%, 31.3%, 43.5% in Burj El-Barajneh. The economic security construct attenuated the odds of poorer SRH in Burj El-Barajneh as compared to Nabaa from 2.57 (95% CI: 1.89-3.79) to 1.42 (95% CI: 0.96-2.08), but had no impact on this association in Hey El-Sellom (OR: 2.12, 95% CI: 1.39-3.24). The incorporation of the social capital construct in the fully adjusted model rendered this association insignificant in Hey El-Sellom (OR: 1.49, 95% CI: 0.96-2.32), and led to further reductions in the magnitude of the association in Burj El-Barajneh camp (OR: 1.18, 95% CI: 0.80-1.76).

Conclusions: The social context in which older adults live and their financial security are key in explaining disparities in SRH in marginalized communities. Social capital and economic security, often overlooked in policy and public health interventions, need to be integrated in dimensions of well-being of older adults, especially in post-conflict settings.

Keywords: self-rated health; ethnicity; displacement; older adults; urban health; conflict; Lebanon.

Introduction

As countries undergo rapid demographic transitions, population aging presents the challenge of mitigating the rising burden of co-morbidities, the pervasive lack of age-appropriate support services, and the growing health inequalities in later life (Bloom et al. 2015). The need to inform policy led to the development of various indicators to characterize health among older adults including quality of life and well-being, and to assess determinants of health inequalities in old age. While the West is spearheading efforts in geriatric research, the epidemiology of aging remains poorly understood in other settings including Arab countries of the Mediterranean region. Here, population aging is doubly challenged by chronic political and economic instability, waves of displacement caused by the recent regional turmoil, and socioeconomic disparities across sectarian and ethnically-diverse populations.

Located at the heart of the Middle East, Lebanon is a middle-income country that continues to be heavily affected by over 16 years of armed conflict and instability from 1975 until 1992. Amongst Arab countries, Lebanon has the highest percentage of older people aged 65 years and above (8.4%) (United Nations Population Division 2012). Close to 87% of the population, estimated at around 4 million people, are clustered in urban areas and a substantial proportion reside in the outskirts of the capital, Beirut (United Nations Population Division 2011). The aim of this work is to characterize older adults' self-perception of health across three underprivileged ethnically-diverse urban communities affected by displacement waves in Lebanon and to explore whether differential in access to social and economic resources can mitigate health disparities.

Self-rated health: a comprehensive measure of well-being

A well-established quality of life indicator among older adults is self-rated health

(SRH)—it has been described in the literature as a robust and universal measure of an individual's current and future health status that encompasses the physical, mental and social dimensions of well-being (Jylha 2009; Mavaddat, Valderas, et al. 2014; Abdulrahim and El Asmar 2012). Beyond its ability to reflect on an individual's quality of life, SRH is also key in predicting mortality, even after controlling for age, gender, socioeconomic status and comorbidities (Idler and Benyamini 1997; DeSalvo et al. 2006; Stenholm et al. 2015; Mavaddat, Parker, et al. 2014).

Determinants of SRH: theoretical perspective

Building on Bourdieu's theoretical approach, better SRH in old age appears to be largely determined by access to psychosocial and material resources as well as the characteristics of the places in which older people live (Carpiano 2006; Berkman 2000; Eriksson 2011; Kim and Kawachi 2006). Bourdieu's social capital theory emphasizes "the collective resources of groups that can be drawn upon by individual group members for procuring benefits and services in the absence or in conjunction with their own economic capital" (Carpiano 2006), which in turn appear to be linked to better health outcomes (Eriksson 2011; Berkman 2000; Kim and Kawachi 2006). Social capital resources include the structural characteristics of a neighborhood (neighborhood's socio-economic conditions, perceived satisfaction with features and services), social connectedness (networks' formation, strength of social ties, and social participation), social norms (trust, reciprocity), and social support (resources that can be mobilized to promote an individual's well-being) (Carpiano 2006; Linden-Bostrom, Persson, and Eriksson 2010). Additionally, economic capital has been suggested to play a role in facilitating access to social capital resources since the ability to acquire services or amenities, such as a phone, or a car, may as well promote social connectedness (Kawachi et al. 1997; Kawachi, Subramanian, and Almeida-Filho 2002).

Mechanisms linking social capital and economic capital to health

Social capital through its various constructs has been shown to attenuate the impact of adverse life circumstances on poor health outcomes including SRH through both direct and indirect pathways (Kawachi, Subramanian, and Almeida-Filho 2002; Chen et al. 2015; Kim and Kawachi 2006; Linden-Bostrom, Persson, and Eriksson 2010; Mavaddat, Valderas, et al. 2014; Eriksson 2011). Specifically, social connectedness, reciprocity, and social support were noted to have a direct impact on maximizing access to resources and addressing individuals' unmet needs (Kawachi, Subramanian, and Almeida-Filho 2002; Eriksson 2011; Pollack and von dem Knesebeck 2004; Kawachi, Subramanian, and Kim 2008). More specifically, higher levels of trust have been also associated with lower rates of cardiovascular and cerebrovascular conditions, cancers, injuries, and even mortality (Kawachi et al. 1997; Berkman, Leo-Summers, and Horwitz 1992). Social participation has been shown to activate cognitive systems and promote positive feelings of meaningfulness and belonging, and more generally mental health (Eriksson 2011). The impact of social capital on health may also follow indirect pathways. Studies have demonstrated that individuals with higher levels of social capital are less likely to engage in risky behaviors such as smoking, poor dietary intake and physical inactivity, which are pre-disposing factors for many chronic conditions (Kawachi, Subramanian, and Kim 2008). The link between lower levels of social capital among older adults and poor SRH has also been established (Pollack and von dem Knesebeck 2004; Nummela et al. 2009) with multi-level analyses reaching similar findings (Kim and Kawachi 2006; Subramanian, Kim, and Kawachi 2002).

Similarly, the association between economic security and better health outcomes including SRH is well documented (Subramanian, Kim, and Kawachi 2005; Subramanyam et al. 2009; Smith 1999). Besides, the affordability of higher living

standards and the ability to seek improved care for various health conditions, a capital of economic resources, has been associated with a sense of financial security—a buffering factor against physical and emotional stress, especially among older adults (Grundy and Sloggett 2003; Huisman et al. 2013; Smith 1999; Kawachi, Subramanian, and Almeida-Filho 2002; Chemaitelly et al. 2013).

The limited data available from the Middle East and North Africa region suggest a positive association between lack of community services, poor housing quality, a derelict infrastructure, and the prevalence of chronic illness (Habib et al. 2009; Habib et al. 2011). Some studies have gaged the accumulated burdens of unemployment and unpaid domestic labor, as well as shrinking social networks, on the health of older persons (Habib et al. 2006; Webster et al. 2015). Others portrayed the gendered dimensions of poor SRH among older persons in urban and informal neighborhoods (Ahmad et al. 2013; Chemaitelly et al. 2013). However, the impact of successive displacement waves on the well-being of older adults and on the social dynamics and economic security among displaced populations remains unexplored.

Setting and context

This research was conducted in three neighborhoods in Lebanon located in the 'poverty belt' surrounding the capital city, Beirut: an eastern suburb (Nabaa) and two southern suburbs (Hey El-Sellom and Burj El-Barajneh). Our choice of neighborhoods was informed by their historical trajectory as their formation is, in part, the result of displacement waves caused by local and regional conflicts. These neighborhoods are geographically defined, and differ not only with respect to their infrastructure, but also with respect to their ethnic and sectarian make-up which renders social interactions across these communities highly unlikely. In this work, we define ethnicity as a socially-constructed identity based on factors inherent to a group such as background,

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culture, and religion which dictate social standing, political power, and access to services (Abdulrahim and Khawaja 2011).

Nabaa is an established formal neighborhood that used to be home for Lebanese with mixed religious backgrounds. Following years of civil strife, Nabaa became largely inhabited by Lebanese Christian families who were either among the original residents of the neighborhood or displaced from other areas (Makhoul, Ghanem, and Ghanem 2003). The neighborhood benefits from developmental plans for that area and a large number of churches, schools and commercial and industrial institutions can be also found in its vicinity.

On the other hand, Hey El-Sellom is an agricultural land that slowly became an informal settlement largely inhabited by Lebanese Muslims moving from rural villages in the South of Lebanon to seek employment in the capital or to flee war and conflict. Although settlements in Hey El-Sellom evolved from tin huts to more concrete structures, these settlements are still considered illegal by the government and lack the appropriate infrastructure to serve its growing population. Residents of Hey El-Sellom are also unique in that they tend to have their extended family living in their original remote villages rather than within the neighborhood (Khawaja et al. 2006; Makhoul J. 2003).

Unlike Nabaa and Hey El-Sellom, Burj El-Barajneh was formed as a temporary settlement to house Palestinian refugees following the 1948 exodus. The Lebanese State has withheld major development of Burj El-Barajneh camp's infrastructure, and thus it has remained largely neglected in terms of infrastructure and basic public services. Palestinian refugees in Lebanon also face legal restrictions in terms of work and travel, and consequently, are at an economic disadvantage compared to the Lebanese population.

Study objectives

This study comes to fill a gap in the aging literature for Arab countries and aims to contribute to a better understanding of the social and economic determinants of health inequality in later life. The study is in tandem with the growing literature on 'Aging in Place' and the associated policy direction that stresses the importance of reinforcing the social and physical environment to ensure healthy aging in one's home and community, and the prevention of isolation, marginalization, and the costly option of unwanted institutional care (World Health Organization 2007).

The study addresses three specific research questions and hypotheses. Firstly, are there differentials in SRH among older adults across the three communities, Nabaa, Hey El-Sellom and Burj El-Barajneh? We hypothesize that older adults in Nabaa, a formal community, will express better SRH than older adults residing in the informal settlement of Hey El-Sellom or in the Palestinian refugee camp of Burj El-Barajneh. Secondly, how do the three communities vary in terms of social capital and economic security? We hypothesize that social capital will be highest in Nabaa, followed by Burj el Barajneh camp, and subsequently Hey El-Sellom, while economic security will be higher in Nabaa and in Hey El-Sellom than in Burj El-Barajneh camp. And finally, can variations in social capital and economic security explain differences in SRH across the communities and what is the contribution of each of these constructs to SRH? We hypothesize that social capital and economic security contribute separately to SRH of older adults across the three communities under study, net of the effect of potential confounding factors.

Data and methods

Study design and data collection

Data for this study were drawn from the Older Adult Component of the Urban Health Study (UHS), a large cross-sectional population-based study conducted by the Center of Research on Population Health of the Faculty of Health Sciences at the American University of Beirut during 2002-2003 in the three neighborhoods of Nabaa, Hey El-Sellom and Burj El-Barajneh. Further details related to the design and conduct of the UHS have been described elsewhere (Khawaja and Mowafi 2006; Jawad, Sibai, and Chaaya 2009). Briefly, the UHS followed a two-stage sampling design, where a sample of 3,300 households was initially selected using a probability sampling proportional to population size. Older adults aged 60 years and over, regardless of religion or legal status, were subsequently invited to participate in the Older Adult Component survey. Institutionalized individuals, migrant workers and those residing in abandoned buildings were not approached. Out of 852 eligible older adults, 740 (86.8%) completed the face-to-face interview. There were minor variations in response rate between communities: 85.8% in Nabaa, 83.1% in Hey El-Sellom, and 90.4% in Burj El-Barajneh camp. Non-response was mainly attributed to residential change and no contact following three unsuccessful attempts. The interview took around 75 minutes to be completed. Less than 1% of older adults had missing or incomplete information and those were excluded from further analyses. The original UHS study and its various components were reviewed and approved by the Institutional Research Board of the American University of Beirut.

Data for the Older Adult Component of the UHS were collected using an interview schedule that comprehensively assessed a range of socio-demographic, health, social and economic indicators. The tool was constructed in Arabic and pilot-tested prior to its

administration by trained university-level interviewers selected from the different communities. Consistency and quality control checks were performed at multiple levels of the data collection and data entry phases. Data were entered using CSpro software where automatic skips and further validity and consistency checks were applied. Questionnaires with detected inconsistencies were returned to the field for re-interview. The validity of the data was further ascertained through a systematic re-interview of 10% of the sample.

Measures

Our dependent variable, SRH, was assessed using a 5-point likert scale ranging from very good, good, average, poor and very poor health. Informed by the frequency distribution of the 5-point measure for SRH across the three communities and other scholarly work (Mellor and Milyo 2005; Wen et al. 2003), we analyzed SRH as an ordinal variable with three categories. Here, subjects who rated their health as 'very good' and 'good' were grouped as having 'good' SRH (coded as 0), those who reported 'average' SRH were considered as a separate category (coded as 1), whereas those who rated their health as 'poor' and 'very poor' were classified as having 'poor' SRH (coded as 2). Details of a sensitivity analysis performed to assess the robustness of our findings using the trichotomous SRH measure to that using the original measure are discussed in subsequent sections.

Social capital is a multidimensional construct which was operationalized based on seven subcomponents including locational capital, social anchorage, social participation, civic trust, reciprocity, hypothetical social support, and social networks (Lindstrom, Sundquist, and Ostergren 2001; Harpham, Grant, and Thomas 2002; Kim and Kawachi 2006; Carpiano 2006; Travis et al. 2004). Items describing these subcomponents (n=21) are detailed in Table 2. Briefly, *locational capital* refers to self-perception of

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neighborhood characteristics and was measured by four indicators that described satisfaction with the neighborhood ('satisfied', 'average satisfaction', 'not satisfied') and perception of services in the area ('good', 'average', 'poor'). *Social anchorage*, defined as the level of ties with the neighborhood, was assessed using four indicators that described one's feeling of belonging ('yes', 'no'), knowing people in the area ('the majority', 'a substantial fraction', 'a few', 'no one'), feeling of safety walking at night ('very safe', 'safe', 'average safety', 'unsafe', 'very unsafe'), and exposure to assaults or harassments ('yes', 'no'). The *social participation* dimension was assessed by two items, namely belonging to a social/community group ('yes', 'no') and attending weekly religious gatherings ('always', 'some of the time', 'never'). *Civic Trust*, described as an acquired sense of confidence that emanates from respectful social interactions with others, was assessed in relation to the generalized trust in people in the area ('the majority', 'a substantial fraction', 'a few', 'no one'), trusting merchants ('the majority', 'a substantial fraction', 'a few', 'no one'), and vigilance being unnecessary when dealing with others ('yes', 'no'). *Reciprocity*, a measure of exchange of voluntary services with others, was assessed using two indicators, namely perception that a sense of reciprocity among community members prevails ('yes', 'no') and engagement in reciprocal exchange of favors with relatives, friends or neighbors in the month preceding the survey ('yes', 'no'). *Hypothetical social support,* a measure of the emotional and instrumental assistance available to the older adult, was assessed using four indicators inquiring about the self-perceived availability of someone to turn to in case of illness ('yes', 'no'), financial hardships ('yes, 'no'), personal hardships ('yes', 'no'), and when needing to go out ('yes', 'no'). Last, *social network*, a measure of the strength of social ties, was assessed based on the quality of the social interaction with children ('yes', 'no') and with relatives, friends, and neighbors ('yes', 'no').

In line with the literature (Nummela et al. 2009; Linden-Bostrom, Persson, and Eriksson 2010; Chemaitelly et al. 2013; Kawachi, Kennedy, and Glass 1999; Lindstrom, Sundquist, and Ostergren 2001), indicators describing the different subcomponents of the social capital construct were dichotomized using a conservative approach for combining negative outcomes. Favorable outcomes for each indicator were coded '1' while negative outcomes were coded '0'. For example, for the 'satisfaction with the neighborhood' indicator, responses of 'satisfied' and 'average satisfaction' were coded 1 and those of 'not satisfied' were coded 0; for the 'knowing people in the area' indicator, responses of 'the majority' and 'a substantial fraction' were coded 1 and those of 'a few' and 'no one' were coded 0, and for the 'feeling of safety walking at night' indicator responses of 'very safe', 'safe', and 'average safety' were coded 1 and those of 'unsafe' and 'very unsafe' were coded 0. The responses for the resulting dichotomous indicators were then summed up to generate a continuous composite score for social capital (range: 0-21; Cronbach's alpha: 0.61).

Economic security was assessed using seven indicators (Table 2): current employment ('yes', 'no'), a monthly income value exceeding the minimum wage in Lebanon ('yes', 'no'), having other sources of income from self or spouse ('yes', 'no'), not receiving monetary assistance from children ('yes', 'no'), charity ('yes', 'no'), or relatives ('yes', 'no'), and having no dependents ('yes', 'no') (Chemaitelly et al. 2013; Clark 2004; National Council on Aging date not known). Following the same methodology used to generate a composite score for social capital, the responses for these indicators were summed up to generate a continuous composite score for the economic security construct (range: 0-7, Cronbach's alpha: 0.56).

Several socio-demographic factors and health-related characteristics were assessed as covariates (Table 1). Socio-demographics included age ('60-64', '65-69', '≥70'), gender

('male', 'female'), education ('any formal schooling', 'no formal schooling'; the majority of older adults had only basic reading and writing skills), marital status ('married', 'not married'), history of displacement ('yes', 'no'), and number of years lived in the neighborhood. Co-morbidity was measured using self-reported physician-diagnosed chronic medical conditions including hypertension, diabetes, cardiovascular and cerebrovascular diseases, arteriosclerosis problems, renal problems, and cancer. Each of these reported medical conditions was dichotomized and coded '1' whenever the condition was present and '0' otherwise. A summative score for chronic conditions was subsequently formed. We further characterized the physical health status of older adults based on limitations in activities of daily living ('yes', 'no') as measured using the Katz's ADL index (Katz et al. 1970). The latter assesses independence in six functions including bathing ('yes', 'no'), dressing up ('yes', 'no'), toileting ('yes', 'no'), transferring ('yes', 'no'), continence ('yes', 'no'), and feeding ('yes', 'no'). An older adult reporting a limitation in any of these functions was considered as having a disability. Cigarettes and/or narghile smoking were also reported ('yes', 'no').

Statistical analysis

Bivariate analyses using Chi^2 and ANOVA tests were performed to examine differentials in SRH across the three communities, Nabaa, Hey El-Sellom and Burj El-Barajneh camp, and further characterize them based on the socio-demographic and health profile of their older adults' population (Table 1). Cross-community comparisons in relation to social capital and economic security indicators and their summative scores were also performed using respectively, Chi^2 and ANOVA tests (Table 2), as well as bivariate logistic and linear regression analyses (Table S1 in Supplementary Online Material; SOM).

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Four multivariate ordinal logistic regression models were subsequently developed
to explain the perception of poorer SRH expressed by older adults in Hey El-
Sellom and in Burj El-Barajneh camp compared to those in Nabaa (Table 3). The
first model examined the association between community and poorer SRH
adjusting for the effect of socio-demographic and health-related factors that were
either identified as significant in the bivariate analysis (Table 1) or known as
established correlates of poor SRH. Models 2 and 3 assessed, respectively, the
individual contribution of each of the economic security and social capital
constructs to the association between community and poorer SRH net of the effect
of socio-demographic and health-related factors. The relative contribution of the
economic security and social capital constructs (incorporated simultaneously in
the model) was assessed in Model 4. To examine the magnitude of the differences
between Hey El-Sellom and Burj El-Barajneh with respect to poorer SRH,
supplemental multivariate ordinal logistic regression analyses were performed
applying the models described above while using Burj El-Barajneh as the
reference community (Table S2 in SOM). The results of these multivariate
analyses were reported using odds ratios (OR) and 95% confidence intervals (CI).

Sampling weights were applied to all analyses to adjust for cluster sampling effects and
the unequal sampling probabilities from these neighborhoods. Statistical analyses were
performed using STATA/SE version 13.0, and p-value ≤ 0.05 was considered
significant.

Social capital and economic security: mediation tests

Analyses testing whether the social capital and economic security constructs will
qualify as mediators for the association between community and SRH based on
Baron and Kenny's criteria were also performed (Baron and Kenny 1986). These

entailed testing whether a) the type of neighborhood is significantly associated with each of the social capital and economic security constructs (Table 2 and Table S1 in SOM), b) the social capital and economic security constructs are significantly associated with poorer SRH (data not shown), and c) the type of neighborhood is significantly associated with poorer SRH, and this association becomes attenuated towards the null hypothesis and not significant after controlling for social capital and economic security constructs (Table 3).

Sensitivity analyses

A sensitivity analysis was performed to assess the robustness of our findings to the use of a trichotomous measure for SRH instead of the original 5-point likert scale for that measure. To this end, we applied our full multivariate ordinal logistic regression model adjusted for the effects of the socio-demographic, health, economic security and social capital variables (Model 4) to the association between community and poorer SRH using respectively, the trichotomous and the 5-point likert scale measures (Table S3 in SOM).

Another sensitivity analysis was implemented to assess the robustness of our findings to an alternative conceptualization of social capital that distinguishes between community- and individual-level resources (Table S4 in SOM). A composite score for each of the community- and individual-level social capital measures was calculated by summing up their respective dichotomous indicators. The contribution of the resulting measures to the association between community and poorer SRH was subsequently evaluated using the multivariate ordinal linear regression analyses, described earlier (Table S5 in SOM).

Results

Significant differences in SRH were observed across the three communities (Table 1).

Nabaa had the highest proportion of older adults reporting good SRH (41.5%), followed

by Hey El-Sellom (33.3%) and Burj El-Barajneh (25.2%). The distribution of average

and poor SRH was, respectively, 37.0% and 21.5% in Nabaa, 23.9% and 42.7% in Hey

El-Sellom, and 31.3% and 43.5% in Burj El-Barajneh camp. The three communities

were comparable in terms of age, gender and marital status distributions. Older adults in

Nabaa were significantly more likely to have achieved formal schooling (48.4%) than

their counterparts in Hey El-Sellom (23.7%) and Burj El-Barajneh (39.4%). More than

two thirds of the older adult population across these settings reported a history of

displacement (69.3%) with the highest percentage being noted in Burj El-Barajneh

(83.2%). The overall mean number of years lived in the household (±SD) at the time of

the survey was 26.5 (±16.2) years with significant differences across the three

communities, being highest in Burj El-Barajneh camp (35.3 years), followed by Nabaa

(23.8 years), and Hey El-Sellom (17.4 years). Close to 70% of older adults reported

being diagnosed with at least one chronic medical condition, and around one third faced

limitations in their activities of daily living. The latter was significantly highest in Burj

El-Barajneh camp (53.5%, $p<0.001$). Tobacco smoking was also more prevalent in Burj

El-Barajneh camp (36.6%) than in Nabaa (26.1%) and Hey El-Sellom (22.0%).

[TABLE 1 ABOUT HERE]

Table 2 shows the distribution of social capital and economic security indicators

compared across the three communities. Overall, Nabaa had the highest level of social

capital, showing on a 21-points score, a mean of 13.5, while Burj El-Barajneh camp and

Hey El-Sellom followed with mean scores of 12.1 and 10.6, respectively ($F_{2,733} = 52.51$,

p-value <0.001). The higher levels of social capital observed in Nabaa was mainly

attributed to consistently higher scores on locational capital, social participation, reciprocity, hypothetical social support, and social networks beyond the immediate family. However, Burj El-Barajneh camp appeared to match and, in some instances, exceed Nabaa and Hey El-Sellom in relation to certain other social capital indicators such as social anchorage and civic trust. For example, 86.2% of older adults in Burj El-Barajneh expressed strong feelings of belonging to the community compared to 74.6% in Hey El-Sellom and 51.9% in Nabaa. Also, stronger feelings of civic trust towards merchants and community members prevailed in Burj El-Barajneh camp (67.9% and 27.2%, respectively) compared to Nabaa (49.7% and 21.0%, respectively) and Hey El-Sellom (56.4% and 7.6%, respectively). Hey El-Sellom scored lowest on indicators for hypothetical social support with only about two third of older adults reporting that they can turn to someone in case of financial hardships or when in need of help with personal hardships, and slightly more than half reporting that they can turn to someone when they feel like going out. Meanwhile, the vast majority of older adults across the three communities reported having strong social networks and excellent relations with their children, relatives, friends, and neighbors.

In contrast to the above, in examining differentials in economic security across the three communities, Burj El-Barajneh camp was found to be the most disadvantaged (Table 2), while Nabaa and Hey El-Sellom exhibited comparable characteristics. On a 7-points score, we estimated a mean economic security of 2.9 in Burj El-Barajneh compared to 4.0 in Nabaa and 4.1 in Hey El-Sellom ($F_{2,736} = 69.86$, p-value <0.001). Significant differences in economic security were revealed between Burj El-Barajneh camp and each of Nabaa and Hey El-Sellom. Meanwhile, Nabaa and Hey El-Sellom had comparable economic profiles. Indeed, although levels of current employment were not significantly different across the three communities (17% overall), older adults in Nabaa

and Hey El-Sellom were significantly more likely to have a monthly earning exceeding the minimum wage than those in Burj El-Barajneh camp (84.6% and 79.7% vs. 46.8%, respectively, p <0.001). Older adults in Burj El-Barajneh were also more likely than those in the other two communities to be dependent on others, thus receiving income assistance from charity (52.0% vs. 4.8% and 1.7%, respectively, p-value <0.001) and were more likely to financially support other dependents (68.3% vs. 42.5% and 41.5%, respectively, p-value <0.001).

[TABLE 2 ABOUT HERE]

Table S1 in SOM shows findings of the bivariate regression analyses examining the magnitude of the association between the three communities and the various social capital and economic security indicators as well as their summative scores. Compared to Nabaa, older adults in Hey El-Sellom and Burj El-Barajneh were significantly less likely to exhibit neighborhood satisfaction, engage in social activities or reciprocal exchange of non-financial favors, or to have social support. This translated to older adults in Hey El-Sellom and Burj El-Barajneh being significantly more likely to have lower scores on the social capital construct than older adults in Nabaa (β=-2.90, 95% CI: -3.48 ; -2.31 and β=-1.45, 95% CI: -1.90 ; -0.98, respectively). As expected, older adults in Burj El-Barajneh camp were particularly prone for poorer socio-economic security compared to those in Nabaa (β=-1.12, 95% CI: -1.33 ; -0.92). Meanwhile, there was no difference in economic security between older adults residing in Hey El-Sellom and those residing in Nabaa (β=0.12, 95% CI: -0.14 ; 0.38).

Compared to Burj El-Barajneh, older adults in Hey El-Sellom were significantly more likely to be satisfied with their neighborhood, but less likely to express feelings of social anchorage and civic trust, to be socially active, and to have someone to turn to in case of illness or when feeling like going out. Meanwhile, there was no difference between the

two neighborhoods with respect to perception of local infrastructure, feeling safe to walk at night, engaging in reciprocal exchange of services, getting support in case of financial and personal hardship, and having a strong social network. However, overall, older adults in Hey El-Sellom were significantly more likely to have a lower social capital score than those in Burj El-Barajneh camp (β=-1.45, 95% CI: -2.07 ; -0.82). Lebanese older adults in Nabaa and Hey El-Sellom were also significantly more likely to score higher on the economic security construct than their Palestinian counterparts in the camp (β=1.12, 95% CI: 0.92 ; 1.33 and β=1.25, 95% CI: 0.97 ; 1.53, respectively).

Findings of our multivariate regression analyses are presented in Table 3. Older adults residing in Hey El-Sellom and Burj El-Barajneh had higher odds for reporting poorer SRH outcomes (OR: 2.07, 95% CI: 1.36-3.16 in Hey El Sellom and OR: 1.72, 95% CI: 1.19-2.49 in Burj El-Barajneh) than older adults residing in Nabaa in the first model adjusted for socio-demographic and health-related factors (Model 1). The inclusion of the economic security score in Model 2 explained the variation in poorer SRH for Burj El-Barajneh where the OR was attenuated from 1.72 (95% CI: 1.19-2.49) to 1.42 (95% CI: 0.96-2.08) after adjusting for confounders but not for Hey El-Sellom (OR: 2.12, 95% CI: 1.39-3.24 in Model 1 vs. OR: 2.12, 95% CI: 1.39-3.24 in Model 2). However, unlike Model 2, the multivariate model assessing the contribution of social capital (Model 3) was able to explain most of the variation in poorer SRH for older adults in both Hey El-Sellom (OR: 1.46, 95% CI: 0.94-2.23) and Burj El-Barajneh (OR: 1.45, 95% CI: 1.00-2.12). In the fully adjusted model (Model 4) examining the relative contribution of the social capital and economic security constructs, further reduction of the OR for only Burj El-Barajneh camp to 1.18 (95% CI: 0.80-1.76) was noted.

[TABLE 3 ABOUT HERE]

Our supplemental multivariate regression analyses using Burj El-Barajneh as a reference, showed no significant differences in poorer SRH between Hey El-Sellom and Burj El-Barajneh camp in the first model controlling for basic socio-demographic and health variables (OR: 1.20, 95% CI: 0.73-1.96), nor in subsequent models controlling for additional covariates (Table S2 in SOM).

Mediation analysis

Our analyses assessing whether the social capital and economic security constructs fulfill *Baron and Kenny*'s mediation criteria (Baron and Kenny 1986) revealed significant associations between the type of neighborhood and each of the social capital and economic security constructs (Table 2 and Table S1 in SOM). The social capital and economic security constructs were also significantly associated with poorer SRH (OR: 0.84, 95% CI: 0.81-0.89 and OR: 0.70, 95% CI: 0.63-0.78, respectively; bivariate analyses that are not shown in tables). In addition, the significant association between type of neighborhood and poorer SRH (Tables 1 and 3) was rendered non-significant after the inclusion of the social capital and economic security constructs (Table 3). These analyses affirm the social capital and economic security constructs as mediators for the association between type of neighborhood and poorer SRH.

Sensitivity analyses

Our sensitivity analysis comparing the outcomes of multivariate ordinal regression analyses (Model 4) using respectively, the 3-point and 5-point measures for poorer SRH yielded similar results with a slightly better R^2 for the model using the trichotomized outcome (Table S3 in SOM).

We explored the robustness of our findings to an alternative conceptualization of social capital that distinguishes between community- and individual-level resources (Table S4

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in SOM). On an 8-point score for community-level social capital, Nabaa showed a mean of 5.4, followed by Burj El-Barajneh camp with a mean of 4.2, and Hey El-Sellom with a mean of 4.1. Similarly, on a 13-point score for individual-level social capital, Nabaa had a higher score (mean of 8.1), than Burj El-Barajneh (mean of 7.8), and Hey El-Sellom (mean of 6.5). Incorporating community-level social capital in a multivariate ordinal regression model reduced the magnitude of the association between community and poorer SRH from an OR of 2.07 (95% CI: 1.36-3.16) to 1.59 (95% CI: 0.94-2.23) in Hey El-Sellom and from 1.72 (95% CI: 1.20-2.49) to 1.35 (95% CI: 1.00-2.12) in Burj El-Barajneh camp, after controlling for socio-demographic and health variables (Table S5 in SOM). On the other hand, while it reduced the magnitude of the association between community and poorer SRH, a model incorporating individual-level social capital did not fully explain this association among older adults in Hey El-Sellom (OR: 1.71; 95% CI: 1.11-2.64). This model did not also have an impact on the association between Burj El-Barajneh and poorer SRH (OR: 1.70; 95% CI: 1.18-2.46). However, all three constructs for economic security, community-level and individual-level social capital remained significant in the full multivariate ordinal logistic model examining the magnitude of the association between community and poorer SRH. The latter was assessed at an OR of 1.48 (95% CI: 0.96-2.32) in Hey El-Sellom and of 1.16 (95% CI: 0.80-1.76) in Burj El-Barajneh camp compared to Nabaa.

Discussion

This study extends on previous research on the various roles played by social capital and economic security in explaining health disparities among older adults within the context of ethnically-diverse underprivileged urban neighborhoods. As a result of years of civil strife and conflict in Lebanon, the three communities examined in this study

share a low socio-economic profile characterized by dense urban livings, economic hardships, displacement, and lack of public services and infrastructure. Despite these similarities, striking differences in SRH were revealed and these were explained by differentials in the availability of social and economic resources—possibly a reflection of the structural differences across these communities. Older adults in Nabaa, a formal neighborhood, fared better in SRH than the older cohort in Hey El-Sellom, an informal settlement, and the Palestinian refugees in Burj El-Barajneh camp. Although older adults in Nabaa and Hey El-Sellom were similar with regard to economic security, Nabaa exhibited higher levels of social capital. Social and economic deficiencies appeared to contribute equally to the poorer perception of health among older adults in Burj El-Barajneh camp. Meanwhile, the poorer SRH among older adults in Hey El-Sellom was largely determined by the lower levels of social capital in this neighborhood. These findings and the contextual realizations of these relations are discussed below.

The disparity in SRH between older adults in Burj El-Barajneh camp and Nabaa is not surprising. Palestinian camps in Lebanon were established as temporary settlements following the 1948 Palestinian exodus, and political agreements entailed that the Lebanese government has minimal interference in the camps' governance. Six decades past their institution, the camps are still viewed as temporary arrangements and are often overlooked in the government's infrastructure renovation plans (Makhoul, Ghanem, and Ghanem 2003). Calls for granting citizenship to the second- and third-generation Lebanese-born Palestinians have been continuously rejected out of concerns over upsetting the sectarian balance in the country (Abdulrahim and Khawaja 2011). Palestinians' participation in the Lebanese labor force is also largely restricted leading those working in professional jobs to earn substantially lower wages than their

Lebanese counterparts (Abdulrahim and Khawaja 2011). The lack of adequate social and economic integration programs for Palestinian refugees makes Burj El-Barajneh camp the most deprived among the three neighborhoods. This disconnect may have fostered social ties within the camp and may have led to higher levels of social support and social anchorage among its residents, despite poor locational capital and the absence of proper national integration schemes. The environmental and economic disparities between Palestinian older refugees and Lebanese older adults were also reflected in health differentials, with Palestinians bearing twice the disability burden and significantly higher smoking levels. Our analysis underscored the role of social capital and economic resources in shaping poor SRH among Palestinian older adults. These findings appear to be consistent with reviews and studies conducted among underprivileged refugees and ethnic minorities elsewhere. Research from Europe and the USA argues that disparities in health, including a lower perception of health, are a direct outcome of the disadvantage triad of poor sense of control, social isolation, and deprivation (Lindstrom, Sundquist, and Ostergren 2001; Nielsen and Krasnik 2010; Wong et al. 2011).

Our findings of a significant differential in SRH between Hey El-Sellom and the baseline Nabaa community, largely explained by social capital, merits further discussion of the contextual factors specific to Hey El-Sellom. Although Lebanese, residents of these communities have different displacement histories and their social conditions and health are shaped by differences in background and culture. Residents of Hey El-Sellom are, in the majority, displaced from rural areas in the South of Lebanon, which is perceived as their primary place of belonging (Makhoul, Ghanem, and Ghanem 2003). Because support systems in Lebanon, as elsewhere in Arab countries, tend to revolve around the extended family sphere (Rashad, Osman, and Roudi-Fahimi

2005; Sibai and Yamout 2012), older persons compelled to remain in urban settlements may find themselves disconnected from their origin and from extended familial social networks (Habib et al. 2011; Connidis 2009) and, hence, prone to poorer health. This social disconnect was evident, particularly, through the low levels of social participation, support, trust, and reciprocity in Hey El-Sellom (Table 2 and Table S1 in SOM). Older adults displaced from rural areas may also be facing challenges in adjusting to urban living. Indeed, unlike urban areas, villages tend be less crowded, have more friendly physical environments for elder adults, a slower pace of life, and multiple opportunities for vibrant social interactions among residents. The nature of informal settlements could have also added other constraints on the involvement of older adults residing in these neighborhoods in decision-making at community level, thus contributing to their poor SRH. For instance, electoral rights in Lebanon are defined by the individual's area of origin rather than area of residence, which may have contributed to the weakened local ties and a detachment from community affairs in Hey El-Sellom. These observations were affirmed by our regression analyses emphasizing social capital as a key determinant of well-being among older adults even after controlling for economic deprivation (Table 3).

We observed no difference between older adults in Hey El-Sellom and those in Burj El-Barajneh camp with respect to poorer SRH (Table S2 in SOM). One plausible explanation to our findings pertains to the type of migration—a factor closely related to self-perceived health (Sundquist, Johansson, and Sundquist 2009; Sundquist et al. 2000). Indeed, unlike Nabaa where older adults tend to be voluntary-returns to their community post-war, the settlement of older adults in Hey El-Sellom and Burj El-Barajneh camp was rather involuntary. The context in which these displacements occurred and the resulting sensitivities between the various ethnicities dictated that

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individuals displaced from southern villages reside in informal settlements in the southern suburbs of Beirut and that Palestinian refugees be confined to their camps. Evidence has linked 'forced' migration/displacement and the associated sense of lack of control to poorer health outcomes and poorer SRH (Sundquist, Johansson, and Sundquist 2009; Sundquist et al. 2000). However, further research is warranted to explore whether there could be other explanations to the observed trend.

Our alternative conceptualization of the social capital construct highlighted the role of community-level resources in alleviating poorer SRH among older adults and indicated that, despite their importance, individual-level resources are not the sole determinants of older adults' well-being (Table S5 in SOM). These findings are in line with an abundant literature on 'Ageing in Place' which highlights the sense of attachment, security, and feelings of autonomy that older adults tend to attribute to their neighborhoods and the health benefits associated with a positive neighborhood perception (Wiles et al. 2012; Wiles et al. 2009). Our findings emphasize the need to advocate for infrastructure development plans that would maximize the opportunities of older adults in underserved communities to carry comfortably their activities of daily living, engage in age-appropriate recreational activities, promote their social interaction, and provide them with a positive perception of their physical environment.

Our study findings need to be discussed in view of certain limitations. The cross-sectional design of the survey renders the temporal evolution of events less evident. For instance, while low levels of social capital and economic security may have likely contributed to poorer SRH among older adults, there is a possibility that poorer SRH could have affected not only social capital pillars, but also the motivation to engage in income generating activities. Furthermore, in the absence of a unique standardized scale for social capital, our constructs' indicators were adapted from scales that have been

widely used in Western countries. The authenticity of these indicators to the original measures and their applicability to the Arab context still need to be established using validation studies. Also, our analytical approach was limited by the various metrics used to assess the indicators of the social capital and economic security constructs. This dictated the dichotomization of measures prior to constructs' development which may have obscured part of the variability captured by those measures, thus possibly introducing bias to these constructs. A formal mediational analysis for the social capital and economic security constructs was also not possible given the ordinal nature of our dependent variable. Finally, it should be mentioned that, although the findings of this study provide insights into possible determinants of SRH among older adults, they may not be directly generalizable to older adults in other impoverished settings or to the older Lebanese population at large.

Since the date of this survey, the country has witnessed several other conflicts, including the July 2006 war on Lebanon and the more recent Syrian crisis, yielding an influx of over 1.5 million refugees. The resulting strains on existing social and economic infrastructures in these neighborhoods are magnified by the prevailing governmental dysfunction hindering the development and implementation of interventions. While these emerging circumstances could have an impact on the magnitude of the association between social and economic constructs and SRH, they are unlikely to change the directionality of our findings highlighting the importance of these dimensions for well-being at old age.

In conclusion, this study sheds light on the role of social capital and economic security in explaining disparities in SRH among older adults in marginalized communities. Programs and policy should focus on addressing these, often overlooked, dimensions of well-being among older adults especially in post-conflict regions. This is a timely public

health concern in the Arab region in light of the ongoing regional strives and the increasing numbers of displaced communities with various geo-historical trajectories of movements and displacements.

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Table 1. Socio-demographic and health-related characteristics of older adults, Urban Health Survey, Beirut, 2003.

Table 2. Comparison of social capital and economic security indicators across Nabaa, Hey El-Sellom, and Burj El-Barajneh camp, Urban Health Study, Beirut, 2003.

Table 3. Multivariate ordinal logistic regression analyses for poorer self-rated health, Urban Health Study, Beirut, 2003.

TABLE 1 Socio-demographic and health-related characteristics of older adults, Urban Health Survey, Beirut, 2003.

Variables	Total		Nabaa		Hey El-Sellom		Burj El-Barajneh Camp		p-value
	N = 740		N = 376		N = 118		N = 246		
	n	%	n	%	n	%	n	%	
Self-rated health									
Good and better	257	34.8	156	41.5	39	33.3	62	25.2	<0.001
Average	244	33.0	139	37.0	28	23.9	77	31.3	
Poor and worse	238	32.2	81	21.5	50	42.7	107	43.5	
Socio-demographic									
Age (years)									
60-64	260	35.1	114	30.3	47	39.8	99	40.2	0.088
65-69	211	28.5	118	31.4	31	26.3	62	25.2	
≥70	269	36.4	144	38.3	40	33.9	85	34.6	
Sex (% males)	328	44.3	165	43.9	50	42.4	113	45.9	0.790
Marital status (% married)	462	62.4	239	63.6	72	61.0	151	61.4	0.810
Education (% any formal schooling)	307	41.5	182	48.4	28	23.7	97	39.4	<0.001
History of displacement (% yes)	510	69.3	223	59.6	84	71.2	203	83.2	<0.001
Years living in the house (mean±SD)	26.5 ± 16.2		23.8 ± 15.3		17.4 ± 12.8		35.3 ± 15.5		<0.001
Health-related variables									
Chronic conditions[*] (% yes)	510	69.4	261	69.6	84	71.8	165	67.9	0.748
Disability (% yes)	237	32.2	79	21.1	27	23.1	131	53.5	<0.001
Smoking cigarettes or narghile (% yes)	214	28.9	98	26.1	26	22.0	90	36.6	0.004

*Chronic conditions include one or more of the following medical conditions: hypertension, diabetes, cardiovascular and cerebrovascular diseases, arteriosclerosis problems, renal problems, and cancer.

TABLE 2 Comparison of social capital and economic security indicators across Nabaa, Hey El-Sellom, and Burj El-Barajneh camp, Urban Health Study, Beirut, 2003.

Concept and indicator	Total (%)	Nabaa (%)	Hey El-Sellom (%)	Burj El-Bararajneh (%)
Social Capital				
Locational capital				
Happy living in neighborhood/ neighborhood satisfaction (yes)	74.7	84.8	77.1	58.1**
Perception of services in the area-good local schools (yes)	64.2	77.9	58.5**	45.9**
Perception of services in the area-good local infrastructure (yes)	49.7	62.8	39.8**	34.6**
Perception of services in the area-good waste management (yes)	70.3	72.3	48.3**	77.6
Social anchorage				
Feeling like you belong here (yes)	66.9	51.9	74.6**	86.2**
Knowing people in neighborhood (yes)	52.8	60.6	18.6**	57.3
Feeling safe walking alone at night (yes)	85.3	88.5	78.8**	83.3
No exposure to physical assaults/ verbal harassment (yes)	84.2	79.8	83.1	91.5**
Social participation				
Belong to social/community group/neighborhood union (yes)	11.8	16.5	2.5**	8.9**
Attendance of weekly religious activities (yes)	32.6	33.7	28.2	33.1
Civic trust				
Trusting people in area (yes)	21.0	21.0	7.6**	27.2
Trusting merchants (yes)	56.8	49.7	56.4	67.9**
One need not be vigilant in dealing with others in community (yes)	21.0	31.4	11.9**	9.4**
Reciprocity				
People in this community help each other (yes)	34.5	46.8	17.1**	23.9**
Any exchange of non-financial favors last month (yes)	31.3	41.4	18.8**	21.6**
Hypothetical social support				
Can turn to someone in case of illness (yes)	94.2	97.6	82.2**	94.7
Can turn to someone in case of financial hardship (yes)	71.4	79.0	61.9**	64.2**
Can turn to someone for help with personal hardships (yes)	76.0	83.2	62.7**	71.1**
Can turn to someone if feels like going out (yes)	75.5	85.4	53.4**	71.0**
Social networks				
Good relation with children (yes)	92.3	91.7	95.7	91.4
Good relation with relatives/friends/neighbors (yes)	91.6	95.7	88.9**	86.5**
Social capital composite score (mean±SD)†	12.6± 3.0	13.5±3.0	10.6**± 2.7	12.1**±2.6
Economic security				
Current employment (yes)	17.0	16.2	13.6	19.9
Monthly income exceeding 450,000 Lebanese pounds (yes)	71.2	84.6	79.7	46.8**
Income from self/spouse (yes)	24.9	24.5	25.4	25.2
Income assistance from children (yes)	68.5	68.6	61.5	71.5
Income assistance from charity (yes)	20.0	4.8	1.7	52.0**
Income assistance from relatives or friends (yes)	11.4	11.4	4.3*	14.6
Income dependents (yes)	50.9	42.5	41.5	68.3**
Economic security composite score (mean±SD)†	3.6± 1.4	4.0± 1.1	4.1± 1.1	2.9±1.5**

*p-value <0.05 (bivariate analyses using Nabaa as a reference category).

**p-value <0.01 (bivariate analyses using Nabaa as a reference category).

[†]Composite scores for the social capital and the economic security constructs were generated by summing up indicators describing each of these constructs. Favorable outcomes for each indicator were coded '1' while negative outcomes were coded '0'. It bears notice that for certain indicators, the favorable outcome might not have been necessarily used to describe that indicator in the table.

TABLE 3 Ordinal logistic regression analyses for poorer self-rated health, Urban Health Study, Beirut, 2003.

Variables (reference category)	Model 1		Model 2		Model 3		Model 4	
	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI
Community (Nabaa)								
Hey El-Sellom	2.07	1.36-3.16	2.12	1.39-3.24	1.46	0.94-2.23	1.49	0.96-2.32
Burj El-Barajneh	1.72	1.20-2.49	1.42	0.96-2.08	1.45	1.00-2.12	1.18	0.80-1.76
Age (60-64)								
65-69	1.46	1.02-2.09	1.34	0.93-1.92	1.39	0.97-2.00	1.27	0.88-1.84
70+	1.27	0.90-1.80	1.12	0.78-1.60	1.26	0.88-1.79	1.10	0.77-1.59
Sex (female)								
Male	0.70	0.50-0.97	0.72	0.51-1.00	0.80	0.57-1.12	0.81	0.58-1.14
Education (formal schooling)								
No	1.19	0.86-1.66	1.15	0.83-1.61	1.18	0.85-1.66	1.14	0.81-1.60
History of displacement (none)								
Yes	1.18	0.86-1.61	1.18	0.86-1.61	1.24	0.90-1.69	1.22	0.89-1.68
Years living in house	1.00	0.99-1.01	1.00	0.99-1.01	1.01	1.00-1.02	1.01	1.00-1.02
Smoking (no)								
Yes	1.25	0.89-1.75	1.25	0.88-1.75	1.16	0.82-1.63	1.16	0.82-1.64
Chronic conditions	1.42	1.29-1.57	1.41	1.28-1.56	1.43	1.29-1.59	1.42	1.28-1.57
Disability (no)								
Yes	2.60	1.85-3.65	2.47	1.76-3.48	2.59	1.84-3.65	2.46	1.74-3.47
Economic security score			0.81	0.72-0.92			0.81	0.72-0.92
Social capital score					0.87	0.82-0.91	0.86	0.82-0.91

Model 1: Association between community and poorer SRH adjusting for age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability.

Model 2: Role of economic security in explaining the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Model 3: Role of social capital in explaining the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Model 4: Relative contribution of economic security and social capital to the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Supplementary Online Material

Self-rated health disparities among disadvantaged older adults in ethnically-diverse urban neighborhoods in a Middle Eastern country

TABLE S1 Cross-community comparisons for the social capital and economic security indicators and their summative scores using respectively, Nabaa and Burj El-Barajneh camp as the reference community, Urban Health Study, Beirut, 2003.

Reference community	Nabaa (reference)		Burj El-Barajneh (reference)	
	Hey El-Sellom	Burj El-Barajneh	Nabaa	Hey El-Sellom
Concept and indicator	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Social Capital				
Locational capital				
Happy living in neighborhood/ neighborhood satisfaction	0.60 (0.36-1.00)	0.25 (0.17-0.36)[**]	4.03 (2.76-5.89)[**]	2.43 (1.47-4.00)[**]
Perception of services in the area- good local schools	0.40 (0.26-0.62)[**]	0.24 (0.17-0.34)[**]	4.15 (2.93-5.89)[**]	1.66 (1.06-2.58)[*]
Perception of services in the area- good local infrastructure	0.39 (0.26-0.60)[**]	0.31 (0.22-0.44)[**]	3.19 (2.28-4.47)[**]	1.25 (0.80-1.97)
Perception of services in the area- good waste management	0.36 (0.23-0.55)[**]	1.32 (0.91-1.93)	0.75 (0.52-1.10)	0.27 (0.17-0.43)[**]
Social anchorage				
Feeling like you belong here	2.72 (1.72-4.32)[**]	5.79 (3.82-8.76)[**]	0.17 (0.11-0.26)[**]	0.47 (0.27-0.82)[**]
Knowing people in neighborhood	0.15 (0.09-0.25)[**]	0.87 (0.63-1.21)	1.15 (0.83-1.59)	0.17 (0.10-0.29)[**]
Feeling safe walking alone at night	0.48 (0.28-0.83)[**]	0.65 (0.41-1.03)	1.54 (0.97-2.45)	0.74 (0.43-1.29)
No exposure to physical assaults/ verbal harassment	1.24 (0.72-2.14)	2.71 (1.62-4.53)[**]	0.37 (0.22-0.61)[**]	0.46 (0.24-0.88)[*]
Social participation				
Belong to social/community group/neighborhood union	0.13 (0.04-0.43)[**]	0.50 (0.30-0.83)[**]	2.01 (1.20-3.37)[**]	0.27 (0.08-0.91)[*]
Attendance of weekly religious activities	0.77 (0.49-1.22)	0.97 (0.69-1.37)	1.03 (0.73-1.45)	0.80 (0.49-1.29)
Civic trust				
Trusting people in area	0.31 (0.15-0.64)[**]	1.41 (0.97-2.05)	0.71 (0.49-1.03)	0.22 (0.11-0.46)[**]
Trusting merchants	1.31 (0.86-1.99)	2.14 (1.53-2.99)[**]	0.47 (0.33-0.65)[**]	0.61 (0.39-0.96)[*]
One need not be vigilant in dealing with others in community	0.29 (0.16-0.54)[**]	0.23 (0.14-0.36)[**]	4.43 (2.74-7.17)[**]	1.30 (0.65-2.64)
Reciprocity				
People in this community help each other	0.23 (0.14-0.39)[**]	0.36 (0.25-0.51)[**]	2.79 (1.95-3.98)[**]	0.65 (0.37-1.15)
Any exchange of non-financial favors last month	0.33 (0.20-0.54)[**]	0.39 (0.27-0.56)[**]	2.56 (1.78-3.70)[**]	0.84 (0.48-1.46)
Hypothetical social support				
Can turn to someone in case of illness	0.11 (0.05-0.25)[**]	0.44 (0.18-1.04)	2.27 (0.96-5.41)	0.26 (0.12-0.53)[**]
Can turn to someone in case of financial hardship	0.43 (0.28-0.67)[**]	0.48 (0.33-0.68)[**]	2.09 (1.46-3.00)[**]	0.90 (0.57-1.42)
Can turn to someone for help with personal hardships	0.34 (0.21-0.54)[**]	0.50 (0.34-0.73)[**]	2.02 (1.37-2.97)[**]	0.68 (0.43-1.08)
Can turn to someone if feels like going out	0.20 (0.12-0.31)[**]	0.42 (0.28-0.62)[**]	2.38 (1.60-3.54)[**]	0.47 (0.30-0.74)[**]
Social networks				
Good relation with children	2.02 (0.77-5.33)	0.96 (0.54-1.72)	1.04 (0.58-1.85)	2.10 (0.77-5.72)
Good relation with relatives/friends/neighbors	0.36 (0.17-0.77)[**]	0.29 (0.15-0.53)[**]	3.48 (1.87-6.48)[**]	1.24 (0.63-2.47)
Social capital composite score *expressed as* β (95% CI)	-2.90 (-3.48 ; -2.31)[**]	-1.45 (-1.90 ; -0.98)[**]	1.44 (0.99 ; 1.90)[**]	-1.45 (-2.07 ; -0.82)[**]
Economic security				
Current employment	0.81 (0.45-1.47)	1.28 (0.85-1.95)	0.78 (0.51-1.18)	0.63 (0.34-1.16)

Monthly income exceeding 450,000 Lebanese pounds	0.71 (0.42-1.21)	0.16 (0.11-0.23)[**]	6.25 (4.29-9.09)[**]	4.46 (2.67-7.46)[**]
Income from self/spouse	1.05 (0.65-1.69)	1.04 (0.72-1.51)	0.96 (0.66-1.39)	1.01 (0.61-1.68)
Income assistance from children	0.73 (0.47-1.13)	1.15 (0.81-1.64)	0.87 (0.61-1.24)	0.64 (0.40-1.01)
Income assistance from charity	0.35 (0.08-1.51)	21.57 (12.63-36.85)[**]	0.05 (0.03-0.08)[**]	0.02 (0.004-0.07)[**]
Income assistance from relatives or friends	0.35 (0.13-0.89)[*]	1.33 (0.83-2.13)	0.75 (0.47-1.21)	0.26 (0.10-0.68)[**]
Income dependents	0.96 (0.63-1.46)	2.91 (2.07-4.07)[**]	0.34 (0.24-0.48)[**]	0.33 (0.21-0.52)[**]
Economic security composite score *expressed as* β (95% CI)	0.12 (-0.14 ; 0.38)	-1.12 (-1.33 ; -0.92)[**]	1.12 (0.92 ; 1.33)[**]	1.25 (0.97 ; 1.53)[**]

[*]p-value <0.05
[**]p-value <0.01

TABLE S2 Supplemental multivariate ordinal logistic regression analyses for poorer self-rated health using Burj El-Barajneh camp as the reference community, Urban Health Study, Beirut, 2003.

Variables (reference category)	Model 1		Model 2		Model 3		Model 4	
	OR	*95 % CI*	*OR*	*95 % CI*	*OR*	*95 % CI*	*OR*	*95 % CI*
Community (Burj El-Barajneh)								
Nabaa	0.58	0.40-0.84	0.71	0.48-1.04	0.68	0.47-1.00	0.84	0.56-1.25
Hey El-Sellom	1.20	0.73-1.96	1.50	0.90-2.50	1.00	0.61-1.65	1.25	0.75-2.10
Age (60-64)								
65-69	1.46	1.02-2.09	1.34	0.93-1.92	1.39	0.97-2.00	1.27	0.88-1.84
70+	1.27	0.90-1.80	1.12	0.78-1.60	1.26	0.88-1.79	1.10	0.77-1.59
Sex (female)								
Male	0.70	0.50-0.97	0.72	0.51-1.00	0.80	0.57-1.12	0.81	0.58-1.14
Education (formal schooling)								
No	1.19	0.86-1.66	1.15	0.83-1.61	1.18	0.85-1.66	1.14	0.81-1.60
History of displacement (none)								
Yes	1.18	0.86-1.61	1.18	0.86-1.61	1.24	0.90-1.69	1.22	0.89-1.68
Years living in house	1.00	0.99-1.01	1.00	0.99-1.01	1.01	1.00-1.02	1.01	1.00-1.02
Smoking (no)								
Yes	1.25	0.89-1.75	1.25	0.88-1.75	1.16	0.82-1.63	1.16	0.82-1.64
Chronic conditions	1.42	1.29-1.57	1.41	1.28-1.56	1.43	1.29-1.59	1.42	1.28-1.57
Disability (no)								
Yes	2.60	1.85-3.65	2.47	1.76-3.48	2.59	1.84-3.65	2.46	1.74-3.47
Economic security score			0.81	0.72-0.92			0.81	0.72-0.92
Social capital score					0.87	0.82-0.91	0.86	0.82-0.91

Model 1: Association between community and poorer SRH adjusting for age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability.

Model 2: Role of economic security in explaining the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Model 3: Role of social capital in explaining the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Model 4: Relative contribution of economic security and social capital to the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

TABLE S3 Sensitivity analysis assessing the robustness of our multivariate regression analyses to the use of the 3-points ordinal self-rated health measure as opposed to the original 5-point likert scale measure.

Variables (reference category)	Model using a 3-point Likert scale for SRH		Model using a 5-point Likert scale for SRH	
	OR	*95 % CI*	*OR*	*95 % CI*
Community (Nabaa)				
Hey El-Sellom	1.49	0.96-2.32	1.42	0.93-2.17
Burj El-Barajneh	1.18	0.80-1.76	1.08	0.74-1.59
Age (60-64)				
65-69	1.27	0.88-1.84	1.22	0.86-1.73
70+	1.10	0.77-1.59	1.10	0.78-1.56
Sex (female)				
Male	0.81	0.58-1.14	0.84	0.61-1.16
Education (formal schooling)				
No	1.14	0.81-1.60	1.13	0.82-1.56
History of displacement (none)				
Yes	1.22	0.89-1.68	1.18	0.87-1.59
Years living in house	1.01	1.00-1.02	1.01	1.00-1.02
Smoking (no)				
Yes	1.16	0.82-1.64	1.14	0.82-1.59
Chronic conditions	1.42	1.28-1.57	1.38	1.26-1.52
Disability (no)				
Yes	2.46	1.74-3.47	2.60	1.86-3.63
Social capital score	0.86	0.82-0.91	0.86	0.82-0.91
Economic security score	0.81	0.72-0.92	0.82	0.73-0.92
Number of observations	729		729	
LR Chi^2 (df=13)	202.62		209.48	
P-value	0.000		0.000	
Pseudo R^2	12.66%		10.43%	

TABLE S4 Comparison of community-level and individual-level social capital indicators and economic security indicators across Nabaa, Hey El-Sellom, and Burj El-Barajneh camp, Urban Health Study, Beirut, 2003.

Concept and indicator	Total (%)	Nabaa (%)	Hey El-Sellom (%)	Burj El-Bararajneh (%)	p-value
Social Capital					
Community-level indicators					
Happy living in neighborhood/ neighborhood satisfaction	74.7	84.8	77.1	58.1	<0.001
Perception of services in the area- good local schools	64.2	77.9	58.5	45.9	<0.001
Perception of services in the area- good local infrastructure	49.7	62.8	39.8	34.6	<0.001
Perception of services in the area- good waste management	70.3	72.3	48.3	77.6	<0.001
Feeling safe walking alone at night	85.3	88.5	78.8	83.3	0.020
No exposure to physical assaults/ verbal harassment	84.2	79.8	83.1	91.5	<0.001
One need not be vigilant in dealing with others in community	21.0	31.4	11.9	9.4	<0.001
People in this community help each other	34.5	46.8	17.1	23.9	<0.001
Community-level social capital composite score (mean±SD)	4.8± 1.6	5.4± 1.5	4.1± 1.7	4.2± 1.4	<0.000
Individual-level indicators					
Feeling like you belong here	66.9	51.9	74.6	86.2	<0.001
Knowing people in neighborhood	52.8	60.6	18.6	57.3	<0.001
Belong to social/community group/neighborhood union	11.8	16.5	2.5	8.9	<0.001
Attendance of weekly religious activities	32.6	33.7	28.2	33.1	0.534
Trusting people in area <0.	21.0	21.0	7.6	27.2	<0.001
Trusting merchants	56.8	49.7	56.4	67.9	<0.001
Any exchange of non-financial favors last month	31.3	41.4	18.8	21.6	<0.001
Can turn to someone in case of illness	94.2	97.6	82.2	94.7	<0.001
Can turn to someone in case of financial hardship	71.4	79.0	61.9	64.2	<0.001
Can turn to someone for help with personal hardships	76.0	83.2	62.7	71.1	<0.001
Can turn to someone if feels like going out	75.5	85.4	53.4	71.0	<0.001
Good relation with children	92.3	91.7	95.7	91.4	0.300
Good relation with relatives/friends/neighbors	91.6	95.7	88.9	86.5	<0.001
Individual-level social capital composite score (mean±SD)	7.7± 2.1	8.1± 2.1	6.5± 1.9	7.8± 1.9	<0.000
Economic security					
Current employment	17.0	16.2	13.6	19.9	0.268
Monthly income exceeding 450,000 Lebanese pounds	71.2	84.6	79.7	46.8	<0.001
Income from self/spouse	24.9	24.5	25.4	25.2	0.967
Income assistance from children	68.5	68.6	61.5	71.5	0.158
Income assistance from charity	20.0	4.8	1.7	52.0	<0.001
Income assistance from relatives or friends	11.4	11.4	4.3	14.6	0.015
Income dependents	50.9	42.5	41.5	68.3	<0.001
Economic security composite score (mean±SD)	3.6± 1.4	4.0± 1.1	4.1± 1.1	2.9± 1.5	<0.001

TABLE S5 Sensitivity analyses examining the relative contribution of social capital community-level and individual-level constructs on the association between community and poorer self-rated health SRH, Urban Health Study, Beirut, 2003.

Variables (reference category)	Model 1 OR	Model 1 95 % CI	Model 2 OR	Model 2 95 % CI	Model 3 OR	Model 3 95 % CI	Model 4 OR	Model 4 95 % CI	Model 5 OR	Model 5 95 % CI
Community (Nabaa)										
Hey El-Sellom	2.07	1.36-3.16	2.12	1.39-3.24	1.59	0.94-2.23	1.71	1.11-2.64	1.48	0.96-2.32
Burj El-Barajneh	1.72	1.20-2.49	1.42	0.96-2.08	1.35	1.00-2.12	1.70	1.18-2.46	1.16	0.80-1.76
Age (60-64)										
65-69	1.46	1.02-2.09	1.34	0.93-1.92	1.39	0.97-2.00	1.43	0.99-2.05	1.27	0.88-1.84
70+	1.27	0.90-1.80	1.12	0.78-1.60	1.34	0.88-1.79	1.21	0.85-1.72	1.12	0.77-1.59
Sex (female)										
Male	0.70	0.50-0.97	0.72	0.51-1.00	0.67	0.48-0.93	0.84	0.60-1.18	0.79	0.58-1.14
Education (formal schooling)										
No	1.19	0.86-1.66	1.15	0.83-1.61	1.22	0.87-1.70	1.16	0.84-1.63	1.15	0.81-1.60
History of displacement (none)										
Yes	1.18	0.86-1.61	1.18	0.86-1.61	1.26	0.91-1.72	1.18	0.86-1.61	1.23	0.89-1.68
Years living in house	1.00	0.99-1.01	1.00	0.99-1.01	1.00	0.99-1.01	1.01	0.99-1.02	1.01	1.00-1.02
Smoking (no)										
Yes	1.25	0.89-1.75	1.25	0.88-1.75	1.22	0.87-1.72	1.16	0.83-1.64	1.17	0.82-1.64
Chronic conditions	1.42	1.29-1.57	1.41	1.28-1.56	1.44	1.30-1.59	1.42	1.29-1.57	1.42	1.28-1.57
Disability (no)										
Yes	2.60	1.85-3.65	2.47	1.76-3.48	2.66	1.88-3.74	2.55	1.81-3.60	2.47	1.74-3.47
Economic security score			0.81	0.72-0.92					0.81	0.72-0.92
Community-level social capital score					0.80	0.73-0.88			0.84	0.76-0.93
Individual-level social capital score							0.86	0.79-0.92	0.88	0.82-0.95

Model 1: Association between community and poorer SRH adjusting for age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability.

Model 2: Role of economic security in explaining the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Model 3: Role of social capital community-level construct in explaining the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Model 4: Role of social capital individual-level construct in explaining the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).

Model 4: Relative contribution of economic security and social capital constructs to the association between community and poorer SRH after adjusting for confounders (age, gender, education, history of displacement, years living in house, smoking, chronic conditions, and disability).