

AMERICAN UNIVERSITY OF BEIRUT

AGRARIAN TRANSITION AND FOOD SECURITY IN A
LEBANESE VILLAGE

by
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AMERICAN UNIVERSITY OF BEIRUT

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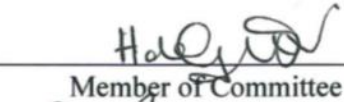
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AN ABSTRACT OF THE THESIS OF

Cara Weber for Master of Science
Major: Food Security

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Background: Lebanon's development trajectory has been severely impacted by political challenges internally and from abroad resulting in an urban-biased government disassociated from the country's rich agricultural history. This disassociation contributes to waves of agrarian transition in response to challenging socio-economic situations in which rural people have few options to avoid poverty and food and nutrition insecurity other than migration and livelihood diversification. Both strategies are common in Lebanon and result in drastic food system changes from 'traditional' localized production to further integration into the global trade regime. As agrarians become more integrated in this market, diets change and often rely on more imported, often processed, food that while rich in calories is often significantly less nutritious than what was produced locally. A "metabolic rift" accompanies the processes of livelihood diversification away from agriculture and diet change as the traditional nutrient cycling between agrarians and their is reduced. Literature on the motivations for smallholders' diversification, diversification pathways, and outcomes is extensive in regards to poverty reduction and market integration. However, the results vary on diversifications' impacts on poverty reduction; its impacts on food security are inconclusive and vary depending on the food security measurement and whether or not nutrition is adequately included as a factor of food security

Objectives: This research examined how rural, non-farm livelihood diversification has impacted the food and nutrition security of smallholder farmers in comparison to those with non-agricultural livelihoods. The study also quantifies the extent of the metabolic rift and livelihood diversification in a rural Lebanese village.

Methods: The original study was conducted over the summer of 2018 in Batloun, the Chouf, Lebanon with participants from a smallholder farming association and local small entrepreneurs. Surveys were conducting using a questionnaire covering participants farming systems, motivation for practicing agriculture, and home gardening practices along with their changes over the time period of 1990 until 2018. The Food Consumption Score, FCS, and the Food Insecurity Experience Scale, FIES, were conducted along with a simple household expenditure module.

Results: Results found that agrarian transition, measured by changes in livelihoods over a thirty year time period, was observed in the village. Participants in the study were largely moving away from both exclusively agricultural livelihoods as well as diversified livelihoods. Moderate food insecurity was experienced on the FIES on both the global and Lebanese specific cate-

gorization schemes. The Lebanon categorization detected a higher rate of food insecurity. According to the FCS, study participants consumed adequate diets — nutritional diversity was supported by consumption from home gardens. FCSs were generally high and well above the cutoff point that indicated food and nutrition secure diets.

Conclusion: Livelihoods did not have a significant impact on the participants' food and nutrition security, although their rural location does have an impact. Despite the livelihood transition away from agriculture, participants and their transitioned livelihoods are still in the same rural location. While the participants' livelihoods are transitioning away from agriculture, they are not completely disassociated from the land as strong agricultural traditions support the maintenance of home gardens. The traditions around home gardens are still strong over the period of agrarian transition examined, this desire to have fresh food produced at the household level has limited the metabolic rift in the village to one of livelihoods but not of diet.

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CHAPTER I

INTRODUCTION

Lebanon’s development trajectory has been severely impacted by political challenges internally and from abroad resulting in an urban-biased government disassociated from the country’s rich agricultural history. This disassociation contributes to waves of agrarian transition¹ in response to challenging socio-economic situations in which rural people have few options to avoid poverty and food and nutrition insecurity other than migration and livelihood diversification (Traboulsi 2007). Globally, both options prompt drastic food system changes from ‘traditional’ localized production to integration into capitalized food markets requiring the exchange of money for nutrients. The exchange reduces the traditional nutrient cycling between rural agrarians with their lands in a process referred to as the “metabolic rift” (McMichael 2013; Moore 2000)². In Lebanon — and other countries producing for the corporate food regime’s

¹ Agrarian transition refers to the broad process under which pre-capitalist, primarily subsistence (feudal or sharecropping) agrarian societies and their livelihoods are altered by deepening financialization of agricultural-based activities. This penetration of capitalism monetizes sustenance and nutrition under the globalization and liberalization of food systems as agrarian smallholders are brought into the global economy (Rignall & Aita 2017). This process forces new livelihood patterns, relationships with capital, re-valuation of land, and alters diets of both consumers and producers. More narrowly, agrarian transition — i.e. the agrarian transition to capitalism — is often explained by looking at how and to what extent agriculture contributes to capital accumulation of the individual and the state. The transition of agrarians to wage-laborers for the production of commodities consumed outside rural areas is the most observable indicator of this transition

² The metabolic rift is a Marxist theory explaining how capitalist agriculture destroys the ecological recycling of nutrients in the natural world by creating a fissure between humans and their environment. As food and agricultural systems change and populations become more dependent on food they do not themselves produce, a one way path is created in which food and goods are transported from the rural to the urban. In urban areas, their wastes are disposed in trashcans and sewer systems, rather than recycled back into the original locations, withholding them from future reuse (Holt-Giménez 2017a).

The metabolic rift is embodied in two primary forms: 1) in the socio-economic metabolism, in which peoples’ livelihoods diverge from their natural environments, and 2) in the socio-ecological metabolism, in which nutrient consumption changes sources from local natural resources to imported foods from foreign natural resources (Zurayk

global trade platform³ — the market primarily provides imported, often processed, food that while rich in calories is often significantly less nutritious than what was produced locally (Ghantas et al. 2013; Michael 2009).

This shift from the consumption of ‘food from somewhere’ and its focus on agroecology to ‘food from nowhere’ and from no-one exemplifies the metabolic rift as agriculture falls subordinate to capitalist production and is disassociated from its biological base (McMichael 2009). To adapt to this separation, smallholders across the world attempt to diversify their livelihoods for adequate, more stable incomes (McMichael 2009). Livelihood diversification has many outcomes depending on a multitude of economic, social, political, and ecological factors of a region and the individual farmer. Literature on the motivations for smallholders’ diversification, diversification pathways, and outcomes is extensive in regards to poverty reduction and market integration. However, results vary on diversifications’ impacts on poverty reduction; its impacts on food security are inconclusive and vary depending on the food security measurement and whether or

2018). In both forms, residual nutrients from foods and goods that are not metabolized remain in urban areas. They are not returned and invested into future soil fertility hence “robbing the soil...ruining the more long-lasting sources of that fertility...undermining the source of all wealth — the soil and the worker” (Marx 1967).

³ McMichael’s (2009) development of Harriet Friedmann’s 1987 food regime genealogy seeks to highlight capitalist expansionism’s role in geopolitics and how this shapes our food systems. By situating food as a pivotal tool of geopolitical power and examining the ways in which its production, consumption, and trade impact power relationships, this concept complicates the seemingly straightforward process of agriculture modernization. Understanding the relations of the food regimes to their historical context allows for an understanding of the geo-political interactions with the environments that produce our food across time and space. A key element of the theory is in understanding the convergence of the above ideas on the role of food and its contributions to the capitalist world economy over a distinct chronology of socio-economic relationships.

The current Third Food Regime or the Corporate Food Regime (McMichael 2009) has distinct markers including the growth of agri-fuels, supermarket influence on food systems, concentration of landholdings, industrialized agriculture, and the increased prioritization of private profits above the public good (Akram-Lodhi & Kay 2010a; Holt-Giménez 2017a; McMichael 2009). This food regime has intentionally continued to exploit the “free markets that exclude agrarian populations that are increasingly dispossessed” for capitalist accumulation (Akram-Lodhi & Kay 2010b p. 268). This exclusion is exemplified in McMichael’s synonym for the emergent regime, “food from nowhere”, under the growth of corporate/capitalist food systems. The expansion of this system is often met with resistance from agroecological and food sovereignty movements who provide the opposite, food from somewhere and someone.

not nutrition is adequately included as a factor of food security⁴. A holistic measurement of nutrition, including both diversity and quality of nutrients, was found to be largely missing from the current literature. The incorporation of nutrition in any measurement of food security is essential in understanding food system changes, including the penetration of the corporate food regime into rural agrarian-based societies. This takeover of agrarian social relations by capitalist ones, referred to as agrarian transition, alters rural-urban divides and impacts the food security of farmers well beyond the number of calories consumed. Food security must be addressed through the pillars of access, availability, utilization, and stability, this requires diverse measurements used in collaboration. Furthermore, as seen in the literature review of this paper, studies of food insecurity are largely focused on developing countries perpetuating the inaccurate belief that food insecurity does not exist in middle and high income countries where high inequality and economic injustice also exists.

By examining the effects of agrarian transition and livelihood diversification on the metabolic rift in Lebanon, this paper intends to address these gaps in the food security literature. Furthermore, this research uses these concepts to determine how smallholders' livelihood diversification impacts their food and nutrition security in comparison to households which have transi-

⁴ In this research, the term food *and nutrition* security is used with the intention of emphasizing the role of nutrition within the broad discussions surrounding food security. This document accepts the widely used definition of food security put forth by the Food and Agriculture Organization: “ ‘Food security’ exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” (FAO 1996) But this document also intends to incorporate the FAO’s separate definition for nutrition security which acknowledges the wider environment in which food is prepared and consumed. “A situation that exists when secure access to an appropriately nutritious diet is coupled with a sanitary environment, adequate health services and care, in order to ensure a healthy and active life for all household members. Nutrition security differs from food security in that it also considers the aspects of adequate caring practices, health and hygiene in addition to dietary adequacy.” (FAO et al. 2012 p. 57). While “attaining food security is shown to be one of the key determinants of nutritional status of individuals” (Babu et al. 2009 p. 7), food security without explicit attention to nutritional elements is inadequate as the terms are not one and the same (Jones et al. 2013a). Although the acknowledgement of nutritional requirements is considered under the “utilization” component, explicit attention to nutrient diversity and quality are rarely considered in the existing literature.

tioned away from agricultural income. This thesis focuses primarily on the situation of smallholders, but is based on the dominant discourse around agrarian transition. As smallholders depend less on their fields for their daily consumption and more on the market to provide their food, their diets change particularly with respect to the utilization of food. Using diverse measurements of food and nutrition security along with a semi-structured questionnaire and simple expenditure module, this study first compares the changes in smallholders' food security over one of Lebanon's significant agrarian transitions and then between smallholders with diversified livelihoods against those with non-agrarian, transitioned livelihoods. This study not only addresses food security in a middle income country but also considers the nutritional aspect of food security as diversity and quality of nutrients consumed, filling multiple gaps in the literature on smallholders' food security.

CHAPTER II

LITERATURE REVIEW

A. Agrarian Transition

1. Agrarian Transition and Development

Agrarian transition — referring to the process of financialization of agrarian-based activities and the monetization of sustenance and nutrition for capital generation — is viewed as a necessary step in a country's progression from a traditional “developing” economy into a modern “developed” economy. This naturally occurring process has often been expedited by development programs seeking to accelerate economic transformation. Facilitation of agrarian transitions have therefore been adopted by rural development institutions to shift rural livelihoods from those based on natural resource management, such as agriculture, to livelihoods that more tightly link to urban networks and food systems. A key indicator of the transition is the expanding use of wage-labor, in either agricultural or non-farm enterprises, as small farmers shift their production to include more non-subsistence and non-agrarian livelihoods (Akram-Lodhi & Kay 2010b).

Ellis & Biggs (2001), in their review of the trajectory of development theory and its adaptation into policy, focus on the debate around small farmers in the transition from the 1950's emphasis on large, modern farm technologies to that of small farms “being considered the very engine of growth and development” (Ellis & Bigg 2001 p. 440). They introduce agrarian transition as a theory on the fringes of rural development discourse:

“An important continuing minority discourse of rural development that manifested itself especially strongly in debates of the 1970s, is the ‘political economy of agrarian change’ strand of thinking inspired largely by Marxist or neo-Marxist social science approaches and methods. . . The emphases here were (and still are) on

class, power, inequality, and social differentiation in agrarian settings driven by the large-scale forces and tendencies of development under capitalism.” (p. 438-440)

This subset of rural development theory diverges from the institutionalized development agendas which tend to homogenize all agrarians under the broad term “small farmers.” Instead, agrarian transition stresses class relations and divisions within rural agrarian society as pivotal to any discussion on rural development. Ellis and Biggs (2001) cite Harriss’ work (1991) as a comprehensive collection of this Marxist discourse and its development situating the theory of agrarian transition as central in understanding the variations within “small farm” societies and their contributions to the larger paradigm of “development”.⁵ Across the globe, agrarian transition has often come in the form of migration away from rural areas as post-agrarians seek or are forced to diversify their livelihoods in order to maintain an acceptable level income from which to meet food and nutrition security.

Early development literature, circa 1960s-1970s, understood agrarian transitions to occur via three possible channels of agricultural development as reviewed by Harriss’ (1991); 1) the

⁵ Van der Ploeg et al. (2000) state that there is no clear definition of rural development as the paradigm of development is dynamic and based off a concept that has not been well defined since with popularization in the 1990. However, this concept is central to this paper and therefore must be grounded in literature. In his analysis of agricultural intensification in Lebanon, Hamade et al. (2015) suggests the common use of the term refers to “a locally identifiable process, to some extent self-sustaining, addressing well-being in economic, social, cultural and environmental respects on an inclusive basis (see, for example, Shepherd, 1998; Thomson, 2001; Moseley, 2003; Freshwater, 2007)” (p.439) and that economic analysis alone cannot adequately depict the process and its outcomes. The term development on its own is an extension of imperialist discourse in which the global south is expected and manipulated to follow a Western model of change/growth lead by primarily Western-dominated institutions with Western agendas. Adopting the dominant narrative of what “development” means it is revealed that the process is financially focused under the assumption that human capital can only improve after economic capital has done so and that domestic markets must firmly be established in global ones. A process which Akram-Lodhi and Kay (2010b) refer to McMichael (2004) calling “the ‘development project’: the transformation of the structure of societies, starting with the economy” (p. 192). And Holt-Giménez (2017a) summarizes this perspective stating “... your economic well-being is best measured by your growth rate, irrespective of how such growth destroys the environment, lives, or entire cultures and societies” (p. 34). Furthermore, the World Bank’s 2016 decision to transition from the terminology of “developing” and “developed” countries to classifying countries by low, middle, and high income level further enforces the idea the financial situation of a country/location is its most important feature (Rignall & Aita 2017).

development of capitalist farming in which large farms would grow and subsume peasant communities into their work forces, 2) large state organized cooperatives, or 3) continuing small scale farming that becomes capital intensive. No matter the route, the result of the transition would be more productive agricultural systems which produce a surplus and therefore better off communities, i.e. development of rural areas (Harriss 1991). The third route mentioned above reflects the same shift in attention observed by Ellis and Biggs (2001) to a focus on the role of small commercial farms. The primacy of small farms is discussed in Mellor's theory of development where small farms are the central catalyst to economic development (Mellor 1966). Mellor's route and the third option outlined by Harriss, suggest that agrarian transition is not always synonymous with urbanization and the depopulation of rural areas but that capitalism can thrive in rural areas. However, empirically, agrarian transitions have challenged the ability of small scale farmers to remain exclusively small scale farmers.

2. Agrarian Transitions of Smallholders

Agrarian transition often threatens the existence of smallholder farmers who cannot be subsumed into capitalism's rural expansion. Referring to Chalak's (unpublished) definition of agrarian transition, adapted to the Lebanese context from Bernstein (2010), farmers who cannot integrate their production in the market or sell their own labor in their rural area, are forced to migrate to urban areas in search of basic necessities. At the same time, large industrial farms seeking horizontal integration move into rural areas to secure horizontal integration following Harriss' (1991) first route of development. This crossing of paths of rural and urban social relations blurs the boundaries of the once distinct geographic zones (Davis 2006; Rignall & Aita 2017). Rignall and Aita (2017) refer to this as the creation of a "global rural" in which poverty

pushes rural dwellers into urban areas for their livelihoods and then who send remittances back to sustain rural areas (Thomas-Hope 2017). This process of agrarian transition pulls the local economy into the global one serving to link the two zones (Rignall & Aita 2017).

The extent to which agriculture, and particularly small farming, contributes to overall growth of a country and its national economy is often debated using Mellor's small farm first theory⁶ in the affirmative. This theory has ebbed and flowed in popularity and was not adequately understood until the 1960s, when the development paradigm around "small-farm agriculture switched to being considered the very engine of growth and development" (Ellis & Biggs 2001 p. 440; Rignall & Aita 2017). This theory is related to Marx's "enclosure model or effect"⁷ theory, which focused on the displacement of peasants as agriculture became capitalized under industrialization in the English countryside (Bernstein 2003). Here, globalization and privatization pushed peasant producers into and then out of capitalist agriculture. It continues today pushing them towards what many argue is their ultimate nonexistence (Bernstein 2001; Bernstein 2003).

⁶ The Small Farm First Theory (Mellor 1966; Mellor 2017) explains that the transition in agrarian systems from subsistence to sharecropping to small commercial farming enhances industrial growth. It is therefore pivotal for poverty reduction, rural economic development, and is a way of "providing labour, capital, food, foreign exchange, and a market in consumer goods for the nascent industrial sector in a low-income country" (Mellor 1966). Under his long developed theory, small commercial farmers form the foundation of *all* development as they are a central and necessary sector of developing countries (Ellis & Biggs 2001; Akram-Lodhi & Kay 2010a; Mellor 1966; Mellor 2017). The theory explains that some farmers become more productive and adopt new expenditure patterns as they become more technologically efficient. This therefore reduces the high labor needs of traditional agricultural systems and allows surplus workers to move to the industrial sector where jobs should be growing (Harriss 1991). Under this logic, the theory proposes that "the faster agriculture grows, the faster its relative size declines" (Ellis & Biggs 2001 p.441; Mellor 1966, indicating that small commercial agriculture is the root catalyst of wider economic development.

⁷ Enclosures, such as fences, were a pivotal part of the establishment of capitalist agriculture and the beginning of the end of communal lands for grazing and cultivation as peasants were effectively cut-off from productive land. This separation challenged peasants' ability to use the land to feed themselves and therefore instigated their turn to selling labor for a wage in order to buy food instead of produce it (Holt-Giménez 2017). This reserve of labor was therefore available to staff factories in urban areas and the growing industrial sector or to remain in rural areas as workers or tenants for expanding commercial farms.

The centrality of smallholder agricultural development's contribution to national growth is affirmed by multiple influential development organizations including the World Bank and the Department for International Development of the United Kingdom, DFID. "The literature linking household's asset endowments to agricultural productivity has long emphasized an inverse relationship between farm size and factor productivity," which translates to national development (World Bank 2008 p. 90). The World Bank's 2008 report 'Agriculture for Development' solidified this perspective in the international development discourse although it clarified that the extent of the impacts are factor dependent. Results depend on the country's state of agricultural transition, share of agriculture in aggregate growth, and the level of poverty and then categorized as agriculture-based countries, transforming countries, and urbanized countries.⁸ This statement reflects Harriss' (1966) conclusion on agrarian class differentiation and its impacts on their stratified transition. Overall, small farm agriculture is essential to stimulate overall economic growth, reduce poverty, and stimulate wider development as the relative impact of agriculture on gross domestic product shrinks as development accelerates. The 2008 World Bank report also called attention to the necessity of providing alternative sector work opportunities to those displaced from agrarian livelihoods as agriculture's relevance to development agendas and contribution to national economies declines (World Bank 2008).

A representative of the global development industry, the Department for International Development of the United Kingdom, DFID, also acknowledges agriculture's impact but as a pivotal contributing factor, not enough in and of itself enough to stimulate national development:

⁸ Under this categorization, Lebanon is an urbanized country where "Agriculture contributes directly even less to economic growth, 5 percent on average, and poverty is mostly urban. Even so, rural areas still have 45 percent of the poor, and agri-business and the food industry and services account for as much as one third of GDP" (World Bank 2008 p. 4). However, the country is again experienced agrarian transition as will be discussed in the results section.

“No poor country has ever successfully reduced poverty through agriculture alone, but almost none have achieved it without first increasing agricultural productivity” (2005 p. 1; Lanjouw & Feder 2001). Echoing Mellor’s theory, agriculture’s percentage of gross domestic product and economic importance decreases as lower income countries develop. However, the initial contribution is key in starting economic growth and reducing poverty as other livelihoods and sectors of employment become available to those who were once subsistence or smallholder farmers (DFID 2005; Patel et al. 2015). In this process, it is not that agriculture loses its importance, but that its subsumption by other sectors is foundational in developing countries.

With this understanding of agrarian transition within the small farm first paradigm, it is essential that other employment opportunities for those exiting farming exist and offer sufficient livelihoods and wellbeing. If the transitioning country does not offer alternatives, the result may be even larger scale unemployment and poverty. Holt-Giménez emphasizes this point:

“If the current iteration of the agrarian transition is allowed to continue, we would expect the final depopulation of the countryside and the consolidation of agricultural production into the hands of 50,000 or so mega-farms, worldwide. These might be able to supply the planet with industrial food, but they will not provide employment for the 2.5 billion peasants, small farmers, and their families presently living in the countryside” (2017a p. 141).

It is widely acknowledged that there are not enough urban and/or industrial sector jobs to absorb transiting agrarians (Holt-Giménez 2017a; Mehta 2009). Agrarian transitions continue to shape rural and urban landscapes through livelihood diversification and urban migration. The resulting dispossession of agrarian communities alters food systems and therefore food and nutrition security of vulnerable rural communities. Despite the capital-focused production squeeze applied to smallholders around the world and their migration, many smallholders resist transitioning into the capitalist food system. Smallholders remain the dominant food producers contributing around

70% of the world's food (GRAIN 2014; Herrero et al. 2017; Holt-Giménez 2017a; IFAD & UNEP 2013). The smallholder persistence has resulted in maintaining the same number of smallholders in 2017 as there were 100 years ago (Holt-Giménez 2017a). Their existence indicates that there is still a strong role for small commercial and non-commercial farms in sustaining rural societies or that they have no viable alternative.

Despite the seemingly simple transition Mellor (1966) and Harriss (1991) outline, many small farmers remain poor. They have not transitioned nor had the ability, opportunity, or resources to intensify into strong commercial enterprises, migrate, or pursue profitable diversification. Poverty persists when transitions to jobs in other industrial sectors do not exist or when they fail to provide adequate living and livelihood standards (Mehta 2009). One theoretical reason for the continued poverty of smallholders stems from the transition of agrarian-based societies to the development of the industrial sector relating to the failure of the small farm first theory:

“In the early stages of the economic transformation, rapid agricultural growth allows the incomes of small commercial farmers to keep pace with rising urban incomes... A problem arises when the initial impetus for increasing productivity in cereals runs down, with a failure to shift into the high-value livestock and horticulture for which demand is rapidly increasing. Most middle-income countries have failed to follow cereal productivity increases with an increase in the high-value commodities. As a result, small commercial farmers' incomes stagnate. And the income gap between this group and urban area dwellers becomes more apparent” (Mellor 2017 p. 59).

If smallholders cannot diversify into capitalist systems or cannot make adequate livelihoods from smallholder farming, poverty and food and nutrition insecurity continue.

3. Agrarian Class Divisions

The way in which agrarian communities have transitioned to capitalist forms of agriculture has not been uniform across developing countries or even within a specific community. Although Bernstein believes the global peasantry is fading in its entirety, his paradigm does not view this decline evenly (2003). Instead “the categories of the capitalist mode of production: the social relations, dynamics of accumulation, and divisions of labour of capitalism imperialism” (Bernstein 2003 p.4) have shaped distinct levels and conditions of agrarian classes. The differences in peasant classes account for Harriss’ (1991) multiple pathways of agrarian transition as more options are available to wealthier smallholders with urban connections than to poorer smallholder (Babatunde & Qaim 2010; Ellis 2000; Erasdo 2006; Haggblade & Hazell 2010; Loison 2015). Rignall & Atia (2017) agree, relating this unevenness of capital integration to an agrarian communities’ location “in all senses of the word” (p. 11) referring to geographic location as well as in the context of global networks and power relations. The transition from pre-capitalist modes of production to the current globalizing food system has not been linear.

Others acknowledge transition-induced class structures but with more narrow divisions. Akram-Lodhi & Kay (2009, 2012b) observe agrarian transition as a “bifurcated agrarian structure [which] is a significant and increasing proportion of the global peasantry who are seeking, day by day, refuge in their small plot of land, producing agricultural products for food security reasons while increasingly engaging in selling their labour-power to capitalist farmers, to richer peasants or to non-farm capitalists” (2009 p. 229). This division differentiates between non-farm diversification — often in the form of wage-labor — and on-farm diversification into capitalists and proto-capitalist systems. Lenin describes those who diversify as semi-proletarian, referring to the peasants who cultivate shrinking plots of land for food security and subsistence purposes

but also have livelihoods as wage-laborers (Lenin 1966 p. 1530).⁹ They confront the corporate food regime's "drive of capital to separate producers, to a greater or lesser extent, from the means of production" (Akram-Lodhi & Kay 2010b p. 271). These agrarians are marked by their inability to accumulate capital and therefore the inevitability of selling their land and leaving agricultural livelihoods (Akram-Lodhi & Kay 2009).

B. Diversified Livelihood Strategies

Globally, agrarian communities have experienced a shift to more diverse farm and non-farm livelihood strategies in which incomes are earned partially from agriculture and partially from a non-farm source. This has been necessary to confront the challenges of insufficient farm-based livelihoods which contribute to food and nutrition insecurity (Barrett et al. 2001; Lanjouw & Feder 2001). Despite being intimately linked to the land, agrarian communities are the demographic with the highest food insecurity and poverty; many have independently undertaken more diversified livelihood strategies to improve their situations (Akram-Lodhi & Kay 2009; Batal 2007). Diversified livelihood strategies have also been promoted by governments and international development organizations as methods for addressing rural food insecurity at the household level. Common approaches have been facilitating the transition away from complete dependence on agricultural incomes or diversifying crop production. These methods are noted to enhance resilience and mitigate vulnerabilities associated with the various external risks of agricultural-based incomes (weather, climate, pests, price volatility, oil price volatility associated with agricultural inputs, consumer taste and demand) (Barrett et al. 2001; Lanjouw & Feder 2001).

⁹ First published in 1920.

Diversified livelihood strategies have two primary paths in agrarian communities: enterprise diversification and livelihood diversification. The underlying argument for the promotion of diversification of *enterprise* (i.e. diversification out of traditional commodities) is to plant more crops palatable to foreign food markets. This promotes integration into the global agricultural trade. The diversification of *livelihoods* applies to the small and marginal farmers who become laborers of other, i.e. wealthier, farmers or who engage in low-skill non-farm employment as an additional part-time income sources, or to those who exit farming altogether. The strategy of livelihood diversification is related to Sen's theory of entitlements (1983) which shifts the focus from the supply/production side of food insecurity to the accessibility and availability of food. Ideally with livelihood diversification, enhanced means to earn livelihoods are created and the resulting entitlements are used to purchase/secure food from local markets. This means that food and nutrition security should not depend exclusively on having agricultural livelihoods. Although, producing some portion of one's own food is seen to have positive impacts on food and nutrition security.

In the context of the World Bank's operations, diversification is referred to "In its simplest form [as]... a change in business activities based on the flexible and differentiated response to changing opportunities created by new production technology or markets signals..." but the authors look to Pingali and Rosegrant (1995) for a more nuanced definition citing "change in product (or enterprise) choice and input use decisions based on market forces and the principles of profit maximization" (Barghouti et al. 2004 p.1). These guidelines go on to recommend that diversification needs to be pro-poor and supported by collaborative stakeholders (Barghouti et al. 2004).

Diversified livelihood strategies — combined agriculture and non-farm incomes — have emerged from natural origins into a global strategy for the rural and agricultural development objectives of mitigating poverty and food and nutrition insecurity in rural, agrarian regions. Strategy focuses on expanding income activities and assets of rural dwellers who are no longer sufficiently supported by exclusively agricultural-based livelihoods due to a variety of changing socio-ecological and political conditions related to agrarian transitions (Barghouti et al. 2004; Barrett et al. 2001; Lanjouw & Feder 2001). Diversified livelihood strategies are widely regarded to improve wealth and income but their effectiveness varies by context (Barghouti et al. 2004; Ellis 2000).

1. Diversification as Development Agenda

Agricultural enterprises and livelihood diversification have recently been promoted by governments and international organizations, such as the World Bank. Experience-based guidelines for diversification implementation in poor agricultural communities have been in development since the early 2000s (Barghouti et al. 2004; World Bank 2008). Food security is related to poverty and the ability to access food. Therefore rising incomes and wealth associated with diversifying away from farm-related risks is often assumed to be a solution to food insecurity (Barrett et al. 2001; Ellis 2000). The assumption is that by reducing the vulnerability associated with agrarian livelihoods, better food access is attained.

Barghouti et al.'s (2004) discussion paper for the World Bank names two types of diversification: livelihood and enterprise, and two rationales: 'necessary' and 'stimulated'.¹⁰ Both types of diversification are promoted solutions to poverty and food insecurity. Both rationales are instigated by factors in the external world that render diversification necessary to continuing economic growth. In the 1990's the World Bank began documenting instances and outcomes of diversification in rural Africa. They noted that only 5% of rural households in Zimbabwe relied fully on subsistence food production as their livelihood (Barghouti et al. 2004). Households that had independently diversified had stronger incomes than those who did not. Households with enterprise diversification — specifically livestock — had double the income of subsistence households. Cash crop enterprise diversification had triple the income, and households that combined all three categories — subsistence, livestock, and cash crops — had five times the income. Households that included non-farm activities in addition to the other three had the highest income of all (Gittinger et al. 1990). Furthermore, the economic growth of the individual contributes to a country's rising gross domestic product and to poverty elimination stimulating government involvement in diversification schemes (Barghouti et al. 2004; DFID 2005).

¹⁰ It is commonly acknowledged that there are two main causes of diversification although the exact terms vary. What the World Bank refers to as necessity and stimulated diversification, Bouahon et al. (2004) refer to as voluntary, or distress/forced. Tolossa and Robaa (2016) discuss the concept of "push" and "pull" diversification (as do Barrett et al. 2001, Haggblade and Hazell 2010, Yaro 2006): "...[W]hile distress-push diversification is driven because there are no opportunities in the on-farm sector. Factors that lead to demand-pull diversification include the increased income of lower and middle-income households and increased demand from urban areas for rural products (Davis 2003; Ellis 2000)." Logically, demand-pull diversification tends to provide higher returns and often requires higher investment to initiate. This makes it limited to wealthier rural households and/or dependent on external support for the transition (Ellis 2000). Forced diversification will be more disruptive of lives, landscapes, and local management systems of natural resources of the communities (Barrett et al. 2001; Bouahon et al. 2004). This forced diversification is observed across Lebanon in the abandonment of land, especially terraces, and the selling of agricultural lands for real estate purposes (all of the NRM case studies).

2. Livelihood Diversification and Development of Discourse

This research focuses primarily on the Diversified Livelihood Strategy of livelihood diversification as this was the more common strategy observed in the research location. The expanding focus on livelihood diversification of agricultural-based livelihoods instead of enhancement of agricultural activities indicates a significant paradigm shift in rural and agricultural development agendas (Barghouti et al. 2004; Ellis & Biggs 2001; Lanjouw & Feder 2001; Lanjouw & Lanjouw 2001; Van Tongeren 2008). This shift represents a re-visioning of the conceptualizations of rurality and agriculture due to the socio-economic changes induced by agrarian transition. The growth of livelihood diversification — both naturally occurring and imposed as development strategies — in rural agrarian communities is an example of this reevaluation. Bernstein (2004) posits the thesis that, “Agrarian capital can have a range of sources beyond the countryside and its ‘original’, localized (indigenous) rural classes of landed property and peasantry” (p. 201). Van Tongeren (2008) reaffirms the expansion of non-agricultural incomes for agrarian communities stating, “Non-agricultural activities assume an increasing importance for the development of rural areas, and the identification of ‘rural’ with ‘agriculture’ is less and less valid” (p.22). Developed countries tend to have more diversified rural economies (Mehta 2009). As an example from a fully-transitioned context, in Organization for Economic Cooperation and Development (OECD) countries, 50% of agri-food workers are classified as urban and less than 10% of the rural workforce is employed in agriculture indicating that these terms are no longer synonymous (Van Tongeren 2008 p. 22 & 9). The World Bank (2008) reported that globally 30-50% of the rural workforce was engaged in non-farming employment and 47-49% was in the Middle East (p. 203-204). Even in developing countries, rural non-agricultural diversification has com-

prised a significant proportion of rural employment; Lanjouw & Feder (2001) refer to Bangladesh, Indonesia-Central Java, Malaysia, Nigeria, El Salvador, and Ecuador having over 25% of rural employment classified as “non-farm” since the 1970s (although there is some discrepancy on the definition of ‘rural’) (p. 4-6). After the 2007/2008 price spikes rural development once again was considered relevant for wider economic development schemes which were focused on rural, non-farm activities (Akram-Lodhi & Kay 2009).

In a discussion on reforming the agricultural policy process in OECD countries, Van Tongeren (2008) highlights this paradigm shift. He points to the lack of acceptable farm income and its variabilities as important policy priorities that are often unaddressed through agriculture alone: “Agriculture is the dominant land user in rural areas, but rarely the dominant source of economic activity” (Van Tongeren 2008 p. 9). His research indicates that regardless of access to natural resources and agricultural extension, farmers are still unable to create dignified livelihoods from farming alone; strategies beyond agriculture are necessary to address rural poverty and its underlying causes. These realities ring true across the Arab World as well. In the countries within the United Nations Economic and Social Commission for Western Asia (UNESCWA), 45% of the population is considered rural with 12% of the population engaged in agricultural labor for on average 6% of GDP (Byiringiro 2013). This means that 33% of the rural population is either not working within the agricultural sector, due to a lack of opportunities, or is engaged in livelihoods diversified away from agriculture. In Lebanon, Seyfert et al. (2014) use data from the Ministry of Agriculture in 2004 and 2012 to calculate that under quarter of Lebanese farmers are able to make a living from farming — although they believe that the real number is less than a fifth.

Ellis and Biggs' (2001) review of the evolution of dominant rural development concepts and policies highlights the delay between concept inception and implementation. They also search to see if a consensus is emerging on potential sustainable livelihood approaches in offering innovative strategies for the future of rural development. They conclude that sustainable livelihood approaches — as long as the approaches acknowledge the “cross-sectoral and multi-occupational” (p. 4371) nature of the modern “rural” landscape, i.e. diversification of livelihoods — have potential to enhance the existence of viable rural communities (here they state rural communities but not agrarian communities). The differentiation between “rural” communities and “agrarian” communities is emphasized given the “emerging evidence that the rural poor tend to depend on non-farm (and often non-rural) sources of income in order to sustain their livelihoods” (p. 442). This key issue may contribute to the reevaluation of the small-farm first theory.

Within the evolutions discussed, the contribution of smallholders, or the ‘small farm first’ paradigm, has been dominant since the 1950s-1960s. Previously the emphasis lay on large, modern farm technologies or the ‘dual-economy theories’ of development. However this discursive shift has not been accompanied with the “immediate demise of the set of ideas which is being replaced” (Ellis & Bigg 2001 p. 440; Loison 2015). In other words, despite the rhetorical transition, smallholders are still not receiving the support necessary to maximize their contributions to global food and nutrition security and adequate rural livelihoods. This is often due to sector-specific policies that are not capable of addressing the problems holistically (Van Tongeren 2008). Without policy and physical support, this strategy threatens the ‘small farm first’ theory by promoting diversification in traditionally agrarian regions rather than making agrarian livelihoods more environmentally and financially efficient (Ellis & Biggs 2001). Diversification is a move away from agrarian lifestyles even if some of the resulting income is invested back into farming.

Both Van Tongeren (2008) and Ellis and Biggs' (2002) discussion of rural development strategies are premised on the capitalization of rural agrarian communities and the need for growth through increased connections to markets and the urban. A brief review of Mellor's (2017) definition of economic development related to agriculture is essential to understand their perspective. Mellor considered economic development essential for reducing food and nutrition insecurity: "The economy is transformed from a dominantly rural and low-productivity agricultural economy to one that is dominantly urban and non-agricultural. That includes a large scale shift of population and labor force from rural to urban areas" (p. 11). This shift is partly the result of rural capitalization/the agrarian question in which more efficient agricultural systems require less labor, and this labor surplus then migrates to urban areas for industrial work.¹¹ Eventually agriculture is no longer a primary influencer of development, but remains an important industry due to its modernization and efficiency. This economic transformation,¹² where a primarily rural and agricultural-based economy transitions to one based on industry and services in urban areas, is a prominent trajectory for growth in low- and middle-income countries (Mellor 2017 p. 17). Therefore a defining feature of middle income countries is a larger urban economic sector than those in low income countries.

¹¹ However, despite the logic of this theory, in reality the surplus of agrarian labor can often not be adequately subsumed into the developing urban industrial labor markets (Rignall and Aita 2017).

¹² This economic transition is followed by a demographic transition in which "The population growth rate first accelerates then slows and eventually declines. Health and life expectancy improve greatly." In Lebanon, the country is in the midst of its economic transition and therefore still experiencing high population growth due in part to birth rare and in part to the influx of refugees from Syria (McKee 2017). Combined, these two transitions constitute a re-organization of space and change of social relations as urban and rural are brought closer together through increased financial interactions and human movement.

The World Bank (2008) is also careful to note that as productive as livelihood diversification appears to be, it is not a guaranteed path to successful rural development. From a governmental angle, Tolossa and Robaa (2016) give the example of the Ethiopian Government's Food Security Strategy. The strategy cites four primary ways that poverty can be reduced and food insecurity mitigated in rural areas: "intensification of smallholder agriculture, expansion of commercial farms (commercialisation of agriculture), resettlement and livelihood diversification" (p. 94). This places livelihood diversification as only one possible route and suggests that the specific conditions of each community are paramount in reducing agrarian food insecurity. Patel et al. (2015) argue that livelihood diversification can garner inappropriate support to small farmers that "downplays the significance of economic growth and market forces that offer opportunities for alternative or non-agrarian livelihoods" (p.4). In this way, farmers may be encouraged to maintain agricultural activities despite a negative impact on their wellbeing, livelihood and/or natural environment. Barghouti et al. (2004) also acknowledge that livelihood diversification is not always the solution; in certain contexts farmers' wellbeing and livelihoods are enhanced by exiting agrarian livelihoods altogether.

C. Diversification and Food Security

Research has been conducted on how both diversified livelihood strategies impact smallholder food security. These studies primarily focus on smallholders in developing countries and largely lack an adequate investigation of the nutritional aspect of food security despite the terms expanding definition (as will be demonstrated in the literature review). Both enterprise and livelihood diversification are cited as methods to raise incomes and better integrate smallholders into globalized food markets. While these outcomes are assumed to lead to better food security, the case studies below reveal that the connection is not always so clear.

1. Food Security and Livelihood Diversification

Livelihood diversification has mixed impacts on rural households depending on the potential employment offerings within the rural and urban settings. In some households this diversification means moving to more urban areas while for others it means less farming, or both. Across the globe, livelihood diversification is not just a strategy to move away from agriculture-based livelihoods but can also become a *strategy to support* maintaining them (Lanjouw & Feder 2001; Lanjouw & Lanjouw 2001; Thomas-Hope 2017; Yaro 2016). However, certain context-specific infrastructure must exist to support agrarian resilience in this manner. With multiple livelihoods strategies, the shocks and crises that impact one pathway may not impact all pathways enabling household resilience and less sensitivity to risks (Ellis 2002; Lanjouw & Feder 2001). As a risk aversion strategy or resilience, livelihood diversification is often correlated to better food and nutrition security: “The degree of diversification of a household’s livelihood or the way in which household members allocate their time and resources in pursuit of various means of earning a living determine also their ability to acquire food. The greater the degree of diversification, the greater the ability to acquire food” (Thuo 2011 p. 224).¹³ Livelihood diversification in promotion of food security therefore reduces income from agriculture, but tends to increase accessibility though market dependence.

¹³ While Thuo focuses on the increase in access to food via livelihood diversification, the article does not elaborate on the quality of food to determine if nutrition security is also improved; the focus on calories and food access without analysis of diet quality is incapable of revealing the whole food and nutrition security picture.

Opportunities for non-farm work may not exist within a rural region requiring people to move to outside their communities, for example to urban areas or other countries. The lack of rural non-farm incomes and resulting migration does not necessarily constitute a household's disassociation from farming (Patel et al. 2015; Thomas-Hope 2017; Thuo 2012; Yaro 2016).

Haggblade and Hazell (2010 p. 1437) state "non-farm incomes help to finance on-farm investment". Income earned from these non-farm sources is often directed back to the farm household and invested into agricultural income generation. Patel et al. (2015) follows Bernstein's line of thought which "argues that in the contemporary agrarian economy, the capital required to pursue rural livelihoods is not only generated from within the rural areas, but also expanded and diversified by using non-agrarian sources outside the countryside" (Patel et al. 2015 p.14). Diversification in order to support agriculture suggests its non-economic value as many agrarians do not want to abandon the practice despite its often negligible or negative economic contributions. Regional studies from Morocco capture how international remittances, as part of a diversified household livelihood strategy in agricultural oasis communities, were used to invest in agriculture and food consumption. The household did not fully transition away from agriculture (Kusunose & Rignall 2018). If rural opportunities and/or infrastructure do not exist to provide adequate livelihoods, migration becomes necessary for diversification but this diversification does not always result in dissociation from agricultural activities.

Under the right circumstances, livelihood diversification from non-farm income can be used to support rural communities. Many rural communities are already transitioning away from agriculture. Supporting rural communities by maintaining agricultural-based livelihoods requires the development of opportunities to prevent migration (Lanjouw & Lanjouw 2001). Strategies

for preventing rural to urban migration have revitalized interest in small farmers while at the same time their role in global food and nutrition security is better acknowledged. “Once seen by some actors as part of the poverty problem, family farmers, including smallholders, are increasingly seen as key components of campaigns to improve food and nutritional security and to end global poverty. Based on a comprehensive analysis of global agricultural census data, family farming is by far the most predominant form of agriculture” (Graeub et al. 2016). Small farmers are a prominent component of family farmers,¹⁴ and it is smallholders who contribute the most to food and nutrition security and conserving rural livelihoods.

Livelihood diversification can perpetuate permanent urban migration. Ellis (2000) emphasizes the geographic location change often associated with livelihood diversification from rural to urban by stating that the strategy is not a brief or transient engagement in alternative employment. It tends to be permanent or the population returns with different social and economic relations to the rural (Kusunose & Rignall 2018). In this paradox, a family member with a non-agricultural livelihood in an urban area or second country, financially supports continued farming activities; this in turn maintains the rural population. This relationship is well captured in Rachid’s (2007) research in Batloun in which the households with non-agricultural and agricultural livelihoods often continue farming for the quality and freshness of their production, reporting that financial gain is not the primary motivation (Rachid 2007 p. 120).

If livelihood diversification is undertaken with attention to contextual challenges, it can be a strategy to strengthen agricultural communities by enhancing the ability to resist shocks and stresses. Diversification widens the variety of resources to support households (Lanjouw & Feder

¹⁴ While family farmers are estimated to comprise between 90 to 98% of all farms globally (FAO 2014a; Graeub et al. 2016) the tenure arrangements and holding size vary significantly between region and cropping system. Smallholder farmers are estimated to be between 80 to 92% of family farms (GRAIN 2014; IFAD and UNEP 2013; Lowder et al 2016) making smallholders the most prominent category of farmer.

2001): “For example, those who depend only on cattle production have livelihoods that are vulnerable to environmental degradation and to animal disease. On the other hand, those who depend on cattle in addition to poultry, vegetables and waged labour are in a less vulnerable position” (FAO 2001 p. 72). When more types of resources are drawn upon, vulnerability is decreased. Stronger outcomes result from adding a non-farm income source, such as work in a local shop or rural industry, and could further assist households in situations of agricultural shocks or rapid price declines.

2. Case Studies of Food Security and Livelihood Diversification

Across the world, livelihood diversification has generally been shown to improve household income; higher incomes are widely revealed to have a varied but positive impact on food security (Frelat et al 2016; Limon et al. 2017; Thomas-Hope 2017). However, few studies connect livelihood diversification directly to changes in food security and fewer yet to the role of nutrition. In the literature on livelihood diversification — separate from enterprise diversification — nutrition security is occasionally *assumed* to be an outcome of rising incomes but the connection largely lacks empirical evidence. Livelihood diversification implies a disassociation of the farmer from the land as productive hours are dedicated to earning a non-farm income. This transition alters diet patterns as more food must be purchased to compensate for the time rifted away from agricultural activities. The outcomes of this household level metabolic rift on the food and nutrition security of the farming household has not been well studied. The ways in which diversification is practiced vary by region, available natural resources, penetration of capitalist enter-

prises, and historical context producing different food and nutrition security outcomes. This section examines how different approaches and employment opportunities for livelihood diversification combine with local context to impact food and nutrition security across a global perspective.

The connection between rural non-farm economic growth and poverty, as indicators of household food security, has been well studied and often results in a positive correlation (Ahmed et al. 2017; Barghouti et al. 2004; Haggblade & Hazell 2010; Lanjouw & Feder 2001; Thomas-Hope 2017). However, Haggblade and Hazell (2010) argue that many independent factors can influence the connection between growing rural non-farm economies, i.e. livelihood diversification, and reduction of poverty. They state that limited data exists to adequately account for third party factors, thus making the relationship less clear. The authors cite conflicting studies: Viet Nam's rural non-farm economy did not reduced poverty, while India's non-farm, export-focused economic activity has notably contributed to a reduction in poverty. China has also experienced a reduction in poverty but positive results for food security were only minimal.

Good infrastructure, market access, proximity to the urban, and existing non-farm economies are essential conditions to stimulate the strong growth of the rural non-farm economy (Haggblade & Hazell 2010). The authors conclude that when these conditions are met, rural people will benefit from globalization and urbanization rather than experience the widespread negative impacts associated with economic liberalization in non-farm economies. However investment is required to ensure the existence of these conditions and to stimulate their growth.

Delvaux and Gomez y Paloma (2018) indirectly address the relationship between livelihood diversification and food security through a study on the use of common resources for household food security in Nigeria. They found in the data of 3,300 households with primarily

agriculture-based activities, that this livelihood source had ambiguous impacts on food security, while “involvement in secondary off-farm activities is *expected* to be positively associated with food security” (Delvaux & Gomez y Paloma 2018 p. 126). The authors concluded that higher incomes are more often associated with reduced food insecurity and with lower food expenditures ratios. While the authors initially acknowledge the role of diet quality, their study measures food insecurity by frequency of going without food and going to sleep hungry in the past 12 months and past seven days. Frequency measurements alone cannot adequately capture food insecurity and do not address diet or nutrition quality. The Delvaux and Gomez y Paloma (2018) study is therefore another example of the failure to adequately include nutrition in the discussion of livelihood diversification’s impacts on food and nutrition security.

Thomas-Hope’s 2017 study in Jamaica and St Vincent and the Grenadines found that seasonal second country migration positively impacted the food security status of families receiving remittances. Both governments’ have helped to facilitate migration since post-World War II as a livelihood option since limited options exist on the island. Migration has therefore become a significant source of employment for poorer communities especially from rural areas; in Jamaica, remittances contribute 22.1% on average to household income. In Jamaica, a strong agricultural policy resulted in residents’ investment in their small farms and home gardens contributing directly to food security. In the Grenadines, weak agricultural policy combined with remittances improved food security by enabling purchase of food and urban migration. Despite differences in agricultural agendas, small farmers cannot fully support themselves in either location. Thomas-Hope quotes data on St Vincent stating, “The income generated by small-scale farmers is generally low, with most households earning less than 25 per cent of total household expenditure from

farming activities (FAO, 2012)” (Thomas-Hope 2017 p. 38). In conclusion, the food security status of both island countries would most likely decrease without diversified household livelihoods from migration.

Patel et al. (2015), in examining rapid agrarian change in India, look at how different levels of income diversification impact rural agrarians’ food security and subjective wellbeing. They divide Indian agrarians into four livelihood categories: 1) primarily agricultural based income, 2) agriculture and off-farm income (nearby) 3) agriculture and off-farm income (far), 4) non-farm income (although it is noted that most agrarians in this category owned livestock). The study then measured food security using food sufficiency, i.e. the ability of households to meet their food needs from their own farming. Patel et al. found that the “food security and the subjective wellbeing of farmers is complex and shaped by the productivity of small-scale agriculture and livelihood aspirations of farm households” (2015 p. 1).

The primarily agriculture-based households had the highest food self-sufficiency — which Patel et al. (2010), Jones et al. (2013b), and Herrero (2017) believe *suggests* better diet diversity¹⁵ — but had low income and wellbeing. Mixed livelihoods had lower food sufficiency and crop diversity but higher income and wellbeing. The landless had higher income than the exclusively agriculture category but the lowest wellbeing. However, all relied on supplemental food provided through the government to households below the poverty line. Although sufficiency is a narrow way to measure food security, this finding highlights the contribution of self-

¹⁵ This statement, based on the published articles of the above referenced authors, is a prime example of how the literature on food security and livelihood diversification addresses the aspect of nutrition. Using limited empirical evidence, it is widely assumed that enhanced income and diversification will improve food and nutrient security.

produced foods to food and nutrition security and the challenges of reliance on agricultural livelihoods.

Agrarian transition, experienced as out migration from rural areas, shows that income earned through diversification is higher than that attained exclusively from agriculture. However, higher income does not ensure food security since there are many other uses for income in a household setting. Patel et al. find that agricultural livelihoods therefore have a tradeoff: better food security and nutrient diversity but less assets on hand for other basic or emergency expenses. Patel et al.'s (2015) findings highlight the hypothesis that diversification of livelihoods can potentially obscure household experiences of food, particularly nutrition, security.

In conducting a large scale study across seventeen Sub-Saharan African countries, Frelat et al.'s (2016) research revealed that households which relied more on non-farm activities had improved food availability compared to those more reliant on on-farm incomes. In other words, the households depending on their own food production for consumption had the lowest food availability (the authors note that home production provided the "base supply of energy" to all households (p. 459)). Although their study covered a wide range of countries, the depth of their conceptualization of food security is shallow. Measuring food security as availability "is an indicator of potential supply" (p. 459) and does not adequately consider the aspects of diet quality nor nutrient diversity meaning that the aspect of nutrition security is yet again left out of the overarching definition of food security. The authors conclude that non-farm incomes and better access to markets improves food security more than increasing agricultural production can.

In a study that evaluates household perceptions of livelihood risks and food insecurity, Ahmed et al. (2017) propose that a lack of resources and market access have the most negative impact on small farmers' food security in developing countries. Food security is therefore more effectively impacted by these factors, not livelihood diversification. Two-thirds of Pakistan's population relies on agriculture for food and livelihood security, either directly or indirectly, despite the lack of market access. The authors believe that improving market access could greatly improve food security. However, reliance on markets as the purveyor of food security ignores the aspects of stability and nutrient quality and ties domestic food security to volatility in global food trade.

Within Ahmed et al.'s study a calorie consumption calculation, the Dietary Intake Assessment (DIA), was used to assess intake based on a recall of the past seven days by the male head of household; Adult Consumption Equivalent was used to calculate consumption for other ages and genders in the household. Market access was determined by three indicators: transportation cost, access to roads, and access to market. There was a significant, positive relationship of food security to those closer to the road. The authors therefore concluded that supplementary non-farm livelihood opportunities could improve food security, but better infrastructure would have the greatest impact. However, these impacts were measured as calorie intake and do not consider nutrition nor the quality of food available on the markets.

Limon et al.'s (2017) study on smallholders across the Andean region examined livelihood diversification's interaction with food security as a secondary objective. Limon et al. found that all of the households with borderline food insecurity, measured by a frequency-weighted diet diversity score, had no non-farm income, i.e. they were dependent on their own food production

for consumption. Households with non-farm income had better financial situations and better coped with production shortages. In the six months prior to the study, almost all households purchased meats and main staples to supplement their production indicating that household production is insufficient and cash is needed to maintain food security. Those with non-farm income, either from remittances abroad or a family member in another village, were generally better able to cope with food shortages.

Ruben and Van Der Berg (2001) study the impacts of non-farm income on the food adequacy of rural households in Honduras. Food adequacy is determined by daily consumption of calorie and protein requirements for the entire household. At the time of their study, many rural farmers were already highly dependent on non-farm incomes despite the fact that over 50% of the population was engaged in agrarian activities. In the variables analyzed against food adequacy, they found that a 10% increase in non-farm income raises food adequacy 0.3%; but “Farm income is most important for food security: a 10% rise in farm income improves nutritional adequacy by 0.8%” (p. 556).. Farm income therefore improved food security more than non-farm income sources. However, non-farm income is noted to be important for the purchase of food and farm inputs related to higher productivity. Ruben and Van Der Berg (2001) reiterate the finding that the proportion of non-farm income rises as levels of household income rises, reaffirming the conclusion that better off rural households tend to be more diversified than poorer ones.

Tolossa and Robaa (2016) assess the impacts of livelihood diversification on food security at the household level in southern Ethiopia. In contradiction to the previously examined studies, the authors found that the poorest were most likely to have diversified livelihoods as a strategy to improve their food security. However, despite diversification these demographics did not report feeling more food secure than before diversification. Tolossa and Robaa's (2016) measurement of food security used a combination of self-sufficiency and perception of security but does not adequately take into account the four pillars of food security to include a nutritional aspect.

Ethiopia provides an interesting context as it has not fully undergone an agrarian transition — its population was still 83% rural as of the most recent data (2008) and agriculture was the main source of economic growth contributing 50% to gross domestic product (Tolossa & Robaa 2016 p. 93). Diversification came primarily in the form of selling wage-labor since physical capital was one of the few resources available to the studied demographic; most wage laborers worked on other farms. More than 88% of the heads of households or spouses, or both partners, were engaged in a variety of non-farm activities, primarily petty-trade (p. 104). Most of the households who had diversified their livelihoods still reported perceiving food insecurity. The lingering feelings of insecurity may be linked to households' challenges in securing food in the long term while short term food security is bolstered by livelihood diversification. Furthermore, the perceived insecurity may be related to inconsistencies in the market which may not offer adequate food even if households have obtained a wage from diversified labor.

The strategy of livelihood diversification for improved food security has been widely adopted by governments and development organizations. This livelihood strategy is now widely

used and monitored as a way to raise income and therefore food and nutrition security. However, the few empirical studies on the results are inconclusive. The above literature review highlights three studies in which the results are obscure (Haggblade & Hazell 2010; Delvaux & Gomez y Paloma 2018; Patel et al. 2015); one in which a variable other than livelihood diversification had a more significant impact on food insecurity (Ahmed et al. 2017); and one in which agricultural incomes had a higher impact (Ruben & Van Der Berg 2001). One study showed that livelihood diversification did not result in better food security (Tolossa & Robaa 2016). Only one-third of the studies indicated that livelihood diversification has some level of positive impact on food and nutrition security (Frelat et al. 2016; Limon et al. 2017; Thomas-Hope 2017). Within the positive outcomes, the method used to diversify livelihoods and achieve these results varied from second country migration, urban migration, and local farm and non-farm employment. These studies span four continents, more than 16 countries, over 9 methods of food security measurements, and 17 years. Even within these inconclusive results, the ability to generate income is widely assumed to be the most direct path to food security.

3. Food Security and Enterprise Diversification

In terms of food and nutrition security, Barghouti et al. (2004) cite a positive relationship between nutrition and diversity *of enterprise* calling attention to smallholders' high consumption of their own production (Jones et al. 2013b; Sibhatu & Qaim 2018). The authors believe that enterprise diversification can improve diets' nutrition diversity — which enhances health and therefore “improves earning capacity of labor” (Barghouti et al. 2004 p.2) — through raised incomes and increased purchase of food. The authors express confidence that diversification of enterprise

for export results in enhanced household food security and cite von Braun (1995) and an example from Kenya for evidence. Their example does show higher net revenue, but fails to acknowledge that agricultural-based households may have financial demands competing with food purchases. They also do not examine the impacts of diversification on household food security if the additional crop production is non-consumable or outside of local consumption preference, or if land previously used for household production is converted to the new enterprise. The authors' claim that the promotion of enterprise diversification will not only raise incomes, improve the capacity of labor through better nutrient health, reduce the risks and vulnerability associated with single livelihoods, and increase the employment in rural areas in line with their pro-poor agenda is not well substantiated (Barghouti et al. 2004).

4. Case Studies of Food Security and Enterprise Diversification

Enterprise diversification is widely believed to raise household food and nutrition security through two primary pathways: increased income generation from cash crops and/or increased consumption of crops produced at home. Many studies exist that connect enterprise diversification to income generation since this strategy neatly fits into the neoliberal development agenda of increasing global trade and integrating smallholder farmers into the global economy. Slightly fewer studies connect enterprise diversification to food security since it is widely assumed that households who earn more income will use it to purchase food and this will effectively eliminate food insecurity. Enterprise diversification does not directly imply a disassociation of the farmer from the land and it is widely assumed smallholders will continue to consume some of their own food production and may even diversify their consumption through production

(although this depends on their enterprise). Fischler (1988; HLPE 2017) acknowledges that production diversity does not necessarily lead to enhanced diet diversity but that the relationship is complex and highly dependent on the specific context, regional economics, and infrastructure. This section therefore examines how different approaches to enterprise diversification impacts the food security of smallholders.

Batal et al. (2007) found that, “There was no correlation found between self-production and food security status” in his study of three rural Lebanese villages (p. 29). Despite the small sample size, of the 31 participants who responded that they had skipped either a meal or a full day of eating, 87% reported they had done so during the winter season. The seasonality of the response suggests that the respondents could not bolster their food insecurity with either their own production or with wild edible plants (which Batal believes are a cheap source of nutrients for rural communities). They may be more food secure in the fall and summer when produce is cheaper, present in their gardens, and more readily harvested from the wild. Hunter’s (2008) research, using the same data as Batal, also stated that “self- production of food was not significantly correlated with food security” (p. ii.). In Batal et al.’s the diversity of the food crops produced was not an important factor. None of the results adequately explored the connection to nutrition security, instead relying on a very basic understanding of food security.

Islam et al. (2018) set out to determine if higher farm diversity impacts diet diversity in order to improve the health of Bangladeshis. They acknowledge that the impacts on diet diversity vary significantly by context and the causes for this variation are not fully understood. Using

multiple diet diversity scores against a crop count and species richness score, they found a positive association between farm diversity and diet diversity. However, farm diversity was not the only significant factor for diet diversity; market access, commercialization, non-farm livelihood diversification, and women's empowerment were also positively associated with household dietary diversity. In the study they refer to "farm production diversity" and "household farm diversity" synonymously but fail to delineate whether these terms refer solely to household subsistence production or to commercial production that the household also eats from. In discussions of nutritional adequacy neither the dietary diversity score nor a food variety score appropriately address nutrient quality as they are associated with calorie consumption alone.

These two studies, and the intervention by Fischler (1988; HLPE 2017), highlight the major debate in judging the effectiveness of the enterprise diversification strategy on smallholder food security. While enterprise diversification is not the focus of this research, its inclusion in comparison to livelihood diversification provides an examination of the dominant methods adopted both by farmers on their own, and promoted by development agendas. Batal's finding goes against the common narrative that the self-production of food along with enterprise diversification positively impacts household food security. Conversely, Islam et al. (2018) found the opposite to be true, that more diverse crops on a farm result in more diverse diets. The comparison of these two studies emphasizes that the details of each context are important. A thorough understanding of the locations' natural resource availability and accessibility to established markets determine how effectively enterprise diversification can raise household food security.

5. Potential of Livelihood Diversification in Lebanon

Recalling the requirement for successful enterprise and/or livelihoods diversification laid out in Barghouti et al.'s strategy paper and the above case studies, positive outcomes in terms of . . . seem unlikely in Lebanon. Barghouti et al. (2004) find that an organized strategy for diversification requires a well-designed, multi-stakeholder process combining the investment of the private and public sector along with consultation of the farmers themselves. And Patel's et al. (2015) example of India highlighted the role of government in leading the diversification scheme through actions in health, education, and employment sectors. Lebanese smallholders have not had access to programs easing the economic and political stresses that have resulted in their evidenced forced livelihood diversification. Instead, migration has been the dominate form of diversification (Chalak unpublished; Trablousi 2007). As has been the case in similar contexts across the world, agrarian communities without diversification options often turn to real estate development and the sale of their lands, both of which result in agricultural abandonment (NRM case studies; Lanjouw & Feder 2001). All of the case studies and examples reviewed in Barghouti et al.'s (2004) report would be impossible in Lebanon where farmers have few producer subsidies, almost no extension services (Byiringiro 2013; Hamade et al. 2015), where 1% are able to access credit services (Byiringiro 2013), and the agricultural budget is under 1%-3% (Biddle 2013; Byiringiro 2013; Haggblade & Hazell 2010; Zurayk 2000).

Instead, the government of Lebanon seems to be using the strategy of livelihood diversification as a method to reduce rapid rural to urban migration and not to stimulate widespread rural economic growth (MoA 2014 p.7). Migration to cities has emerged as a prevalent result of the

agrarian transition's displacement of smallholder agriculture and its correlating poverty.¹⁶ However the country appears unable to offer adequate jobs and infrastructure in urban areas to absorb this demographic of displaced agrarian labor and therefore intends to prevent migration. This observation is reaffirmed by the Ministry of Agriculture's Strategy 2015-2019 stating that "growth in agricultural GDP has been more effective at reducing poverty compared to that originating from other sectors, thus contributing to *social stability*" (MoA 2014 p 13). This statement is the opposite of the empirical evidence outlined in the above literature review which credits livelihood diversification as an effective method to reduce agrarian poverty. The objective of the Ministry's statement, and of the document as a whole, is to garner support for intensifying agricultural activities in rural areas rather than reducing livelihoods dependent on limited natural resources through diversifying rural livelihoods and rural-urban relations; in other words to maintain the status quo of Lebanon's struggling agrarians.

While the Government of Lebanon acknowledges that agrarian poverty leads to out-migration in search of sustainable livelihoods, (MOA 2014) its strategy supports enterprise diversification above livelihood diversification. Enterprise diversification, as a way to curb migration's stress on urban infrastructure, ignores its environmental impacts and reinforces the urban-development bias that catalyzes the metabolic rift undermining natural resource health. Hamade et al. (2015) argue against the Ministry of Agriculture's approach suggesting that while it may raise aggregate national food security, intensification will not adequately raise rural farming incomes:

¹⁶ The impacts of male (as the head of household) migration for work on the Lebanese household has been studied by the Arab Families Working Group in 2011. Over 50% of the surveyed households were from rural localities and villages. Although the sample size was very small, the investigation revealed the primary reason for migration was access to employment regardless of the educational background of the head of household. Migrants included those with little formal education as well as those with advanced degrees.

“Future rural development will depend more on engagement with and influence of political processes than on technical assistance packages provided by extensionists” (p. 515). Here, technical packages refer to intensification and its enabling technologies — which are short-sighted solutions acquired by purchase that enhance current practices — while political processes refer to a reassessment of the status quo. According to the case studies and theories previously reviewed, the Government of Lebanon’s agricultural strategy will not effectively reduce poverty or curb rural-to-urban migration.

D. Diversification and Food and Nutrition Security

As explained in the previous sections, both the diversification of livelihoods and of enterprise have been connected to food security outcomes, although with varying results. The connection between food security improvements and livelihood diversification is ambiguous at best with multiple studies showing that factors outside of livelihoods have more significant impacts on household food security. Within the positive outcomes, the methods used to achieve these results varied from second country migration, urban migration, and local farm and non-farm employment. The studies on enterprise diversification and food security are also inconclusive with impacts of diverse home production varying due to third party factors. One factor that all studies had in common was little to no attention to the nutritional aspect of food security, food and nutrition security. While “attaining food security is shown to be one of the key determinants of nutritional status of individuals” (Babu et al. 2009 p. 7), food security without explicit attention to nutritional elements is inadequate as the terms are not one and the same (Jones et al. 2013a). Although the acknowledgement of nutritional requirements is considered under the “utilization”

component, explicit attention to nutrient diversity and quality are rarely considered in the existing literature. The following sections first examine the role of nutrition in food security through the nutrition transition and globalization, before looking at regional diet changes as a result of their occurrence. The paper then proceeds with a review of studies that attempt to measure the outcome of diversification on food and nutrition security.

1. Nutrition Transition and Globalization

Globalization has catalyzed the spread of the nutrition transition across the globe with different impacts for different income levels within a country (Friel & Lichacz 2009; Kearney 2010). While all income levels experience some negative outcomes due the nutrition transition — such as higher exposure to excessively sugary, salty, and fatty foods — only higher income levels receive some nutritional benefits (Akram-Lodhi & Kay 2010b). Friel and Lichacz (2009) confirm the Western Diet’s association with obesity in middle- and low-income countries. According to their review of global studies, as national wealth rises so does consumption of processed foods leading to increased calorie intake through higher concentration of sugar, salts, and fats. They also note the increasing inequalities within the nutrition transition, as the availability of nutritious food follows a distinct social gradient in which those at the bottom are facing reduced access to nutritious foods.

Globalization and trade liberalization are increasing the food options available and reducing the limited seasonality of fresh foods in high-income markets; but in lower- and middle-income countries, the result is the availability of more energy-dense processed foods (Akram-Lodhi & Kay 2010b; Kearney 2010). Lower-income markets include not only poorer urban dwellers

but also agricultural producers. The producers of this food are also impacted by the complex relationship of food security, poverty, and agricultural production. As farmers switch to the production of cash crops they may earn more income but experience a decrease in the local availability of consumable foods (HLPE 2017; Holt-Giménez 2017a). Furthermore, the food they do have access to may not be as nutrient rich as what they produced before. Instead in poorer rural areas, as mentioned by Chege et al. (2015), Hawkes (2008), Nasreddine et al. (2014), and Seyfert et al. (2014), markets offer less nutritious foods. Globalization has been key in spreading the Western Diet accompanied by obesity, overweight, and diet-related health problems including certain non-communicable diseases across all income levels (Abdul Rahim 2014; Friel & Lichacz 2009; HLEP 2017; Nasreddine et al. 2014).

Globalization's impacts on the nutrition transition vary by consumer income level. While higher-income levels often consume more animal sourced foods, like red meat and dairy, they also consume more sodium. Lifestyle changes include increased frequency of eating out and snacking. This combination makes this demographic prone to obesity and overweight (HLPE 2017). On a positive note for nutrition, rising incomes also allow consumers to depend less on local production and pay for more diet diversity by consuming foods from around the world (Seyfert et al. 2014). It is pivotal to note that "healthier" diets tend to be more expensive per-calorie than those with low nutritional value (HLEP 2017). Nabhani-Zeidan et al. (2011) conducted a study finding that Lebanese university students of a higher socio-economic level consumed more nutrient rich foods and fewer carbohydrates than their lower socio-economic status peers.

While higher-income consumers are prone to obesity and overweight due to over-nutrition, lower income level consumers, in all countries, are also prone to overweight and obesity as a result of the nutrition transition. For lower-income consumers, these outcomes stem from low

consumption of nutrient-rich foods, like red meat and dairy, and high reliance on cheap, processed foods. Poor nutrition and high micronutrient deficiencies are common in this demographic and are linked to poor diet diversity (Batal et al. 2007) and to lower food security (Herrero et al. 2017). Lower income households with mothers with lower education levels tend to have higher food insecurity and more frequently transitioned to the Western Diet (Jomaa et al. 2017). The Western diet is associated with obesity and related health problems of Lebanese mothers and in many other high-income countries, as they tend to have more of their daily consumption from low nutrient foods such as bread, sweets, and sweetened beverages. Connections are still being established in lower- and middle-income countries (Jomaa et al. 2017).

2. Western Diet and Lebanese Diet

In Lebanon, the nutrition transition has been well documented through comparisons of the content and health outcomes of Western Diet versus the Lebanese variation of the Mediterranean Diet. Overall the Western Diet has had negative net impacts on the country's health. Changes from traditional diets that transition to consumption of inexpensive processed foods are often correlated to decreasing nutrition status (Fischer 2017).

The Western Diet, as described by Lebanese academics, generally entails the consumption of foods high in calories, fats, sugars, and salts that are energy dense but low in nutrient content (Jomaa et al. 2016; Jomaa et al. 2017). They also note growing consumption of red meat and dairy (Jomaa et al. 2016; Jomaa et al. 2017; Naja et al. 2015; Nasreddine et al. 2012). This Western Diet is often associated with sugary beverages including soda (Jomaa et al. 2017; Nasreddine et al. 2014). Furthermore, the Western Diet concept is not limited to food consumption but also lifestyle changes. Lifestyle and social changes include eating outside of the home and therefore

more packaged, processed, and fast-food (Naja et al. 2015).. Jomaa et al. (2017) and Naja et al. (2015) have also linked this dietary pattern with an increase in sedentary activities. The nutrition transition is more than just a diet change but an alteration of food-related behaviors. Fischler (1988) “notes that food is about much more than macro- and micronutrients; it is intimately linked to identity and social relationships and the subjective and emotional components of food and eating should not be ignored” (HLPE 2017 p. 83-84). As lifestyle choices around food and diets change, so do cultural relationships around food consumption and production.

Given the above mentioned diet content, Western Diets are associated with obesity and negative health outcomes like non-communicable diseases (NCDs) (Abdul Rahim 2014; Friel & Lichacz 2009; Jomaa et al. 2016; Naja et al. 2015; Nasreddine et al. 2012). This diet pattern is also associated with decreasing diet diversity (Batal et al. 2007) — decreasing diet diversity is well acknowledged as an early indicator and coping strategy for food insecurity. The Western Diet, disseminated through the global nutrition transition, has altered not only what is eaten in Lebanon and many other non-Western countries, but the entire culture around the collection, preparation, and consumption of food (Fischer 2017). This adoption of the Western Diet is therefore negatively impacting the health benefits of the traditionally healthy Lebanese diet.

The Mediterranean Diet, and its traditional Lebanese variation, is composed of high plant content and high consumption of whole grains, legumes, and fish¹⁷ with low dairy, meat, and saturated fats (Issa et al. 2009; Jomaa et al. 2016; Naja et al. 2015). The diet encompasses wide diet diversity (Batal et al. 2007; Hwalla et al. 2008) and is generally considered a diet beneficial to

¹⁷ Nasreddine et al. (2006), cited in Zaki et al. (2014), and Nasreddine et al. (2014) reported that Lebanon has a low consumption of fish while the other sources listed above cite fish as a central nutrient component. This variation on the role of fish highlights the difference between a Lebanese-Mediterranean Diet and a more generalized Mediterranean Diet; the articles by Lebanese academics cited in this paper include examinations of both above referenced diets.

health (HLPE 2017; Sofi et al. 2010).¹⁸ This eating pattern is associated with healthy weight (Nasreddine et al. 2014), prevention of morbidity, positively impacted longevity, and NCD prevention (Hwalla et al. 2008; Sofi et al. 2010). In Lebanon, a study on the adherence to a Mediterranean diet found correlations to lower waist circumference and a decrease in body mass index in both men and women (Nasreddine et al. 2014).

Issa et al. (2009) conducted a data analysis of nutrients in composite dishes of Lebanese and French meals. The selection of countries depicts a comparison of a “transitioned” Mediterranean Diet, represented by “an industrialized country of the Mediterranean Basin, such as France” (p. 286) and a “transitioning” Mediterranean Diet represented by Lebanon. This diet comparison offers insight into Lebanon’s potential diet future as it undergoes the nutrition transition that France has already completed, according to the authors. The study found that twice as many Lebanese dishes as French dishes fell into the ‘most favorable nutrient profile’ category — meaning that “Traditional [Lebanese] composite dishes had a better nutrient profile, without necessarily having a lower energy density or a lower fat content than western foods” (p. 292). However, the author’s romanticization of the “traditional way” Lebanese meals are prepared ignores the local realities of the nutrition transition; they assume that most of the foods consumed by this rural Lebanese population are those that they produce for themselves or are attained locally but do not adequately investigate this claim. Furthermore, they rely on a popular cookbook to determine nutrient content of the Lebanese meals, not actual meals prepared in rural households.

¹⁸ The Mediterranean Diet is shown to protect against the risk of non-communicable diseases. Western, high-fat, diets are known to impact “postprandial vascular function, an integrative marker of CVD risk” (Nasreddine et al. 2014 p. 84). Furthermore, diet is a modifiable risk for non-communicable diseases.

3. Livelihood Diversification and Nutrition

While diversified livelihoods often result in improved income, they do not necessarily lead directly to improved food and nutrition security. Within the limited studies on this relationship, nutrition is often, inexplicably, ignored. The diversification from agricultural based livelihoods can lead to less nutritious and diverse diets where vegetables and fiber are consumed less frequently while red meat, processed meat, and sodium consumption increases (HLPE 2017). The change of diet sources from the land to the supermarket is a sign of the global nutrition transition that accompanies agrarian transitions. Relying on income instead of household production for sustenance *may* expose the household to another set of food security related challenges. Under the nutrition transition calories are more likely to come from marketed processed and packaged foods offered in supermarkets (Akram-Lodhi & Kay 2010b; Seyfert et al. 2014) than from the nutrient diversity associated with household production (Sibhatu & Qaim 2018). Income from diversified livelihoods is just one factor influencing household food and nutrition security; food is just one of many uses for income.

Nutrition security has been complicated by the global nutrition transition as it has played a significant role in changing diets and food systems in Lebanon and the world. However the impacts are highly context specific. The diversification of livelihoods in agrarian communities implies a greater reliance on the market — both global and local — to meet food and nutrition security. This diversification furthers the metabolic rift of agricultural production of foods from local natural resources. Markets are influenced by political and economic systems which often prioritize the import of cheap, internationally traded foods.¹⁹ Due to this change, foods may be more

¹⁹ Holt-Giménez cites the experience of one smallholder in Mexico as a representative example of how the nutrition transition and penetration of the global food regime impacts this demographic. The farmer shifted from primarily

readily available in commercial markets like supermarkets in rural locations but the nutritional quality may not be as high as what was previously produced by the households.

4. Nutrition Terminology

When nutrition is considered, the lack of established lexicon and discussion on what constitutes adequate nutrition obscures consensus. The terms ‘diet diversity’, ‘nutrient diversity’, and ‘nutrient quality’ are used interchangeably without clear definitions. While diet diversity is a common proxy for nutrition, consensus is emerging that it is not an adequate measure of nutrition quality or adequacy (Kennedy et al. 2013; Mozaffarian 2016; de Oliveira 2015). de Oliveira et al. (2015) and Mozaffarian (2016) have found that it is the diversity of *nutrients* and diet *quality* that has important implications for health, not diversity of diet which refers to a diverse number of foods. A diverse diet may only be diverse in “unhealthy” or less nutritious foods such — as a wide range of those high in sugars, salts, and fats while still low in essential micronutrients. Statistically this diet may still be calculated to be diverse, but it does not adequately constitute nutrition. The terms diet quality and nutrient diversity more accurately reflect the intended nutritional outcomes of Food and Nutrition Security.

subsistence based agriculture with some non-farm employment, into the capitalist food system under the Green Revolution. After a few good seasons of high production, his farm began to produce significantly less, he tried to spend more money on fertilizers and pesticides, and on renting more land but to no avail. As income declined, the area-wide transition to cash crops meant that food crops were infrequently grown and their prices rose as they now had to be purchased from other regions. In this way, the household fell into poverty as they could not sell their crop at a profitable rate and their food security therefore declined. The farmer and his household were not able to attain enough food and the food they did eat, from the small amount of cash from the cash crop, was less diverse than when they had previously produced the major of their consumption needs from near their own home (2017a).

5. Case Studies of Livelihood Diversification and Food and Nutrition Security

In the previous section, diversified livelihoods have been shown have an inconclusive impact on food security; the case studies largely examined how income generated from non-farm livelihoods can be used to purchase food. The relationship of income to food security is subject to multiple other factors that can interfere with income translating directly into better household food security. The discussion of the impacts of livelihood diversification is largely lacking the inclusion of adequate nutritional measurements. While the pathway from livelihood diversification to poverty reduction and food security is taking shape, the pathway between livelihood diversification and nutrition security — including both nutrient diversity and quality — has even less empirical research.

Households with diversified livelihoods are therefore subject to food availability and financial limitations which fluctuate with the global market — which they are now dependent on for food. In other words, while livelihood diversification can improve access to food through income (*if* adequate, nutritious food is available for purchase in the market), it does not necessarily improve stability or utilization including quality.

Ghattas et al. (2013) study the food and nutrition security status of forcibly settled Bedouin communities in Lebanon. They found that many households had diversified their livelihoods away from agriculture since their settlement in areas unfavorable to agriculture. However, diversification did not improve food and nutrition security, as “[F]ood-insecure households had a significantly higher mean total of working individuals than the food-secure households” (p. 1668). This result indicates that within their area of residence, the Bedouins would be better off

producing their food than earning an income with which to purchase it. Food insecurity was negatively associated with food production as well as with diet diversity. The authors conclude that cultivation may help reduce food insecurity in the face of shocks, like the global food crisis that occurred during this study. A question remains whether the relationship would be the same during “normal” or lowering food prices or if the study’s findings were swayed by its timing. The study acknowledges that increased reliance on the market for food puts households at potential risks for food insecurity and for lower diet quality due to volatility in global availability. Although there are also risks associated with household cultivation, certain communities may be better equipped to deal with one set or risks above the other depending on their assets and resources.

Babatunde and Qaim (2010) intend to fill the knowledge gap on the relationship of livelihood diversification to agrarian food security by looking into the impacts of off-farm income on food security. Their measurement of nutrition includes diet quality, micronutrient content, and child anthropometry. Although their literature review is surprisingly short, its brevity highlights the lack of thorough research considering livelihood diversity and food and nutrition security. Their mixed methods approach uses multiple measurements of food security, a food consumption score with a seven-day recall period, expenditure module, and a standardized questionnaire inquiring about on- and off-farm income over the previous 12 months. Their results demonstrated that off-farm income increases with household income meaning that the poorest quartile in their study was found to have the lowest proportion of off-farm income. They also noted that households with off-farm income had higher diet quality measured by calories from high-value foods such as fruits, vegetables, and animal products while the proportion from starchy foods was much lower.

Their analysis indicated that the source of the income was less important than the level of income, suggesting that on-farm income is not a fruitless endeavor if the production is profitable. The study also indicated that off-farm income contributes to farming activities. This finding reinforces other studies that find that households with off-farm income hired more labor, used more input such as fertilizers and pesticides, and had around 10% higher food output (p. 309; Thomas-Hope 2017).

Despite the methodological relevance of Babatunde and Qaim their paper is not without criticism. They begin by making the uncited assumption that, “Nutrition impacts might be positive, because off-farm income contributes to higher household income and therefore better access to food” (p. 303). However, food is not always the top priority every month for every household and this logical conclusion cannot be assumed. The paper also highlights an academic bias of the food security literature in which developing countries are disproportionately examined; this limitation suggests that food insecurity and low agricultural income are not problems faced in middle or higher-income countries as well. Furthermore, the paper examined the diet impacts in a vacuum by ignoring the impacts local markets have on meeting nutritional needs once households shift away from subsistence production. The paper stated that many of the participants did not have access to electricity, water from a tap, or a paved road, and the mean distance to the nearest market was 11.7 kilometers. Without deeper analysis of these factors it is unclear if households further from roads and markets would have the same financial success and/or access to off-farm incomes; and, if they did, if these households would be able to maintain a sufficient and quality diet from a distant food source.

Herforth and Ballard (2016) review indicators used to measure the impacts of agriculture on nutrition, finding that there is limited empirical evidence from which to draw conclusions. The authors argue that, “Understanding the true impact of agriculture on nutrition has been limited by the scope of available indicators” (p. 8). Existing indicators often focus on consumption and diet diversity *but not* on nutrition. The modern relevance of the agrarian question and expanding definitions and impact of food security suggest new indicators could be highly useful in this dynamic field of study. Most of the studies that the authors reviewed assessed diet quality via household dietary diversity scores, demonstrating a shift from the early 2000s when indicators focused on the consumption of individual food as proxies for food security (Herforth & Ballard 2016). It is now widely recognized that a single food or food group cannot adequately demonstrate food and nutrient security. Instead, discussions around diet diversity and how to enhance nutritional diversity and nutritional quality have expanded. The authors recognize that one pathway to enhanced nutrition comes from increased market interactions in which farmers have incomes to exchange for more diverse food *if* diverse food exists for purchase in the local area. In conclusion, the authors believe that nutrition has not been well measured and that better indicators need to be developed to fully understand the impact pathways of agriculture on nutrition.

In the three studies on livelihood diversification and food and nutrition security, no common conclusion was reached. Although it is impossible to draw wide conclusions from only three studies, the representation in this research demonstrates how few studies on this topic current exist. On the topic of livelihood diversification, impact analysis generally does not extend beyond income change since identifying causal chains is incredibly difficult given the interaction of other factors. When studies do address food security, they rarely address food and nutrition

security adequately. The three studies above, all of which focused on lower- and middle income countries, highlight the fact that results vary by location, level of market integration, and method of nutrition measurement. Herforth and Ballard (2016) reaffirm the conclusions of both studies stating that food and nutrition security can be reached through a combination of enhanced market connections but this is dependent on the strength of these connections. The resounding conclusion from these studies indicates that the topic needs further investigation and clarity of measurement methods.

6. Case Studies Enterprise Diversification and Food and Nutrition Security

Since studies on the impacts of enterprise diversification on food and nutrition security are more common than those on livelihood diversification and food and nutrition security, this section reviews the outcomes of enterprise diversification. Although some studies exist addressing the impacts of enterprise diversification on food and nutrition security, more often than not nutrition is left out of the conversation as it is also done in investigations of livelihood diversification.

Although they do not address livelihoods within the study, Zaki et al. (2014) draw attention to how Lebanon's tradition of diverse, rural household gardens help to maintain food and nutrition security under times of stress. This household garden tradition helps to bolster Lebanon's status as a net food-importing country and the impacts this has on the nutritional vulnerabilities of its urban dwellers. Since Lebanese households spend an average 20% of income on agricultural commodities, the country is sensitive to international price changes. In their study on eight micro and micro-nutrients — protein, zinc, potassium, vitamin A, vitamin C, calcium, iron

and folate — the authors found a notable decrease in nutrients related to the 2008 food price shocks. The decrease in consumed nutrient quantities is related to diet pattern changes in accommodation of price changes. They found the largest aggregate decreases occurred in urban areas of Beirut and Mount Lebanon while the rural area of the Bekaa experienced the smallest decrease in nutrient consumption; noting that the difference is most likely tied to the higher percentage of agricultural based livelihoods in the Bekaa ,the authors speculate meaning that residents may have been able to bolster nutrient deficiencies with their own production.

In practice, the relationship of household production and diet diversity is complicated and impacted by a multitude of factors. Jones, Shrinivas, and Benzer-Kerr (2013b) state that globally most farmers are already engaged in some type of “mix of subsistence and market-oriented production” (p. 2) and that this dynamic requires a more nuanced examination. In a study of smallholders in Malawi, they confirm that household production is linked to diet diversity. Smallholders’ diets are impacted by their production via two primary paths: through the consumption of their own production of vegetables, fruits, and animals sourced foods and/or from income earned from selling crops/agricultural products on the market. In most situations these two pathways function together. Jones et al. (2013b) found that, “The production diversity of farms in Malawi was consistently positively associated with the diversity of household diets” independent of household wealth and social factors (p. 8). They also found that when looking at farm diversity and diversity of household diets, crop and livestock count was greater in woman-headed households. Data also revealed that wealthier households dedicated more land to cash crops which may suggest that the two pathways to nutrition diversity — via consumption of diverse home

production or use of income to purchase food — vary between income levels for an overall similar result. This study did not examine how diet diversity and production diversity relate to the more adequate nutrition indicators of nutrient diversity or diet quality.

Sibhatu and Qaim (2018) found that the impacts of diversification of farm production — i.e. enterprise diversification — on food and nutrition security for smallholders in Indonesia, Kenya, and Uganda would lead to better dietary diversity from greater cash income via market sales than from consumption of diversified subsistence production. They argue that this strategy of diversification — further or initial market integration — would enhance food and nutrition security of households in all locations. The authors acknowledge that adequate nutrition, as an aspect of food and nutrition security, depends on the consumption of a range of nutrients. This means that food quality is just as important as food quantity. In order to enhance smallholder nutrition security, they analyze whether production diversity is a logical way to pursue this agenda based on the understanding that smallholders obtain a significant amount of their food, and therefore nutrients, from what they produce. They state, “Most of these studies suggest that farm production diversity has a positive influence on people’s diets, although the magnitude of the estimate varies” (p. 48). Citing one of the author’s earlier works, in which “Sibhatu et al. (2015) used data from various countries and showed that the production diversity effect tends to be small, and sometimes insignificant,” they suggest that access to markets may be more impactful. They complicate the understanding of nutrition diversity through their selection of indicators, clarifying that it is not the number of different foods or food groups consumed that matters. Instead, the important factors are the nutritional diversity contained in this food and the presence of all essential nutrients — although the authors use the term “diet diversity” their application more

accurately aligns with the understanding of “nutrient diversity” or “nutritional quality.” They use a Household Dietary Diversity Score and a food group classification score to ensure that nutrient diversity is included in their examination of food and nutrition security. They conclude that the sale of agricultural products for income enhances food and nutrition security more than diversified production.

Loos and Zeller (2014) documented that the income generated through sales of home farm products, in this case milk, raised dietary quality through food purchase. More diverse and nutritious foods were bought but the quantity of food consumed was not changed by the generated income. In the pastoralist Maasai community in Tanzania, women are responsible for collecting milk as well as purchasing and distributing food for her household. The Maasai have faced forced settlement as well as loss of grazing lands due to land privatization and climate change. Both factors have forced communities to diversify their enterprises into livestock intensification and also to diversify crops for home consumption. Only 0.7% of those surveyed had non-farm employment (p. 81). The researchers found that it is not the diversity of home production that influences diet and nutritional diversity as much as access to markets. Market access facilitated both the sale of milk and the purchase of diverse foods (Loos & Zeller 2014). Those who sold milk, especially to a milk-collection center, were found to have higher and more diverse vegetable consumption, including leafy greens and higher consumption of “luxury” foods such as fruit and soft drinks. However, this diversity may not contribute significantly to enhancing health as more variety was observed in terms of food items consumed but less variety in the number of food groups consumed. This difference highlights the difference between diet diversity — what the community achieved by selling milk — and nutrition diversity which comes from eating a larger variety of foods with different nutrients.

Unlike the studies on livelihood diversification and food and nutrition security, enterprise diversification studies more frequently address nutritional impacts. This may be due to the agricultural nature of enterprise diversification and understanding that smallholders consume a significant portion of what they produce (Barghouti et al 2004). While enterprise diversification and diversified household production are seen to have positive impacts on food and nutrition security, the measurements of nutrition are often weak. Jones et al. (2013b) rely on a diet diversity measurement although it has been established that a diverse diet does not equate a nutritious one. Loos and Zeller (2014) use the assumption that higher incomes from diversification will translate to enhanced food and nutrition security, but this assumption has also proved to be weak and inconsistent. Overall, more research and a standardization of nutrition measurements is needed to adequately understand the impact of enterprise diversification.

While both livelihood and enterprise diversification can result in higher household income with which food can be purchased, livelihood diversification (non-farm) increases dependence on the market for food as less time and energy can be devoted to home production. Livelihood diversification also increases the metabolic rift on the household scale as less nutrients are consumed from the land and available as waste to be returned to it. Under enterprise diversification, farmers may transition to non-edible cash crops, but may also expand consumable crop production, or maintain a household plot alongside non-food crops. Either way, enterprise diversification keeps farmers working their lands and provides an opportunity to continue producing for household consumption. However neither strategy has clearly documented, consistently reported impacts on food and nutrition security.

The sections above highlight that the relationship between enterprise diversification and food security, including nutrition outcomes, has been addressed — although the inclusion of nutrition could be enhanced to better address utilization. Comparatively, studies of livelihood diversification and food security are fewer in number and even less likely to include nutritional components. In terms of livelihood diversification, the resulting income generation *can* positively impact food and nutrition security but market conditions must be favorable, particularly for an often poor demographic. This requires the existence of stable local markets which offer diverse and nutritionally adequate foods. In the case studies reviewed, livelihood diversification had an unclear impact on food security. Enterprise diversification had weakly positive impacts on diet diversity and nutrition. These situations highlight the differences between food security as calorie consumption and food *and* nutrition security as well as the difference between nutritional diversity and nutritional quality. The exchange of time from agriculture to other livelihoods reduces the time and energy a household may invest in cultivating food at home for consumption. As less is produced at home, smallholders are required to purchase at least some of their food from the market with their incomes. New livelihoods and their social and ecological relations therefore become necessary for even simple household reproduction and the meeting of basic food and nutrition security requirements. Additionally, local markets must offer a consistent variety of fresh and nutritious foods at affordable prices if income is to translate to food and nutrition security. Smallholders' diversified livelihoods are often not lucrative livelihoods in which case food purchase options are limited and often energy dense but nutrient poor.

E. Metabolic Rift

As food systems change in response to the global transportation of nutrients, a distinct one-way relationship has developed between the production of rural resources and their consumption in urban centers. This movement of nutrients, in the form of capitalized food and goods, from rural to urban without a return of nutrients to the rural is referred to as the metabolic rift (Foster 2000; Holt-Giménez 2017a; Marx 1981; Moore 2000). This global movement is the progressive transition to the third global food regime (McMichael 2009). The metabolic rift in agrarian-based communities can occur in the ecology cycling or in the economic cycling, both of which contribute to the loss of rural self-sufficiency and foster new social relationships with urban centers. Self-sufficiency is premised on the recycling of nutrients for the long-term health of the natural resources used by agricultural systems which sustain rural agrarians and the strength of local economies. This rift is observable in the growing global presence of supermarkets and the separation created between the term agricultural and rural. Supermarkets appeal to all income levels of consumers entrenching “subordination of agriculture to capitalist production” (Moore 2000 p.141). While supermarkets may promote stability and availability of food to consumers, at the same time the separation of consumer from rural, producing landscapes is widened. These factors intensify the metabolic rift through consumers’ disassociation of the process, labor, and resources that their food requires.

The disassociation of nutrient cycling between primary and secondary consumers is increased under urbanization. Growing cities depend on imported resources to support their non-agrarian populations who do not contribute energy or nutrients back into the natural resource base decoupling consumption from the processes of production. In this way, the urban becomes more dependent on the rural for resources, especially food, that seems to come from nowhere

and from no one (McMichael 2009; Moore 2000). As consumers disassociate resources from their rural sources, food becomes just another commodity for purchase without consideration of the lifestyle and food security of those who work to produce it. The rift between food and natural resources prevents the recycling of nutrients back to agricultural areas and therefore limits the future production of food for both urban and rural residents. Farmers are then forced to seek new sources of nutrients, such as synthetic inputs or nutrient imports from other areas, which can further increase the distance between natural resource and their end-users.

1. Supermarketization

Supermarketization refers to process by which consumers change both the location of purchase and their relationship with the food that they consume. This shift is emblematic of the global food system change from local, traditional commodity-specific markets to a ‘modern’ system. Under the modern system a wide variety of foods from all over the world are brought together in one building and sold under processing and packaging, no longer from the hands of the farms or producer. The supermarketization of the developing world has become emblematic of the nutrition transition and expansion of the global food system which fosters the metabolic rift. Together, these factors deepen the rift by further removing and concentrating rural resources and nutrients in urban centers as a more rapid rate. Large quantities of food are transported and stored in supermarkets in order to be distributed to urban populations; supermarkets therefore have emerged as efficient storage networks for fresh as well as packaged foods although not without negative side-effects.

In this rift of the socio-ecological metabolism, one such side effect is the decrease in consumers’ comprehension of where food originates and the effort required in its production. A

plethora of food is always available regardless of origin or season. This further enforces the metabolic rift as understandings of food production process is separated by plastic wrap, cardboard, and marketing campaigns enforcing the idea it comes not from somewhere and by someone's hands, but from nowhere and no-one (McMichael 2009); and also touching on the emotional and aesthetic impacts of a detachment from the natural landscape. In lower- and middle-income countries, where food systems have been associated with shorter supply chains, supermarkets have been proliferating since the 1990s with significant impacts on diet and nutrient access (Chege et al. 2015; Hawke 2008). The intervention of transnational food corporations in line with the third food regime and globalization has increased the length of food chain, rifting the distance between consumers and producers.

Supermarkets not only alter how non-agrarian consumers, i.e. non-agrarians, interact with their food systems and their diets, but also the relations of agrarians to their food under the socio-economic metabolism. The most significant rifts occurred during agrarian transitions from subsistence to cash crops to engagement in a global food system (Akram-Lodhi & Kay 2010b; Holt-Giménez 2017). These changes can have positive or negative impacts on producers depending on their level of capitalist integration and the extent of control the vendors exercise over the production process.

Chege et al. (2015) have examined how supermarketization has impacted producers in Kenya and highlight the beneficial outcomes. Their study noted higher calorie, vitamin A, iron, and zinc consumption of smallholder supermarket producers. They connect this outcome to their enhanced incomes, altered crop production choices at the farm level, and changes in agricultural gender roles. On the topic of nutrition, they developed simultaneous equation models to predict

the influence on nutrition. They determined an overall positive impact although there are some potential negative outcomes as well — one such impact was the reduction in women's control over household agriculture as it shifts male-dominated. Kenya is an interesting example for Chege et al. (2015) study since it has only recently begun the supermarket transition. The study therefore contributes to literature on the intermediate impacts since most data exists on fully transitioned countries. This study also focuses on the impacts of nutrition outcomes for the farmer household, another topic with limited empirical evidence. Chege et al. find that the integration of Kenyan smallholders into the supermarket system raised incomes which translated into more food purchased, which was often found to be of better diet quality and more nutritious than their own production. Results were more positive for households with longer-term supermarket connections. In this example of a lower-income country undergoing supermarketization, it was found to have a positive impact on smallholders' food security. This study did not examine to what extent purchased foods replace produced foods in the smallholder diets or if the purchased foods were locally produced, traditional foods or imported from other regions.

Supermarkets enforce the socio-ecological metabolic rift of consumers from their natural environments through their offering of cheap, convenient, ready-to-eat foods. Supermarkets are generally able to sell foods for cheaper than traditional markets, as they buy many products at once, can set prices, and operate on economies of scale (Hawkes 2008; Seyfert et al. 2014). Cheaper products are often the result of cutting supply chain costs, the impacts of which have been examined on farmers in Lebanon and Qatar in Seyfert et al. (2014). Prices for consumers are kept low while producers supply chains are undervalued to create supermarkets' profits. When the supermarket management seeks to reduce prices to attract consumers it is the small

farmer, the most widely food insecure and hungry demographic, who experiences income cuts; these cuts further reduce *the farmers'* ability to purchase food. Since a main objective and effect of the supermarket transition has been to draw consumers away from traditional markets (Hawkes 2008), it is the owners, operators, and workers of the traditional markets — who are also food consumers — who have the greatest potential to be impacted. In this way, the metabolic rift is widened not only through the nutrition transition and focus on global trade, but also through the increased challenges presented to smallholders to increase production while their profits are low and the nutrients exported from their land are no longer returned.

Hawkes (2008) examines the dietary implications of supermarkets on consumers from the period of 1983 to 2008 focusing on “developing” markets. In lower- and middle-income countries, the proliferation of supermarkets is related to rising incomes, urbanization, and changing consumer demands. These outcomes are related to the nutrition transition’s promulgation of calorie-dense and nutrient-poor foods (Chege et al. 2015; Fischer 2017; Hawkes 2008). While supermarkets make this type of food more accessible to all consumers, they have different impacts across the gradient of income levels; when examining the impacts, it is pivotal to consider the implications across these divides.

The origin of supermarkets reflects the income gradient bias. Initially opened for wealthier demographics resident in suburban areas or rapidly urbanizing ones, supermarkets focused on provisioning packaged and processed foods for the convenience of working families. Shortly afterwards, they diversified the products sold to include fresh foods and those minimally processed (Hawkes 2008). The focus on serving wealthier consumers has often left poorer areas devoid sources from which to purchase food as other vendors become less competitive and leave poorer

areas. “Where consumers are less well-served, the dietary implication is that they are more likely to consume a lower quality diet than those in other neighbourhoods” (Hawkes 2008 p. 666). Supermarkets’ impacts on “health” are therefore divided. For example, the year-round availability of fresh fruits and vegetables is possible in supermarkets but only for those who can afford the high prices due to the long distance supply chains. With the common exception of fresh fruits and vegetables, supermarkets tend to offer cheaper foods compared to traditional or open air markets making them more attractive to poorer consumers but often less accessible given their location further from poorer areas. As a result, wealthier consumers gain access to a stable supply of nutrient rich fresh foods year round, while lower income consumers gain stable, year-round access to cheaper processed and packaged foods. Therefore, Hawkes’ study highlights how supermarkets have developed to increase the diet and nutrient diversity of only those consumers who can afford to access it while decreasing the nutrient quality of less well-off consumers.

2. Rural v. Agriculture

The metabolic rift’s interruption of nutrient recycling between urban centers of consumption and rural centers of production has contributed to a reexamination of the relationship of rurality and agriculture (Ellis & Biggs 2001; Van Tongeren 2008). The necessity of this reexamination is easily recognized in changing livelihood patterns; livelihood diversification of rural agrarian communities and agrarian transitions in the form of migration are common examples of this rupture. Agrarians are struggling to maintain decent living standards related, in part, to the

pressures applied to them from integration into supermarket systems, despite the increasing demand from growing urban areas. Many are searching for alternative livelihoods with less vulnerability and more stable profits.

Van Tongeren (2008) simplifies this transition between farm and non-farm livelihoods stating that “non-agricultural activities assume an increasing importance for the development of rural areas, and the identification of “rural” with “agriculture” is less and less valid” (p. 22). Low agricultural incomes prompt farmers to consider abandoning and/or selling their land to compensate for the loss. The change in livelihood sources is accompanied by a change in social relations between the rural and urban as the two distinct geographic locations blur together. As agricultural areas transition into expanding urban centers, rural lands’ production value decreases while its exchange value increases enticing farmers to sell their land for a more immediate income. These impacts contribute to making agrarian livelihoods insufficient.

The change in livelihoods results in new methods of natural resource management that often do not consider the longevity of their utilization. The current food system outlined above threatens the longevity of natural resources by “hinder[ing] the operation of the eternal natural condition for the lasting fertility of the soil” (York 2010). As soils are degraded and turned to other uses, their future agricultural potential is further reduced. Following this trend, socio-geographic changes result in a confounding combination that further widens the divide as aspects of urban environments creep into and take over rural landscapes furthering the metabolic rift. Davis (2006) best explains this phenomenon citing Magdalena Nock: “Globalization has increased the movement of people, goods, services, information, news, products and money, and thereby the presence of urban characteristics in rural areas and rural traits in urban centers” (p. 11). While

these two geographic centers may be moving towards each other in terms of an 'import'/'export' dynamic, the lack of resource cycling foreshadows ecological demise.

CHAPTER III

LEBANON: HISTORICAL CONTEXT AND TRENDS

This section reviews the agricultural history of Lebanon using a timeline from 1950 to present day. Along this timeline, important events and transitions are highlighted in order to demonstrate the challenges to smallholders and their ability to produce adequate livelihoods from agricultural activities. This section begins with a brief review of the lingering influence of the silk industry on Lebanon's agricultural economy. Although outside of the stated timeline, the silk industry's influence cannot fully be ignored in any discussion of Lebanon's agricultural history. Then, focusing on the 1950s to present, the influences of urbanization and migration, inequities execrated under urban-biased development agendas, and changes in the economic systems enhanced by neoliberalism are reviewed. These factors have combined to force agrarian transitions with impacts on the food and nutrition security of both those who work to produce food in Lebanon as well as of urban consumers. This section concludes with an examination of current trends in the economics, urbanization and migration, and environment as they relate to shaping the future of Lebanon's agricultural sector.

A. Silk Industry

1. Silk Industry and Early Export Focus

Under the Ottoman Empire, the elite families of the self-governing area of Mount Lebanon cultivated an early focus on non-food products, most notably silk. They prioritized international agricultural trade above domestic agriculture indicating an early urban development bias

(Firro 1990; Makhoul & Harrison 2002; Traboulsi 2007). This interest in international trade existed prior to the imposition of international finance institutions in the post-Civil War (1975-1900) development period. While laissez-faire and neoliberal economic systems would later have deep impacts on continued development, Lebanon initiated early forms of these economic systems.

Prior to the expansion of the silk industry in Mount Lebanon, peasants were historically engaged in subsistence sharecropping under the Ottoman Empire's tax-farming system. The Ottomans used large landowners to oversee the stability of their empire in Lebanon. These local landowners exploited their tenants to pay taxes to Istanbul; uprisings over access to land and rents were common as peasants struggled under the system (Traboulsi 2007).

The silk industry's expansion beginning in the 1860s²⁰ contributed to a shift in land tenure to smaller silk-producing monocultures which were sometimes owned by peasants (Firro 1990). Under this industry, farmers produced mulberry bushes for silkworm consumption and raised silkworms that produced the raw material. While peasants continued to suffer from exploitation under silk's expansion, it also marked the beginning of Lebanon's history as a country of small producers (Traboulsi 2007). As the large estates owned by prominent families were broken down under silk production and their power eroded without the development of a concomitant power, peasants were able to accumulate some land. This tenure change was aided by the emigration of nearly one third of the population of Mount Lebanon out of Lebanon in search of live-

²⁰ Although silk had been widely cultivated around the areas of modern Lebanon and Syria since the 7th century, it was not heavily exploited as a capital producing commodity until the 19th century (Firro 1990). And therefore the changes in production systems and land tenure of those cultivating it did not experience as profound a change until the 1860s when silk became a monoculture taking over almost 80% of the cultivatable land in Mount Lebanon (Traboulsi 2007).

lihood opportunities (Traboulsi 2007). However the new landowners' integration into the silk industry did not result in independent small enterprises but in heavy dependence and restrictive contracts with powerful merchants.

The demand for silk pushed a transition from subsistence tax-farming supporting the Ottoman Empire, to a cash-crop economy and the breakup of communally used lands (albeit for some peasant ownership). Peasants who had previously grown food for their own consumption — although heavily taxed — were now forced to grow exclusively mulberry to accommodate the capitalist demands of this monoculture. This transition enriched only their landowners and/or merchants while it decreased the food and nutrition security of the peasants and contributed to burgeoning unrest (Firro 1990). Expanding mulberry production led to the loss of traditional mixed cropping and management systems, the decline of the agro-silvi-pastoral system, and shared use of common lands in Mount Lebanon (Rachid 2007).

As competition from other markets and the beginning of World War I slowed Lebanon's silk production, another agrarian transition began. Those who did not own land or those who could not afford to transition away from silk and mulberry to new crops, transitioned to wage laborers again altering the socio-economic dynamics of rural Lebanon. "The commodification of labour underpins deeper processes of wholesale commodification across the rural economy as a whole, and the concomitant transformation of the purpose of farm production, from production for use to production for exchange" (Akram-Lodhi & Kay 2009 p. 21). Lebanon's silk production concluded between the 1930s-1940s, but instead of experiencing growth in small commercial farms as predicted by Mellor (2017) and Harriss (1991), rapid consolidation became capitalism's new oppressive force furthering migration as an output of agrarian transition (Traboulsi

2007). While small and fragmented land ownership remained the norm across Lebanon, smallholders' production was not well integrated into the global market nor well accepted into Lebanon's urban market — outside of fruits and vegetables — leading to hardships for rural agrarians.

2. Decline of Silk

With the end of the silk industry and Lebanon's independence shortly afterwards, development began a new phase in which agriculture was secondary to Lebanon's unique position on the Mediterranean Sea as the connection between North Africa, Southern Europe, and the wider Middle East. This new phase brought rapid urban development which excluded the concerns of rural communities and resulted in their forced migration into urban areas in search of more sustainable livelihoods. "After independence in 1943, economic policies continued to serve the interests of the urban elite... Agriculture and rural development were almost completely neglected... and the result of this *laissez-faire à la libanaise* was growing income inequality and uneven territorial development, with massive rural–urban migration creating economic roots for social unrest (Gaspar 2004)" (Hamade et al 2015 p. 494). Given the advantages related to trade and finance, agricultural development continued only moderately, primarily through private investment as urban sectors were prioritized by the government.

B. Historical Timeline of Agrarian Transition

1. 1950s-1970s Burgeoning Unrest

In the 1950s, burgeoning unrest began to be seen in agrarian communities as sustaining rural livelihoods became increasingly challenging across rural Lebanon. Unrest in agricultural

areas grew under the looming threat of Civil War and increasing instability as the 1960s and 1970s progressive modernization of the agricultural sector, and its ensuing capitalization, pushed struggling agrarians across the country into action. Although this transition out of the silk monoculture contributed to dismantling the widespread sharecropping system, it furthered rural-to-urban migration as ex-sharecroppers searched for new livelihoods. This significant wave of migration influenced national elections. In the 1972 general elections “massive migration toward the cities rendered the rural basis of the electoral system obsolete... no more than 20 per cent of the inhabitants of the suburbs of Beirut voted in their localities” (Traboulsi 2007 p. 171). The rest of the inhabitants returned to their home villages; the expansion of urban center was due primarily to the arrival of rural Lebanese.

Commercialization and financial consolidation of growing industry resulted in agricultural land dispossession and an increasing demographic of poor and unemployed. The few families that dominated the industrial and agricultural sectors increased their profits by forming monopolies and expanding their purview. This increasingly squeezed farmers who were not part of influential families. According to Traboulsi,

“[The] salient characteristic of this period was the rising encroachment by the commercial/financial complex on industry and agriculture... 57 family ‘holdings’.... controlled... 52 per cent of the capital of the SARLs in trade, agriculture and services... Twenty-five brokers who also owned the main refrigerated storehouses controlled two-thirds of the market for apples; 20 brokers controlled 81 per cent of the market for citrus fruits (three of whom controlled a third of the market), and two firms practically controlled the imports of insecticides and fertilisers... 20 merchants controlled 85 per cent of the import of food products.” (pp. 156 - 158).

In the 1970s, Lebanon was already functioning as a neoliberal economy²¹ albeit without the trademark integration in the World Trade Organization — which is currently a stagnated process in Lebanon started in earnest in 1998-99 (Biddle 2013). Lebanese farmers primarily produced for export since domestic markets were saturated by lower-priced imported goods meaning there was no room for local agricultural production.²² In the 1970s only 15% of domestic food consumption was produced within Lebanon while 2/3 of exports were made up of poultry, fruits and vegetables (Traboulsi 2007 p. 158-159). The export-dependent trend was prevalent across most sectors, not only agriculture.

²¹ The trademarks of a neoliberal economic system, embodied by membership in the World Trade Organization, state the goal of leveling the international economic playing field. This is accomplished through the abolishment of unfair or discriminatory trade barriers which allow all partners to trade their goods, services, and intellectual property across the world. This agenda follows the principles of competition and comparative advantage as the main regulators of global free trade (WTO 2018).

This system, and its central perspective that competition and supply and demand are adequate to create ‘free trade’, hinges on the reduction of governments’ regulations over their import and export controls. Critics of the system point out that reducing trade barriers alone does not create an equal and freely competitive system. Some countries, primarily wealthier counties, are able to provide substantial producer subsidies, the outputs of which can then flood foreign markets with cheap goods by undercutting that county’s local production costs (Akram-Lodhi 2010b; Biddle 2013). Focusing on trade is therefore inadequate in “leveling the playing field.”

Relying on Ricardo’s 1817 concept of “comparative advantage” — which has been adopted by proponents of neoliberalism who believe that trade is the solution to food insecurity — is somewhat antiquated in today’s globalized world. The root belief is that this mode of trade will support sustainability and economic growth through global efficiency gains. However, considering the changes in global mobility and globalization 200 years after his theory challenges its continued relevance. In today’s world, people move across borders independently of commodities (often looking for employment), investment seeks absolute advantage above comparative advantage. High concentration by transnational companies of the food market allows them to set prices which severely reduce competition. Additionally, the theory’s failure to consider transportation costs and all of their negative environmental externalities render the concept less relevant (Clapp 2016). Following Clapp’s argument, Lebanon and its experience with migration render the theory less appropriate for its economic development trajectory. The dominant idea that trade liberalization, supported by comparative advantage, will lead to global food system sustainability when in fact the numbers of hungry people have not significantly decreased as trade barriers have progressively been reduced (Clapp 2016; HLPE 2017) further highlight that Lebanon’s goal to join to join the World Trade Organization will not likely reduce hunger and/or food and nutrition insecurity.

²² Lebanese economists Nassib Ghobril, has stated that Lebanon is more than ready to join the WTO as it already operates on many of the WTO principles: “Lebanon has a free-market economy, based on trade; our imports are higher than our exports, so with the WTO membership, that would eventually help Lebanese companies access other markets.” Furthermore, he stresses that the country has low tariffs making the continued elimination of other trade barriers easy to implement. Agricultural goods, primarily fruits and vegetables, are the exception to low import taxes with 70% tariffs on foreign imports (Biddle 2013).

The laissez-faire economy has a wide impact across Lebanon, especially on the agricultural sector. The agricultural market, already heavily concentrated within prominent families, smoothly transitioned into a neoliberal economy. The neoliberal economic system allowed for capital to take over the market and further reduced interventions of the government to regulate for the benefit of the people. The bank secrecy policy, lowering of import taxes, and the lack of attention and future plans to mitigate debt accumulation all contributed to the disappearance of the agricultural sector and across Lebanon. Products could be imported for cheaper than those produced locally, and those that could not afford them were not offered institutional support to do so (Makhoul & Harrison 2002; Rachid 2007; Traboulsi 2007).

2. 1960s-1970s Agricultural Uprisings

The small and medium farmers, who cultivated both food and silk up until the 1940s, had served as the backbone of Lebanon's quickly developing economy without reaping many of the economic benefits due to the squeeze applied by profit seeking agencies (Traboulsi 2007).

Zurayk (2000) stated that starting the 1950s, Lebanese food production began a major transition from a "low input, extensive farming system aimed at staples and some fruit production to an intensive, land-limited and horticulture-based system" (p.2). This change could only be adopted by wealthier farmers who could afford the inputs. Culminating in the 1960s, two decades of agricultural exploitation, which had pillaged Lebanon's resources for the few, resulted in the internal and out-migration of around 100,000 members of agrarian communities of all sects. Thousands ended up in the growing shantytowns that rapidly surrounded Beirut leading into the Civil War; this type of agrarian transition is common across developing countries (Akram-Lodhi & Kay 2010a; Traboulsi 2007).

In the mid-1960s in reaction to decades of being overlooked and unsupported by the government *and* exploited by progressive financialization from expanding agribusiness, smallholders began to oppose continued consolidation. Trabloussi (2007) highlights increasing country-wide agrarian unrest descending into the Civil War — which Chalak (unpublished) goes as far as to call “decisive” and “linger[ing] to our present day with no prospect for resolution in sight” (p. 6). Agrarian and rural unrest had been brewing since the first major agrarian transition from subsistence to silk; discontent would continue to rise as exploitation grew under laissez-faire capitalism. This system went from default to an institutionalized economic system under Lebanon’s application to the WTO in the 1990s. In a series of agrarian protests in late 1960s and early 1970s, small and medium farmers across the country protested financial exploitation under rapid monopolization and capitalization of the agricultural sector. Farmers in Tannourin, Mayfuq, Hanin, Qantara, and Akkar went on strike for better access to land and fairer systems of economic distribution (Trabloussi 2007). Tobacco farmers demanded better terms for their sales to the single purchaser (the contract of which was held by an ex-government official). Beetroot farmers in the Bekkaa protested against the industrial sugar monopoly, and vegetable producers spoke out against middlemen who took high prices in the market but paid producers little. Apple producers in Mount Lebanon not only called out middlemen, but also the growing storage costs (Trabloussi 2007). The consolidation of the sector and struggle to maintain small farms resulted in a situation where “even with rapid urban industrial and service sector growth, poverty increases when the agricultural growth rate drops” (Mellor 2017 p. 43; Akram-Lodhi & Kay 2009). Objections converged with a joined set of actions and intended general strike in 1965.

The movement received little attention until it was politicized by the participation of Kamal Jumblat who pointed a finger directly at commercial monopolization (Trabloussi 2007).

Despite their best efforts, the peasants' attempts to demand change were quickly subsumed and diverted by politicians shifting the focus to industrial commercial monopolization. While this movement against commercialization grew, the agricultural focus was lost and went unresolved into the civil war (Chalak; Makhoul & Harrison 2002; Traboulsi 2007). The Civil War did not result in any land distribution programs such as those common following developing countries' social and political disturbances (Bernstein 2004).²³

3. 1970s - 1900s Civil War

Lebanon's Civil War, lasting from 1975 to 1990, was a combination of escalating tensions from internal power struggles between divided religious and political factions and the meddling of regional interventionists including Syria, Israel, and the United States. These tensions boiled over with the establishment of Palestinian resistance movements in southern Lebanon after the expansion of Israel in 1967. The Palestine Liberation Organization, PLO, moved into Lebanon and retaliated against Israeli for its bloody occupation of the territory of Palestine; this resulted in violence and death of Lebanese civilians from Israeli attacks. These activities evoked animosity from Lebanese civilians and politicians towards the PLO causing many to blame them for the Civil War. However, this reduction ignores a variety of prior existing economic and social tensions as well as the urban development focus of the Beirut-based government. The government's lack of regard for rural citizens of Lebanon and their challenging existences in the forgotten rural regions — highlighted in this paper — also played a role in building tensions to the point of the country's eruption in Civil War (Al Issawi 2004; Nasr 1987; Traboulsi 2007).

²³ Hazell et al. (2010) note the influence agrarian reform has generally had on developing countries "Moreover, most of the countries that have failed to launch an agricultural revolution remain trapped in poverty, hunger, and economic stagnation" (p. 1431).

Lebanon's disassociation during the Civil War and its emergence to rapid reconstruction and development in the 1990s furthered local agrarian transitions. Smallholders were faced with the choice of rapid integration into global markets or hunger — and often both — throughout the war's development and resolution since little support or advice was available to them. The impacts of the national conflict and its alteration of socio-environmental and economic conditions have contributed to making Lebanese agrarian households those with the highest prevalence of poverty and extreme poverty (Laithy et al. 2008). A lack of land regulation and zoning enforcement during the war contributed to land and agricultural abandonment and to owners selling their lands to aid their emigration. From the 1960s to 1993, this migration away from agricultural areas can be observed by the drop in the share of agricultural labor of the total labor force from 38 to 7.5 percent (Abdallah 2002). These waves of agrarian migration leading into the Civil War were a result of an economic and political system that focused almost exclusively on the urban while only utilizing the rural region for its resources to contribute to the development of the urban.

The Civil War also pushed many Lebanese abroad for safety and economic opportunities. The rising dependence on money from abroad demonstrates the limited opportunities within the country and need for second country migration. From 1951-1974 the amount of remittances from abroad grew from 5.38 to 30% of gross national product (Traboulsi 2007 p. 159). This change in geographical demographics and the rising dependence on foreign livelihoods indicates the negative experience of capitalist expansion on Lebanon's rural communities due to the lack of attention these regions received.

4. 1990s Post-War Development

By the end of the Civil War, Lebanon's national output had been cut to half of its previous capacity with a significant impact on livelihoods in agrarian communities (Abdallah 2002). The abandonment of agricultural land combined with migration reduced the number of individuals working in agriculture and the potential of the sector. While Mellor, Harriss, and Bernstein all cite the reduction of agricultural workers and the sector's contribution to GDP as signifiers of economic development, in the case of Lebanon these factors indicated a troubling future for ex-agrarian households. After the Civil War agricultural development was sporadically addressed through international organizations' projects while the government focused on reconstructing Beirut and entrenching its urban development bias challenging agrarian existence and breeding resentment in rural areas (Hamade et al. 2015). Although the urban bias is a common feature across the developing lower- and middle-income countries noted by the World Bank (Akram-Lodhi & Kay 2010b; Lanjouw & Feder 2001), according to Hamade et al. (2015) in Lebanon this bias has logical *neoliberal economic* reasons²⁴:

“Lebanon has comparative advantage in its trade and financial services sectors, and this provides some justification for the national elite's post-war reconstruction efforts focused on Beirut. Nevertheless, this has resulted in policy biases against agriculture and other industrial sectors which have led to impoverishment in rural areas, particularly in the periphery” (p. 515).

In line with McMichael's corporate food regime theory, this approach to development prioritizes private profits above public goods, allowing corporations to further profit from the dispossession of, in this case, agrarian populations who receive little governmental support (Akram-Lodhi &

²⁴ The end of the Civil War catalyzed Lebanon's desired development into a global finance center. Only a few years after the war's conclusion, the application for the WTO was started as a continuation of Lebanon's laissez-faire economic system (WTO 2018).

Kay 2010b). In Lebanon, this has taken the form of disregard for rural, peripheral, economies in favor for urban, financial sector development. While one could argue for this bias within the limitations of economic development, this rationale does not appear as strong within a context widened to include regard for human rights and human development considering the impacts this bias has had on poverty and food and nutrition security.

The combined impacts of migration during the war and concentration of agricultural enterprises assisted by post-war development agendas, have led GRAIN, an international advocacy organization for small farmers, to call out Lebanon for its extreme disparity between the number of small farms and the proportion of land they occupy within the country (2014). Although concentration of agricultural holdings is a noted trend in Lebanon, the country's geography prevents large-scale, non-fragmented farms from forming over large areas (Seyfert et al. 2014). The "rugged" and rocky, mountainous landscapes set "natural limits" to land parcel expansion (Seyfert et al. 2014). While large-scale land concentration is possible, the parcels are rarely contiguous; this geography restricts the development of large-scale mechanized commercial farming seen in countries where large, flat landholdings are common.

5. 2000s - Present Lingering Impacts of Conflict on Agriculture

The end of Lebanon's Civil War did not address the needs of rural communities or agrarians nor did it conclude with land redistribution. Instead, political conflict both domestically and externally continues to impact the growth and functioning of farming livelihoods. In 2000, despite post-war development efforts, Zurayk stated "the Lebanese agricultural sector is clearly collapsing" (p.2). And the situation continued to look bleak heading into Israel's war on Lebanon

in 2006. During this conflict Israel devastated Lebanese agriculture by destroying land and infrastructure; this further reduced the government's capacity to support and facilitate sector development. Government offices no longer functioned allowing for disastrous environmental abuses of land and water resources. The impacts are still strongly felt today in regards to water and environmental pollution and degradation that occurred during Israel's invasion of the Lebanese south (1982-2000) and the Civil War. Since the Civil War, the Lebanese Government has been more concerned with the rehabilitation of urban areas, allowing the private sector to take over with "unsupervised and uncontrolled commercial companies" (Zurayk 2000 p.2). Combined with post-2006 rehabilitation, the agricultural sector has been almost abandoned. During this period, smallholder family farms managed to persist due in part to large labor reserves including a large proportion of underpaid Syrian agricultural workers and the use of household/family labor. However, the demands of modern agriculture tied farmers to systems highly dependent on insecticides, fertilizers, agricultural machinery and tools, as well as the services of the packing and refrigeration industries, and distribution of outside firms under the domination of agribusinesses and single processors (Traboulsi 2007). Maintaining sufficient agricultural livelihoods has become increasingly hard after the Civil War and conflicts with Israel, and many farmers again experienced migration away from agricultural livelihoods.

More recently, Hamade et al. (2105) examined the state of agriculture and its economic marginalization in Lebanon. They declared that the sector is, still, "not regarded as a priority for policy-makers" (p.492) and that continued veiled attempts to support capitalization in agriculture have been limited to agricultural extension promoting the use of increased inputs and intensification. This strategy has improved the overall agricultural economy but has negatively impacted farming households. Ignoring the sector also means not addressing the needs and rights of those

who work within it; this has led to agrarian poverty and food insecurity. Within Lebanon a survey based on the Household Food Insecurity Access Scale, HFIAS, carried out in the peri-urban area around Tripoli—and around Amman, Jordan—indicted that 51% of respondents were food insecure and “that food producers were more food insecure than non-food producers” according to an unpublished study by Hwalla (Hwalla & Bahn 2015 p.4), highlighting the need for similar studies in food producing communities across Lebanon.

Hamade et al.’s (2015) simulations of potential paths of agricultural development determine that inefficient marketing channels and long, costly supply chains are the greatest problems facing the agricultural sector — issues also highlighted in Seyfert et al.’s (2014) examination of the supermarketization of Lebanon. Hamade et al. (2015) state that without institutional alterations, only the wealthiest will benefit from enhanced output and the agrarian poor, possibly including those peri-urban producers mentioned above, will not. To improve their situation, farmers often decide to use inputs in alternative ways and search for more secure markets. The lack of government and institutional intervention has only resulted in employment opportunities within the trade, transport, communication, and construction sectors concentrated within and around Beirut and central Lebanon (Hamade et al. 2105) revealing that nothing within the government’s priorities has changed for the better in regards to support for rural Lebanon.

C. Trends Impacting the Agricultural Sector

1. Urbanization

Recalling the historical events recounted in the previous section, it is clear that Lebanese villages have been feeling the impacts of rapid and urban-focused development accelerated by independence and post-Civil War reconstruction. After independence in 1943, economic policies continued to serve the interests of the urban elite (Hamade et al. 2015) Development agendas have long excluded rural concerns and have resulted in the forced migration of rural and agrarian people into urban areas in search of more sustainable livelihoods. Migration has been the primary form of agrarian transition. Migration to urban areas, particularly, has been catalyzed by globalization and the influence of neoliberal economics which has ushered in cheap imported foods undercutting the livelihoods of those producing food locally (Akram-Lodhi & Kay 2010b; Haider 2004; Zurayk 2000). Movement away from land and agriculture, in search of more profitable, sustainable livelihoods combined with cheap imported food has further devalued agricultural land; the production value of a fertile piece of land no longer competes with its exchange value leading to the selling of productive land for construction purposes (Al Ahad & Helwani 2017; Gebrael & Salmon 2013; Hassan et al; Nasser & Hobballah; Zurayk, Lecture on Natural Resource Management in Lebanon, 2018). Selling land and moving to urban areas is seen to be more profitable than agriculture.

Lebanon's continuing agrarian transition has not provided non-farm or many non-rural livelihoods options for those leaving the farm. Instead, ex-farmers often migrate from rural areas to abroad and to urban areas. This migration without adequate urban livelihood opportunities contributes to poverty on the outskirts of its larger cities where urban sprawl and lack of infrastructure and services (Traboulsi 2007) are the same factors noted to contribute to food and nutrition insecurity in urban areas.

2. Population Growth

Population growth, especially since the Civil War, has largely occurred in urban areas of Lebanon. The only official census conducted in 1932 recorded 793,396 people. Subsequent unofficial counts have demonstrated rapid growth with the population almost doubling in less than 20 years to 1,443,000 in 1950; before jumping 2,151,000 after 15 years in 1965. By 1995 the population reached 3,150,000; and in 2004 3,755,034 (CAS 2013).²⁵ The most recent 2016 population count is estimated at 6,006,668 including refugees (World Bank 2018).²⁶

Population growth has been concentrated in urban areas, and rising urbanization levels further assisted by rural to urban migration. In 1950 70% of the population was considered rural, by 1965 the rate had dropped to 50% and then down to between 20% to 10% sometime between 1990 and the early 2000s (Abdallah 2002; Haidar 2004; MOSA 2000; Trablousi 2007; UNData 2018). The urban population is expected to reach 90% by 2030 and just under 95% by 2050 (UNHSP 2011).²⁷ Population exchange and rapid population growth present challenges to both

²⁵ As of 2016, the United Nations' Department of Economic and Social Affairs reported that Lebanon has one of the highest population growth rates in the region at 6% — although it must be noted that part of this rise is due to regional displacement and temporary settlement in Lebanon of refugees. It is noted that this growth is occurring most rapidly in urban areas with 3.2% urban population growth rate (UNData 2018). In addition to urban and population growth, Lebanon's average life span has recently increased significantly due to the end of the Civil War and improvements in health — from sixty-seven to almost eighty years from 1990 to 2015 (McKee 2017). Despite this demographic rise, education, and urbanization have combined to influence lowering fertility rates: "Whereas higher numbers of children in rural settings can offer labour support for family farms, and represent fewer challenges in housing and childcare costs, in urbanised settings such economic implications appear to contribute to declining rates of urban fertility" (McKee 2017 p. 17).

²⁶ This figure from the World Bank includes all persons residing in the country regardless of their citizenship or legal status. In Lebanon, population figures reflect the number of refugees, including those from Palestine arriving around 1948 and 1967 who have been denied Lebanese citizenship, as well as the more recent arrival of Palestinian and Syrian refugees from the Syrian Civil War.

²⁷ In Mellor's correlation of rurality and poverty he classifies low-income countries as those that tend to have 50-80% of the population rural with 40-70% of this rural population poor; while middle income countries tend to have 40-60% of their population rural with 20-50% of this demographic poor (2017 p. 48). Demographically speaking, Lebanon is rising out of this middle income demographic but still held back by inequality between rural and urban areas.

locations as the metabolic rift reduces the cycling of nutrients and therefore the incomes of those whose livelihoods depend on natural resources and the food security of those who consume rural-produced products. The rift is forcing agrarians to disassociate from agriculture and move to urban areas for stable livelihoods.

Rising urbanization in Lebanon has been assisted by poor zoning regulations and the natural expansion of the traditional Lebanese village. Traditionally, villages were constructed in valleys close to water sources and arable land to allow peasants easy access to their lands and therefore sustenance. As villages have grown into their modern equivalents around their traditional centers, some of the first land to be subsumed has been fertile agricultural lands (Zurayk 2018). These lands are often close in distance to the village center and in many cases have been abandoned as farmers seek alternative incomes. In a comparison of land cover in Lebanon from 2000 to 2010, the FAO discovered the 308 kilometers square of land had been lost to expanding urban centers; 63% of the expansion was onto agricultural lands, 17.2% onto wooded lands, and 16.2% onto grasslands and had been converted to concrete. Only 3.7% of unproductive lands have been similarly converted (Darwish et al. 2012. 112). The most impacted land has been along the coastal strip where some of the most productive agricultural land is located. Much of this land could be considered optimal for the development of sectors outside of agriculture such as tourist attractions and other commercial activities. The shifting of Lebanon's population towards increasing urban dominance challenges the existence of rural livelihoods through the fracturing of farm size as other sectors expand onto agricultural lands.

3. Land Tenure

Generally speaking, farms in Lebanon are fragmented and small²⁸ (Darwish et al. 2012; Seyfert et al. 2014; UNESCWA 2016). Farm size has generally been shrinking in recent years due to fragmentation. Increasing fragmentation reduces farmers' capability of significantly aiding local consumption needs and presents many other problems to attaining adequate livelihoods (Darwish et al. 2012). Compared to global definitions of small farms, Lebanese farms could be considered very small. According to the Ministry of Agriculture's calculations in 2012 the average farm size was 1.36 hectares. The highest average was found in the Bekaa at 2.9 hectares and the lowest in Mount Lebanon at 0.66 hectares (Byiringiro 2013). Darwish et al. (2012) note that 1.3 hectares is a decline of 28% from the data in 1961. In the 2010s, 70-75% of Lebanese farmers occupied 1 hectare on average accounting for 18-20% of total utilized agricultural area indicating that small farmers are the dominant demographic (MOA & FAO 2010). Seyfert et al. (2014) cite the Ministry of Agriculture reporting that around 50% of all farmers work land 0.5 hectares or less (MOA & FAO 2010). Of slightly larger farms, 26% of land holdings fell between 1-6 hectares accounting for 40% of total utilized agricultural area (MOA & FAO 2010). 95% of operators cultivate less than 4 hectares using only 51% of the useful agricultural surface area (Darwish 2012 p. 23). The large numbers of smallholders in Lebanon can be traced back to

²⁸ Within this document, "small farmer" and/or "smallholder" refers to those cultivating land sizes of 2 hectares or less. This cutoff aligns with the World Bank's Rural Development Strategy use of landholdings under 2 hectares to refer to smallholder farmers and is widely accepted in academic literature (Conway 2011; Hazell et al. 2010; Graeub 2016; Lowder et al. 2016; Wiggins et al. 2010). In Lebanon specifically, the Ministry of Agriculture reported in 2014 the average farm size was 1.36 hectares; Seyfert et al. (2014) report 1.4 hectares. As of 2010, 70% of Lebanese farmers occupied 1 hectare on average accounting for 18% of total utilized agricultural area (MOA & FAO 2010). These numbers include both farmers cultivating crops for sale and subsistence crops since the term "land holding" refers to 'the land that is managed by agriculture' without specification of its commercial use (FAO 2013a). The HLPE (2017) also calls out the need to protect smallholder farmers for their continued contributions to traditional food systems which needs adaption and improvement in order to enhance food and nutrition security in the future.

the development of the silk industry and the disassembly of communal land as well as the division of lands under inheritance.

In 2007 the total area of cultivated lands comprised 27% of the country's land area with 277,000 hectares. The amount dropped down to 248,000 hectares equaling 24% of total land area in 2011 (Darwish et al. 2012). In 2010, 301,900 hectares were determined to be cultivated by remote sensing, down 6,700 hectares from 2000 (Darwish 2012). Between 2013 and 2015 IDAL reported a 2% decrease in cultivated lands, down to 65% of the country is agricultural land and that only 14% is arable. While the amount of utilized agricultural area has fluctuated significantly in the records of the World Census of Agriculture since the 1960s,²⁹ the number of holdings has increased reaching 169,512 in 2010 (FAO & MOA 2010). In the 1998 census, 194,826 farm operators were reported — up more than 36% from the censuses of 1961 and 1970 — indicating that individual holdings are quite small (Darwish 2012 p 23).

Direct tenure accounted for ownership of 62% of the total useful area of land in Lebanon with 80% of small farms less than 0.5 hectares under direct tenure; this ownership decreased as the size of farms increased with only 50% of farms more than 10 hectares under direct tenure (Darwish 2012). Indirect tenure is more likely to be in the form of leasing land — which comprises 18% of the useful agricultural area and mostly as a part of larger farms — while the lease in nature comprises only 4% (Darwish 2012). This indicates a high level of ownership and that larger farms may be fragmented therefore decreasing direct ownership of their entirety. The growing number of holdings, and expansion in the number of owners/operators, is most likely

²⁹ Fluctuations in land area is in part due to changes in the methodology of the World Census of Agriculture which altered the definition of land area in the 1970's to no longer include communal forests and pastures in agricultural land size as it previously did (FAO 2013a p. 52). This change challenges annual comparisons.

due to land division under family inheritance. This division increases the number of smallholders but often leaves them with plots incapable of producing a satisfactory livelihood (Darwish 2012; Zurayk & ElMoubayed 1994).

4. Gross Domestic Product

As predicted in both Mellor (1996) and Harriss' (1991) development trajectory, agriculture's importance to Lebanon's GDP has been dropping significantly since the end of the Civil War. Prior to Lebanon's Civil War, agriculture constituted around 23% of the GDP compared to 4-7% in the mid- 2010s (Byiringiro 2013; Hackenbroich 2013; IDAL 2013). Recent figures indicate agriculture, including forestry and fishing, comprises a combined 4% of GDP as reported in the Lebanese National Accounts Report 2014 (MoA 2014). Agriculture has also been decreasing in relevance in the national budget. The drop in agricultural GDP is related to the development of other sectors which have grown to dwarf the impact of agriculture. The sector receives less than 1% of total government spending (MoA 2014).

Considering the limited support for agriculture from the national government and the growth of monopolies in all sectors of Lebanon's economy, it is not surprising that the agricultural sector has developed a "bifurcated agrarian structure" (Akram-Lohdi & Kay 2009 p. 215). The current contributions of agriculture to GDP are starkly divided between small scale peasant production and expanding capitalist, export focused production dominated by the private sector (Traboulsi 2007). This bifurcation promotes the commodification of natural resources, rural products, and labor which contributes to deepening this structural change along with disrupting the exchange of nutrients that both systems require for their longevity. As access to land in Lebanon changes, challenging smallholder production and livelihood security, development strategies

for agriculture have been shifting to promote more diversified livelihoods which contribute to industrial and service sector growth (Hackenbroich 2013; Hamade et al. 2015).

5. Import and Export Dynamics

Lebanon is frequently noted for its high import dependence. In the 1990s, the country was sufficient in poultry as well as as fruits and vegetables (Abdallah 2002; Zurayk 2000) and continues to be today despite the impacts of agrarian transition and climate change (Seyfert et al. 2014; UNESCWA 2016). However, while fruits and vegetables are frequently consumed, they do not comprise the basis of the Lebanese diet. The imports are largely staple crops like grains and wheat which Lebanon has largely moved away from cultivating at high volumes in order to direct its limited natural resources towards higher value export crops like fruits and vegetables (Traboulsi 2007; UNESCWA 2016).

Given its climate and geographic location on the Mediterranean Sea, Lebanon has been engaged in international trade as a method of economic development long before Western powers began exploiting strategic countries for the advancement of the neoliberal trade. Inexpensive and locally produced vegetables and fruits are easy to find throughout urban areas, but Seyfert et al. (2014) worry that availability may be reduced as more farmers leave the sector. Fruits and vegetables comprise well over half of the country's total agricultural production (IDAL 2015; UNESCWA 2016) while Seyfert et al. (2014) state just under 50% of cultivated land is for fruit trees and seasonal crops such as vegetables, leafy greens. The 2013 World Census of Agriculture, WCA, reported poultry was the most plentiful livestock by head with 16,527,398, followed by goats, sheep, and then cattle (FAOa 2013).

Lebanon is an exporter of fruits and vegetables (IDAL 2015; Seyfert 2014; Zurayk 2000) with 95% of its exports going to regional countries (IDAL 2015). Syria was historically one of the top importers of Lebanese produce but trade has declined 20-30% since the beginning of the conflict in Syria (Hackenbroich 2013). While Lebanon has long looked towards international trade to support its economic growth, in recent years this strategy has been challenged due in part to its limited production but also internal factors such as low quality and poor health and sanitation standards in the agricultural industry (Awwad 2017). IDAL reported a drop in fruit production from 2013 to 26% — fruit production is primarily citrus and apples — and a significant rise in vegetables to 48% with potatoes as the most important crop (2015).

Despite self-sufficiency in fruits and vegetables, Lebanon relies on other countries to attain the majority of its calories due to high consumption of staples such as wheat (since Lebanon cannot grow wheat at globally competitive prices³⁰ (Seyfert et al. 2014; UNESCWA 2016). A recent UNESCWA (2016) report connected Lebanon's forms of food and nutrition insecurity to the high reliance on the consumption of high energy foods which are not produced within the country. The foods that are most depended on are imported and therefore subject to price and availability fluctuations that impact their availability and access. UNESCWA further reports that Lebanon imports between 65-80% of its consumed food (UNESCWA 2016 p 31) which is an amount three times higher than exports (IDAL 2015). In the early 2000s 20% of the national deficit came from imported agricultural products alone (Darwish et al. 2012). With growing affluence and the nutrition transition, Lebanon is importing more animal sources foods, up to 78% of

³⁰ Lebanon has a long history of producing wheat for domestic consumption but this has changed drastically with the impacts of globalization, agrarian transitions, and international dumping schemes disguised as aid regimes. As of 2010, wheat covered 29,840 hectares and was primarily produced in the Bekaa (44%) and to some extent in the Aakkar (22%) (MoA, FAO, BCI 2010 p 52).

meats and dairy needs (Abdallah 2002). Some domestic livestock production has expanded, doubling since 1990 (IDAL 2013), in response to regional demand but still falls far short of the country's demands.

Lebanon's export agenda enforces the bifurcation of the agricultural sector. Despite growing attention on export potential in line with Lebanon's conformity with WTO regulations, smallholders may not benefit from this type of market expansion as large and small farmers serve different markets. Typically small farmers do not directly export. According to Seyfert et al. (2014) small producers in Lebanon primarily distribute to local fruit and vegetable retailers via middlemen or in producer-owned small retail shops in urban centers. Only larger, more mechanized farmers produce for export. The reasons for this production dichotomy — or bifurcation — are catalyzed by both land and labor access in which only wealthier farmers can access capital to expand production at the levels and quality demanded by the export market (and supermarkets). These reasons are largely the same reasons that larger producers are also better able to integrate into supermarkets and global trade regimes (Akram-Lohdi & Kay 2010b; Byiringiro 2013; Seyfert et al. 2014).

As larger farms produce for supermarkets and export, the procurement side of the food system shows a blending of tradition and modern food systems which is an indication that the supermarket transition in Lebanon is not complete. In Lebanon only 15% of retailers have contracted agreements with suppliers, and these suppliers are all categorized as large producer (Seyfert et al. 2014). This system disadvantages smallholders financially by providing significant power to the wholesalers (Hermel smallholders, personal communication, 2017; Seyfert et al. 2014). But at the same time, this system has also helped smallholders to avoid being pulled into a

larger corporate food regime as they are still able to individually negotiate their own purchase agreements with local markets.

Lebanon's continued ability to export fruits and vegetables is under considerable debate regarding the potential impacts of climate change, natural resource management, agrarian transition, and the geography of the country. The former director of ICARDA, El Solh, maintains high hopes for regional production stating: "Today, the advances made in agricultural research and technology development can help unlock the potential of production systems in dry areas even with scarce natural resources – making it entirely possible for Arab countries to significantly increase their food self-sufficiency" (El Solh 2014 p. 45). Despite optimism from ICARDA and the Lebanese Government's agricultural invest arm, IDAL, others disagree. The Arab Forum for Environment and Development considers Lebanon a country with limited agricultural potential, although the organization insists that all countries in the region currently function significantly below their sustainable potentials (Saab 2017). The potential of the region must be taken in consideration with the challenges of agrarian transition, low agricultural incomes, high diversification out of agriculture and rural areas, and encroachment of urban environments onto fertile land across the region.

6. Role of Smallholders

Smallholders comprise the majority of Lebanon's farmers. However, considering their demographics and the variety of economic and environmental challenges posed to this group, it is unclear if this will remain so in the near future. A 2012 study by the Ministry of Agriculture in Lebanon reported that 66% of farmers were between the ages of 35 and 64, while 11-13% were under the age of 35, and 23% over 65 years (Byiringiro 2013; Darwish et al. 2012). In 2015 the

average age of a Lebanese smallholder was reported to be 52 (ECODIT-Led Consortium 2015). The small number of those under 35 is significantly less than would be needed to replace those nearing their retirement.

The reasons for the lack of younger farmers are manifold. There is the issue of land access; current trends in land inheritance increase fragmentation of already small holdings challenging commercial production (Darwish 2012; Zurayk & ElMoubayed 1994). The majority of farmers, 75% , do not have access to social security (CIRAD & CIHEAM-IAMM 2016; MoA, FAO, BCI 2010) — this may contribute to the large number of older farmers who are therefore forced to keep working to have an income as older farmers are least likely demographic to have social security (CIRAD & CIHEAM-IAMM 2016). Combined with the already discussed issue of potential climate change impacts, challenges in market access, and meeting export standards, exclusively agriculture-based livelihoods for smallholder households seem hard to sustain.

Furthermore, the Ministry of Agriculture indicates that only 20-25% of farmers make their living fully from farming (CIRAD & CIHEAM-IAMM 2016; Seyfert et al. 2014). And that in order to do so, 87% of agricultural labor is family (MoA & FAO 2010). The high level of diversification and reliance on free family labor supports the finding that there is high poverty in agricultural communities in Lebanon. Of the 194,826 farm operators that were reported in 1998, only 66,000 were farming full-time (just under 34%) and on only 121,581 hectares. Darwish et al. calculated in 2012 that only 28% of the population live off of a part-time or full time agricultural livelihood (2012). The percentage of farmers that rely exclusively or partly on agriculture has been dropping.

Of Lebanon's farmers, less than 11% reported receiving extension services from the government while 86% received some form of extension through the providers of their inputs

(Byiringiro 2013 p. 9). Only 4% were cooperative members and 1% reported having access to credit (Byiringiro 2013 p.9). In regard to social protection, it is worth mentioning that this sector is not covered by the labour law; there is no minimum wage nor monitoring of working conditions legally required (UNESCWA 2016). Agriculture would be a challenging career choice for young farmers who do not have significant funds to invest in their practice and are therefore more attracted to better paying jobs in the productive sector (Darwish et al. 2012). Those who are still engaged in farming may have few options to leave the practice if they do not have capital to invest in private businesses or move closer to other employment opportunities.

The proportion of agricultural employment has been dropping since the 1950s as theories of development predict (Harriss 1991; Mellor 1966). In 1960 38.5% of the active working population was engaged in agriculture before dropping sharply in 1970 to around 19.8%. In 1994 Adallah estimated that there were only 70,000 individuals — 61% males and 39% females — actively engaged in agriculture (2002 p. 4). More recent accounts of the percentage of the population involved in agriculture vary considerably due to the informal nature of the work, use of migrant, refugee, and family laborers, and different standards of measurements. In 2010 IDAL reported agriculture was Lebanon's fourth largest employer with 10% of the work force engaged in agricultural activities (IDAL 2013 p. 4; IDAL 2015 p.4). In 2012 Darwish et al. reported 20-30% of employment is in agriculture (p. 93). Hackenbroich (2013) says 25% "of Lebanese" are employed in agriculture; a UNESCWA presentation by Byiringiro (2013) reported agriculture made up only 3% of the total labor population, 2% of the total population, and 11% of the rural population (p. 6). In 2016 UNESCWA calculated agriculture employed 20-25% of the labor force, although many more are known to work informally and are not included in this estimate

(UNESCWA 2016). This makes the range of agricultural employment from 2010-2016 somewhere between 3%-30% of the labor force.³¹

The below chart reveals the variations of data on agricultural employment in Lebanon which is further complicated by the different terms used to discuss this employment.

³¹ The notable gap between the percentage of the population employed in agriculture and agriculture's low contribution to GDP indicates that poverty is still largely rural in the country and that the continued growth of nonagricultural sectors will not remedy the problems of unemployment and poverty if not directly addresses (World Bank 2008 p. 28).

Table 1. Chronological estimates of agricultural employment in Lebanon

Data From	Year	%	Terminology
Traboulsi 2007 p. 159	1950s	50	of population
Abdallah 2002	1960	38.3	portion of agricultural labor (Of work force)
“”	1970	19.8	% of population working in agriculture
“”	1975	17	% of population working in agriculture
Traboulsi 2007 p. 159	1975	20	of population
“”	1980	14	% of population working in agriculture
“”	1984	11.8	% of population working in agriculture
“”	1990	9.4	% of population working in agriculture
“”	1992	7.8	% of population working in agriculture
Abdallah 2002	2002	7	portion of agricultural labor (Of work force)
“”	2009	6	of the labor force
“”		25	of rural population
IDAL 2013/15	2010	10	of the work force engaged in agricultural activities
Byiringiro, 2013	2010?	3	agriculture “” of the total labor population
“”		2	of the total population
“”		11	rural population
Hackenbroich, 2013	2013	25	of Lebanese
UNESCWA 2016		25%	of the work force
“”		20-25	of the labor force (formal labor force)

7. Food and Nutrition Security

Food and nutrition security has become a common topic in Lebanon since the influx of refugees from Syria have added strain to the country's weak infrastructure, social services, and systems of natural resource management (UNHCR, UNICEF & WFP 2016; UNHCR, UNICEF & WFP 2017). Although UNESCWA believes that malnutrition is not a "grave concern" for the country, they perceive multiple challenges in maintaining this rating. However, food insecurity has been reported as a factor influencing farmers' livelihood diversification across the country (CIRAD & CIHEAM-IAMM 2016). UNESCWA found instances of food and nutrition insecurity are rising and are partially tied to the fact that "food items with the highest estimated contribution to energy intake in Lebanon do not correspond to the items most produced in the country" (2016 p 31). The high levels of food import, especially staples like wheat, have the potential to impact everyone in Lebanon — refugees and Lebanese of all incomes levels — if food price spikes like those of 2007/2008 occur again and without quick intervention by the state. Maintaining stable imports and the domestic price of these imports is therefore essential to Lebanon's food and nutrition security.

Food and nutrition insecurity is not experienced by all Lebanese but is most notable in poor urban areas and rural, agricultural communities where unemployment and poverty prevent people from acquiring food from the market (CIRAD & CIHEAM-IAMM 2016). The connection between poverty and food and nutrition insecurity is strong in agrarian communities in Lebanon whether the household is an agricultural producer or not (CIRAD & CIHEAM-IAMM 2016; Hackenbroich 2013; Hwalla & Bahn 2015; UNHCR, UNICEF & WFP 2017). The total poverty rate in Lebanon stands around 30% with unemployment at 32% — youth unemployment

is the most significant portion; these are some of the main indicators of food and nutrition insecurity (Hackenbroich 2013; UNDP 2016; UNESCWA 2016). Poverty is particularly high in agrarian communities where 40% of agricultural workers are poor. This figure is even higher in the Bekaa, Lebanon's largest agricultural area by land and production amount (CIRAD & CIHEAM-IAMM 2016; UNESCWA 2016). These figures are not surprising considering agriculture's low contribution to GDP and high percentage of employment.

However, poverty and food and nutrition insecurity are not exclusively rural problems but also prevalent in lower socio-economic households in urban areas, including Beirut (Jomaa et al. 2017). When acknowledging this problem in urban areas, the impacts of Lebanon's growing population and urbanization fed by agrarian transitions are clear. The high number of rural people moving to the outskirts of urban areas that are searching for livelihoods are likely to make up a majority of this poorer "urban" population suffering from food and nutrition insecurity. Globally this connection has been established in the United Nations High Level Panel of Experts report on Nutrition and Food Systems: "One result of the rural to urban migration is livelihood diversification; this pattern of migration, from rural to urban has been noted to cause significant changes in diet that lead to a significant rise in diet related chronic diseases as a result of this nutrition transition." (HLPE 2017 p. 64). A change in diet, towards less healthy and less nutritious foods, is associated with this physical change of space and the changing social relations that accompany it.

In regard to nutrition security and its impacts under the nutrition transition, all income levels are experiencing higher rates of overweight and obesity related to this diet shift. Levels in Lebanon are reaching those associated with higher-income countries: "Studies on adult men and women in Lebanon show that obesity prevalence rates have increased during the past decade

from 17% in 1997 to 28.2% in 2009... expected to approach 40% by the year 2020.” (Nasreddine et al. 2014 p. 84). Batal et al.’s (2007) survey on over- and undernutrition in rural Lebanon primarily blames the heavy reliance on refined white flour, and other refined grains, and the decrease in diet diversity for the double burden of poor nutrition and growing prevalence of non-communicable diseases; these changes are also indicators of the wider nutrition transition to a Western Diet.

Lebanon’s adoption of the “Western Diet” has been an active process since the mid-2000s as the global food system permeates not only large, urban areas but also more distant rural areas (Batal et al. 2007; Issa et al. 2009; Jomaa et al. 2016; Naja et al. 2015; Nasreddine et al. 2014). In late 2009, according to Issa et al., the Lebanese population was “progressively abandoning the traditional dietary pattern in favor of more westernized dietary habits (Batal & Hunter 2007)” (p. 286). However, at this point, close to one decade ago, the rural populations were more likely to continue to consume a more traditional Lebanese diet — but the transition was occurring in this population as well. In a cross-sectional study of 798 adults, Nasreddine et al. (2014) found that the number of adults aged 40-60 who adhered to a Mediterranean diet was decreasing as consumption of fats, oils, refined cereals, sweet beverages and dairy products — foods not common to the Mediterranean diet — were rising. The change in diet reflects the change of foods offered in their locations due in part to Lebanon’s liberalization of its economy in the quest to join the World Trade Organization and reliance on imported food for all income levels.

D. Conclusion

Political and economic factors in the form of development strategies and wars combined to have great effects on the agricultural trajectory of Lebanon with relatively the same outcomes: migration away from rural regions. One of the most powerful factors and catalysts of change has

been the imposition of capitalized food systems which accelerated Lebanon's export-focused transition to a neoliberal food system. Lebanon's agricultural history and the widespread agrarian transition to capitalism reveal the extent to which migration for non-farm livelihoods has resulted in changes in the country's socio-economic dynamics and relationships with the natural environment. This acceleration further encouraged agrarian communities to leave rural areas in search for more stable incomes— which were needed to ensure that all people, at all times could consistently engage in and contribute to 'the expanding market'— as agrarian incomes could no longer support households and farming was abandoned. The quest for stable incomes pushed people towards migration both within Lebanon to urban centers and abroad. The government's almost exclusive focus on urban development stemming from Beirut and the burgeoning urban areas of its rapidly developing suburbs seems to have forgotten that rural areas had anything to offer except a reserve labor force. The lack of alternatives left migration and emigration as the only option.³²

There are notable common drivers of agrarian transition across the historical timeline laid out above. One such driver has been the agendas of development institutions that promote agricultural trade and neoliberal economics as poverty alleviation, especially for smallholders, but do not always provide strong results: "Every country in the world is impacted by globalization, although many people have not seen its benefits" (HLPE 2017 p. 72). This combination of globalization and neoliberal economics that has spurred agrarian transitions across the globe and has also instigated the nutrient transition. Agrarian transition induced-migration can also be traced to limited support of the agriculture sector (Makhoul & Harrison 2002) and invasion of labor-re-

³² Prompting Traboulsi (2007) to state "Emigration is the process by which Lebanese society hides its high rates of unemployment and rids itself of the human surplus" (p. 159).

ducing sectoral concentration (Traboulsi 2007). Without governmental support small farms depend on informal and inexpensive family and Syrian labor (Akram-Lodhi & Kay 2009; Traboulsi 2007) and more importantly, on out-migration of some family members (Akram-Lodhi & Kay 2009) or — as Patel et al. (2015) references Bernstein’s conclusion on the modern agrarian community — in “the capital required to pursue rural livelihoods [which] is not only generated from within the rural areas, but also expanded and diversified by using non-agrarian sources outside the countryside” (p. 13). It is clear that exclusively agricultural livelihoods are decreasing across the country as livelihood diversification offers more stable income options. However, it is difficult to determine how much the decrease in agriculture’s contribution to GDP and employment is due to the above mentioned challenges versus the predicted decline as other sectors take prominence (Mellor 1966). High levels of unemployment, poverty, and inequality suggest that the outlined challenges may have a more significant influence on the situation — however, in Lebanon, the impact of the Syrian crisis and recent influx of refugees must also be taken into consideration, a factor that is outside of the purview of this research.

CHAPTER IV

METHODOLOGY

A. Study Design and Sampling Framework

The intention of the below stated methodological process is to examine how rural, non-farm livelihood diversification has impacted the food and nutrition security of smallholder farmers in comparison to those with non-agricultural livelihoods. It has been well established in this paper that globally smallholders have chosen to or have been forced to diversify away from exclusively agricultural-based livelihoods in order to provide their households with adequate income as a source of meeting food and nutrition security standards. In this way, agrarian livelihood diversification has been promoted by governments and humanitarian organizations to reduce rural poverty as the first step in mitigating food and nutrition insecurity of the population that produces the majority of the food consumed globally (Grain 2014; Herrero et al. 2017; Holt-Giménez 2017; IFAD & UNEP 2013).

While these implementation strategies of development programs are documented, their impacts on food and nutrition security are not well recorded. Instead, programming for livelihood diversification has been examined in the context of reducing poverty while programming for enterprise diversification has been connected to food security impacts but infrequently to food *and nutrition* security. Rather than relying on the assumption that reducing poverty through livelihood and/or enterprise diversification has potential to improve food security indirectly, this research quantifies this relationship to determine if they are in fact connected. It is well noted that income is deployed flexibly towards a household's greatest needs whether for food, rent,

medical, or another competing need and that the prioritization of these needs may change monthly (Tolossa & Robaa 2016).

This research intends to provide data to begin to fill the existing gap on how livelihood diversification impacts the food and nutrition security of smallholder farmers given the modern agrarian transition's impacts on widening the metabolic rift and its promotion of the concept of food from no-where and no one (McMichael 2009). Currently, very little empirical research connects the outcomes of livelihood diversification to food and nutrition security; of the few studies conducted nutrition quality and diversity are often not well examined or ignored under the broader term of 'food security' as a simple calorie count or issue of availability. Furthermore, studies on food and nutrition security and potential impacts from both types of diversification (livelihoods and enterprise), off-farm/non-farm incomes, and poverty reduction generally focus too narrowly on lower- or middle-income country contexts inaccurately perpetuating the idea that food and nutrition insecurity are only issues for these countries and not for the world. This perspective also diminishes the contributions of smallholders to economic development and local economies in lower-income countries as well as in middle- and high-income countries. Using Lebanon as a study, this mold is broken to offer the example of an upper-middle-income country that is undergoing agrarian transition to explore the relationship of livelihood diversification and food and nutrition security.

This research was conducted using guidance from the study of rural non-farm livelihoods by Babatunde and Qaim (2010). Given the complex nature of food and nutrition insecurity, including its multidirectional relationships with the environment, health, nutrition, and eco-

nomics, along with the need to look at all four pillars (access, availability, utilization, and stability) in unison, Babatunde and Qaim's study provided a comprehensive methodology to follow using quantitative and some qualitative research methods.

Quantitative research addresses the depth and frequency of this demographic's experiences of food insecurity and can be analyzed to provide insight on the relationships between variables for deductive reasoning. Quantitative research has been collected at the same time using a standardized questionnaire, Food Consumption Score, a household expenditure module, and the Household Food Insecurity Experience Scale. The responses and experiences of the villagers have informed the primary data of this research.

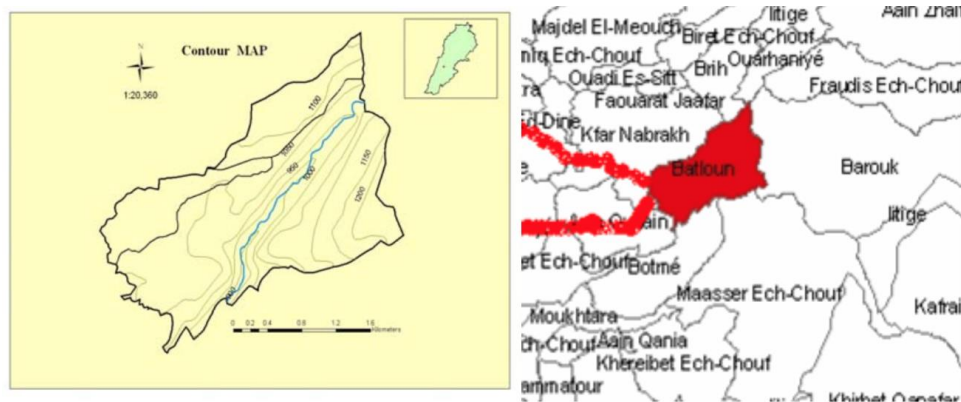
This research was initiated with a thorough review of secondary data on the history of Lebanon and the Chouf region. Sources on the village of Batloun were sought but few exist outside of one master's thesis conducted on the village by a student and resident in 2007 and a few papers on food security by the Canada's International Development Research Centre also conducted in 2007.

B. Introduction to Batloun

Like most of Lebanon's rural, mountain villages, Batloun's history and its more recent socio-economic changes are deeply tied to agriculture. Ethnographer and graduate student Rachid (2007) believes that "The facts interfering with life at Batloun are in big part, if not all, the same or the reverberations of the factors at play at the level of Mount Lebanon, the country, the region..." (p.29). Since not much literature exists on Batloun exclusively — outside of Rachid's comprehensive examination of the evolution of natural resource management practices — this

research is based on a general history of Lebanon's rural areas highlighting Batloun's experience of agrarian transitions where information is available. Rachid's (2007) investigation into the natural resource management of the village utilized the memories of the localities' elderly residents as well as local authorities, social and cultural activists, and local historians to illustrate as holist a picture of village history as possible.

Figure 1. Map of Batloun and surrounding village



(Rachid 2007)

The village of Batloun in the Chouf Caza, is approximately 50 kilometers southeast of Beirut. It is 10 kilometers west of the popular Barouk Cedar Forest Reserve and 7.5 kilometers east of the Beit Ed-Dine historical cite as seen in Figure 1. Batloun is 3.5 kilometers square with a population of around 3,500; 1,000 of which are seasonal residents including those who only reside there for the summer months and semi-permanent workers. 60% of current residents are of the original village families (Rachid 2007 p.17). Batluon was selected for village's connection to

the American University of Beirut, familiarity with international researchers, and its rich agricultural history. The village's access to fertile land and the presence of a river and many springs have allowed it to continue to depend on agriculture as an economic activity and source of sustenance long after other neighboring villages have transitioned to other livelihood strategies (Al Ahad & Helwani 2017; Gebrael & Salmon 2013; Hassan et al; Nasser & Hobballah; Rachid 2007). Batloun has therefore also been selected, in part, due to the remaining reliance on agriculture and on-going agrarian transition.

1. Natural Resources in Batloun

Rachid's (2007) exploration of natural resources and their management practices over the timeframe of 1935 to 2005 provides background to the history of agriculture in the village and its impacts on food and nutrition security. Despite its average elevation of 1,080 meters and steep outcrops and cliffs, Batloun has had a successful agricultural history. Aided by an average rainfall of 1,000 millimeters, snow melt, the Barouk River running through the village, and three natural springs the village has had relatively high access to water. In 2017-2018, issues relating to water access have been noted in the village due to low winter snowfall and, according to some residents, the division of available sources to the areas growing population of Syrian refugees (M. Kaiss, personal communication, June 2018). The steep slopes of the village have long been terraced demonstrating the historic agricultural focus.

Early livelihoods and food security needs were based on agriculture in the river valley and around its ancient canals. Most of the village land close to the river was dedicated to agriculture as was significant land further from its sources. On irrigated land mulberry — an early cash crop used in the production of silk — and vegetables grew while non-irrigated lands held cereals,

vineyards, and olive trees. Rachid (2007) notes that what was grown was consumed in season and processed for out of season consumption making the village diet largely self-sustaining. Wheat was a major product and cereals were widely cultivated as they are a staple in the Lebanese Diet (Rachid 2007).

2. Village History

Batloun's agricultural history has been subject to the same conflicts and political challenges that have influenced the development of the country. However, the village's rural location — and therefore subjection to the country's urban-biased development trajectory — has resulted in very different outcomes than were experienced in the capital.

The first major event impacting Batloun within the timeline was the 1958 political conflict and physical fighting between supporters of Kamal Jumblatt and Camille Chamoun. Although the conflict stemmed from their parties' responses to the creation of the United Arab Republic,³³ it caused significant destruction and land abandonment across Batloun due to its proximity to

³³ Kamal Jumblatt was a prominent Lebanese Druze politician from an influential family in the Chouf. He was noted for his support of the Palestinian Liberation Organization and opposition to Syrian Assad's intervention into the Lebanese Civil War. As the leader of the secular Progressive Socialist Party (Batloun's aligned party, however Rachid notes that some residents were personally aligned with the National Social Syrian Party), he fought against monopolies and focused on the needs of peasants, workers, and intellectuals.

Camille Chamoun took over the presidency in 1952 when the president elKhoury was forced to resign due to allegations of corruption. Chamoun strongly aligned himself with the United States and committed to their opposition to "communist" threats in the region. Chamoun tried to extend his succession into a new term as president against the constitution in 1958, this sparked opposition from Pan-Arab and Sunni groups who attempted to overthrow Chamoun's government. The United States marines intervened in Lebanon on the side of Chamoun and selected General Fouad Chehab take over the presidency that year given his position as a Christian with popular Muslim support he was seen as a compromise to tensions.

The main tension and fighting between Jumblatt and Chamoun stemmed from their opposite views on the joining of Syria (a long-time influential entity in Lebanese domestic and international politics) with Egypt in the United Arab Republic, UAR, in 1958. Jumblatt founded the Popular Socialist Front and was active in fighting against Chamoun's Maronite-focused government in 1958 which favored the formation of the UAR. The fighting between the two sides was bloody and disruptive in the Chouf especially in the villages around Batloun which were primarily mixed Druze and Christian residents (Traboulsi 2007; Rachid 2007; Al Issawi 2004).

Jumblatt's assassination in 1976 set off another wave of religious-based political conflict between villagers that resulted in instability, land abandonment, and migration from the village region of many Christians (Rachid 2007).

mixed Druze and Christian villages.³⁴ Spillover from their conflict prevented Batloun's farmers from safely accessing their lands for six months (Rachid 2007). After the fighting ceased, the damage to fields and homes further prevented a quick return to agricultural livelihoods. Land abandonment was also noted as some families left the area for safer conditions. This instability in the Chouf corresponded with the relative calmness in the country under the Shebab-era (1958-64); during this time employment opportunities grew in both the public and private sectors in Beirut. In contrast to the challenging agricultural and economic situation, the stability these new positions offered pulled many, primarily males, from Batloun into these roles and out of the village (Rachid 2007). While farming did continue to be practiced in the village, its primacy changed as workers were no longer available to work their fields during peak daylight "office hours."

During the 1967 and 1973 Arab wars with Israel, Rachid notes instability in Batloun that presented village males with the option to fight or migrate for livelihoods contributing to a reduction in population and transition away from agriculture (2007). Despite experiencing repeated waves of external migration, Batloun benefited economically as a safe location later during the Lebanese Civil War, 1975-1990, when residents of Beirut and other coastal cities, which were destroyed by harsh fighting, sought new residences in safer parts of the country away from the conflict. Migration to the village offered a reprieve from its agrarian transition related migration when it became a transport hub bringing more traffic through its streets and enhancing its small commercial sector. This inflow, however, did not stir the agricultural sector out of recession but

³⁴ At this time, Batloun was predominantly a Druze village with the exception of only one Christian family while most of the surrounding villages, particularly Barouk, Masser, and Kfarnabrakh were mixed Druze and Christian (Rachid 2007).

instead firmly rooted an active market in the village as livelihoods increasingly diversified to meet the needs of the growing population. As commerce developed, exchange value of its lands and interest in commercial activities rose. The lack of land surveying, zoning, and oversight further spurred agrarian transitions and the accompanying metabolic rift as more villagers left agrarian practices and integrated further into the global market that brought cheap food and goods into the village (Rachid 2007).

With Israel's invasion in 1982, a curfew-like schedule was set on the village which reduced agriculture livelihoods and the movement of produced goods — agrarians could no longer wake up early or stay late in the evenings to mind their fields. Additionally, Israeli soldiers used fertile wheat and cereal lands as their campsite severely altering the villagers' access to and consumption of the staple crop (Rachid 2007).

In 1983, the Israelis forces oversaw the return of Christian families to Batloun and its neighboring mixed Christian-Druze villages (after they had left in response to rising tension after Jumblatt's assassination in 1976). Their return resulted in the "Mountain War" which caused multiple deaths and further challenges to the movement of people, their agricultural goods, and access to land (Rachid 2007). The combined impacts of multiple wars and fighting in Batloun reduced farming from a sustainable and safe livelihood to one subject to violence and destruction. This forced many to turn to alternative livelihoods while the country-wide conflicts depressed the economic situation to the point where even those could maintain agricultural livelihoods had almost no market on which to exchange their goods.

3. Current Agriculture in Batloun

Currently few of Batloun's residents still engage in agricultural livelihoods; fewer depend on agriculture as their sole livelihood (Kaiss, personal communication, 2018). Just one decade before, in 2007, agriculture was still recognized as one of the main sources of livelihoods in the village along with governmental jobs, local trade, and industry (Batal et al. 2007). At that time, it was reported that villagers were calling for development of the agricultural sector and saw this as an important and needed investment (Batal et al. 2007). The main crops recorded in 2007 were fruit trees including apple, peach, cherry, figs, almonds, and grapes. Animal husbandry was limited to smaller ruminants for households use only (Batal et al. 2007 p. 16).

Rachid's research categorized the 2007 livelihood categories of Batloun as: 30.4% employed in public or private work for fixed salary, 28.6% on private work, 5.4% exclusive agriculture, 1.8% exclusive pastoralism, 1.8% previous savings, an additional 12.5% depend on agriculture in addition to another income course (Rachid 2007 p.107). Rachid's data shows that 17.9% of the village was dependent on some level of agricultural income.

The average land holding of the households that depended exclusively on agriculture was 1.8 hectares (based on 1998 Ministry of Agriculture data) — which is less than the 2 hectares minimum land size needed to support a family (Zurayk & ElMoubayed 1994). This average qualifies globally as a “small farm” (Conway 2011; Hazell et al. 2010) but is larger than the average farm size in Lebanon of 1.36 hectares (MoA & FAO 2010). Given this small size, Rachid classifies the farms in the village as those < 2 hectares and those ≥ 2 hectares. 82.1% of households owned land in the < 2 hectares category which is relatively in line with Lebanon's national average. 90% of the lands ≥ 2 hectares were used for agriculture (a trend noted globally by the World Bank (2008) that larger small farmers tend to be more engaged in production for sale).

This trend suggests that some plots are too small for their owners to consider them useful for production and therefore impactful on income.

Rachid also found that all of the houses depending exclusively on agriculture and pastoralism earned under 10,000,000 L.L. annually (around \$6,600); those who combined agriculture and employment earned between <10,000,000 and a maximum of 30,000,000 LL (around \$19,500). Of those who combined agriculture and private work, 40% earned <10,000,000 L.L. and 60% earned 10,000,000 - 30,000,000 L.L. These findings show that households with diversified income sources are more likely to have higher income, especially if they are engaged in private work as an additional income (Rachid 2007 p. 111). However, no household with any level of agricultural income earns higher than 30,000,000 L.L. Households that only utilize agriculture as livelihoods have the lowest recorded income level of all livelihoods recorded (Rachid 2007 p.109). The World Bank also notes this trend globally — that households with higher percentages of income from agriculture tend to be poorer than those with less agricultural income (2008 p. 77).

Rachid also divides the households into those where agriculture contributes to less than 20% of income and those where agriculture contributes to more than 20% of income for further analysis. In combined agriculture and *private work* incomes, agriculture contributed 50% or more to income. In combined agriculture and *employment* incomes, agriculture contributed 20% or more to income. This suggests that private work better accommodates agricultural work and therefore agriculture can contribute more to income. Additionally, the households that owned more total land were also those that depended more on agriculture.

Of Rachid's sample of 56 households, 73.2% had agricultural contributions to income of under 20% of total household income. This indicates that livelihood diversification is a prominent strategy used by most villagers to meet their needs since agriculture generally contributes little to household incomes. The families where agriculture contributed less than 20% to their income reported that their reasons for practicing agriculture were "to produce quality crops and to eat what they grow", whereas the families with more than 20% contribution reported their motivation as "business" (Rachid 2007 p 120). This revealed that diversified livelihoods are both dominant and secondary income sources but that agriculture is still an important sector for households in the village. While agricultural livelihoods are present and active, they are no longer the dominant livelihoods of the village.

4. Western Diets and Nutrition Transition in Batloun

Batal et al. (2007) conducted 1,000 surveys across Aarsal, Batloun, and Kwakh in 2005 in order to examine how over- and undernutrition are impacted by diet diversity represented by the consumption of wild edible plants. The surveys revealed high prevalence of noncommunicable diseases and both overweight and obesity being common problems but food insecurity, as measured by calorie intake, was rare in these rural areas. Despite these quantitative findings, "qualitative food insecurity was common with more than 50% of respondents reporting substituting less quality food for their usual diet some of the time." (p. 5) Lower quality food suggests decreased diversity of food; decreased diet diversity is a coping strategy for food insecurity that was recorded in Batloun and in the rural villages examined in the IDRC study (Batal 2007 p. 28). This paradox confirms that measuring food security by calories alone is not sufficient for food and nutrition security and may actually obscure results. Furthermore the role of diet diversity and

nutrition quality are highlighted as the missing links between calorie consumption and health problems. The authors fail to acknowledge the nutritional quality of a diverse diet as it is not just a variety of food that improves health, but the quality of the variety of nutrients (de Oliveira et al. 2015; Mozaffarian 2016).

While no nutritional studies have been conducted in Batloun, the limited information available does provide some insight into how changing local food systems impact nutrition and diet diversity. Having been a traditional agrarian village, as was common in the Chouf region of Lebanon, it is safely assumed that until 1950s villagers primarily consumed from their own production and took part in local barter and trade to accumulate whatever they did not produce. Rachid (2007) reveals that while more than 80% of the village relies on non-farm livelihoods to meet their food and nutrition security needs, many of the households still practice agriculture on a small scale. Home gardens are common across Lebanese villages and while they may not directly generate income, they do effectively increase incomes by reducing the amount of total income spent on food and arguably maintain a decent level food and nutrition security by providing highly accessible, low cost, fresh, nutritious food (Batal et al 2007; Hunter 2008). However there are families in the village with no such garden and no access to land.

5. Batloun's Metabolic Rift

Batal's et al.'s above discussed survey on diet diversity and the collection of wild edible plants introduces the topic of the metabolic rift and its embodiment in Batloun. "The communities where WEP-DD [wild edible plant - diet diversity] was carried out are poor rural communities where knowledge about wild edible plants and the traditional food system is still present."

(p. 7) This quotation suggests that poor communities maintain better indigenous knowledge *because* they are poor— i.e. that poorer people have not been as well integrated into the spread of the Western Diet that accompanies the invasion of capital into rural areas i.e. the agrarian transition. Batal assumed that the lack of a full agrarian transition left room for better diet diversity due to the fact that people do not have enough capital to purchase sufficient and adequate foods, and therefore rely on the provision of free foods i.e. wild edible plants. This quote draws a line between rural poverty and positive diet diversity in a romanticization of poor rural communities. Collecting WEPs was found to be a coping strategy used across all three villages of the study and while the consumption of WEP is associated with food insecurity (Batal et al. 2007; Hunter 2008), the direction of the relationship remains unclear: “Our analysis so far does not allow us to conclude whether collection of wild plants provides protection against food security or rather that people suffering food insecurity resort to wild plant collection” (Batal et al. p. 28-29). The quote continues, stating that it is these same areas that have largely been ignored by the urban-biased, Beirut-centered government therefore reaffirming the government’s capitalist agenda and its contribution to agrarian transitions across the country. In her thesis study of the food security of three rural areas in Lebanon, Hunter (2008) concluded that while diet diversity is associated with food security, the policies of Lebanon’s government unintentionally contribute to the promotion of unhealthy foods as farmers are integrated into the global food regime and depend less on their own production.

Furthermore, Rachid (2007) concludes that while the sustainable livelihoods framework shows that human, physical, and financial capitals of the village have generally improved, the current state of livelihoods is poorer than the traditional livelihoods remembered by those she in-

interviewed. This change in status, spurred on by agrarian transitions, has been the direct and indirect result of political and economic factors that have forced people off of the land in search of more stable and/or less vulnerable livelihoods. Given the slow development and lack of government support for rural development of so many of Lebanon's villages, including Batloun, people have had to leave their land, and in many cases villages, in search of livelihoods therefore becoming less dependent on the land to provide and sustain them. This abandonment of agriculture, whether considered push or pull migration, is impacting not only livelihoods based on natural resource management, but also the use of income as those who no longer have fields to harvest and store food from turn to spending income on the purchase of food from local markets.

C. Recruitment of Participants and Inclusion Criteria

1. Target Individual

Using a thesis conducted by an American University of Beirut student on natural resources and their management in Batloun in 2007 (Rachid, 2007), it was established that 437 individuals residents in Batloun had agricultural livelihoods or agricultural livelihoods combined with diversified livelihoods. This number was used as the basis for this study planning despite the recognition that, if the prior conclusions about the impacts of the agrarian transition on livelihood diversification were correct, after 11 years, significantly fewer individuals would currently be involved in agricultural livelihoods in 2018. Using this base number, it was determined that a minimum of 45, or a 10% minimum of the village with agricultural livelihoods as of 2007, would be surveyed.

This study has two target demographics; one set with some level of agricultural livelihood and the second with livelihoods completely diversified away from agriculture. Other than

the difference in livelihoods, all the other inclusion criteria were the same. The target participants were ideally the heads of their households with knowledge of the household diet, income sources, expenditures, and were around 50 years old. This age was determined to be old enough for the participant to recall agricultural practices and general diet information from around 1990 in order to capture impacts of agrarian transition. The year 1990 was selected as a memorable time period given the end of Lebanon's Civil War and the ease of residents to recall events and the general agricultural situation in relation to this year. The Civil War had mixed positive and negative impacts on the village which are highlighted under the previous section on Batloun.

This division allows for a comparison of the food and nutrition security status between those who no longer depend on agriculture and those who have agricultural income. It also examines how varying levels of livelihood diversification impact these securities for the ultimate goal of determining which livelihood pathways provides better food and nutrition security considering diet quality and diversity. As the agrarian transition and metabolic rift separates agrarian communities from their land-based livelihoods and integrate subsistence farmers into the corporate food regime at the village level, the nuances of the disassociation must be more carefully reviewed.

Working with the Head of the Municipality, it was determined that the demographic with agricultural livelihoods would be made up of a convenience sample of the village's agricultural co-op members and a convenience sample of small entrepreneurs and employees from the villages two main commercial streets.

The surveys were first piloted and approved by head of the co-op and an active board member. Then, the co-op members were initially approached through a local interlocutor, the

Head of the Municipality who graciously agreed to assist and support the study in his village. The members who indicated interest were then either visited by the research team at their homes or came to the Municipality to meet the research team and hear the study explained in detail. Those who agreed to participate were then read the Invitation Script and Oral Consent Form; if consent was given, the surveys were conducted on the spot. If consent was not given, the co-op members were thanked for their interest and the meeting was concluded. For those with livelihoods diversified away from agriculture, the research team randomly approached small entrepreneurs in Batloun. Batloun is a small town which enabled the research team to walk between businesses to ask for participants. If no one was present when the team approached a business, it was skipped and the next business was approached. When a business was occupied, the research team first tried to determine a rough estimate of the owner or employees' age. If they appeared to be around 50 or above, the team would enter to introduce themselves and explain the survey after first identifying ourselves as graduate students from the American University of Beirut and working in the village with the approval of the Head of the Municipality.

Not all of the co-op members nor those with livelihoods diversified from agriculture met the exact age target. Due to the small size of the village and the limited number of individuals willing to meet with us, it was determined that the inclusion of some younger participants would be necessary.

2. Agricultural Cooperative

The co-op is made up of around 50 members who are all land-owning residents of the village. It is open to all residents of Batloun who own land within the village boundaries and are committed to maintaining this land for agricultural purposes; there is no requirement to produce

for sale or home consumption. The size of members' land holdings indicate a wide range of agriculture practices and coping systems ranging from 300 meter to 5,000 meters (Rabas, personal communication, 2018). Although still in development, the goals of the co-op are manifold including the general support of Batloun's agricultural community, reduction of village waste, creation of organic matter, and enhancement of environmental awareness. Other benefits to members include occasional extension services from visiting experts, distribution of pesticides at lower prices, distribution of seedling trees and chickens at subsidized prices. A chicken distribution project has already occurred targeting lower-income community members. It does not matter if chickens are used only for home consumption or to start a small business (Rabas, personal communication, 2018).

D. Data Collection

After consent was attained the surveys proceeded in the following order 1) standardized questionnaire, 2) Food Consumption Score, 3) Household Expenditure Module, and 4) Food Insecurity Experience Scale; each of these surveys can be found in the same order in the Annex.

1. Questionnaire

The questionnaire was developed by the researcher based on a historic understanding of agrarian transition in Lebanon and the impacts of livelihood diversification in Lebanon and globally. The questions were determined to provide deeper descriptive analysis and understanding of how the food security status of smallholder farming households in Lebanon is impacted by the socio-ecological conditions resulting from agrarian transition over a set period of time. The structure, asking each of eight questions twice, once about the last 12 months and the second

time to recall memories around the end of the Civil War, was designed to capture this transition within an almost 30 year timespan.

These questions pertain to changes in livelihood strategies and how those changes have impacted household diets and the perceived benefits of practicing agriculture at any scale. The questions are intended to provide context to the Food Consumption Score and Food Insecurity Experience Scale which both reduce the participants' experiences to numerical scores. The questionnaire adds more descriptive elements by allowing participants to answer with open-ended questions that adequately describe their individual experiences.

2. Food Consumption Score

The Food Consumption Score, FCS, was selected for its ability to capture the dimensions of diet frequency, quality, and diversity, elements that are often left out of food and nutrition security measurements. The World Food Programme developed the Food Consumption Score in order to capture both the diversity and nutrition content of diets while measuring food security (WFP 2008). It has been used in Lebanon as a proxy measure of food security for Syrian refugees and their vulnerable Lebanese host populations (VaSyR 2017).

The FCS was selected for its ability to qualify food and nutrition security beyond a simplistic calorie count; specifically for addressing nutrient diversity, not just diet diversity. Diet diversity is often used as a proxy measure for food security — through the logic that not all necessary nutrients are found in a single food therefore requiring a variety of foods to be consumed for adequate nutrition. Diet diversity is typically a challenge for poor, rural communities who globally tend to rely on starchy staples and do not have as much access to fresh fruits and vegetables

and animal based foods.³⁵ However, it is pivotal to recognize that diet diversity does not equate a nutritious diet (de Oliveira 2015, Mozaffarian 2011, Mozaffarian et al. 2014). Depending on the diversity scale used, a diverse diet may only be diverse in “unhealthy”/ less nutritious foods such as a wide range of those high in sugars, salts, and fats; statistically this diet may still be calculated to be diverse but it is not nutritionally beneficial. The research intends to examine how the nutritional content of foods and quality of diets has changed as a result of agrarian-transition induced livelihood diversification.

The FCS for an individual is based on a seven-day recall period of nine food categories: meat, milk, fish, pulses, staples, vegetables, fruits, sugar and oil, and condiments. Each food group is multiplied by the number days in which it is consumed (the maximum being seven = food is eaten everyday) and then weighted by a predetermined relative nutritional content of each category. The foods present in each category are selected based on the dietary preferences of a specific area and therefore provide a more specific list of foods. The general categories and their nutritional weights are:

Meat/Fish/Eggs - 4,
Milk/Dairy - 4,
Pulses - 3,
Roots and Tubers - 2,
Vegetables - 1,
Fruit - 1,
Fats - .5,
Sugars - .5,
Condiments - 0

³⁵ While this has been the recorded case globally, in Lebanon, the consumption of the Mediterranean Diet (even in rural communities) has tended to have higher vegetable and fruit consumption and are considered as a healthy diet (Issa 2009).

These values are then combined into a composite score that is comparable across datasets, households, regions, and countries. And in the case of this study, across villages.

Food Consumption Score = $a_1x_1+a_2x_2+\dots+a_8x_8$

Where 1...8 = food group (see above),

And a = frequency (seven day recall),

And x = weight (standardized).

After each food category, the researcher can ask for the source of each food, whether it was produced by the household, purchased, given as a gift or aid.

The individual's scores are then divided into three food security/consumption categories: poor, borderline, and acceptable. The World Food Programme recommends the cutoff points: poor food security = 0-21, borderline 21.5-35, acceptable = > 35 (WFP 2008). These cut-offs can be adjusted to local contexts and diets; in the monitoring FCS of Syrian refugees in Lebanon the high oil and sugar consumption related to frequent coffee and tea drinking has resulted in shifting the cutoff points to poor food security = 0 - 28, borderline 28.5 - 42, and acceptable = > 42.5. This shift is to prevent frequent small amounts of oil and sugar consumption from skewing results higher (VaSyR 2017). Given the high coffee and matte consumption in Batloun, the adjusted cutoffs were used; additionally, without the adjusted cutoffs the variance in the results would be further reduced. The highest value possible on the score, if all foods groups are consumed every day, is 112. Weights were determined by analysis based on energy, protein, and micronutrient provision.

3. Simple Household Expenditure Module

The expenditure module used in this research was formulated through a combination of the module used in the previously mentioned VASyR 2017 and the 2012 Lebanese Central Ad-

ministration of Statistics, each of which used 12 expenditure categories. The purpose of this expenditure module is to determine the proportional amount of income the household spends on food and beverages and on agricultural inputs whether they are for a home garden or for commercial fields.

Income is a sensitive question and data often reveals that asking participants to self-report their income leads to inaccurate data. Expenditure data has therefore been recognized as a proxy for income which can be collected in a more effective and comfortable way for the participant (Cope et al. 2012).

The other seven categories are intended to provide data on all other major household expenditures in order to understand the proportion that food and agriculture input comprise of the total monthly household expenditures

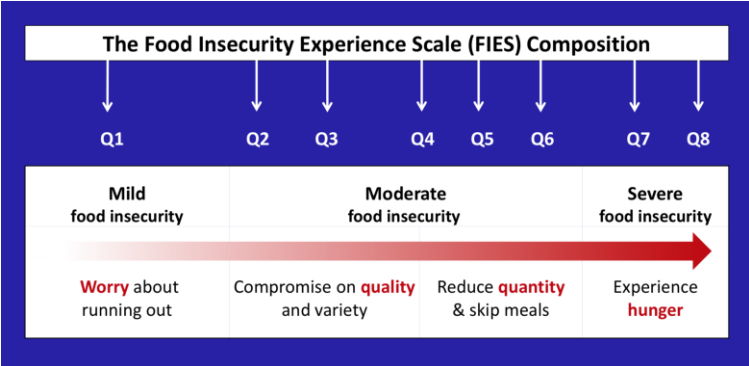
4. Food Insecurity Experience Scale

The FIES was translated, adopted to the local context, and validated by researchers at the American University of Beirut in 2015 for its validity and reliability of use in rural Lebanon (FAO 2018b; Jamaluddine, personal communication, 2018). It is recommended and widely used by the United Nations Food and Agriculture Organization to collect data in over 140 countries (2018a). This scale is an indicator of hunger and the prevalence of undernourishment as measured in the Sustainable Development Goal indicator 2.1.1. There are multiple categorizations of this scale, one for global comparison and others that apply to a specific county to context.

By addressing the psychosocial elements of anxiety and/or uncertainty, this survey captures households' experiences and perceptions of food and nutrition insecurity through eight 'yes' or 'no' questions on their ability to acquire food. The sum of affirmative answers equals the

respondents' raw score. The FIES is designed to capture the anxiety that is associated with challenges in adequate acquisition of quality and sufficient food. The questions are structured with the experience of food insecurity increasing in severity as the question proceed as shown in Figure 2 for the globally comparative scale. Question one indicates a much milder experience of

Figure 2. Global Food Insecurity Experience Scale severity



(Caley 2017)

food insecurity than question eight which quantities acute food insecurity; additionally, a raw score of one is less severe than a raw score of four.

The raw scores are then divided into three categories of food security under the global categorization scheme. This scheme states that category I is food secure and refers to zero to three affirmative answers, category II indicates moderate food insecurity for those who answer four to six questions affirmatively, and those category III indicates severe insecurity for those who answer seven or eight questions affirmatively. The Lebanon specific categorization refers to

food secure as raw score zero to two, and food insecure as any score three or higher (FAO 2018; Z Jamaluddine, personal communication, 2018).³⁶

These eight qualitative questions can then be statistically analyzed to measure prevalence and severity of food insecurity. Additionally, the scores can be calibrated on a common metric to allow comparison across regions and countries potentially revealing how Lebanese smallholders' food security compares with those in other counties at similar positions of agrarian transition.

E. Ethical Approval

Approval by the Institutional Review Board (IRB) of the social and behavioral sciences at the American University of Beirut (AUB) was given to this study prior to starting the data collection phase in Batloun. The research team successfully obtained the Collaborative Institutional Training Initiative (CITI) course certificates which included ethical and technical training via online course. The research team was made up of three graduate students in the Food Security Program at the American University of Beirut. The two team members conducting the surveys are Lebanese and fluent in Lebanese Arabic; both are certified dietitians in Lebanon and therefore well prepared to conduct such surveys.

During data collection, the co-op members were first introduced to the study by the research team's main interlocutor. The small entrepreneurs were approached randomly inside of

³⁶ The Lebanese categories differ slightly from the Global categories. While the Global categorization intends to provide a platform to compare scores between countries, its generalizations do not capture the nuances of food insecurity on a local level. For example, the question "You ate only a few kinds of foods because of a lack of money or other resources?" indicates different levels of severity for a respondent in Lebanon than it might in Sri Lanka depending on what a 'typical' diet consisted of. To account for local experiences of severity, the FIES was equated to a locally developed indicator of food security, the Arab Family Food Security Scale (Sahyoun et al 2015). Equating the two measures revealed that the global cut off points did not adequately capture the human experiences of food insecurity and resulted in the adjustments of the global point to the Lebanese points (Z. Jamaluddine, personal communication, 2018).

their places of work. All individuals were informed about this study by a brief verbal introduction and, if they expressed interest, were then read an invitation script and a consent form outlining the voluntary nature of the study and the types of questions that would be asked. Participants were assured that their participation was voluntary, that there were no incentives to participate, no perceived risks to participation, and that they were free to end the survey whenever they wanted and to skip any questions they felt uncomfortable answering. It was stressed that their answers are confidential, their names would not be connected to their answers or used in any documents produced from the study, and their relationship with AUB and AUBMC would in no way be affected if they choose not to participate. Consent was obtained verbally.

F. Statistical Analysis

Data collected in the surveys were coded, entered, and analyzed using Stata/SE 12.0. Prior to conducting the quantitative analysis, data was analyzed qualitatively to provide a general outline of the results. Variables that were continuous were expressed as means and ranges and categorical variables as proportions and frequencies. The qualitative analysis intends to view the data holistically before the quantitative analysis examines variables' interactions. The qualitative analysis specifically addresses how livelihood changes have occurred in the village, the food and nutrition security as it is related to these transitions, and the effects of the metabolic rift on livelihoods and diets.

All analyses center around the topic of food and nutrition security with the goal of determining how livelihood diversification and the metabolic rift have impacted diet in the period from 1990 to 2018. To do this, first the current state of food and nutrition must be determined, the change in livelihood quantified, and the extent of the metabolic rift determined; after this the

effects of these topics on each other can be explored. In order to determine the diets, livelihoods, and metabolic rift at the beginning of the transition period, participants were selected who were old enough to have been heads of households and recall information from the 1990s. To account for the agrarian transition, the questionnaire was conducted for the 2018 period and then the same questions were asked for the 1990 period using participants' memories and the significant time period around the end of the Civil War to trigger their memories. References to the data collected from the participants memories of 1990 is referred to as either 1990 or as the 'past period' or 'past'. Data on 2018 is referred to as either 2018 or as the 'current period' or simply as 'current' (as in current income from agriculture, or past motivations for maintaining a garden).

For the purpose of quantitative analysis and the small sample size, agricultural and diversified livelihoods (i.e. livelihoods where a portion of income comes from agriculture and another portion from a non-agricultural source) are referred to together as diversified livelihoods. Livelihoods that do not depend on any agricultural income are referred to as transitioned livelihoods as they have moved away from agrarian sources (in the study location, transitioned livelihoods referred to who earned an income as small entrepreneurs, employees, retired, remittances, or unemployed).

The quantitative analysis has three primary objectives. The first is to determine the extent of the livelihood transitions that have occurred in the village in relation to the role of agricultural income. The second objective is to analyze the differences in food and nutrition security status as related to the two livelihood categories and to determine the most influential factors on food security. And the third is to analyze the effect of the agrarian transition on the metabolic rift on diets and livelihoods over the period of 1990 - 2018. The quantitative tests are displayed under their topic of analysis as listed in Table 2. In the quantitative analysis, t-tests, ANOVAs, and

simple regression analyses were conducted to find the effect of the independent variables on the food security scores. Non-parametric tests was determined to be appropriate given the small sample size and the accepted assumption of normality. Furthermore, the lack of variability in the income sources of the participants made many of the results obvious in the qualitative analyses. These analyses determined the extent to which proxies for livelihoods and for the agrarian transition have impacted the food and nutrition security of Batloun.

Table 2. Statistical tests conducted by topic of analysis

Topic	Dependent Variable	Independent Variable	Test & Result
Agrarian Transition	Past Livelihood	Current Livelihood	2-Sample T-test Chi square
			Cross tabulation
	Past Income from AG	Current Income from AG	Cross tabulation
			One-Way ANOVA
Food and Nutrition Security	FCS	Current Livelihood	2-Sample T-test
		Current Consumption from HG	One-Way ANOVA
		Current Income from AG	One-Way ANOVA
		Expenditure on AG	One-Way ANOVA
		Expenditure on Food	One-Way ANOVA
		Total Expenditure	Scatterplot
			Simple Regression

Topic	Dependent Variable	Independent Variable	Test & Result
	Current Livelihood	Expenditure on Food	T-test
	FIES	Current Livelihood	T-test
		Total Expenditure	One-Way ANOVA
			Scatterplot
		Expenditure on Food	One-Way ANOVA
			Scatterplot
	<i>FIES - raw score > 1</i>	Expenditure on Food	One-way ANOVA Significant
Metabolic Rift	Past Consumption from HG	Current Consumption from HG	Cross tabulation

CHAPTER V

RESULTS AND DISCUSSION

In order to examine the extent to which the socio-ecological conditions of agrarian transition have impacted the food and nutrition security status of the residents in Batloun, Lebanon, livelihood diversification is adopted as the indicator of this transition. Participants in the study are divided between those with diversified agricultural livelihoods and those with transitioned livelihoods (similar to the off-farm and farm categories used by Babatunde & Qaim 2018).³⁷ The impacts of livelihood are then compared to food and nutrition security determinants to see how the transition has altered their status. The transition period stretches between a 30 year period from the end of Lebanon's Civil War to the summer of 2018. In this Results and Discussion section the results of the study will be analyzed and discussed in the following sub-sections 1) the Agrarian Transition as experienced in Batloun between 1990 and 2018, 2) the current state of food and nutrition security, and 3) the prevalence of the metabolic rift in terms of livelihood and food consumption.

A. The Agrarian Transition

The indicators of the agrarian transition in Baltoun are current and past livelihood sources and the current and past income earned from agricultural activities. The extent of diversification

³⁷ As explained in the Methodology section, exclusively agricultural livelihoods and diversified livelihoods are grouped together. Diversified livelihoods refer to any combination of partially agricultural livelihood plus transitioned livelihood like small entrepreneur, employee, retired, and or remittances. Exclusively agricultural livelihoods can always be assumed to be included under 'diversified livelihoods' unless explicitly stated otherwise. Livelihoods that do not depend on any agricultural income are referred to as transitioned livelihoods as they have moved away from agrarian sources as explained under the explanation of agrarian transition.

and the agrarian transition is examined qualitatively before their relationships to food and nutrition security are examined quantitatively. The results will show livelihoods have moved away from diversified sources to transitioned livelihoods and that those who remain in agriculture earn proportionally less of their total income from agriculture in 2018 than they did in 1990.

1. Livelihood Transitions

The number of exclusively agricultural livelihoods in Batloun has dropped from four (8%) in 1990 to only one (2%) in 2018 as shown in Table 3. Additionally, the number of diversified livelihoods has also dropped by 44%, from 16 to only nine of the participants by 2018. The number of livelihoods which are completely transitioned away from agriculture has increased from 31 to 41 participants' livelihoods in 2018. Overall, only 10 of the study participants had some level of agricultural income in 2018. This reveals that incomes reliant on agriculture are becoming less common; based on qualitative evidence, this appears to be because those who were exclusively agricultural-based and diversified no longer see economic benefit in maintaining the practice of agricultural production.

Table 3. Livelihood sources as reported by Batloun residents

Livelihood Source	Exclusively Agriculture	Diversified	Transitioned	Total
1990	8%	31%	61%	51
2018	2%	18%	80%	51

Each of the livelihood categories in Table 3 were compared against each other across the two time periods to determine the proportion of change using a 2 sample t-test (for example current exclusively agricultural against past exclusively agriculture). The results indicate that the increase in the proportion of participants with diversified livelihoods was significant at the 10% significance level. Additionally, that hypothesis that the number of transitioned livelihoods had increased between the time periods is significant at the 5% significance level. The hypothesis that there is drop between 1990 and 2018 in exclusively agricultural incomes is significant at a 10% significance level with a p-value.

Of the five participants who reported incomes dependent exclusively on agriculture (whether in 1990 or 2018 or both), two adopted diversified incomes by 2018 and two transitioned out of agriculture completely by 2018 (one small entrepreneur, one employee). One left a diversified income strategy in 1990 to become completely dependent on agriculture in 2018. None of the participants whose livelihoods were exclusively dependent on agriculture in 1990 were also exclusively dependent on agriculture in 2018.

Of the 16 participants who had diversified income sources in 1990, by 2018 50% retired, 31% left agriculture for transitioned livelihoods, 13% maintained a diversified livelihood strategy, and one participant became dependent on agriculture exclusively. In 2018, the nine participants (22% of respondents) with diversified livelihoods also worked as employees or small entrepreneurs; one respondent is retired in addition their agricultural income.

Comparing livelihoods from the past period to the present demonstrates that Batloun experienced changes in livelihood composition of the village indicating agrarian transition as referred to in Table 3. The decreasing prevalence of exclusively agricultural-based livelihoods and

diversified livelihoods as well as the increase in fully transitioned livelihoods demonstrate this. In 1990 40% of the study population had livelihoods that involved some level of agriculture, where in 2018 this number decreased by 20%.

2. Income From Agriculture

Of the participants with diversified livelihoods, the percentage of income coming from agriculture has decreased from 1990 to 2018. Ten participants currently reported diversified livelihoods, meaning agriculture contributed to some proportion to their income. As referenced in Table 4, of the ten, two (20%) reported they currently earned no income from their agricultural production, two (20%) reported around half of their income is from agriculture, and one reported that all of their income came from agriculture (this is the one participant who reported the exclusively agricultural livelihood in 2018). The remaining half of this group, five participants, said that agriculture made up a minimal portion of their income.³⁸ The additional income sources reported were divided between a combination of small entrepreneurs, salaries from being an employee, and retirement.

³⁸ Minimal portion of income refers to somewhere between 1-30%, while ‘around half’ of income refers to 40-60% of income. Participants were not asked to report the exact amount of this income from agriculture but to place their estimate within the categories of no income from agriculture, minimal, around half, mostly, and all of income from agriculture.

Table 4. Categories of income earned from agriculture among respondents with diversified livelihoods in 2018

Income category	None 0%	Minimal 1-39%	Around Half 40-60%	Mostly 61-99%	All 100%	Total
1990	10%	40%	45%	-	5%	20
2018	20%	50%	20%	-	10%	10

Of the 20 participants with diversified livelihoods in 1990, nine (45%) reported agriculture contributed around 50% to their current incomes, eight (40%) reported agriculture contributed minimally, one participant (5%) reported their current income came fully from agriculture. Two (10%) reported no current returns from agriculture despite listing it as a livelihood source. Three of the participants who reported that agriculture was their sole livelihood, also reported that their income was made up of only 50% or less from agriculture; they did not report any other income source outside of agriculture.³⁹ In the past period, 45% of participants with diversified livelihoods reported that agriculture made up around half of their income, whereas in 2018 only 22% reported that around half of their income came from agriculture indicating that agriculture is comprising a smaller proportion of incomes.

In terms of statistical analysis, 82% of participants reported no income from agriculture in 2018 compared to 59% in the past period; overall fewer participants are working with diversified livelihoods. A one-way ANOVA of current against past livelihood sources showed at a 95%

³⁹ The participants that cited agriculture as a sole livelihood source but currently did not earn their full income from their practice are those who are not currently returning a profit from the practice and/or have not been able to find a market for their products.

confidence level no significant association with a p-value of 0.17. The level of income from agriculture in the past period was not found to have an association with the level of income a participant earned from agriculture in the current period. However, it is worth noting that 50% of respondents reported the same level of income from agriculture for both time periods.

3. Discussion

The number of participants with exclusively agricultural livelihoods has dropped from 1990 to 2018, as have the number of individuals with diversified livelihood. Additionally, the proportion of income that is earned from agriculture has also dropped between the time periods. The decreasing frequency of exclusively agricultural and diversified livelihood sources was also documented in Baltoun between the period of 1935 and 2005 (Rachid 2007) and is reflective of the agrarian transition across Lebanon and the Middle East region (Chalak; CIRAD – CIHEAM-IAMM 2016; Rignall & Aita 2017). Chalak focuses on agrarian transition in Lebanon spurred by the decline of the silk industry and how unresolved labor and land issues of this transition fed into the Civil War. Rignall and Aita (2017) review how many rural Moroccans were willing to leave their homeland, families, and small agricultural incomes for potentially more lucrative work abroad. Globally, small farmers are transitioning away from agriculture across high, middle, and low-income countries (Akram-Lodhi & Kay 2010a; Holt-Giménez 2017a; Thomas-Hope 2017).

For Batloun's study participants, there are various reasons for this transition, many of which have been briefly addressed in this study but are more fully discussed by Rachid (2007),

Seyfert (2014), Traboulsi (2007) and others. Within the study sample, many reported issues pertaining to water access and perceived a decreasing supply despite the proximity to multiple water sources. Other participants cited the crash of the fruit market and conflict with Syria reducing export opportunities which significantly reduced farmers' profits pushing them out of agriculture, specifically the production of stone fruits. The loss of Syria as an export market and agricultural transport hub for Lebanon's farmers has negatively impacted farmers across Lebanon in the years since the war began (Hackenbroich 2013).

In Batloun particularly, the aging population contributes to changes in livelihood sources and transition away from agricultural livelihoods. The survey data shows that half of the participants who had agricultural incomes in 1990 had retired by 2018. Multiple participants mentioned how the "younger generation" does not see the benefit of working the land and that they are attracted to other livelihoods out of the village. Of the participants who were too young to head households in 1990 — there were seven participants who were approximately 40 years old or younger at the time the surveys were conducted — only two reported diversified livelihoods in 2018. Of this 'younger demographic', five reported transitioned livelihoods as small entrepreneurs and employee salary as their livelihood sources. This trend of the village youth seeking opportunities outside of agriculture has been well documented (Byiringiro 2013; Rachid 2007). Across all of Lebanon 23% of farmers are over 65 years (Darwish et al. 2012) and in 2015 their average age was 52 (ECODIT-Led Consortium 2015). As Lebanon has developed post Civil War, new and more stable livelihood opportunities are offered to the youth in increasingly urban centers contributing to the agrarian transition in rural areas. The current survey sample reinforces this trend as only one of the younger demographic has a diversified livelihood.

The differences in income earned from agriculture between the two periods reveal that not only are agricultural livelihoods less common, but for those participants who still practice agriculture, the percentage of income resulting from the practice is also decreasing. In the 2018 period, two of the participants reported that they currently were not earning income from agriculture despite listing it as a livelihood source, both were also employees. This corroborates Rachid's (2007) finding that diversified employees earn less money from agriculture than diversified small entrepreneurs — possibly due to employees' set hours that take them away from their home and land. Both time periods had only one respondent with an exclusively agricultural livelihood; however they were not the same individual. Jointly interpreted, these findings indicate that the limited return from agriculture is a driving factor out of agriculture in Batloun. Lebanon has widely experienced decreasing agricultural incomes for farmers and in contribution to GDP (Byiringiro 2013; Hackenbroich 2013; IDAL 2015) and Batloun's data seems to fit this trend. The decreasing importance of agriculture to GDP is seen as a sign of diversification towards development and is considered a necessary step in economic development (Harriss 1991; Mellor 2017).

B. Food and Nutrition Security

Food and nutrition security are measured with the Food Consumption Score, FCS, and Food Insecurity Experience Scale, FIES. These scores cannot be quantified reliably retroactively over 30 years, and therefore can only be discussed for the present period. In addition to the food security scores, current total monthly household food expenditure data was collected with attention to expenditures on food. There was one participant who did not complete the FIES due to a privacy issue, bringing the total respondent count down to 50. The results indicate that there was

no severe food insecurity according to either the FIES or the FCS and that the prevalence of moderate food insecurity was very low among the survey respondents.

1. Food Insecurity Experience Scale

The FIES is made up of eight ‘yes’ or ‘no’ questions about perceived food insecurity that increase in severity with the eighth and final question indicating the most severe experience of food insecurity quantified. According to the FIES 26 participants (52%) did not respond affirmatively to any of the FIES questions, the remaining 24 (48%) responded to at least one question relating to uncertainty or anxiety related to access to food over the past 12 months.

Table 5 shows the participants’ accumulative FIES score, also referred to as the raw score. The raw score can be interpreted across either a global scale for comparison or a Lebanon specific scale to divide participants into food security categories. The globally comparable raw score categorization states that a raw score of zero to three is considered food secure and falls in category I, raw scores four to six are considered moderately food insecure in category II, and raw scores seven or eight are considered food insecure category III. The Lebanon specific categories are slightly altered where category I is raw scores of zero to two indicating food security, while category II is raw scores of three and above indicate food insecurity.

The highest raw score recorded in Batloun was four, meaning that four of the eight questions were answered affirmatively (the raw score does not reveal which questions were answered). No affirmative answers, a raw score of zero, was the most common raw score with 26 (52%) participants. In total 46 (92%) participants were considered food secure according to the FIES global scale; according to the Lebanon specific scale the number drops to 43 participants (86%) food secure. This shows that the global scale overestimates food security in Lebanon.

Those with diversified livelihoods answered FIES questions affirmatively at a higher rate overall (66%) than those with transitioned livelihoods (46%).

Table 5. Raw Food Insecurity Experience Scores by livelihood

FIES Raw Score	Diversified	Diversified Rate	Transitioned	Transitioned Rate	Total	Global Category	Lebanon Category
0	4	44%	22	54%	26	I	I
1	1	11%	11	27%	12	I	I
2	3	34%	2	5%	5	I	I
3	-	-	3	7%	3	I	II
4	1	11%	3	7%	4	II	II
	9	100%	41	100%	50		

Table 5 shows the rates at which the different livelihood categories achieved their raw scores and how these scores are divided differently between the Lebanese and global categories of food insecurity. Diversified livelihoods had a higher rate of responding to four questions than transitioned livelihoods; while transitioned livelihoods responses to only one and to zero questions at a higher rate than diversified livelihoods.

Table 6 shows that the Lebanon specific categorization detects a higher percentage of moderate food insecurity than is detected by the global categorization; 14% of the participants were moderately food insecure on the Lebanese scale, compared to 8% on the global scale. Within the change, it is only transitioned livelihoods that are impacted, becoming increasing food insecure under the Lebanese categorization and adding to the higher rate of moderate food

insecurity. The rate of diversified livelihoods experiencing moderate food insecurity stays the same under both categorization schemes. Overall, those with transitioned livelihoods reported moderate food insecurity at a higher rate on both the Lebanese and global scales than those with diversified livelihoods did. Diversified livelihoods reported food insecurity at a rate of 2% under both categorizations, transitioned livelihoods reported a rate of 12% under the Lebanese categorization and 6% under the global categorization. Despite these tabulated differences, a chi

Table 6. Summary table of number of participants in Food Insecurity Experience Score Categories by livelihood

	Lebanon Category Diversified	Lebanon Category Transitioned	Lebanon Total (Percent)		Global Category Diversified	Global Category Transitioned	Global Total (Percent)
I	8 (16%)	35 (70%)	43 (86%)		8 (16%)	38 (76%)	46 (92%)
II	1 (2%)	6 (12%)	7 (14%)		1 (2%)	3 (6%)	4 (8%)

square test of independence was done between FIES global categories and livelihood source. The result was a p-value of 0.704, it is insignificant at the 10% significance level indicating that a participant being in FIES category I or II is independent of their livelihood i.e. current source of income does not impact the FIES.⁴⁰ When the test was conducted using the Lebanon specific categories, the result was a p-value of 0.783 which is also insignificant at the 10% level.

⁴⁰ A t-test was done to see if current livelihood had an impact on participants' FIES raw score. The t-test was not significant at a 95% confidence level with a p-value of .47; livelihood does not affect FIES.

The raw score does not show which of the eight questions were answered, only the sum of affirmative answers. Since the FIES questions increase in severity, knowing which questions were answered affirmatively provides another layer of analysis. Table 7 shows which questions were answered and with what frequency.

Table 7. Response rates to Food Insecurity Experience Scale⁴¹

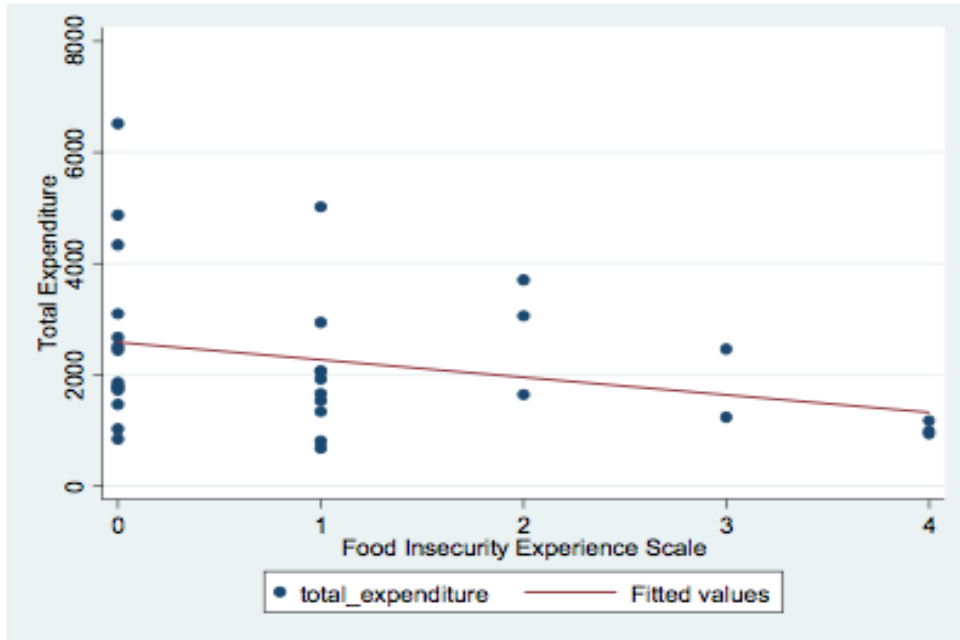
FIES Question Number	Question	Number of Responses
0	—	26
1	You were worried you would not have enough food to eat because of a lack of money or other resources?	11
2	You were unable to eat healthy and nutritious food because of a lack of money or other resources?	16
3	You ate only a few kinds of foods because of a lack of money or other resources?	9
4	You had to skip a meal because there was not enough money or other resources to get food?	5
5	You ate less than you thought you should because of a lack of money or other resources?	3
6	Your household ran out of food because of a lack of money or other resources?	3
7	You were hungry but did not eat because there was not enough money or other resources for food?	0
8	You went without eating for a whole day because of a lack of money or other resources?	0
total		73

⁴¹ As outlined in the Methodology section, the global categories are I = food secure and refers to zero to three affirmative answers, category II = moderate food insecurity for those who answer four to six questions affirmatively, and category III = severe insecurity for those who answer seven or eight questions affirmatively. The Lebanon specific categories are I - food secure raw scores zero to two, and II - food insecure with raw scores of three and above (FAO 2018; Z Jamaluddine, personal communication, 2018).

The most common question answered affirmatively was #2 “You were unable to eat healthy and nutritious food because of a lack of money or other resources?” with 16 responses. This was followed in frequency of responses by question #1 “You were worried you would not have enough food to eat because of a lack of money or other resources?” with 11 responses, and then question #3 “You ate only a few kinds of foods because of a lack of money or other resources?” with nine affirmative responses. Given the increasing severity of each question, responses indicate experiences of food insecurity but the frequency of responses being clustered around the first three questions, with no responses to the last two questions, reveals there was no severe food insecurity within the participant population.

A scatterplot, shown in Figure 3, and one-way ANOVA test were done on total monthly expenditure and FIES raw score. The scatterplot seems to suggest a weak relationship, but the multiple outliers in the data obscure any potential conclusion. The one-way ANOVA determined at a 95% confidence level and a p-value of .36 that the effect was insignificant. Therefore, total monthly expenditure was not found to have an association with FIES score.

Figure 3. Scatterplot total monthly expenditure and Food Insecurity Experience Scale



A one-way ANOVA was also done on the effect of monthly expenditures on food on raw FIES scores. This test was found not to be significant at confidence level of 95% with a p-value of .18; the amount of expenditures on food does not impact FIES. However, Table 8 shows that when considering the responses of only those who had a raw score of two or more on the FIES,

Table 8. One-way ANOVA current food expenditures and Food Insecurity Experience Scale responses greater than 1

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	1456.3	2	728.15	9.70	0.0096
Within groups	525.3	7	75.0428571		
Total	1981.6	9	220.177778		

there is a significant trend observed. This relationship is at confidence level of 95% with a p-value of .01. The participants with raw score of more than one FIES were also those who spent more on food each month.

2. Food Consumption Score

The FCS quantifies diets over a seven day recall period by recording what participants consumed in predetermined nutritionally-weighted categories. Scores are determined by the sum of responses of each of nine categories; a higher score indicates a higher level of food and nutrition security. Fifty of the 51 conducted FCS were able to be read and analyzed, one revealed inconsistencies in responses that made the score unusable. Table 9 shows the FCS food security categories by livelihood; the result of their statistical analysis with a 2 sample t-test between the livelihood categories found that there was no significant association between livelihood and FCS in this study

Table 9 Adjusted Food Consumption Scores by livelihood

Adjusted FCS Range	Food Security Category	Diversified	Transitioned	Total
0 - 28	Poor	—	—	—
28.5 - 42	Borderline	—	2	2
42.5 - 112	Acceptable	10	38	48
		10	40	50

Using the FCS to examine food and nutrition security, with the adjusted cutoffs points⁴² (VaSyR 2017), there was no recorded instance of poor food and nutrition insecurity within the study sample. If the normal cutoff points were used, all participants would be considered food and nutrition secure as scores were all above 35. Two participants (4%) reported scores that indicated they were borderline food and nutrition insecure, and the other 48 responses had acceptable levels of food and nutrition security. The average FCS was 79.25, well above the 'acceptable' cut off point of 42. The lowest score reported was 38.5 and the highest, with two responses, was 112, which is the highest score possible indicating that all food groups are consumed every day. Of the two 112 FCS one was from a diversified livelihood and the other a transitioned livelihood.

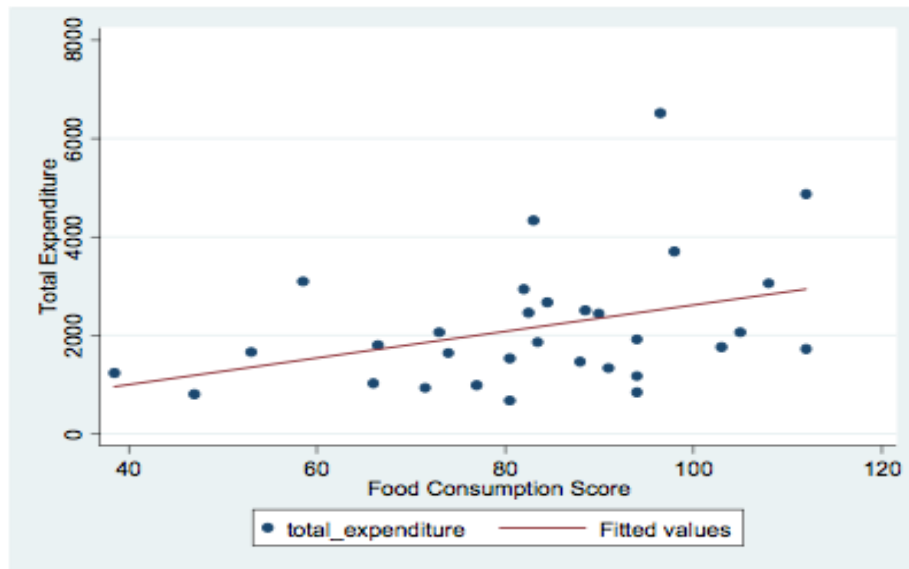
In terms of nutrient diversity, the participants consumed a wide variety of nutrient rich, diverse foods. For the purpose of analysis, discussion will be on eight food and nutrient categories, excluding the 'condiments' group as the FCS rates this group with zero nutritional value. 37 participants (74%) reported consuming all eight food and nutrient categories over the seven day recall period. 11 participants (22%) reported consuming seven food and nutrient categories over the seven day recall period (of this 22%, five of the participants reported not consuming anything from the low-nutritional rated 'sugar' category, the other six reported not consuming anything from the moderate-nutritional rated 'legumes and nuts' category). The remaining two participants (4%) both consumed six of the food and nutrient categories over the recall period. One participant is vegan and therefore did not consume from either the 'milk and other dairy products' or the 'meat, fish, and eggs' category. The other participant did not report eating from either the 'sugar' or 'legumes and nuts' food and nutrient category.

⁴² As mentioned in the methodology section, the adjusted cutoff points were used to account for the high consumption of sugar and olive oil in cooking and tea/coffee in the diets of Syrian refugees in Lebanon (VaSyR 2017). Trends in consumption of these two foods was also high in Batloun suggesting that the higher cutoff points would better indicate food and nutrition security levels.

Furthermore, 80% of respondents consumed vegetables everyday while 86% consumed them on five or more days during the recall week. 86% of respondents consumed fruits every day during the recall week, while 92% consumed them on five or more days during the recall week. And 86% of participants consumed tubers and cereals every day during the recall week, while 88% consumed them on five or more days during the recall week. Meat was consumed every day during the recall week by 34% of the participants and five or more days during the week by 74% of the participants. Another 37% consumed meat three or fewer days during the recall week.

The FCS was also analyzed statistically with a variety of other factors. In a t-test of current livelihood association on monthly expenditures on food, no significant relationship was seen at a 95% confidence level with a p-value of .25. The association of total monthly expenditure, as a proxy for income, was then tested on the FCS. As seen in Figure 4, the scatterplot suggests a relationship that the participants with higher total expenditures have better FCS. The relationship was then tested in a simple regression at a confidence level of 95% and showed a p-value of .04 with an R-squared of 0.14 suggesting a positive, significant relationship. Food insecurity is often related to poverty. This relationship has been examined on Palestinian refugees in Lebanon using a United States Department of Agriculture food insecurity score by Ghattas et al (2015) who found that “poor” households, those with low expenditures, were more likely to be food insecure. In her validation of the Arab Family Food Security Scale Sahyoun et al (2014) also found a strong relationship between food insecurity and low expenditures in both Palestinian refugees in Lebanon and residents of Southern Lebanon.

Figure 4. Scatterplot total monthly expenditure and Food Consumption Score



A two-sample t-test with equal variances showed that the FCSs of those with either diversified or transitioned livelihood sources in 2018 were not significantly different from each other at a 95% confidence level, with a p-value of 0.46 in the study sample. Similarly, a one-way ANOVA test between FCS and the current percentage of food consumed from a home garden showed no significant association at a 95% confidence level with a p-value of 0.47. This means that the percentage of food consumption from the home garden was not found to impact the amount of food consumed nor the nutrition diversity of a participants' diet. The comparison of FCSs and the percentage of income from agriculture was also found not to have significant association with a p-value of 0.42 with a confidence level of 95%. This means that the income earned from agriculture does not influence how participants use their income to purchase adequate or nutritionally diverse foods.

A one-way ANOVA test comparing FCSs of participants with different monthly food expenditures revealed no significant association at a 95% confidence level with a p-value 0.92.

This means the amount spent on purchasing food from the market does not have a strong association to a participant's score. This finding is in contradiction to studies by both Ghattas et al (2015) and Sahyoun et al (2014) who found strong relationships between food insecurity and low food expenditures in their work in Lebanon.

3. Paired Food Insecurity Experience Scale and Food Consumption Score

In order to examine the interactions of food security with food and nutrition security, a scatterplot was made of participants' two food security scores. While the FIES indicates participants' perceived fears and experiences of food security, the FCS documents the diet of the participants with attention to the frequency and nutritional diversity of the diet. A one-way ANOVA test showed no significant association between the two scores at a 95% confidence level with a p-value of 0.71. The results were also tabulated against each other and a regression analysis was run; there was no significant association observed between any pair wise comparison of raw FIES and FCS in the study population.

4. Discussion

No severe food insecurity was detected in the participants from Batloun and very little moderate food insecurity was detected. Scores on the FIES and FCS were not impacted by livelihood source. Transitioned livelihoods fell into the moderately food insecure FIES category at a higher rate than those with diversified livelihoods — but not statistically significantly higher — according to the global FIES scale on both the Lebanese scale and global categorizations.

The most common question answered affirmatively on the Food Insecurity Experience Scale was question #2 with 16 affirmative responses (34%) of total FIES responses. The high

concentration of responses to this question warrant a deeper examination into its subjective meaning. The FIES relies on the respondents' personal perceptions of food insecurity and therefore broad understandings of the terms "healthy" and "nutritious". Without any form of standardized dietary knowledge, different experiences lead to the same answers. Additionally, recalling that 96% of the study participants had acceptable levels of food security according to the FCS, responses to this question are subject to food preference, not need. So, what does the typical Batloun resident consider healthy? One of the participant responses referred specially to meat consumption in the context of healthy foods; another quote suggested that labneh and zaatar was not a healthy option. The FCS and findings by experts like Mozaffarian (2011) and de Oliveira et al (2015) affirm that the diversity of nutrients is the pivotal aspect of a nutritious diet; therefore eating meat only twice a week and eating a labneh and zaatar sandwich for dinner occasionally during the week — as long as other diverse nutrients are consumed at other points — are not unhealthy options although it appears to be considered so by the participants. If all of the participants who answered 'Yes' to question 2 have similar understandings of nutrition, the food insecurity on this scale would be severely over-reported. In conducting the FIES across Lebanon, experience has shown that Lebanese often understand question #2 to refer to "food safety" (Z. Jamaludine, 2018, personal communication).

The seven participants who reported three or four as a raw FIES scores (the highest scores recorded in the study sample) are shown in Table 10. Of these participants, only one had a diversified livelihood. The other six participants all reported transitioned income sources; one was unemployed (but had a FCS above 90), one reported being an employee, three reported they

were small entrepreneurs, and one had multiple income sources that were non-agricultural. Of these seven participants, one did not have a home garden, but raised a variety of fruit trees.

Table 10. Food Insecurity Experience Scale, livelihood, home garden and consumption from home garden

Participant	FIES Raw Score	Livelihood	Home Garden	% Consumption from HG
1	4	Diversified	Yes	Minimal
2	4	Transitioned	Yes	Minimal
3	3	Transitioned	Yes	Minimal
4	3	Transitioned	No	Minimal
5	4	Transitioned	Yes	Minimal
6	3	Transitioned	Yes	Minimal
7	4	Transitioned	Yes	Minimal

In Batloun 92% of participants were food secure according to the global categorization and the remaining 8% were moderately food insecure in category II. Across 19 Arab states, 86% of surveyed participants were found to be food secure and moderately food insecure while the

remaining 14% were severely food insecure according to the FIES global score (Sheikomar et al 2017). Severe food insecurity was prevalent in 21% of adults in low-Human Development Index countries while only 7.1% were food insecure in high-Human Development Index countries; Lebanon is a high-Human Development country. Sheikomar et al (2017) also found that severe food insecurity was more prevalent in adults in rural areas. Across five Sub-Saharan African countries, the FIES global categories detected severe food insecurity in 36% of the study population and was significantly more prevalent in rural participants and those with lower incomes (Wambogo et al 2018). In a similar study in 22 Latin America and Caribbean countries Smith et al (2017) found that 23% of the study population experienced severe food insecurity. In terms of the determinants of food insecurity, higher income households had a high prevalence of food security and this effect is stronger in rural areas than in urban ones. They also found that living in a country with low GDP per capita is one of the strongest influences on low FIESs.

The participants in the study scored very high on the food security and nutritional adequacy of the Food Consumption Score with the exception of only two individuals. The two reports of borderline food insecurity both had transitioned livelihoods and were small entrepreneurs. Survey participants consumed a wide variety of nutritionally diverse foods with the majority consuming fruits, vegetables, and tubers and cereals every day during the recall week.

The nutritional diversity of Batloun's diet comes in part from the effect of its rural location. Rural and urban diets differ in terms of the access to certain types of foods that each location has (these divisions are further divided by income level within each location) due in part to the penetration of the Western Diet. For example, rural areas across Lebanon keep home gardens with vegetables, fruits, and herbs for home consumption and winter storage (Al Ahad & Helwani

2017; Gebrael & Salmon 2013; Hassan et al; Rachid 2007). In urban areas, concentration of rising national wealth increases the consumption of processed foods leading to increased calorie intake through higher concentration of sugar, salts, and fats under the Western diet transition (Friel & Lichacz 2009). Transition to the Western Diet in Lebanon has widely been linked to decreasing diet diversity in rural and urban areas with a stronger effect in urban areas (Batal et al. 2007; Naja et al. 2015), but diet diversity was not an issue for study participants in Batloun. In many lower and middle income countries these types of foods are reaching rural areas and having similar impacts, but the negative health effects can be bolstered by rural dwellers production of their own fruits and vegetables (Zaki et al. 2014). While it is known that those with higher “socio-economic levels” in urban Lebanon and globally tend to consume ‘better diets’ (Nabhani-Zeidan et al 2011; Sheikomar 2017; Wambogo et al 2018), in Batloun this impact was also observed by those with higher total monthly expenditures having higher FCSs. In terms of the differences between rural and urban diets, Zaki et al (2014) found that those in rural areas were better able to maintain nutritious diets in the face of international price shocks than urban dwellers due to their gardens. The location of an individual, rural or urban, therefore has a strong impact on their access to adequate food and its accessibility.

In 2018, 51% of participants spent between 1-25% on food and beverages, 40% spent between 26-50%, 9% spent above 50% of their monthly expenditures on food. The average for monthly expenditure on food was 31% for the participants in Batloun. Lebanese households spend an average 20% of income on food and beverages (exclusive of alcoholic beverages) (CAS 2005; CAS 2012). While the Central Administration of Statistics of Lebanon, CAS, does not an-

alyze expenditure data by region (urban verses rural), they do so by income level with the highest income level spending the smallest proportion on food and beverages. As the income level decreases, so does the proportion of expenditure on food (CSA 2012). With expenditure as a proxy for income (Cope et al. 2012), all of Batloun's participants fall into the lowest income category in the CAS' categorization which, according to the CAS, spend 25% of their income on food. Under this income specific comparison, Batloun's participants spent more than would be expected on food and beverages than the average Lebanese household in this income category. The high percentage spent on food overall makes the country sensitive to international price changes while also supporting the maintenance of home gardens in rural areas as a common expenditure reduction method (Zaki et al 2014). Within the CAS breakdown of the food categories in their expenditure module, vegetables were the second highest food expense after meat (CAS 2012). Batloun's high consumption of protein many contribute to their high food expenditures. According to the World Bank, low income countries spend an average of 42% on food and beverages, middle income counties spend 35% while high income countries spend only 21% on this need. According to this comparison, Lebanon's average fits the model of a high income country, while Batloun is between the expected averages of low income and middle country status, given Lebanon's urban development bias, the high spending in rural locations align with this finding (World Bank 2010). While the location effect keeps food security high and diets diverse, rural residents still use a higher proportion of their income and/or expenditures on food.

C. Metabolic Rift

The metabolic rift is examined in terms of the frequency of home gardens and the motivations for maintaining these gardens. In the study location, home gardens were intended to be

understood as small plots of land near participants' homes where food crops were grown for non-commercial purposes and consumed within the house. This definition had to be expanded to include plots of land not near the home, or near the home of a family member, from which the participants consumed food from. While the agrarian transition in Batloun is observed in the wide transition of livelihoods away from agriculture, this trend does not constitute a complete disassociation from the land and traditional forms of natural resource management. Home gardens, and consumption of fruits and vegetables from them, are as much a part of daily life in Batloun in 2018 as they were in 1990.

1. Frequency of Home Gardens

Having a home garden is common among the study population. In 2018, 91% of respondents maintained some type of a garden for home and/or commercial production; 9% did not maintain any type of garden. 73% of the total maintained exclusively home gardens with no commercial purpose. In 1990 72% of the respondents maintained gardens for home consumption or commercial purposes; if the 'young demographic' of the seven participants who were too young to be heads of household in 1990 are removed from the analysis, the percentage rises to 87% with some type of home garden. Also in 1990 35% were exclusively home gardens. There was very little change in the percentage of participants with gardens between 1990 and 2018.

It is interesting to note that of the seven youngest participants — those who were too young to have reported having a livelihood in 1990 — only two did not maintain home gardens. The other five maintained home gardens (71%). Four of the younger demographic reported a minimal amount of their food consumption came from their gardens while one reported that most of their consumption came from the home garden. All of those with home gardens reported food

quality as a motivation for maintaining the garden, while three also reported a love of the land, and responsibility towards it that was instilled in them by their families. Food quality concerns and a fear of unconstrained chemical use were widely cited by this and the other demographic of participants as motivations for keeping a home garden. Food, especially fruit and vegetable, quality is widely questioned in Lebanon (Awwad 2017).

2. Motivations for Maintaining Home Gardens

As noted above, some of the participants have kept gardens exclusively for home consumption while others did so for livelihoods purposes. Differences were also found in the personal motivations for practicing agriculture at both levels. The motivations for maintaining a garden in 2018 were 31% for health and food quality reasons compared to 39% in 1990. In 2018 57% of respondents reported environmental reasons such as a love of the land, desire to maintain green spaces, aesthetic value, and hobby as a motivation; in 1990 only 22% reported these motivations. In 2018, financial reasons⁴³ in combination with one of the previously mentioned categories motivated 12% of respondents, but 24% in 1990. Additionally, in 1990 16% reported exclusively financial motivation while none of the respondents in 2018 reported this motivation.

In 2018, no participants reported that exclusively ‘financial reasons’, were motivation to keep a garden, while in 1990 16% responded this was their primary motivation. Only five of the 51 respondents reported that they did not have some type of garden near their home or elsewhere in the village (one of the five reported maintaining fruit trees, but no “garden”). In 1990, 14 participants reported not having any type of garden for home nor commercial purposes, however

⁴³ ‘Financial motivations’ refer to maintaining a garden as either a livelihood source and/or strategy to reduce expenditures on food.

half, seven participants, of this group were too young to have their own garden (but many reported memories of consuming food from their families' gardens) and two were abroad due to the Civil War. Five participants did not give a reason for not having a garden that they ate from.

The quality of the food consumed from a private garden was widely reported as the most common motivation for keeping a garden. This health aspect increases participants' motivations to eat from their own gardens, however, even those with home gardens do not consume a high proportion of their daily diets from their gardens. Cross-tabulating the percentage of food consumed from a private garden across the two time periods indicated that this variable did not impact whether or not the practice was continued into the current period. Despite these statistical results, the observation of transition away from agricultural livelihoods is clear in the qualitative results. The statistical tests add to this observation about Batloun to inform that factors outside of income level from agriculture and the amount of food consumed from one's home garden are not the most significant factors influencing this change.

Home gardens are a common feature across the older demographic in Batloun as well as the younger demographic outlined above. Of the 14 participants that were retired in 2018, 13 (97%) maintained home gardens. One participant reported their income as retirement and agriculture meaning that agriculture was used as a supplementary income source for the retirement plan. Of the grouping of retired participants, only four of the 14 reported that they did not maintain gardens for the purpose of reducing their expenditures on food. There were also three participants who only started home gardens after their retirement indicating a return to the land.

3. Discussion

Food consumption and diet are influenced internally by factors such as culture, location, tradition and social relations. In Batloun, these internal factors push for the maintenance of home gardens as is done across rural Lebanon and has been done in Batloun since before 1935 (Rachid 2007). The fact that there is very little change in the percentage of participants who kept gardens between 1990 and 2018 suggests that very small scale farming is a maintained tradition in Batloun; this is seen in the high percentage of both the younger and retired demographic who keep gardens. The motivations for keeping these gardens have changed over time.

The four (8%) participants who did not keep gardens in 2018 all cited small entrepreneur as their livelihood source (one reported mixed small entrepreneur and retired). However, most participants that were small entrepreneurs kept home gardens; 91% of total participants did. This finding indicates that livelihood does not have a strong impact on whether or not the participants are rifted from their natural resources and suggests that other factors should be considered. Considering the high percentage of home gardens and the fact that rural areas often provide more space on which to keep a garden, location, divided between rural and urban, may have a stronger impact on one's diet and state of metabolic rift than livelihood source does. This is observable in Batloun as the study participant's livelihoods are clearly becoming increasingly rifted from their natural environment but at the same time diets are still nutritionally supplemented by home gardens and local agriculture despite the influence of the Western Diet. The metabolic rift of the participants' livelihoods is not forcing the rift to the same extent on participants' diets.

The results from the participants in Batloun reveal that while there is continued movement away from agricultural livelihoods in favor of transitioned livelihoods, often outside of the

village, participants in the study, including the younger residents, are still committed to maintaining connections to the land and using home gardens as important, although supplementary, food sources.

D. Strengths and Limitations

This study is one of the few that directly connects livelihood diversification to its food and nutrition security outcomes. To the best of the researcher's knowledge, it is the second such study in Lebanon to do so and the first to document the impacts of Lebanon's agrarian transitions on food and nutrition security (Ghattas et al 2013). In Lebanon, food and nutrition security studies are primarily conducted with refugees or with the Lebanese host communities in closest contact with refugees. While these populations are in great need of measurement and support, their needs should not detract from the food and nutrition security status of the country at large. Lebanon's status as an upper-middle income country has the tendency to shift researchers' gaze away from the extreme inequality within this classification and therefore the extent of food and nutrition security within the country. Additionally, food and nutrition security are not enough examined outside of crisis and developing contexts, this data is needed for baseline data as well as to provide comparisons and targets for countries struggling with food and nutrition insecurity.

Furthermore, this study extends the definition of food security beyond a simple calorie count and economic need by highlighting nutritional and cultural aspects of the Lebanese diet. The push to have nutrition better integrated into discussions on food security is ongoing. It is well acknowledged by scientists and nutritionists that calories and staple foods alone do not constitute the healthy diet referenced in the United Nations' definition of food security. But the term's association with interventions in crisis and conflict contexts often reduces the importance

of nutrition as something to be considered ‘later’ when the situation is more stable. Additionally, food is much more than an economic good to be produced and traded, the commitment of Batloun’s residents to agriculture and their motivations highlight this. Food is an intrinsic part of culture and identity and should be acknowledged as such, especially in the context of deepening penetration of third food regime and globalization in rural landscapes. This research intends to help fill these gaps.

However, this study was also impacted by limitations in its design and implementation. The most prominent limitation is the nature of the master’s thesis which is intended to be designed, conducted, and analysis in only a few short months without funding, however this is a constraint almost all students face. Another limitation is its small sample size of only 51 participants, although this number is more than the originally stated objective. Within this small sample size, the exact distribution of livelihoods was not achieved. As outside researchers not from the village, access to the intended number of participants with exclusively agriculture or diversified livelihoods was challenged by the portion of the population we had access to. The agricultural co-op was introduced to the research team as a group we could have access to but within the co-op there were few individuals with agricultural incomes. This resulted in a lack of variability in the livelihoods of our participants that could not have been remedied without significantly extending the timeline of the study. This lack of variability impacted the statistical analysis since the categories of exclusively agriculture and diversified livelihood were small compared to transitioned livelihoods.

Potential respondent bias is always a limitation in collecting the unique experiences of human participants. There is potential error related to memory in both the FCS recall period of

seven days and the reflection on the general food consumption 30 years previously. However, these errors are mitigated to the best of the ability of the research team using triangulation methods to compare answers against the responses of other participants and discussions with the head of the municipality, and with questions within the study designed to check responses.

Other limitations were encountered and addressed within field visits. Many of these challenges came from different understandings of common terms between academic and local usages despite the use of Lebanese translators. For example, when asking about agricultural systems practiced, participants would list horticultural crops and proceed to the following questions only later mentioning they kept chickens or cows as well. Another common misunderstanding in this question was on the reporting on fruit tree ownership; perhaps because fruit-bearing trees were planted by parents or other family members, participants often did not report having trees or eating from them until later in the survey. The participants may not have considered the trees as “theirs” if they did not plant them or if they were on a plot of land that was not directly next to their house. However, the research team quickly became sensitive to these and similar issues which were easily caught by adjusting the wording of the questions or through the established triangulated questions.

Additionally, the research team experienced challenges in contacting participants. After conducting the survey with around 20 members of the agricultural co-op, it was brought to the researchers’ attention that some co-op members were no longer interested in participating since they would not receive any benefits. This occurred despite the fact that the researchers, the invitations script, and consent form all stated that participation is completely voluntary, without any compensation, and that this study is a thesis project not affiliated with an organization or extension programming and therefore provides no direct benefits to participants. It is thought that the

recent collection of data from village residents by a group of students from a different university may have created some research fatigue in the village. The research team was not made aware of the other study until the end of their field work.

Implementing the FIES also challenged the research team and the comfort level of participants as parts of the scale seemed sensitive or offensive to some of the participants. The research team also noted multiple instances where responses to the FIES did not fall in line with other diet information given in more unstructured conversation. On four particular occasions, participants would answer ‘no’ to every questions asked, but continue speaking about their experiences with food insecurity after the scale was completed. Participants made statements that clearly indicated an experience with food insecurity that should have been reflected on the scale. One respond told us how meat is so expensive these days, and although their family prefers to eat it, they only eat meat twice a week due to its expense. Another respondent, upon the conclusion of the FIES, told us how sometimes, one cannot buy anything other than labneh and zaatar, so when that is all that’s in the house, that’s what you eat for dinner. The research team took notes of the conversations and later matched these more organic responses to the experiences laid out in the FIES. The research team did not want the perceived formality of the scale to ignore participants’ unstructured responses.

Overall the limitations of this study were easily overcome due to the kind support the interlocutors and the unceasing flexibility and enthusiasm of the research team. While the limitations forced the research team to think on their feet and adjust questioning to local contexts, these limitations did not impact the objectives of the research nor the quality of data collected. The above highlighted strengths of the study outweighed its limitations.

CHAPTER VI

CONCLUSION

Results from this study show that the participants in the village of Batloun did not experience food and nutrition insecurity no matter their level of agrarian transition as indicated by livelihood. The instances of moderate food insecurity detected by the Food Consumption Score and the Food Insecurity Experience Scale were very few.

Agrarian transition, measured by changes in livelihoods over a thirty year time period, was observed in the village. Participants in the study are largely moving away from both exclusively agricultural livelihoods as well as diversified livelihoods. Transitioned livelihoods were the most common livelihood sources in the village in 1990 and in 2018 but increased in 2018. In the current situation only one participant reported an exclusively agricultural livelihood, and only nine reported diversified livelihoods, both notable decreases from 1990. Additionally, the percentage of income earned from agriculture for those with diversified livelihoods decreased between 1990 and 2018. However, while the participants' livelihoods are transitioning away from agriculture, they are not completely disassociated from the land as strong agricultural traditions support the maintenance of home gardens.

The FCS and the FIES showed slightly different results but overall there were very few instances of food insecurity in Batloun — although almost half of participants did indicate feelings of anxiety and uncertainty about their food security status according to the FIES. Livelihood

did not have an impact on FIES global or Lebanon categorizations nor on the FCSs; the statistical differences between participants' two scores were insignificant.

Moderate food insecurity was experienced on the FIES on both the global and Lebanese specific categorization schemes. The Lebanon categorization detected a higher rate of food insecurity. While the rate of diversified livelihoods' food insecurity was the same across both categorizations, the rate of food insecurity for transitioned livelihoods increased under the Lebanese scheme. Over both categorizations, transitioned livelihoods had higher rates of food insecurity than diversified livelihoods' rate. The effects of total monthly expenditures and total monthly expenditure on food on FIES raw scores were insignificant.

According to the FCS, study participants consumed adequate diets — nutritional diversity was supported by consumption from home gardens. FCSs were generally high and well above the cutoff point that indicated food and nutrition secure diets. The two lowest FCS scores reported, which corresponded to borderline food insecurity, were both from individuals with transitioned livelihoods. The effect of income, for which total monthly expenditure was used as a proxy, on food security was statistically significant as participants with higher total monthly expenditures had better FCSs. This is a common effect found around the world. However, total monthly expenditure on food on FIES raw score was insignificant; this finding contradicts findings by Ghattas et al (2015) and Sahyoun et al (2014) in Lebanon.

While livelihoods do not have a significant impact on the participants' food and nutrition security, their rural location — and the fact that their increasingly transitioned livelihoods have not moved the participants or their livelihoods away from this rural location — does have an impact. Regardless of livelihood or age, participants widely kept home gardens for the purpose of

their household consumption, to reduce food expenditures, and to mitigate fears about chemical use. While gardens for commercial purposes are fewer, household gardens are still common. Livelihood did not have a significant impact on food security, instead other factors within this rural system had a greater effect. Although this study could not fully capture these other factors, its results suggest that the effect of a rural location and higher expenditures significantly impact food and nutrition security. In rural Batloun, the traditions around home gardens are still strong over the period of agrarian transition examined, this desire to have fresh food produced at the household level has limited the metabolic rift in the village to one of livelihoods but not of diet.

APPENDIX I INVITATION SCRIPT (ARABIC)

*Institutional Review Board
American University of Beirut*

30 APR 2018

RECEIVED



الجامعة الأمريكية في بيروت
الانتقال الزراعي والأمن الغذائي في القرية اللبنانية
خطاب دعوة
دعوة للمشاركة في بحث علمي
اشعار عن بحث علمي موافق عليه من قبل لجنة الأخلاقيات
الدكتور رامى زريق و الطالبة الباحثة كارا ويدر

أودّ دعوتك للمشاركة في دراسة بحثية عن سبل العيش الزراعية والأمن الغذائي، والتي أريد أن أوثق فيها كيف أن تنوع سبل العيش الزراعية يغني حالة الأمن الغذائي والنظم الغذائية. هذه الدراسة هي بعنوان التحولات الزراعية والأمن الغذائي في القرية اللبنانية.

سُطلب منك تعبئة استبيان قصيرين وإعطاء معلومات ديموغرافية. تتطلب منك الاستبيانات أن تذكر ما هي الأطعمة التي تناولتها أنت وعائلتك خلال الأسبوع الماضي، وما إن كنت أنت أو أي شخص في عائلتك يعاني من الجوع أو نقص الغذاء.

تستغرق تعبئة كل استبيان حوالي العشر دقائق، وأدعوك لإضافة أي تعليقات أو توضيحات إضافية لإجاباتك. سيتم إجراء هذا البحث من قبل الجامعة الأمريكية في بيروت حيث سيتم تخزين المعلومات.

إذا كان لديك أي سؤال الآن أو في وقت لاحق، يمكنك الاتصال بي على رقم هاتفي 81859504، أو عن طريق البريد الإلكتروني ccw02@aub.edu.lb

أو عبر الاتصال بالدكتور رامى زريق على rzurayk@aub.edu.lb أو على 01350000 تمديد 4571
إذا كان لديك أية أسئلة حول حقوقك كمشارك، يمكنك الاتصال بالمكتب التالي في الجامعة الأمريكية في بيروت:
5445 IRB Office 01350000 تمديد

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15 MAY 2018

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APPENDIX II

INVITATION SCRIPT (ENGLISH)



AUB Social & Behavioral Sciences INVITATION SCRIPT

Invitation to Participate in a Research Study

This notice is for an AUB-IRB Approved Research Study

for Dr. Rami Zurayk and student Cara Weber at AUB.

Dr Zurayk (961) 1 350 000 x4571 or 45717

I am asking you for your participation in a research study about agricultural livelihoods and food security in which I want to document how diversifying agricultural livelihoods change food security status and diets. The study is called Agrarian transition and food security in a Lebanese village.

You will be asked to complete two short surveys and to give demographic information. The surveys will ask you to recall what foods you and your family have eaten over the past week and if you or anyone in your family experiences hunger or food shortages.

The two surveys will take about 10 minutes each and I invite you to add any additionally comments or explanations of your answers. This research is conducted by AUB and the information will be stored there.

Please listen as the consent form is read to you and consider if you would like to participate in the study. If have any questions about this study, now or in the future, you may ask me or contact the investigation research team at any time.

Student Researcher: Cara Weber

ccw02@mail.aub.edu

(961) 81 859 504

Principle Investigator: Dr Rami Zurayk

rzurayk@aub.edu.lb

(961) 1 350 000 x 4571 or 45717

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APPENDIX III

CONSENT FORM (ARABIC)

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المحولات الزراعية والأمن الغذائي في القرية اللبنانية

الجامعة الأمريكية في بيروت

وثيقة الموافقة

اشعار عن بحث علمي موافق عليه من قبل لجنة الأخلاقيات

الدكتور رامى زريق و الطالبة الباحثة كارا و بير

إنّي أدعوك للمشاركة في دراسة بحثية. أرجو منك الإصغاء لما سأقوله من معلومات عن هذا البحث قبل أن تتخذ قرار المشاركة. يرجى عدم التردد في السؤال عن توضيح أي نقطة.

تم اقتراح منزلك إما من قبل رئيس البلدية، أو من قبل أشخاص يعملون في المجال الزراعي. سوف أجري هذه الاستطلاعات مع ٤٠ شخصاً من بلدتك.

اسمي كارا و بير، أعمل كطالبة باحثة في الجامعة الأمريكية في بيروت. موضوع بحثي هو الأمن الغذائي عند المزارعين الذين يعملون اليوم في قطاعات مختلفة ويعتمدون على مصادر دخل متنوعة أي أن الزراعة لم تعد تشكل مصدر دخلهم الأساسي

أنا عشت و عملت في مزرعة عائلتي الصغيرة في الولايات المتحدة الأمريكية قبل مجيئي إلى لبنان للدراسة والبحث، حيث يشكل هذا البحث جزءاً من متطلبات شهادتي في الماجستير بالتخصص الغذائي.

هدفي من هذه الدراسة تجميع بيانات عنك وعن عائلتك بما يتعلق بالغذاء، الممارسات الزراعية، سبل العيش وتحولاتها.

تنتهي هذه الدراسة في تاريخ ٨ آب ٢٠١٨.

سيتم مشاركة المعلومات المجموعة مع الباحث الرئيسي المشارك في هذه الدراسة، الدكتور رامى زريق من الجامعة الأمريكية في بيروت، وسنكون الشخصان الوحيدان اللذان يستطيعان الإطلاع على هذه المعلومات، حيث سيتم نشر ورقة بحثية تتضمن نتائج الدراسة، لكنها لن تحتوي على أسماء أو أي معلومات تدل على هويتك. وفي حال رغبتنا باقتباس جزء من حديثك سنطلب إذن منك قبل فعل ذلك.

إن مشاركتك في هذه الدراسة لن تنطوي عليك بأي مخاطر جسدية أو نفسية تتجاوز مخاطر الحياة اليومية. لديك القدرة على الانسحاب من المشاركة في هذه الدراسة في أي وقت تريده و لأي سبب كان.

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American University of Beirut

15 MAY 2018

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_____ تاريخ

_____ ساعة

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15 MAY 2018

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APPENDIX IV

CONSENT FORM (ENGLISH)

*Institutional Review Board
American University of Beirut*

30 APR 2018

Agrarian transition and food security in a Lebanese village American University of Beirut

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Oral Consent document

Research team: Cara Weber and Rami Zurayk

We are asking you to participate in our research study. Please let me tell you some information before taking the decision to participate or not. Feel free to ask any questions that you may have. Your household was recommended to me by the Head of the Municipality or by someone in the community who works in agriculture. I will be conducting these surveys with 40 individuals from your community.

I am Cara Weber a student researcher from AUB, and I am working on a study about the food security of farmers who have adopted diverse income sources and no longer rely exclusively on agriculture for income. I lived and worked on my family's small farm in the United States before I moved to Lebanon am now conducting this study as part of my graduate degree in Food Security. In this study we would like to collect information about you and your family's diet, agricultural practices, income sources and their changes. The study will end in August 2018.

Aggregated data and information from this research study will be shared with my principal researcher at AUB Professor Rami Zurayk; we will be the only people with access to this information. A paper will be published as a result of this research but no names or identifying information will be revealed. If I would like to use a quote from our conversation, I will ask your permission before using it.

Your participation in this study does not involve any physical or emotional risk beyond the risks of daily life. You have the right to withdraw your consent or discontinue participation at any time for any reason. There are no particular personal benefits from participating in the research study. Your participation may help us to better understand the evolution of livelihoods and the food security in Lebanese villages.

Your participation is voluntary. You may choose not to answer any question. You may end the study whenever you like and your refusal or withdrawal from the study will involve no loss of benefits to which you are otherwise entitled nor will it affect your relationship with AUB/ AUBMC.

Your name or other identifiers will not be attached to your answers so that your confidentiality can be maintained. Your privacy will be ensured in that all data resulting from this study will be analyzed, written, and published in an anonymous form.

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I would like to take notes during our conversation. These notes are to help me remember the conversation and will not be shared or published in their original form. I will keep these notes in a locked drawer in my office. Only the aggregated data from the interviews will be shared. If you would prefer I do not take notes, please let me know. Feel free to skip any question you do not want to answer. You can end this survey at any time you want. And you can reverse your consent or withdraw completely from the study at any time.

If you have any questions now or at any later time, you can contact me on my number 81859504, or by e-mail ccw02@aub.edu.lb or the principal researcher Dr. Rami Zurayk at rzu-rayk@aub.edu.lb, or at 01-350000 Extension 4571

If you have any questions about your rights as a participants you can contact the following office at AUB: IRB office 01-350000 Extension 5445

Are you interested in participating in this study? yes ----- no -----

May we quote from this interview either in the presentation or articles resulting from this work ?
yes ----- no -----

Researcher -----

Date ----- Time -----

Faint mirrored text from the reverse side of the page, including the word "APPROVED".

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American University of Beirut*

15 MAY 2018

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APPENDIX V
QUESTIONNAIRE (ENGLISH)

NOW v End of Civil War 1990

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 end of the Civil War?
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 end of the Civil War?
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 is from agriculture?

And around the end of the Civil War?

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 end of the Civil War?

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 end of the Civil War?

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 end of the Civil War?

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 end of the Civil War?
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 end of the Civil War?

APPENDIX VI

FOOD CONSUMPTION SCORE FORM (ARABIC AND ENGLISH)

<p>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?</p>	<p>كم يوم في خلال السبعة ايام الماضية تناولت فيه عائلتك الأطعمة التالية</p>
<p>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)</p>	<p>1. الدرنيات (البطاطس) والنشويات، : الخبز، المعكرونة، الأرز، الذرة، القمح، البرغل ، الفريكة</p>
<p>2. How many days over the last 7 days, did members of your household eat: Cereals (bread, rice, pasta, wheat, bulgur, other cereals)</p>	<p>2. النشويات: الخبز، المعكرونة، الأرز، الذرة، القمح، البرغل ، الفريكة</p>
<p>3. How many days over the last 7 days, did members of your household eat: Roots and Tubers (potatoes)</p>	<p>3. الدرنيات (البطاطس)</p>
<p>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</p>	<p>4. المكسرات والبقول : الفاصوليا، العدس ، الحمص، الفول السوداني، الفول، البازلاء الخضراء، اللوبيا، وغيرها جوز-لوز-صنوبر /نواة) ، (البازلاء الحلوة)</p>
<p>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)</p>	<p>5. الحليب ومنتجات الحليب (حليب طازج أو مجفف،اللبن، اللبنة، الجبن، منتجات الحليب الأخرى – بإستثناء السمنة / الزبدة أو كميات صغيرة الحليب لصنع الشاي / القهو</p>

<p>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 consumed in large quantities and not as a condiment). (if 0 skip to section k)</p>	<p>6. اللحم والأسماك والبيض: الماعز، البقر والدجاج ولحم الخنزير، والأسماك، وديك الرومي، بما في ذلك التونة المعلبة، فوقعة، و / أو غيرها من المأكولات البحرية والبيض (اللحوم والأسماك المستهلكة بكميات كبيرة وليس باعتبارها مطيبتات. (إذا صفر انتقل إلى القسم ك)</p>
<p>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</p>	<p>7. اللحم الحمراء: لحم البقر، لحم الماعز، لحم الخنزير، الدجاج، الديك الرومي، الأغنام، اللحم الأخرى.</p>
<p>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</p>	<p>8. اللحم العضوية: الكبد، الكلى، القلب و / أو غيرها من اللحوم العضوية</p>
<p>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)</p>	<p>9. الأسماك: الأسماك المجففة، الطازجة، المدخنة، مأكولات بحرية أخرى (باستثناء صلصة ومسحوق السمك) الأسماك المستهلكة بكميات كبيرة وليس باعتبارها مطيبتات</p>
<p>10. How many days over the last 7 days, did members of your household eat: Eggs</p>	<p>10. بيض</p>
<p>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)</p>	<p>11. الخضروات والأوراق: السبانخ والبصل والطماطم والجزر والفلفل، والخس، والخيار والفجل والملفوف وغيرها. (إذا صفر انتقل إلى القسم م)</p>

<p>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</p>	<p>12. الخضار الغنية في الفيتامين أ (البقطين، القرع، الفلفل الأحمر، الجزر، البطاطا الحلوة) الخضار البرتقالية و المتنوعة الالوان</p>
<p>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</p>	<p>13. الخضار ذات الأوراق الخضراء: السبانخ، البروكلي، قطيفة و / أو غيرها من الأوراق الخضراء الداكنة، وأوراق من الكسافا والأوراق البرية، الهندباء البرية والروكا والملوخية</p>
<p>14. How many days over the last 7 days, did members of your household eat: Other vegetables: onion, cucumber, radish, tomatoes, eggplants, zucchini etc...</p>	<p>14. الخضار الأخرى: البصل والخيار والفجل والطماطم والباذنجان والكوسا الخ ...</p>
<p>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 section r)</p>	<p>15. الفاكهة: الموز، التفاح، الليمون والمانجو والبابايا والمشمش والخوخ والبطيخ وغيرها. (إذا صفر انتقل إلى القسم ف</p>
<p>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</p>	<p>16. الفاكهة الغنية في الفيتامين أ : المانجو، المشمش، الدراق، البابايا، والفاكهة البرتقالية اللون</p>
<p>17. How many days over the last 7 days, did members of your household eat: Other fruits: Banana, Apple, watermelon, cherry, dates</p>	<p>17. الفواكه الأخرى: الموز، ألتفاح، البطيخ، الكرز، والتمر</p>
<p>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</p>	<p>18. الدهون / الزيوت (زيت الزيتون، الزيت النباتي، زبدة، سمن، الدهون أخرى)</p>

<p>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)</p>	<p>19. لسكر / المنتجات السكرية/ العسل (السكر، قصب السكر، العسل، مربى، جيلي، حلويات / بونبون/ الشوكولاته، وغير ذلك من منتجات السكر والبسكويت والباتيسري والكعك</p>
<p>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</p>	<p>20. 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</p>

APPENDIX VII

EXPENDITURE MODULE (ARABIC AND ENGLISH)

Category	الفئة	مثال	
Food and Beverages	المواد الغذائية والمشروبات		
Clothing and Footwear	الألبسة والأحذية	أقمشة الملابس الملابس أصناف البسة 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	

Category	الفئة	مثال	
Recreation, Amusement, and Culture	الإستجمام والتسليية والثقافة	لعب وألعاب ووسائل تسليية ألعاب الحظ كتب جرائد ومجلات مطبوعات أخرى القرطاسية وأدوات الرسم	
Education	التعليم	رسوم تسجيل وأفساط برامج تعليمية أخرى	
Agriculture	الزراعة	تأجي ,عمال ماء ,بذور سماد مبيدات حشرات الآلات وسيط /نقل الى سوق كهربات مضخات المياه مداخلات أخرى	
Other	سلع وخدمات متفرقة	تبغ وتنباك تأمينات سداد الديون الإتصالات /خدمات اتصالات البرق والهاتف	

APPENDIX VIII

FOOD INSECURITY EXPERIENCE SCALE FORM (ARABIC)



*Institutional Review Board
American University of Beirut*

01 MAR 2018

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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

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نسخة الإختبار التجريبي لعام 2015 خل مقياس (سَلْم) تجربة (معاناة) انعدام الأمن الغذائي العالمي
(GLOBAL-FIES)
ال مؤسسة غالوب العالمية للاستطلاع

أرغب بسؤالك بعض الأسئلة عن استهلاكك للغذاء خلال الإثني عشر شهراً الماضية

خلال الإثني عشر شهراً الماضية ، هل حدث وأن :

<p>يشير السؤال إلى حالة القلق أو الهم من عدم وجود غذاء كافي أو من نفاذ الطعام الموجود بسبب نقص النقود أو المصادر الأخرى. قد يعود سبب القلق أيضاً إلى الظروف التي قد تؤثر في قدرة المستجيب على تأمين الطعام كافتقار الوظيفة أو عدم القدرة على إنتاج الغذاء أو تعطيل العلاقات الاجتماعية، أو فقدان المساعدات الغذائية أو بسبب الأزمات السياسية والبنية أو لأسباب أخرى قد تؤدي لنقص النقود لديه . إنه ليس من الضروري أن يكون المستجيب أو الأسرة قد فقدت فعلاً الطعام حتى يجيب بالإيجاب على هذا السؤال .</p>	<p>س1. شعرت بالقلق بأنه لن يتوفر لك الطعام الكافي لتأكل بسبب عدم توفر النقود أو المصادر الأخرى؟</p>
<p>يسأل هذا السؤال المستجيب إذا ما كان غير قادر على تأمين الطعام الذي يعتبره صحياً أو الطعام المغذي والمتوازن . قد يحصل ذلك في حال عدم توفر النقود الكافية أو المصادر الأخرى لتأمين ما يعتبره المستجيب طعاماً صحياً ومغذي . يشير هذا السؤال إلى نوعية الغذاء وليس كمية الطعام المتناول أو المخاطر المتعلقة بالأكل كالتهاون صلاحية.</p>	<p>س2. لم يكن باستطاعتك أكل طعام صحي ومغذي بسبب عدم توفر النقود أو المصادر الأخرى؟</p>
<p>يسأل هذا السؤال عما إذا اضطرَّ المستجيب أن يتناول وجبات قليلة التنوع من الطعام أو إذا كان يأكل نفس الطعام أو فقط عدد قليل من الأصناف كل يوم لأنه لم يكن لديه المال الكافي أو المصادر الأخرى لتأمين الطعام. يفترض هذا السؤال أن تحسين فرص الحصول على الغذاء تؤدي إلى تحسين نوعية الطعام ويشير لنوعية الغذاء وليس كمية الطعام المتناول . هذا لا يتضمن اتباع الحمية الغذائية لفقدان الوزن أو الصيام لأسباب صحية أو دينية .</p>	<p>س3. أكلت أنواع قليلة من الأطعمة بسبب عدم توفر النقود أو المصادر الأخرى؟</p>
<p>يستفسر هذا السؤال عن تجربة المستجيب فيما إذا اضطر على إستثناء أو التخلي عن " تافى " كما يقال في العامية اللبنانية) وجبة رئيسية (مثل الإفطار أو الغذاء أو العشاء لعدة مرات بما يخالف الأعراف والتقاليد المتبعة في تناول الطعام) والتي كان يجب أن تؤكل وذلك بسبب نقص النقود أو المصادر الأخرى لتأمين الطعام . يشير هذا السؤال لنقص كمية الطعام المتناول .</p>	<p>س4. كان عليك أن تتخلى عن وجبة طعام بسبب نقص النقود أو المصادر الأخرى؟</p>
<p>يستفسر هذا السؤال عن تناول المستجيب لكمية من الطعام أقل مما يجب حتى إذا لم يستتجبه وجبة رئيسية وذلك لأن الأسرة ليس لديها المال أو المصادر الأخرى اللازمة لتأمين الطعام . لا ينطبق هذا السؤال على الأفراد البالغين الذين يتناولون كميات قليلة من الطعام لتخفيف الوزن . إن الإجابة تعتمد على رأي المستجيب الخاص حول كمية الطعام التي يجب أن يتناولها وليس النوعية.</p>	<p>س5. أكلت أقل مما اعتدت أنك يجب أن تأكل بسبب نقص النقود أو المصادر الأخرى؟</p>
<p>يشير هذا السؤال إلى أي من التجارب التي تضمنت عدم وجود طعام للأسرة بسبب نقص النقود أو المصادر الأخرى (على سبيل المثال إنتاج الأسرة الخاص من الغذاء أو مقايضة الطعام) أو لأن الأكل الموجود لم يكفي الأسرة .</p>	<p>س6. نفذ الطعام لدى أسرتك بسبب نقص النقود أو المصادر الأخرى ؟</p>
<p>يسأل هذا السؤال عن الشعور الفيزيائي بالجوع لدى المستجيب وبشكل خاص الشعور بالجوع مع عدم القدرة على تأمين الطعام بسبب نقص النقود أو المصادر الأخرى اللازمة لتأمين الطعام . هذا لا يتضمن اتباع الحمية الغذائية لفقدان الوزن أو الصيام لأسباب صحية أو دينية .</p>	<p>س7. كنت جائعاً لكنك لم تأكل لأنه لم يكن هناك ما يكفي من النقود أو المصادر الأخرى للطعام؟</p>

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يسنفسر هذا السؤال عن تجربة معينة وهي عدم تناول أي شيء من الطعام ليوم كامل بسبب عدم توفر النقود أو المصادر الأخرى . هذا لا يتضمن اتباع الحمية الغذائية لفقدان الوزن أو الصيام لأسباب صحية أو دينية .	س8. بقيت دون تناول الطعام ليوم كامل بسبب نقص النقود أو المصادر الأخرى؟
---	--

العبارة	المعنى المقصود والاقتراحات من أجل العثور على العبارة الصحيحة
الإثني عشر شهراً الماضية	هناك طرق مختلفة للإشارة إلى فترة 12 شهراً التي سبقت المقابلة ، بما في ذلك "العام الماضي" . وينبغي الحرص على إيجاد أفضل عبارة لتفادي الخلط مع تصورات شبيهة أخرى لفترة 12 شهراً ، مثل الموسم الزراعي أو السنة التقويمية الدينية .
نقص من النقود والموارد الأخرى	بالإضافة إلى المال لشراء الطعام ، تشير عبارة "الموارد الأخرى" إلى نقص الوسائل العادية الأخرى للحصول على الطعام ، مثل الإنتاج الخاصة للأسرة و الحيوانات الصغيرة المعدة للبيع أو الاستهلاك الخاص و المقايضة و التجارة و صيد الأسماك و الصيد أو الجمع .

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APPENDIX IX

FOOD INSECURITY EXPERIENCE SCALE FORM (ENGLISH)



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09 MAR 2018

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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

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Questions that compose questionnaire and explanations of the intended meanings

<p><i>"Now I would like to ask you some questions about food.. During the last 12 MONTHS, was there a time when:</i></p>	
<p>Q1. You were worried you would not have enough food to eat because of a lack of money or other resources?</p>	<p>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)</p> <p>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.</p>
<p>Q2. You were unable to eat healthy and nutritious food because of a lack of money or other resources?</p>	<p>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.)</p> <p>The answer depends on the <u>respondent's own opinion</u> of what <i>they</i> consider to be healthy and nutritious foods.</p> <p>This question refers to the <u>quality</u> of the diet and not the quantity of foods eaten.</p>
<p>Q3. You ate only a few kinds of foods because of a lack of money or other resources?</p>	<p>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. <i>The implication is that the diversity of foods consumed would likely increase if the household had better access to food.</i></p> <p>Alternative phrases:</p> <ul style="list-style-type: none"> • You ate meals with a limited variety of foods; • You ate the same foods or just a few kinds of foods every day; • You <u>had to</u> eat a limited variety of foods; • You <u>had to</u> eat the same foods every day; • You <u>had to</u> eat just a few kinds of foods. <p>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 .</p>
<p>Q4. You had to skip a meal because there was not enough money or other resources to get food?</p>	<p>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.)</p> <p>This question refers to <u>insufficient quantity</u> of food.</p>
<p>Q5. You ate less than you thought you should because of a lack of money or other resources?</p>	<p>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).</p> <p>The answer depends on the <u>respondent's own opinion</u> of how much <i>they</i> think they should be eating.</p> <p>This question refers to <u>quantity</u> of foods eaten and not the quality of the diet.</p> <p>This question does <i>not</i> refer to special diets to lose weight or for health or religious</p>

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	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
<i>Past 12 months</i>	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.
<i>Lack of money and other resources</i>	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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APPENDIX X

STATISTICAL MODELS

Past income source tabulated with current income source

```
. ttest1 51 0.078431373 0.2688492 51 0.019607843 0.138648388
Two-sample t test with equal variances
-----
|      Obs      Mean   Std. Err.   Std. Dev.   [95% Conf. Interval]
-----+-----
x |         51   .0784314   .0376464   .2688492   .0028163   .1540464
y |         51   .0196078   .0194147   .1386484   -.0193876   .0586033
-----+-----
combined |        102   .0490196   .021276   .2148773   .0068137   .0912255
-----+-----
diff |             .0588235   .0423578             -.0252131   .1428602
-----+-----
diff = mean(x) - mean(y)                                t = 1.3887
Ho: diff = 0                                           degrees of freedom = 100

Ha: diff < 0                Ha: diff != 0                Ha: diff > 0
Pr(T < t) = 0.9160          Pr(|T| > |t|) = 0.1680          Pr(T > t) = 0.0840

. ttest1 51 0.31372549 0.464006257 51 0.176470588 0.381220041
Two-sample t test with equal variances
-----
|      Obs      Mean   Std. Err.   Std. Dev.   [95% Conf. Interval]
-----+-----
x |         51   .3137255   .0649739   .4640063   .1832216   .4442294
y |         51   .1764706   .0533815   .38122    .0692507   .2836905
-----+-----
combined |        102   .245098   .0423901   .4281195   .1610074   .3291887
-----+-----
diff |             .1372549   .0840903             -.029578   .3040878
-----+-----
diff = mean(x) - mean(y)                                t = 1.6322
Ho: diff = 0                                           degrees of freedom = 100

Ha: diff < 0                Ha: diff != 0                Ha: diff > 0
Pr(T < t) = 0.9471          Pr(|T| > |t|) = 0.1058          Pr(T > t) = 0.0529
```

```
. tab p_source c_source
```

p_source	c_source		Total
	1	2	
1	5	15	20
2	5	26	31
Total	10	41	51

Two Sample T-test of equal variance on livelihood 1990 to 2018

```
. ttesti 51 0.607843137 0.488231357 51 0.803921569 0.397028563
-----
Two-sample t test with equal variances
-----+-----
      |      Obs      Mean   Std. Err.   Std. Dev.   [95% Conf. Interval]
-----+-----
      x |      51      .6078431   .0683661   .4882314   .4705259   .7451604
      y |      51      .8039216   .0555951   .3970286   .6922555   .9155877
-----+-----
combined |     102      .7058824   .0449125   .4535937   .6167881   .7949766
-----+-----
      diff |           -.1960784   .0881177           -.3709015   -.0212553
-----+-----
      diff = mean(x) - mean(y)                                t = -2.2252
Ho: diff = 0                                                degrees of freedom = 100

      Ha: diff < 0                Ha: diff != 0                Ha: diff > 0
Pr(T < t) = 0.0142            Pr(|T| > |t|) = 0.0283            Pr(T > t) = 0.9858
```

Chi Square current income source and Global Food Insecurity Experience Scale

```
          | RECODE of fies (FIES)
C_source |      1      2 | Total
-----+-----+-----
      1 |      8      1 |      9
          | 88.89  11.11 | 100.00
-----+-----+-----
      2 |     38      3 |     41
          | 92.68   7.32 | 100.00
-----+-----+-----
      Total |     46      4 |     50
          | 92.00   8.00 | 100.00

Pearson chi2(1) = 0.1443 Pr = 0.704
```

Chi Square current income source and Lebanon Food Insecurity Experience Scale

```
. tabulate c_source var25, chi2
```

c_source	var25		Total
	1	2	
1	8	1	9
2	35	6	41
Total	43	7	50

Pearson chi2(1) = 0.0761 Pr = 0.783

T-Test past income source with current income sources

```
. ttest p_source == c_source
```

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
p_source	51	1.607843	.0690463	.4930895	1.469159	1.746527
c_source	51	1.803922	.0561483	.4009792	1.691144	1.916699
diff	51	-.1960784	.0841083	.6006532	-.3650149	-.027142

mean(diff) = mean(p_source - c_source) t = -2.3313
 Ho: mean(diff) = 0 degrees of freedom = 50

Ha: mean(diff) < 0 Ha: mean(diff) != 0 Ha: mean(diff) > 0
 Pr(T < t) = 0.0119 Pr(|T| > |t|) = 0.0238 Pr(T > t) = 0.9881

T-Test Food Consumption Score and current income source

```
. ttest fcs_raw, by(c_source)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
1	10	83.15	6.021282	19.04096	69.52891	96.77109
2	40	78.2875	2.875342	18.18526	72.47157	84.10343
combined	50	79.26	2.583276	18.26652	74.06871	84.45129
diff		4.8625	6.487261		-8.181012	17.90601

```
diff = mean(1) - mean(2)                                t = 0.7495
Ho: diff = 0                                           degrees of freedom = 48
```

```
Ha: diff < 0                                           Ha: diff != 0                                           Ha: diff > 0
Pr(T < t) = 0.7714                                     Pr(|T| > |t|) = 0.4572                                   Pr(T > t) = 0.2286
```

Regression analysis raw Food Insecurity Experience Scale and Food Consumption Score

```
. reg fcs_raw ib(none).fies, nocons
```

Source	SS	df	MS	Number of obs	=	49
Model	306580.043	5	61316.0085	F(5, 44)	=	175.04
Residual	15412.9573	44	350.294485	Prob > F	=	0.0000
				R-squared	=	0.9521
				Adj R-squared	=	0.9467
Total	321993	49	6571.28571	Root MSE	=	18.716

fcs_raw	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fies						
0	80.28571	3.537021	22.70	0.000	73.15732	87.41411
1	77.38889	6.238719	12.40	0.000	64.81558	89.9622
2	86	8.370119	10.27	0.000	69.13113	102.8689
3	70.66667	10.80578	6.54	0.000	48.88905	92.44428
4	71.125	9.358078	7.60	0.000	52.26503	89.98497

One-way ANOVA Food Consumption Score and percentage of income from agriculture

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	874.08875	3	291.362917	0.87	0.4655
Within groups	15475.5313	46	336.424592		
Total	16349.62	49	333.665714		

Bartlett's test for equal variances: $\chi^2(3) = 6.1340$ Prob> $\chi^2 = 0.105$

One-way ANOVA Food Consumption Score and monthly expenditures on agriculture

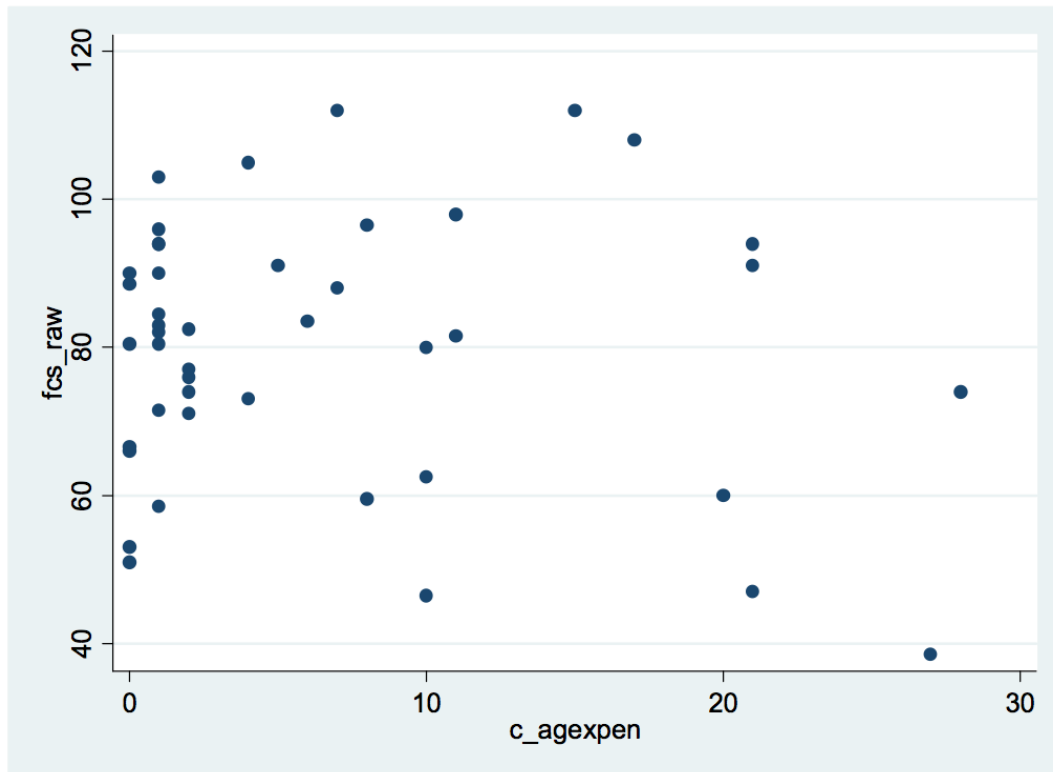
. oneway fcs_raw per_agexpen

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	1619.37924	2	809.689621	2.72	0.0778
Within groups	12208.6833	41	297.772762		
Total	13828.0625	43	321.582849		

Bartlett's test for equal variances: $\chi^2(2) = 1.7034$ Prob> $\chi^2 = 0.427$

.

Scatterplot Food Consumption Score and monthly expenditures on agriculture



One-way ANOVA Food Consumption Score and monthly expenditures on agriculture

```
. oneway fcs_raw agexpen_newcats
```

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	672.686923	2	336.343462	1.01	0.3726
Within groups	15676.9331	47	333.551768		
Total	16349.62	49	333.665714		

```
Bartlett's test for equal variances: chi2(2) = 4.3614 Prob>chi2 = 0.113
```

One-way ANOVA Food Consumption Score and Monthly Expenditures on Food

```
. oneway fcs_raw per_foodexpen
```

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	53.0472222	2	26.5236111	0.08	0.9242
Within groups	13775.0153	41	335.975982		
Total	13828.0625	43	321.582849		

```
Bartlett's test for equal variances: chi2(2) = 1.5908 Prob>chi2 = 0.451
```

```
.
```

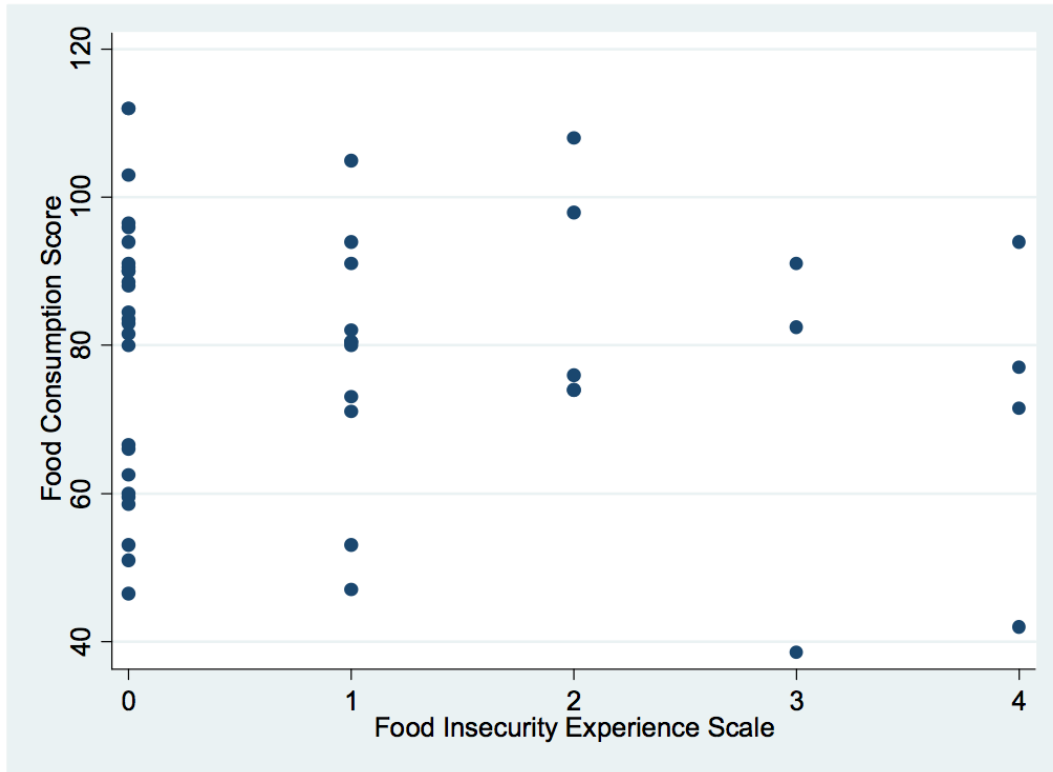
One-way ANOVA Food Consumption Score and percent of income from agriculture

```
. oneway fcs_raw c_income
```

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	584.863902	2	292.431951	0.87	0.4248
Within groups	15764.7561	47	335.420343		
Total	16349.62	49	333.665714		

```
Bartlett's test for equal variances: chi2(2) = 2.1594 Prob>chi2 = 0.340
```

Scatterplot Food Consumption Score and Food Insecurity Experience Scale



Past percentage of food consumed from private garden tabulated with current percentage of food consumed from private garden

```
. tab p_ownf c_ownf
```

p_ownf	c_ownf				Total
	1	2	3	4	
1	2	8	1	1	12
2	0	11	1	0	12
3	0	8	4	1	13
4	2	4	2	2	10
5	0	2	2	0	4
Total	4	33	10	4	51

One-way ANOVA past percentage of food consumed from private garden and current percentage of food consumed from private garden

```
. oneway c_ownf p_ownf
```

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	1.69276018	4	.423190045	0.80	0.5341
Within groups	24.4641026	46	.531828317		
Total	26.1568627	50	.523137255		

```
Bartlett's test for equal variances: chi2(4) = 14.5181 Prob>chi2 = 0.006
```

Past percentage of income from agriculture tabulated with current percentage of income from agriculture

```
. tab p_inc c_inc
```

p_income	c_income			Total
	1	2	3	
1	28	2	0	30
2	6	4	1	11
3	8	1	1	10
Total	42	7	2	51

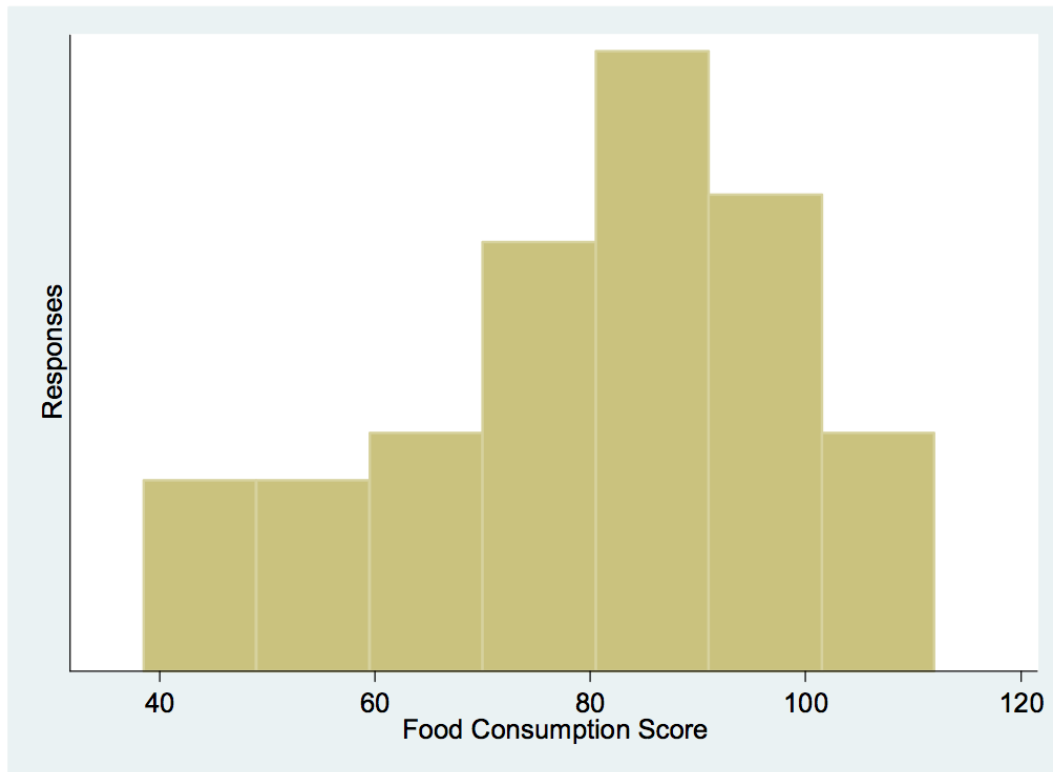
One-way ANOVA past percentage of income from agriculture with current percentage of income from agriculture

```
. oneway p_inc c_inc
```

Analysis of Variance					
Source	SS	df	MS	F	Prob > F
Between groups	2.32352941	2	1.16176471	1.87	0.1653
Within groups	29.8333333	48	.621527778		
Total	32.1568627	50	.643137255		

```
Bartlett's test for equal variances: chi2(2) = 0.2072 Prob>chi2 = 0.902
```

Histogram of Food Consumption Score responses



One-way ANOVA current food expenditures and Food Insecurity Experience Scale (greater than 1)

```
. oneway c_foodex fies if fies>1
```

Source	Analysis of Variance			F	Prob > F
	SS	df	MS		
Between groups	1456.3	2	728.15	9.70	0.0096
Within groups	525.3	7	75.0428571		
Total	1981.6	9	220.177778		

```
Bartlett's test for equal variances: chi2(2) = 4.4939 Prob>chi2 = 0.106
```

Two sample t-test livelihood source and Food Insecurity Experience Scale

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
1	9	1.222222	.4648111	1.394433	.1503658	2.294079
2	41	.8780488	.1950457	1.248902	.4838467	1.272251
combined	50	.94	.179364	1.268295	.5795546	1.300445
diff		.3441734	.4690807		-.5989765	1.287323

diff = mean(1) - mean(2) t = 0.7337
 Ho: diff = 0 degrees of freedom = 48

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.7667 Pr(|T| > |t|) = 0.4667 Pr(T > t) = 0.2333

Simple regression Food Consumption Score on total monthly expenditure

. reg fcs_raw total_ex

Source	SS	df	MS			
Model	1381.30704	1	1381.30704	Number of obs =	31	
Residual	8451.24134	29	291.422115	F(1, 29) =	4.74	
Total	9832.54839	30	327.751613	Prob > F =	0.0378	

R-squared = 0.1405
 Adj R-squared = 0.1108
 Root MSE = 17.071

fcs_raw	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
total_expenditure	.0052064	.0023914	2.18	0.038	.0003154	.0100973
_cons	71.83844	6.00544	11.96	0.000	59.55594	84.12095

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