

# Housing conditions and health in Jalazone Refugee Camp in Palestine

I.A. Al-Khatib<sup>1</sup> and H. Tabakhna<sup>1</sup>

## ظروف السكن والصحة في مخيم الجالزون للاجئين في فلسطين

عصام أحمد الخطيب، حسن طبخنا

**الخلاصة:** قام الباحثان بتقصي بعض ظروف السكن في مخيم الجالزون للاجئين، وأثر هذه الظروف على صحة اللاجئين داخل المخيم، ولاسيما من يعانون من أمراض وأعراض تنفسية. وتم انتقاء عينة عشوائية مكونة من 200 وحدة سكنية يمثل سكانها خمس سكان المخيم. وكان نحو نصف أفراد العينة دون سن الخامسة عشرة. وكان الاكتظاظ المفرط والكثافة السكانية العالية من الموجودات المهمة التي كشفت عنها الدراسة. كما بينت النتائج وجود ترابط يُعتدُّ به إحصائياً بين بعض الحالات التنفسية (الزكام، والسعال، والتهاب اللوزتين، والتهاب الأذن) وبين سوء ظروف السكن (بما في ذلك الرطوبة ووجود العفنات) والاكتظاظ والكثافة السكانية العالية. وتمس الحاجة إلى حل جذري لمشكلة السكن، لتجنب مزيد من الآثار السلبية على الصحة.

**ABSTRACT** We investigated some of the housing conditions at Jalazone Refugee Camp and their impact on refugees' health inside the camp, especially those with respiratory symptoms and diseases. A randomized sample of 200 housing units, representing one fifth of the camp's population, was selected. Approximately half of the people in our sample were under 15 years. Overcrowding and high population density were significant. There was a statistically significant relationship between some respiratory conditions (common cold, cough, tonsillitis and ear infection) and poor housing conditions (including damp and mould), overcrowding and high population density. A radical solution for the housing problem is needed to avert further negative health impacts.

### Conditions de logement et santé dans le camp de réfugiés de Jalazone en Palestine

**RÉSUMÉ** Nous avons examiné certaines conditions de logement dans le camp de réfugiés de Jalazone et leur impact sur la santé des réfugiés dans le camp, notamment ceux qui avaient des symptômes et des maladies respiratoires. Un échantillon aléatoire de 200 logements, représentant un cinquième de la population du camp, a été sélectionné. Environ la moitié de la population de notre échantillon était âgée de moins de 15 ans. Le surpeuplement et la forte densité démographique avaient une grande importance. Il y avait une relation statistiquement significative entre certaines conditions respiratoires (rhume, toux, amygdalite et infection auriculaire) et des mauvaises conditions de logement (y compris l'humidité et les moisissures), le surpeuplement et la forte densité démographique. Une solution radicale au problème du logement est nécessaire pour éviter d'autres effets négatifs sur la santé.

<sup>1</sup>Environmental Health Unit, Institute of Community and Public Health, Birzeit University, West Bank, Palestine (Correspondence to I.A. Al-Khatib: ikhatib@birzeit.edu).

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## Introduction

In 1948, most of the Palestinian people, whose normal place of residence was Palestine, lost both their homes and means of livelihood when they were moved out to the other parts of Palestine, later known as the West Bank and Gaza Strip, or to neighbouring countries such as Jordan, Lebanon and the Syrian Arab Republic [1].

Palestinian refugees were scattered in 58 camps within these countries [1]. Jalazone Refugee Camp is among the 19 refugee camps that were created in the West Bank. It is located 6 km to the north of Ramallah.

In the beginning, the camp was composed of tents. In 1952, the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) built just 1 room for every family, without a kitchen or toilet facilities. There were 15 communal toilets distributed throughout the camp and a single communal water source. Therefore, living conditions were hard and the health situation poor for the refugees living there during the fifties and sixties of the last century. Furthermore, electric services were not connected to the camp till the beginning of the 1970s.

Gradually, the inhabitants of the camp started to add to their single room a kitchen, another room or rooms and a WC. In the seventies, they began to expand vertically since every new family needed a house, not just 1 room as had been planned at the establishment of the camp. This was due to the fact that the land area of the camp was limited and therefore people could not expand horizontally.

With the natural and gradual increase in the population, the housing problem became more complicated, and had (and still has) a negative impact on the inhabitants' health. These problems are expected to become worse as time goes by [2].

The camp now has 1050 families with a population of about 6250 persons (M. Adarbeh, Jalazone Refugee Camp Office Head, personal communication, 2002) living on a limited piece of land of 225 dunums (1 dunum = 1000 m<sup>2</sup>). In 1949 the population was 3500 people, living in tents [2].

Many studies have confirmed the relation between housing conditions and health [3–7]. Direct factors included site of residential area, building materials, natural lighting and ventilation, crowding and availability of and access to water and sanitation. Indirect factors included proximity to health care facilities, access to education, transportation and place of employment and tenure.

Conditions inside the home can have a significant effect on health. It has been found that dampness in the home was the major environmental factor that could be linked to many respiratory diseases: cold, bronchitis, sore throat and ear infection [8]. Cold and dampness in the home may lead to respiratory diseases, infections and allergies [9,10]. People in damp housing pay more for health services than people living in healthy housing [11].

In a study carried out in Ramallah, Palestine, it was found that poor ventilation caused dampness and this may lead to tuberculosis, dyspepsia, allergies and psychological illness [12]. Overcrowding facilitated the spread of infectious diseases, e.g. common cold, tuberculosis, influenza. It also led to psychological stress: blood pressure, anxiety and stress were higher among inhabitants who had a negative perception of their residential environment.

Another suggested risk factor is environmental tobacco smoke. In several studies, researchers have demonstrated an association between exposure to environmental tobacco smoke in the home and the

incidence of pneumonia, bronchitis, cough and ear infection [13–15].

Poor housing may lead to a decrease in the amount of solar radiation reaching the rooms and this will reduce exposure of inhabitants to ultraviolet rays, which may lead to tooth decay, rickets in children, osteomalacia in adults, and increases in viral and other infections [12].

The aim of this study was to investigate the housing conditions and the natural population growth in Jalazone Refugee Camp, and to assess their impact on the health of the camp's inhabitants, focusing on some respiratory symptoms and diseases.

To obtain information on the relative importance of the different factors, we studied the relationship between frequency of respiratory infectious disease in children and the relative importance of the risk factors: number of siblings, number of rooms in the residence, dampness and mould in the homes and exposure to environmental tobacco smoke.

## Methods

The population included all the households in Jalazone Refugee Camp. Therefore, the unit of study was considered to be the household as a whole, regardless of how many people lived in it. Households were selected according to simple random sampling in a single step; not on the level of the individual, but by randomly choosing 200 households with all members included in those households. There were no refusals to participate.

A semi-structured questionnaire, designed for this study, was used to collect information about population characteristics, housing conditions and the prevalence of some respiratory symptoms and diseases in the camp over a 2-week period in January 2002.

The *SPSS* statistical program, version 8, was used for data analysis for descriptive and inferential statistical purposes. The natural increase in the population was calculated from the infant registration files at the health centre in the camp and from an approximate assessment of the number of deaths from patient files (no. of live births – no. of deaths = natural increase in the population).

A staff of 3 well-trained field workers (1 physician, 1 nurse and 1 social worker with an education level of diploma or Bachelor) from the camp and from Jalazone Refugee Camp Health Centre and Alawdah Health Centre, located in the camp, participated in collecting the data. The data were collected by the field workers through personal interviews with the family head or another adult in the household if the family head was not available. The interviewee was asked about all family members; 1 questionnaire was used for each household visited.

## Results

The total number of people living in the 200 households we studied was 1259. Family size ranged between 2 and 13 persons. Mean family size was 6.3 persons. About 50% of the sample was under 15 years of age (Table 1). Just over 40% were still in school or university and 16% homemakers; only 2.7% were unemployed (Table 1).

From the records in the camp health centre, the natural annual population increase was calculated as 215 people (3.5%).

Almost all the homes in the camp were owned: only 3.0% of our sample lived in rented accommodation. Just over half lived on the ground floor. Mean house area was 94 m<sup>2</sup>. About 60% of households had 3 or fewer rooms and 75.0% had 1 or 2 bedrooms (Table 2). The vast majority of households (89.0%) had a bathroom inside the home.

Table 1 Distribution of sample by age group and occupation

Characteristic	No.	%
<i>Age (years) (n = 1259)</i>		
0-1	53	4.2
2-5	192	15.1
6-15	383	30.1
> 15	631	49.6
<i>Occupation (n = 1259)</i>		
Student	527	41.9
Homemaker	199	15.8
Preschool children	195	15.5
Labourer	137	10.9
Office worker <sup>a</sup>	102	8.1
Skilled worker	37	2.9
Unemployed	35	2.8
Self employed <sup>b</sup>	15	1.2
Retired (> 60 years)	13	1.0

<sup>a</sup>Those employed in government and private institutions with a regular salary.

<sup>b</sup>Shop owners, owners of small companies.

A considerable proportion of the households we studied (61.0%) had high-density living conditions (3-5 persons/room). Overcrowding, defined as having more than 5 persons per room, was observed in 16.5% of the households.

Almost all households were connected to the piped water supply. The camp does not have a public sewage system. Most of the buildings (91.5%) have block walls; only 5.5% are made of reinforced concrete and 3.0% are made of stone. Dampness was present in 72.5% of houses, 50.5% had mould and 37.0% had leakage. Only 41.5% were exposed to the sun.

Smokers were present in 74.0% of the households: 48.5% had 1 smoker, 16.0% had 2 smokers and 9.5% had  $\geq 3$  smokers.

We found a statistically significant relationship between the common cold and cough and overcrowding and poor housing conditions (number of household members, maximum number of persons

Table 2 Distribution of residences according to characteristics

Characteristic	%	Cumulative %
<i>No. of rooms</i>		
1	3.0	3.0
2	18.5	21.5
3	39.0	60.5
4	24.0	84.5
5	12.0	96.5
6	3.5	100
<i>No. of bedrooms</i>		
1	23.0	23.0
2	52.0	75.0
3	20.0	95.0
4	5.0	100
<i>Bathroom</i>		
Inside	89.0	89.0
Outside	5.0	94.0
Both	6.0	100
<i>Accommodation</i>		
Owned	97.0	97.0
Rented	3.0	100
<i>Floor</i>		
Basement	10.0	10.0
Ground	56.0	66.0
1st	29.0	95.0
2nd	4.5	99.5
3rd	0.5	100

using 1 bedroom, number of smokers in the house, presence of damp, leakage or mould, and lack of ventilation throughout the house (Table 3).

With the exception of number of family members, number of smokers and ventilation throughout the home in the case of ear infection and number of family members in the case of tonsillitis, the relationship between tonsillitis and ear infection and high population density and poor housing conditions was also statistically significant (Table 3).

There was a statistically significant relationship between asthma and age group

Table 3 Predictors of respiratory infections using simple linear regression

Predictor	Common cold		Cough		Tonsillitis		Ear infection	
	$\chi^2$	P	$\chi^2$	P	$\chi^2$	P	$\chi^2$	P
No. of household members	30.891	0.001	33.111	0.001	–	NS	–	NS
Maximum no. using 1 bedroom	76.445	***	45.573	***	44.930	***	43.756	***
No. of smokers in the house	33.110	***	40.829	***	14.118	0.015	–	NS
Dampness present	47.164	***	29.211	***	18.097	***	7.642	0.006
Leakage present	20.875	***	21.740	***	8.678	0.013	13.945	0.001
Mould present	36.739	***	36.527	***	23.594	***	13.434	***
Lack of ventilation	29.410	***	6.091	0.014	8.233	0.004	–	NS

\*\*\* $P < 0.001$ .

NS = not significant.

( $\chi^2 = 25.749$ ,  $P = 0.001$ ): asthma was more prevalent in younger people. There was no statistically significant relationship between influenza and bronchial asthma and over-crowding and poor housing conditions.

From cross tabulation of presence of dampness in the home and prevalence of cough, we found that 199 (20.8%) persons were suffering from cough out of 956 persons living in houses with dampness in them, and 22 (7.3%) persons were having cough out of 303 persons living in houses without dampness. In addition, from the cross tabulation of having mould in the

home and prevalence of common cold among family members, it was found that 225 (33.4%) were having common cold out of 674 inhabitants living in houses with mould present, and 107 (18.3%) out of 585 persons living in houses without mould.

The most prevalent respiratory condition among our sample was the common cold (26.4%) followed by cough (17.6%); asthma was the least prevalent (3.4%) (Table 4).

Respiratory diseases and symptoms were attributed to changes in the weather by 27.2% of the respondents; 1.5% attributed

Table 4 Prevalence of acute respiratory conditions and asthma among different age groups

Condition	Prevalence (%)				Overall prevalence (%)
	Age group (years)				
	0–1	2–5	6–15	> 15	
Common cold	4.2	20.5	32.5	42.8	26.4
Cough	4.5	21.3	28.1	46.2	17.6
Tonsillitis	6.8	22.0	31.1	40.2	10.5
Ear infection	10.5	21.1	36.8	31.6	4.5
Influenza	5.9	8.8	21.6	63.7	8.1
Asthma	11.6	18.6	16.3	53.5	3.4

Symptoms were present at the time of the interview or within 2 weeks prior to it.

respiratory symptoms and diseases to poor housing conditions and 21.9% to infection (Table 5).

## Discussion

About 50% of the inhabitants were under 15 years. In the Palestinian Central Bureau of Statistics 1997 census, people under 15 years old in the West Bank and Gaza constituted 45% of the whole population. So the inhabitants of Jalazone Refugee Camp were younger than in other areas in Palestine.

The natural annual population increase was 3.5%. Mean family size was 6.3 persons, indicating a high fertility rate. Taking into account mean house area (94 m<sup>2</sup>) and the fact that 75% of homes had 1 or 2 bedrooms, this obviously leads to overcrowding. Poor housing conditions

were apparent in that most of the homes had damp or mould and only 41.5% were exposed to the sun. Damp and mouldy conditions have a number of direct and indirect impacts on health. Haverinen et al. reported an association between moisture damage and respiratory infections. It also has to be acknowledged that economic factors play a part in this equation [16]. Refugees on low fixed incomes, the long-term sick or the mentally ill often find themselves in the least desirable of homes with significant dampness. In addition, dampness is associated with the proliferation of both mite and mould populations [17].

Moulds have been linked as risk factors for asthma [18]. Due to their action the body attempts to respond to their presence through natural defence mechanisms including coughing and sneezing, excess mucus production or rhinitis. Studies have shown links to persistent cold-like symptoms in adults and children [19].

Almost all households were connected to the piped water supply, which was a positive indicator. On the other hand, the lack of a public sewage system is a big problem for the camp inhabitants and also for the nearby village of Jifna. The persistent sewage problem in the camp has had, and still has, a negative effect on the environment because the sewage flows to Jifna throughout the year with no solution so far.

We found a statistically significant relationship between common cold and cough and overcrowding and poor housing conditions. The common cold is caused by infection with rhinovirus spread by close personal contact and nasal mucus on the hands, and spread is facilitated by overcrowding and poor ventilation, as is the case in Jalazone Refugee Camp [20].

There was also a statistically significant relationship between tonsillitis and ear infection and overcrowding and some risk

Table 5 Causes of respiratory conditions as indicated by inhabitants of Jalazone Refugee Camp

Proffered reason	Frequency	%
Weather	139	27.2
Infection	112	21.9
Draught	95	18.6
Overcrowding	37	7.2
Dampness	31	6.1
Viral infection	30	6.0
Movement from hot to cold place	22	4.3
Smoker in the household	11	2.2
Chronic	10	2.0
Bad housing conditions	8	1.5
Sewage	6	1.2
Dust	5	1.0
Heredity	4	0.8
Tear gas	1	0.2
Total	511	100

748 (59.4%) out of the 1259 were not infected.



factors for poor housing conditions. Tonsillitis is a disease caused by *Streptococcus haemolyticus* and the disease flourishes in conditions of overcrowding and poor ventilation along with poor sanitary conditions. This is consistent with the situation of housing in the Jalazone camp [21]. It has been reported that children who are inadequately housed or living in overcrowded housing are at significantly increased risk of ear infection, are not likely to receive regular medical care and are more likely to contract other contagious infections such as diarrhoea and tuberculosis [22].

There was no statistically significant relationship between influenza and bronchial asthma and overcrowding and poor housing conditions. Nevertheless, socioeconomic disadvantage (poverty) has been associated with increased rates of asthma and influenza in children living in inner cities in the United States of America and in Montreal schoolchildren. This association may be a reflection of poor housing conditions, dampness, which encourages the growth of moulds and house-dust mites, use of certain fuels for home heating or cooking with unvented gas appliances or wood [23].

This study has limitations since the collected data depended on the assessment by the inhabitants themselves about housing conditions and the occurrence of some respiratory symptoms and diseases. Our results may have been affected by the fact that diagnosis of influenza is difficult, and that bronchial asthma is considered more a hereditary disease by the camp inhabitants rather than a condition associated with poor housing conditions and overcrowding.

The housing and the crowding problems increase year after year since the camp's borders are fixed and people have no space to expand except in a vertical direction. This will inevitably create further negative health impacts and exacerbate social, ecological, psychological and other problems

## Conclusions and recommendations

Housing conditions in Jalazone Refugee Camp are poor and we found a statistically significant relationship between certain respiratory diseases and the housing conditions. Half of the respondents attributed respiratory conditions to weather changes, so some effort is needed to increase the awareness of the population about the causes of such conditions.

It is essential to satisfy the present housing needs of the refugees, thus relieving problems of overcrowding and inadequate facilities. There is a growing need for a comprehensive housing strategy in Palestine; this should include special housing requirements where required.

Increasing awareness among the camp's population about causes and modes of transmission of respiratory diseases is essential since 50% of the respondents attributed them to weather changes.

The tragedy of the refugees is interminable, and unless a radical solution is found for their problems, serious future catastrophes are likely to overrun the camps and their surroundings in the future.

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#### **British medical journal call for papers**

On 21 October the *British medical journal* will publish a cluster of articles drawing attention to some of the key health problems, policy challenges, and research priorities in the Middle Eastern region. The issue will be linked to the 10th meeting of the Global Forum for Health Research which is being held in Cairo (29 October–2 November) with the broad theme of combating disease and promoting health.

The richly diverse countries of the Eastern Mediterranean and Middle Eastern region contain both some of the wealthiest and most deprived populations of any region. Sociocultural contrasts are marked and health challenges, priorities, and expectations are equally varied. There are, nevertheless, issues of common concern. These include the growing burden of noncommunicable disease, a high incidence of genetic and inherited disorders, rising rates of injury, rising rates of communicable disease including HIV/AIDS, poor access to reproductive health services, the relatively weak position of women and civil society, and the searing impact on health of political unrest and armed conflict.

We welcome submission of original research papers, particularly in relation to the topics outlined above. Brief papers for the Analysis and Comment section of the journal aimed at airing regional debates and controversies, and drawing attention to innovative health initiatives and the positive impact of strong social and cultural values are equally welcome, along with personal views and letters. We want to hear from clinicians and researchers who have much to say but whose voices are heard infrequently in Western journals.

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