Introduction

Migrant farmworkers are among the most marginalized populations; they are often poor, lack basic legal protections, frequently discriminated against in host communities, and face life circumstances that undermine their basic human rights. Farm labor is physically taxing work and can pose many potential health risks. Migrant farmworkers also often live in underserved rural communities that lack basic social and health services, infrastructure and adequate housing. These neighborhood and household conditions complicate health burdens for migrant farmworkers, who already live precariously on the economic, social and political fringe.1–3

Syrian migrant workers in Lebanon

These concerns are acute to the Lebanese context, where Syrian migrants have widely participated in the agricultural workforce...
since the 1940s. The number of permanent and seasonal Syrian workers in Lebanon have fluctuated over the past few decades, depending on local and regional socio-political changes. Very few Syrian migrants have ever received working permits, so the vast majority projected at 600,000 were in the country without official documentation and legal status. Without legal protections and support services, Syrian migrants have remained in marginalized, transient communities vulnerable to exploitation from their employers and the Lebanese authorities.

Although the harsh realities of migrant workers were visible to the Lebanese public—on the streets and in the media—the health and wellbeing of these workers had not been a focus of public health research/programming in the country. Over a million Syrians have registered as ‘refugees’ in Lebanon with the advent of the Syrian Civil War in 2011. Many of these people may in fact be former migrant workers, who have now been reclassified by the United Nations High Commissioner for Refugees (UNHCR). Before the Syrian armed conflict, Syrian workers moved freely between Lebanon and Syria. The universal healthcare coverage in Syria enabled migrants to schedule medical vacations, and return back to Lebanon for work. The majority of migrants have little formal education and work in the agriculture, construction and service industries. Migrant Syrians working in agricultural fields reportedly received salaries of US$10–15 per 8–10 h workday, though anecdotal evidence suggests that many work >10 h/day. As unauthorized workers, Syrians cannot sign binding contracts or receive social security benefits.

Living conditions and the health of Syrian farmworkers

This research focuses on the nexus of living conditions and health outcomes for Syrian migrant workers in Lebanon’s agricultural industry. These migrants make up a large proportion of the agricultural workforce in the country. In addition to the harsh working conditions, the living conditions that migrant Syrian agricultural workers experience pose an added risk to their health and wellbeing. Syrian agricultural workers in the Bekaa valley of eastern Lebanon live in clusters of makeshift dwellings adjacent to the agricultural fields in which they work. These workers often resort to a broker, known as the ‘Shaweesh’, for help in securing work and accommodation. The ‘Shaweesh’ usually leases a piece of land from Lebanese property owners and charges the migrants a fee for rent, water supply and other amenities, though conditions remain quite primitive. Dwellings are often poorly constructed, with leaky roofs, insufficient lighting and poor ventilation. Established evidence correlates inadequate household conditions with direct and indirect negative impacts on health. For example, indoor dampness and mold has been associated with increased development and exacerbation of respiratory problems, recurrent headaches, fever, nausea and vomiting. Poorly insulated housing can lead to increased mortality rates from cardiovascular conditions and respiratory diseases. Pest infestations have been associated with infectious diseases and asthma. Syrian workers often reside in tiny overcrowded dwellings shared with 10 or more people. These conditions contribute to an increased risk of infectious diseases, such as tuberculosis and hepatitis. Community infrastructure, including the availability and quantity of clean drinking water, functionality of local sewage systems, availability of electricity and solid waste disposal services, impact household health.

A number of studies conducted in disadvantaged communities in Lebanon show a positive association between the increase in household and infrastructure problems and the presence of illness. Yet only a few studies on housing and health explore the cumulative effect of household living conditions on the health of residents. This study explores the association between household living conditions and multi-morbidity among Syrian migrant agricultural workers residing in the Bekaa region in Lebanon.

Methods

A cross-sectional survey was carried out on migrant agricultural workers and members of their household living in the Asheish campsite, a cluster of tented dwellings in the town of Joub Jannine. This town is located in the West Bekaa valley of Lebanon at an elevation of 930 m above sea level and ~68 km from the capital. It stretches over an area of ~1575 ha, and is surrounded by agricultural fields. In mapping the West Bekaa valley, the research team found most Syrian migrant farm workers’ campsites to share structural features (i.e. tented dwellings close to agricultural fields). Hence, the Asheish campsite was considered to represent the living conditions of migrant agricultural workers in that region.

In summer of 2011, the researchers approached all housing units in the camp (n = 48), and data were collected on 290 individuals living in 46 housing units on the campsite (96% response rate). Face-to-face interviews were conducted with one proxy respondent (designated as the head of the household) from each housing unit in the camp. In the event that this person was not present during the visit, the spouse or sibling was interviewed.

Information on demographics, household conditions, working conditions and the general health of this population was collected through a structured questionnaire. The questionnaire was developed in English and then translated into colloquial Arabic and pilot tested with a few migrant workers in a different area in the Bekaa valley. The study was approved by the Institutional Review Board at the American University of Beirut (IRB Protocol Number: FHS.RH1.02).

Indicators

The primary outcome of this study is multi-morbidity measuring the number of distinct health problems (zero, one, two, three or more), counting once for each acute and chronic illness. Chronic illnesses were reported by the proxy respondent with ‘Yes/No’ answers to the question: ‘Does (name) suffer from a chronic illness? Acute illnesses were reported by the proxy with the question: ‘In the past 3 months, has (name) suffered from an acute illness?’ Respondents answering ‘yes’ could report up to four types of chronic illnesses and four types of acute illnesses. All illnesses were categorized based on the 10th revised edition of the International Classification of Diseases.

The independent variable of interest is housing quality which was measured by an index of housing and infrastructure (HII) conditions. All housing units in our study were tents. By definition, a tent ‘is a portable shelter with a cover and a structure’; the descriptive terms adopted for tent are ‘roof’, ‘walls’ and ‘floor’. The tents in the Asheish campsite were made of hard cloth material and cardboard, supported by poles and car wheels. On the inside, they were divided into separate ‘rooms’/compartments. The choice of index is based on published research by Habib et al. Items included in the index have been previously used in assessing housing conditions with slightly varying methods. The index included six items relating to the housing unit, as follows:

1. Presence of holes or tears in the ‘roof’ of the tent: Respondents were asked whether their tents showed any holes or tears. Similar to the component above.
2. Presence of holes or tears in the ‘roof’ of the tent: Similar to the component above.
3. Rainwater flooding: Settlements similar to Asheish camp are at risk of flooding, particularly during the rainy season. Respondents were asked if they suffered any flooding incident due to rainwater over the past year.
4. Pest infestation (including cockroaches, rats, mice and ants): Presence of pests is a common indicator of poor housing conditions.
quality. Respondents were asked to report pest infestations in their housing units.

(5) Absence of a heating source: Respondents were asked if they possessed a heating source/device for the winter. Since the index is a summation of problems in housing conditions, the variable was recoded such that ‘yes’ denoted the absence of a heating source and ‘no’ denoted the presence of a heating source.

(6) Shortage in drinking water: Respondents were asked if they suffered from shortages in drinking water and how often that problem occurred (always, most of the time, some of the time or never). The variable was later recoded into a yes/no question to be included in the index.

All the items of the HII are dichotomized such that zero denoted the absence of the problem and one denoted its presence. These items are summed up to form a score ranging from 0 to 6. A higher score on the index indicated worse housing and infrastructure conditions.

Associations were drawn between health indicators and the HII, adjusting for age, gender, crowding, household assets and wealth. Crowding was calculated by dividing the number of individuals residing in each housing unit by the number of ‘rooms’ in the unit (not including the kitchen area). Overcrowded residences housed more than three persons per room. An assets score was calculated based on a principal components analysis of a respondent’s household assets and amenities (fridge, dishwasher, laundry machine, cell phone, house phone, water heater, radio, television and satellite). Indicators of household assets and amenities were converted into z-scores, and factor loadings for a single assets factor were calculated. For each respondent, values of the indicator variables were multiplied by the factor loadings to obtain an assets score. Respondents were grouped into quartiles by assets score. Wealth included income, owning a house in Syria and the ability to rent the land they currently live on.

Bivariate analyses were carried out to examine the associations between multi-morbidity and other independent variables. An ordinal logistic regression model was carried out to establish the association between the HII and the number of health outcomes adjusting for age, gender, crowding, assets and wealth. Statistical analysis was conducted using Stata 10. Adjusted and unadjusted odds ratios and their 95% confidence intervals are reported, and P values <0.05 are considered significant.

Results

All of the migrants residing in the campsite held Syrian nationality. The population was young, with a mean age of 20 years and almost an equal distribution between genders (table 1). Forty-one percent had low levels of formal education, being either illiterate or not having completed any level of education. The population lived in crowded dwellings (an average of six persons per ‘room’), and 62% of the housing units categorized as overcrowded. Household income was categorized into two equal groups indicating that almost half of all households earned <800 dollars total per month.

The survey revealed that a considerable percentage of households in the camp had problems in housing and infrastructure conditions (table 2). About 68% reported holes in the ‘walls’ and 72.1% reported holes in the ‘roof’. Thirty-five percent had no heating source for the winter season, and 64.8% were subjected to flooding due to rainwater. Almost all (94.5%) reported the presence of pest infestation. Around two-thirds of the housing units (62.4%) reported suffering shortages in drinking water supply. In sum, we found that almost 70% of inhabitants reported living in housing units with over three problems in housing and infrastructure conditions.

Our analysis showed a significant positive association between multi-morbidity and poor housing and infrastructure conditions (table 3). Almost half the population suffered from at least one illness (47.2%), with 13% suffering from three types of illness or more. The most prevalent health problems (table 1) are diseases of the respiratory system (54.5%), undiagnosed symptoms (i.e. coughing, headache, dizziness and nose bleeds; 16.6%), and digestive system illnesses (7.6%). With every unit increase in the HII, the odds of having an additional health problem increases by 77% (OR = 1.77; 95% CI = 1.37–2.29).

### Table 1: Demographic, socio-economic and health characteristics of Syrian migrant workers and members of their household living in informal settlements in Bekaa, Lebanon, n = 290, 2011

| Gender   | N  | %     |
|----------|----|-------|
| Male     | 131| 45.2  |
| Female   | 156| 53.8  |
| No answer| 3  | 1.0   |

| Age (years) | N  | %     |
|-------------|----|-------|
| 0–10        | 63 | 21.7  |
| 11–20       | 87 | 30.0  |
| 21–30       | 50 | 17.2  |
| >30         | 48 | 16.8  |
| No answer—Don’t know | 47 | 16.2 |

| Mean (min–max) | N  | %     |
|----------------|----|-------|
| Level of education |    |       |
| Does not read and write/did not complete any level of education | 120 | 41.4 |
| Primary/elementary | 63 | 21.7 |
| Intermediate/secondary | 69 | 23.8 |
| Does not applya | 19 | 6.6  |
| No answer | 19 | 6.6  |

| Assets | N  | %     |
|--------|----|-------|
| Lowest | 82 | 28.3  |
| Middle | 112| 38.6  |
| Highest| 96 | 33    |

| Household income/month (dollars) | N  | %     |
|----------------------------------|----|-------|
| ≤800                             | 139| 48.0  |
| >800                             | 151| 52.0  |

| Mean (min–max) | N  | %     |
|----------------|----|-------|
| Crowding ≤3    | 109| 37.6  |
| >3              | 181| 62.4  |

| Number of illnesses | N  | %     |
|---------------------|----|-------|
| None                | 153| 52.8  |
| One                 | 57 | 19.6  |
| Two                 | 42 | 14.5  |
| Three or more       | 38 | 13.1  |

| Prevalence of type of illnesses (percent out of total) | N  | %     |
|-------------------------------------------------------|----|-------|
| Diseases of the respiratory system (such as flu, acute tonsillitis and sore throat) | 158| 54.5 |
| Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (such as headache, cough, dizziness and nose bleeds) | 48 | 16.6 |

| Diseases of the digestive system | N  | %     |
|---------------------------------|----|-------|
| Diarrhoea                        | 22 | 7.6   |
| Dysuria                          | 13 | 4.5   |

| Diseases of the musculoskeletal system and connective tissue | N  | %     |
|------------------------------------------------------------|----|-------|
| Arthritis                                                   | 11 | 3.8   |

| Diseases of the circulatory system | N  | %     |
|-----------------------------------|----|-------|
| Shock                            | 6  | 2.1   |

| Certain infectious and parasitic diseases | N  | %     |
|------------------------------------------|----|-------|
| Tuberculosis                               | 4  | 1.8   |

| Endocrine, nutritional and metabolic diseases | N  | %     |
|-----------------------------------------------|----|-------|
| Diabetes                                     | 3  | 1.0   |

| Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | N  | %     |
|------------------------------------------------------------------------------------------------|----|-------|
| Conjunctivitis                                | 3  | 1.0   |

| Diseases of the nervous system | N  | %     |
|--------------------------------|----|-------|
| Multiple sclerosis               | 1  | 0.3   |

| Diseases of the genitourinary system | N  | %     |
|--------------------------------------|----|-------|
| Pelvic inflammatory disease           | 1  | 0.3   |

| Disorders of the eye and adnexa | N  | %     |
|---------------------------------|----|-------|
| Cataract                         | 1  | 0.3   |

| Neoplasms | N  | %     |
|-----------|----|-------|
| Leukemias | 1  | 0.3   |

| Diseases of the skin and subcutaneous tissue | N  | %     |
|----------------------------------------------|----|-------|
| Acne                                          | 1  | 0.3   |

a: Below the age of 5 years.
Discussion

The findings of the study add to mounting evidence of greater multimorbidity among disadvantaged populations.\textsuperscript{29–31} The present research is consistent with findings from a previous study of Palestinian refugees in Lebanon showing a significant positive association between multi-morbidity and increasing disadvantage.\textsuperscript{32} The poor environmental and housing conditions and associated illnesses reported in the Asheish camp are comparable to those in other disadvantaged farming communities.\textsuperscript{2,5,27} The multiplicity of neighborhood and household problems found in disadvantaged communities has been associated with increased prevalence of multiple illnesses.\textsuperscript{14,18,33} This connection is strongly supported by an international literature, which associates housing problems such as structural integrity, dampness, flooding and pest infestations to increased morbidities.\textsuperscript{16,17,21} Our study showed a high prevalence of housing units with poor structural integrity (resulting in water leakage and dampness), the presence of pests and shortage of drinking water, all of which have been linked to increased risks of chronic and acute illnesses.\textsuperscript{16,17,19,21} Consequently, improving the housing conditions of Syrian migrant workers may be one of the more achievable means to improve health outcomes.\textsuperscript{32}

Syrian civil war and Syrian migrant workers

The status of the Syrian seasonal migrant workers in Lebanon, following the field research of this study, has changed: they are either permanent migrants or refugees seeking asylum. By January 2016, official estimates suggested that >1 million Syrians now reside in Lebanon (representing 25% of Lebanon’s total population).\textsuperscript{34} With the escalation of the Syrian armed confrontation starting in March 2011, seasonal migrants are unable to cross the border; thus, they can no longer benefit from healthcare services in Syria. Consequently, the ongoing conflict and deterioration of Syria’s healthcare infrastructure has produced a new ‘therapeutic geography’.\textsuperscript{35} This, in addition to the limited availability of cheap healthcare and already limited national infrastructure and economy in Lebanon, is expected to exacerbate the health of these migrants.\textsuperscript{34}

Mass evacuations from Syria to Lebanon negatively impacted living conditions of Syrian workers in Lebanon.\textsuperscript{13} For some, immediate and extended family members fled Syria and joined their crowded tents. Figure 1 shows the aerial maps of the Asheish camp in July 2011 around the time of data collection, and in May 2014. The difference in population density between 2011 and 2014 is

Table 2 Infrastructure and housing conditions of Syrian migrant workers and members of their household living in informal settlements in Bekaa, Lebanon, \(n=290\), 2011

| N | %  |
|---|----|
| Presence of holes in walls | \(198\) | 68.3 |
| No | \(92\) | 31.7 |
| Presence of holes in ceiling | \(209\) | 72.1 |
| No | \(81\) | 27.9 |
| Absence of heating source | \(102\) | 35.2 |
| No | \(188\) | 64.8 |
| Shortage in drinking water | \(181\) | 62.4 |
| No | \(109\) | 37.6 |
| Rainwater flooding | \(188\) | 64.8 |
| No | \(102\) | 35.2 |
| Pest infestation | \(274\) | 94.5 |
| No | \(16\) | 5.5 |
| Housing and Infrastructure Index—HII (number of problems) | \(8\) | 2.8 |
| 2 | \(27\) | 9.3 |
| 3 | \(61\) | 21.0 |
| 4 | \(76\) | 26.2 |
| 5 | \(105\) | 36.2 |
| 6 | \(13\) | 4.5 |

Table 3 Ordinal logistic regression model of the association between the housing and infrastructure index and the number of health outcomes\(^a\) among Syrian migrant workers and members of their household living in informal settlements in Bekaa, Lebanon, \(n=290\), 2011

| Multiple Health Outcomes\(^a\) (\(n=239\)) | Unadjusted OR (95% CI) | \(P\) values | Adjusted OR\(^b\) (95% CI) | \(P\) values |
|---|---|---|---|---|
| Housing and Infrastructure Index—HII | 1.37 (1.13–1.66) | 0.001 | 1.77 (1.37–2.29) | <0.001 |

\(a\): The multiple health outcome is a composite score of having one or multiple chronic or acute illnesses.

\(b\): Adjusted for age, gender, crowding, assets and wealth.
clearly depicted by the increase in the number of dwellings in the camp (see figure 1). In a survey carried out by UNHCR in June 2015, Syrian refugee households showed increased crowding levels, and ~16% exhibited substandard and/or dangerous conditions. Around 18% of households were located in informal settlements (i.e. tents, collective shelters, unfinished constructions, garages, squatting and separate rooms). The number of makeshift camps like those described earlier have multiplied. Over 1224 informal settlements can now be found in Lebanon, particularly between the Bekaa and northern regions. Observers have noted these housing communities to have poor sanitation conditions, fire hazards and flooding. In January 2015, heavy rainfall led to severe flash floods damaging Syrian refugees’ camps and belongings. In addition, the numerous reports of contaminated drinking water and overall poor hygiene in camps are troubling. The spread of infectious diseases is a primary concern for camp residents. Surveys reporting on the health of Syrian refugees in Lebanon indicated acute respiratory tract infections as the most common communicable diseases. The top causes for morbidity due to non-communicable diseases were diabetes, hypertension, cardiovascular illnesses and lung disease.

The new economic and humanitarian migrants from Syria have likely altered Syrian participation in the Lebanese labor force, as well as the complexity of workers’ health issues. Further research is needed to explore the changing ‘therapeutic geography’ for Syrians residing in Lebanon, specifically on how the Syrian working population negotiates its healthcare access. Learning more is an important first step to establish and improve upon existing aid programs.

Limitations

A limitation of this study is that the data were collected prior to the influx of Syrians from the war. Yet, there are no preexisting studies on the association between health and neighborhood and household living conditions for this marginalized population. Another limitation of this study is the inability to stratify the analysis by independent variables (age, sex/gender, socioeconomic status, etc.) due to the relatively small sample of participants. This study provides a useful baseline from which to build future research, policy and practice, even if the realities on the ground are rapidly shifting.

Conclusion

The findings in this study show that multi-morbidity is closely tied to neighborhood and household environmental conditions of Syrian migrant informal settlements across Lebanon. A collaborative effort to address these conditions among stakeholders (namely community representatives, academics, NGOs and government offices) is necessary to help secure Syrian migrants’ health and wellbeing. Given the scope of such an initiative, the fragmented efforts undertaken by the UNHCR, UNICEF and NGOs are insufficient.

Moreover, studies have not yet assessed the effect of the conflict and mass migration on the previous migrant farmworker communities in Lebanon. This avenue of research might help adapt new agricultural, labor and health policies around the changing realities for this population. Studies might explore whether these populations have registered as ‘refugees’, and if so, why? Have there been significant demographic shifts in these communities? Has the increased number of job seekers led to lower compensation and greater unemployment among these communities?

This research voices some of the health and community problems of this population with the hope that by highlighting these realities, greater advocacy work can be done to support the needs of these communities. Research and advocacy that benefit this population will become increasingly relevant since the number of displaced Syrians seeking jobs in Lebanon’s agricultural sector continues to grow. As the size of these informal settlements continues to multiply, it is unlikely that the pervasively poor living conditions will improve.

Key points

- This study is the first to explore the relationship between multi-morbidity and poor infrastructure and housing conditions in a migrant agricultural community.
- There is a statistically significant positive association between community members’ household living conditions and multi-morbidity.
- The outbreak of the Syrian armed conflict which has displaced over a million Syrians to Lebanon may lead to a dramatic deterioration of living standards for migrant farmworker communities.
- Multi-faceted community development initiatives should promise basic minimums of neighborhood infrastructure and housing quality for Syrian migrant informal settlements across Lebanon and would safeguard the health and wellbeing of community residents.

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Health-based risk neutralization in private disability insurance

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Background: Exclusions are used by insurers to neutralize higher than average risks of sickness absence (SA). However, differentiating risk groups according to one’s medical situation can be seen as discrimination against people with health problems in violation of a 2006 United Nations convention. The objective of this study is to investigate whether the risk of SA of insured persons with exclusions added to their insurance contract differs from the risk of persons without exclusions. Methods: A dynamic cohort of 15 632 applicants for private disability insurance at a company insuring only college and university educated self-employed in the Netherlands. Mean follow-up was 8.94 years. Duration and number of SA periods were derived from insurance data to calculate the hazard of SA periods and of recurrence of SA periods. Results: Self-employed with an exclusion added to their insurance policy experienced a higher hazard of one or more periods of SA and on average more SA days than self-employed without an exclusion. Conclusion: Persons with an exclusion had a higher risk of SA than persons without an exclusion. The question to what extent an individual should be entitled to benefit from being less vulnerable to disease and SA must be addressed in a larger societal context, taking other aspects of health inequality and solidarity into account as well.

Introduction

In modern society, insurers provide a valuable social function in shifting, spreading and reducing risks.1 Therefore, accessibility and affordability of insurance are of great importance. Over the past years, private insurance companies have been met with growing criticism regarding risk selection practices, allegedly leading to unfair discrimination. Risk rating is thought to lead to discrimination of groups with chronic conditions.2 A person’s health is usually perceived as being influenced by a range of social and genetic factors, over which the person has limited or no control. Excluding people based on their health is seen as unethical by many.3 However, the fundamental rule that applies to all genetic factors, over which the person has limited or no control. Excluding people based on their health is seen as unethical by many.4,5 However, the fundamental rule that applies to all genetic factors, over which the person has limited or no control. Excluding people based on their health is seen as unethical by many.6,7 Thus risk classification based on medical underwriting lies at the core of most of these health-related voluntary insurance policies.6

Until now, most concern regarding risk stratification based on medical information has focused on life insurance and genetic information. However, other forms of insurance, e.g. disability insurance and risk factors other than genetic information such as past medical history are equally important and deserve just as much attention to prevent unfair discrimination.7,8

When applying for private disability insurance, the risk of future claims is estimated by evaluating the current health status and the medical history of the applicant. Possible forms of risk management at application stage are a longer waiting period before a benefit is paid (longer deferment period), limited duration of the insurance contract, extra premium or in case of an excessive risk even rejection of the insurance application. If a specific condition substantially increases the risk of claims being made, an exclusion can be added to neutralize this risk, i.e. the insured will not be entitled to a benefit if sickness absence (SA) is caused by the condition specified in the exclusion.4,9 Internationally, exclusions are a frequently used method of risk management in disability insurance.4,9 In a survey among Dutch self-employed 8% of those insured had an exclusion added to their insurance policy.10

Only two studies have attempted to evaluate this practice of risk neutralization. Wildhagen et al.11 performed a case-control study in an exclusively male population comparing insured with and without exclusions. They found that insured without an exclusion claimed benefits less often than those with an exclusion. No significant difference in the length of the SA between those with and those without an exclusion was found.11 Hamilton et al.12 studied risk factors for insurance claims in a case-control study comparing claimants and non-claimants from a disability insurance company. In contrast to the findings of the previously mentioned study they found no relation between claims and exclusions.12

Thus knowledge regarding risk estimation and neutralization at application for private disability insurance is scarce, is based on limited evidence and is contradictory, leaving a considerable knowledge gap. The aim of this study is, therefore, to investigate whether the risk of SA of insured persons with exclusions added to their insurance contract differs from the risk of persons without exclusions.