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AGRARIAN TRANSITION AND FOOD SECURITY IN THE VILLAGE OF NABHA, CENTRAL BEKAA.

by
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AN ABSTRACT OF THE THESIS OF

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Agrarian transition is a global phenomenon affecting most countries. It is manifested by the decrease in the contribution of agriculture to GDP, the decrease in the number of agricultural workers, the detachment of agrarians from their land, and the change in livelihoods. Lebanon, a developing country, is still experiencing an agrarian transition. This is because factors like climate change, water scarcity, cash crops, and the state's sectoral investment priorities and development policies have been to the detriment of rural areas and agrarian livelihoods. These agrarian transformations can leave the rural population vulnerable to food insecurity, as both access to food and its availability may be negatively affected by the shrinkage of the agricultural sector. However, mitigation strategies like migration and livelihood diversification have been adopted by agrarians to alleviate poverty, and food and nutrition insecurity. Studies carried out on the linkages between agrarian transformation and food security are returning inconclusive results, possibly because of the diversity of indicators that have been used. It is noteworthy that most of these indicators do not consider the nutrition dimension of food security.

This research aimed to study the main drivers of agrarian transition in the village of Nabha, in the Baalbek-Hermel governorate of Lebanon. It examined the effect of this transition, manifested by livelihood diversification, on food and nutrition security.

A sample consisting of 100 randomly selected households, or 40% of the local population, was surveyed. Four questionnaires were administered: a livelihood qualitative questionnaire covering the drivers of the agrarian transition and changes in livelihoods during the period of 1960 – 2018, the Food Insecurity Experience Scale (FIES) to study food security, Food Consumption Score (FCS) to study diet diversity and quality, and a Household Expenditure Module as a proxy of income to study the expenditure on food. The results showed that most of the population of Nabha had already exited agriculture as a unique source of livelihoods as early as the 1960's.

Interviewees with non-agrarian livelihoods constituted the majority of the sample, but their number increased from 38% in the 1960's to 81% in 2018. Pastoralism is the only agrarian livelihood still currently practiced. Food insecurity measured on the FIES was detected on both Lebanese and global categorization scales. Moderate and severe food insecurity in the village of Nabha represented 26% and 20% of the sample respectively; based on the global FIES scale. The FCS showed that the entire sample studied had acceptable food consumption. The diet diversity that this score reflects is provided by the availability of the protein dense mouneh and the fruits

from the home gardens. However, household size has been shown to affect the expenditure share of each family member where a large household size had a negative association with food expenditure per capita, food consumption, and food security.

In conclusion, the source of livelihoods did not have a significant association on food and nutrition security of the residents. The availability of food from home gardens and mouneh positively enhanced their diet quality and diversity. However, large household size contributed to a decrease of the per capita share of food, an increase in FIES and a decrease in FCS.

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CHAPTER I

INTRODUCTION

Agrarian transition is a global phenomenon that has been experienced by a vast majority of countries. It is a broad process by which multiple reasons affect the agrarian sector on more than one level. Agrarian transition is manifested by the decrease in the contribution of agriculture to GDP, the decrease in the number of agricultural workers, the detachment of agrarians from their land, and the change in livelihoods. Lebanon, a developing country, was and is still experiencing an agrarian transition. Throughout history the Lebanese government has focused on developing the industrial and the services sectors while ignoring agriculture (Trabulsi 2007; Hamade 2015). This governmental neglect has led to the decline in agriculture and the increase in poverty and hunger (Laithy et al. 2008). Other factors like climate change, water scarcity, and cash crops also contributed to push some agrarians away from agriculture. But these factors can have different impacts on agriculture depending on the agrarian subsector is being practiced. On the other side, there were some pulling factors outside the agricultural sector attracting the agrarians and providing them with better profit alternatives. Migrations, manifested by the decrease in the rural population (World Bank 2018), and livelihood diversification were adopted to mitigate the low agricultural income and poverty. However these mitigation strategies can generate more income that can have an effect on the quality, diversity and nutritional content of food consumed and not just on the energy consumed (Ncube 2012).

In remote rural areas, where markets are distant, the lack of food can threaten food availability. This in turn can weaken the food and nutrition security of the local residents; because both availability and access to food are not present. The available studies in the literature

do not commonly analyze the impacts of agrarian change on all of the four pillars of food security; availability access, utilization, and stability. This is because most of the food security indicators address only the access pillar by studying the financial capacity of the individuals/households to afford food purchased from the market. Also only few studies that tackle the utilization phase of food security or nutrition security are available in the literature. Moreover, most studies addressing the linkages between rural livelihoods and food security rely on ex-ante indicators, such as income levels and quantities of food produced. There is a paucity of research addressing food security through measurement tools that use ex-post indicators, and which offer a more realistic view of the food security status of individuals.

This research intends to address the gap in the food and nutrition security literature by studying the effect of the agrarian transition and the resulting livelihood diversification on food and nutrition security in a remote rural area, the village of Nabha, in the Baalbeck-Hermel governorate of Lebanon. This thesis investigates first the drivers and the significance of agrarian transition. It then studies the effect the residents' livelihoods – the full-agrarian (includes pastoralism and cropping), the diversified, and the fully non-agrarian livelihoods - on their food and nutrition security. It also explores the associations between some cofounding variables like the household size, the availability of home gardens, and per capita food expenditure and food consumption. This is accomplished by using ex-post indicators of food and nutrition security together with a livelihood questionnaire and an expenditure module. The working hypothesis on agrarian transition is that it has become more pronounced compared with the situation 60 years ago when most of Nabha's inhabitants were farmers. The working hypothesis for the linkages between livelihoods and food security is that those people who are still producing food are more

likely to be food secure than those who have exited agriculture, given that food production ensures food availability and secures access to food thus improving food security (World Bank).

CHAPTER II

LITERATURE REVIEW

A. Agrarian Transition

Agrarian transition refers to the transformation of a large society from the agricultural domain towards services and industrial domain. In other words it is when the community at large shifts from the dependence on agriculture as the central occupation, source of income and the highest contribution to GDP towards dependence on industry and services where urbanization and livelihood changes take place. The pace of this transformation depends on the degree by which this large community is integrated in the market economy. Simply it is defined as the shift from agriculture and farming towards other sectors for the sake of development and wellbeing. According to Harris (1991) the agrarian transition can take up to three different routes:

1. The growth of large farmers, the capitalist farming, by being fed on the small farmers labors.
2. Large state organized cooperatives.
3. The growth and capitalization of the small farmers.

All of the three routes have a common base: “the small farmers” who are the promoters towards a developed economy as they aim towards higher yield (Harris 1991 & Mellor 1996). The small farmers in rural areas are forced to transition from agriculture towards other domains; mainly being wage-laborers in either agriculture or non-agricultural jobs to maintain their living (Akram-Lodhi & Kay 2010b). In Lebanon, the agrarian transition led to the forced migration from the rural to the urban areas for living, because of the inability of the small farmers to

integrate in the market, or work as wage-laborers in the area (Chalak, unpublished). Chalak also argues that the rural areas can develop through the routes mentioned above without the need to migrate to the urban areas. Thus agrarian transition has been eased by the availability of the non-agrarian livelihoods in rural areas.

Agrarian transition is a global phenomenon witnessed by many countries. It is usually measured by the change in the agricultural contribution to gross domestic production(GDP) and percentage labor employed in the farm sector. For example, Vietnam has been through economic development with a 7% increase in the total GDP between the period 1986 to 2008, accompanied by a sharp decrease in poverty rates. However the contribution of each of the agriculture, manufacturing, mining, and services has also changed. Agricultural share of the GDP has fallen from 34% in 1986 to 17% in 2009. The employment scheme has changed. In the 1990s Vietnam had an agrarian economy where 70% of the labor force was in agriculture followed by the services sector, the manufacturing, and the lowest percentage was that of the mining. However, this picture has also changed in 2008 with a significant drop of agricultural employment share to 54% and an increase in services employment share to 32 %. This shift in labor came as result of the integration of Vietnam into the global economy (McCaig & Pavnik 2013).

A similar image is depicted in the Philippines. The contribution of agriculture to the economy's GDP has been declining since the 1960s to reach 33% and then to 23% in 1981. Agricultural output was deteriorating at the time where the output of industry and services was increasing. This reveals the current non-agricultural nature of the Philippines economy. As for the labor force, the services sector dominates and occupies the largest share of employment (around 50%) while the agricultural sector contributes only 37%. Also, the harsh weather

conditions are slowing down the growth in the agricultural performance (Habito and Briones 2005).

In Southeast Asia, transcontinental permanent flows from the rural areas of the countries and rural-urban migration have been reported. The most significant emigration movements are from Vietnam and the Philippines to the United States, United Kingdom, Canada, and Australia (Kelly 2011). In 2007, the number of Indonesian overseas workers has reached 4.3 million. In many countries, rural-urban migration is considered an essential element of agrarian transition. In 2008, Kelly reported that 45% of Southeast Asians resided in urban areas. Also, urbanization of rural areas was taking place leading to the formation of desakota[1] as industrial sites were being implemented in green fields. Rural-urban migration has been most prevalent in Indonesia, Laos, Malaysia, East Timor, and the Philippines where the percentage of urban residents has been increasing between the periods 1970 -2010. For example, the percentage of the urban residents in Malaysia was 33.5 in 1970 and it reached 72.2% in 2010 (Kelly 2011). These two manifestations led to the shortage in the agrarian labors in the countryside of the countries. Rigg (2007) states that migration can be an element of economic transformation; it can either help sustain the agricultural domain or lead to a complete shift from agriculture.

In Sub-Saharan Africa, the increase in the population growth accompanied by the decrease in the farm size poses a negative effect on the rural well-being. The low agricultural productivity is augmenting the outflow of the rural population, mainly the unskilled labor, from agrarian livelihoods (Haggblade et al. 2007; Headey & Jayne 2014; Kassie et al. 2017). Non-agrarian income contributes to 40-45% of the total average income of the African farmers (Kassie et al. 2017). Taking Ethiopia as an example, 35% of the farmers' income comes from

[1]Desakota is used to describe the areas that experience an increase in the non-agricultural activities after being dominated by only agrarian activities and the land start to be used by sectors other than agriculture (Oliveau2008).

non-agrarian jobs (Woldehanna 2000). This can be explained by the fact that there is only one harvest season in the country (from May to September); the farmers tend to be employed in non-agrarian livelihoods during the remaining months (Kassie 2017). A study done with 151 farm households in Amhara National Regional State of Ethiopia, shows that only 27.81% of the sample rely on full agrarian livelihoods (Kassie el al 2017).

The Center for Strategic and International Studies has traced the roots of the agrarian change in Nigeria. Eigege and Cooke stated that, before the 1960s, "Nigeria was one of the world's most promising agricultural producers" (2016 p.1). Agrarian livelihoods were the most adopted by the Nigerians allowing them to be food secure and keeping the country self-sufficient; agriculture was the main income generating sector and had the largest share of labor force (70%). Nigeria was also the world's largest groundnut, palm oil, cotton and cocoa producer. Nigeria was an exporter of cash crops contributing 66.4% of the GDP. However, after the 1960s, when the oil was extracted, the governmental attention shifted towards crude oil production. This has led to readdressing the public investments and the private-sector engagement to the favor of the energy and not agricultural sector. By the time oil became the major exporter, the agricultural exports dropped down. As for per the agricultural share of labor force it has been decreasing to reach 37% in 2017 (World Bank 2018).

1. Agrarian transition in the Arab World

Agriculture used to be an important sector in most Arab economies as a contributor to GDP and employment, and as a main source of income generation and livelihood for the majority of the rural population (Sadik et al. 2011). However, this contribution to GDP is not even across all countries due to the difference in the nature of the land and the climate. For example, despite the decrease in the agricultural share in the GDP in Sudan from 35.7% in 2000

to 29.3% in 2008, it is still higher than that of Saudi Arabia that has also decreased from 4.9% to 2.3% in the same period of time. This is due to the variations in land and water resources. For example, the arid climate and the desert-like land of Saudi Arabia favors the livestock sub-agriculture sector allowing them to achieve self-sufficiency in fresh milk and eggs (BarjeesBaig 2014). However, in the irrigated lands in Egypt, rice, cotton, and sugar cane are mostly planted (Lewis 2016). Each of Algeria, Egypt, Morocco, and Syria has witnessed this decrease in agricultural contribution to GDP. The average of the contribution of agriculture to the GDP of all Arab countries experienced a severe decline from 11.6% (1990) to 5.4% (2008) (Sadik et al. 2011).

In Morocco, specifically in the agricultural Todgha Valley, international and internal migrations are dominant over the household with only 34.5% of all households are not migrants. This gives a clear image about the livelihoods that the Moroccans adopt for living. Agrarian livelihoods are rarely adopted as the percentage of non-migrant full agrarians is only 4.3% and the percentage of the local non agrarians is 86.2% (Haas 2005). This is the case in Toghda because of the high capital demand to acquire the resources needed for agricultural yield and mainly water. The better off migrants may be capable of affording the water pumps more than the internal migrants or the permanent residents. So the issue of low agricultural engagement is an issue of poverty rather than migration.

Not only has the average GDP contribution of agriculture to the economies of the Arab countries been decreasing, but also the average percentage of agrarian employment (in Algeria, Jordan, Mauritania, Morocco, Oman, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen) has decreased from 44% to 29% over the two periods 1990-1992 and 2005-2007, respectively (Sadik et al. 2011).

The statistics of 2010 show that the percentage of rural population in the Arab countries has been decreasing since 1981 from 56%, to 50% in 9 years, and finally reach 45% in 2008 (World Bank 2010; Sadik et al. 2011). This decrease is explained by the rural-urban migration. From 1990-1992 to 2005-2007 there has been a decline in the share of agrarian employment at a rate of 2.3% annually, at a time where there has been a growth in the rate of rural labor force by 3.6% annually during the same period. These two opposing changes favored the migration process (Sadik et al. 2011) where in most countries; the urban areas have pulled the labor force offering them opportunities in non-agrarian livelihoods (Ben Jelili 2010). Jelili gave Morocco as an example where urban facilities such as education, health, and cultural services were the most influencing factors that pulled the rural poor. High rural poverty rates in the Arab countries are also reported where Yemen, Sudan, and Mauritania are considered the poorest with more than 50% of rural poverty rate(FAO RNE 2015).

Zooming in into the Mediterranean countries, agriculture is found to be a very important in the rural areas. The labor force employed in agriculture, in most countries, is found to be the highest compared to other sectors (Shetty 2006). However this sector is the least contributing to the gross domestic production in all countries reaching its highest contribution in Syria with a 24% (Shetty 2006). For example, Jordan, an upper-middle income country, has a market economy, and the services sector contributes to the highest percentage of GDP which is 66% and the lowest contribution is that of agriculture accounting for 4% only (UNEP 2011). This share was much higher in the 1950s, contributing to 40%. Similar to the contributions towardsGDP, the services sector has the highest employment share (80%), followed by industry (18%) and agriculture (1.8%) (Sidahmed et al. 2012). The employment share has also been subject to decline as it decreased from 3.1% in 2006 to only 2% in 2010. Rural poverty is also prevalent in

Jordan and the reasons are the high rates of unemployment and the low wage rates (Sidahmed et al. 2012).

However, the status of agriculture in the Mediterranean countries is not stable, and not advancing. Rural areas are witnessing more poverty and more agrarian transition with each area/country having its own way of doing it. For example the agricultural sector in Iraq is the country's third largest employer and contributor to the economy however it has been declining for the last few decades (USAID 2018).

B. History of the Lebanese agrarian transition

In 1860s, change in tenure took place after the emigration of large number farmers from Mount Lebanon. Parallel to this immigration, the small farmers had the chance to own land and have their own mulberry trees to cultivate and raise silkworms (Trabulsi 2007). Although in this period Lebanon was well known for being the country of small producers, they could not enter the market without establishing any contact with powerful merchants. Also the expansion of the silk industry promoted monocultures and decreased the cultivation of fruits, vegetables and livestock and thus threatening the food and nutrition security (Firro 1990; Rachid 2007). This was the first transition, the transition to cash crops. It was followed by another form of transition which is the "wage-labor" as a result of the incapability of the small producers to diversify their plantations or integrate in the market. By the time Lebanon gained the independence, as reported by Hamade (2015) when citing Gaspar, the new rules and regulations in building the economy were in the favor of the better off urban elites. This lead to rural-urban migration, inequalities of both income and territorial development compared between the rural and the urban.

In the 1950s it became hard to maintain the agrarian livelihood in rural Lebanon. This was because of the success that capitalism has achieved in the rural areas leading to a further

migration into urban areas; thus expanding the urban centers. The exclusive privileges that were granted in the hands of elites, in both industry and agriculture, have led to a profit surplus through monopolies and to the dispossession of land from the poor. This has led to further migration of different sects to the surroundings of Beirut. Around the mid-1960s the small agrarians started to stand in the face of this domination until the late 1960s and early 1970s when they protested against the neoliberal economy that allowed capitalism, monopolization, and free trade to harm and diminish their financial capacity rendering them less able to sell their produces locally or even continue with their agrarian livelihood. However, because of the integration of politics and the civil war that came after, their voices were not heard and their demands were not met (Trabulsi 2007).

Regardless of the religious and political factors that contributed to the civil war during the period of 1975-1991, the lack of governmental attention to the rural areas also contributed to the tension that took place. This civil war has led to: 1) migration of the rural agrarians overseas 2) further local agrarian transition, and 3) increased poverty and hunger (Laithy et al. 2008; Trabulsi 2007). Abdulla (2002) reported that the agricultural labor force decreased by 30.5 percentage points during the period between 1960s and 1993.

Even after the protests, the civil war, and the observed decline in agricultural labor force, the government did not put any effort to boost the development of agriculture in the rural Lebanon. But rather it focused on rebuilding Beirut (Hamade et al. 2015) and according to Zurayk (2000), agricultural projects were implemented by private commercial firms without governmental direct observation and monitoring.

The Israel invasion during the 1982 and the 2006 war of Israel on Lebanon, have led to the devastation of the Lebanese agricultural land and infrastructure, thus abandoning the

agricultural sector. With all of this happening to the agriculture in Lebanon, some farmers persisted and managed to use their available work force to continue, others adopted the intensification system (increasing the inputs and using pesticides and insecticides for higher yield). But these strategies can make no difference to the farmer if the government does not supervise, control and impose policies that would support agriculture and the rural Lebanon as a whole (Trabulsi 2007).

C. Current Lebanese agriculture

According to the ESCWA 2016 report, agriculture's contribution to GDP in Lebanon is minor, only 4%. Also the sector's contribution towards the effective labor force is small, only 6% (Chlouk2016).It contributes to the income of 30-40% of the agrarian population with a different share depending on area of residence (Bekaa, South, and the North) (Byiringiro 2013). The governorate of Baalback-Hermel accounts for 43% of the total farms in Lebanon (Byiringiro2013). Also, the land dedicated to agriculture has been declining over the past twenty years, to below 11% in 2011 (Haydamous& El Hajj 2016).

A research carried out in Batloun, Chouf (2018) to study the agrarian transition of the village, showed that there has been a significant change between the livelihoods adopted in the 1990s and those adopted in 2018. Among a sample of 51 participants, the percentage of those who had a full agrarian livelihood has significantly decreased from 8% to 2%, the percentage of those with diversified livelihoods has also significantly decreased from 31% to 18% while the percentage of the non-agrarians has increased from 61% to 80% (Weber 2018).

According to the data of the World Bank, the Lebanese rural population has dropped from 58% in 1960s to 12% in 2016 (2018). However, this 12% constitutes the poorer compared to the other 82%. Agriculture contributes to 80% of the local GDP. This means that agriculture is

the main contributor to GDP in Baalback-Hermel. However it is difficult to predict the number of the full agrarians because it is more common now that the agrarians have other jobs; with agriculture being their part time job (FAO 2008). Bashour(2017) reported that 66% of the farmers have non-agrarian jobs.

Crops represents 60% of the agricultural output and livestock represents 40%. Fruit trees are the mostly cultivated crop, followed by cereals, olive trees, and vegetables (Chlouk 2016).

As for the livestock, this subsector is essential and plays a significant role in reducing poverty in rural Lebanon (FAO 2006). The rural areas in the Bekaa and the South are the most involved in livestock subsector where it generates income by selling the livestock heads and/or their dairy products. The "rehabilitation of the animal production" program that was funded by IFAD took place in the Bekaa to support the farmers who depend on livestock for living. And in the South, farmers tended to increase the number of animals head in order to cope with the increase in the population growth (FAO 2006).

1. Agriculture in Bekaa and Nabha

The fertile Bekaa valley is around 900 meters above sea level and hosts 43% of the total agricultural production. However, among the Bekaa district, the cultivation systems differ between regions. A study for a viable framework for livelihood and social enterprise projects in the Bekaa states that while agriculture tends to be mechanized and intensive with high capital investments in west and central Bekaa, "in Baalback-Hermel agriculture is still a livelihood option" (Kassis& Osman 2018 p.34).

The northern Bekaa or Baalback-Hermel, where Nabha is located, is arid with low rainfall. These climatic characteristics allow the farmers to plant mainly cereals, forage crops, fruit trees, vegetables, and legumes. Not only crops are prevalent in the northern Bekaa, but also

pastoralism is an important subsector in agriculture with it sedentary dairy sectors (Kassis& Osman 2018). An assessment on the small ruminant value chain shows that 9% of Bekaa farmers own livestock, mostly sheep (Mercy corps 2014). Almost 60% of livestock farmers depend on dairy production as their main source of livelihood (Data Bank 2014).

The Food Security and Livelihood Assessment (FSLA) report, prepared by REACH and FAO, reported that, 64% of the Bekaa farmers tend to sell livestock for many purposes. 58% of these farmers said that their main reason is the urgent need of money and 28% said that it is their normal source of livelihood (2015).

Nabha is a Lebanese municipality located in Baalback district, an administrative division of Baalback-Hermel Governorate in the northeast region of Lebanon. Nabha is located between the mountains (Dahr el Qadeeb) and the Bekaa valley (Zurayk 2008). Behind the mountains there are the OyounOrgosh ponds that supply water downstream to Nabha and the nearby villages. The residents of Nabha belong to two different religious affiliations and this has led to the formation of two different municipalities in 2010. The history of agriculture in Nabha is not well documented in the literature, however, interviews with some key informants in the village were helpful to get the information about the agrarian transition that took place.

The Moukhtar reported that Nabha originally belongs to the Christians. Land ownership of Nabha is mostly for the Christians. The Muslims came from Jbeil, escaping the Ottomans, to settle in Nabha and hide. After settling in, they started the agrarian livelihoods in order to make a living and ensure the availability of food.

One of the current municipality members narrated the agrarian history that goes back to the 1960s. During that period, and up until the mid-1970s, people used to plant lentils, barley, wheat, and chickpeas for sale and home consumption. Vegetables like tomatoes, cucumbers, and

radish were also planted, however for home consumption only. Fruit trees were not common crops, agrarians used to plant only grapes, and figs and also mainly for home consumption. Pastoralism was also a significant practice among the residents. Pastoralists used to raise livestock, and depend on their dairy products for income, consumption, and mouneh production.

In 1975, the civil war in Lebanon began. During this period, the government was not well supervising agriculture and this facilitated the plantation of cannabis and opium that were first introduced and planted in Nabha in 1958 and 1976 respectively; Turkish experts helped and taught the locals on how to plant and harvest this crop. The locals then shifted from planting legumes towards planting opium and cannabis as it became their income generating source. The first transition in the village was shifting from legumes to cannabis and opium.

The conflicts between the two different sectors date back to the 1950s. As reported by the Daily star (2009), a feud took place between two main families in the village, Amhaz (Shia) and Tawk (Maronites). As a result, the Tawk family left the village and moved to settle in the mountains, nearer to the water source of OyounOrgosh. By the time the Muslim families were planting opium and cannabis, the Tawk family used to plant fruits, mainly cherry, and established restaurants and some trout farms. In 1991, another feud took place because the Tawk family was restricting the water flow to the village, and diverting it to water their own production (TheDailyStar 2009; Zurayk 2008). The water diversion is considered a violation to the laws of the Ottoman Empire.

The village had no municipality until 2010. The residents had multiple meetings to discuss the process of establishing a new municipality for the village. The Christians requested that the vice president and half of the municipality's members to be Christians. But the Muslims did not agree because now they are the majority in the village. As a result the Christians reached

out to governmental leaders asking them to have to two municipalities to the village; one for Christians and the other for Muslims.

As reported by the heads of both municipalities, Nabha has transitioned from the cash crops because of the extensive water shortage, the climate change (decrease in the rainfall), and the increase on the governmental supervision (legal measures are taken against cannabis plantations). If the people decide to buy water, and other agricultural inputs in order to plant legumes or other crops now, the profit of the yield will be minimal compared to the costs. It will push the farmers into financial debt and not financial gain. However, it is reported that the remaining practice in the village is pastoralism. This livelihood has not been much affected by the water shortage and climate change as much as the crops. This is because livestock demands less on water and they can graze anywhere in the uphill land near the village[2]. Pastoralists in Nabha count their livestock as a food source, an income source and an asset.

D. Elements of agricultural degradation in Lebanon:

1. Urbanization and urban population growth

The urban population growth has been increasing since the Civil War with an absolute decrease in the rural population number (World Bank 2018; Abdalla 2002). Among the Lebanese population, 70% were considered rural in 1950s but after the Civil War this percentage decreased to become 10% (Haidar 2004; UNData 2018). This urban population growth and urbanization happening at the same time has led to the decrease in the agricultural land where it is utilized by other sectors; for tourism and commercial activities. But with urbanization and the abandonment of the fertile land while seeking a more income generating livelihood, along with better

[2] However it allows only few farmers to have a big number of livestock heads.

availability of cheaper food, has led to a further neglect to the agricultural sector allowing other sectors to come and utilize the land (Al Ahad&Helwani 2017; Gebrael& Salmon 2013).

2. Climate change and availability of natural resources

Lebanon is characterized by hot, dry summers and moist, cool winters. However Lebanon is facing climate change and agriculture is the most vulnerable sector because of the insufficient availability of water and land resources in addition to the factors mentioned above; mainly urbanization and population growth. The climate change is manifested through an increase of annual mean temperature[3] (around 0.3°C per decade since1970). Warm weather and high temperatures led to several dry seasons thus leading to droughts and severe water scarcity. "Though drought has been especially damaging to agriculture in Lebanon, there have been other extreme weather events that impacted the sector. These include frosts, wild fires, and flash floods. The temperature extremes, increased water scarcity, and extreme weather events have damaged crops, lands, and agricultural infrastructure" (World Bank 2018 p.29). Thus climate change is a driver of agrarian transition.

Urbanization and climate change have been threatening the rural well-being and the agrarian livelihoods. As it is noticed in the sections above, the agrarian domain in many countries is uninteresting to the residents. When the farming does not satisfy the farmers with its productivity and financial profit, it can lead a shortage in the total income of the agrarian household thus rendering the farmers incapable to address all their needs. For this, the agrarians tend to shift their work productivity and reorient it towards other income generating jobs. Thus diversification strategies are adopted with the hope for better living conditions.

[3]This increase is much higher than the global mean trend of ~0.15°C over the same period (World Bank 2018).

E. Diversification strategies: livelihood diversification and enterprise diversification

As a result of the mentioned vulnerabilities, the agrarian communities developed strategies that would allow them to cope. They tend to diversify their living and their sources of income; approaching agrarian transition. According to Akram-Lodhi and Kay (2009), adapting a livelihood diversification strategy is essential among the agrarians and this is because of their high levels of food insecurity and poverty (Batal 2007). Not only this has been the case or the decision of the community itself, but this is a governmental and institutional plan to overcome the poverty and food insecurity that are induced by the exclusive dependence on agriculture income. Lanjouw and Feder (2001) reported that diversification strategies are ways to ease the harm caused by both the extreme natural factors such as the weather and climate change, and the market fluctuations such as the price spikes of goods and agricultural input products, and the consumers demand. There are two diversification streams adopted as strategies:

a. Livelihood diversification: by definition is the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living (Ellis 1998). This diversified portfolio aims to amplify the multiple income sources in order to sustain the living conditions of a household (Lanjouw and Feder 2001). Diversification can be adopted because of the restrained capability to survive in a weak household's financial system (Kassie 2017).

   Diversification is not always the same in all households: it can be a movement away from agriculture (moving from rural to urban areas), or a shift from one's own agricultural production to work for another well competent farmer as wage-labor thus less farming, or it can be a non-agricultural income generating job that is intended to help sustain and augment the original agricultural livelihood (Lanjouw& Feder 2001; Thomas-Hope 2017;

Yaro 2016). Thus the money spent on developing the agrarian livelihood can be from rural and non-rural source; urban jobs or remittances (Patel et al. 2015; Higgblade and Hazell 2010). Livelihood diversification does not always mean a full agrarian transition (Kununose&Rignall 2018). Kelly (2011) in his article stated that remittances sent from migrants (from rural areas) helped significantly in increasing the capital used in the agrarian production of the farmers. He also cited a case study of a migrant worker in the Philippines where she found out that the remittances helped in buying the farm land.

b. Enterprise diversification: is to have more than one enterprise/crop or produce more than one product to avoid having your income totally dependent on the production and price of one product (Bastian& Held 1999).

These strategies are accepted and implemented by the exclusive agrarians as a way to help them respond to the fluctuations that occur at the socio-ecological and political levels to be able to enhance their living conditions and maintain an income that helps them alleviate poverty and food and nutrition insecurity (Barghouti et al. 2004; Barret et al. 2001; Lanjouw and Feder 2001). And according to Ellis, although the livelihood diversification strategy helps to mitigate poor livelihood conditions (low income and poverty), however its effect differs between a case and another depending on the surrounding drivers and opportunities (2000). And this is integrated in the world's bank definition of livelihood diversification as the following: "a change in business activities based on the flexible and differentiated response to changing opportunities created by new production technology or market signals" (Barghouti et al. 2004).

Both diversifications can increase the competence of the small scale farmers in the market and increase their income, with research showing that they can impact the household food security; with fewer studies on food and nutrition security.

F. Food security

1. Food security, according to the World Food Summit in 1996, is as follows: “Food security exists when all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences (FAO 2012). There are four pillars of food security:

- Food availability: the availability of adequate amount of good quality of food that is provided through imports or/and domestic/local production.
- Food access: the access to sufficient resources for obtaining the nutritious food
- Utilization: utilization of food through food and non –food inputs; this includes clean water and nutritious food, hygiene and sanitation together with appropriate health care.
- Stability: stability resides in the “at all times” part of the definition reflecting the need to maintain the above pillars with the ability to mitigate the sudden shocks and the cyclical events.

1. Case Studies

There has been an increase in the number of people facing food insecurity around the world. The 2018 SOFI (FAO 2018) report shows that in 51 countries, the number of food insecure people increased from 80 million in 2015 to 108 million in 2016 to reach 124 million in 2017. In Lebanon, according to The 2015 Food Security and Livelihoods Assessment, the vulnerability to household food insecurity reached more than 10% of the Lebanese households (MoA, WFP & FAO). The Regional Refugee and Resilience Plan 2015-2016 showed that out of the 1.3 million people who are in need for food in Lebanon, 1.1 million are Syrian refugees, 64,000 are Palestinian refugees, and 182,000 are of the host communities/Lebanese (USAID, IMMAP, & FAO 2015). So compared to the others, the Lebanese rarely suffer from food security. According

to the WFP, 49% of the Lebanese population worry about their access to food. In a study done by Jomaa et al. (2017) food security was assessed using the Household Food Insecurity Access Scale (HFIAS). Data from 378 Lebanese households showed that approximately 50% of interviewed Lebanese households were food secure while 8% were mildly food insecure, 16% were moderately food insecure, and 26% were severely food insecure.

Hwalla and Bahn (2015) in their paper, reported two study done by Naja et al. (2014) and Sahyoun et al. (2014) that assessed the food security status of the Lebanese in Bekaa valley and Tyre respectively. Each study used different indicator in each region. In the Bekaa valley they used the HFIAS and they found out that 48% of the households interviewed were food secure, 17.7% were mildly food insecure, 12.9% were moderately food insecure and 21.1% were severely food insecure. They also found a positive correlation between food security, poverty, malnutrition, and poor dietary quality among the participants. In the South, the Arab Family Food Security Scale was used to assess food insecurity among the Lebanese and the Palestinian refugees and the results showed that 42% and 62% of the studies populations, respectively, were food secure.

Hamade et al. (2014) studied the prevalence of food insecurity among low-income households in peri-ubran areas; Tripoli in Lebanon and, Amman in Jordan. 51% of each of the populations were food secure where the food producers contribute more to this percentage than the non-food producers. Two factors were strongly associated with the food insecurity, 1) household size 2) poverty; percentage of income spent on food.

The study done in Batloun, measured the food security status of 51 residents using the Food Insecurity Experience Scale. And the results indicated, based on the Lebanon specific scale, that

85% of the studied sample were food secure and the remaining 14% were food insecure. However the global scaling showed that 92% of the sample were food secure.

G. Food Security and Livelihood Diversification

Livelihood diversification is adopted to have multiple sources of income in order to maintain the living condition; the more diversification exists per household the better is the ability to obtain food (Thou 2011). If the income generated from the second non-agrarian job is not invested on farm, the household's income from agriculture is then decreased (also less time is spent on one's own land for production) and the household will depend more on purchasing food from the market. This shift in food purchase dependence and its effect on the food and nutrition security has not been well studied. But it is shown that the higher the number of income sources of the family, through livelihood diversification, the better the food security is (Frelat et al. 2016; Limon et al. 2017).

1. Case studies

Delvaux and Paloma, in their study in Nigeria to study the same link, found that those with secondary non agrarian incomes were food secure while those with full-agrarian livelihood, their income had no clear effect on the household food security (2018). Another study carried out in Jamaica, St Vincent, and the Grenadines where the authors stated that the agrarian income does not contribute much to the total expenditure and that without the remittances, the food security of would decrease (Thomas-Hope 2017).

Another set of case studies show that there is no impact of livelihood diversification on the household food security. Ruben and Van Der Berg in Honduras, they studied the effect of non-agrarian income on the food adequacy (determined by the consumption of calories and

protein requirements by the whole household per day) among rural households. Opposing the above studies, the results showed that an increase in the farm income by 10% increased the nutritional adequacy by 0.8% while the increase in 10% of the off farm income led to an increase in only 0.3% in the nutritional adequacy (better consumption of nutrients compared to the requirements) of the household (2001). Also, another study done in Ethiopia, Tolossa and Robaa found that those with the poorest household were the ones with diversified livelihoods- mainly wage-labors- and the ones with the highest experience of food insecurity (2016).

The study done in Batloun (Chouf, Lebanon) showed that livelihood diversification has no significant impact on the food security level on the sample studied (Weber 2018)

The above results are mixed and they cannot derive a definite conclusion about the impact of livelihood diversification on food security. The impact depends on the household settings, socio-economic state of the household, the accessibility criteria in their surroundings and the entitlements that allow the agrarian to diversify and make the best out of his diversification.

Table 1. Summary of case studies

Region	Author	Year	Finding
Nigeria	Delvaux and Paloma	2018	Livelihood diversification improves food security.
Jamaica, St Vincent and grenadines	Thomas-Hope	2017	Remittances increase food security.
Honduras	Ruben and Van Der Berg	2001	Increase in farm income improves food security more than non-farm income.
Ethiopia	Tolossa and Robaa	2016	Livelihood diversified households we the poorest and most food insecure.
Batloun, Chouf, Lebanon	Weber	2018	Livelihood diversification has no effect on food security.

H. Nutrition Security

Nutrition security is defined by the World Bank in 2006 (cited by FAO 2012 p. 6), as "Nutrition security exists when food security is combined with a sanitary environment, adequate health services, and proper care and feeding practices to ensure a healthy life for all household members."

In 2010, the definition was elaborated by SUN, The Road Map for Scaling-Up Nutrition (SUN), 2010 edition, as follows: "Nutrition security is achieved when secure access to an appropriately nutritious diet is coupled with a sanitary environment, adequate health services and care, to ensure a healthy and active life for all household members" (FAO 2012 p. 6).

In 2012, FAO, in order to assert that nutrition security focuses on the actual consumption of nutritious food and not only access to nutritious food, has established this definition: "Nutrition security exists when all people at all times consume food of sufficient quantity and quality in terms of variety, diversity, nutrient content and safety to meet their dietary needs and food preferences for an active and healthy life, coupled with a sanitary environment, adequate health, education and care" (p.6). Nutrition security combines access to nutritious food that fulfills the nutritional requirements of the individual and access to proper environment that allows this individual to make the best use out of this food in order to reinforce growth and carry out basic life needs.

I. Food and Nutrition Security

Food and nutrition security combines both food security and nutrition security. Integrating them in one term, or adding the nutritious aspect to the food security term shows that nutrition is the definite goal.

Two definitions are stated for food and nutrition security:

The first was in 1990, by IFPRI, cited by FAO from UNICEF 2018, “Food and nutrition security is achieved when adequate food (quantity, quality, safety, socio-cultural acceptability) is available and accessible for and satisfactorily used and utilized by all individuals at all times to live a healthy and active life.”

And:

“Food and nutrition security exists when all people at all times have physical, social and economic access to food of sufficient quantity and quality in terms of variety, diversity, nutrient content and safety to meet their dietary needs and food preferences for an active and healthy life, coupled with a sanitary environment, adequate health, education and care”(FAO 2012 p. 7).

J. Livelihood diversification and food and nutrition security

The case studies, presented in the section above, show the effect of the livelihood diversification on the food security without taking into consideration the nutrition security in its definition. The nutrition dimension is often neglected. The process of agrarian transition in accompanied with what is called the nutrition transition. Nutrition transition is defined as the shift in diet due to “Modernization, urbanization, economic development, and increased wealth (Misra& Khurana 2008; Popkin 2006). And with agrarian transition, the diet shifts towards less consumption of fruits and vegetables because they are no longer produced (HLPE 2017).

As explained in the sections above, livelihood diversification leads to increased income from different jobs. Globalization and trade liberalization are increasing the availability of cheap, processed, calorie-dense and non-nutritious food that is bought mostly by those with lower income than the better off individuals who can afford the nutrient dense healthy food like red meat and dairy (Akram Lodhi & Kay 2010b; Batal et al. 2007). Thus those of lower income are linked to lower food security (Herrero et al. 2017).

1. Case studies

There are not enough studies to draw a conclusion on the effect of livelihood diversification on food and nutrition security. The available studies are as follows:

One case study in Nigeria by Babatunde and Qaim (2010) investigated the effect of non-agricultural income on food security while looking at the nutritional dimension measuring diet quality, micronutrient content, and child anthropometry. They also used food consumption score, expenditure module, and questionnaire with inquiries about the sources of income in the past year. The results of the study showed that those with nonagricultural income had better diet quality (consumed more fruits, vegetables, and animal products than calorie dense/starchy food). Not only this, but they also found that those with lower nonagricultural income are among the poorest quartile.

Another case carried out in a Bedouin community of the Central Bekaa to study the effect of off-farm income on food and nutrition security. The population was residing in an area where the resource endowment is not compatible to farming. The results indicate that households with diversified incomes (who had more off farm worker) are food insecure compared to those who produce their own food. Thus food consumption is threatened by the availability and the accessibility of food because they are to be made available by purchase and not self-production (Ghattas et al. 2013).

The studies above offer contradictory results and this make the link between livelihood diversification and food and nutrition security vague.

Weber (2018), in her study in Batloun, used the Food Consumption Score (FCS) indicator to assess food and nutrition security among the participants. The results show that only 4% of the studied sample were borderline food and nutrition insecure. The results also indicate

that there is no significant associationbetween livelihood diversification and FCS, thus the livelihood did not impact the food and nutrition security of the participants.

K. Role of home gardens in nutrition security

Home-gardens with diversified vegetables, fruits, and sometimes livestock, can contribute to the nutritional intake by households and thus improving nutrition security especially among those with low income generating livelihoods. Home-gardens can assist in addressing the issue of food insecurity because, if well-planned and taken care of, they can assist in fulfilling of the four pillars of food security: availability, accessibility, utilization and stability(Ajahet al. 2013). The stability of the home-gardens that include fresh fruits and vegetables, and livestock adds up to the nutritive intake of the household (Galhena et al. 2013). Not only can it add up to the intake, but for low income households who cannot afford to buy the nutrient-dense food, which usually cost more in the market, home-gardens can ensure the availability and the proper access to the food items; "through gardening, households can have better access to a diversity of plant and animal food items that lead to an overall increase in dietary intake and boost the bioavailability and absorption of essential nutrients" (Galhenaet al. 2013). A study done in Batticaloa District, Sri Lanka showed that the home-gardens are taken as a coping strategy since the value of the home-garden products increased as the coping strategies index score increased and the agrarians tend to be more food secure when they depend more on their home-gardens (Krishnalet al. 2012).

Another study was carried out with 100 rural households in Butere division, western Kenya in order to study the role of home gardening on household food security. Musotsi (2008) found that there is a significant correlation between number of livestock and food stock. Livestock products (mainly dairy) are used for home consumption only, and thus they help in the

availability of food in the household. So livestock improves food security by maintaining food availability.

CHAPTER III

METHODOLOGY

This research aims to study the effect of the agrarian transition on the food and nutrition security of the residents of the village of Nabha, Baalbaack-Hermel, Lebanon by surveying a randomly selected sample of 100 households and carrying out qualitative and quantitative survey.

A. Study area

The study is carried out in a remote rural area called Nabha. Nabha is a Lebanese municipality located in Baalback district, an administrative division of Baalback-Hermel Governorate in the northeast region of Lebanon. It islocated between the mountains (Dahr el Qadeeb) and the Bekaa valley (Zurayk 2008).Nabha is well known for its agrarian history of planting legumes, wheat, barley and lentils. However some drastic conditions[4] in this village have led to major changes in this sector.

Figure 1. Map of Nabha

[4] Discussed in details in the literature review

B. Sampling

The target sample is chosen from the 2017 elections' voter lists. With the help of one of the municipality members, the permanent residents were able to be identified. They were a total of 1000 individuals. The 1000 names were entered into an excel document, and with randomization a total of 100 individuals were chosen; thus targeting 40% of the total permanent households.

Upon randomization of the permanent residents' list, only heads of households were chosen. For example if the first name in the list is for a deceased person, then, his wife, being the head of household, was selected and interviewed; this happened twice in this study. However, if the name was for a family member and not a head of household, the name was rejected. These steps were followed along the list until a final list of 100 names, representing 100 heads of households, was ready.

C. Data collection

After introducing the project to each of the 100 heads of household, their consent was taken orally. Then the interviews were conducted using four survey tools:

1. Livelihood questionnaire
2. Food Consumption Score
3. Household Expenditure Module
4. Food Insecurity Experience Scale

1. Questionnaire

The questionnaire is a qualitative set of 8 questions with each question asked twice referring to different periods of time. In other words, each of the 8 questions is asked once about the 1960s period, and once again about the current (2018) period. This specific period is chosen because it is considered a memorable time for the village: 1) before the civil war 2) water conflict 3) spreading of cannabis and opium.

This questionnaire is meant to study the change in the livelihoods adopted by the permanent residents during the period of 1960s-2018; as indicator of agrarian transition. The questions also tackle the main drivers behind livelihood changes and the main motivators behind their current agricultural practices, if they were still practicing agriculture. This primary qualitative data will give a clear understanding of the livelihood evolution in Nabha. Also, this survey asks about the home gardens: the motivators behind having them, and the most cultivated crops.

2. Food Consumption Score

Food Consumption Score (FCS) is a quantitative tool that has been developed by the World Food Programme (WFP 2008) in order to have a standard food consumption data collection instrument and analysis approach. It is a composite score[5] based on dietary diversity, food frequency and relative nutritional importance of different food groups consumed by a household during the 7 days before the administration of the survey. There are 9 different food groups: main staples, pulses/legumes, vegetables, fruits, meat (meat, poultry, and fish) and eggs, milk and dairy, sugar, oil, and condiments. Attention should be given to food items like bread, cereals and other staples that have important different economic meaning and not-so nutritious

[5] The formula to calculate the score, based on 9 groups, with the standard weights, is: FCS = (starches*2)+ (pulses*3)+ vegetables + fruit + (meat*4)+ (dairy*4)+ (fats*0.5)+ (sugar*0.5) (IFPRI 2009)

value. This can be noticed in the different nutritional weight given for each food group. The nutritional weight is as follows:

Figure 2. FCS the standard Food Groups and current standard weights (WFP 2008).

	Food groups	**Food items**	**Weight (definitive)**
1	Main staples Cereals and tubers	Maize , maize porridge, rice, sorghum, millet pasta, bread and other cereals	2
		Cassava, potatoes and sweet potatoes, other tubers, plantains	
2	Pulses	Beans. Peas, groundnuts and cashew nuts	3
3	Vegetables	Vegetables, leaves	1
4	Fruit	Fruits	1
5	Meat and fish	Beef, goat, poultry, pork, eggs and fish	4
6	Milk	Milk, yogurt and other diary	4
7	Sugar	Sugar and sugar products, honey	0.5
8	Oil	Oils, fats and butter	0.5
9	Condiments	Spices, tea, coffee, salt, fish power, small amounts of milk for tea.	0

The consumption of food groups like sugar, fat, and staples shows diet diversity but of a very low nutritional importance. For this reason, because of the high consumption of sugar and fat in Nabha, the cutoff points recommended by the World Food Programme's (WFP 2008): poor food security = 0-21, borderline food security 21.5-35, acceptable food security = >35 are not used in this study. We have used the adjusted cutoff points that were used in studying food security of the Syrian refugees and the vulnerable Lebanese hosts in Lebanon (VaSyr 2017). The adjusted cutoff points are as follows: poor food security: 0 - 28, borderline food security: 28.5 -

42, and acceptable food security = > 42.5. The highest score that can be recorded is 112 reflecting the consumption of all food groups every day for a 7 days period.

3. Household Expenditure Module

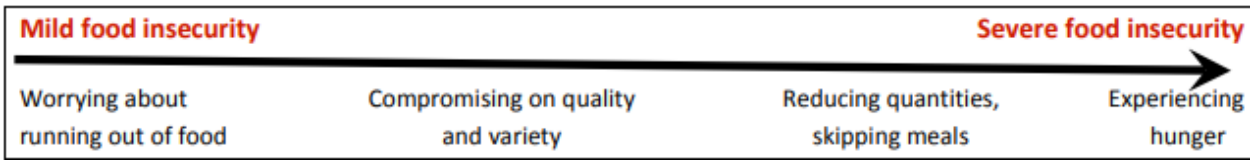
In this survey, participants are asked to report their total household expenditure and this is considered an indirect way to estimate the household's income. This method is used because income related questions are sensitive and some people find them embarrassing or inappropriate. This expenditure module was set up from two different expenditure modules used by VASyR 2017 and the 2012 Lebanese Central Administration of Statistics. The final expenditure module had a total of 9 categories and was used in a prior study by Cara Weber (2018) in Batloun, Chouf to study the effect of agrarian transition on food and nutrition security. These 9 categories include all the potential expenditures of a household. The expenditure of some categories was collected on a yearly basis, others on a monthly basis, and some on a daily basis. Calculations were done; a monthly total expenditure was estimated and used as a proxy for income. The percentage of expenditure on food per month was then calculated. The expenditure on food per capita is calculated by dividing the household's monthly expenditure on food by the household size.

4. Food Insecurity Experience Scale

Food Insecurity Experience Scale (FIES) is a global version of a tool that has been developed by FAO and validated for international use. Researchers at the American University of Beirut in 2015 have validated this tool to be used in rural Lebanon. It is a valuable method that allows monitoring the access pillar of food security. It has been used by FAO to measure food security in 140 countries (FAO 2018a). This has aligned the FIES with the second sustainable

Development goal (Target 2.1) that focuses on ensuring access to food for all: “By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.” The survey consists of eight “yes” or “no” questions that reflect: 1) the perception of food insecurity (anxiety/uncertainty regarding food access) 2) the change in the quantity (skipping meals, decreasing portion size of the meal or even going a day without food), and 3) the change in quality of food (having less balanced diet) all because of the lack of money or resources. The standard labels of the eight questions are as follows: worried, healthy, few foods, skipped, ate less, ran out, hungry, whole day with no food. As the questions go from 1 to 8, the severity of the food insecurity increases; represented in figure 1. Using this tool, we will be able to measure the food insecurity of the permanent Nabha residents together with its severity; in case it exists.

Figure 3 Food insecurity severity along a continuous scale of severity (FAO 2018)



The total score of the survey can range between 0 and 8, depending on the total number of affirmative answers. The total score is referred to as the raw score. Other categorizations exist: 1) the global scale and it allows the comparison of the food insecurity between countries, 2) Lebanese scale. The scales differ in the categorization of the final score. For example the global scale divides the raw score into 3 categories where a score of zero to three categorizes people as food secure (category I), a score of four to six categorizes people as moderate food insecure (category II), and a score of seven and eight categorizes people as severely food insecure (category III). However the Lebanese scale categorizes those with a total affirmative score of

zero to two as food secure (category I), and those with scores of three or higher as food insecure (category II) (FAO 2018).

D. Statistical Analysis

Data was collected from the four surveys, coded and entered on an Excel sheet.

The questionnaire has the qualitative data that was carefully read and analyzed. This data was used to account for and track the livelihood changes between the period of 1960 and 2018. The answers allowed categorizing the livelihoods into: non-agrarian livelihood referring to those who do not have any agricultural income, diversified livelihood referring to those with an income that is earned partially from agriculture and partially from a nonagricultural source, and the third full-agrarian livelihood referring to those who gain their total income from agriculture.

Also the information gathered allowed to record the frequency of home gardens and the mostly planted crops. The main drivers for 1) having a home garden and 2) changing livelihoods that were noted allowed proper analysis of the agrarian transition of the village.

The quantitative data from the FCS, FIES, and the expenditure module was analyzed using Stata/SE 12.0. Different variables were used (continuous and categorical) and the statistical tests were done according to variables being tabulated. The 95% confidence interval (95% CI) was used to study the significance of all test results. The tests used for analysis are displayed in the following table, and the Stata results are attached in the appendix.

Table 2. Statistical tests conducted by topic of analysis

Topic	Dependent Variable	Independent Variable	Test & Result
Agrarian Transition	1960 Livelihood	2018 Livelihood	Cross tabulation
			Proportion test

Topic	Dependent Variable	Independent Variable	Test & Result
Home gardens and fruit consumption	Fruit consumption	Presence of a home garden	Chi-square test
	FIES	Presence of a home garden	Chi-square test
	FCS	Presence of a home garden	Chi-square test
Food and Nutrition Security	FCS	Current Livelihood	2-Sample T-test
		Household size	Regression test
		Expenditure on Food	Regression test
		Food expenditure per capita	Regression test
		FIES	Scatter plot
			Regression test
	FIES	2018 Livelihood	Chi-square test
		Religious affiliation	Chi-square test
		Total food expenditure	One way ANOVA
		Expenditure on Food per capita	Regression test
Impact of religious affiliation	2018 Livelihood	Religious affiliation	
	FCS	Religious affiliation	
	FIES	Religious affiliation	

CHAPTER IV

Results and Discussion

Agrarian transition, in Nabha, is manifested by livelihood diversification and migration to the cities and countries. As was reported by one of the municipality members, Nabha's voting list has around 3000 names while only 1000 of them are permanent residents; they make around 250 households. The livelihoods of the households are grouped under three categories: 1)non-agrarian livelihoods, 2) diversified livelihoods, 3) full agrarian livelihood. Livelihood changes between the 1960s and 2018 are recorded and statistically analyzed.

The current food consumption and the food security status are meausred by the Food Consumption Score (FCS) and the Food Insecurity Experience Scale (FIES) respectively. Then statistical analysis is done to study the effect of the agrarian transition on the current food consumption and food security. The analysis aims to answer the research question of this paper that asks "What is the effect of the agrarian transition and livelihood diversification on household food security of the Lebanese residents in the village of Nabha?"

A. The Agrarian Transition and livelihoods

The agrarian transition is studied by comparing the past livelihood sources of the participants to the current livelihood sources. The changes in livelihoods are reported as follows:

Table 3. Livelihood sources as reported by Nabha residents.

Livelihood sources	1960s	2018	P-value (95% CI)
Non-agrarian	38	81	0.00
Diversified	25	12	0.00
Full agrarian	37	7	0.00
Total	100	100	0.00

The data presented in table 3 shows that there has been a change in livelihoods between the period of 1960s and 2018. In the sample studied, the percentage of residents who used to have a non-agrarian livelihood has increased from 38% to 81%. However, the percentage of those with diversified livelihoods has decreased from 25% to 12%. Also, the percentage of residents who have a full-agrarian livelihood has decreased from 37% to 7%. Currently, the 100 households studied are divided, according to their livelihood adopted, as 81 non-agrarian livelihoods, 12 diversified livelihoods, and only 7 full-agrarian livelihoods. All of the residents, who shifted to a non-agrarian livelihood, have reported the same reason: the lack of water availability that highly rendered their yield low; this left them with more expenses than profit.

To study the significance of livelihood changes, a proportion test is done and the results show that the transition in the three livelihood categories from the 1960s to 2018 is significant at 95% confidence interval. This means there has been a significant change in livelihoods of Nabha residents. Table 4shows the change among each livelihood between the 1960s and 2018.

Table 4. Changes among livelihoods 1960-2018.

2018 livelihoods	1960 livelihoods			total
	Non-agrarians	Diversified	Full-agrarians	
Non-agrarians	33	20	28	81
Diversified	3	5	4	12
Full-agrarians	2	0	5	7
Total	38	25	37	100

1. Livelihood changes of the 1960s' non-agrarians

The category of the 1960s non-agrarians has 38 individuals. 33 (out of the 38) individuals are still non-agrarians in 2018, 3 adopted a diversified livelihood recently, and 2 shifted towards a full-agrarian livelihood. They reported the change in their livelihoods as follows:

One used to live abroad and had a non-agrarian livelihood in the 1960s. In 1990 he migrated back to Nabha where, in 1992, pastoralism has been contributing to 40% of his income and the remaining 60% is his retirement salary. They are only 2 individuals in the household, his wife and him, and they both asserted that their livestock is behind their "daily" dairy consumption and their household mouneh production like kishek, shanklish, labneh etc. The other 2 ex-non-agrarian used to live in Beirut but they came back to Nabha 10 years ago. They adopted pastoralism that now contributes to 50% of their current income.

The remaining two (of the 38)shifted towards a full agrarian livelihood. The first, of these currently full-agrarians, reported that he has newly bought 450 goats and one cow; almost a year ago and since that time this has been his exclusive source of living. The second reported that he used to live in Beirut and had no agriculture before, but upon his return to Nabha he owned a donkey by which he ploughs other people's land and earns his money to buy his daily bread.

2. Livelihood changes of the 1960s' diversified

Of the 25 participants who had diversified livelihoods in the 1960s, 20 shifted to a non-agrarian livelihood and five remained in this category. Three (of these five with past and current diversified livelihoods) had to sell some of their livestock because they were in huge need for money, thus the percentage of income from pastoralism has decreased. One participant has a constant percentage of agricultural income that constitutes 50% of the total household income;

he owns 12 goats in the village and he has 80 other goats in partnership with others; where they take care of the animals and provide him with his share from the total profit. The remaining participant, of thefive in this category, has an increased contribution from agriculture (from 40% to 60%). He depends on his own agricultural crops in order to produce mouneh like jam and makdous, sell them and make 60% of his total income. However, this boost (from 40% to 60% of contribution) is not because of an increase in plantations or yield profit, but because his salary from the other job has decreased.

3. Livelihood changes of the 1960s' full-agrarians

Of the 37 who reported a full agrarian livelihood in the 1960s, 28 participants have shifted completely towards a non-agrarian livelihood, only four have shifted to a diversified livelihood (3 of these 4 still practice pastoralism that contributes partially to their income, and the remaining one owns a piece of land outside the village that he plants with potatoes), and the remaining five still rely fully on agrarian livelihoods.

The ex-agrarians, those who had a full agrarian livelihood in the 1960s, reported that they used to plant wheat, barley, lentils and chickpeas for sale and for home consumption. However this situation started to change since the 1958. More than one factor contributed to this change and they are: 1) water shortage[6], 2) the spreading of cannabis since 1958[7], 3) introduction of opium (by the Turkish experts) in 1976. And all of them were shifting towards cannabis and opium because of their lower water need and higher profit. This continued to be the case until no one planted legumes any longer. However, nowadays, the lack of water availability is also preventing cannabis, which produces best with one or two supplementary irrigations.

[6] The village has water shortage from Oyoun Orgoush because of the conflict that happened between two families residing in Nabha; explained in the literature review.
[7] Cannabis was first introduced to the village in 1958 but it was spread in the 1975 where there was no proper governmental surveillance because of the civil war,

4. The current full agrarians

Out of those 7 who reported a current full agrarian livelihood, 6 own livestock (practicing pastoralism)and the 7th participant owns livestock and crops(practicing agro-pastoralism). He plants apples, cherries, apricots, almonds and olives for sale; used to produce and sell olive oil but stopped since 2013 because of the decrease in rainfall that left him with low yield. He also reported that his income gain from his livestock is higher than the income from his crops. A 25 years old participant has bought 50 heads of sheep and goats few years ago and he depends on them for living. He also mentioned that this was the livelihood source of his parents back in the 1960s. Three participants, who are currently pastoralists, reported a full agrarian livelihood since the 1960s. They used to practice agro-pastoralism in the 1960s however now they depend solely on livestock. The remaining 2 participants were non-agrarians in 1960s and currently are full agrarian practicing pastoralism[8]. All of the 7 pastoralists interviewed, mentioned that livestock raising has been a more sustainable livelihood, than crops, in the face of water shortage that the village is experiencing and that the animals are like an asset that they can sell and benefit from its cash when they are in need. A pastoralist narrated the following: "when my wife got sick, I had to sell few heads of sheep in order to pay the entire hospital expenses. My animals are my income source that allows me to buy my daily bread and at the same time they are my bank account that I can rely on when I am in a financial need."

[8]described in the 1960s non-agrarians section

5. Current Livelihoods and Different religious affiliations:

Out of the 100 participants in this study, Christians[9] account for 13% and Muslims account for the remaining 87%. Four Christian participants have either a diversified livelihood (total of 3) or a full agrarian livelihood (total of 1) and the remaining 9 participants have zero income from agriculture. This makes the Christians 25% of those who currently have diversified livelihoods and 14% of those who have a full agrarian livelihood.

Table 5. Pearson chi2 test of livelihood sources per religious affiliation

Sector	**Non-agrarian livelihood**	**Diversified livelihood**	**full agrarian livelihood**	**Total**
Muslims	72	9	6	87
Christians	9	3	1	13
Total	81	12	7	100

Pearson chi2 = 1.7936 Pr = 0.408

A chi-square test is done, as represented in table 5, and it shows that there is no significant association of religious affiliation on the livelihood source at alpha 0.05. This means that religious affiliation does not affect the livelihood adopted.

6. Current livelihood and household size

Oneway ANOVA test shows that there is no significant association between the current livelihood and the household size at alpha 0.05. This means that the livelihood adopted does not affect the household size.

[9] these 13 households represent around 75% of the permanent Christian residents in the village

7. Current livelihood and Household's expenditure

Three different t-tests were carried out to study the association between the current livelihood adopted by the permanent residents and the total household's expenditure. The results show that there is a significant difference in the mean total household expenditure between the non-agrarians and those with diversified livelihoods, and between the non-agrarians and the full-agrarians at alpha 0.05. The mean total expenditure of the non-agrarians is significantly lower than that of both the diversified and the full-agrarians. However, there is no significant difference between the total expenditure of those with diversified livelihoods and the full-agrarians. This means that the non-agrarians have lower total household expenditure than the diversified and the full-agrarians.

Oneway ANOVA test shows that there is a significant association between the current livelihood and relative total food expenditure at alpha 0.05. Bonferroni test shows that this significant difference of expenditure is between the non-agrarians and the diversified only. Upon comparing the means, the results show that the non-agrarians tend to spend significantly more on food relative to their total expenditure[10] than those with diversified livelihood.

There is no significant association between 2018 livelihoods and each of expenditure on food in dollars, expenditure on food per capita and the Food Consumption score. This means that the entire studies sample consumes more or less the same food, but this "same" uses a bigger share of the income of the non-agrarians.

We also found that the increase in the relative expenditure on food is significantly associated with lower total expenditure. As reported by Lloyd (2016) and the INDDEX Project (2018) that low income/poor households tend to spend a highest share of their income on food compared to

[10] Non agrarians have a higher relative food expenditure and lower total expenditure

the wealthier households. This indicates that the total household expenditure is an adequate proxy for the total income.

This satisfies that the total expenditure is a proxy for income. The fact that the non-agrarians in the studied sample have the least household expenditure and the highest relative food expenditure reflects that the non-agrarians are probably poorer and that diversified improves livelihoods.

The distribution of total expenditure (as a proxy for income) according to livelihood is not normal and skewed to the right. Three out of the 7 full agrarians (45%) are in the upper decile.

This distribution shows that twenty one interviewees in the sample studied have a total expenditure above the mean, among which three of them have a full-agrarian livelihood and four have a diversified livelihood. The qualitative data collected using the Livelihood Questionnaire tells that these three full agrarians have more livestock than the rest of the full agrarians where the first one has 450 heads of sheep, the second one has 200 heads of goats, and the third one is the agro-pastoralist. This indicates that agriculture can provide a good livelihood, but only if the sector is concentrated among a few producers.

8. Discussion

The number of interviewees who still have a fully agrarian livelihood in 2018 was found to be seven. This is around five times less than the number of full agrarians (37) of the 1960s. However, data of 1960 shows that the number full-agrarians was already small, 37% of the sample. This finding informs us that the agrarian transition was already well underway before 1960. This picture reflects the agrarian transition across Lebanon and the Arab World. Abdalla (2002) reports a decline in the number of Lebanese agricultural workers since the 1960; it decreased by five folds during 1960 – 1993. The land dedicated to agriculture has been declining

over the past twenty years, to below 11% in 2011 (World Bank, 2013). In another rural area, in the village of Batloun, Chouf, Lebanon, Weber (2018) found that the number of full agrarians, in the studied sample, decreased by four folds (from 8% to 2%) during 1990 – 2018. This transition in Batloun was also underway before the 1990s because full agrarians were a minority during the period 1935 – 2005 (Rachid 2007). In Jordan, a decrease in 36% of agrarian workers was documented during the period 2006 – 2010 (Sidahmed et al. 2012). Similarly, a review article showed that in Todgha valley, Morocco, 86.2% of the non-migrant residents have local non-agrarian sources of income (Rignall and Aita 2017; Haas 2005). Globally agrarian transition is also evident across countries. For example, the survey compiled by Japan's Ministry of Agriculture, Forestry and Fisheries showed the number of agriculture workers fell from more than 7 million farmers in the mid-1970s to 4.82 million in 1990, to below 3 million in 2008, and to below 2 million in 2016 (Kyodo 2016).

Two main reasons were reported by the people interviewed to explain the agrarian transition in Nabha. The first one is the water shortage that the village has been experiencing since the early 1950s, where the first feud over water between the residents of the region took place. This led to the monopolization of water in the hands of one community. Controlling water from the uphill source has also controlled the agricultural activity downhill in the village. The water reaching the village was not meeting the demands of the crops thus leading to low yield and low profit. After seasons of losses, farmers started quitting agriculture and selling their fertile land. Thus, the number of the agrarians decreased. Water shortage has pushed the agrarians to change their livelihoods. In the late 1950s, cannabis cultivation started to spread in the village, and those who were still growing traditional crops and suffering from the low yield adopted cannabis as an alternative to wheat, barley, lentils etc. They reported that cannabis

required less water but provided them with almost double the monetary profit. This transition to cash crops (cannabis) that happened in Nabha has happened in other villages in the Bekaa. During the civil war 1975-1990, the Bekaa, as a whole, was well known for drug trade - both cannabis and opium – as it was producing around $500 million in a year (Mroue 2018). However, after the civil war the government raided and crashed down the plantations. Parallel to this, water was getting scarcer in Nabha because of the extensive water shortage from the source and the decrease in the rainfall that the village was receiving. This has led the farmers in Nabha to cease relying on agriculture as a main source of livelihood and shift towards non-agrarian livelihoods. However, the Syrian war in 2011 has shifted the governmental attention towards other security measures (Rose 2018) and this has allowed the farmers, in different villages in the Bekaa where water is available (unlike Nabha), to continue cannabis cultivation and boost their yield (Mroue 2018). A similar case to that of Nabha is the Christian village of Deir el Ahmar in the Bekaa. The Yammouneh village and Deir el Ahmar are geographically close. Yammouneh is located at higher altitude than Deir el Ahmar. Farmers of Deir el Ahmar report that Yammouneh residents control the water flow to the village and the amount of water they receive allows them to plant nothing but cannabis which has a lower water requirement than other crops (Rose 2018). While villages like Yammouneh and Deir el Ahmar are still planting cannabis, Nabha is not. This is because of the water shortage the village is facing are hasher than those of Deir el Ahmar and do not even allow cannabis cultivation.

The transition to cannabis as a cash crop that happened in Nabha in the late 1950s is happening now in Ontario (Canada) after the legislation of cannabis. The farmers in Ontario are switching from planting vegetables to planting cannabis or adopting an enterprise diversification strategy; adding cannabis to their crops (Buckner 2018). They also described cannabis as a gold

rush that can increase their profit by 30-40%. Nabha residents reported that they are willing to buy water and put themselves in debt to irrigate cannabis, only if it is legalized; they cannot afford doing this while the government is still launching crackdowns on the fields.

Drivers of abandonment of agriculture can vary from one location to another in Lebanon. In Batloun, for instance, the decline of farming has been reported to be due to 1) the loss of Syria as an export market of the Lebanese products causing a decline in the farmers' profit 2) the aging population whereby the elderly are retiring and the new generation is interested in non-agrarian livelihoods (Weber 2018).

Some of Nabha's residents were forced to leave the village to other cities and countries because agriculture was no longer helping in generating a sufficient income to make a living as a result of water shortage. This migration corresponds to what Chalak (unpublished) described as a manifestation of agrarian transition. Migration was also witnessed in Batloun especially by the young generation who seek livelihoods that provide them with higher profit (Weber 2018).

The number of the interviewees with diversified livelihoods has also decreased in Nabha between 1960 and 2018, from 25 to 12. So while some people where shifting from a full-agrarian livelihood towards a diversified livelihood, allowing them to depend on two income-generating jobs in order to have better financial capacity to afford a living[11], others where shifting from diversified livelihoods towards a non-agrarian livelihood, thereby, exiting agriculture completely and forming the bulk of our sample (81%). The World Bank's (Barghouti et al. 2004) definition of livelihood diversification best describes this situation when stating that a change in a livelihood depends on the flexibility of the changing environment and opportunities. The water

[11]This situation has been described by Ellis (2000) who stated that livelihood diversification can be a way to mitigate poor livelihood conditions (low income and poverty).

shortage and the climate change (the decrease in the rainfall) pushed the agrarians to either completely shift away from planting crops into a non-agrarian livelihood like opening a small shop or a mini market, becoming public drivers, joining the army or a political party, or to adopt these jobs alongside agriculture. This description matches Lanjouw and Feder's report (2001) where they mentioned that livelihood diversification strategies are means to alleviate the harm caused by extreme natural factors like the weather and climate change. The average agrarian income of those with diversified livelihood in Nabha is 34% of total household income. This is similar to the case of Tigray Region of Northern Ethiopia (Woldehanna 2000) where the non-agrarian livelihood contributes more to the total household's income.

The number of those with non-agrarian livelihoods in the sample studied increased between 1960 and 2018 from 38 to 81. Those interviewed reported that because of the low agricultural yield and profit, they started working off-farm. This transition was witnessed in Batloun where the number of non-agrarians increased from 31 to 41 in the studied sample (Weber 2018). This trend is seen elsewhere in the world. For example, in the East Gojjam s located in Amhara National Regional State of Ethiopia, 71.52%, of the 151 farm households that were surveyed participated in off farm activities.

The percentage of the current (2018) local non-agrarians in Nabha is 81%. Out of the 100 interviews carried out in Nabha, only one resident, who receives remittances, could afford to divert a water canal to irrigate his home garden; the yield is only for home consumption. Without the remittances, he would not be able to diversify his home garden crops. This reliance on remittances for supporting agriculture has been reported elsewhere. An example is the case of farmers in Todgha, Morocco where the percentage of the local non-agrarians is 86.2% because the agricultural inputs were expensive and only afforded by better residents; mainly those who

were receiving remittances. Nabha residents also reported that currently they cannot afford buying agricultural inputs, mainly water, to irrigate; some mentioned that they cannot even afford to irrigate vegetables in their home gardens and this is why they only have some fruit trees that do not require lots of irrigation; fruit trees like figs for home consumption only.

All of the full-agrarians in Nabha rely on livestock for income and 83% of those with diversified livelihood rely on the livestock for their agricultural income. The pastoralists interviewed argued that in Nabha, livestock is economically more sustainable than crops, as there is plenty of land in the nearby mountains were the animals can graze. They also reported that they consider their animals as an income source and a mobile asset that they can sell when they are in need. These findings are similar to those reported in the FSLA report (REACH & FAO 2015) that was also conducted in Bekaa, where 58% of the farmers rely on their livestock for urgent money needs and 28% consider pastoralism their main income source. So the availability of land and the monetary value of the animal contributed to the survival of pastoralism as a livelihood; although water is scarce.

In summary, it appears that the agrarian transition was well underway in the 1960s as most people has already adopted a diversified livelihood or had existed agriculture. Yet there was still a significant number of farmers. By 2018 those who are practicing farming, be it as a full time or part time, constitute a minority of our sample. Among these still practicing agriculture, pastoralism for small ruminant production is the dominant agricultural activity.

B. Frequency of home gardens in Nabha

The regularity of home gardens among the participants was found to be high. 81 participants representing 81% of the sample have home gardens. The participants were

passionate when they started talking about their home gardens. One resident reported that “the home without a home garden values nothing...” another stated that “this piece of land is for me and my wife to eat healthy food, and for my grandchildren to pick the fruits and eat from it when they come visit.” They often stated that consuming fruits directly from the tree tastes better than just buying it from the market. The participants reported planting only few varieties of fruit trees: figs, pomegranate, and grapes and not only they consume the fruits during the season but also they make mouneh like figs jam or dried figs, molasses, vine leaves etc. that they can consume until the next season. However, almost all of the 81 home gardeners reported that the yield of these trees has been decreasing. One participant mentioned that: “my garden used to produce enough fruits to prepare mouneh for two families, my family and my daughter’s family, but now we can barely supply one family because of the lack of water.” Vegetables, unlike fruits, are not very common in home gardens. And the reason for this, and for the lower yield of fruits, is the lack of water availability in the village. All of the 81% who have a home garden now reported a failed trial of planting vegetables. Participants reported that if they choose to plant vegetables, they will have to buy water in order to irrigate. However, not all of them can afford it, one of the participants continued saying, “I can barely afford drinking water to my family; you want me to afford buying water to irrigate?” The participants were also nostalgic and mentioned that they still take care of their home gardens to preserve the green history of the village.

There was one exception among the 100 individuals interviewed. This participant has a separate water canal that he diverted towards his home garden from the water source uphill (of course he pays for this on monthly basis), and this allows him to plant a wide variety of fruits and vegetables. And the yield supplies him with 50% home consumption during the seasons of harvest.

The frequency of consumption of fruits in the week prior to the data collection has been recorded using the FCS (FCS results are mentioned in the coming sections) and the results show that 75 participants consumed fruits on daily basis and they are all among the 81 participants with a home garden. The remaining 6 participants reported consuming fruits at least once per week.

To study the association between home gardens and the frequency of consumption of fruits per week, a Chi-square test is done and the results are stated in table 6.

Table 6. Chi2 test of home gardens and the frequency of fruits consumption (days/week)

Home garden	**Frequency of consumption per week**		**Total**
	<7 days per week	7 days per week	
No	5	14	19
Yes	6	75	81
Total	11	89	100

Pearson chi2 = 5.6204 Pr= 0.018

The results in table 6 show that those who have a home garden tend to consume more fruits frequently, on daily basis, than those who do not have a home garden at P-value of 0.05.

Another Chi-square test shows that there is no significant association between the current livelihoods and the presence of a home garden at alpha 0.05. This means that there is no association between the household's livelihood, whether a full-agrarian, diversified, or a non-agrarian livelihood, and home gardens.

The entire sample reported the willingness to own and maintain their home gardens if they have the proper resources, mainly water. 10 participants out of the 19 who do not have a home garden now, had a home garden before. However, the lack of water and decrease in rainfall have led them to stop gardening.

All of those who have home garden now reported that they consider it a way to reduce the expenditure on food during the fruitful seasons and to make mouneh (jams, dried figs, etc.). They also want to keep at least a home garden, a small planted piece of land next to their home, to preserve the agricultural history of the village. Elderly people take it as a hobby and a source of good quality of food.

C. Food and Nutrition Security

The Food Consumption Score (FCS) and the Food Insecurity Experience Scale (FIES) are indicators of food and nutrition security. This quantitative data collected reflects the period of the past week for FCS and the past 12 months for the FIES. Information about household size and the household total expenditure are also collected and their association with food and nutrition security is also statistically studied.

1. Food Insecurity Experience Scale

As mentioned in the methodology, the low score reflects a better food security status than a higher score. The data collected is as follows:

Table 7. Response rates to Food Insecurity Experience Scale with the Global and Lebanese Scales per livelihood source.

FIES raw score	Full agrarians	Rate %	Diversified	Rate %	Non agrarian	Rate %	Total	Global scale	Lebanese scale
0	2	29%	6	50%	29	36%	37	I	I
1	0	-	0	-	4	5%	4	I	I
2	0	-	1	9%	3	4%	4	I	I
3	1	13%	0	-	8	10%	9	I	II
4	2	29%	0	-	4	5%	6	II	II

5	0	-	3	25%	11	13.5%	14	II	II
6	0	-	0	-	6	7%	6	II	II
7	0	-	0	-	5	6%	5	III	II
8	2	29%	2	16%	11	13.5%	15	III	II
Total	7	100%	12	100%	81	100%	100		

Table 7 shows that 37% of the population had zero affirmative answers indicating a high level of food and nutrition security; the lower the score the better the food security. However, in the past 12 months and because of the lack of money or resources:

- 4% were worried about that they would not have enough food to eat.
- 4% thought there was a time they were unable to eat healthy and nutritious food.
- 9% thought there was a time when they ate only a few kinds of foods.
- 6% thought there was a time when they had to skip a meal.
- 14% [12]thought there was a time they ate less than they should eat.
- 6% thought there a time when their household ran out of food.
- 5% thought there was a time when they were hungry but did not eat.
- 15% answered affirmatively on all eight questions stating that there was a time when they went without eating for a whole day.

a. <u>FIES and livelihoods</u>

[12]These 14 individuals also commented that "with the availability of mouneh in the household, we can never reach a stage to go a whole day without food. Mouneh is very common in the village and we tend to rely on it when we are in financially incapable to buy food or when snow blocks our roads not allowing us to reach the mini market."

The association between the current livelihoods and food security is studied. Three tests are done studying the association between livelihood and each of the Lebanese scale, the global scale and the FIES raw score. And the results are as follows:

Table 8. Pearson Chi2 test of Lebanese FIES scale and 2018 livelihoods.

FIES Lebanese scale	Non-agrarian (%)	Diversified (%)	Full agrarian (%)	Total (%)
I	36 (44%)	7 (58%)	2 (29%)	45 (45%)
II	45 (56%)	5 (42%)	5 (71%)	55 (55%)
Total	81 (100%)	12 (100%)	7 (100%)	100

Pearson chi2 = 1.6354 Pr = 0.441

Table 8 shows that, based on the Lebanese categorization, 45% of the sample studied is considered food secure (category I) and the remaining 55% is considered food insecure (group II). The table also shows that 44% of the non-agrarians are food secure, 58% of those with diversified livelihoods are food secure, and 29% of those who rely exclusively on agriculture for their income are food secure.

Table 9. Pearson Chi2 test of Global FIES scale and 2018 livelihoods

FIES Global scale	Non agrarian (%)	Diversified (%)	Full agrarian (%)	Total (%)
I	44 (54%)	7 (58%)	3 (43%)	54 (54%)
II	21 (26%)	3 (25%)	2 (28.5%)	26 (26%)
III	16 (20%)	2 (17%)	2 (28.5%)	20 (20%)
Total	81	12	7	100

Pearson chi2 = 0.5531 Pr = 0.968

Table 9 shows that, as per the Global scale, 54% of the non-agrarians are food secure, 58% of those with diversified livelihoods are food secure, and 43% of those who are exclusively in agriculture are food secure. The table also shows that54% of the sample is considered food

secure (group I), 26% is considered moderately food insecure (group II), and the remaining 20% is considered severely food insecure (group III).

In both scales, when studying each livelihood, the highest percentage of food security is found among those with diversified livelihoods, followed by those who completely shifted from agriculture, and the least percentage is among those who have full agrarian income. However the Chi-square tests show that there is no significant association between the livelihood source and food security (both scales tested) of Nabha residents with a P-value greater than alpha of 0.05. Comparing both scales, the global scale overestimates the food security level of the participants.

To study the association between the livelihood sources and the raw FIES scores, a t-test is done. The result shows that there is no significant association at a 95% confidence interval. This means there is no significant association between the current livelihoods and household's food security.

b. FIES and food expenditures

The percentage of total expenditure on food per household per month is calculated from the expenditure module administered upon data collection. Table 10 shows a oneway ANOVA test that is performed to study the association between food expenditure and FIES raw score. The results show that there is no significant association between food expenditure and FIES raw score at a 95% confidence interval. This means that the total food expenditure of the total household has no impact on food security.

Table 10. Onaway ANOVA test of total food expenditure and FIES raw score.

Analysis of Variance					
Source	SS	df	MS	F	Probe > F
Between groups	121.863932	17	7.16846637	0.74	0.7552
Within groups	796.376068	82	9.71190327		
Total	918.24	99	9.27515152		

Also, 2 separate t-tests show no significant association between the monthly total household's food expenditure and each of the global and the Lebanese categorization at alpha of 0.05.

The food expenditure per capita is then calculated by dividing the total household's food expenditure (in dollars) on the household size.

To study the impact of the food expenditure per capita on the raw FIES score, a regression test is done. The results in table 11 show a significant impact of food expenditure per capita on the raw FIES score at 95% confidence interval with a P-value of 0.0429 and a negative coefficient. This means that a decrease in food expenditure per capita can significantly increase the FIES raw score.

Table 11. Regression test between food expenditure per capita and raw FIES score.

Source	**SS**	**Df**	**MS**	**Number of obs = 100** **F(1,98) = 4.21** **Prob > 7 = 0.0429** **R-squared = 0.0412** **Adj R-squared = 0.0314** **Root MSE = 2.9973**
Model	37.7980068	1	37.7890068	
Residual	880.441993	98	8.98410197	
total	918.24	99	9.27515152	

FIES	**Coef.**	**Std. Err.**	**t**	**P > | t |**	**[95% CI]**
Food exp/capita	-0.009457	0.0046106	-2.05	0.043	- 0.186 -0.0003
_cons	4.397628	0.6390.54	6.88	0.000	3.129 5.6657

Also, a t-test shows that food expenditure per capita has no significant association with food security in the Lebanese scale with a 95% confidence interval. However, another t-test shows that those who are food insecure tend to spend significantly less on food per capita as per the global scale at alpha 0.05. This means that a significant less expenditure on food per capita starts with those answering affirmatively on the first 4 questions and not the first 3 questions;

question number 4 is concerned with skipping meals reflecting the less expenditure on food per capita.

c. FIES among different religious affiliations

In order to know if there is a difference in the FIES between the different religious affiliations of the sample, a Chi-square test is performed. The results show that there is no significant association between religious affiliation and FIES (both global and Lebanese categorization) at alpha 0.05.This means that religious affiliation has no impact on food security.

d. FIES and Household size

One way ANOVA test shows that there is no significant association between household size and FIES scores (on both Lebanese and Global scales) at alpha 0.05. This means that the food security is not impacted by the number of people living in the same household.

e. FIES and home gardens

A Chi-square test shows that there is no significant association between home gardens and the FIES scores (both Lebanon and global scales) at 95% CI. This means that the home gardens do not affect the food security of the households.

2. Food Consumption Score

The Food Consumption Score is a qualitative tool that measures the level of food and nutrition security. The subjects are asked to report the frequency of consumption of 9 food groups where each group has its own nutritional weight. The frequency is then multiplied by the nutritional weight and the scores of all the groups are added up to get the final score; the higher the score, the better the food and nutrition security of the participant.

In this sample, as represented in table 12, the minimum score is 45 and the highest score is 112 with an average of 82.70. The whole sample has an acceptable food consumption score even when using the adjusted cutoffs (VASyR, 2017).

Table 12. Summary of total food consumption scores

Variable	Obs	Mean	Std. Dev.	Min	max
Total FCS	100	85.1	13.74773	45	112

Table 13 below shows that 90% of the sample consumed 9 food groups and the remaining 10% consumed 8 groups. The one food group that is not consumed by the 10% of the sample is the legumes group, where the participants reported that they used to consume it more before because they used to produce it.

Table 13. Frequency of consumption of food groups

Number of food groups consumed	Frequency	Percentage %	Total
8	10	10	10
9	90	90	90
Total	100	100	100

Table 14 shows that 71% of the entire sample, consume 9 food groups and have a non-agrarian livelihood (88% of the non-agrarians), and all of those with a full agrarian livelihood consume the 9 groups. However, after running Fisher's exact test at a 95% confidence interval, the results show that there is no significant association between livelihood sources and the number of food groups consumed with a P-value of 0.54.

Table 14. Number of food groups consumed by livelihood

Number of food groups consumed	Livelihood			Total
	Non-agrarian	Diversified	full Agrarian	
8	10	-	-	10
9	71	12	7	90
Total	81	12	7	100

a. Food Consumption Score and Livelihood

A t-test is done to study the impact of the livelihood source on the total Food Consumption Score. The means show that the participants who have a full agrarian livelihood are more likely to have a higher FCS score. However, this result is insignificant with a P-value greater than alpha of 0.05.This means that the livelihood does not significantly affect the food consumption.

b. Food Consumption Score and Food Expenditure

Food consumption is also studied against the food expenditure per household and per capita.

Upon a regression test, represented in table 15, between the food consumption score and the total household's expenditure on food, the results show that, at a 95% confidence interval, a higher total food expenditure is negatively associated with a lower FCS. This result is significant with a P-value of zero. This means that as the household's total expenditure on food increases, the FCS significantly decreases.

Table 15. Regression test between total FCS and total expenditure on food.

Source	SS	Df	MS	Number of obs = 100 F(1,98) = 22.65 Prob > 7 = 0.0000 R-squared = 0.1877 Adj R-squared = 0.1794 Root MSE = 11.654
Model	3075.95236	1	3075.95236	
Residual	13309.0476	98	135.806609	
total	16385	99	165.505051	

Total FCS	Coef.	Std. Err.	t	P > | t |	[95% Conf. Interval]	
Total food exp.	-0.2658432	0.0558804	-4.76	0.000	- 0.3768361	-1.5505
_cons	97.66197	3.352871	29.13	0.000	91.0083	104.3156

A regression test, presented in table 16, also shows a significant negative association between the household size and the total food consumption score with a P-value 0.046 < 0.05. This means that as household size increase, the FCS significantly decreases.

Table 16. Regression test between household size and the total FCS.

Source	SS	Df	MS	Number of obs = 100 F(1,98) = 4.08 Prob > 7 = 0.0461 R-squared = 0.0400 Adj R-squared = 0.0302 Root MSE = 12.669
Model	655.105522	1	655.105522	
Residual	15729.8945	98	160.509127	
Total	16385	99	165.505051	

Total FCS	Coef.	Std. Err.	t	P > | t |	[95% Conf. Interval]	
Total food exp.	-1.276262	0.631734	-2.02	0.046	- 2.529918	-0.022607
_cons	88.55804	3.16435	27.99	0.000	82.27849	94.8376

A third regression test, in table 17, shows that there is a positive significant association between the household size and the total household's expenditure spent on food with a P-value 0.0001<0.05. This means that as household size increases, the household's total expenditure on food significantly increases.

Table 17. Regression between the Household Size and Total Expenditure on Food.

Source	SS	Df	MS	Number of obs = 100 F(1,98) = 17.49 Prob > 7 = 0.0001 R-squared = 0.1515 Adj R-squared = 0.1428 Root MSE = 19.405
Model	6587.12816	1	6587.12816	
Residual	36904.1118	98	376.57257	
Total	43491.24	99	439.305455	

Total FCS	Coef.	Std. Err.	T	P > | t |	[95% Conf. Interval]	
Total food exp.	4.046993	0.9676286	4.18	0.000	2.126765	5.96722
_cons	37.6843	4.846844	4.78	0.000	28.0659	47.30271

The individual's share of food expenditure is calculated and 3 regression tests are done as presented in tables 18, 19 and 20.

The results in table 18 show that the household size and the food expenditure per capita are significantly negatively associated at alpha of 0.05. This means that as the household size increases, the individual's share of food expenditure decreases significantly.

Table 18. Regression test between the food expenditure per capita and household size.

Source	SS	Df	MS	Number of obs = 100 F(1,98) = 11.37 Prob > 7 = 0.0011 R-squared = 0.1039 Adj R-squared = 0.0948 Root MSE = 62.164
Model	43926.5178	1	43926.5178	
Residual	378707.672	98	3864.364	
total	422634	99	4269.03222	

Food ex/capita	Coef.	Std. Err.	t	P > | t |	[95% Conf. Interval]	
HH size	-10.45076	3.099727	-3.37	0.001	-16.60206	-4.299451
_cons	170.379	15.52651	10.97	0.000	139.5671	201.1908

Table 19shows that as the household size increases, the total FCS decreases significantly at 95% CI.

Table 19. Regression test between total FCS and household size.

Source	SS	Df	MS	Number of obs = 100 F(1,98) = 4.08 Prob > 7 = 0.0461 R-squared = 0.0400 Adj R-squared = 0.0302 Root MSE = 12.669
Model	655.105522	1	655.105522	
Residual	15729	98	160.509127	
total	16385	99	165.50501	

Total FCS	Coef.	Std. Err.	t	P > | t |	[95% Conf. Interval]
HH size	-1.276262	0.631734	-2.02	0.046	- 2.529918 -0.022607
_cons	88.55804	3.16435	27.99	0.000	82.27849 94.8376

The third and final regression test in table 20 shows that the food expenditure per capita and the total FCS are positively associated with significance at 95% CI. As the expenditure of food per capita increases or decreases, the total FCS increases or decreases respectively.

Table 20. Regression test between FCS and food expenditure per capita.

Source	SS	Df	MS	Number of obs = 100 F(1,98) = 6.05 Prob > 7 = 0.0157 R-squared = 0.0581 Adj R-squared = 0.0485 Root MSE = 12.549
Model	952.160629	1	952.160629	
Residual	15432.8394	98	157.477953	
Total	16385	99	165.50501	

Total FCS	Coef.	Std. Err.	t	P > | t |	[95% Conf. Interval]
Food ex/capita	0.47469	0.0193031	2.46	0.016	0.0091585 0.0857713
_cons	76.88982	2.675454	28.74	0.000	71.58047 82.19917

These tests indicate that the increase in household size increases the household's total expenditure on food however the individual's share of this expenditure decreases. And when the food expenditure per capita decreases, the total FCS thus decreases.

c. FCS among different religious affiliations

To study the association between the different religious affiliations among the sample and the total FCS, a Chi-square test is performed. The result shows that there is no significant association between the religious affiliations on the FCS at 95% CI. This means that religious affiliation does not impact food consumption or nutrition security.

d. FCS and home gardens

A Chi-square test shows that there is no significant association between the home gardens and the FCS at 95% CI. This means that the home gardens do not affect the food consumption of households.

3. Paired Food Consumption Score and Food Insecurity Experience Scale

Both indicators of food security and food and nutrition security were tested against each other. A scatterplot is done first and it shows that those who have higher FIES score tend to have lower FCS. A regression test was carried out to check the significance of this correlation.

Figure 4. Scatter plot FIES and FCS

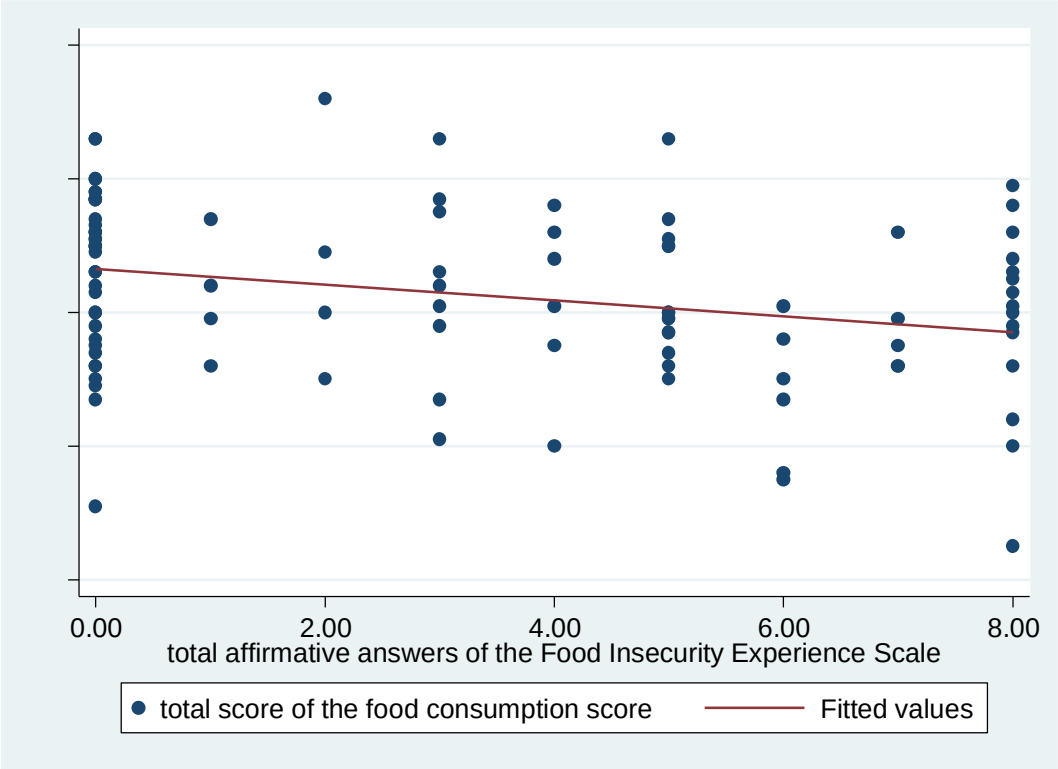


Table 21. Regression test between the total scores of FIES and FCS.

Source	SS	Df	MS	Number of obs = 100 F(1,98) = 8.37 Prob > 7 = 0.047 R-squared = 0.0047 Adj R-squared = 0.0692 Root MSE = 12.411
Model	1288.67054	1	1288.6754	
Residual	150.96.3295	98	154.044178	
Total	16385	99	165.50501	

Total FCS	Coef.	Std. Err.	t	P > | t |	[95% Conf. Interval]
FIES	-1.184658	0.4095855	-2.89	0.005	-1.997467 -0.3718486
_cons	86.53829	1.817009	47.63	0.000	82.9325 90.14409

The results presented in table 21 above show that there is a significant negative association at 95% confidence interval between both indicators with a P-value of 0.04. Thus those who have higher affirmative answers in the FIES tend to have a significant low score in the FCS. Or in other words, those who are food insecure have a lower FCS.

4. Discussion

Scores of the Food Insecurity Experience Scale (FIES) and the (Food Consumption Score) FCS were not impacted by the current adopted livelihood. 20% of the studied sample in Nabha are considered severely food insecure and 26% are considered moderately food insecure based on the global categorization of the raw (FIES) scores. Whereas based on the Lebanese categorization, 55% of the sample is considered food insecure. In both scales, around 50% of the sample suffers from food insecurity.

18% of the sample answered affirmatively on the eight questions indicating that there has been a time in the last 12 months where they went whole day without any meal because of the lack of money and resources. The second most answered question, with a 14% of affirmative answers, is number five. These 14% reported that there has been time where they ate less but never ran away of food or slept hungry because of the availability of the mouneh they prepare. Mouneh can be diversified where some food are made of dairy products like labneh, keshek, shanklish or fruits like jam, or vegetables and nuts like makdous, or fat like olive oil. The availability of such food in Nabha's households allowed the entire interviewed sample to have acceptable food consumption score (FCS); the minimum score recorded was 45.

Hwalla and Bahn (2015) in their report that tackled the study that assessed food security among the Lebanese hosts in the South - however using a different indicator: the Arab Family Food Security Scale (AFFSS) –they mentioned that the original study reported that 32% of the studied sample was moderately food insecure, and 10% was severely food insecure. The authors in the same article reported that AUB researchers have modified, validated, and tested the Household Food Insecurity Access Scale (HFIAS) in the Bekaa valley. The result showed that 48.3% of the sample were food secure, 17.7% were mildly food insecure, 12.9% were

moderately food insecure, and 21.1% were severely food insecure. The results of food security assessment in Nabha (based on the global) are closer to those of the HFIAS. This can be due to the similarity in the questions asked in the HFIAS and the FIES. Both start with the samples' perception of food security, and move to studying the change in the quality and quantity of food consumed. However it is hard to compare[13] the food insecurity of the residents in the South to that of Nabha's residents because the indictors reflect two different periods and different categorization of the levels of food insecurity.

Lebanon also fits in the global trend of food insecurity. An example of the prevalence of food insecurity globally is the study carried out in 19 Arab countries that used the FIES as an indicator to measure food security and it showed that 14% of the 32,146 adults interviewed were severely food insecure (Sheikomar et al 2017). Another study is that of Wambogo et al (2018) where they found that, using FIES, 36% of the studied sample across five Sub-Saharan African sub regions was food insecure. Both findings found that the severe food insecurity is mostly prevalent in the rural areas.

The acceptable food consumption scores of the interviewees reflect the diversity of their diet and follow the trend in the Bekaa and Lebanon where 97.7% and 88.9 % of the residents, respectively, have acceptable FCS (FAO & REACH 2015). Acceptable food consumption scores were also recorded, among 96% of the sample studied in the rural village of Batloun (Weber 2018). The food environment in the rural areas can promote diversity in the diet. As it was noticed in multiple rural areas in Lebanon like Kfour, Ramlieh, and Abadiyeh that home gardens are cultivated in crops used for home consumption and mouneh(Al Ahad&Helwani 2017; Gebrael& Salmon 2013; Hassan et al.). It was significantly evident in Nabha that those with

[13] FIES reflects 12 months period while the HFIAS reflects only 4 months. The FIES has two categorization of food insecurity – based on the global scale – moderate and severe food insecurity, whereas the HFIAS has three categorizations: mild, moderate, and severe.

home gardens (90% of the sample)[14] tend to consume fruits on daily basis while those without a home garden had less frequent fruit consumption. Not only fruits, but also milk and dairy products highly contributed to the total FCS. Interviewees reported that they highly consume dairy products because they are the most available in the village[15] and households[16].

Ten percent of the studied population in Nabha consumed eight food groups[17] with different frequencies during the 7 days prior to survey administration. The food group that was not consumed is legumes. These 10 interviewees were all full-agrarians in the 1960s. The reported that they used to consume legumes more frequently when they used to cultivate legumes. However, this was no longer the case when they quit agriculture. The study of significance of the change in the frequency of consumption of legumes cannot be performed because the 1960s' consumption data is not available. However, from the stories narrated by the interviewees, we can argue that availability of food (in terms of production) – mainly healthy food - is key for consumption of a healthy diverse diet. On the contrary, the availability of the Western diet, which is high in sugar and fat, in the urban areas led to the decrease in the diet diversity (Friel &Lichacz 2009; Batal et al. 2007; Naja et al. 2015). Nutritious diet was more economically sustainable in rural areas during the international price shocks (Zaki et al 2014). Food production helped maintain food diversity and acceptable food consumption in Nabha.

In Nabha it was found that the household size significantly affects the expenditure on food that in turn affects the FCS. The interviewees who belonged to households with big

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[14]The frequency of home gardens can be used to measure the metabolic rift. Although there was a significant agrarian transition in the village, this did not stop the residents from having their home gardens. The remaining 10% mentioned that they had a home garden at a certain time before.

[15] Pastoralism, through small ruminant production, and permits the constant availability of milk and dairy for consumption in the village.

[16] The availability of mouneh like kishek, shanklish, labneh allows the constant availability of dairy products for household consumption.

[17] Eight food groups out of the nine food groups in the FCS.

household size had higher expenditure on food and lower FCS. This was explained by the decrease in the expenditure on food per capita that in turn significantly negatively affects the raw FIES score. Thus, the availability of food for consumption in the household is affected by the household size as "it [food] is not a particularly private (non-shared) good" (Jacobson et al. 2010). The average expenditure on food in the studied sample is 56% of the total income. This places Nabha in the low-income level according to the World Bank's cutoff points (2010), though Lebanon fits in the high income countries. Batloun did not fit the model of Lebanon as well (Weber 2018).

In summary, livelihood diversification did not affect the food security nor food consumption and food diversity of Nabha residents. 26% of the sample was moderately food insecure and 20% of the sample was severely food insecure. However, the entire sample had acceptable food consumption score. This is explained by the availability of mouneh in the households all year long. However, those with higher FIES had lower FCS[18]. Household size affected the FCS by decreasing the share of food expenditure per capita in the household.

[18] These scores were significantly evident among those who belong to households with bid household size. Food expenditure per capita decreased by the increase in household size.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

A. Conclusions

Results from this study show that agrarian transition is evident in the village of Nabha where food insecurity was also detected. However, the food security of the residents was not found to be affected by the livelihood adopted in 2018.

Agrarian transition, manifested by the changes in livelihoods away from agriculture during the period 1960 – 2018, was prevalent in the village of Nabha. Interviewees with non-agrarian livelihoods constituted the majority of the sample, but their number increased from 38% in the 1960's to 81% in 2018. Both the full-agrarian and diversified households of 1960 shifted to a non-agrarian livelihood with the exception of two interviewees who reported adopting a full-agrarian livelihood after their return from the city to the village. Pastoralism was reported to be the most practiced agrarian livelihood among the full agrarians and the diversified for its higher resilience to the water shortages the village has been chronically experiencing since the 1950s. However, even with the extent of agrarian transition, home gardens were still prevalent.

Food insecurity measured on the FIES was detected on both Lebanese and global categorization scales[19]. Moderate and severe food insecurity in the village of Nabha represented 26% and 20% of the sample respectively; based on the global scale. Also, when studying each livelihood category separately, both global and Lebanese categorizations showed that the highest food insecurity was among the full agrarians, followed by the non-agrarians and least among the diversified group. However, the association between livelihoods and food security of households

[19]The global categorization overestimated the percentage of food security compared to the Lebanese categorization.

was statistically insignificant. The FCS showed that the entire sample studied had acceptable food consumption. The diet diversity that this score reflects is provided by the availability of the protein dense mouneh and the fruits from the home gardens. Livelihoods adopted were not found to have a significant association with FCS.

Food expenditure per capita was found to have significant association with FCS and the raw FIES score. This study found that those with a higher raw FIES score had lower FCS, higher expenditure on food and lower expenditure on food per capita because they belonged to households with bigger household size. Thus household size controls the expenditure share of family members and negatively affects their food consumption and food security.

Home gardens contributed to the diet diversification of the residents in the studied sample. The consumption of fruits on daily basis was significant among those with home gardens. However, the legumes group was not reported to be consumed as frequent as the other groups because it is no longer cultivated in the village[20]. This supports the hypothesis that the availability of food[21] – subsistence farming – seems to play a role in the frequency and diversity of consumption.

B. Recommendations

This study aimed to capture and document the changes in livelihoods and the food security status in one of the remote, rural areas in the Baalbek-Hermel region of Lebanon, where agriculture is reported to be the main livelihood source. But unfortunately, this is no longer the case in Nabha, essentially due to the severe water shortages experiences by the village, due to serious and sometimes violent competition over water resources with upstream communities. This has caused the shrinkage of crop production and the impoverishment of the community, exposing an

[20]Based on the reports of the interviewees
[21]Dairy products and fruits from home gardens are being used all year long at the household's level.

interesting interaction between livelihood, resources availability and food security. Similar studies are encouraged to be carried out in other rural areas all over Lebanon because they help clarifying the fine-grained image of the causal factors of the agrarian transition and its implications. Our results can inform policy shifts towards the local production of food even at home garden scale, because this has been shown to contribute to food and nutrition security. This can be supported by ensuring the availability of natural resources, mainly water[22]. Greywater systems[23] can be implemented to use in areas like Nabha to sustain water supply and safeguard the agricultural production.

Since pastoralism is the only agrarian livelihood practiced in Nabha, it would be of great benefit to have animal health facilities that supply pastoralists with the needed care for their livestock. This would be essential to food and nutrition security because in Nabha, and it might be the case in other villages, small ruminant production is contributing to the availability of nutrient dense food that is used for instant daily consumption like milk and mouneh production; thus ensuring the consumption of high quality of food all year long.

For future research in other rural areas, where there is a lack of data availability, just like Nabha, a focus group prior to the implementation of the study would be helpful. This can ease the process of developing the questionnaire and choosing the time frame during which to study the agrarian transition.

Also when studying the food and nutrition security in villages that have witnessed high migration rates, like Nabha, it would be beneficial to target a sample of the migrants who live outside the village. Comparing food consumption of the local residents to that of the migrants

[22]Especially in rural areas like Nabha where water is found to be scarce and the reason behind the agrarian transition.
[23] Greywater is water from basins, baths and showers that is piped to a surge tank. The greywater is held briefly in the tank before being discharged to an irrigation or treatment system (Level 2018).

who left the village can help in studying the association between food environment (rural versus urban) and food and nutrition security.

APPENDIX I

QUESTIONNAIRE (ENGLISH)

2018 versus 1960

Name?

For our filing purposes only- name will not be used in any public discussion or publication that results from this research. All of your answers are completely confidential and will remain so, this paper and survey materials will be destroyed at the completion of this research at the end of the August.

1. In the past 12 months, what were your sources of income? Do you have income from agriculture?

Thinking back to the time around the 1960s?
What were your main income sources? Did you have income from agriculture?

2. What type of agriculture do you currently practice?
What is your cropping system? What do you grow/harvest/raise?

And thinking back to the time around the 1960s?
What type of agriculture did you practice?

3.How much of your income do you think comes from agricultural annually? (*considering seasons individually/ looking back at the past 12 months)*
Would you say that none of your income, only a little but *(minimal)*, around half, mostly *(but there are other income sources)*, or all of your income income is from agriculture?

And around the 1960s?
How much of your income do you think came from agricultural annually?

4. What are the most important crops that you grow for your household's consumption?

And around the 1960s?
What were the most important crops that you grew for your household's consumption?

5.What are the most important crops you grow for sale?

And around the 1960s?
What were the most important crops you grew for sale?

6. What percentage of what you eat, seasonally, comes from your land?
Would you say that none of what you eat comes from your land, only a little (*minimal***), around half, mostly (***but there are other sources***), or all of your food comes from agriculture?**
This includes from crops that produce for sale but also eat, crops you grow only for your household to eat from a garden or from fields, foods and herbs you grow in a small garden

And around the 1960s?
What percentage of what you consumed, annually, do you think came from your land?

7. What are your current motivations for farming/ having a garden?
(for income? to save on food expenditures? to help the environment?)

And around the 1960s?
What motivated you to keep a garden?

8) Do you consider agriculture/your garden as a way to reduce your household food expenditures?

And around the 1960s?

APPENDIX II

FOOD CONSUMPTION SCORE FORM (ARABIC AND ENGLISH)

How many days over the last 7 days, did members of your household eat the following food items, prepared and/or consumed at home, and what was their source?	كم يوم في خلال السبعة ايام الماضية تناولت فيه عائلتك الأطعمة التالية
1. How many days over the last 7 days, did members of your household eat: Tubers (potatoes) and Cereals (bread, rice, pasta, wheat, bulgur, other cereals)	١. الدرنيات (البطاطس) والنشويات، : الخبز, المعكرونة, الأرز، الذرة، القمح، البرغل ، الفريكة
2. How many days over the last 7 days, did members of your household eat: Cereals (bread, rice, pasta, wheat, bulgur, other cereals)	٢. النشويات: الخبز, المعكرونة, الأرز، الذرة، القمح، البرغل ، الفريكة
3. How many days over the last 7 days, did members of your household eat: Roots and Tubers (potatoes)	٣. الدرنيات (البطاطس)
4. How many days over the last 7 days, did members of your household eat: Legumes / nuts : beans, cowpeas, peanuts, lentils, nut, soy, pigeon pea, chick peas, Groundnut; Ground Bean; green peas, Cow Pea; and / or other nuts	٤. المكسرات والبقول : الفاصوليا، العدس ، الحمص، الفول السوداني، الفول، البازلاء الخضراء، اللوبيا، وغيرها جوز-لوز-صنوبر /نواة) ، (البازلاء الحلوة)
5. How many days over the last 7 days, did members of your household eat: Milk and other dairy products: fresh milk / sour, yogurt, lebneh, cheese, other dairy products (Exclude margarine / butter or small amounts of milk for tea / coffee)	٥. الحليب ومنتجات الحليب (حليب طازج أو مجفف،اللبن، اللبنة، الجبن، منتجات الحليب الأخرى – بإستثناء السمنة / الزبدة أو كميات صغيرة الحليب لصنع الشاي / القهو
6. How many days over the last 7 days, did members of your household eat: Meat, fish and eggs: goat, beef, chicken, pork, blood, fish, turkey, including canned tuna, escargot, and / or other seafood, eggs (meat and fish	٦. اللحوم والأسماك والبيض: الماعز، البقر والدجاج ولحم الخنزير، والأسماك، وديك الرومي، بما في ذلك التونة المعلبة، قوقعة، و / أو غيرها من المأكولات البحرية والبيض (اللحوم والأسماك المستهلكة بكميات كبيرة وليس باعتبارها مطيبا ت. (إذا صفر انتقل إلى القسم ك)

consumed in large quantities and not as a condiment). (if 0 skip to section k)	
7. How many days over the last 7 days, did members of your household eat: Flesh meat: beef, pork, lamb, goat, rabbit, chicken, duck, turkey other birds	٧. اللحوم الحمراء: لحم البقر، لحم الماعز، لحم الخنزير، الدجاج ،الديك الرومي ،الأغنام ،اللحوم الأخرى.
8. How many days over the last 7 days, did members of your household eat: Organ meat: liver, kidney, heart and / or other organ meats	٨. اللحوم العضوية: الكبد، الكلى، القلب و / أو غيرها من اللحوم العضوية
9. How many days over the last 7 days, did members of your household eat: Fish/shellfish: dried, fresh and smoked fish, including canned tuna, and / or other seafood (fish in large quantities and not as a condiment)	٩. الأسماك: الأسماك المجففة، الطازجة، المدخنة، مأكولات بحرية أخرى (باستثناء صلصة ومسحوق السمك) الأسماك المستهلكة بكميات كبيرة وليس باعتبارها مطيبا ت
10. How many days over the last 7 days, did members of your household eat: Eggs	١٠. بيض
11. How many days over the last 7 days, did members of your household eat: Vegetables and leaves: spinach, onion, tomatoes, carrots, peppers, lettuce, cucumber, radish, cabbage etc. (If 0 skip to section o)	١١. الخضروات والأوراق: السبانخ والبصل والطماطم والجزر والفلفل، والخس، والخيار والفجل والملفوف وغيرها.(إذا صفر انتقل إلى القسم م)
12. How many days over the last 7 days, did members of your household eat: Orange vegetables (vegetables rich in Vitamin A): carrot, red pepper, pumpkin, squash, orange sweet potatoes	١٢. الخضار الغنية في الفيتامين أ (اليقطين ،القرع، الفلفل الأحمر، الجزر، البطاطا الحلوة) الخضار البرتقالية و المتنوعة الالوان
13. How many days over the last 7 days, did members of your household eat: Green leafy vegetables:, spinach, broccoli, amaranth and / or other dark green leaves, cassava leaves, wild leaves, chicory, rockets, mulukhiyi	١٣. الخضار ذات الأوراق الخضراء: السبانخ، البروكلى، قطيفة و / أو غيرها من الأوراق الخضراء الداكنة، وأوراق من الكسافاوالأوراق البرية، الهندباء البرية والروكا والملوخية
14. How many days over the last 7 days, did members of your household eat: Other vegetables: onion, cucumber, radish, tomatoes, eggplants, zucchini etc…	١٤. الخضار الأخرى: البصل والخيار والفجل والطماطم والباذنجان والكوسا الخ ...
15. How many days over the last 7 days, did members of your household eat: Fruits: banana, apple, lemon, mango, papaya, apricot, peach, waterlemon etc. (If 0 skip to	١٥. الفاكهة: الموز، التفاح، الليمون والمانجو والبابايا والمشمش والخوخ والبطيخ وغيرها.()إذا صفر انتقل إلى القسم ف

section r)	
16. How many days over the last 7 days, did members of your household eat: Orange fruits (Fruits rich in Vitamin A): mango, papaya, apricot, peach	١٦. الفاكهة الغنية في الفيتامين أ : المانجو، المشمش، الدراق، البابايا، والفاكهة البرتقالية اللون
17. How many days over the last 7 days, did members of your household eat: Other fruits: Banana, Apple, watermelon, cherry, dates	١٧. الفواكه الأخرى: الموز، ألتفاح، البطيخ، الكرز، والتمر
18. How many days over the last 7 days, did members of your household eat: Oil / fat / butter: olive oil, other vegetable oil, gee, Butter, margarine, other fats / oil	١٨. الدهون / الزيوت (زيت الزيتون ،الزيت النباتي ، زبدة، سمن، الدهون أخرى)
19. How many days over the last 7 days, did members of your household eat: Sugar, or sweet: sugar, honey, jam, cakes, candy, cookies, pastries, cakes and other sweet (sugary drinks)	١٩. لسكر / المنتجات السكرية/ العسل (السكر، قصب السكر، العسل، مربى ،جيلي، حلويات / بونبون/ الشوكولاته، وغير ذلك من منتجات السكر والبسكويت والباتيسري والكعك
20. How many days over the last 7 days, did members of your household eat: Condiments / Spices: tea, coffee / cocoa, salt, garlic, spices, yeast / baking powder, lanwin, tomato / sauce, meat or fish as a condiment, ketchup/hot sauce; u.Maggy cubes, powder; other condiments including small amount of milk / tea coffee	٢٠. بهارات / توابل (شاي، قهوة، نسكافيه / كاكاو، ملح، توابل، خميرة / باكنج بودر، كاتشب/ صلصة حارة، مكعبات ماجي، بهارات أخرى - بما في ذلك كميات صغيرة من الحليب لصنع الشاي / القهوة

APPENDIX III

EXPENDITURE MODULE (ARABIC AND ENGLISH)

Category	الفئة	مثال	
Food and Beverages	**المواد الغذائية والمشروبات**		
Clothing and Footwear	**الألبسة والأحذية**	أقمشة الملابس الملابس أصناف ألبسة أخرى وكماليات للألبسة تنظيف وتصليح واستئجار الألبسة الأحذية تصليح واستئجار الأحذية	
Housing, Water, Electricity, Gas and Other Fuels, and household maintenance	**مسكن وماء وغاز وكهرباء ومحروقات أخرى, وصيانة مستمرة للمنزل**	الإيجارات المدفوعة فعلياً من المستأجر إيجارات فعلية أخرى لوازم أعمال صيانة وتصليح المسكن خدمات تتعلق بصيانة وتصليح المسكن تزويد المياه جمع النفايات المنزلية الصرف الصحي للمياه المبتذلة خدمات مشتركة أخرى متعلقة بالمسكن الكهرباء الغاز وقود سائل ,وقود صلب	
Health	**الصحة**	منتجات صيدلانية منتجات طبية أخرى الأجهزة والمعدات العلاجية خدمات طبية)معاينة طبية(خدمات أطباء الأسنان خدمات طبية أخرى خدمات الاستشفاء	
Transportation	**النقل**	سيارات دراجة نارية دراجة هوائية صيانة وتصليح وسائل النقل النقل البري خدمات النقل الأخرى	
Recreation, Amusement, and Culture	**الإستجمام والتسلية والثقافة**	لعب وألعاب ووسائل تسلية ألعاب الحظ كتب جرائد ومجلات مطبوعات أخرى القرطاسية وأدوات الرسم	

Category	الفئة	مثال	
Education	**التعليم**	رسوم تسجيل وأقساط برامج تعليمية أخرى	
Agriculture	**الزراعة**	تأجي ,عمال ماء ,بذور سماد مبيدات حشرات الات وسيط /نقل الى سوق كهربات مضخات المياه مداخلات أخرى	
Other	**سلع وخدمات متفرقة**	تبغ وتنباك تأمينات سداد الديون الإتصالات /خدمات اتصالات البرق والهاتف	

APPENDIX IV

FOOD INSECURITY EXPERIENCE SCALE FORM (Arabic)

Food and Agriculture Organization of the United Nations

Institutional Review Board
American University of Beirut
01 MAR 2018
RECEIVED

The Food Insecurity Experience Scale (FIES)

Guidance for translation:

intended meanings of the questions and specific terms

English
Spanish
Portuguese
French
Arabic
Russian
Chinese
Albanian

FAO, July 2015

Institutional Review Board
American University of Beirut
15 MAY 2018
APPROVED

Food and Agriculture Organization of the United Nations

Questions that compose questionnaire and explanations of the intended meanings

"Now I would like to ask you some questions about food.. During the last 12 MONTHS, was there a time when:	
Q1. You were worried you would not have enough food to eat because of a lack of money or other resources?	The question refers to a state of being **worried, anxious, apprehensive, afraid or concerned** that there might not be enough food or that food will run out of food (because there is not enough money or other resources to get food The worry or anxiety is due to circumstances affecting their ability to procure food, such as: loss of employment or other source of income, or other reasons for not having enough money; insufficient food production for own consumption; insufficient food available for hunting and gathering; disrupted social relationships; loss of customary benefits or food assistance; environmental or political crises. It is not necessary for the respondent to have actually experienced not having enough food or running out of food to answer yes to this question.
Q2. You were unable to eat healthy and nutritious food because of a lack of money or other resources?	This question asks the respondent whether s/he was not able to get foods they considered **healthy or good for them, foods that make them healthy,** or those that make a **nutritious or balanced diet** (because there was not enough money or other resources to get food.) The answer depends on the respondent's own opinion of what *they* consider to be healthy and nutritious foods. This question refers to the quality of the diet and not the quantity of foods eaten.
Q3. You ate only a few kinds of foods because of a lack of money or other resources?	The question asks if the respondent was forced to eat a limited variety of foods, the same foods, or just a few kinds of foods every day because there was not enough money or other resources to get food. *The implication is that the diversity of foods consumed would likely increase if the household had better access to food.* Alternative phrases: • You ate meals with a limited variety of foods; • You ate the same foods or just a few kinds of foods every day; • You had to eat a **limited variety of foods;** • You had to eat **the same foods** every day; • You had to eat **just a few kinds of foods.** This question refers to quality of the diet and not the quantity of foods eaten. It implies lack of money/resources rather than customary habits or other circumstances (i.e., health or religion) as the reason for limiting the variety of food .
Q4. You had to skip a meal because there was not enough money or other resources to get food?	This question inquires about the experience of having to **miss** or **skip** a major meal (for example, breakfast, lunch or dinner depending on the norm for number and times of meals in the culture) that would normally have been eaten (because there was not enough money or other resources to get food.) This question refers to insufficient quantity of food.
Q5. You ate less than you thought you should because of a lack of money or other resources?	This question inquires about eating less than what the respondent considered they should, **even if they did not skip a meal** (because the household did not have money or other resources to get food). The answer depends on the respondent's own opinion of how much *they* think they should be eating. This question refers to quantity of foods eaten and not the quality of the diet. This question does *not* refer to special diets to lose weight or for health or religious

	reasons.
Q6. Your household ran out of food because of a lack of money or other resources?	Referring to any experiences when there was actually no food in the household because they did not have money, other resources, or any other means to get food .
Q7. You were hungry but did not eat because there was not enough money or other resources for food?	This question asks about the **physical experience of feeling hungry**, and specifically, feeling hungry and not being able to eat enough (because of a lack of money or resources to get enough food). It does not refer to special diets to lose weight or fasting for health or religious reasons.
Q8. You went without eating for a whole day because of a lack of money or other resources?	This question asks about a specific behaviour—not eating anything all day (because of a lack of money and other resources to get food). It does not refer to special diets to lose weight or fasting for health or religious reasons.

PHRASE	INTENDED MEANING AND SUGGESTIONS FOR FINDING THE RIGHT PHRASE
Past 12 months	There are different ways to refer to the 12 month period preceding the interview, including "the past year". Care should be taken to find the best phrase to avoid confusion with other common conceptualizations of a 12-month period, such as an agricultural season or religious calendar year.
Lack of money and other resources	In addition to money to buy food, "other resources" refers to the lack of other usual means for getting food, such as own production, small livestock for sale or own consumption, barter, trade, fishing, hunting or gathering.

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