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ENVIRONMENTAL CONDITIONS AND ACUTE ILLNESSES AMONG HOUSEHOLD MEMBERS OF MIGRANT AGRICULTURAL WORKERS IN LEBANON

by
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AN ABSTRACT OF THE THESIS OF

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Migrant agricultural workers in Lebanon face harsh occupational and living conditions which ultimately impact their health and wellbeing. A significant number of studies have shown that harsh living conditions characterized by poor housing and infrastructure have both direct and indirect effects on the prevalence of illnesses in underprivileged communities living in such conditions. In Lebanon, a number of studies found an association between the occurrence of chronic illnesses and the poor living conditions of three underprivileged communities. However, studies addressing these issues for migrant agricultural workers in particular remain scant worldwide.

This study aims to identify the rates of acute health problems reported by Syrian migrant agricultural workers and members of their households in the Bekaa region in Lebanon and to explore the association between their living conditions and the reported acute health problems.

A cross-sectional study of 46 households in the Ashish campsite in the West Bekaa valley was conducted in the summer of 2011. One proxy respondent from each housing unit in the cluster of dwellings was interviewed by trained interviewers using a standardized questionnaire. To analyze the association between housing and infrastructure conditions and acute health problems, a binary logistic regression model was developed using the Generalized Estimation Equation while adjusting for other relevant variables.

The results obtained indicated a 43.8% prevalence of acute illnesses among the migrant families, distributed between the flu, fever, headaches, diarrhea, oral health problems and others. Although overcrowding was a significant characteristic in most of the surveyed dwellings, there was no significant association between level of crowding and the reporting of illness. Migrants living in households with more housing and infrastructure problems were more likely to report the occurrence of an acute illness. The identified household and infrastructure conditions that were significantly associated

with acute illness were the presence of pest infestation, the presence of holes in the dwelling structure and shortage in drinking water.

The findings of this study shed light on the prevalence and determinants of acute illness in migrant agriculture workers and their families. Information obtained on the contributing factors can be used in intervention plans and awareness campaigns to improve living conditions and health practices. Further research is needed to explore particular health conditions and assess the environmental conditions using different methods.

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CHAPTER 1

INTRODUCTION

1.1 Agriculture in Lebanon

The agricultural sector in Lebanon contributes to around 6% of the Gross Domestic Product (GDP) and to 17% of the value of exports (CDR, 2011). The largest agricultural areas in Lebanon lie in the Bekaa valley and North Lebanon, which account for almost 46% and 23% of the total arable land respectively (Asmar, 2011). The main agricultural crops produced include fruit trees, cereals, olives, vegetables and industrial crops; the Bekaa plain is planted mainly with cereals, sugar beets as well as grape vine in its central region (Asmar, 2011).

Around 10% of the Lebanese labor force is employed in the agricultural sector, which depends largely on seasonal family laborers and migrant workers (Emergency Market Mapping and Analysis (EMMA) of the Agricultural Labor Market System in North and Bekaa, Lebanon, 2013). The majority of seasonal agricultural workers in Lebanon, and the Bekaa in particular, are of Syrian nationality. The following section describes in detail the history and status of migrant agricultural workers in Lebanon.

1.2 Migrant workers in Lebanon

The presence of migrant Syrian workers and their families in Lebanon dates back to the 1940s and 1950s (Kawakibi, 2008). Since that time, Syrian migrants have worked in agriculture in the fields of the Akkar and Bekaa valleys, as well as in construction in Beirut and Tripoli (Kawakibi, 2008). The number of permanent and seasonal Syrian workers in Lebanon has fluctuated over the past few decades, varying

according to the local and regional socio-political changes. With the outbreak of the civil war in 1976, the number of Syrian workers dropped significantly; it was not until after the war ended in 1990 that the revival of the Lebanese economy and the boom in reconstruction boosted the demand for Syrian labor again (Kawakibi, 2008). In addition to that, the increasing unemployment rates in the underdeveloped areas of Syria at that time prompted a greater flow of Syrian migrants towards the Lebanese labor market; migrants included both single job-seeking youth as well as entire families looking for better opportunities (Balanche, 2007).

Although it is widely acknowledged that Syrian migrant workers contribute to a significant part of the Lebanese labor market, the exact number and status of workers is unknown due to the lack of statistics and studies. According to official sources, only 440 new working permits were issued for workers of Syrian origin in 2010 and 464 permits were renewed, which might falsely indicate that a small number of Syrian migrant workers are actively involved in the labor force (Central Administration of Statistics, 2010). However, in reality the number of Syrian migrants working in Lebanon in the last ten years is much more sizeable, with some sources estimating it between 300,000 and 1.5 million Syrians; while other independent observers, estimate the number at 400 to 600,000 (Kawakibi, 2008; Balanche, 2007; Bennafla, 2006). This marked discrepancy in figures between official records and the estimates indicates that the majority of the Syrian migrant laborers work illegally in Lebanon.

According to the limited information on Syrian migrant workers in Lebanon, most of the migrants come from the least developed regions in Syria, such as the valley of the region of Idleb (in northern Syrian), Al-Jazyra (in northeast Syria), and Horan (in southern Syria) (Kawakibi, 2008). The majority of migrants are either illiterate or have

limited primary education, and consequently can only seek jobs that do not require specific educational qualifications or skills; such jobs in agriculture, construction and the service industry can be quite "strenuous, labor-intensive and often dangerous" (Balanche, 2007; Chaaban, 2009). Unofficial sources estimate that Syrian migrant workers are paid about ten to fifteen dollars per work day in exchange for an 8-10 hour working day (Balanche, 2007; Kawakibi, 2008). Furthermore, Syrian migrant workers are granted no additional benefits and are excluded from social-security schemes; with most migrants working illegally, employers have no binding contracts that oblige them to provide the workers with social security benefits (Balanche, 2007; Chaaban, 2009). In addition to the low wages, dismal working conditions and lack of benefits, Syrian migrant workers also have to endure harsh living conditions; most workers reside in dwellings that lack basic infrastructure requirements and services (Bennafla, 2006; Balanche, 2007; Kawakibi, 2008). Despite their significant number and contribution to the Lebanese labor market, there is a dearth of research on the conditions of these migrants; only a few articles and sporadic news stories have given a general account of the problems faced by the migrant Syrian worker population.

Rough estimates indicate that approximately 39% of the migrant Syrian labor force in Lebanon works in agriculture (Gambill, 2001); these migrants make up the majority of the agricultural work force in the country (Habib and Fathallah, 2012). The migrant workers take part in various agricultural tasks such as plowing the fields, planting and harvesting crops such as vegetables and fruit trees (Habib, 2010). All family members of migrant agricultural worker including women and children take part in the agricultural activities in order to maximize the household income and compensate for the minimal wages that are barely sufficient to cover the expenses of basic needs

such as food and shelter (Habib, 2010). Agricultural workers are exposed to a number of occupational hazards such as pesticides, injury, repetitive motion and heat exposure; this puts them at risk of serious acute and chronic health problems, such as pesticide poisoning, respiratory health problems, musculoskeletal disorders and other illnesses (Habib, 2010).

In addition to the harsh working conditions, the living conditions of migrant agricultural workers pose an added risk on their health and wellbeing. Syrian agricultural workers in the Bekaa live in clusters of makeshift dwellings adjacent to the agricultural fields in which they work. These workers often resort to a local broker, known as the "Shaweesh", for help in securing work and a place to live (Emergency Market Mapping and Analysis (EMMA) of the Agricultural Labor Market System in North and Bekaa, Lebanon, 2013). The "Shaweesh" usually leases a piece of land from Lebanese property owners and charges the migrants a sum of money in exchange for the land, water supply and other amenities (EMMA, 2013) However, the conditions in which the workers live remain quite primitive (Habib, 2010; 2010a); the dwellings are poorly constructed and exhibit several defects such as leaky roofs, insufficient lighting and ventilation. Overcrowding is yet another problem these migrants have to endure, as the workers reside in these tiny dwellings with their families, which often consist of more than ten members (Habib, 2010; 2010a). Living under the burden of so many psychosocial, socioeconomic, cultural and physical problems, and with limited access to medical, social and governmental resources, migrant agricultural are vulnerable to a number of adverse health conditions (Habib, 2010).

1.3 The Current Situation: influx of Syrian refugees

In 2011, the onset of armed conflicts in Syria led to an influx of migrants into Lebanon, which increased significantly over the course of three years with tens of thousands of Syrians fleeing their war-ridden regions seeking asylum. By August 2014, official estimates indicated that the total number of refugees residing in Lebanon since the beginning of the Syrian conflict had reached 1,176,971individuals, with 470,604 living in the Bekaa region alone (UNHCR, August 29, 2014). The huge number of refugees has added pressure on already limited resources to provide the refugees with basic needs such as food and shelter (WFP, UNHCR and UNICEF, 2013). According to a survey carried out by UNHCR in August 2013 to assess the vulnerability of registered Syrian refugees, around 41% reported living in informal settlements such tents, collective shelters, unfinished constructions, garages, squatting and separate rooms; those living in tented settlements alone amounted to around 12% (WFP, UNHCR and UNICEF, 2013). As a result, the number makeshift camps in the Bekaa valley has multiplied in comparison to the period prior to the conflict, when it was limited to migrant agricultural workers; some 420 informal settlements can now be found between the Bekaa and northern regions of Lebanon (UNHCR, 2014). It has been documented that many of these camps exhibit multiple problems from poor sanitation, to fire hazards, and even flooding in camps locating in flood-planes, all of which pose a significant risk on the lives and health of the refugees particularly during winter (UNHCR, 2014). Consequently, the spread of infectious diseases is a primary concern for refugees residing in such camps. A number of reports have documented contaminated drinking water, inadequate sanitation facilities and overall poor hygiene in camps in the Bekaa and the North, and alerted to increased risk of water-related diseases

such as diarrhea, skin disease and Hepatitis (ILO Regional Office for Arab States, 2014).

Migrant agricultural workers residing in Lebanon prior to the Syrian conflict have also been directly affected by the strife in Syria. While these migrants used to previously cross the border seeking cheaper healthcare services available to them in Syria, with the escalated dangers of the war conflict and heightened security measures, migrants are no longer able to cross the border easily and safely. As such, many migrants can no longer benefit from such healthcare services in their permanent residence in Lebanon; this in addition to the limited availability of cheap healthcare in Lebanon is expected to have a negative impact on the health of these migrants.

A large number of Syrian refugees in Lebanon are living in squalid conditions which may be comparable to those faced by the population of migrant agricultural workers prior to the strife in Syria. In order to gain a better understanding of the extent, progression and implications of these problems, the presence of a study documenting the previous status of Syrian migrants in Lebanon would provide baseline quantitative information regarding the living conditions of Syrian migrant workers in Lebanon, which would be of great value due to the lack of official data on this population. By exploring the possible associations between specific housing and living conditions and the occurrence of illness in this underprivileged population, this study would pave the way to possible action plans and interventions to deal with the current problems of Syrian refugees.

1.4 Objectives of the study

This study aims to:

- Identify the rates of acute health problems reported by Syrian migrant agricultural workers and members of their households in the Bekaa region in Lebanon.
- Study the association between the living conditions and acute health problems among migrant agricultural workers and other household members living in the Bekaa region in Lebanon.

1.5 Significance of the study

There have been a number of studies addressing the link between poor living conditions and health for certain groups of vulnerable populations both in developing and developed countries, yet, those that focus on migrant agricultural workers in particular are quite few. In the limited literature available on agricultural worker health, we find that the main health concerns addressed in such studies are chronic illnesses and serious infectious diseases; however they do not look into any differences in trends of prevalence of common acute illnesses. As such, this research serves to add to the body of knowledge on the health of migrant agricultural workers by exploring both the socio-economic and environmental conditions these workers and their families are living in and identifying their association with acute illnesses.

While some developed countries have established laws and regulations to control the flow of migrant laborers and to organize their working and living conditions, developing countries are still far behind when it comes to the establishment and

implementation of laws that regulate this labor sector (Vallejos, et al., 2011). In the Lebanese context, with the lack of regulations for housing conditions of migrant workers, this study will highlight the need for intervention and policy-making to regulate housing and working conditions for migrants and refugees. By identifying the main problems in housing conditions faced by migrant agricultural workers residing in such make-shift camps, the study will serve as a gateway for specific recommendations and action plans to improve the living conditions of this population.

The ongoing crisis in Syria has led to increased number of migrants, consisting of entire families, fleeing to Lebanon since 2011, and significant numbers of these migrants have set up refuge in camps in areas such as the Bekaa Valley and Akkar (UNHCR, 2013). With more people living in these make-shift dwellings under such critical conditions, and with clearly increased chances of health risks, it is crucial and timely to provide empirical evidence on the association between poor housing conditions and ill-health among Syrian migrants living in Lebanon.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview of the Chapter

Over the past two decades, interest of public health research in the significance of various environmental factors as determinants of health has increased significantly, particularly that of the "housing environment" (Krieger & Higgins, 2002; Bonnefoy, 2007). This chapter examines the various aspects of the impact of living conditions in which individuals reside on their health. It also provides a review of the literature to specifically showcase which indicators are most commonly used to measure living conditions and to examine the findings on the associations between living conditions and the health of residents focusing on those unique to migrant agriculture workers.

2.2 Living Conditions and Health

According to the WHO, housing consists of "four interrelated dimensions the physical structure of the house (or dwelling), the home (psychological, economic and cultural construction created by the household), the neighbourhood infrastructure (physical conditions of the immediate housing environment) and the community (social environment and the population and services within the neighborhood" (WHO, 2011). The report adds that "each of these four dimensions has the potential to have a direct or indirect impact on physical, social and mental health, and two or more of them combined can have an even larger impact." (WHO, 2011).

Although it is difficult to quantify the direct association between housing quality and health, many studies have shown that certain features of substandard housing can have direct and indirect negative impacts on health (Krieger & Higgins, 2002; Al-Khatib et al., 2003; Habib, et al., 2006; Bonnefoy, 2007; Habib, et al., 2009; Bailie et al., 2010; Govender et al., 2010; Habib, et al., 2011; Haines, et al., 2012). The following sections will inspect the specific components of housing quality, particularly those of the household and the existing infrastructure conditions.

It is important to clarify that a "household" is defined as either:

a) A one-person household: an arrangement in which one person makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household, or
b) A multi-person household, defined as a group of two or more persons living together [in the same housing unit] who make common provision for food or other essentials for living (UN Department of Economic and Social Affairs- Statistics Division, 2008).

In the case of a multi-person household, the members may be related or unrelated persons or a combination of persons both related and unrelated (UN Department of Economic and Social Affairs- Statistics Division, 2008).

2.2.1 Housing Conditions and Health

Studies on housing environmental conditions include a number of components as indicators of housing conditions; they assess the physical soundness of the structure of the dwelling, the presence of dampness or humidity, indoor air quality, pest

infestation, ventilation and lighting, the material used for the construction of the housing unit as well as others (Keall et al., 2010; Habib et al., 2006; 2009; 2011; WHO, 2011). Presence of indoor dampness and mold in the household setting can usually be attributed to inadequate insulation, seepage of water and lack of proper ventilation in households (Keall et al., 2010; Haines et al., 2012). This has been associated with increased development and exacerbation of asthma, cough, bronchitis, respiratory infections and other chronic respiratory symptoms in a number of research studies (WHO, 2011; Keall et al., 2010; Mendell et al, 2011). Epidemiological findings have also shown dampness and mold to be related to reporting of recurrent headaches, fever, nausea and vomiting, and sore throats (Krieger & Higgins, 2002; Haines, et al., 2012 ; Bonnefoy, 2007; Keall et al., 2010).

Cold housing, also a result of insufficient insulation and lack of sufficient thermal control of the indoor environment, can have detrimental impacts on the general health of household residents (Krieger & Higgins, 2002; Keall et al., 2010). Exposure to excessively low indoor temperatures leads to increased mortality rates from cardiovascular conditions and respiratory diseases (WHO, 2011).

Pest infestation and intrusion of disease vectors is another common indicator of poor housing often a result of defects in household structure, poor ventilation and conditions of the surrounding environment (Krieger et al., 2002; Haines et al. 2012). Pest infestation is often strongly associated with housing disrepair and structural problems, thus it is a recognized indicator of poor housing (Bradman et al., 2005). The presence of pest and vermin infestation has been associated with infectious diseases such as malaria and vector-borne diseases (VBDs) (Krieger & Higgins, 2002; Haines, et

al., 2012; Bonnefoy, 2007), as well as chronic dieaseases such as asthma (Krieger & Higgins, 2002).

Another critical and commonly reported problem that impacts housing conditions is flooding, which can leave behind significant damages to housing structures, household possessions (WHO, 2011). This often leads to structural damages to the tents themselves, which adds to the costs of the household due to the required repair and upkeep (Govender et al., 2011). In addition to the direct financial burden, rainwater flooding is known to lead to the proliferation of pests and disease-vectors which in turn can lead to outbreaks of infectious diseases including diarrhea, malaria and leptospirosis (Kouadio et al., 2012).

2.2.2 Infrastructure Services and Health

In addition to the above-mentioned charactersitics of the housing unit, infrastructure services availabe in the dwelling play a signficant role in determining housing quality and also have a direct impact on the health of the household dwellers. Basic infrastructure and services include adequate sanitary areas (functional toilets, washing facilities, hot water) and waste disposal (solid waste storage and collection and safe sewage disposal), reliable energy sources (electricity supply and energy source for heating and cooking) as well as clean and sustainable water supply both potable and non-potable (Haines et al., 2012; Keall et al., 2010).

According to the WHO defnition of domestic water supply, access to clean water is essential for three basic uses: consumption (drinking and cooking), hygiene (for personal and domestic cleanliness), and amenity use (such as watering plants) (Howard & Bartram, 2003). Several studies have shown that the amount of available drinking

water is associated with the reporting of poor health outcomes both chronic and acute (Manz & Wentz, 2005; Jequier & Constant, 2010; Popkin, D'Anci, & Rosenberg, 2010). One such study has explored the links between thirst and dehydration and increased the occurrence of headaches (Blau, Kell, & Sperling, 2004). Although there has yet to be set requirements on the the minimal amounts of drinking water needed to "maintain an adequate hydration level and minimize risk of disease", some studies suggest that "a minimum of 3 litres per capita per day is required for adults in most situations". However, this is subject to change with varying climatic conditions, working conditions and age (Howard & Bartram, 2003). The quality of water available for drinking and domestic use also has a critical impact on the health of consumers. Countless studies have shown that contamination of water sources lead to the high risks of diarrheal disease. A meta-analysis of 38 studies on water, sanitation and hygiene interventions by Fewtrell et al. summarized that improvement in water supply and water quality reduced the risk of diarrhea-related morbidity by 25 and 31 %, respectively (Fewtrell et al., 2005).

Another critical infrastructure issue commonly included in assessments of living conditions is waste disposal. Lack of proper waste disposal can lead to pest infestation such as rodents and flies, which in turn can lead to the spread of infectious disease (Keall et al., 2010). This, in addition to contaminated water supply, and lack of washing facilities also contribute to the increased occurrence of diarrheal disease, intestinal parasites and other enteric infections (Krieger & Higgins, 2002; Haines, et al., 2012; Bonnefoy, 2007).

2.2.3 The Cumulative Impact of Living Conditions on Health

A quick review of the literature on housing and health shows that most studies focus on specific parameters of the diverse-health-relationship individually, while very few studies examine the effect of the cumulative risks and overall setting on the general health of the residents (Bonnefoy, 2007; Adamkiewicz, et al., 2013). A study on housing conditions and common childhood illness in remote Australian Aboriginal communities reported a strong association between respiratory infection and overall functional condition of households (OR=3.1; 95% CI 1.36–6.63), as well as the association of reported skin infection with evidence of poor temperature control in the house (OR=3.25; 95% CI 1.06–9.94) and with evidence of pests and vermin in the house (OR=2.88; 95% CI 1.25–6.60) (Bailie, et al., 2010).

Similar studies done on living conditions of underprivileged populations in refugee camps were conducted in Palestine, whereby one explored the relationship between the housing conditions at Ama'ri camp and the prevalence and incidence rates of upper respiratory tract (Al-Khatib et al., 2003). The study found that the diseases and symptoms most encountered in winter included the common cold, cough, pharyngitis, influenza, ear infection, asthma and bronchitis; it was also able to establish an association between these diseases and the poor housing conditions prevalent in the camp (Al-Khatib et al., 2003). Cold housing, presence of dampness and moulds, dust and smoke, burning of biomass fuel, crowding, poor ventilation and inadequate lighting problems are commonly found in the houses of this refugee camp. With 78.2% of households reporting dampness, leaking or mold, a significant association was found between this indicator of poor housing conditions and the occurrence of the common cold (Al-Khatib et al., 2003).

Another study conducted in the Jazalone refugee camp in Palestine explored the presence of respiratory illnesses and their relation to housing conditions. It reported the prevalence of acute respiratory conditions as well as asthma as follows: common cold (26.4%), cough (17.6%), tonsillitis (10.5%), ear infection (4.5%), and influenza (8.1%) (Al-Khatib and Tabakhna, 2006). The study showed statistically significant associations between the common cold and cough, with overcrowding and poor housing conditions (number of household members, maximum number of persons using 1 bedroom, number of smokers in the house, presence of damp, leakage or mold, and lack of ventilation throughout the house). The prevalence of tonsillitis and ear infection appeared to be associated with high population density and poor housing conditions as well (Al-Khatib and Tabakhna, 2006).

One study on the health of tsunami refugees in Sri Lanka compares the conditions of those living in transitional camps and those living in formal settlements. It reported that those living in transitional camps as opposed to formal housing projects showed high and significant risk of coughs (OR 3.53; 95% CI 2.11–5.89), stomach aches (OR 4.82; 95% CI 2.19–10.82), headaches (OR 5.20; 95% CI 3.09–8.76), general aches and pains (OR 6.44; 95% CI 3.67–11.33) and reports of feeling generally unwell (OR 2.28; 95% CI 2.51–7.29) (Turner et al., 2009). Separate analysis of the environmental conditions of the transitional camps and the reported symptoms showed that only household population density was a significant risk factor for stomach ache 1.40 (1.09–1.79) and headaches 1.33 (1.01–1.77) (Turner et al., 2009).

In Lebanon, studies that adressed the association between living conditions and illnesses in disadvantaged communities have been carried out in the outskirts of Beirut (Habib et al., 2006; 2009; 2011). In these studies, housing quality was assessed based

on two indices, an infrastructure and services index which consisted of items relating to electrical power, sewage and garbage disposal, and rainwater flooding, and a housing conditions index that included pest infestation, adequate lighting, ventilation, heating, the presence of humidity and cracks in walls and ceiling, as well as other items (Habib et al., 2006; 2009; 2011). These studies provided much needed data on the status of displaced and disadvantaged communities living under precarious conditions in Lebanon and added to the body of knowledge on the associations of health and living conditions by identifying the common problems.

A study on the on chronic illnesses among a displaced population in the impoverished Nabaa neighborhood at the outskirts of Beirut, found that the presence of illness increased by 9% (OR=1.09, 95% CI 1.01–1.18) with each additional problem reported by the residents concerning the infrastructure and services. Similarly, for each additional problem reported in housing conditions, the presence of illness increased by 5% (OR=1.05, 95% CI 1.02–1.09) (Habib et al., 2011). Among those who had reported a chronic illness (20% of surveyed residents), 27% had circulatory problems, 20% had endocrine, nutritional and metabolic problems, 14% had musculoskeletal problems and 13% had respiratory problems (Habib et al., 2011). The study also goes further to compare the housing conditions and reported illnesses between displaced residents and non-displaced residents. The results showed that displaced individuals were more likely to suffer from chronic illness and more likely to report problems related to poor housing (Habib et al, 2011).

Findings in another study in Lebanon in the area of Hay El Sellom, an informal settlement which includes both displaced and non-displaced residents, indicated that households reporting four or more problems in housing conditions were 60% more

likely to report the presence of chronic illness than households reporting less than four problems (OR 1.62, 95 % CI 1.25–2.10). Crowded households, having more than two persons per room, were less likely to report the presence of illness (OR 0.76, 95% CI 0.60–0.97) than less-crowded households (Habib et al., 2009).

This positive association between poor housing conditions and poor health had also been reported in a study on the population of Palestinian refugees in Burj Al-Barajneh camp in 2006, whereby households with 8-15 housing problems were twice more likely to report the presence of illness than those with less than four housing problems (OR = 2.08, 95% CI = 1.40–3.11). This research contributes to the understanding of the influence of the built environment on the health of underprivileged refugee and displaced populations (Habib et al., 2006; 2009; 2011).

A research study conducted on the Dom people in Lebanon, an ethnic minority of the Levantine region similar to the gypsies of Europe who are sometimes referred to as “Nawar”, reported on the poor living and health conditions this community suffers from (Squire et al., 2011). Unlike the studies above, it did not establish a direct quantifiable association between the living conditions and health status, however, this study revealed important information on a different kind of population residing in informal settlements in Lebanon. According to the report, Dom families live in make-shift shelters built out of scrap materials, whereby 77% of surveyed households had roofs made of corrugated iron, wood or cardboard, while 76% of households had walls made out of the same materials (Squire et al., 2011). The report added that some shelters exhibited severe structural damages, including holes in the roof and external walls, which expose the dwelling residents to the harsh weather conditions, the sun and heat in the summer and the cold and heavy rains in the winter (Squire et al., 2011). Additional

housing and infrastructure problems included the lack of connection to a sewage network in 73% of sampled shelters and the lack of hand-washing facilities in 61% of toilets (Squire et al., 2011). The study reported on common health problems faced by the Dom people based on interviews with a number of physicians who treat patients in that community. It explained that the illnesses faced by members of the Dom community are not very different to other communities with socio-economic problems and limited access to services; this includes upper respiratory infections, diabetes, chronic ear infections, musculoskeletal problems, and diseases transmitted due to close living quarters (i.e. scabies) (Squire, et al., 2011). However, it added that the harsh environmental conditions of their makeshift shelters exacerbate the occurrence of health problems particularly during change of seasons, with increased risk of pulmonary infections during the winter and increased cases of food poisoning and gastroenteritis during the summer (Squire, et al., 2011).

2.3 Migrant Agricultural Workers in the Literature

As the studies above have shown, substandard housing is a common characteristic of disadvantaged communities, and populations with the least resources at their disposal suffer the worst from the impacts of poor housing conditions (Bonnefoy, 2007). It is widely recognized that agricultural workers make up a significant part of the population living below the poverty line, particularly in developing countries (ILO, 2000). As such, agricultural workers in general endure harsh environmental, living and working conditions making them more susceptible to health risks (ILO, 2000; Villarejo, 2003; Villarejo et al., 2010; Svensson et al., 2010; Arcury & Quandt, 2011; Vallejos et al., 2011; McLaurin & Liebman, 2012). Although this study focuses on the prevalence

of acute illnesses in migrant agricultural workers, it is worth noting that studies have reported a high prevalence of indicators of chronic health problems such as obesity, high serum cholesterol, high blood pressure, poor dentition, diabetes risk and anemia risk (Villarejo et al., 2010).

2.3.1 Living Conditions of Migrant Agriculture Workers

Migrant and seasonal agricultural workers in developed countries as well as agriculture workers in developing countries commonly reside in rural areas lacking of many basic services and primitive if not non-existent infrastructure which poses several challenges in the area of housing and health (ILO, 2000; Early et al., 2006). These burdens can lead to the occurrence of health conditions and an overall lower health status for the workers themselves and any family members residing with them (ILO, 2000; Early et al., 2006; Habib & Fathallah, 2012).

Studies discussing the housing conditions of migrant agricultural workers, while few in number, all show a common trend of substandard, overcrowded and unsafe housing lacking in adequate sanitation and protection from various infectious elements (Ziebarth, 2006; Svensson et al., 2010; Vallejos et al., 2011; Habib & Fathallah, 2012; Gustafson et al., 2013). A survey conducted in the Coachella Valley of California found that 30% of seasonal farm workers live in conditions not meant for human habitation (such as the outdoors, cars, trucks, or vans parked in streets or parking lots, or inhabited converted garages), with over 35% having no access to hot water and 27% without access to a shower facility (Colletti et al., 2007).

In a study carried out on the housing conditions and health status of migrant farmworkers living in camps in eastern North Carolina, all camps surveyed had at least

one exterior housing problem (Vallejos et al., 2011). These problems included overflowing trash containers, uncovered trash cans, trash or litter in yard and signs of rodents. Almost 93% of camps had at least one interior housing problem including: sign of pests, no fire extinguisher, no smoke detector/fire alarm, no first aid supplies, no resident to administer first-aid, dirty/no matresses, holes in the walls, floors or ceilings and <50 square feet per person in sleeping rooms (Vallejos et al., 2011). According to the overall score for combination of documented housing problems, 67% of the camps were moderately substandard and 22% were severely substandard (Vallejos et al., 2011).

Another study in North Carolina by Gentry et al. reported similar poor housing conditions, with 69.4% of households being crowded (having more than one person per room). Dwellings were often located adjacent to fields (46.0%), suffered from structural problems (e.g., 18.3% had roof leaks), and lacked facilities and appliances (e.g., 26.9% did not have a functional oven) (Gentry et al., 2007). Similarly, a study documenting the housing quality in the homes of Latino families with young children in the agricultural area of the Salinas Valley in California showed that pest infestations were a common problem in homes whereby 60% indicated presence of cockroaches and 32% presence of rodents (Bradman et al., 2005). Other indicators or poor housing conditions were also evident whereby 58% of dwellings had peeling paint, 43% had mold, 25% had water damage, and 16% had rotting wood (Bradman et al., 2005). High levels of household crowding were also measured with 39% of participants living in homes with ≥ 1.5 persons per room (Bradman et al., 2005).

Similarly, a study carried out on the housing of migrant workers working in the agricultural production and processing industries in Minnesota reported that 87% of

surveyed workers commented negatively about their housing (Ziebarth, 2006). The comments about housing conditions included complaints of inadequate private bathrooms, lack of kitchen, overcrowding, lack of water or poor water quality, the need for structural repairs, poor heating or ventilation, and other problems (Ziebarth, 2006).

Although these studies reported on housing quality and camp conditions, they did not attempt to establish or quantify a direct association with the health of the migrant workers. According to Arcury et al., farm worker housing exposes workers and their families to toxicants, including lead and pesticides, to allergens, including mold, mildew, and insect and rodent dander, to electrical and structural hazards and to crowded conditions, all of which impact their health and quality of life (Arcury & Quandt, 2011; Arcury et al., 2012).

2.3.2 Acute Illness and the Health of Migrant Agricultural Workers

Crowded and poor housing conditions of migrant agricultural worker households contribute to an increased risk of infectious diseases such as tuberculosis and hepatitis for the workers (Arcury & Quandt, 2011). A significant number of reports in the literature also show a high prevalence of colds, respiratory infections, otitis media, gastrointestinal and urinary tract infections among farm workers (Slesinger, 1992; Villarejo, 2003; Weigel et al., 2007). Deaths from influenza, pneumonia and tuberculosis have been found to be up to 25 percent higher in migrant farm workers than the general population in the USA (Sandhaus, 1998). A study that looked into the health needs of seasonal and migrant farm workers in the United States of America determined that colds, fevers, sore throats, and gastrointestinal disorders were among the acute illnesses that were commonly reported (Anthony et al., 2008).

One study on more than eight thousand seasonal migrants working in coffee harvesting in Costa Rica reported similarly prevalent illnesses; respiratory illnesses were reported in only 4.2% of the population, digestive illness in 2.1% and unspecific pains and fever in 1.9% (Bolaños et al., 2008). The study also reported on the housing conditions of the surveyed population and showed that nearly 25% of dwellings had insufficient sanitary facilities. Many dwellings suffered from structural deficiencies, whereby almost half of them had cracked and permanently dirty floors, deficient ceilings/roofs, or poor lighting and ventilation (Bolaños et al., 2008). Poor water quality was reported 38% of the dwellings, and almost 80% suffered from a problem with garbage disposal (Bolaños et al., 2008). Although the study did not clearly indicate a direct correlation between the reported illnesses and the poor housing conditions, it mentioned that "the major categories of adverse health determinants were inferior quality of dwelling structures, isolation, crowding, lack of radio and television, substandard basic installations such as toilet, and deficient cooking facilities" (Bolaños et al., 2008).

Of the numerous health issues commonly reported in migrant farm workers, oral health is also of major concern, as documented in a number of studies (Quandt et al., 2007; Weigel et al., 2007; Lukes & Simon, 2005). In one study assessing household food insecurity and health of Mexican migrant and seasonal farm workers living near the U.S.-Mexico border, 73.9% of surveyed households reported the occurrence of dental caries in at least one member of the household (Weigel et al., 2007). Whereas in another study in Southern Illinois, 69 % of surveyed migrant farm workers had at least 1 decayed (untreated) tooth surface, and more than 50% had 3 or more decayed surfaces

(Lukes & Simon, 2005). Other reported oral health problems include periodontal disease and missing or broken teeth (Weigel et al., 2007).

One study by Gustafson et al. on the prevalence of certain self-reported skin conditions among Latino migrant farm workers in North Carolina reported that pruritus (itching), rash, scaling, blisters and ingrown nails were commonly reported (Gustafson et al., 2013). The study also showed an association between the reported skin conditions and several housing conditions based on the findings recorded from interviewer-administered questionnaires and housing inspections. It showed that pruritus was more likely to be reported by farm workers living in dwelling without air conditioning. The occurrence of rash was associated with low humidity, and scaling was associated with indoor air temperatures in the thermal discomfort range (Gustafson et al., 2013).

Studies on the health and living conditions of migrant agriculture workers in Lebanon are few in number (Habib, 2010; Habib, 2010a). In early 2011, the number of seasonal migrant workers working on a daily basis in Lebanon was estimated to around 12,000 workers in the Bekaa and 9,000 in Akkar (International Rescue Committee, 2013). Before the onset of the strife in Syria, migrant workers and their families used to move freely between Lebanon and Syria seasonally and whenever the need to seek specific services arose; the Syrian migrants would cross the border to seek medical care available at cheaper cost in their home country. However, since then, movement across the border has become restricted due to the unstable and precarious situation in Syria. As such migrant workers and their families now stay in Lebanon throughout the year, enduring the harsh environmental conditions and the lack of basic services and affordable medical care (International Rescue Committee, 2013).

CHAPTER 3

METHODS

3.1 Overview of the Chapter

This chapter explains in detail the methods used in the study. It presents the data source used, the sampling and data collection methods, and provides an explanation of the study variables as well as the data management and the data analysis processes. Finally it includes a brief description of the essential ethical considerations.

3.2 Data Source

This thesis is based on a secondary data analysis of a cross-sectional study that was carried out by Dr. Rima Habib and her research team in 2011 at the Faculty of Health Sciences to assess the living conditions among migrant agricultural workers and their families in the Bekaa Valley in Lebanon. The survey consisted of a structured questionnaire that aimed to collect information on demographics, household conditions, working conditions and the general health of this population.

3.2.1 Questionnaire Content

The front page of the questionnaire included a consent form with a brief explanation of the purpose of the study, the type of information the questionnaire sections seeks to gather, the duration of the interview, and a statement ensuring the confidentiality of the data and the informed consent from the respondent. Consent forms were followed by a cover sheet that includes the questionnaire number, identification

information of the main respondent (name and gender), and the person responsible for completing the questionnaire (interviewer, data coder and data entry operator). This page also included an identification number for the respondent relative to the other members of his/her household.

The questionnaire included close-ended questions as well as open-ended questions and was divided into two main sections. The first section aimed to collect information on demographics, socio-economic conditions and general health of each individual living in the housing unit as reported by the proxy respondent. The second part of the questionnaire focused on characteristics of the dwelling/built environment consisting of questions on infrastructure and housing conditions; it also contained sections addressed specifically to the main respondent on working conditions and occupational health.

3.2.2 Translation and Pilot Testing

The questionnaire was developed in English and then translated into colloquial Arabic. Two interviewers (a male and a female) were thoroughly trained on interviewing techniques and questionnaire items. The survey questionnaire was pre-tested in a pilot with a few migrant workers in a different area in the Bekaa valley and was then revised as needed.

3.3 Sampling

The survey for this study was carried out in the Ashish campsite, a cluster of tented dwellings located in Joub Jannine in the West Bekaa valley. Joub Jannine is located approximately 68 kilometers from Beirut, the capital of Lebanon, at an elevation of 930 meters above sea level. It stretches over an area of around 1575 hectares, and is

surrounded by agricultural fields (Centre de Resources sur le Developpement Local, 2008).

In a previous qualitative study carried out by the research team on migrant agricultural workers in the Bekaa, a number of settlements had been located in and around Joub Jannine based on a thorough exploration of the area and the information provided by local contacts, key informants, and migrant agricultural workers themselves. The main criterion for the selection of the sample was migrant workers living in tents. Based on the research team's earlier observations, the cluster in Ashish campsite was found to resemble other campsites scattered all over the Bekaa valley, and thus it was considered to represent the living conditions of migrant agriculture workers and their families. All housing units in this campsite (n=48) were included for the purpose of this study.

Since the study aims to collect information on the living conditions shared by the migrant workers and members of their households, each dwelling was considered as a unit of observation (i.e. the sampling unit). Meanwhile, the data collected on the outcome measure, the reported acute illnesses for members of the households, was analyzed per each individual; in other words, the unit of analysis used is the individual member. Accordingly, data was collected from 290 individuals residing in 46 housing units from the campsite with response rate of 96%. Two housing units refused to participate.

3.4 Data collection

Data were collected from June 15, 2011 to July 31, 2011 through face-to-face interviews with one proxy respondent from each housing unit in the cluster of

dwellings. The proxy respondent was chosen as the person in charge of decision making in the household. In the case this person was not present during the visit, the spouse or sibling was interviewed. Initially, the survey aimed to interview two main respondents from each housing unit (one male, one female); however, during pilot testing, there was a strong reluctance by the household dwellers for another interview in the same housing unit.

3.5 Data Management

3.5.1 Review

Questionnaires were reviewed by members of the study team at AUB. This was done after the pilot stage and prior to the data collection stage.

3.5.2 Coding

Coding of the questionnaire elements was carried out at the Faculty of health Sciences at AUB by an AUB graduate assistant, under the supervision of an employed research assistant who was also a member of the study team. All questions were coded, along with an "Other, specify" category for close-ended questions to account for additional options provided by the respondents. All answers were listed, grouped and assigned suitable codes, each corresponding to an appropriate answer.

3.5.3. Data Entry

Data entry was also carried out by AUB graduate assistants on the Census and Survey Processing System (CSPro) for data entry. Regular quality checks on the data entry were also executed. Next, data cleaning was carried out followed by a preliminary

analysis of the data using the Statistical Package for Social Sciences (SPSS) software version 19.00. The regression analyses were carried out using STATA statistical software, version 10.0.

3.6 Study Variables

3.6.1 Dependent Variable

The main outcome of interest in this paper is reported acute illness, being any non-chronic illness occurring in the last 3 months prior to the interview. Other reports and studies have adopted similar definitions of "acute illnesses" describing them as: "those [illnesses] that are of short duration" (Jones, 2010). These would include illnesses such as upper respiratory tract infections, skin rashes dental conditions, eye infections, and diarrhea (Jones, 2010; UNHCR, 2013).

Health information was collected for each household member by asking the proxy respondent "Did (name) suffer from any acute illness in the past 3 months?" If the answer was 'yes', the respondent was also asked about the type of illness the household member suffered from. Members reported up to 4 types of acute illnesses in the past 3 months prior to the study; they specified the types of illnesses as per the list of acute illnesses provided in the questionnaire, which included the common cold, fever, diarrhea, headache, tooth decay, lice, rabies, scabies, worms, and skin infections, as well as any other additional illness not included in the list.

3.6.2 Independent Variable

The independent variable of interest is housing quality which was measured by an index of "housing and infrastructure conditions". It should be noted that all housing

units in our study are tents. By definition, a tent "is a portable shelter with a cover and a structure; tent = cover + structure". The terms adopted to describe the structure of the tent are "roof", "walls" and "floor" (UN Office for the Coordination of Humanitarian Affairs, 2004). The tents in the Ashish campsite were made of hard cloth material and cardboard, supported by poles and car wheels. Inside, the tents were divided into separate 'rooms'/compartments. The choice of index is based on published research by Habib et al. (2006; 2009; 2011); items included in the index have been used in other studies assessing housing conditions with slightly varying methods (Arcury et al., 2012; Keall et al., 2012; Govender et al., 2011; Vallejos et al., 2011).

The index includes 6 items relating to the housing unit:

(1) *Presence of holes or tears in the material forming the 'walls' of the tent*: The fabric, cardboard and even plastic material used for the sidewalls of the tents are prone to tears and rots after prolonged use and effects of weather conditions; which can lead to water leaks, and the escape of warm air from inside the tent (UN Office for the Coordination of Humanitarian Affairs, 2004). As such, drawing on previous studies on housing conditions which accounted for the presence of holes in the walls to assess the structural integrity of the household, the proxy respondent from each household was asked to indicate whether the tents they resided in possessed any holes or tears.

(2) *Presence of holes or tears in the material forming the 'roof' of the ten*t: similar to the component above.

(3) *Rainwater flooding:* this variable was included in the index, because tented settlements such as the Ashish camp are at risk of flooding particularly

during the rainy season. As such, the respondents were asked to report if they had suffered any flooding incident due to rainwater over the past year.

(4) *Pest infestation (including cockroaches, rats and ants)*: Presence of pests is a common indicator of poor housing quality. As such, respondents were asked to report the presence of pest infestation in their housing units.

(5) *Absence of a heating source*: Respondents were asked to indicate if they possessed a heating source/device to keep warm during 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) *Problems in accessing drinking water*: Respondents were asked if they suffered from a shortages in drinking water and to indicate 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 index 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 zero to six problems. Thus, the higher the score on the index, the higher the number of reported problems indicating worse housing conditions.

3.6.3 Covariates

The study adjusts for the following variables as potential confounders in the model:

- *Age:* The roster gathered information on the age of each household member. The ages were grouped to map the distribution of the relatively young population; it was divided into twelve categories: '0–5 years old', '6–10 years old', '11–15 years old', '16–20 years old', '21–25 years old', '26–30 years old', '31–35 years old', '36–40 years old', '41–45 years old', '46–50 years old', '51–55 years old', and '≥56 years old'. However, for the purpose of logistic regression, age was used as a continuous variable.
- *Gender*: This asked for the gender of each household member. The variable was dichotomized as 'male' and 'female'
- *Crowding*: The measure for crowding was calculated by dividing the number of individuals residing in each housing unit by the number of 'rooms' in the unit (other than the kitchen). Since the larger tents were separated into areas or 'compartments by cloth screens/partitions (for example a 'living room' area, an area to sleep, a kitchen area) (UN Office for the Coordination of Humanitarian Affairs, 2004). Most tents have their 'bathroom' area outside the tent. For the purpose of the regression analysis, and in order to reduce bias, crowding was used as a continuous variable in our final logistic model.
- *Household assets*: an indicator of household wealth, was calculated using the Principle Component Method (PCA) and divided into tertiles (lowest, second, highest) based on the presence of nine different assets (fridge, dishwasher, laundry machine, cell phone, house phone, water heater, radio, television and satellite) in each housing unit as reported by the main respondent. Such household assets indices are commonly used in studies to assess wealth levels (Cordova, 2008; Smits, 2012). In the case of our study sample, the tented

settlements are secondary dwellings in which the migrants in our study population reside during the agricultural season; meanwhile their primary dwellings are located in their native villages in Syria. However, the assets that these migrants have in their temporary dwellings are generally a reflection of their assets in Syria; they bring with them some of the assets and try to recreate a housing environment similar to what they have back home. As such, the items included in the assets index have been assumed to be a valid measure of their actual economic status.

3.6.4 Other variables

- Level of Education: Respondents were asked "What is the educational level of [name of household member]? According to the UN Department of Economic and Social Affairs, educational attainment is defined as the highest grade completed within the most advanced level attended in the educational system of the country where the education was received (UN Department of Economic and Social Affairs- Statistics Division, 2008). In this study, educational attainment was indicated by the level of education last completed for those 5 years of age and older based on the following categories:

  1. Does not read or write
  2. Reads and writes but has not completed any level of education
  3. Preschool
  4. Elementary
  5. Intermediate
  6. Secondary
  7. Technical Diploma
  8. College/University

  These categories however were later collapsed into 3 main categories: Does not read or write/Reads and writes but has not completed any level of

education, Preschool/Elementary, Intermediate/Secondary. Household members who were less than 5 years of age were categorized under “does not apply”.

- Marital Status: The roster included a question on marital status for each household member. The respondent had to indicate whether each member was married, single, widowed, divorced, separated, or engaged. The answers were later grouped into three categories based on the frequency distribution; married/engaged, single/widowed/divorced/separated, and no answer.
- Household Income: In order to gather data on income, the questionnaire required the proxy respondent to provide information on the earnings of each working member of the household from agriculture, construction or any other occupation; the question asked, “What is the monthly income for [household member’s name]?” (in Lebanese Pounds). For individuals with multiple sources of income, the salaries from each source were added up; then the total income per household was calculated by adding all the amounts earned by all working members of the household.
- Working household members: Three questions were included in the roster to gather information on the occupational status of each household member. Proxy respondents had to answer each of these questions with a “Yes” (1) /”No” (0):

  1. Does [name of household member] work in agriculture?

  2. Has [name of household member] worked in construction in the past year?

  3. In the past year, has [name of household member] worked in anything other than agriculture or construction?

In order to find the total number of people who are working, the above variables were consolidated into a new binary variable.

3.7 Data Analyses

As stated earlier, data was collected from 240 individuals representing 46 households and all were included in the analysis. The secondary data analysis was carried out using STATA statistical software, version 10. Descriptive statistics showing frequency distribution and means of the selected data variables were performed in order to determine the characteristics of the study sample.

Bivariate analysis was carried out using generalized estimating equations (GEE) to model the possible associations between the outcome (presence of acute illness) and the independent variables (housing and infrastructure conditions index, crowding, assets index, age, and gender), following the analysis strategy adopted in previous similar studies (Habib et al., 2009; 2011); the GEE model accounts for repeated housing and infrastructure conditions shared among occupants of the same housing unit (Vallejos, et al., 2011). The model was conducted on individuals that had provided complete data for all the variables included; answers of "Do not know" or "No answer" were excluded from the model analysis. Variables with p-values less than 0.05 were considered statistically significant. Other variables that were shown to be significant in other studies were adjusted for such as gender, age, crowding and a household assets index used as an indicator of the economic conditions of the household.

A logistic regression analysis was also done using GEE model to determine the adjusted association between the outcome and the predictors. The analysis included

variables from the bivariate analysis with p-value ≤0.25 and variables known from the literature to be associated with the dependent variable. 95% confidence intervals are reported, and p-values less than 0.05 were considered significant.

3.8 Ethical Considerations

All information collected by the research team was stored at the Faculty of Health Sciences at AUB and kept confidential. The data was de-identified by removing the respondents' names and then assigning each questionnaire and each respondent is a unique identifier. This key that identifies the household is kept in a separate folder.

3.8.1 Informed Consent

Before conducting each interview, informed consent was sought from the respondent in each household. The consent explained the aims of the study and clearly stated that the respondents had the right to stop the interview at any time and/or refuse to answer any questions they felt uncomfortable with.

3.8.2 IRB Approval

The Institutional Review Board at AUB gave the principal investigator Dr. Rima Habib approval for the study on 15 December 2009 (IRB ID: FHS.RH1.02). IRB approval is still currently valid. This thesis was exempted from IRB review and oversight since it involved a study of existing data (the analysis relies on secondary data analysis) and the subjects could not be identified directly or through identifiers linked to the subjects. In addition, the principal investigator Dr. Rima Habib serves as the advisor on this thesis work.

I have sat for and passed the CITI online course on January 30, 2012.

CHAPTER 4

RESULTS

4.1 Overview of the Chapter

The following chapter presents the results of descriptive statistics, bivariate analysis and binary logistic regression. It describes the socio-demographic, economic, and health variables included in the study and exhibits the presence of reported acute illnesses among migrant agriculture workers and their families residing in Joub Jannine in the Bekaa valley. This chapter also presents the relationship between the reported acute illnesses and the study variables considered.

4.2 Descriptive Statistics

4.2.1 Socio-demographic Characteristics

4.2.1.1. Socio-demographic characteristics of migrants in the Ashish campsite

As shown in Table 4-1-1, the surveyed population in this study was young in nature with a mean age of 19.88 years ranging from 1 month to 80 years of age. The gender distribution was almost equal with a female-to-male ratio of approximately 1:1. All of the migrants residing in this campsite were of Syrian nationality and possessed significant high levels of poor education with 41.4 % unable to read or write or have not completed any level of education. Only 27.6% of the migrants were married or engaged meanwhile 70% were single/widowed/ divorced/separated. The dwellings in the campsite exhibited high levels of crowding with mean crowding of 5.8 persons per 'room'. Around 51% of migrants in the Ashish campsite reported that they have worked

in agriculture in the year preceding the interview, with over 78% working in open fields and only 4% in greenhouses. Only half of agricultural workers specified the types of crops that they work with, such as fruit trees (23%), olive trees (19.6%) and tobacco (5.1%). As for the types of agricultural activities/tasks, those who provided an answer (50.8%), said that they were involved in ploughing (18.9%), watering (17.6%), and cutting trees (12.2). Meanwhile only16.6% reported working in construction.

By looking into the breakdown of all working members of the Ashish campsite by age (Table 4-1-2), results show that members of all age groups were involved in some type of work during the year prior to the interview, about 20% of whom were less than 15 years of age, the basic minimum age for employment based on the ILO convention for child labor (ILO Convention 192, 1999). Of those working in agriculture, 20% were less than 15 years of age and approximately 14% were between the ages of 16 and 18. The majority of those who worked in construction (48.8%) during the year prior to the interview were between 19 and 24 years of age.

Table 4-1-1: Demographic Characteristics of Migrant Agricultural Workers and their household members, Joub Jannnine, 2011 (N=290)

Variable	N	%
Gender		
Male	131	45.2
Female	156	53.8
No answer	3	1.0
Age		
5 years or less	26	9.0
6 – 10 years old	37	12.8
11 – 15 years old	45	15.5
16 – 20 years old	42	14.5
21 – 25 years old	37	12.8
26 – 30 years old	13	4.5
31 – 35 years old	11	3.8
36 – 40 years old	7	2.4
41 – 45 years old	9	3.1
46 – 50 years old	7	2.4
51 - 55 years old	4	1.4
>56 years old	5	1.7
Mean (min – max)	19.88 (1 month – 80 years)	

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 apply*	19	6.6
No answer	19	6.6
Marital status		
Married/engaged	80	27.6
Single/widowed/divorced/separated	203	70.0
No answer	7	2.4
Crowding		
Mean (min – max)	5.80 (1 - 16)	
OCCUPATIONAL STATUS & TYPE OF WORK		
Work in agriculture		
Yes	148	51.0
No	142	49.0
Type of crops (out of 148)		
Fruit trees	34	23.0
Olive trees	29	19.6
Tobacco	9	6.1
Green beans	4	2.7
Watermelon	1	0.7
Wheat	1	0.7
Potatoes	4	2.7
Unspecified	66	44.5
Type of agricultural practice (out of 148)		
Open field agriculture	116	78.4
Greenhouse agriculture	6	4.1
Unspecified	26	17.5
Type of agricultural activities (out of 148)		
Ploughing	28	18.9
Watering	26	17.6
Cutting trees	18	12.2
Weeding	2	1.4
Gardening	1	0.7
Unspecified	73	49.2

Table 4-1-2: Distribution of Occupational Status of Migrants in Ashish camp by Age, (N=290)

	Age of Individual (year old) N (%)										
	<10 (N=63)	**11 – 15* (N=45)**	**16 – 18** (N=27)**	**19 – 24 (N=45)**	**25 – 29 (N=15)**	**30 – 34 (N=14)**	**35 – 39 (N=5)**	**40 – 44 (N=10)**	**45 – 49 (N=5)**	**50 – 54 (N=7)**	**>55 (N=7)**
Work											
Yes	3 (2.0)	26 (17.2)	21 (13.9)	41 (27.2)	14 (9.3)	13 (8.6)	5 (3.3)	10 (6.6)	5 (3.3)	7 (4.6)	6 (4.0)
No	60 (65.2)	19 (20.7)	6 (6.5)	4 (4.3)	1 (1.1)	1 (1.1)	0	0	0	0	1 (1.1)
Work in agriculture											
Yes	3 (2.4)	25 (20.0)	18(14.4)	27 (21.6)	11 (8.8)	12 (9.6)	5 (4.0)	9 (7.2)	4 (3.2)	7 (5.6)	4 (3.2)
No	60 (50.8)	20 (16.9)	9 (7.6)	18 (15.3)	4 (3.4)	2 (1.7)	0	1 (0.8)	1 (0.8)	0 (0.8)	3 (2.5)
Work in construction											
Yes	0	1 (2.4)	4 (9.8)	20 (48.8)	5 (12.2)	3 (7.3)	1 (2.4)	1 (2.4)	2 (4.9)	2 (4.9)	2 (4.9)
No	63 (31.2)	44 (21.8)	23 (11.4)	25 (12.4)	10 (5.0)	11 (5.4)	4 (2.0)	9 (4.5)	3 (1.5)	5 (2.5)	5 (2.5)
Involved in other type of work											
Yes	0	0	0	4 (40.0)	1 (10.0)	1 (10.0)	1 (10.0)	2 (20.0)	0	0	1 (10.0)
No	63 (27.0)	45(19.3)	27 (11.6)	41 (17.6)	14 (6.0)	13 (5.6)	4 (1.7)	8 (3.4)	5 (2.1)	7(3.0)	6(2.6)

* According to ILO convention 182 on child labor, the basic minimum age at which children can start work is 15 years (ILO, 1999)

**According to ILO convention 182, hazardous work which may jeopardize children's physical, mental or moral health, safety or morals should not be done by anyone under the age of 18 (ILO, 1999)

4.2.1.2. Socio-demographic characteristics of the proxy respondents in the Ashish campsite

As mentioned earlier, the proxy respondent in this study was determined as the main decision maker in the household, or the spouse or sibling if he/she were not available. According to the results in Table 4-1-3 below, 63% of the proxy respondents interviewed were males and only 37% were females. Approximately 41% of the respondents were only between 21 and 30 years of age and 50% could not read/write or had not completed any level of education. The majority of the proxy respondents reported to have worked in agriculture (82.6%), and 37% worked in construction during the year prior to the interview. Only 15.2% had been involved in other types of work.

When asked about the availability of another house/residence, almost 70% of respondents indicated that they had a house other than the one they currently inhabit, almost all of which were located in Syria (97%); about 83% of these households were owned by the migrants themselves. The results showed that the majority of the migrants in the Ashish camp visited their other houses in Syria at least once or twice a year.

Table 4-1-3: Socio-demographic Characteristics of Proxy Respondents in Ashish camp, Joub Jannine, 2011 (N=46)

Variable	N	%
Gender		
Male	29	63.0
Female	17	37.0
Age		
16 - 20 years old	3	6.5
21 - 30 years old	19	41.3
31 – 40 years old	10	21.7
41 – 50 years old	10	21.7
> 50 years old	2	4.3
No answer –Don't know	2	4.3
Level of education		
Does not read and write/ Did not complete any level of education	23	50.0
Primary/Elementary	9	19.6
Intermediate/ Secondary	14	30.4
Work in agriculture		
Yes	38	82.6

No	8	17.4
Work in construction		
Yes	17	37.0
No	29	63.0
Involved in other type of work		
Yes	7	15.2
No	39	84.8
MOVEMENT PATTERN & HOME OWNERSHIP		
Availability of another house/residence		
Yes	32	69.6
No	13	28.3
No answer	1	2.2
Location of other house/residence (out of 32)		
Syria	31	96.9
No answer	1	3.1
Number of visits to other house/residence per year (out of 32)		
Less than once a year	2	6.3
Once or twice a year	29	90.6
No answer	1	3.1
Ownership of other house/residence (out of 32)		
Yes	26	83.1
No	4	12.5
No answer	2	6.3

4.2.2 Economic Characteristics

The household economic characteristics are shown in Table 4-2 below. The household income per month, which was achieved by pooling the incomes of all working members of each housing unit per month, was divided into four categories with almost equal distribution. With regard to the possession of household assets, we notice that the highest percentage of households belonged to the second category of the assets index, followed by the highest category; this shows that more than 70% of surveyed households declared the possession of a number of assets indicating a certain level of financial wealth.

Table 4-2: Economic Characteristics of Migrant Agricultural Workers and members of their housheholds, Joub Jannine, 2011 (N=290)

Variable	N	%
Household Income/month		
≤ 600$	77	26.6
600$ - 900$	79	27.2
901$ - 1600$	65	22.4
> 1600$	69	23.8

Household Assets Index		
Lowest	82	28.3
Middle	112	38.6
Highest	96	33.1

4.2.3 Health Characteristics

As previously mentioned the main health outcome in this study is the presence of acute illness in as reported by the main household respondent on behalf of all members of the housing unit. The results showed that 43.8 % of migrants residing in the camp had suffered from an acute illness in the 3 months prior to the interview. Of those who had an acute illness, 51.2% had suffered from two or more illnesses during that time. The frequency of each type of reported illnesses is listed in table 4-3 with the common cold (30.7 %) and fever (30.3 %) being the highest reported illnesses.

Table 4-4 shows the distribution of the reported acute illnesses according to age and gender. It shows that the common cold is most prevalent among individuals who are 6 to 10 years of age. The occurrence of fever, headaches and oral cavity problems were reported with the highest percentages among those 21to 25 years of age. Females reported a higher incidence for all types of illness except oral cavity problems in comparison to males.

Table 4-3: Acute Illnesses of Migrant Agricultural Workers and members of their households, Joub Jannine, 2011 (N=290)

Variable	N	%
Presence of acute illness (in past 3 months)		
Yes	127	43.8
No	163	56.2
Number of reported acute illness per individual		
One	56	44.1
Two	43	33.9
Three or more	28	22.0
Type of reported acute illness (row percent out of 290)		
Common cold	89	30.7
Fever	59	20.3

Headache	32	11.0
Oral cavity problems	18	6.2
Diarrhea	5	1.7
Cough or other respiratory tract problems	4	1.4
Skin infections/rashes	1	0.3
Back pain	1	0.3
Everything*	6	2.1

* When asked what type of acute illness respondents suffered from, the answer was "everything"

Table 4-4: Distribution of Acute Illnesses of Migrant Agricultural Workers and members of their household by Age and Gender, Joub Jannine, 2011 (N=290)

	Prevalence of Acute Illness N (%)				
	Common cold	**Fever**	**Headache**	**Oral Cavity Problems**	**Other Acute Illness***
Age Group (years)					
5 years or less	9 (10.7)	8 (14.3)	0	2 (15.4)	3 (20.0)
6 – 10 years old	17 (20.2)	7 (12.5)	2 (7.1)	1 (7.7)	3 (20.0)
11 – 15 years old	12 (14.3)	4 (7.1)	4 (14.3)	0	1 (6.7)
16 – 20 years old	11 (13.1)	4 (7.1)	2 (7.1)	1 (7.7)	3 (20.0)
21 – 25 years old	12 (14.3)	14 (25.0)	9 (32.1)	4 (30.8)	0
26 – 30 years old	5 (5.9)	5 (8.9)	2 (7.1)	2 (15.4)	2 (13.3)
31 – 35 years old	5 (5.9)	3 (5.4)	1 (3.6)	2 (15.4)	1 (3.7)
36 – 40 years old	4 (4.8)	2 (3.6)	3 (10.7)	0	0
41 – 45 years old	5 (5.9)	5 (8.9)	3 (10.7)	0	0
46 – 50 years old	1 (1.2)	0	0	0	0
51 - 55 years old	1 (1.2)	2 (3.6)	1 (3.6)	0	1 (6.7)
>56 years old	2 (2.4)	2 (3.6)	1 (3.6)	1 (7.7)	1 (6.7)
Gender					
Male	34 (38.2)	29 (49.2)	15 (46.9)	10 (55.6)	6 (37.5)
Female	55 (61.8)	30 (50.8)	17 (53.1)	8 (44.4)	10 (62.5)

*The other types of acute illnesses reported in low frequencies [diarrhea (n=5), cough/other respiratory tract conditions (n= 4), shin infections/rashes (n = 1), back pain (n = 1) and 'everything' (n=6)] were grouped together (Other Acute Illness)

4.2.4 Household Conditions

According to the survey, all of the migrants in the Ashish camp resided in tents which were constructed from a varying combination of materials, primarily wood or metal beams for the frames of the tents, and nylon/cardboard and pieces of fabric/cloth for the paneling and insulation. The survey revealed that a considerable percentage of the households in the camp reported problems in household and infrastructure conditions (Table 4-5). With regard to the structure of the dwelling 71.7% reported the presence of holes in the walls and 73.9% reported presence of holes in the ceilings. Approximately 34.8% of surveyed tents did not have a heating source for warmth during the winter season and 69.6% suffered from flooding due to rainwater. A critical measure of poor housing conditions is the presence of pest infestation with rats, mice, cockroaches and insects, which was reported in almost all of the dwellings (93.5%) in the Ashish campsite. Access to drinking water is yet another crucial factor in assessing the living conditions of a population; in this case, more than half the households (63%) reported suffering shortages in supply of drinking water. Almost 70% of the households reported the presence of more than 3 problems per household.

Table 4-5: Measures of Housing and Infrastructure Conditions for households of Migrant Agricultural Workers, Joub Jannine, 2011 (N=46)

Independent Variable	N	%
Presence of holes in walls of the tent		
Yes	33	71.7
No	13	28.3
Presence of holes in roof of the tent		
Yes	34	73.9
No	12	26.1
Absence of heating source		
Yes	16	34.8
No	30	65.2
Shortage in drinking water		
Yes	29	63.0

No	17	37.0
Rainwater flooding		
Yes	32	69.6
No	14	30.4
Pest infestation		
Yes	43	93.5
No	3	6.5
Housing and Infrastructure Index		
1	1	2.2
2	4	8.7
3	9	19.6
4	11	23.9
5	19	41.3
6	2	4.3

4.3 Bivariate Analysis

4.3.1 Socio-Demographic Characteristics

Bivariate analysis results for household socio-demographic characteristics are shown in Table 4-6. The results indicate that household crowding is significantly associated with the reporting of acute illness among members of the same household (p-value<0.05). On the other hand, we notice that no association was achieved for the level of education, age, and marital status.

Table 4-6: Acute illnesses by Socio-Demographic Characteristics (N=290)

	Acute Illness		
	Yes	**No**	**p-value**
	N (%)	**N (%)**	
Gender			0.344
Male	54 (41.2)	77 (58.8)	
Female	73 (46.8)	83 (53.2)	
Age			0.150
0 – 5 years old	11 (42.3)	15 (57.7)	
6 – 10 years old	20 (54.1)	17 (45.9)	
11 – 15 years old	16 (35.6)	29 (64.4)	
16 – 20 years old	15 (35.7)	27 (64.3)	
21 – 25 years old	19 (51.4)	18 (48.6)	
26 – 30 years old	9 (69.2)	4 (30.8)	
31 – 35 years old	7 (63.6)	4 (36.4)	
36 – 40 years old	5 (71.4)	2 (28.6)	
41 – 45 years old	6 (66.7)	3 (33.3)	
46 – 50 years old	1 (14.3)	6 (85.7)	
51 – 55 years old	2 (50.0)	2 (50.0)	
≥ 56 years old	2 (40.0)	3 (60.0)	

Mean (min – max)	20.54	19.31	0.4920
Education			0.057
Does not read and write/ Did not complete any level of education	44 (36.7)	76 (63.3)	
Primary/ Elementary	31 (49.2)	32 (50.8)	
Intermediate/ Secondary	39 (56.5)	30 (43.5)	
Does not apply	9 (47.4)	10 (52.6)	
Marital Status			0.153
Married/Engaged	41 (51.2)	39 (48.8)	
Single/widowed/divorced/separated	85 (41.9)	118 (58.1)	
Crowding			
Mean (min – max)	4.93	6.47	0.0009

4.3.2 Economic Characteristics

According to the results of the bivariate analysis for economic conditions (Table 4-7), neither the household assets index nor the household monthly income were associated with reporting of acute illness. In households with the lowest assets index, 37.8% of individuals had reported acute illness, compared to 50.9% in household with a medium assets index and to 40.6% in households with the highest index. The results also showed that there was no marked difference in acute illnesses between households of higher income and those of lower income. However, since the household assets index presented a p-value <0.25, it was included in the binary logistic model as an indicator for the economic characteristics.

Table 4-7: Results of Bivariate Analysis of Economic Characteristics (N=290)

	Acute Illness		
	Yes	**No**	**p-value**
	N (%)	**N (%)**	
Household Assets Index			0.144
Lowest	31 (37.8)	51 (62.2)	
Medium	57 (50.9)	55 (49.1)	
Highest	39 (40.6)	57 (59.4)	
Household Income/month			0.358
≤ 600$	32 (41.6)	45 (58.4)	
600$ - 900$	30 (38.0)	49 (62.0)	
901$ - 1600$	29 (44.6)	36 (55.4)	
> 1600$	36 (52.2)	33 (47.8)	

4.3.3 Household Conditions

The results of the bivariate analysis for the household and infrastructure conditions considered in this study are presented in Table 4-8 below. The analysis showed that the presence of holes in the 'walls' and the presence of holes in the 'ceilings' of the dwellings are both significantly associated with the presence of acute illness in the household (p-value= 0.000).For households that had holes in the 'walls' and in the 'ceilings', around 55% and 51% of household members respectively reported suffering from acute illnesses. Households that suffered from shortages in drinking water also showed a significant association with the presence of acute illness (p-value=0.003). However, there was no association between the presence of rainwater flooding and the absence of a heating source in the households with the occurrence of acute illness as reported by the respondents.

Table 4-8: Results of Bivariate Analysis for Housing and Infrastructure Conditions (N=290)

	Acute Illness		
	Yes	**No**	**p-value**
	N (%)	**N (%)**	
Presence of holes in 'walls'			0.000
Yes	108 (54.6)	90 (45.4)	
No	19 (20.6)	73 (79.4)	
Presence of holes in 'ceiling'			0.000
Yes	106 (50.7)	103 (49.3)	
No	21 (25.9)	60 (74.1)	
Absence of heating source			0.186
Yes	50 (49.0)	52 (51.0)	
No	77 (41.0)	111 (59.0)	
Shortage in drinking water			0.003
Yes	67 (37.0)	114 (63.0)	
No	60 (55.0)	49 (45.0)	
Rainwater flooding			0.247
Yes	87 (46.3)	101 (53.7)	
No	40 (39.2)	62 (60.8)	

4.4 Binary Logistic Regression

In order to assess the correlation between reported acute illnesses among members of households in the Ashish campsite and the socio-demographic, economic and living conditions, a logistic regression model was done (Table 4 - 9). The model revealed a significant association between household and infrastructure conditions and the presence of acute illness in the households; every additional household and infrastructure problem reported resulted in an 82% increase in reporting of acute illness (OR 1.82; 95% CI: 1.04–3.17).

The logistic regression also showed that older individuals were more likely to report the presence of acute illness than younger members (OR 1.02, 95% CI: 1.00–1.03). While the model adjusted for gender, there appeared to be no significant association between gender and the reporting of acute illness. On the other hand, crowding did not show a significant association with the reporting of acute illness when included in the regression model.

As for the household assets index, it presented an opposite effect, whereby houses with a higher index were more likely to report acute illness; however, this indicator did not show a significant association with acute illness.

Table 4-9: Association of Short-term Illness with Demographics and Household Factors

	Unadjusted		Adjusted	
	OR (95% CI)	**P-value**	**OR (95% CI)**	**P-value**
Housing and Infrastructure Index	1.43 (0.94 – 2.19)	0.099	1.82 (1.04 – 3.17)	**0.035**
Age	1.01 (1.00 – 1.03)	0.014	1.02 (1.00 – 1.03)	0.006
Gender				
Male	1		1	
Female	1.11 (0.79 – 1.54)	0.534	1.31 (0.92 – 1.86)	0.135
Household Assets Index				
Lowest	1		1	
Second	1.16 (0.36 – 3.70)	0.805	1.49 (0.39 – 5.78)	0.562
Highest	1.57 (0.48 – 5.16)	0.455	3.55 (0.78 – 16.20)	0.103
Crowding	0.88 (0.75 – 1.03)	0.122	0.92 (0.78 – 1.10)	0.382

CHAPTER 5

DISCUSSION

5.1 Overview of the Chapter

This chapter discusses the findings of the study conducted on the living conditions of migrant agriculture workers and their families in the Ashish campsite in the West Bekaa area and compares them with existing relevant literature. It addresses the presence of acute illnesses among household members of the campsite and explores the different indicators of their living conditions. Finally, it relates the prevalence of the reported acute illnesses to the household environmental characteristics.

5.2 Household Conditions and the Prevalence of Acute Illness

As stated earlier, the results of this survey revealed a high incidence of acute illnesses among migrant agriculture workers and members of their households. The types of acute illnesses reported by members of Ashish campsite, predominantly common colds (n= 89 ; 30.7%), fever (n=59; 20.3%) and headaches (n=32; 11.0%) are similar to those reported by other migrant populations in general (Slesinger, 1992; Sandhauss, 1998; Villarejo, 2003; Weigel et al., 2007; Anthony et al., 2008; Zanuzdana et al., 2013). One study on more than eight thousand seasonal migrants working in coffee harvesting in Costa Rica reported similarly prevalent illnesses though with different prevalence; respiratory illnesses were reported in only 4.2% of the population, digestive illness in 2.1% and unspecific pains and fever in 1.9% (Bolaños et al., 2008). Although the available studies indicate similar types of reported acute illnesses among

migrants and refugees living in underprivileged conditions, it is important to note that comparisons between data sets on housing conditions and health from different countries and regions is less informative than comparisons between conditions of the underprivileged community and the larger population in the same country. However, no such studies exist on acute illnesses in Lebanon for us to make such comparisons.

The results also showed that most households suffered from poor housing conditions and indicated the presence of an association between these conditions and the acute illnesses reported by members of the households. The following sections discuss in detail the associations found in this study.

5.2.1 Association of socio-demographic and economic conditions with the reporting of acute illness

The binary logistic regression analysis in this study showed a positive association between age of each household member and the likelihood of reporting the presence of an acute illness. A similar trend was reported in the study on housing conditions and health in the Jazalone refugee camp in Palestine whereby older age groups showed significantly higher prevalence of the common cold, cough, tonsillitis, ear infection, and influenza; however, the study did not address the possible causes of this reported trend (Al-Khatib & Tabakhna, 2006). Yet this contradicts the findings of epidemiological studies which show that in general the incidence of acute illnesses such as upper respiratory tract infections diarrheal disease is inversely proportional to age (Heikkinen and Jarvinen, 2003; WHO, 2013). A possible explanation for the obtained results could be that older migrants are exposed to additional occupational and psychological stressors which may increase their susceptibility to contracting acute illnesses. The results did show that the migrants worked in agriculture, construction as

well as other occupations (Table 4-1-2) which can expose them to certain risks and hazards. However, the study survey did not collect sufficient data on the psychological wellbeing and working conditions of all interviewed migrants reporting an acute illness to substantiate such an interaction.

A significant positive association was reported between household crowding and the presence of acute illnesses among household members at the bivariate level. Such findings have been presented in previous studies exploring the link between poor health outcomes (chronic and acute) and overcrowding (Al-Khatib, 2003; Bailie et al., 2010; Baker et al., 2013; Habib et al., 2011; Turner et al., 2009; Zabaneh at al., 2008). However, after adjusting for age, gender and wealth, the logistic regression model did not show an association between crowding and the presence of acute illnesses at the household in this study. Similar results were obtained in other studies conducted in deprived areas in the suburbs of Beirut, Lebanon (Habib et al., 2009). These unexpected findings could be explained by the choice of the crowding indicator; there is no one set definition of household crowding in the literature, and different studies adopt different methods of calculating the crowding index and select different cutoff points for overcrowding depending on the context of the study. In addition to that, the choice of the health outcome may also have an impact on the association with crowding. In this study, we examine the overall presence or absence of acute illness in household members as reported by the proxy respondent, whereas other studies assessing the effect of crowding on the prevalence of acute illnesses select specific illnesses and assess the correlations separately. However, given the small sample in this study, we were unable to do so since some specific acute illnesses had low rates in the study population.

In the binary logistic regression model, the household assets index, which was

used as an economic indicator of wealth, did not show a significant association with acute illness. In fact, in the binary analysis, there appeared to be a reverse effect in the reporting of acute illness; members from households with a higher assets index (households that possessed more assets) were more likely to report acute illness. This contradicts the findings of existing studies which have shown that household assets are a predictor of poor health outcomes whereby more affluent people were less likely to report poor health (Habib et al., 2014; Szwarcwald et al., 2005, Wamani et al., 2004). The use of the this wealth indicator is based on the assumption that the household assets index "reflects not only the material necessities of life, such as securing good nutrition and adequate habitation, and is also a social marker of wellbeing" (Szwarcwald et al., 2005). However, the index used in our study does not take into account the usage and functionality of these assets which may have more of a direct impact on the health of household residents; for example, if the refrigerator in the dwelling does not function properly or is not supplied with electricity for a certain number of consecutive hours, this compromises the safety of the food stored inside and consequently might lead to an increased risk of food-borne illnesses. As such, the use of this household assets index which disregards the functionality of each item may have missed useful information, which might explain the reason the assets index did not achieve a significant association with acute illness in our study.

5.2.2 Association of Housing and Infrastructure Conditions with the reporting of acute illness

The bivariate logistic regression showed a positive association between the number of housing and infrastructure problems (measured by the index) and the presence of acute illness among household members. Although few studies have explored the prevalence of acute illnesses relative to the overall housing conditions, a number of studies focusing on chronic illnesses have reported such a positive association (Habib et al., 2006; 2009; 2011; Zabaneh et al., 2008). One study conducted in Australia showed that individuals living in houses of poor overall condition with three or more breaches in "healthy living practices" were almost twice as likely to suffer from four out of the five surveyed acute illnesses (skin infection, respiratory infection, diarrhea and/or vomiting and ear infection (Bailie et al., 2010); the indicators used in this study assessed the functional state of infrastructure required for healthy living practices such as; washing children, washing clothes and bedding, preparing and storing food, removal of human waste (toilet and drainage), removal of waste water, removal of rubbish, boundary fence and electrical (Bailie et al., 2010) .

5.2.2.1 Structural Integrity of the Household

As mentioned previously, the Ashish campsite consisted of tented dwellings constructed from primitive available materials such as wooden beams, cardboard and scraps of cloth. In exploring the housing conditions, it was essential to assess the structural soundness of the tents themselves, which is why the tents were assessed for presence of any tears and holes in the walls and roof. Studies assessing the living conditions of farm workers in the USA have similarly reported high rates of structural defects in the camp housing (Arcury et al., 2012; Early et al., 2006; Vallejos et al.,

2011). The results of the bivariate analysis showed that the presence of holes in the walls and in the ceilings of the dwellings were positively associated with the reporting of acute illness among household members (p-value <0.05). Such defects in the dwelling structure lead to water leakages at times of rainfall, and with the poor insulation and use of material that traps moisture (cardboard, cloth and wood) this leads to dampness and moisture inside the dwelling (UN Office for the Coordination of Humanitarian Affairs, 2004). A study in Uganda reported similar findings on the significance of the structural integrity of the household and showed that residents of dwellings characterized with "bad walls" were 10 percent more likely to report higher number of sick days per month (Herrin, Amaral, & Balihuta, 2013).

Several studies have shown that the presence of water leakages and moisture caused by housing structural defects increases the prevalence of respiratory diseases and symptoms. One study on respiratory health of children in the Russian Federation reported that the prevalence of respiratory symptoms (cough, dry cough, upper respiratory tract infection, current bronchitis, and allergy) showed strong associations with reported mold and water damage (Spengler et al., 2004). Other studies have reported strong associations between dampness or mold with the occurrence of acute illness such as the common cold, upper respiratory tract infections, cough and otitis media (Al-Khatib et al., 2003; Al-Khatib and Tabakhna, 2006; Mendell et al., 2011). Thus the findings reported in our study echo those of previous studies indicating that the structural defects in the dwelling can compromise the health of its inhabitants and lead to increased risk of acute illnesses, particularly respiratory tract infections.

5.2.2.2 Rainwater Flooding

As described earlier, the campsite in which the migrant workers and their families reside is located adjacent to the open agricultural fields, with the tents mostly constructed at the ground level (as opposed to a raised surface). During the rainy winter season, flash floods are a common occurrence in the Bekaa valley, which puts the dwellings in the campsites at high risk of being affected by the flood waters (UNHCR, 2014). However, the bivariate analysis in our study did not show an association between acute illness and the presence of rainwater flooding in the Ashish campsite, although the majority of the households had reported the occurrence of this problem in the past year. The lack of association between acute illness and flooding might be explained due to the level of flooding and the weather conditions at the time of its occurrence. Nevertheless, it is important to note both the direct and indirect impacts of flooding. In the case of the Ashish campsite, the extent of the damage caused by the floods may not have left a significant direct impact for the respondents to report.

5.2.2.3 Access to Drinking Water

The bivariate analysis indicated a significant association between shortage of drinking water and the reporting of acute illnesses among household members, whereby two thirds of the households had reported suffering from this problem. This result is in line with other studies that have linked the quantity of drinking water available for consumption with poor health outcomes such as headaches (Blau, Kell, & Sperling, 2004; Jequier & Constant, 2010). With insufficient access to clean drinking water, household members of the migrant agriculture workers are at increased risk of dehydration, particularly in the summer season when temperatures rise. Dehydration can

lead to and exacerbate other health conditions such as urinary tract infections, hypertension, heart disease and others if it persists over a period of time (Popkin, D'Anci, & Rosenberg, 2010).

Shortage of clean drinking water may also lead migrants to resort to unprotected water sources to partially compensate for the needed quantities; these sources of water may be unsafe due to possible contamination with waste water, pesticides and other chemical runoffs from nearby agricultural fields and thus pose a great risk of infectious diseases (Howard & Bartram, 2003). In the study survey, the majority of migrant workers in the Ashish campsite indicated that the source of drinking water was either a public network pipe or tap close to the camp or a well/borehole for groundwater. The study did not test the quality of drinking water from these sources, however, with the campsite located adjacent to agricultural fields, there is a possibility that groundwater may be contaminated by chemical runoff and improper disposal of waste water. Further investigation is required to determine the safety of these water sources.

5.2.2.4 Pest Infestation

A large proportion (93.5%) of households in the Ashish campsite reported the presence of pest infestation such as rates, mice, cockroaches and insects. This is a much higher finding than that in Arcury et al.'s study in migrant worker campsites in Northern Carolina which reported that almost three-quarters of the camps had signs of cockroach infestation, and 55.2 percent had signs of mouse infestation (Arcury et al., 2012). Pests such as rodents and cockroaches can be carriers of allergens and infectious agents (Bradman et al., 2005). Presence of pest and vermin infestation has been associated with infectious diseases such as malaria and vector-borne diseases (VBDs) (Krieger &

Higgins, 2002; Bradman et al., 2005; Bonnefoy, 2007; Haines, et al., 2012). However,further investigation is warranted to determine how the presence of pests and vermin is impacting the health of the migrants and to possibly identify chronic health conditions that are known to be associated with this problem such as asthma.

5.2.2.5 Presence of Heating Source

The presence of indoor heating did not show a strong significance when correlated with the reporting of acute illness, despite the fact that previous literature has shown that the availability of sufficient heating source and temperature control have a significant impact on the health of household dwellers. Cold ambient temperatures have been linked to increased mortality rates and lower general health status (Krieger & Higgins, 2002).

Most studies that examine the effect of cold temperature on the prevalence of respiratory illnesses and other acute illnesses factor in the presence of dampness as well, since the presence dampness and cold temperature are often interrelated (Evans and Kantrowitz, 2002). However, in this case the lack of significance of the presence of a heating source, which impacts both indoor temperature and dampness, may be attributed to the timing of survey; the survey was conducted during the summer season in Lebanon which is characterized by warm and dry weather when the use of heating is not essential (Zabaneh et al., 2008).

It should also be noted that the respondents had to report the presence of acute illness in the period three months prior to the survey, which in this case would have coincided with the late spring and early summer seasons. Perhaps if the study had been conducted at the end of the winter season when weather conditions are cold and more

extreme, the presence of the heating source may have showed an association with the presence of acute illness. Several accounts of infant deaths due to extreme cold temperatures have recently been recorded during the winter season in Lebanon, particularly in tented camp settlements housing Syrian refugees (Naharnet Newsdesk, December 2013). The absence of a heat source may not be the only contributing factor in such cases; however, such incidents highlight the cumulative impact of lack of proper shelter and supplies needed for protection from extreme weather conditions.

5.3 Strengths of the Study

Despite the limitations of this study, it has shed light on the plight of migrant agriculture workers in Lebanon in terms of their precarious living conditions. There is a dearth in the literature assessing the living conditions of migrant agriculture workers and the association with health, particularly in Lebanon and the Arab region. The findings of this study are extremely valuable in that they provide quantitative information on the status of Syrian migrants residing in Lebanon prior to the civil strife in Syria. As such, this can serve as a baseline study provide an information base against which to monitor and assess the change in the conditions of these migrants , and it can serve as a stepping stone for future intervention efforts to improve housing and infrastructure conditions in similar informal settlements found in different regions of Lebanon.

This pilot study and its findings come at a critical time, with the large numbers of migrants having set up refuge in camps in areas such as the Bekaa Valley and Akkar since the beginning of the crisis in Syria (UNHCR, 2013). With entire families living in these make-shift dwellings under such critical conditions, the crowded and degrading

conditions increase the chances of health risks and illnesses Our study was able to identify an association between acute illnesses and specific housing conditions, and thus it provides a baseline of quantitative evidence upon which to build on future studies assessing the living conditions of refugees in particular.

5.4 Limitations of the Study

As with similar types of research studies, the cross-sectional design of the survey is one of the limitations of this study as it only gives a snapshot of the living conditions at the time of data collection; the survey was conducted during one agricultural season (in this case during the summer of 2011), and thus does not provide a longitudinal and accurate description of the conditions of migrant farm worker housing as the conditions may fluctuate according to the season (Vallejos, et al., 2011). In addition to that, the fact that the outcome measure was based on the reporting of the proxy respondent allows for the possibility of under-reporting.

The duration of time for data collection was limited to a period of two months due to the forthcoming month of Ramadan, during which most of the workers and family members would be fasting thus making it more difficult for them to be cooperative and leaving less time for interviews. As such, data collection was not able to reach optimal number of surveyed housing units at that time by targeting additional clusters of housing units.

Another limitation in this study relates to the housing and infrastructure index used to assess conditions of each dwelling, as several items that serve as indicators of the built environment (such as ventilation, the reliability of the electrical power, sewage and garbage disposal) could not be included due to lack of sufficient data reported by

the study participants.

It is also worth noting that migrant workers are a mobile population that moves seasonally seeking work in different regions of Lebanon and Syria (prior to the escalation of the war in Syria). This mobility exposes the migrant workers and their families to changing living and environmental conditions depending on their area of residence. As such, the implications of the findings in this study are limited, for we cannot be certain that the effects associated with these conditions are due to the conditions they lived in at the time of the survey or to those from which they came. Any effect from these living conditions could be made worse or better shortly.

CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

6.1 Recommendations

The findings of this study have highlighted a number of characteristics of the health and living conditions of migrant agricultural workers and their families in the Bekaa region; these findings can be used to direct intervention efforts aimed at improving the environmental living conditions of the migrants in this camp and similar camps all over Lebanon. Such an intervention would involve various stakeholders, such as community representatives, academics, relevant non-governmental organizations as well as government-sponsored commissions who can work together to address the issues of living conditions and health promotion. By establishing communication channels with relevant organizations and stakeholders, it would also be possible to provide migrants with the proper resources to improve their living conditions, by introducing minor changes and elements into their households; providing them with better construction and insulation material for weather proofing, particularly during the winter months would help prevent the occurrence of structural damages in the dwellings and minimize the occurrence of water leakages and dampness which were identified as common problems in this study. The provision of heating sources and ventilation devices would also aid in the improvement of indoor housing conditions during the winter and summer respectively. Water filtration devices would also be of great use as camp dwellers in the Bekaa have reported a lack of access to clean water, a problem that is becoming more prevalent with the increasing shortages in water supplies nationwide.

Since many tented settlements in the Bekaa are prone to flooding during the rainy season, as mentioned earlier in the paper, the provision of better drainage systems could prevent severe damages in housing units. The improvement of camp settlements would also entail, decongestion of the site, limiting the number of dwellings per site and organizing their distribution within the camp.

With the increase in number of tented settlements in various regions in Lebanon due to the influx of refugees, and the ongoing Syrian crisis, it is critical that the local government recognizes that the issue of informal settlements may be a long-term one. As such, there is a need to establish clear-cut regulations and policies to provide the adequate system to support migrant agricultural workers even if the Syrian crisis ends and the number of displaced Syrians goes back to that before the crisis. This requires the collaboration of the ministries of agriculture and public works and transport to set up the proper infrastructure necessary for the establishment of managed settlements that provide the basic requirements of adequate shelter. With the help of the involved NGOs, one possibility would be to introduce prefabricated housing units instead of tents particularly in regions that suffer from harsh weather conditions. One such proposal for the establishment of formal Syrian refugee camps in border regions in North Lebanon and the Bekaa has been brought forward by government officials as a means to "curtail the problem of scattered refugee settlements" (Shoufi, 2014). Although the government has yet to present an official proposal, discussion have indicated that the establishment of such camps would rely on prefabricated housing units developed by the UNHCR and the Ikea Foundation, which have been pilot tested on refugee populations in different parts of the world namely in Iraq and Ethiopia (Baker, 2013). The units possess the following structural specifications:

> "[They] are made of a light, flexible steel frame lined with polymer-foam panels designed to let in light during the day while providing privacy at night. A shade net embedded with a lightweight solar panel provides warmth in the winter, shade in the summer, and electricity when needed. It weighs less than 220 lb. and, when unassembled, is easily transportable." (Baker, 2013)

These housing units along with the proper infrastructure can provide refugees and displaced Syrians with a safer living environment and minimize the health risks. However, the primary concern that remains is the sustainability of such an initiative if the Syrian crisis exacerbates in the years and leading to a continuous increase in the flow of refugees.

This would entail organizing community-based awareness campaigns and educational workshops on preventive health and hygiene, nutrition, mother and child health as well as work habits. As discussed in the results above, the common health problems that were reported by residents of the Ashish campsite included the common cold, fever, headaches, diarrhea and oral health problems, which are easily preventable and treatable conditions. It would also be possible to organize health drives or no-cost wellbeing fair, which aim to bring health awareness and provide free health care to migrant workers and their families. These campaigns would require the collaboration of the ministries of public health and social affairs, as well as organizations involved with health and wellbeing. The services would be provided by volunteers of medical students, residents and attending physicians. Such events would also provide the opportunity to educate workers on preventive medicine information on STIs (sexually transmitted infections), HIV (human immunodeficiency virus), as well as vaccinations and nutrition. Another recommendation to manage the occurrence of acute illnesses is by immunization, whereby certain illnesses can be prevented by introducing the proper vaccinations. A number of health organizations and stakeholders can be solicited to take

part in vaccination campaigns targeting migrant workers, whereby they can provide vaccines at minimal subsidized costs or free of charge (depending on available funds).

It is also recommended that further in-depth investigation is carried out to explore the prevalence and management of specific health conditions, chronic diseases and mental health in these migrant camps. Different methods for collecting data on health outcomes can be employed in addition to self-reported health such as running diagnostic tests for specific ailments; this however, would be quite costly. A survey using objective scientific measures of the housing and infrastructure conditions (such as measurement of indoor air quality, ambient temperature and water quality) would provide essential information required to more accurately assess the environmental conditions effectively and to direct and plan the needed interventions. Collecting data at different times of the year would also reflect the possible changes in housing conditions along the seasons and its potential impact on the health of migrants.

6.2 Conclusion

It is widely recognized that migrant and seasonal workers in Lebanon face harsh living and occupational conditions which can have direct and indirect effects on their wellbeing. This study focused on migrant agricultural workers and their families living in tented camp settlements; it investigated the link between the environmental conditions and the presence of acute illness in Ashish campsite in the West Bekaa valley. The findings of the study indicated an association between the housing and infrastructure conditions and the reporting of acute illness among the migrants. The analysis revealed particular problems in the housing and infrastructure that may explain the high prevalence of specific acute illnesses; these problems include the poor structure

of the dwellings due to the presence of holes in the walls and ceilings, the absence of proper heating source, pest infestation and shortages in drinking water. Although the survey did detect a high level of crowding in the tented dwellings, however, it was not able to identify a correlation between overcrowding and acute illnesses. Similarly, other socio-demographic and economic indicators did not achieve significant associations with the reporting of acute illnesses.

Despite some limitations, this study has shed light on a significant number of problems faced by migrant agriculture workers and their families residing in Lebanon and the role of housing conditions as a determinant of health. By pinpointing specific contributing factors and illnesses, this study opens the ground for potential simple interventions and preventative measures that can be implemented to minimize the health burden on such migrant workers and improve the overall living conditions in similar campsites in different regions of Lebanon. Several surveys have been conducted on the current refugee crisis in Lebanon, identifying similar trends in reported health concerns and harsh living conditions. However, these recent studies have not attempted to quantify an association between the environmental and socio-economic conditions and the prevailing illnesses in the refugee population. As such, this study, serves as a baseline study on Syrian migrants in Lebanon with crucial quantitative data and as a stepping stone for future studies to be conducted on Syrian refugee population, in order to better identify specific areas of need and to direct upcoming interventions and response plans aiming to relieve the burdens of the refugee crisis.

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