

## **The built environment in poor urban communities on the outskirts of Beirut, Lebanon**

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### **Abstract**

This research examined the association between the existing built environment in poor urban communities in Lebanon and the presence of illnesses among household members. Data were collected in poor urban communities in the outskirts of Beirut, Lebanon on 2797 households using a face-to-face interview with a household member. A structured questionnaire comprising several sections on the built environment and socio-demographic characteristics was used. Association between the presence of illness among household members and four built environment indices, namely housing conditions, infrastructure and services, crowding, and the availability of durable goods in the household, was determined using odds ratios from binary logistic regression models. Covariates such as education of head of household and total monthly household income were taken into account. Poor housing conditions were significantly associated with the presence of illness among household members in the studied sample. Households indicating six or more problems relating to housing conditions, mainly poor ventilation, infestation with rodents and cockroaches, cracks in ceiling and walls and others, were twice more likely to report the presence of illness among household members when compared to households with one or no problems [OR=2.10; 95 % CI=(1.68, 2.63)]. This line of research contributes to the understanding of the general context of the built environment and its influence on the health of residents in poor urban communities in developing countries.

*Keywords: built environment, poor housing conditions, outskirts of Beirut.*



## 1 Introduction

The literature on the built environment in underserved urban communities is vast and growing. Communities residing in urban areas, are more likely to reside in poor built environment, with outdoor air pollutant mainly from fumes of industrial zones, insecure tenure and poverty (Galea and Vlahov [10]; Northridge *et al.* [21]; Curtis *et al.* [5]; Kahlemeier *et al.* [15]). To date, a number of studies have investigated the impact of the built environment namely infrastructure and services, housing conditions, indoor air quality, and crowding on the health of individuals (Al-Khatib *et al.* [1]; Bierman-Lytle [2]; Dunn [6]; Jackson [13]; Krieger and Higgins [16]; Kumie and Berhane [17]; Lawrence [18]; Northridge *et al.* [21]; Perdue *et al.* [22]; Sharfstein and Sander [24]; Samet and Spengler [23]; Sirinivasan *et al.* [25]; Wallerstien *et al.* [28]; Xavier *et al.* [30]). A comprehensive review of studies in the literature indicates an association between poor housing conditions and presence of ill health namely dizziness, headache, irritation of eyes and skin, upper respiratory tract infection and increase in the prevalence of cardiovascular diseases (Al-Khatib *et al.* [1]; Chiaverini *et al.* [3]; Jones [14]; Krieger and Higgins [16]; Lowry [19]; Sirinivasan *et al.* [25]; Xavier *et al.* [30]). This research examined the association between the existing built environment in poor urban communities in Lebanon and the presence of illnesses among household members.

## 2 Methods

### 2.1 Study area

Densely populated urban communities were selected based on poverty conditions, inadequate services and infrastructure, rural-urban influx, war displaced populations and proximity to metropolitan Beirut. The studied communities are located within the eastern and southern suburbs of Beirut.

### 2.2 Data and survey instrument

Data were collected using face-to-face interviews with a proxy respondent in a cross-sectional survey based on a two-stage probability sample of 2,797 households conducted in 2002 by the Faculty of Health Sciences at the American University of Beirut. Prior to data collection, the University Review Board approved the questionnaire. All respondents were informed of the objective of the study and oral consent was obtained. The overall response rate was 88.3%. Data included demographic, health and socio-economic factors as well as information on the built environment indices concerning housing conditions, infrastructure and services, crowding conditions and durable goods.

### 2.3 Formulation of the measures in the study

The educational attainment of the head of the household and total monthly household income was used in the analysis of this study. The total household



monthly income, measured in thousands Lebanese pounds, was categorized into three levels: low (less than 460,000 LBP) medium to low (460,000 to 700,000 LBP) and medium (700,000 LBP) based on the frequency distribution. Completed years of education for head of household were also categorized into three levels: none-elementary, primary-intermediate, and secondary and above (Table 1).

Table 1: Characteristics of households in poor urban communities in Beirut, Lebanon Urban Health Survey 2003.

	<i>Frequency (n)</i>	<i>Percentage (%)</i>	
<b><i>Household Characteristics</i></b>			
<i>Households (n)</i>	2797	100.0	
<i>Type of Household</i>			
One individual	117	4.2	
Nuclear	2236	79.9	
Extended	444	15.9	
<i>Size of household (number of individuals)</i>			
1-3	885	31.6	
4-6	1476	52.8	
>6	436	15.6	
<i>Head of household highest educational level (completed number of schooling years)</i>			
None-elementary	1006	37.0	
Primary-Intermediate	950	34.8	
Intermediate-Secondary	768	28.2	
<i>Total monthly income of household. (In 1000 Lebanese Pounds)</i>			
<460	1058	37.8	
460-700	614	21.9	
>700,000	827	29.5	
<i>Occupation of head of household (ILO Classification)</i>			
Economically active	2071	74.0	
Economically inactive	671	24.0	
<i>Presence of illness</i>			
Yes	<i>Only one reported illness</i>	564	32.7
	<i>More than one</i>	1158	67.2
	<i>Total</i>	1722	61.5
No	1075	38.4	

\* Total observations per variable differ due to missing data.

Four built environment indices were used namely housing conditions, infrastructure and services, crowding and durable goods (Table 2).



Table 2: Built environment indices and presence of illnesses among household members in poor urban communities (n=2797) in the outskirts of Beirut, Lebanon.

<i>Housing Conditions</i>	<i>Unadjusted OR (95 % CI)</i>	<i>Adjusted OR (95 % CI)</i>
0-4 problems	1	1
5-7 problems	1.41 (1.18-1.69)	1.40 (1.14-1.69)
8-15 problems	2.36 (1.94-2.88)	2.10 (1.68-2.62)
<i>Measures of Housing Conditions</i>	<i>N</i>	<i>%</i>
Lack adequate lighting in living room	1038	37.1
Lack adequate lighting in bedroom	1140	40.8
Poor ventilation	2420	86.5
Presence of humidity	1682	60.1
Presence of cracks in walls	1369	48.9
Presence of cracks in ceiling	945	33.8
Presence of seepage in walls	1799	64.3
Presence of seepage in ceilings	1370	49.0
Presence of main source of heating	1962	70.1
Presence of broken windows	703	25.1
Presence of exposed electrical wires	447	16.0
Mice infestation	645	23.1
Rats infestation	405	14.5
Insects infestation	2136	76.4
Water overflow from drains	1064	38.0
<i>Infrastructure and Services</i>	<i>Unadjusted OR (95 % CI)</i>	<i>Adjusted OR (95 % CI)</i>
0-1 problem	1	1
2-3 problems	1.27 (1.05-1.54)	1.10 (0.89-1.37)
4-9 problems	1.32 (1.06-1.64)	1.11 (0.87-1.41)
<i>Measures of Infrastructure and Services</i>	<i>N</i>	<i>%</i>
Availability of drinking water	2797	100
Adequacy of drinking water	2784	99.5
Problems in timing of garbage collection	382	13.7
Problems in garbage collection	2106	75.3
Problems in sewage disposal	141	5.0
Problems in sewage disposal	931	33.2
Cuts in electrical power for more than 4 hours/ day	912	32.6
Problems with the reliability of electrical power	393	14.1
Problems with the reliability of electrical power	84	2.0
Rain water flooding	78	2.8
Evacuation due to rainwater flooding	-	-
River water over flooding	-	-
<i>Crowding Index</i>	<i>Unadjusted OR (95 % CI)</i>	<i>Adjusted OR (95 % CI)</i>
U ≤ U 2 persons/room	1	1
> 2 persons/room	0.97 (0.83-1.14)	0.94 (0.78-1.13)



Table 2 continued.

<i>Education of Head of Household</i>		
None- Elementary	1	1
Primary- Intermediate	0.52 (0.44-0.63)	0.57 (0.46-0.70)
Intermediate-Secondary+	0.38 (0.32-0.47)	0.44 (0.35-0.55)
<i>Total Monthly Income of Household</i>		
Low	1	1
Medium	0.69 (0.56-0.84)	0.82 (0.67-1.02)
High	0.65 (0.54-0.80)	0.44 (0.70-1.12)
<i>Durable Goods</i>		
0-8 items	1	1
9-10 items	0.69 (0.56-0.84)	0.57 (0.73-1.12)
11-22 items	0.65 (0.54-0.80)	0.44 (0.68-1.08)

### 2.3.1 Housing conditions index

Data on housing conditions consisted of 15 indicator variables measuring the absence of adequate lighting in both living rooms and bedrooms, the absence of a source of heating; the presence of poor ventilation, humidity, cracks in walls and ceilings, leakage in walls and ceilings, broken windows, exposed electrical wires, infestation due to mice, rats and cockroaches and water overflow from drains.

### 2.3.2 Infrastructure and services index

The infrastructure and services indicators comprised 10 items including the availability of a source of drinking water, adequacy of drinking water, problems in garbage disposal related mainly to (method of collection, timing and frequency of collection), problems in sewage disposal, cuts in electrical power for more than 4 hours per day, reliability of the electrical power (low or high volt), floods due to rain water, house evacuation due to rainwater flooding and river water over flooding.

Indicators used in the calculations of these built environment indicators were dichotomized into 0 for the “absence” or 1 for the “presence” of the problem. The numbers were then summed to form a score ranging from 0 to 15 problems for housing conditions, and 0 to 10 problems for infrastructure and services. The more numerous the reported problems, the poorer the quality.

### 2.3.3 Durable goods

The total number of durable goods present per household out of 22 items including: refrigerator, electrical appliances, tele-communication equipment and other items was used as a measure of the level of comfort in the household.

### 2.3.4 Crowding index

The crowding index was based the number of persons per room (Lowry [19]). Crowding was defined as the ratio of the number of people in the household to the number of rooms in the household excluding the kitchen, unclosed balconies,



bathrooms and garage. The crowding index was categorized into two levels: less than or equal to two persons / room and more than two persons/room (Table 2).

The housing, infrastructure and durable goods indices were divided into 3 categories based on the tertiles of their respective frequency distributions as follows: (0-4; 5-7; 8-15 problems) for the housing conditions index, (0-1; 2-3; 4-10 problems) for the infrastructure and services index, and (0-8; 9-10; 11-22 items) for durable goods (Table 2).

### 2.3.5 Outcome measure

Presence of illnesses among household members was the outcome of interest. It was dichotomized into 0 indicating the absence of illness among all household members and 1 indicating the presence of any illness among one or more household members. Reported illnesses were classified according to the 10<sup>th</sup> revised edition of the International statistical classification of diseases and related health problems (ICD-10) (WHO 1992).

## 2.4 Statistical analysis

To determine the association between the built environment and the health status of members of the household, a logistic regression was done. Adjusted odds ratios and 95 % confidence intervals (CI) were computed using the Statistical Package for Social Sciences (SPSS) 11.0 software.

## 3 Results

The majority of the households (79.9 %) were nuclear with an average size of 5 persons per household (Table 1). 37.0 percent of household heads did not complete an elementary educational level, and 34.8 percent attained a primary to intermediate level education or more. The majority of the heads of household (74.0 %) were economically active. 37.8 percent of the households reported an income of less than 460,000 Lebanese pounds per months (around 300 US Dollars). Results showed that 61.5% of households reported the presence of illness among household members and of these, 67.2 % reported two or more types of illness (Table 2).

Adjusted odds ratios for the presence of illnesses among household members were calculated using binary logistic regression models (Table 2). The findings of the study indicated that a significant positive association exists between the presence of illness and housing conditions. No significant association was found with other built environment indices including infrastructure and services, crowding conditions and durable goods.

A significant education gradient was also apparent for the presence of illnesses in this population; the higher the educational level attained by the head of the household, the lower was the prevalence of illnesses among household members [OR=0.57, 95% CI= (0.46-0.70 for primary-intermediate; OR=0.44, 95% CI= (0.35-0.55) for intermediate-secondary].



## 4 Discussion

Our findings indicated that inadequate housing conditions were associated with the presence of illnesses among household members residing in underprivileged urban communities. Poor ventilation, excess humidity, inadequate lighting, cracks and leakage in walls and ceilings, and cockroach and rodent infestation prevailed in a large proportion of households. The positive association between poor housing conditions and ill health has been previously established in the literature (Chiaverini *et al.* [3]; Samet and Spengler, [23]; Sirinivasan *et al.* [25]; Krieger and Higgins [16]; Hynes *et al.* [12]). Empirical evidence links the prevalence of respiratory diseases, cardiovascular diseases, skin diseases, cancer, psychosocial distress, and reported mental health problems to poor housing conditions which characterize urban squatters in developing cities (Chiaverini *et al.* [3]; Jackson, [13]; Samet and Spengler, [23]; Sirinivasan *et al.* [25]; Evans *et al.* [8]; Krieger and Higgins [16]; Jones [14]; Al-Khatib *et al.* [1]; Cardoso *et al.* [4]). Our findings did not show an association between existing infrastructure and services and ill health among household members. It is worth noting that the studied areas have access to basic services and sanitation mostly provided by formal and informal networks and community associations (Fawaz [9]). Contrary to some published studies (US Census of Bureau [27]; Evans *et al.* [8]; Evans and Kantrowitz [7]; Gray [11]; Kumie and Berhane [17]) we did not find an association between crowding conditions and ill health although a large proportion of the population resides in crowded dwellings. The literature on this association has been inconclusive due to the confounding effect of hygiene practices and access to health care (Gray [11]; Myers *et al.* [20]). These indicators were not taken into account in our analysis due to lack of data.

In conclusion, poor housing conditions were a significant predictor of self-reported illnesses by household members living in poor urban communities in the outskirts of Beirut. Our results add to the understanding of the built environment, a recurrent and global issue. Further studies should focus on issues relating to self-satisfaction with housing conditions, housing tenure and their association with social health.

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