

Intra-urban agriculture in Nanjing, China: Practices, motivations, and challenges

by

Geoffrey Luehr

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Author's declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

China has experienced strong economic growth in the last three decades through urbanization and economic transitions. However, increasing population and rapid urbanization have resulted in profound social, economic, and ecological challenges, which have also affected China's food system. These challenges, which include the rapid loss of farmland, environmental degradation and pollution, and the changing and more resource intensive diets of affluent urban citizens, have often been overlooked in favour of economic development. China's economic focused policies have resulted in criticisms of the country's food system and concerns surrounding food safety and food scandals have created a high level of mistrust among consumers and producers. As a result, opportunities exist to re-examine how urban spaces in China are being developed and how urban inhabitants are being fed.

One promising avenue to ensure the sustainability of urban food systems may be the expansion of urban agriculture into cities. Urban agriculture is a practice that is seen by many scholars as beneficial socially, economically, and environmentally in both post-industrial and developing cities due to its localized food system and urban food production focus. Moreover, urban agriculture can be seen as a pragmatic response to current environmental global discourse about the conventional agricultural system. However, current urban agriculture discourse in China has largely been a state-defined project dominantly concerned with growing food for the city, rather than within it. Amidst these pressures and the noted lack of empirical research on the perceptions and benefits of intra-urban agriculture in China, the purpose of this research is to better understand the motivations of residents practicing urban agriculture and what role it may have in dealing with food-related issues in an urbanized China. This research utilized semi-structured interviews and questionnaires to achieve the following research objectives: (1) to assess the demographics of small-scale, individual intra-urban agriculture practices within Nanjing and where it is taking place, (2) to identify the various modes of intra-urban agriculture in Nanjing, (3) to determine the motivations of populations engaging in small-scale intra-urban agriculture, and (4) to identify how China's evolving socio-political and economic context and increasing integration within global institutional and market networks affects urban agriculture development.

This study found that intra-urban agriculture in China remains largely an informal practice, dominated primarily by older, working-class individuals growing vegetables on yards, balconies, rooftops, in "empty" non-built-up spaces in the around the city and on areas of ceased development. Moreover, participants mentioned several social wellbeing/health benefits. Lastly, non-monetary values associated with growing included freshness, food safety and recreation. Challenges among participants included: space limitations, weather, soil quality, age, confrontations with construction crews and other city officials. Based on the literature and interviews with government officials in Nanjing, it would appear that within a Chinese context the government sees or defines intra-urban agriculture as a means of modernization, with mixed high-tech plans of urban integration and rural revitalization (multifunctional) of peri-urban agriculture projects. This is juxtaposed with growing civic agriculture movements around China that continue to align more with urban agriculture movements seen in the Global North (e.g.,

food sovereignty, against industrial agriculture) and opposes what is happening informally on the ground in Nanjing. In sum, the notable diversity of motivations for urban farmers that exist within Nanjing challenges many of the assumptions about urban agriculture as being a dominantly urban poor activity in the Global South.

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List of abbreviations

AFN – Alternative Food Network
CNY – Chinese Yuan (*Renminbi*)
CPC – Communist Party of China
CSA – Community supported agriculture
FAO – Food and Agriculture Organization
HCP – Hungry Cities Project
IFAD – International Fund for Agricultural
Development NUP – New Urbanization Plan UA –
Urban Agriculture
UN – United Nations
US – United States

Chapter 1: Introduction

1.1 The context of urban agriculture as part of productive urban food systems

Today's 21st century will be defined by its urban form, as more than half the world's population now live in urban areas and continued migration has projected an increase to 68 percent by 2050 (UN, 2018). Especially in the Global South, where rural inhabitants at times seek opportunities to enhance their quality of life by moving to metropolitan areas. This global, rapid, and unprecedented urbanization has generated growing and concentrated food demand around cities (Opitz et al., 2016). It has been estimated that global food production will need to more than double between now and mid-century to continue feeding the world (FAO, 2017). For example, annual cereal production would have to grow by almost one billion tons, meat production by over 200 million tons in 2050 (FAO, 2009). Moreover, the International Fund for Agricultural Development (IFAD) in 2011 estimated that by 2050 the area of arable land will not be able to grow by more than 12 per cent in developing countries thus resulting in a significant gap in supply and demand. This monumental hurdle can be met only if sustainability is at the foundation of approaches to food security in every country and every community (IFAD, 2012). Meeting the needs of food demand sustainably could be achieved through accelerated and scaled up actions that strengthen the resilience and adaptive capacity of food systems (FAO et al., 2018).

Today's industrial agri-food system has succeeded in supplying large volumes of food to global markets, but agriculture transformations in the late twentieth century has relied on large-scale intensification using high levels of inputs and remains at the forefront of several global environmental issues (FAO, 2017, p.xiv). In addition, current dynamics of agri-food systems coupled with industrial agricultural methods have impaired access to food and contributes to environmental degradation, greenhouse gas emissions, social disintegration (Stavi & Lal, 2013), and has ultimately been deemed unsustainable (Blay-Palmer & Donald, 2016; Jones et al., 2013). Recent global events—the 2007-2008 food crisis, climate change, and increasing land use conflicts due to urbanization—have revealed vulnerabilities in contemporary agri-food systems (Clapp & Cohen, 2009; Filippini et al., 2018), which has led to numerous social, ecological and economic challenges for cities. Therefore, the globalization of industrial agriculture and rapid

urbanization has greatly impacted cities' food security and has resulted in significant challenges for the development of sustainable food systems (Biel, 2016; Sonnino, 2009; White & Hamm, 2017). This is not only putting the sustainability of global agri-food systems in peril but is shaping the function and role of urban food systems. Therefore, the key issue becomes whether the impacts of industrial agriculture and urbanization can be sustained under the growing and changing demands of an urban world, while supporting food systems and urban sustainability (Satterthwaite et al., 2010). As a result, current levels of urban expansion and the challenges of industrial food systems have significant implications for prioritizing strategies that guide sustainable food systems and urban development. Acknowledging the large body of literature that provides evidence that urbanization, industrial/urban food systems, and food demand will increase in importance for urbanized areas, this paper seeks to investigate the state of knowledge and role of urban agriculture as an urban food strategy.

1.1.1 Linking cities' urban food systems and urban agriculture

As increasing urbanization and food demand is unavoidable and characteristically defines several components of sustainability within cities (UN, 2018), new approaches to food are needed. Therefore, it is "vital to plan and provide for sustainable and resilient food systems which reflect this challenge" (Zeeuw & Drechsel, 2015, p.i). This thesis follows growing research that cities need to go beyond the traditional methods of 'feeding the city' and address what is being called the 'new food equation' and the 'sustainable food challenge' (Sonnino, 2009; Morgan & Sonnino, 2010; Blay-Palmer & Donald, 2016; Blay-Palmer, 2016; Blay-Palmer, Sonnino & Custot, 2016). Cities all around the world are increasingly recognizing their role, and responsibility, in facilitating sustainable urban food systems that promote livelihood opportunities and environmentally sustainable forms of food production that encompasses both food security and environmental sustainability (Dubbeling et al, 2015; Satterthwaite, 2016; Sonnino & Morgan, 2010; Sonnino & Spayde, 2014; Zeeuw & Drechsel, 2015). This has brought food and cities to the forefront of the sustainable food challenge, where emerging strategies have seen cities shift how they manage their food systems to focus on the role of urban food systems (FAO, 2014). This is because urban food strategies are known to complement overarching sustainability goals of cities when properly integrated (Magigi, 2013; Teng et al., 2011; UNDP, 2014; Wiskerke, 2015).

In this context, urban food strategies have become a central component of the urban food system as a lens to address the various social, economic, and environmental challenges of industrial food systems and the challenges of an increasingly urbanized world. Urban food strategies exist within various food movements (e.g. alternative food networks, re-localization of food) that argue for better governance, increased food policy, and the use of urban food system strategies at not only the national and international level but the local level to address urban food insecurities and enhance environmental sustainability (Biel, 2016; Cockrall-King, 2012; Dubbeling, 2013; Ilieva, 2017; Miccoli, Finucci & Murro, 2016; Morgan, 2009; Morgan, 2015; Mougeot, 1999; Redwood, 2012; Sonnino, 2009; Morgan & Sonnino, 2010). Therefore, increased emphasis on urban food system strategies has begun to proliferate globally and has placed food at the top of the urban agenda. Driven by these global imperatives, an urban food system strategy that has received significant attention is urban agriculture. The localization of growing food near or inside urban areas—urban agriculture—can allow for the direct transfer of benefits from agricultural activities to the urban environment (Deelstra et al., 2001). Therefore, this thesis recognizes urban agriculture as a rather novel concept that intertwines environmental, social, and economic co-benefits in urban spaces (Lovell, 2010).

While food strategies such as urban agriculture are not a new phenomenon and until recently “...[was] dismissed as a temporary adjustment...” (Mougeot, 1999, p.15) within urbanization, urban agriculture is now considered to have become a permanent feature in cities. This is supported and advocated by a diversity of actors ranging from local neighborhoods, international communities, scholars, and development practitioners (FAO, 2014; Mougeot, 2005; Veenhuizen, 2006). Urban agriculture represents an opportunity to improve both urban food systems and food sustainability, as urban agricultures presence within cities affects and is affected by the urban environment and therefore links cities and their environment (Mougeot, 2000; Mougeot, 2005).

Today, there remains no universal definition of urban agriculture, which is believed to be due to the relevance of definitions being historically, culturally and geographically dependent (Mougeot, 1999). However, the core understanding of these definitions is that urban agriculture is the production of food in and around urban areas (Mougeot, 2000; Jacobi et al., 2000; Smit et al., 2001). Much of the literature defining urban agriculture (i.e. FAO, 1999; Koc et al., 1999;

Mougeot, 2005; Smit et al., 2001) also includes food production in “peri-urban” or sub-urban areas or discusses and counts urban and peri-urban agriculture as if they were similar activities. Ellis and Sumberg (1998) critique this lack of differentiation, as the ability to grow food are likely physically and economically different in urban as opposed to peri-urban areas. More recently these boundaries are being delineated through the term’s peri- and intra-urban agriculture but still remain unclear within academic circles, as urban agriculture has varied and evolved under different local socio-cultural, economic, and environmental influences (Simon 2008; Stewart et al., 2013) particularly when looking between the Global North and South. Therefore, while definitions of urban agriculture in literature might include food production in peri-urban areas, the focus of this analysis is exclusively on food production within urban areas. Mougeot’s (2000) revision of the term urban agriculture has received significant attention as it has placed emphasis on distinguishing between peri- and intra- urban agriculture where other definitions did not properly capture the integration of urban agriculture within the urban ecosystem (Opitz et al., 2016a). Therefore, to avoid ambiguity between the definitions of urban agriculture, this thesis will use the term “*intra-urban agriculture*” to discuss small-scale urban agriculture in an entirely urban context. The term ‘*intra-urban agriculture*’ is considered “[the] grow[ing] or raise[ing], processe[ing] and distribut[ion] [of] a diversity of food and non-food products, (re-)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area” (Mougeot, 2000, p.11).

Despite increased attention to urban agriculture academics remain critical of its potential (Goldstein, Hauschild, Fernandez & Birkved, 2016; Prové, 2016; Tornahgi, 2014; Webb. 2011) and question its productive capacity (e.g. Born & Purcell, 2006; Hallsworth & Wong, 2013), but the benefits of urban agriculture are not limited to food production alone and offers several unique advantages that benefit urban environments. For example, urban agriculture has been known for its capacity to simultaneously reduce the ecological footprint associated with agriculture, increase urban food security, enhance food sovereignty, and build resilience to changing climates (e.g., Ackerman et al., 2014; Coelho et al., 2013; Obatolu & Speak, 2013; Orsini et al., 2013; WinklerPrins, 2017). Urban agriculture has also been observed to offer household economic benefits and multiple social benefits including: increased access to green space, increased personal health, and community-building (Audate, Fernandez, Cloutier & Lebel,

2018; Beckie & Bogdan 2010; Domene & Sauri, 2007; Gray et al., 2014). As a result, urban agriculture is increasingly understood as a multifunctional practice that addresses various social, economic, and ecological issues (Aubry et al., 2011; Chou, Wu & Huang, 2017; Duchemin et al. 2008; Mouget, 2000; Oh & Kim, 2017) that are often linked to overarching goals of sustainable cities (Ackerman et al. 2014; Clinton et al., 2018; De Bon, Parrot and Moustier, 2008; FAO,2008; Lovell, 2010; McClintock, 2010; Mendes et al., 2008; Mougeot, 2006; Panagopoulos et al., 2018). This has led to widespread endorsements of policies and urban planning frameworks promoting its use (e.g. FAO, 2014; Mougeot, 2006; UN Habitat III, 2017; UN Habitat, 2014). This thesis also recognizes that mere food production and availability will not guarantee food access and security to the most vulnerable; however, this issue is set aside for this thesis. The focus of this research is not on the amount of food that can be grown in cities, but rather in what ways does urban agriculture contribute to urban livelihoods and the urban environment.

As an urban food strategy, urban agriculture is best conceptualized within sustainability arguments of both industrial agriculture (Benis & Ferrao, 2017; Blay-Palmer, & Donald, 2016; Clapp, 2015; Cohen & Garrett,2010; Lawrence et al., 2013; McClintock, 2014; Schupp & Sharp, 2012; Weis, 2010) and the growing impacts and demands of an increasingly urbanized world (Bloem & Pee, 2017; Filippini et al., 2018; Magigi, 2013; Moragues-Faus & Morgan, 2015; Miccoli et al., 2016; Satterthwaite et al., 2010; Seto et al., 2013; Sonnino, 2016; Tacoli et al., 2013; Teng et al., 2011; Zezza & Tasciotti, 2010; Zhu, 2011). Urban agriculture “...is generally studied in isolation from other urban processes, which tends to obscure its urbanness, thus fostering a perception of it as a misplaced rural activity” (White & Hamm, 2017, p.12). Yet, with increased attention to urban food strategies over the past 15 years urban agriculture and food are back on the urban agenda (Sonnino, 2009; Morgan, 2015). Consequently, urban agriculture is challenging many aspects of the global agri-food system and industrial agriculture and is re-establishing itself as a valuable form of urban food production that strengthens urban food systems and its participants. Though public and scientific interest in urban agriculture has grown dramatically in the past two decades, there are still significant challenges for integrating urban agriculture in an increasingly spatially constrained urban landscape. By re-establishing the links between urban agriculture and urban food systems (see Dubbeling, 2013) we can begin to address the food sustainability challenge of cities.

1.1.2 Current trends in China's urbanization and food system

Matters surrounding food production and sustainability are particularly important in the context of rapidly developing countries like China, where the impacts of urbanization and industrial agriculture have resulted in ongoing and emerging social, economic, and environmental challenges. Continuous urbanization will greatly impact how China manages not only its urban environment but also its urban food systems. Therefore, unconventional forms of agricultural production, such as *intra-urban agriculture*, are becoming a topic of great interest in China.

China is moving to a dominantly urban environment, however, China still maintains a largely rural status as it has the second largest rural population in the world (UN, 2018). Over the last few decades the “reform and opening up” policy has caused massive demographic and economic transitions including rapid urbanization. Whilst urbanization has resulted in a declining farming population and farmland, it has also seen a growing middle-class and increased displacement of rural farmers or ‘landless farmers’. The growing middle-class is causing a nutrition transition to a more demanding diet that is creating new food demands on China’s urban food system (Veeck, 2013). In 2011, China reached an urbanization rate of over 50 percent for the first time in its history (Zhang & Lin, 2012), and is predicted to reach 70 percent by 2030, resulting in one billion people in China living in urban areas (World Bank, 2014). This sharp increase in urbanization has outpaced economic growth and has created an urbanization path characterized by “high consumption and high emissions”, causing constraints on resources, the environment, and has exacerbated pressures on the food system, future food security and food sustainability (Chen, 2007).

China has long been concerned with food supply for its large population, having faced several famines in its history (Smil, 2004). Since then, China has had great success in mitigating famine and food insecurity through national-scale and urban food policies. However, contemporary food supply in China remains complex, as the loss of smallholder farms and the rapid growth of urban centers has increased the physical and social distance between food producers and consumers (Scott et al., 2014). Despite urban food policies such as “vegetable basket program” commonly implemented in cities, food policies in China remain fragmented and treats the food system as separate segments—strongly rural-biased and production-focused (Si & Scott, 2016). This is seen further in other national policies that segregate the urban and rural

populations through its *hukou* system and urban rural integration strategies that attempt to further modernize cities (Horowitz & Liu, 2017).

Food policy and security focused on national agendas that have come at the detriment of the environment and human health due to late industrialized and intensive food production over the past three decades—resulting in profound social, economic, and ecological challenges to agricultural lands and natural resources (Cheng, 2012; Lang & Miao, 2013). As a result, agricultural development in China has narrowly emphasized industrialization processes and aligned food policies with a modernized agriculture structure. Industrial agriculture has resulted in the rapid loss of farmland, environmental degradation and pollution, and public health issues (e.g. food safety) (Krul & Ho, 2017). This has had significant implications for China’s food security, including cities like Nanjing (Lu et al., 2015; Yang, 2013), that are still feeling the wake of a string of large-scale food scandals and food safety incidents since the early 2000s. This has provoked growing concerns and criticisms from citizens and scholars about China’s food system and has resulted in continued concern about food security (He et al., 2017). Urbanization and population growth will continue to increase in the future, making the function of urban food systems and urban food strategies in China potentially crucial to furthering food sustainability.

As one alternative urban food strategy, urban agriculture’s position within Chinese agricultural discourse is fraught with uncertainty. Current urban agriculture discourse, to the extent that it exists, has largely been a state-defined project (Cai et al., 2011), dominantly concerned with growing food for the city rather than within it. While urban agriculture in the Global North is supported by civil society movements critical of the industrial agricultural system (Schupp & Sharp, 2012), the state and private sector have dominated the development of food production in cities in China. Instead, urban agriculture is currently serving as a way to “reinforc[e] the government’s priorities for agricultural modernization and neo-productivism— [that is] largely absent of any language of justice, food sovereignty, autonomy, empowerment, or fair trade” (Scott et al., 2014 p.159). Therefore, urban agriculture is still considered a rural activity in many Chinese cities as it does not fit the modern city model (e.g. urban rural integration policy). This is reflective of China’s continued plan to ‘de-peasantize’ the countryside, where urban agriculture is predominantly incentivized and developed in peri-urban

areas with the purpose to serve cities and modernizes the countryside (Schneider, 2014). More recently, the state's 'urban modern agriculture' (*dushi xiandai nongye*) plan, highlighted in 2012 by the Ministry of Agriculture, emphasizes peri-urban regions for robust domestic production and multi-functional urban agriculture, overlooking the potential for intra-urban agriculture (Horowitz & Liu, 2017; Ding, Liu, & Ravenscroft, 2018) and its role within the urban food system. Rather than focusing on urban agriculture as a phenomenon on its own, this study places urban agriculture in the wider context of urban food systems and examines how it is configured within and may complement China's conventional food systems (see section 1.2), rather than strictly focusing on urban agriculture's productive capacity, which is often its main critique. Therefore, this thesis addresses the question: What is the added value of urban agriculture to known food related issues in China's development? By doing so, references are made to the impacts of urbanization, the role of urban food systems, and the impacts of conventional or industrial agriculture practices.

1.2 Purpose of study

As White and Hamm (2017) note, "...there is a danger to conferring sustainability credentials to urban agriculture without working out how and why it exists in particular places and whom it serves" (p.13). Therefore, given there are a number of socio-economic and ecological considerations that affect the development and proliferation of urban agriculture in cities, it is important to recognize the varying contexts that urban agriculture developments exist in different cities. Prove et al. (2016) argues that a better understanding of different approaches to urban agriculture governance – including broader policy-making – is also increasingly needed (p.17). This thesis will review, through explorative empirical research, in Nanjing, China, the multifunctional aspects of urban agriculture. This is done by exploring local perceptions of urban agriculture and examining the various modes (the manner in which something occurs or is experienced, expressed or done) of urban agriculture taking place. Utilizing mixed qualitative research methods and a case study approach, this research aimed to understand the modes, motivations and challenges of urban residents, as well as the challenges and understandings of urban agriculture to stakeholders from the government—including officials and neighborhood committees—and academics. To achieve this, four research objectives were followed and are outlined in Section 1.3.

1.2.1 Rationale

As emerging narratives around urban agriculture have gained increased support from academics, urban planners, and policy makers over the past decade in the Global North (e.g. Benis and Ferrao, 2017; Pasrikidou and Szernyski, 2010; Schupp and Sharp, 2012), there is a paucity of empirical social-scientific research regarding the potential of urban agriculture in the Global South (Korth et al., 2014), and even more so in Chinese cities (see Horowitz & Liu, 2017; Ding et al., 2018). In light of recent studies in Nanjing on food safety (Si et al., 2017, Si et al., 2018; Lam et al., 2013), alternative food networks (Scott et al., 2014; Schumilas & Scott, 2016; Si & Scott, 2016b), and ongoing social and ecological tensions due to rapid urbanization in China (Tan et al., 2017; Chen et al., 2016; Lang & Miao, 2013; Zhu, 2011) alternative forms of agriculture production, such as urban agriculture, have become a topic of great interest (Ding, Liu, & Ravenscroft, 2018; Hamilton et al., 2014; Horowitz & Liu, 2017; Krul & Ho, 2017; Kiminami, Furuzawa, & Kiminami, 2019; Liang et al., 2019; Peng et al., 2015; Yang et al., 2010; Yang et al., 2016) . Given the highly contextual nature of urban agriculture, there are relatively few comprehensive examples in China to draw from. Therefore, it is important to understand the function of urban agriculture within urban food systems in Chinese cities and its role in potentially addressing increasing concerns of sustainability and food safety. According to a July 2015 city household survey done by the Hungry Cities Partnership (HCP), one in five households in Nanjing were engaged in urban agriculture activities (Si & Zhong, 2018). Additionally, 77 percent of those that grew their own food were considered food secure and a further 14.7 percent were only mildly food insecure, despite it being well established that households in many cities in the world engage in urban agriculture to improve food security (MacRae, Welsh, & Koc, 1999; Rezai et al., 2016; WinklerPrins, 2017; Zezza & Tasciotti, 2010; Zeeuw & Drechsel, 2015). In this thesis I consider urban agriculture as an approach that can provide both a lens and set of practices to address mismatches in urban food systems and environmental sustainability.

To address this gap, this research examines small-scale intra-urban agriculture (i.e. residential plots), discusses the experiences of participants engaged in intra- urban agriculture, and the perspectives of participants from various levels of government to gain an understanding of urban agriculture in Nanjing. This is done through a literature review that situates urban agriculture discourse within China's evolving socio-political and economic context and sheds

light on the modes, motivations, and challenges of urban agriculture practitioners. Despite growing evidence of urban agriculture's existence in China (Si & Zhong, 2018; Ding et al., 2018; Horowitz & Liu, 2017; Krul & Ho, 2017), there is little empirical documentation on the scope of urban agriculture's impact on both participants and the urban environment.

1.3 Research objectives and questions

To better understand participants engaged in urban agriculture in Nanjing, China, this research had four main objectives:

- 1) To assess the demographics of small-scale, individual intra-urban agriculture practices within Nanjing and where it is taking place,
- 2) To identify the various modes of intra-urban agriculture in Nanjing,
- 3) To examine the motivations of populations engaging in small-scale intra-urban agriculture, and
- 4) To identify how China's evolving socio-political and economic context and increasing integration within global institutional and market networks impacts urban agriculture development.

While the benefits of urban agriculture are far broader than this paper's objective, the methods for this study have been designed to use empirical evidence to identify links between urban agriculture and the social, economic, and environmental benefits identified in the literature and of those practicing urban agriculture. Therefore, this exploratory research aimed to empirically substantiate urban agriculture dynamics within the urban food system through a case study approach that collected data on small-scale intra-urban agriculture from participants within urban districts of Nanjing. This study is based on a review of literature combined with primary qualitative data collection methods involving questionnaires (n=56), interviews with urban farmers (n=13), neighborhood committees (n=2), government officials (n=3), an academic (n=1), and field observations of urban agriculture activity. Researchers argue that small-scale intra-urban agriculture is an overlooked practice by the state and is of great significance within the Chinese context (Horowitz & Liu, 2017), however, it is important to recognize that this study examined one form of urban agriculture (small scale intra-urban agriculture) and that there are several other alternative food system arrangements (see Si, Scott & Schumilas, 2015) that could also be scrutinized through the urban agriculture lens in China.

In this research I observed various forms of small-scale intra-urban agriculture informally and spontaneously taking place across the city. This unregulated form of urban agriculture took place in urban settings, practiced by urban residents that capitalized on land that was seen as ‘wasted space’. Despite Nanjing’s bylaw that prohibits growing food within public green spaces in residential neighborhoods since 2013 (Si & Scott, 2016a), residents continue to grow within urban areas and are operating outside of any market-oriented structure (Si et al., 2017). I also found that intra-urban agriculture remains largely an informal practice, dominated primarily by older, working-class individuals growing vegetables on balconies, rooftops, in “empty” non-built spaces in and around the city, and on areas of ceased development. Interestingly, the potential economic value that is commonly associated with more market-orientated forms of urban agriculture (e.g. Community Supported Agriculture) was not a priority for most farmers in this study. Additionally, while food safety is of considerable concern in China, it did not appear to be a defining motivation for participants despite concerns of food safety still persisting for participants. Participants also noted several social wellbeing and health benefits by staying active. There were also unintended environmental benefits (e.g. recycling of urban waste). Lastly, non-economic reasons that participants associated with growing included freshness, food safety and recreation. Challenges faced by urban farmers typically included space limitations, weather, soil quality, age, confrontations with construction crews and other city officials.

This research demonstrates the existence of a diversity of urban farmers that exist within Nanjing’s city, where urban agriculture is primarily driven by private individuals who take advantage of urban agricultures broader social and health benefits, rather than its economic or market orientated structures. This challenges common assumptions about urban food strategies like urban agriculture as being predominantly food security measures and urban poor activities in the Global South and the associated civic movements against industrial agriculture in the Global North—emphasizing how urbanization, food safety and contemporary agriculture issues are dynamic and further research into the local contexts of urban agriculture in China are crucial.

1.4 Thesis structure

The thesis is organized as follows. **Chapter 2** discusses the role of urban food systems and the proliferation of urban food strategies like urban agriculture, while critiquing the global agri-food system and the impacts of urbanization. This is followed by a discussion of urban

agriculture as a guiding conceptual framework that highlights recent affirmations of urban agriculture characteristics that compliment urban food systems and the associated challenges of growing urbanization and industrial food production. **Chapter 3** contextualizes China's emerging social, ecological, and economic challenges as a result of urbanization and economic restructuring and discusses current urban agriculture discourse to identify points of intersection between urban agriculture and the urban food systems of Chinese cities. **Chapter 4** outlines the methodology that informs this research and the methods chosen for this study. **Chapter 5** combines discussion of the results and findings for this study, and examines the objectives outlined for this study and how they relate to the themes highlighted in Chapters 2 and 3. Additionally, this research sought to understand how the evolving socio-political and economic context in China and the increasing integration within global institutional and market networks impacts urban agriculture development. Therefore, this chapter will discuss how urban agriculture is viewed by different stakeholders including government officials, neighborhood committees, and academics. This thesis closes with **Chapter 6**, which sums up the main findings of the research and offer suggestions for future research.

Chapter 2: Urbanization and urban agriculture

The literature for this thesis was informed by five key bodies of literature: urbanization, industrial agriculture, urban food systems, urban agriculture, and what the Chinese context is for these areas (see Figure 1). While these concepts may appear to be siloed in this diagram it would be a mistake to not recognize the interconnectedness of many of these concepts, as they each complement each other in some way. The literature is broken up into two chapters. First, Chapter 2 discusses the four key bodies of literature and how urban agriculture relates, while Chapter 3 discusses these topics in a Chinese context.

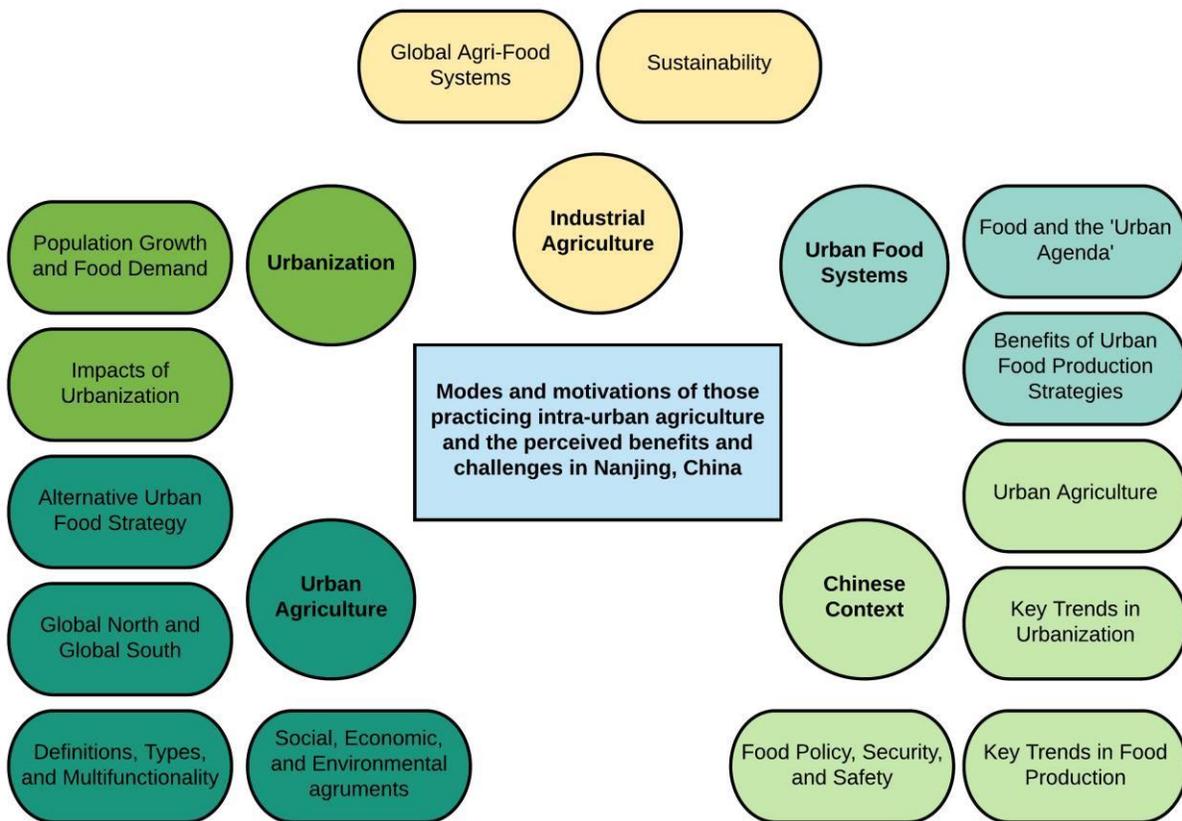


Figure 1. The five key areas of literature for this research (circles) and the key ideas within them (rectangles) center around the research objective of this thesis.

This chapter looks at how *intra-urban agriculture* has been framed within the literature and its importance within the urban food system. This chapter begins with an overview of the impacts of urbanization and industrial agriculture, that highlight why food systems and a focus

on urban food systems matters. Next, this chapter reviews the current literature on the entanglement between the agricultural sector and a city's food provisioning, an avenue of which is the proliferation of urban food strategies. Cities are increasingly recognized as key transition spaces for more sustainable forms of food production and consumption, where the urban food system plays a critical role. Therefore, urban food strategies, such as urban agriculture, are increasingly recognized as a key component of urban food systems. In this section, urbanization and urban food systems will be referred to on a general level and connections between urban agriculture and the literature discussed will be highlighted where applicable. Finally, this chapter will end with a discussion on how urban agriculture remains a relevant urban food strategy, largely due to its multifunctionality which is known to address aspects of both food production and food security and contribute to the overarching goals of sustainable city agendas. Understanding urbanization and population growths impacts on a city's food system will help frame China's current growth as an emerging economy. China has seen impacts from its urbanization path and historic intensified industrial agriculture, which are of increasing importance to its city's urban food systems and has seen recent proliferation of urban agriculture making it an important area of further research. This is further discussed in Chapter 3.

2.1 A century of cities: Globalized industrial food systems and the emergence of urban food strategies

2.1.1 *Why an urban focus matters*

“Nowhere is the current food crisis more visible than in cities” (Sonnino, 2009, p.425)

Urbanization, coupled with economic growth and industrial agriculture, has begun to challenge the limits of social, economic, and environmental sustainability. In 2014, Khoo and Knorr identified the global shift in population demographics from rural to urban as one of the twenty-first century's grand challenges, therefore warranting research on food in urban centers. The rapid, and often uncontrolled, growth of cities in the Global South has led to an increase in poverty, food insecurity, and unemployment in both the urban and peri-urban populations (FAO 2007; Dubbeling et al. 2010). Urban agriculture is therefore typically not a choice, but rather a means of survival, providing people not only with food, but also a living (Smit & Nasr 1992; Hamilton et al., 2014). Nowhere is the food crisis more visible than in cities (Sonnino, 2009),

addressing issues of food security and food sustainability is critical for the future growth of cities, given that cities often already face challenges in the provisioning of resources (Kasper et al., 2017). Since the release of the Brundtland Report in 1987 and the United Nations Conference on Environment and Development in 1992, increasing emphasis has been placed on sustainable development, in particular the role that cities have to play in advancing it (Bulkeley & Betsill, 2005; Bulkeley & Betsill, 2013). In this context, urbanization is increasingly viewed as an area for ‘sustainability fixes’ (Keil, 2007); where “[t]here is... recognition that the crisis of the city is closely related to the crisis of environment” (p.11). While it is not necessary for the purposes of this thesis to recount all urban and food system issues, a short summary that highlights some of the challenges of increased urbanization and the impacts of the globalized industrial food system are merited to further understand the importance of urban agriculture within urban food systems.

2.1.1.1 Growing urban populations

In a time of extremely high population growth, the loss of arable land, dietary changes and climate change, the food issue is becoming more important than ever before (Foley et al., 2011). In 2008, more than half of the world’s population became predominantly urban and this

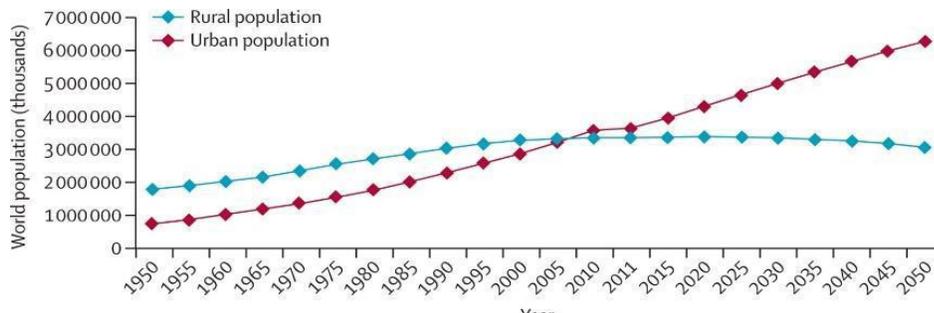


Figure 2. World population growth, 1950–2050 (Source: Ryden et al., 2011, pg.2081)

trend has continued. In fact, in 1950 the global urban population was 751,000,000 while in 2018 it was 4.2 billion people (UN, 2018) (Figure 2).

Additionally, it is estimated that by 2030 5 billion of the world’s projected 8 billion people will live in urban areas, with the majority of this urban population growth happening in Asia and Africa (UN-Habitat, 2016; UN, 2018). However, a growing population is not the only problem the world faces. There are several future threats to food insecurity such as population growth, global climate change, biodiversity loss, and resource depletion, particularly in low-income settings (Godfray et al., 2010). Increasing urbanization and population growth put pressure on global food security, where people continue to suffer from malnutrition from either food

insufficiency, or nutrient deficiency (FAO et al., 2018). While progress to reduce world hunger was positive up until 2014 (FAO et al., 2014), the latest FAO report on food insecurity shows evidence of an increase where now 821 million people or one out of every nine people in 2017 are undernourished (FAO et al., 2018). Interestingly, this report highlights a slowing down of hunger in Asia but remains the region with the highest undernourished people in the world at 11.4 percent or 515 million people (FAO et al., 2018). Additionally, the scale of rural transformation under increased urbanization has seen many abandoned their lands (sometimes ancestral lands) to migrate to urban areas, often “impoverishing cultural identity, abandoning traditional knowledge and permanently alters landscapes” (UNCCD, 2017, p.8).

Urbanization is a process that is influenced by local economic, social, and political change, which varies between regions and explains why the global process of urbanization has substantial local variations (Tacoli, 2017). Yet, the economic growth of cities “...alone does not necessarily result in inclusive urbanization, and in many instances entails risks of exclusion” (Tacoli, 2017). Urbanization rates occur through potentially three phenomena: natural growth, rural-urban migration, and the reclassification of rural areas to urban (Buhaug & Urdal, 2013). For example, in China, and other low- and middle-income nations, urbanization is driven by net rural-urban migration typically in response to better economic opportunities in urban areas, lack of opportunities in rural areas, or forced removal under urban expansion. These larger cities are and will express a strong demand for arable land needed for food supplies and as the income of their residents grow, the demand for food grows accordingly, increasing stress on the environment (Van Kamp et al., 2003). Wiskerke (2015) highlights four challenges of urbanization in addition to the existing complexities in governance of cities, including: (1) resource use, (2) growing inequalities, (3) environmental pollution and lastly (4), food provisioning (Table 1).

Table 1. How cities are viewed	
Category	Impacts
Resources use	<ul style="list-style-type: none"> • Cities consume 75% of worlds resources, while covering 2% of the world’s surface • Larger ecological footprint • Cities considered “parasites” that exploit and pollute the resources around it.
	<ul style="list-style-type: none"> • Inequalities in wealth, health and access to resources and availability • The affordability of services

Growing inequalities	<ul style="list-style-type: none"> • Strong differences between the upper- and middle-class and the low-income class • Challenges attributed to poor governance due to inability to keep up with urban growth
Environmental pollution	<ul style="list-style-type: none"> • Water pollution • Air pollution • Disappearance of urban green worsens air pollution, the urban heat island effect • These impact the vulnerable populations the most
Food provisioning	<ul style="list-style-type: none"> • Feeding cities has great social and physical impacts on our planet • Food issues are not given a second thought • Urban policies are usually associated with jobs, crime, revitalization of districts, maintaining neighborhoods • Food and urban agenda missing due to separation between urban and rural policy

Source: Adapted from Satterthwaite, 2016 and Wiskerke, 2015

Cities must not only provide urban inhabitants with sufficient food, but they must also provide them with sustainable food. However, population increase, and industrial agriculture have placed increased strain on global food systems that already suffer from several sustainability issues. Satterthwaite et al. (2010) argue that many known urban issues are not necessarily due to the immediate impacts of urbanization, but rather the “inadequacies in the response by governments and international agencies” due to economic and urban change outpacing needed social and political reform, especially at the local level (p.2810). This is most evident in cities in Asia, Africa, and Latin America (Satterthwaite et al., 2010). Providing a sustainable environment not only requires environmental quality and livable spaces but also food security and resilient food systems (Haberman et al., 2014). How urbanization is managed has a significant impact on people’s quality of life and the productivity and health of cities (Zhang, 2016, p.251). Thus, urban population growth holds a central place in sustainability and food systems literature and has led to a rise in interest in the role of urban food systems.

2.1.1.2 Environmental impact

Despite only covering 2 percent of the world’s surface, cities are responsible for about 75 percent of the world’s consumption of resources (Pacione, 2009). Historically, cities have been compact with concentrated populations; today, however, cities are increasingly spread-out (Seto et al., 2013). This urban sprawl is largely due to demographic pressures from increased

urbanization, as discussed in 2.1.1.1, that in turn has had drastic impacts on the environment's arable land, water quality, energy, biological resources, and waste generation (see Table 1) (Newman, 2006; Pimentel et al., 1997; Seto et al., 2013; Wiskerke, 2015). This 'urban ecological footprint' (Rees & Wackernagel, 1996, p.228-229) makes urbanization – as a social, economic, and physical transformation of landscapes – “...one of the most powerful, irreversible, and visible anthropogenic forces on Earth” (Sanchez-Rodriguez et al., 2005, p.8), coinciding with global environmental degradation, increased consumption of natural resources, habitat loss, and overall ecosystem change (Daily, 1995; McDonald et al., 2013; McNeill, 2000). Some of the social and economic challenges facing cities can include poverty, increased land use change, and pollution. As a result, “[t]here is...recognition that the crisis of the city is closely related to the crisis of environment” (Luccarelli & Roe, 2012, p. 11) and highlights the environmental concerns of industrial, global food systems and urban food systems role for cities.

Environmentally, the physical expansion of urban areas will require increasingly more land and consume prime agricultural land, will draw more heavily on natural resources, and will occur in areas of limited economic development and institutional capacity placing significant strain on a country's ability to protect the environment (Seto et al., 2013). As a result, urbanization can pose considerable threats to both urban food security and sustainable food objectives that impact underlying sustainability goals of cities (FAO, 2014). Therefore, while urbanization provides many advantages and is characteristic of all prosperous nations (Kourtit & Nijkamp, 2013; Sarterthwaite et al., 2010), it is often plagued by numerous and profound social, economic, and environmental challenges (Seto et al., 2013; Wiskerke, 2015) and are a central element to the sustainability challenge (Seto et al., 2016)—particularly in the Global South (Sanchez-Rodriguez et al., 2005).

Despite the challenges associated with urbanization, considerable literature (Seto et al., 2016; Sarterthwaite et al., 2010; Cohen, 2006; White & Hamm, 2017) also emphasizes the important opportunities for economic and social development that cities offer, as they are often focal points for economic growth, innovation, and employment. While urbanization and sustainable development will be one of the greatest global challenges in the coming decades in both the Global North and South, urban transformation also presents cities, policymakers, and the international community with opportunities and challenges for developing sustainable solutions to pressing global environmental and social issues (Kourtit & Nijkamp, 2013; UN-

Habitat, 2016; UN, 2018). Matine (2012) highlights that while urbanization is both inevitable and necessary, achieving “a pace and pattern of urban development that is beneficial” is needed to enhance global sustainability (p. 2-3). The sustainable development agenda of cities are increasingly recognizing the impacts of global food supply and therefore has seen local food production gain particular relevance (Fabbrizzi et al., 2016; Sonnino, 2009). Producing good within urban boundaries is suggested to simultaneously address a number of environmental and social issues (Weidner et al., 2019) through increased self-sufficiency (Clinton et al., 2018).

Urban agriculture is considered a primary production process, which can be viewed as a component “embedded in the urban food system” (Weidner et al., 2019, p.1638). Therefore, urban food strategies, like urban agriculture, are one way in which cities can create or recreate sustainable social, economic, and environmental linkages with surrounding regions (Sonnino, 2009). Sonnino (2009) notes “emerging urban food strategies are necessary to fully capture the potential of fast-growing cities in creating or recreating more sustainable social, economic and environmental linkages with their surrounding regions” (p.425). As a result, urban food strategies have begun to establish themselves in cities around the world. In fact, Bren d’Amour et al. (2017) found that 36% of urban areas were used for crop production in 2000. While there is a possibility this is an overestimate when speaking of intra-urban agriculture given the probable inclusion of peri-urban areas, nonetheless these results highlight the already critical importance of crop growth within a reasonable distance of existing built environments. Moreover, Clinton et al. (2018) found that urban agriculture production could result in \$80-160 billion (2010 USD) of ecosystem services annually, further illustrating the potentially large incentives to incorporate agriculture within existing and planned urban areas.

Cities are beginning to recognize the advantages of urban food strategies to enhance not only urban food systems and food sustainability but mitigate increasing environmental issues associated with urbanization and industrial food systems (Morgan, 2009; Kulak, Graves & Chatterton, 2013). According to Morgan (2009), rapid urbanization causes cities to become “more conscious about how they feed themselves due to the sensitivity and vulnerability of food shortages and are the most politically combustible areas in every country” (p.342), leading to a rise in interest in sustainable urban food systems as alternatives to a growing dissatisfaction with industrial agriculture.

2.1.2 *Industrial agriculture and global food systems in urban environments*

While today's global food system has brought dramatic gains in economic efficiency, these benefits come at a cost and contribute significantly to many of the global environmental issues faced today (Benis & Ferrao, 2017; FAO, 2015). Urban populations in both the Global North and South are increasingly depending on the global food system (Misselhorn et al., 2012) due to weakening or disappearing urban-rural linkages (Sonnino, 2009), which has profound impacts on people's daily life (Olsson, 2018). This has caused cities have become increasingly dependent on the global industrialized food system (Sonnino, 2009), where urban food demands are largely met by conventional food systems based in industrial and global agricultural supply chains that are interconnected with several environmental issues (Biel, 2016) and have the ability to shape the conditions for current and future urban food systems. The global agri-food system is important to consider as China has had a relatively recent integration into the global economic system (Schneider, 2015; 2017), along with a transition to a more modern (industrial) agricultural system. Consequently, populations in urban areas have immediate vulnerability and unpredictability related to food security (Olsson, 2018).

The global agri-food system has disconnected people from food production and lessens connections with the environment—thus resulting in numerous social, economic, and environmental crises (Weis, 2010). *Food systems* consist of "... dynamic interactions between and within bio-geophysical and human environments which result in the production, processing, distribution, preparation and consumption of food" (Gregory et al., 2005, p.2141). Erickson (2008) expanded this definition to include socioeconomic and global environmental drivers that interact with food system activities and outcomes. Teft et al., (2017) identifies three food systems that predominate in urban and peri-urban areas that constitute the urban food system—modern, traditional, and informal. These systems exist in all cities to some degree as they overlap in functions and respond to the diverse aspects of consumer food demand (Teft et al., 2017). Firstly, the traditional system is characterized by "vibrant urban wholesale markets that are connected to rural areas through a diverse group of rural based traders (assemblers, aggregators, etc.) and various scales of wholesalers (including smaller "semi"-wholesalers) who are in agriculture-based towns and small cities. Traditional urban food systems predominate in many cities in Africa and Asia but continue to thrive through the world despite the growing presence of diverse types of modern channels. (Teft et al., 2017 p.29). Traditional systems are challenged by

modern food systems, which are characterized by “modernized wholesale and food safety systems, capital-intensive food processing, integrated cold chains and food service firms, state-of-the-art logistics, private branding, labelling and packaging, modern retail and restaurants, and global integration” (Teft et al., 2017 p.30-31). Lastly, the informal food system in urban centers represents a third subsystem that predominantly caters to the urban poor (Teft et al., 2017). The informal food system is characterized by largely cash-based and small volume retail transactions “involving both domestic and imported food products sourced from open or wet retail markets or wholesale markets in the traditional system” (Teft et al., 2017, p.36). These three types of food systems are consistent with the findings of this research and the traditional and informal systems function will be further discussed in Chapter 5. The functioning and efficiency of the global food system demands the realization of several preconditions, such as access to land and resources, absence of environmental disturbances like climate change and lack of disturbances from political conflicts (Morgan, 2015; Olsson, 2018).

In addition to the global food systems challenges, urbanization has presented new food demands. Urbanization changes the demand for agricultural products with increased population and changes in their diets and demands (Sartterthwaite, McGranaham & Tacoli, 2010). These changes have created major challenges for urban food security (Sartterthwaite, McGranaham & Tacoli, 2010). As people move from rural, agrarian lifestyles to urban areas, their incomes and consumption tend to rise (Deutsch et al., 2013) and an essential characteristic of this trend is a shift in diet towards more protein. This leads to an increasing demand beyond the simple population growth rate (Deutsch et al., 2013), often making urban areas more vulnerable to global markets, as supermarkets are becoming key stakeholders in the control of access to food (Teng, 2011). The global food system trend is characterized by growing industrialization, increased mechanization and modernization, and intensified fertilizer and pesticide use. Today’s industrial agriculture occupies 37.6% of the world’s arable land, is the world’s largest source of water pollution, is the source of 13.5% of global greenhouse gas emissions (FAO, 2011), causes environmental degradation and social disintegration, and has ultimately been deemed unsustainable (Blay-Palmer & Donald, 2016; Jones et al., 2013; Stavi & Lal, 2013). As a result, cities are placing unprecedented pressure on global, regional, and local natural resources. This is reflective of estimates that place a 70% increase in global food production and a doubling of production in developing countries is needed compared to 2009 levels (FAO, 2011). Increased

food demands will be further amplified by declining available arable land, shrinking productive capacity of industrial agriculture (Davidson, Andrews & Pauly, 2014), growing urban populations, and global climate change which can affect many aspects of food systems (e.g. availability, accessibility, and stability) (Toth, Rendall, & Reitsma, 2016). An example can be seen in the 2007-8 food crisis that saw urbanites (in particular the urban poor) hit the hardest globally (Matuschek, 2009) and highlights the vulnerabilities in the global food system. Therefore, ensuring food security is a major concern worldwide, due to urbanization and increasing world populations (FAO et al., 2015).

Worldwide, cities are inherently forced to become increasingly integrated into the global food system and food production has shifted from one of consumption to food exportation and a matter of global trade (Lyson, 2012) rather than addressing or ensuring food security. Additionally, the impacts of urbanization on food systems can be expected to expand beyond production to affect distribution, storage, and consumption (Tacoli, Bukhari & Fisher, 2013). It is only within the last decade that questions have emerged about the implications of food system challenges within cities (Roberts 2008; Rocha & Lessa 2009) and these questions have highlighted some of the faults within the urban food system which “imply deeper systemic difficulties with the food system” (Haysom, 2015, p. 265). Therefore, the challenge remains that current global food system practices are in many ways locked-in to these paths of dependency with production, distribution, and marketing channels that exacerbate issues of sustainability through environmental degradation and fail to ensure food security and social well-being (Almas & Campbell, 2012; Lawrence et al., 2013). Consequently, simply tweaking food practices will not provide long-term solution to the multiple problems the current globalized food system generates (IPES, 2016). As a result, urban food system strategies like urban agriculture, could help to break the current principles of specialization and uniformity of industrialized agriculture (IPES, 2016) and improve how we manage feeding cities. These statistics and trends surrounding urbanization have profound implications on urban food systems, urban poverty, food security, and nutrition. The larger urban areas grow, the greater the demand for food, therefore adding further pressure to the current dominant global food supply system (Miccoli et al., 2016). According to Morgan (2009), rapid urbanization causes cities to become more conscious about how they feed themselves due to the sensitivity and vulnerability of food shortages created and cities are the “most politically combustible areas in every country” (Morgan, 2009, p.342).

In this section, issues surrounding industrial and globalized food system dynamics were discussed. Against the background of urban challenges and increased dependence on the global food system, cities are beginning to realize their own role within food system sustainability through local/regional food strategies (Olsson, 2018; Sonnino, 2009). As Power (1999) notes, the establishment of a sustainable food system has roots in the critique of contemporary food system, where sustainable food systems emphasize “making the food system local and fostering the development of community” (p.33). Problems with the industrialized and globalized food system have prompted discussions over the last few decades to challenge these trends in the food system. This discussion has presented different sustainability and urban food system discourses and has important implications for considering the functionality of urban food systems and creating urban food strategies that can accommodate the potential issues of increased urbanization and a unsustainable global food system. It is through this lens that global agri-food systems are seen to disregard environmental and human costs and are therefore unsustainable (Power, 1999) and where agricultural methods like urban agriculture within urban food systems begins to take place. Urban food systems are increasingly seen as key transitional elements in addressing urban issues and as a result, increased attention has been placed on urban food strategies that require action from new stakeholders that are traditionally less engaged with food and agriculture (Dubbeling, 2013). Wiskerke (2015) notes that “[n]eglecting the dynamics and sustainability of food provisioning in scientific research on sustainable urban development is a serious omission” because as Steel (2008) argues “feeding cities arguably has a greater social and physical impact on us and our planet than anything else we do” (p.44). In the subsequent section, the importance of linking urban food systems and urban agriculture is introduced as a way to address current urban food demands and issues of food system sustainability in cities.

2.1.3 Putting ‘food’ (back) on the urban agenda

In the last 15 years, food has become an important topic internationally in urban agendas and in scientific publications (Sonnino 2009; Morgan 2014; Ilieva, 2016). Food systems have a great bearing on the quality of urban life and have become a focal point for city residents, municipal governments, and other stakeholders due to their contributions to the local economy, environmental conditions, public health, and the quality of city life (Pothukuchi & Kayfman, 1999). According to Drakakis-Smith (1990), the urban food system has the following components: food-producing areas (domestic rural and urban and foreign), marketing networks,

and urban consumption centres, with urbanization impacting all of these components. Food planning founders Pothukuchi & Kaufman (1999) believe that urban food systems' "... significance needs to be understood more fully for [not only] its impact on the city's economy, public health, environment, land use and other community systems" (p. 221) but because in contemporary urban environments "food issues are hardly given a second thought" (p.216). Food security has assumed a strong urban dimension at a time when most of the world's population live in cities (Sonnino, 2016). Increased interest in urban food systems and the increased engagement of cities in food issues has grown rapidly due in large part to the realization of the significant role cities play in the "urban food production and consumption paradigm, where decentralized cooperation can sustainably help to fight against poverty and hunger in our cities" (Teft et al., 2017, p. ix).

Cities and their urban food system are seen as key transitional elements in addressing the urban food security and food sustainability issues of cities. As Steel (2008) notes, "[f]eeding cities takes a gargantuan effort; one that arguably has a greater social and physical impact on our lives and planet than anything else we do" and yet few of us are conscious of this effort (p.10). Urbanization is a complex phenomenon and is one of the most important drivers of the global economy and is a strong indicator of "all aspects of productivity growth over the long run" (Zhang, 2016, p. 243). This has resulted in increased attention for urban food systems to respond to the need to place food higher on the urban agenda and requires action from new stakeholders that are traditionally less engaged with food and agriculture (Dubbeling, 2013). Urban food systems need to be understood in a systematic and integrated way in an effort to overcome the more traditional sectoral approaches (Kasper et al., 2017). The urban food system can be conceptualized as "a set of activities ranging from production through to consumption" (Ericksen, 2008, p.234). A well-functioning urban food system can be seen as "one that ensures a high level of food security to residents, while simultaneously contributing to sustainable social and economic development" (Smit, 2016, p.81). The reality of this is that "[n]o matter how efficient urban food-supply markets may be, rapid urbanization and growing urban poverty will complicate the demand side of the equation for decades to come" (Mougeot, 1999, p.14).

2.1.3.1 Distancing food in urban areas

Despite cities historically having a strong relationship with food, the connection between ‘urban’ and ‘agriculture’ were uncommon in geographical research until recently. Pothukuchi & Kaufman (1999) argue that the urban food system is an important component of the quality of urban life, as food has long had a reciprocal relationship with cities, where food influenced location, design economics, and politics of cities (Haysom, 2015). However, growing urban populations have made the relationship between cities and food increasingly complex as colonialism, industrialization, and globalization have distanced food production from cities (Clapp, 2015; Elmqvist et al., 2013; Haysom, 2015; Seto, Fragkia, Guneralp, & Reilly, 2011; Steel, 2008), while also concentrating food demand around cities as urbanization increases (FAO, 2010). The linkage of food and city has become an increasingly recognized issue, particularly in urbanized regions where food is increasingly decoupled from food production places and practices (Kasper et al., 2017). As a result, urban inhabitants have lost influence over their food consumption (Kasper et al., 2017). According to Pothukuchi and Kaufman (1999), the reason why urban food policy issues have lacked attention is because urban policies are usually associated with issues such as “the loss of manufacturing jobs, rising crime rates, downtown revitalization, maintaining the viability of ageing neighbourhoods, and coping with rising city government expenditures” (p.216). In addition, Haysom and Tawodzera (2018) emphasize that food has never been an issue on the urban agenda because of the dichotomy between the role of urban and rural in food production for cities. As a result, issues surrounding food, such as food security, are still predominantly measured by rural understandings despite being an increasingly urbanized world (Haysom & Tawodzera, 2018) disregarding the urban food system (Pothukuchi & Kaufman, 1999). This is largely due to urban food system taking a back seat to other urban systems, such as transportation, housing, and the environment (Pothukuchi & Kaufman, 1999). In addition, urban poverty is also consistently underestimated due to the same rural indicators being used in urban contexts, which fail to account for various differences including the higher income required, and how access to food is acquired when living in urban areas (Satterthwaite, 2014). This of particular importance in the Global South, where food insecurity primarily having a rural understanding has resulted in responses that largely focus on production responses (Crush & Frayne, 2011). This separation has directly imposed vulnerabilities embedded within industrial agriculture upon urban residents (e.g. climate change) (Curtis & Ehrenfield, 2012; McMichael,

2011). Food issues being absent from the urban agenda means that the “varied and complex ways food issues are embedded in our lives are not well understood by city residents” (Pothukuchi & Kaufman, 1999, p.217).

However, as Steel (2008) suggests “[i]n order to understand cities properly, we need to look at them through food” (p.10), implying a deeper understanding of cities’ urban food systems. As a result, the understanding of how urban environments affect the urban food system and how urban food strategies can produce a sustainable food system is therefore an urgent priority, as recognized by the FAO (2014). Food policies have historically been seen as non-urban due conventional definitions of “urban” as “non-agricultural” and has conceptually distanced food as an urban issue (Sonnino, 2009, p.431). Therefore, “new levels of attention from actors who have been less traditionally engaged in food and agriculture decisions, including professional planners and local and regional authorities” are required (Dubbeling, 2013, p.1). Pothukuchi & Kaufman (1999) recognize four factors that contribute to the food system having low visibility in an urban context and these include: (1) urbanites take the food system for granted as few see problems with food access or affordability; (2) the development of cities led to definition specific issues and problems as either urban or rural, one that continues today for the most part; (3) the modernization and industrialization of the agri-food system that allows urbanites to separate themselves from the food system; and (4) the persistent dichotomy between rural and urban policies (p.213-214). Being an “...integral part of urban food-supply systems since ancient times (Mougeot 1994), urban food production has expanded enormously since the 1970s in major cities ...” (Mougeot, 1999, p. 15). This is largely due to “insufficient, inadequate, unreliable, and unaffordable food supplies from rural and foreign sources” (Mougeot, 1999, p. 15). More recently, “regulating food safety” has become of great importance and a key component of the governance of urban food systems (Smit, 2016, p. 84). This can be found in China as well where food safety, rather than food security itself tops food concerns among the general public (see section 3.1.1.1).

2.1.3.2 The inclusion of food production in cities importance

Local food production methods within cities can provide agricultural landscapes within the urban system that provide productive features for cities. A well-functioning urban food system ensures not only urban food security, but through the implementation of better urban food

strategies (e.g. urban agriculture), transitioning to a more sustainable food system can ensure sustainable social and economic development (Ericksen, 2008). Pothukuchi & Kaufman (1999) argue that food issues within an urban context can be “made more visible” through better planning efforts (p. 213). In order to understand urban agriculture’s role within the urban food system of cities, one must identify the key components of a food system. While existing conceptualizations of food systems have focused on a chain of activities from production to consumption, Ericksen (2008) expands this model to include socioeconomic and global environmental drivers that interact with food system activities and outcomes. Through this, food systems are “embedded within societies and environments, and are thus shaped by political, social, and ecological factors” (White & Hamm, 2017, p.15). This definition suggests the need to address urban issues at multiple scales. Recently, increased recognition of the urban food system’s role can be seen in the 2015 Milan Urban Food Policy Pact, that was signed by more than 100 cities all over the world and set a precedent that laid the groundwork for the first global urban food policy agenda (Ilieva, 2017). This pact also includes three larger Chinese cities—Shanghai, Beijing, and Guangzhou—and demonstrates how industrialized cities are now taking the lead and attempting to re-envision food as an urban system, where sustainability is closely intertwined with the sustainability of all other basic urban infrastructure (Ilieva, 2017). As Morgan and Sonnino (2010) note, under the ‘new food equation’, which is characterized by a combination of ecological and social crises, cities play a key role in responding to the global challenge of sustainable food security (Sonnino et al, 2014). The “development of healthy, fair and environmentally sound urban food systems is now increasingly recognized as a matter of local policy as much as the responsibility of national and international government institutions” (Ilieva, 2017, p.1). Therefore, local and regional food system plans, and policies are emerging as parts of national and municipality efforts towards sustainable development (Ilieva, 2017).

2.1.3.3 A need for better integration of urban food planning

Despite the established benefits of sustainable urban food strategies like urban agriculture, the extent to which current research or government policies acknowledge the utility of urban agriculture varies widely (Aubry et al. 2012; Crush & Frayne, 2010; Frayne et al., 2014; Holland & Salle, 2016; Zezza & Tasciotti, 2010). Therefore, if cities do not adapt to their new realities, the expected increase in urbanization and population growth could further increase the vulnerability of urbanites to global agri-food systems and undermine the sustainability of the

urban food system of cities. Recently, however, literature about urban sustainability is increasingly acknowledging that a transition of agriculture that embraces strong multifunctionality can generate many benefits for society (Wilson, 2008; Knickel & Renting, 2002; Zasada, 2011). This has great implications for the future of urban agriculture, as it is strongly influenced by urban conditions such as urban policies and regulations, high competition for land, urban markets, and prices (Mougeot, 2000), and governance, whether informal or formal, has significant impacts on its success (Nchanji, 2017). The concept that food production is an exclusively a rural activity fails to appreciate urban food strategies like urban agriculture, an activity that has never disappeared from cities of the Global South and a concept that is reappearing in more sustainable cities in the Global North, where urban planners are re-imagining ‘the city as a farm’ (Viljoen, Bohn, & Howe, 2005 in Morgan, 2009, p. 341). As a result, Urban food production is shifting from being a scientific curiosity to an urban policy issue and development tool. The benefits and challenges of urban agriculture, an urban food strategy which has received great attention, are discussed in the next section.

2.2 Looking to ‘alternatives’ – urban agriculture

Increased interest in urban agriculture can be situated within the larger alternative food movements (AFM) that have given rise to a growing body of literature on local and sustainable alternatives. The aim of these food movements is to not only mediate the physical distance of food but also address aspects of food security. Further understanding of urban agriculture comes from its position within these larger alternative food network movements that are seen as a practical and localized response to growing concerns of industrial food production. As a result, discussions have frequently centered around the understood benefits and critiques of urban agriculture. The body of literature on AFMs is large and includes ideas of food justice, food sovereignty, sustainable food systems and alternative food networks (AFN), to name a few; therefore, a detailed overview would not be possible here. While worth recognizing, I will remain focused on urban agriculture. The argument for urban agriculture does not revolve around the actual output of food produced commonly critiqued within the literature. Instead, much like the aims of this exploratory study aims, this section will review current understandings of urban agriculture and the associated, multifunctional, benefits within an urban food system.

2.2.1 Urban agriculture

The recent proliferation of urban agriculture has brought attention to debates surrounding the sustainability of cities and the role of urban food production strategies. Urban agriculture has flourished on the ground, in policy, and in academic discourse. As a result, urban agriculture's role in cities has become of significant interest to the international community, development practitioners, and academics alike (Aubry et al., 2012; Mougeot, 2005; Opitz, 2016). The link between the urban agriculture city interface is unique due to literature on sustainable cities, and the "need for transformational change to the ecology of western cities, usually ignores the opportunities for [urban agriculture] to contribute to urban sustainability" (Pearson et al., 2010, p.7). However, urban agriculture "is generally studied in isolation from other urban processes, which tends to obscure its *urbanness*, thus fostering a perception of it as a misplaced rural activity" (White and Hamm, 2017, p.12), as a result fails to recognize the significance of the urban food system's role in addressing urban food security (Morgan, 2009; Morgan, 2015). By including urban agriculture's growing prevalence in cities within analyses of food insecurity can provide additional "...insight into the factors that cause people to farm the city, and into how food systems are failing or succeeding" (White & Hamm, 2017, p. 18). It is for these reasons that urban agriculture has and can become further substantiated as a contributor to urban livelihoods and a sustainable urban food system. Where the sustainability of urban agriculture depends on the 'insitutional environment' in which it operates (e.g. social norms, rules, laws, and protocols) (Pearson et al., 2010). Urban agriculture's revival within the food movement stems from a broader recognition that contemporary industrial agriculture has several social, environmental, and economic inequalities that are further compounded by increasing urbanization, making sustainable alternatives difficult (Gagné, 2013). Concerns around urban food security, urbanization, and contemporary agriculture are fueling the need to re-examine how urban spaces are not only being developed but how urban inhabitants are fed (Haysom, 2015). Food should be understood as an important urban issue as it is "...affecting the local economy, the environment, public health, and quality of neighbourhoods" (Pothukuchi & Kaufman, 1999, p.217) and alternatives like urban agriculture are seen as part of a new urban food system for sustaining the environment (Donald, 2010). Pearson et al. (2010) argue that urban agriculture can offer opportunities for contributing to sustainable city development through the urban food

system by looking at the social, economic, and environmental benefits, which are some of the key arguments for the promotion of urban agriculture and its integration into urban food systems.

Urban agriculture also encompasses a variety of practices and can include, community gardening, animal husbandry, aquaculture, and backyard gardening. In many ways, urban agriculture has moved beyond simple horticulture, to encompass diverse practices including rooftop farms and hydroponics. While urban agriculture is only “one component of a complex food system” that is practiced at various scales and in various ways depending on the needs, opportunities, and constraints of practitioners (White & Hamm, 2017, p.14), it can also determine how populations participate, either formally or informally in the urban food-supply system. The inclusion of agriculture in cities has the potential to simultaneously build adaptive capacity and sustainability while introducing innovations in production techniques, markets, and increasing citizen engagement in food systems (Figure 3). The proliferation of food strategies like urban agriculture in cities is an important consideration when considering the local economy, environmental conditions, public life, and the quality of city life (Pothukuchi & Kaufman, 1999). In 2014, a study estimated that 456 million hectares, which is the size of the European Union, was devoted to urban and peri-urban agriculture globally, with 80% of this area occurring in low- to middle-income countries (Thebo et al., 2014). A recent estimate shows urban agriculture accounting for 15 percent of the total agricultural land in the world but this number can be extended to 40 percent when peri-urban production areas within 20 kilometres of cities are included (Teft et al., 2017 p.25). To be a feasible alternative in cities and to exist with other urban land uses, urban agriculture should include ecological and cultural functions in addition to the direct benefits of food production (Lovell, 2010). These additions have become increasingly recognized as a component of urban agriculture and have increased its understanding of being a multifunctional practice (Plate 1). Therefore, urban agriculture can also promote food sovereignty as a way for people to exercise their right to grow and acquire their food on their own terms (Dubbeling & Santandreu, 2003; Leitgeb, Schneider, & Vogl, 2016). As a result, there has been growing academic interest in urban agriculture (e.g. Benis & Ferrao, 2017; Bohn & Viljoen, 2005; Pasrikidou & Szernyski, 2010; Schupp & Sharp, 2012; Viljoen, 2005) and several initiatives have taken place on the ground in both the global North and South. However, despite the many benefits of urban agriculture, empirical research regarding the social,

economic, and ecological outcomes of it is greatly lacking (Larder et al., 2014; Hinrichs, 2014; Mok et al., 2014; Wortman & Lovell, 2013; Draper & Freedman, 2010).

2.2.2 Efforts to define and classify urban agriculture

In a time of rapid urbanization and population growth the separation between the ‘urban’ and ‘rural’ has become increasingly blurred. While urban agriculture has been an integral part of urban livelihoods through human history (Mougeot, 2005), it was not until recently that it



Figure 3. The multifunctionality of urban agriculture.

Source: Duchemin et al. (2008).

became of interest to the international community and development practitioners. In response to the consensus that population growth will require a sharp increase in food supply and that the conventional agricultural production model is considered no longer sustainable, urban agriculture represents a practice that facilitates urban food system sustainability and is well suited to address the various components of food security and social, economic, and environmental challenges.

Over the past two decades' numerous papers have been published on urban and peri-urban agriculture, and a variety of definitions have been suggested. The most widely cited definitions of urban agriculture (Mougeot, 2000; Jacobi et al., 2000; Smit et al., 2001) refer to urban agriculture as any form of farming that takes place within and/or around cities. The foremost urban agriculture scholar Mougeot (2000) defines it as:

“an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city, or a metropolis, which grows and raises, processes and distributes a diversity of food and non-food products, (re)using largely human and material resources, products and services found in and around that urban area, and in turn supplying human and material resources, products and services largely to that urban area” (p.11) (Figure 4).

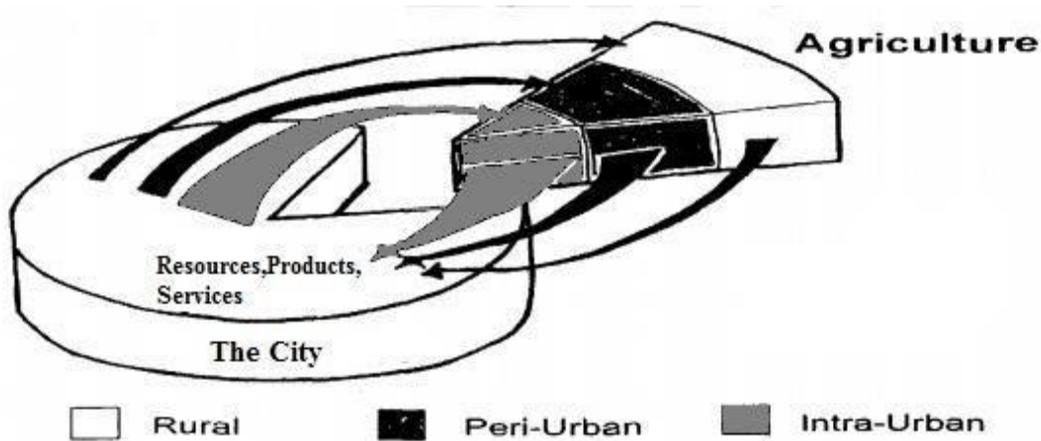


Figure 4. Urban agriculture's various forms. Using from and supplying more to the 'city'. Source: Adapted from Mougeot (2000, p.11).

Urban agriculture allows for increased ecosystem functionality in urban areas that would otherwise likely be of minimal functionality, while simultaneously promoting sustainable food security by providing citizens with local food that is produced in an ecologically responsible manner. Smit and Nasr (1992) argue that urban agriculture is achievable in most, if not all, urban areas, and that it is an essential component of a sustainable community due to its ability to shorten the feedback loop of production to consumption. This definition points to the fact that urban agriculture is not solely for food production, but for a wide range of needs of the local community, including medicinal and ornamental plants. Originally definitions of urban agriculture focused on the social and economic conditions of UA. Mougeot (1996) first described

that urban agriculture was intended as an economic activity related to the production of food. Future definitions integrated the processing and distribution of food, livestock breeding, aquaculture and horticulture (Bailkey & Nasr, 1999) while Mbiba (1994) saw it as the production of crops for urban consumption that could take place in the periphery of urban areas (or what is known as peri-urban agriculture). Further, the inclusion of cultivation of husbandry (Rees, 1997) and the inclusion of forestry and aquaculture (Frojmovic, 1996) within both the city and the periphery expanded what was becoming known as urban agriculture. Mougeot (1998) emphasized early on that urban agriculture in the broadest sense included the producing, processing, distributing, and marketing of food and other related products. More recently, the FAO issued a definition that integrates the previous components by stating that “[urban agriculture] meets urban consumers demand and requires use of intensive production methods and reusing of natural resources and urban waste” (Miccoli, 2016 p.130).

These various definitions demonstrate that the ability to delineate boundaries between intra and peri-urban agriculture are difficult. The definition presented by the FAO regarded urban agriculture as a multifunctional system that connects traditional agricultural activities with the benefits of “leisure activities, economic vitality, individual health, well-being of the community, landscape, environment production issues and safety and food justice issues” (Miccoli et al., 2016 p. 130). Many researchers have chosen to not differentiate between peri or intra-urban agriculture and consider one to be the subset of another under the umbrella of urban agriculture. Other disciplinary fields have sought to mainstream urban agriculture as they seek into their own research and practice, creating new definitions that should enrich existing ones (Mougeot, 2016, p.87). While attempts to clearly distinguish the location between the intra and peri urban have progressed, a consensus can be found with regard to how they are both impacted by varying social, economic, environmental and political conditions.

2.2.2.1 The core dimension of urban agriculture

There are six common dimensions of urban agriculture identified by Mougeot (2000) and include economic activities, products, location, region, scale, and destination (Figure 5) (Mougeot, 2000, p.5).

First, the element most commonly reviewed in these definitions is *region*. Stewart et al., (2013) recognize that “the actual boundaries of peri-urban areas are not often clearly defined”

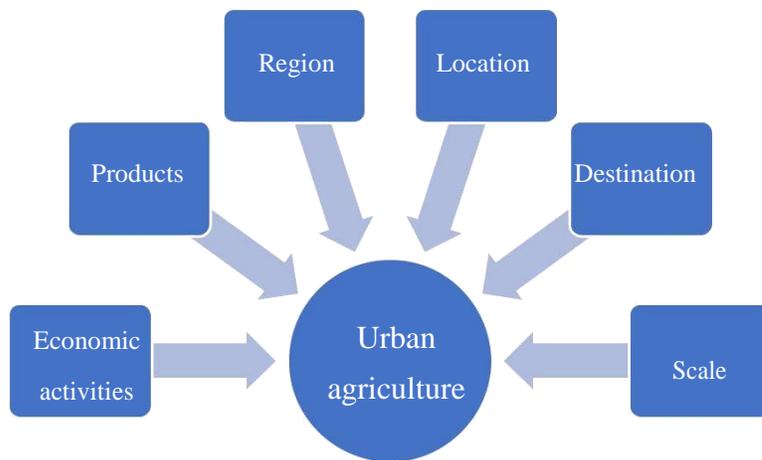


Figure 5. Common dimensions or characteristics of urban agriculture.
 Source: Adapted from Mougeot (2000, p.7)

(p.2) and that the criteria used often varies widely (Mougeot, 2000). The best understanding of the region or delineation of intra- vs- peri- are as follows. *Regions* in urban agriculture can include a wide variety of activities and is often divided into “peri-urban” and “intra-urban” agriculture. However, these boundaries are becoming increasingly unclear within academic circles and have created controversy as to how to define them given the varying socio-cultural, economic, and environmental situations in which they can occur (Willis, 2007; Simon 2008; Stewart et al., 2013). The definition of intra-urban agriculture is its location “in (within) and around” cities is by far the most common element to be reviewed and biggest source of contention when attempting to define intra-urban vs peri-urban agriculture (Mougeot, 2000). Intra-urban agriculture areas are defined as “the heart of the built-up or the fully urbanized area of a city” (Dossa et al., 2015 p. 401). According to Mougeot (2000), urban agriculture is “...more or less urban, according to the extent to which it will use the urban eco-system and in turn be used by this same urban eco-system” (p. 12). Therefore, a component of intra- urban agriculture utilizing resources, inputs, and services which are concentrated in the urban area (Mougeot, 2016, p.88), progressively resulting in a greater integration into the city. A strength known for intra -urban agriculture’s location is that being within a single urban area allows for a high diversity of farm types and farm strategies to exist due to the resources within a city center (Douglas, 2006).

Peri-urbans regional definition is more difficult (Mougeot, 2000). Given intra-urban locations are established within the “older and more settled urban fabric” (Mougeot, 2000, p.7),

peri-urban locations are an “area where agriculture takes places in the close neighborhood of cities in areas that are primarily rural but depend on the city in various economic and social ways (Mougeot, 2000 p.6). These areas are known to be “...in closer contact with rural areas and tend to undergo, over a given period of time, more dramatic agricultural changes than locations in more central and built-up parts of the city” (Mougeot, 2000, p.7-8). This largely due to urbanization or urban expansion, as cities grow the “immediate impacts of land demands from urban growth, pollution... [and] a wider market-related zone of influence – recognizable in terms of handling agricultural and natural resource products” (Simon et al., 2006, p.10) create conflict with peri-urban regions. As a result, these regions are characterized by fast changes in land use/security, social, economic, and environmental settings, and political issues (Simon et al., 2006). When distinguishing between intra-urban and peri-urban the criteria researchers often use is: population sizes, density thresholds, official city limits, municipal boundaries of the city, agricultural use of land zoned for other use, agriculture within the legal and regulatory jurisdiction of urban authorities (Mougeot, 2000). In a recent study, Aubry et al., (2011) found that farming systems defined by these boundaries (peri and intra) differed significantly and performed differently depending on their intra-urban or peri-urban location. Ultimately, intra-urban regions have become essential parts of the urban economy, and “urban agriculture holds the potential to help us diversify and strengthen our urban management strategies” (Mougeot, 2000, p.15). Therefore, “urban agriculture is but one component of a complex food system, practiced in various ways, at various scales depending on the goals, opportunities and constraints of urban cultivators” (White & Hamm, 2017, p.14).

Second, within *economic activities*, the production phase of urban agriculture is typically the most common economic activity included under the urban agriculture rubric. However, Mougeot (2000) believes the inclusion of processing and trade are critical and interact together to “make up an extensive and decentralized supply system[s] within immediate reach of a massive consumption market” (Mougeot, 2000, p.6).

Third, *products* can include food and non-food categories and sub-categories. Food products can include production for consumption by either people or livestock and, although on a smaller scale, other plants, such as ornamental and agro-industrial (e.g., tobacco). Definitions of food products stress the importance of more perishable and high-valued vegetables and animal

products (Mougeot, 2000). Studies often consider food production exclusively, while others encompass both food and non-food products as they often are mutually complementary and “reinforce not only food security but also economic and environmental benefits at various levels (from individual to city) (Mougeot, 2000, p.7). Mougeot (2000) argues that to not include non-food products would ‘truncate’ the understanding of the urban agriculture system, as well as the ways in which urban agriculture can interact with other urban functions that “use and provide resources, outputs and services to the city” (p.7). Also, it is important to consider that food provisioning and exchange in the Global South is an “idiosyncratic urbanistic practice, comprising market and non-market sourcing strategies” (White & Hamm, 2017, p.14) compared to the capitalized and consolidated forms found in the Global North.

Fourth, *location* (or area as described by Mougeot, 2000) perhaps has the most disparity across authors. Location can include residence, development status of sites (built-up vs. open space), modality of tenure (authorized vs unauthorized), and an official land-use category. For this study, the use of home use areas (off plot) and open-space locations were included. Product destinations can include both self-consumption and trade.

Lastly, systems of *scale* in production and *product destinations* are important characteristics when understanding the potential benefits of urban agriculture in cities. *Scale* can involve or describe the level of intensity of practicing urban agriculture. Few definitions include or exclude specific types of production systems; whereas for this study, the focus strictly on small-scale urban agriculture that is primarily at the household scale and not on the small, medium enterprises or the large, national or transnational businesses (Mougeot. 2000). Pearson et al. (2010) developed a scale of urban agriculture production (Table 2). At the macro scale of production, the challenge is preserving land in peri-urban areas and managing the inconsistent land uses (Pearson et al., 2010). At the meso and micro scale of urban agriculture, Pearson et al. (2010) argues that it is less regulated than at the macro scale and therefore develop their own issues. For example, government can provide land for community gardens, but continued operation may be vulnerable to changes in priorities of land use and perceptions of public liability (Pearson et al., 2010).

Table 2. Scale of urban agricultural production			
Scale		Examples of scale	Broad ownership categories of urban agriculture land and produce
Micro		<ul style="list-style-type: none"> • Green roofs, walls, courtyards • Backyards • Street verges 	<ul style="list-style-type: none"> • Private, corporate • Private • Public
Meso		<ul style="list-style-type: none"> • Community gardens • Individual collective gardens (allotments) • Urban parks 	<ul style="list-style-type: none"> • Private, on public land • Private • Public
Macro		<ul style="list-style-type: none"> • Commercial-scale farms, e.g. turf, dairy, orchard, grazing (e.g. horses) • Nurseries • Greenhouses: floriculture and vegetables 	<ul style="list-style-type: none"> • Private, corporate • Private, corporate • Private, corporate

Source: Pearson et al. (2010, p.8)

Product destinations often include both self-consumption and some trade (e.g. sale, barter, gifts etc.) (Mougeot, 2000). Understanding product destinations provide additional insight into understanding the economic performance and nutritional value of growing food. As a result, these common dimensions of urban agriculture directly and indirectly influence the urban food system and the distribution and consumption patterns. As argued by WinklerPrins (2017), a re-thinking and scaling up of urban agriculture or ‘global urban agriculture’ is necessary to enhance urban agricultures practicality in cities and engage with systemic issues hindering not only sustainable food but sustainable urbanization. Currently differences in urban agriculture “practice and motivation” is lessening between the Global North and Global South and a focus on “shared experiences” (WinklerPrins, 2017, p.1-2) that can leverage urban agriculture towards improved urban food security (White & Hamm, 2017) is needed.

2.2.3 Motivations, barriers and understandings of urban agriculture

2.2.3.1 Why individuals engage in urban agriculture: motivations

People engage in food provisioning activities like urban agriculture for a wide variety of reasons. First, emphasized in the literature is urban agriculture as a form of food security. Food

security should be “thought of as a dynamic process or a continuum, along which households are constantly shifting according to numerous variables, such as season or household employment status” (White & Hamm, 2017, p.18). There are four indicators related to the amount and quality of food consumed by households participating in urban agriculture: food and calorie availability, dietary diversity, coping strategies, and nutritional status (Poulsen et al., 2015). In Warren et al.’s (2015) review, food security was a common element among the benefits of urban agriculture; however, they note that comparisons across the nine studies were difficult due to varying definitions of food security. This highlights further complexities within the research and academic fields to establish common definitions in order to understand practices like urban agriculture. Regardless, environments that cause food provisioning to be an uncertain and nebulous struggle cause small amounts of income or food to matter (White & Hamm, 2017). As a result, there is strong evidence that urban agriculture can move people along the continuum to improved food security, while not necessarily wholly eliminating it (Battersby-Lennard & Haysom, 2012; Gallaher et al., 2013). For example, Battersby-Lennard and Haysom (2012) found that families who worked for or bought food in town could still be considered food insecure, but their food insecurity status would be greater if they did not have this food source. A unique study by Zezza and Tasciotti (2010) used nationally representative data from household surveys and did a multivariate analysis on 13 food groups to define a dietary diversity score on urban agriculture in different countries. This analysis found that farming in urban areas was positively associated with greater dietary diversity score in 10 out of 15 countries, with an average increase in the number of food groups consumed of 34% in Albania, 11% in Panama, 9% in Nicaragua and 6-7% for the remaining countries (Zezza & Tasciotti, 2010). Urban agricultures association with food security should be considered in the wider context of food systems, as the existence of urban agriculture will remain indicative of individual, household, or community resilience, it may also indicate a larger failing of food distribution systems that are unable to provide, through traditional markets, all people at all times with food that are healthy, safe, and affordable (Warren et al., 2015). In addition to food security, motivations include accessing fresh produce, improving personal health and mental well-being, or more radically to challenge norms around urban/rural dichotomies or the global agri-food system (Draper & Freedman, 2010; McClintock, 2013). Research shows that people engage in urban agriculture as a coping mechanism (Burger et al., 2009), more so when there is insufficient access to food

(Bukusuba et al., 2007), and when there is an economic crisis (Zezza & Tasciotti, 2010). Bukusuba et al., found that 95% of urban farmers began farming in order to increase their access to food (2007).

2.2.3.2 The social, economic and environmental benefits of urban agriculture

Warren et al.'s (2015) systematic review of urban agriculture suggests that urban agriculture can be seen as a support structure through two primary channels: direct consumption of food, and increased economic security, through the sale of produce. Yet numerous articles have highlighted additional benefits to urban agriculture that include health, social, and environmental benefits, emphasizing the multifunctionality of urban agriculture both in the Global North and South for home gardens and leisure farms (e.g., Santo et al., 2016; Hamiton et al., 2014; Poulsen et al., 2015). Soulard, Perrin and Valette (2018) emphasize looking at urban agriculture through the “geographical lens of the agricultural-urban relations, involving environment, land tenure, planning, employment, social, health” is critical to its multifunctionality (p.4). Increasingly, the scientific community considers more and more the cities as continuous areas where agriculture and food are to be included in the urban development (Soulard, Perrin, & Valette, 2018).

Urban agriculture has also been known for its capacity to simultaneously reduce the ecological footprint associated with agriculture, increase urban food security, and enhance food sovereignty and resilience to changing climates (e.g., Ackerman et al., 2014; Coelho et al., 2013; Obatolu & Speak, 2013; Orsini et al., 2013). Urban agriculture also has been observed to offer multiple social benefits through increased personal health and community-building, household economic benefits through increased income and ecological services (Audate et al., 2018; Beckie & Bogdan 2010; Domene & Sauri, 2007; Gray et al., 2014; Redwood, 2012; Miller & Hobbs, 2002; Stallman, 2011). Some researchers and many advocates assert that urban agriculture is an effective strategy to improve nutrition of urban residents through increased dietary diversity (Hoorweg & Paul, 2008; FAO et al., 2012; Kennedy et al., 2011; Mougeot, 2000; Robertson, 2004; Giovannucci et al., 2012; De Zeeuw et al., 2000). Urban agriculture can increase social capital of communities through increased social bonds, providing support during times of crisis, and it can help communities leverage greater resources, funding and supportive policies from outside organizations and government (Santo et al., 2016). In addition, for health,

participating in urban agriculture, whether for personal consumption or market-oriented structure, can increase participants' physical activity (Bellow, Brown, & Smit, 2003). It is widely known that physical activity is an essential part of maintaining health. In addition, there is a correlation between increased fruit and vegetable consumption of participants in community gardens (Alaimo, Packnett, Miles, & Kruger, 2008). Urban agriculture can provide employment and income opportunities for marginalized population groups (Redwood, 2012). Examples of more effective governance instruments and experiences are also needed to better identify successful approaches for integrating city-based food production into urban sector policies and urban land use planning instruments, and to facilitate the development of safe and sustainable urban agriculture (FAO, 2007). Green spaces of urban agricultural landscapes can also improve urban systems, their biodiversity, and their ecosystem services (Lin & Fuller 2013; Clarke et al. 2014).

2.2.3.3 The barriers or challenges of urban agriculture

Urban agriculture's benefits are often to generally celebrated and do not consider a number of urban realities (White & Hamm, 2017). These include, (1) poor people not having access or only insecure access, to productive resources, such as land and water, in an urban environment; (2) municipal officials are often "antagonistic towards urban agriculture for a number of reasons (e.g., hygiene and the safe production of food)" (p.14); (3) urban agriculture may only produce a small portion of the food needs of urban populations; and (4) urban food insecurity is not due to lack of food, but in the inability to access food (see Crush et al., 2011;2012; Webb, 2011). Urban agriculture can also impact populations directly by contributing to the acceleration of communicable diseases (Hamilton et al., 2014, p.45). Therefore, government constraints play a role in the function of urban agriculture. When misconceptions and negative attitudes towards urban agriculture are introduced to the public through laws and regulations, municipalities hinder the development of urban agriculture. Smit, Nasr and Ratta (2001) verify this assumption and call out common perceptions of planners and economists, as they often fail to recognize the positive contributions of urban food production and only see it "...as a marginal activity of the informal sector, the bias spreads to market and credit agents, legislators, and the general population" (p.1). White & Hamm (2014) highlight that an "over-reliance on urban agriculture,[that]...is often interpreted as a measure to improve 'self-sufficiency' [...], risks relieving urban officials of their duties to respond to the needs of the most

marginalized urban residents by paying attention to and addressing urban processes that hinder people and their abilities to access food” (White & Hamm, 2017, p.14). This has resulted in insufficient official support, public policies and legislation that are unwelcoming to farming in cities. Byrd (2002) encourages the ‘legalization’ of urban agriculture, as it can provide services “to ensure a sustainable behavior towards urban cultivation’ rather than the current ‘illegal’ status that has left a “governance vacuum” that needs to be filled with policy formulation and institutionalized management that includes all relevant stakeholders (p.79). Other barriers can include distance and transportation to plots, cost inputs, theft, legal (or illegal) implications, and lack of technical guidance (Bukusuba et al., 2007; Burger et al., 2009; Hillbruner & Egan, 2008; Mkwambisi et al., 2007).

2.2.3.4 The advocacy and opposition of urban agriculture

Urban agriculture is not without its challenges or critics. Given the broad use of the term urban agriculture for various practices and strategies, scholars sit within two camps on urban agriculture—optimistic and pessimistic (Weidner et al., 2019). Pessimistic researchers still remain skeptical due to the well documented challenges of insecure land tenure, polluted land and water, limited access to resources and support services, lack of recognition by city authorities (Poulsen et al., 2015). Research have also been critical and often question the production capacity of urban agriculture (e.g. Born & Purcell, 2006; Hallsworth & Wong, 2013), as being primarily advocacy driven (Webb, 2011; Battersby, 2013). Yet, in Warren et al.’s (2015) systematic review of urban agriculture and urban food security, there was no evidence that discourages the positive link between the two but highlights poor quality and weak study designs that currently make interpretation difficult.

One particular concern highlighted in the literature and most relatable to this study was food safety. Studies have raised some concerns that growing food in urban environments can impact the quality of the food due to various pollutants in urban areas. (Antisari et al., 2015; Whittinghill & Rowe 2012; Specht et al. 2014; Specht & Sanyé-Mengual, 2017; Oka, Thomas, & Lavkulich, 2014; Liu et al., 2016). For example, studies have documented that urban soils often have increased levels of potentially toxic elements (PTEs) such as zinc (Zn), lead (Pb), zenite (Zi), and copper (Cu) that are of primary concern in food production in cities, mostly due to their potential long-term effects to human and animal health (Liu et al., 2016; Sung & Park, 2018). In

Italy a study found that soil-grown vegetables in urban gardens have high heavy metal content, likely from soil contamination from nearby roads (Antisari et al., 2015). However, Hu et al., (2015) surveyed vegetables grown on three rooftops in Hangzhou, China, and found low levels of lead Pb, arsenic (As), cadmium (Cd), chromium (Cr), and mercury (Hg). More so, Gelman (2014) found insignificant levels of pollution (e.g., trace metals) on five different rooftops in Helsinki when compared to market samples. In addition to potential urban environment pollutants, the use of fecal sludge on food crops has become a common practice in developing countries that practice urban agriculture. This was also found in Nanjing, China. In Ghana, where the use of fecal sludge is illegal, found that 64% of farmers improve soil fertility this way; however, while it does provide many advantages, it is not without its problems (Cofie et al., 2006). In this study, 22% of farmers using fecal sludge complained of itchy feet or foot rot (Cofie et al., 2006). It was also this sludge that caused complaints of bad odor, transport issues, and negative perceptions of consumers (Cofie et al., 2006). Scholars still insist that the debate is unsettled, calling for increased clarity on urban agriculture’s benefits and significance (Webb, 2011).

It is because of these differences that that discourse around the benefits and challenges of urban agriculture need more specification on the growing techniques and operational modes used when discussing benefits and potential drawbacks (Weidner et al., 2019). Therefore, arguments for urban agriculture can be best conceptualized within globally directed sustainability arguments, such as the critique of industrial agricultural and globalized food system instead of a focus on production capacity.

2.2.3.5 Type of urban agriculture

As previously discussed, there are several types of urban agriculture that can occur in peri- and intra- urban environments. This thesis will focus only on the ‘low-tech’ and/or non-market orientated forms of urban agriculture that can include rooftop agriculture and home gardens or leisure farms (Table 3).

Table 3. The multiple forms of urban agriculture					
Type	Organized	Location	Purpose	Management	Reference(s)

Home gardens or leisure farms	Sometimes	Backyards, Front yards, containers, vacant lots, parks	Household food production, landscaping, recreation	Individual or household	Hamilton et al., 2014 Mok et al., 2014 Gray et al., 2014 Chou, Wu, Huang, 2017
Community gardens	Yes	Vacant lots, parks	Food production, cultural reproduction, recreation	Municipality or program	Turner et al., 2011 Guitart et al., 2012
Non-profit urban farms	Yes	Vacant lots, rooftops	Education, food access, vocational training, youth and children's programming	Non-profit organization	
For-profit urban farms	Yes	Vacant lots, warehouses, client yards greenhouses,	Food production, garden installation and maintenance	For-profit company (individual or individuals)	
Institutional gardens	Yes	Schools, prisons, hospitals	Education, rehabilitation	Hired staff or volunteers	Pulighe & Lupia, 2016 Fifolt, M. 2018
Interstitial food spaces (e.g. guerilla gardening, gleaning and foraging)	Sometimes	Sidewalk/pavement strips, alleys, city forests, backyards, front yards	Reclaiming urban spaces, food production and consumption, urban greening	Individuals or group	Tracey, 2013

Source: Adapted from McClintock (2014).

Rooftop agriculture is an important form of urban agriculture, especially in developing countries, as it is “one of the greatest unused resources or capacities of cities [...], especially in denser and inner-city areas where other growing spaces may be lacking” (Dubbeling, Orsini, & Gianquinto, 2017, p.3). It is often undertaken by a range of stakeholders for various reasons and can range “from growing vegetables and herbs in bins or containers on a terrace, to more farm-like expanses that use an engineered lightweight soil applied directly on top of a soil-ready roofing surface, to using simple or more advanced hydroponic systems in the open air or in greenhouses” (Nasr, Komisar & de Zeeuw, 2017, p.9). Participants can also keep small livestock on their roofs and concerns of extreme weather (e.g., flooding) is reduced. Due to land constraints, costs and municipal laws in cities, it is often easier and more affordable to hide from municipal enforcement (Dubbeling, Orsini, & Gianquinto, 2017). In a recent study by Baudoin et al. (2017), rooftop agriculture can be highly productive and efficient in both amount of food cultivated and water use. For example, on square meter could produce a sizeable amount of fruits or vegetables—lettuce can produce 36 units every 60 days, potatoes can produce 10kg within 100 days (Baudoin et al., 2017). For example, an extensive form of rooftop gardening is used in Mexico City, Mexico, where green gardens on top of buildings will decrease energy consumption, reduce air pollution and provide a natural water reserve (Ruiz, 2012). Therefore, the various types of plants that can be grown on rooftops are seen as excellent sources of vitamins, minerals and micronutrients and play a key role in improving urban dwellers diets and reduce micro-deficiencies (Baudoin et al., 2017).

Another type of urban agriculture is community supported agriculture (CSA), which is defined as “a localized food production and consumption system, organized to share farming risks between producers and consumers, practice ecologically sensitive forms of food production, and contribute to building community and educating the shareholders about agricultural processes and realities through their participation (Feagan & Henderson, 2009, p. 203). These forms of urban agriculture, under the alternative food networks (AFN), are often undertaken by “local residents in an effort to take control of food security, social ills and environmental degradation in their communities...” (Sumner et al., 2010, p. 55).

2.2.4 Integrating urban agriculture into urban policies

The ability of urban agriculture to operate sustainably depends on the institutional environment in which it operates and includes the “social norms and rules as well as the formal laws and protocols for urban agriculture...” (Pearson et al., 2010, p.9). The challenge that remains in the Global South is to how best to integrate urban agriculture in urban planning and policy practices. Outside of physical limitations of urban agriculture (water and land), there remains several cases of ineffective policies and poor governance that undermine its long-term potential to address the various social, ecological, and economic features ascribed to urban agriculture (Padgham, Jabbour, & Dietrich, 2015). Urban food production has “shifted from being a scientific curiosity to being an urban policy issue and development tool” (Mougeot, 1999, p. 16). Food issues are not “easily circumscribed within convenient, static boundaries of one municipal district or provincial government. Just as built-up urban areas spill over administrative municipal boundaries into adjoining jurisdictions, so do food system issues transcend the multiple levels of decentralized government within the dynamic urban, peri-urban and rural space” (Teft et al., 2017 p. 45). Mougeot (2015) notes that urban agriculture seeks to integrate itself into the city in different degrees and in numerous ways and argues that while integration is largely driven by practitioners themselves, “this integration can be improved through collaboration with other urban agents and appropriate policies” (p.164). Mougeot (2015) identifies four strategies that could assist this integration - (1) the land rent of urban agriculture production; (2) the value chains of urban agriculture production; (3) the multiple functions of urban agriculture production sites; and (4) the physical connectivity of urban agriculture to production sites (p.164). However, these four integration processes depend greatly on land access which is seen as highly complex and variable when attempting to integrate urban agriculture in cities in the Global South (Mougeot, 2015 p.165). In short, strategy 1 seeks to keep the growing of crops or raising of livestock viable in the production area to which he/she have access to despite a changing urban environment. Strategy 2 sees urban producers seek to extend their opportunities for earning income beyond the sale of their produce by developing downstream products and services and encourage collaboration with other urban agents. In strategy 3 the multiple functionality of urban agriculture seeks to ensure that it contributes to the welfare of the city and develop beyond the livelihood needs of the producers. This logic is seen as the most critical for urban agriculture. Finally, the fourth strategy aims to facilitate physical

exchanges between urban agriculture sites and activities and the rest of the city—allowing urban agriculture to respond to the wide range of urban demands (Mougeot, 2015 p.177). While these four processes can help better integrate urban agriculture into the city, urban planning and management authorities must take on a greater responsibility to make these connections more efficient as the success of urban agriculture “depends on its ability to respond to the needs and demands generated by other urban activities and land use” (Mougeot, 2015, p.181).

In this chapter, issues of rapid urbanization, population growth, and an unsustainable global agri-food system have great implications for urban food systems. This has given rise to urban food strategies like urban agriculture and has highlighted the importance of considering both the (urban) food system and urban sustainability through the impacts of a globalized food system and issues of sustainability. Barthel and Isendahl (2013) found that long term implementation of urban agriculture is “...is not ‘the antithesis of the city,’ but often an integrated urban activity that contribute to the resilience of cities” (p.232). Systemic urban food strategies like urban agriculture are forging new connections between food consumers and producers across urban landscapes (Marsden & Sonnino, 2012). Therefore, without the addition of urban food strategies like urban agriculture and food policies that embody a sustainable food system, it will be impossible to feed the entire world population while simultaneously guaranteeing the protection and preservation of natural resources for future generations (Miccoli et al., 2016). Emphasis from the literature on both urban food systems (e.g. Sonnino & Morgan, 2009; Pothukuchi & Kaufman, 1999; McClintock, 2010;2013;2014) and urban agriculture (e.g. Dubbeling, 2013; Dubbeling et al., 2015; Dubbeling & Santandreu, 2003; FAO, 2008, 2017; Mougeot, 2000; Miccoli et al., 2016) is placed on how sustainability of urban areas is deeply connected to the food system. However, discussion in the literature has largely neglected urban sustainability and urban development within the urban agriculture discourse in both the Global North and South, but rather focuses on urban food systems. Considerations of urban agriculture and its potential benefits to the urban food system need to be considered and integrated into policy more effectively to truly see its potential benefits. Therefore, “emerging urban food strategies are necessary to fully capture the potential of fast-growing cities in creating or recreating more sustainable social, economic and environmental linkages with their surrounding regions” (Sonnino, 2009, p.425). Chapter 3 discusses China’s urbanization path and social and environmental impacts of this as well as how urban agriculture is taking place.

Chapter 3: The tensions of rapid urbanization and the transition to a modern agri-food system in China

In order to understand the modes of and motivations behind intra-urban agriculture in China, it is important to understand the elements affecting the country's urban food system. As an emerging economy, China is still addressing many historic environmental issues due to transitions in its economy that have impacted its food system, in particular unsustainable industrial food production strategies intended to increase food production. The food system in China has been further strained by rapid urbanization, the associated increase in more demanding diets (e.g. meat consumption) from urban citizen, and various urban and rural policies (e.g., hukou) that have caused several ongoing social issues and created an urban rural divide. It is therefore clear that as China becomes more urban, cities will increasingly play a role in delivering sustainable ways of providing essential foods and important for the urban food system. Therefore, this chapter will discuss the process behind China's urbanization path from the early 20th century to today and describe China's historic agriculture system and current food system. This chapter concludes with a discussion on the different perspectives on urban agriculture in China identified within current literature.

3.1 China's 'incomplete' urbanization path and food concerns

For the first time in China's history, the urban population has exceeded the rural population (UN, 2015) (Table 4). Additionally, it is expected that there will be more Chinese moving to cities over the next 12 years than the current population of the United States (Peng, 2011). The rate of urbanization or increase in the proportion of urban population over time (UNICEF, 2012), in China has increased rapidly from 17.9 per cent in 1978 to 53.7 per cent in 2013 (National Bureau of Statistics, 2014 in Hu & Chen, 2015, p.35). Bai et al. (2014) emphasize that urbanization is often seen as an important government goal, a component to modernization and economic growth, and a foreseeable trend in human social development in China. China has seen great success in urbanization by avoiding many of pitfalls experienced in other developing countries (e.g. in Africa, Asia, and South America) (Guan, Wei, Lu, Dai & Su, 2018, p.97). Urbanization has already seen vast tracts of agricultural and their associated villages absorbed into urban areas. This development in economic terms will outbid agriculture for developable land, urban and rural planners should be concerned with the social and

environmental costs of this development, as it is vital to ensure an adequate and sustainable food supply (Yang et al., 2010).

Table 4. The national urbanization ratio in China 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
National urbanization ratio (%)	42.99	44.34	45.89	46.99	48.34	49.95	51.27	52.57	53.73
Source: Zhu (2016, p.1), from Statistic yearbook of China 2014.									

During the transition to a market economy over the last 30 years, China has undergone profound changes such as economic reform in 1978 and becoming a major component of the global economy today. However, these changes have created several social, economic, and environmental challenges including the country’s need to continue to feed its growing urban populations. These challenges are largely due to the Chinese government’s push for rural-urban migration, placing increasing strain on China’s urban food system (Chen, Gu, & Wu, 2006; Jourdan & Goodman, 2014; Lang & Miao, 2013; Smart & Smart, 2001). The “China Dream” has been called the “Urban Dream” (Taylor, 2015) and has seen the urbanization process uniquely transform in a short period of time since economic reform and opening up (Chen, Liu, & Tao, 2013; Long et al., 2012; Wang et al., 2015). While this transformation is considered by some to be a remarkable achievement, the social, economic, and environmental challenges associated with it have drawn great attention (Zhang et al., 2007). In particular, increasing attention has been placed on the impact of China’s urbanization on environmental degradation (Zhang et al., 2007), urban housing problems (Mak et al., 2007), farmland loss (Chen, 2007; Li, Chen, Wang, & Liu, 2014), food security (FORHEAD, 2014), and food scandals (Li Phau, Lu, & Teah, 2017; Yan, 2012; Zhang et al., 2016). For example, Guan et al. (2018) believe China’s urbanization path has been characterized by “four highlights and four ignores” (p.108). The highlights include urbanization speed, construction scale, economic growth, and resources exploitation while the ignores include urbanization quality, management level, social development, and environmental protection (Guan et al., 2018). Chan (2010) describes China’s urbanization process both pre-reform and during reform as an ‘incomplete’ one where industrialization is promoted but indirect costs, such as urbanization, are limited. In the pre-reform era, China’s ‘incomplete’ urbanization

was characterized by industry at the expense of agriculture, priority to investment over consumption, and differential treatment of urban and rural population (e.g. *hukou*) (Chan, 2010; Lin et al., 1996). The process of urbanization in China is complex and it, and the urban system have been greatly influenced by China's economic strategy and administrative jurisdictional systems (Chan, 2010). China's food, social and environmental challenges are best described through its transitions from a planned economy to a market economy or pre-reform, reform and post-reform eras.

3.1.1 The implications of the pre-reform and reform eras on China's food supply

Through its dynasties, China has focused on food supply for its growing population (Smil, 2004). The People's Republic of China (PRC) was first established in 1949 and utilized a Soviet model to establish its economic structures and policies and develop the First Five Year Plan (1953-1957) that drove urbanization through various new construction projects (Smil, 2004). The Soviet planned economy's main objective was a high rate of economic growth, with emphasis on industrial development at the expense of agriculture (Smil, 2004). In China, during the pre-reform era, government control over industry was increased and the creation of increasingly large and socialized collective units improved the efficiency of farming, similar to Soviet regionalization and planning theories (Smil, 2004). The First Five Year Plan in China was quite successful, and created a solid industrial foundation; however, in 1958, food production began to suffer as the states focused on steel production, which left little labour for agriculture (Smil, 2004). Concerns over imbalances between industry and agriculture caught the attention of Mao Zedong (Smil, 2004). Mao became leader in 1943 and it was not until 1958 Mao that while under his rule, the "Great Leap Forward" era began.

Under a planned economy, Mao's administration set to push China into modernity through rapid industrialization (Smil, 2004). As part of this plan, rural and urban areas became two distinct districts. Each district had its own responsibilities to ensure China's goal of rapid economic development (Chan, 2009). The removal of agriculture from urban regions began during this period to make room for the epicenters of industry in cities, while the rural areas were considered the provider of raw materials and cheap or food labour production (Chan, 2014). Mao's ambitious vision to 'catch up' to the economies of the United States and the United Kingdom were seen as a success, but Mao was not well-versed in modern economies and his

vision of a modern economy was too narrowly focused on steel production (Smil, 2004). While China made great economic achievements under the planned economy, the disadvantages of this model, including the low efficiency of labor, the waste of production, a lack of vitality of the economy, and low motivation of laborers, began to show (Wang, 2017). As a result, the Chinese experienced low standards of living, where people in rural areas in particular were in poverty, lacked food, and hindered the progress of China's economy and society (Wang, 2017). In 1959, China experienced a three-year famine unlike any before, which saw estimates of 30 million people dying due to lack of access to food (Smil, 2004). This tragedy is seen by many as manmade (or Mao-made) (Smil, 2004).

Taking power after Mao's death in 1976, Deng Xiaoping proposed a new development model in response to the flaws of the planned economy, beginning the reform era. Deng's new model was intended to not only accelerate China's economic growth but also enhance the confidence of the Chinese to establish a socialist country—the market economy (Wang, 2017). Deng knew that food production “had to be drastically reformed, hence his first step toward modernization was a *de facto* privatization of farming” (Smil, 2004, p.72). The transition from a planned economy to an increasingly market economy furthered urbanization and economic gains, but at the expense of many social, environmental, and equity issues. Fear from the Chinese people that a market economy would lead to a more ‘capitalist’ society, Deng, in 1992, emphasized that the ‘reform and opening-up’ would be slow in an effort to avoid capitalism (Wang, 2017). After 30 years of implementation, China's economic system had successfully shifted to a market economy, but not without its issues. Many of the administrative functions of the planned economy did not match with the new market economy in China and as a result, there were many ongoing issues in employment, housing, healthcare, and other aspects of worker welfare (Wang, 2017).

3.1.1.1 Policy impacts to land, food, and people

The division of rural and urban under the Mao administration created many social issues in China and further divided these two populations, increasing the urban-rural divide that persists today. According to Christiansen (2009), rural people in China have struggled to assimilate into urban regions, largely due to the loss of their land to urban expansion and government policy which classified Chinese citizens as either rural or urban. Introduced in the 1950s, the *hukou*

system labelled households as either agricultural or non-agricultural (Si et al., 2016), which limited the mobility of residents between the rural and urban regions (Chan, 2009; Miller, 2012). *Hukou* is an important element in China's rural to urban migration as it is often seen as the country's domestic visa system and is the legal status registration that specifies the basic demographic information of all household members (Si et al., 2016, p.5). Those with agricultural status, the rural *hukou*, were typically rural residents and either worked on farms or in the rural industrial areas (Miller, 2012). On the other hand, those with non-agricultural status, the urban *hukou*, lived and worked in the urban regions (Chan, 2009). Although the *hukou* system worked for a short while, it began to fall apart in 1958 when the state started moving rural workers into more steel production industries and left little labour for agriculture (Smil, 2004). The movement of rural workers to industrial steel production jobs significantly impacted China's food supply (Cheng & Selden, 1994; Smil, 2004). Consequently, urban workers were laid off and forced back to rural areas in an effort to save grain rations, forcing the country into famine (Cheng & Selden, 1994; Miller, 2012). Therefore, China implemented measures to address food production including a series of land conservation policies, agricultural subsidies, and price controls to ensure agriculture could meet the demand of the growing urban population (Horowitz & Liu, 2017).

The *hukou* system restricted free movement both inside and outside of cities and meant that migrants living in cities without the urban *hukou* status were considered temporary residents and were institutionally discriminated against (Hao & Tang, 2015). Rural to urban migrants without urban *hukou* status were ineligible for many social welfare benefits such as medical care and educational opportunities (Swider, 2015). Not having urban *hukou* status thus strongly discouraged rural migrants from permanently migrating to and settling in the city (Hu, Xu & Chen, 2011). Recently, Hao & Tang (2015) highlight that even if given the opportunity, few rural migrants were willing to convert their *hukou* from rural to urban because they would lose the right to their rural lands, which contradicts a common assumption that rural migrants desire an urban *hukou* (Hao & Tang, 2015). Despite changes in leadership and policy over the years, the *hukou* has remained. In fact, in 2005, following the implementation of China's 10th Five-Year Development Plan, management of the rural to urban migration in China was loosened, resulting in a rapid rise in temporary migrants without urban *hukou* status residing in cities and increasing land-related conflicts (Si et al., 2016; Zhang & Wang, 2010; Zhao, 2009). Zhang and Wang

(2010) and Zhao (2009) both emphasize that rural farmers feel increasingly disrespected and discriminated against under the current land compensation system (Zhang & Wang, 2010; Zhao, 2009). While there are plans to remove the *hukou* system, Horowitz and Liu (2017) estimate that 230 million migrants are working in Chinese cities without permanent or urban *hukou* status, thus creating a large urban population with farming skills and no land to farm (Horowitz & Liu, 2017).

The distinction between urban and rural land has important implications not only for agriculture but the development of urban agriculture. Rapid urban expansion in China has converted large amounts of rural land into urban use, creating a huge pool of landless farmers. The increasing numbers of landless farmers have aggravated problems, such as unemployment, urban poverty and social inequality, which severely hinders China from achieving sustainable development (Tang, Hao, & Huang, 2016). Changing from rural *hukou* to urban *hukou* status requires giving up the right to one's land and therefore, landless farmers often experience dramatic changes in living conditions, social security engagement, re-employment, social networks, and lifestyle transitions following land acquisition, impacting their quality of life (Tang et al., 2016). Although compensation measures for rural land were implemented through the Land Management Law, policies varied by location because of different regional development levels (Hao & Tang, 2015) and consequently, not everyone was treated equally when giving up their land. For example, the compensation scheme in South Jiangsu is typically more generous than in North Jiangsu because of the higher revenue of local land sales and more sufficient financial resources in South Jiangsu (Hao & Tang, 2015).

The *Land Management Law* introduced in 1986, and amended in 1998, includes compensation fees for acquired land, resettlement subsidies for displaced farmers, and compensation for destroyed property (e.g., buildings and crops) when land was acquired (Tang, Hao & Huang, 2016). In its early stages, this law stipulated compensation for farmland to be six to ten times the average annual agricultural revenue generated from the acquired land in the three years prior to acquisition and resettlement subsidies to be four to six times this amount (Tang, Hao & Huang, 2016). The amendment in 1998 saw compensation raised to a maximum of 30 times, however, the ambiguity in the criteria for what multiplier one was eligible for left room for potential corruption and grievances for affected farmers (Chan, 2006). In 2013,

compensations guidelines were again adjusted, resulting in no cap on how much could be paid for the land and new national guidelines encouraging greater compensations schemes that include subsidized housing, social insurance, and job training (Tang, Hao, & Huang, 2016). However, with local governments often overlooking the basic economic and social interests of farmers, many are left under-compensated and living in poor condition (Sargeson, 2013). This is because urban land expansion is often seen as a source of revenue for municipalities (Lang & Miao, 2013) and therefore many of them seek opportunities to continue urban expansion through rural land acquisition. In fact, Seto et al. (2011) emphasize that approximately half of the annual growth in China's GDP per capita is related to the revenue acquired from urban land expansion. Farmers are also often left out of any decision making during their transition, leaving their rights and interests out of the process (Deng & Huang, 2004; Yep, 2013). In addition to the challenges arising from the *Land Management Law*, China's *Urban Rural Integration Policy* further exacerbated the divide between urban and rural populations. Introduced in early 2000s, the *Urban Rural Integration Policy* aimed to make the city more like a city and its rural area more like the countryside (Lei, 2015). The *Urban Rural Integration Policy* integrated collectively owned peri-urban villages into state-owned urban development land, reflecting China's larger economic transition strategy away from agriculture to a more urban migrant worker industry (Schneider, 2015).

More recently, policies have been put in place to control rapid urbanization and prevent the fragmentation of farmland. For example, in 2007, China, under the country's *National General Land Use Planning*, introduced a 'warning line' policy which required the minimum of amount of farmland in the country to be 120 million hectares (Cheng et al., 2015). The country also strengthened its 1998 *Basic Farmland Protection Regulation* in 2008 (Cheng et al., 2015). In an analysis of the farmland in South Jiangsu Province (1958-2010), Cheng et al., (2015) found that despite rapid development from economic reform and urbanization farmland in this area has begun to stabilize. Farmland fragmentation was slow from 1985-1995 but saw a rapid increase in 1995 to 2008 where it slowed and transitions to a stable amount of farmland. With approximately 20 percent of the world's population and 10 percent of the world's arable land, China is at a tipping point for furthering its agricultural development and sustainable food system. Land-centered urban development has resulted in 'incomplete urbanization' and in many ways unsustainable cities, causing increasing urban sprawl, intensified food production, rural-urban

migration, and consequent widespread degradation of agricultural lands and resources (Guan et al., 2018; Lang & Miao, 2013; Zhou, 2014). In 2014, China implemented the *New Urbanization Plan 2014-2020*, in an attempt to address some of these issues and to shift focus from economic

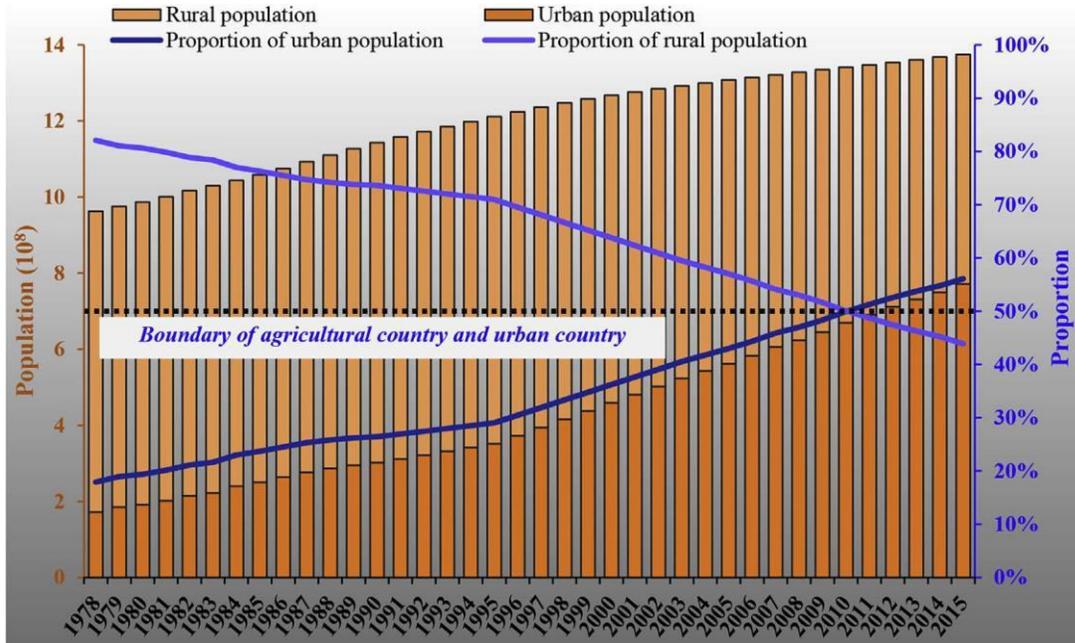


Figure 6. Urbanization level, and urban and rural population in China from 1978 to 2015. Note: The data comes from China Statistical Yearbook (NBSC, 2016). Source: Guan et al, (2018, p.98).

land development to a more sustainable ‘people-centered’ approach “...paying attention to welfare and well-being” to repair a growing urban-rural divide (Bai et al., 2014, p.158). However, Li et al. (2016) argue this plan still largely remains an economic growth strategy where the “state continues to take the interventionist approach that [has] proven problematic in the past” (p. 516). Therefore, until rural-urban migration issues are resolved, urbanization will remain unsustainable in China and will continue to induce social unrest (Guan et al., 2018), as China has already begun to become a dominantly urban society (see Figure 6).

Lastly, China has utilized policies that center around methods of self-sufficiency rather than dependence on importing of foods. In the 1990s, China began to recognize the benefits of “relocalizing” its food systems to reduce food supply vulnerabilities and began to regionalize its food system (Si & Scott, 2016). Food system planning was now coordinated by provincial governors to coordinate grain supplies and city mayors to coordinate vegetable supply for local areas (Si & Scott, 2016). This allowed a city like Nanjing to supply 44% of its own grain; 20%

of its pork; 10% of fisheries; 30% of poultry; and 15% of eggs (Lang & Miao, 2013). This program has seen success in supplying urban food systems with fresh vegetables and is known as the *Vegetable Basket* program. The *Vegetable Basket* Program (*cailanzi gongcheng*) and is perhaps the most reflective use of ‘urban agriculture’ in early Chinese policy. Introduced in the 1980s, the *Vegetable Basket* program aimed to regionalize food production networks and manage supply-issues for large and rapidly-growing cities by streamlining urban production and distribution networks, introducing more agricultural technologies, and ensuring quality and safety in food production practices (Gu, 2009). This program was intensified from the early 90s to the 2000s and eventually established a nationwide supply-distribution network (Gu, 2009). This program has seen success in China and has created a strong regional foodsheds (Cai et al., 2012; Lang & Miao, 2013). In fact, Lang & Miao (2013) estimate that vegetables consumed from regional foodsheds were 40% in Nanjing (40%), 50% in Shanghai, and 70% in Chengdu. Where Cai et al. (2012) note that through ‘urban agriculture’ Minhang, one of Shanghai’s urban districts, has also seen great success in not only supplying the region with vegetables but lessening the urban rural divide through increased income for its 77,000 farmers (Cai et al., 2012). Yet, conflicting evidence exists to the success of the *Vegetable Basket* program, as consumers are increasingly concerned about food quality and safety, seen in many of the food scandals in China (Gu, 2009).

3.2 Food issues in China

For decades, the goal of China’s food policy has been to secure affordable food for its growing population, largely as a result of the famine experienced in the ‘Great Leap Forward’ (Yang, 2012). In the early stages of reform, the availability of food was uneven for the Chinese, where shoppers struggled to provide families with sufficient variety in diets, by the 2000s food supplies were abundant (Klein, 2009). However, this abundance of food supply for China resulted in growing consumption of animal foods, fat, sugar and salt leading to several health issues due to over-nutrition (Zhang et al., 2008). Despite having relatively high levels of household food security in urban China, there is a lack of trust in food quality (Wang et al., 2015; Zhang et al., 2016). Rapid urbanization and late industrialization have left China with several challenges (e.g. loss of agriculture land and farmers) that have increased pressure on its food system (Si & Scott, 2016). The Chinese state continues to predominantly incentivize and

subsidize industrial agricultural and to move away from a dominantly smallholder agriculture system (Schneider, 2014; Mol, 2006). This has caused a broad integration of small farmers into modern food supply chains and the widespread adoption of industrial agriculture technologies (Yan & Chen, 2015).

3.2.1 Food safety

Largely due to the accelerated modernization of farming over the past three decades, China has increased chemical inputs and energy, and have reduced organic fertilizers (Si & Scott, 2016). While China has proven to be relatively successful at securing food to feed its large population, food safety remains a significant issue largely because of a historic “intensified usage of chemicals and fertilizers” to increase production (Krul & Ho, 2017, p.3). In 2008, China faced its largest food safety scandal where more than 50,000 infants and children were hospitalized due to the illegal addition of melamine to milk and infant formula (Chen, 2009). Food production is an absolute priority in China, as agriculture is often viewed as another means by which the state can “increase output [of food] by increasing input [of chemicals and fertilizers]” (Christiansen, 2009, p. 550). This intensified production has come at the expense of both environmental and human health and undermining consumer trust (Cheng, 2012; Li et al., 2017; Wu et al., 2011). Food safety remains “a paramount challenge to China’s... urban areas” (Krul & Ho, 2017, p.3). Liu et al. (2013) identified five key dimensions that influence consumers’ need for safe food. These include food safety concerns, health consciousness, quality consciousness, environmental concerns, and animal welfare (Liu, Pieniak & Verbeke, 2018). In a household survey done in Nanjing, China, the average house was found to have a low ‘Household Food Insecurity Access Scale’ score (0.6109) but 74% of those surveyed were worried that they might not be able to get safe food everyday—creating a “trust deficit” (Si & Scott, 2016). Yan (2012) believes that China “has been affected more by food-safety scares” than any other place in the world (p.706). As a result, there has been several studies by scholars on food safety that emphasize its importance to Chinese residents, and how current monitoring lacks structure and reliability (Gale, 2011; Li Phau, Lu, & Teah, 2017; Yan, 2012; Zhang et al., 2016).

China’s shortcomings in the public and private regulation of food safety has caused consumers to turn to alternatives (Shi et al., 2011) such as urban agriculture (Ding, Liu, & Ravenscroft, 2018). As discussed in Chapter 2, current interest in urban agriculture is growing

across the world, including in China (Si et al., 2014; Spilkova, 2017; Krul & Ho, 2017). Unlike the Global North, where motivations behind supporting alternative forms of agriculture, like urban agriculture, often include community building, social justice, engaging in ecological practices, or education (Mok et al., 2014; Thornton, 2018), Liu et al. (2013), Yu et al. (2014) and Klein (2009) found that support for alternatives forms of agriculture often stemmed from the desire to gain access to safer food and the failure of large scale (organic and conventional) agriculture to address food safety concerns. In China, concerns surrounding the safety of food have led to the so-called ‘quality turn’ of consumers (Goodman et al. 2012; Si et al., 2015). A study done by Veeck et al., (2010) found that Chinese consumers “associate safe food with food that is fresh, natural, locally grown, organic, and non-processed choice anxiety in consumers...[and] many Chinese consumers prefer to buy directly from farmers or purchase locally grown food, both for quality and safety assurances, most are also appreciative of the vastly expanded food options attending improved distribution systems and loosened import regulations” (p.233). Even so, consumers still have significant mistrust (Si et al., 2015), unlike in the Global North where trust between farmers and consumers traditionally exists. This mistrust is predicated on the idea that China’s food system has been characterized by a lack of public confidence in the enforcement of organic or green food standards (Scott et al., 2014) and amplified by continuing media scandals creating strong caution on the part of consumers (Veeck et al., 2010; Zhang et al., 2016). Byrne (2002) identifies that recovering consumer trust is the major challenge for companies in China after the food safety scandal. Therefore, many Chinese people are seeking alternatives food sources like urban agriculture because of a lack of trust with the state-led food system (Scott et al., 2014; Veeck et al., 2010).

3.2.2 Changing diets

In addition to food safety issues, changing diets as a result of an increasing urban middle class poses a considerable challenge to Chinese food security. As people move from rural, agrarian lifestyles to urban areas, their incomes and consumption tend to rise (Deutsch et al., 2013, p. 506) With increased disposable income, urban consumers now have more money available to spend on food, leading to rising levels of consumption and greater demands around food diversity and nutrition, especially with a growing awareness of health and environmental issues associated with food production in China (Shi et al., 2011; Veeck et al., 2010). The diets of the growing Chinese population have shifted dramatically, with the inclusion of more meat,

dairy, and vegetables and less reliance on the traditional staple grains of previous generations (Christiansen, 2009).

3.3 China's growing alternative food network

China's well documented pollution and environmental degradation challenges, alongside increasing integration within global institutional and market networks, have resulted in increasing emphasis on ecological goals within its development agenda. The Chinese government's agricultural policy underscores yield, quality and technology as key elements, as it seeks to "increase the output of high-quality products based on green and innovative production" (Ministry of Agriculture and Rural Affairs, 2017). Current agricultural development has narrowly emphasized industrialization processes, with the state predominantly incentivizing and subsidizing capitalistic agricultural firms rather than smallholder agriculture (Schneider, 2014). What this has caused is a broad integration of small farmers into modern food supply chains and the widespread adoption of industrial agriculture technologies (Yan & Chen, 2015). However, the concern of food safety stems from a long history of an industrialized food system in China.

These emerging issues and dissatisfaction with the conventional food system, most notably food safety, has motivated China's civil society to initiate new approaches to how food systems should be organized (Scott, Si, Schumilas, & Chen, 2014). Alternative food networks (AFNs) provide consumers access to safe, more sustainably produced food (Zhang et al., 2016). The market for 'alternative' food, such as home-grown food (Si et al., 2015), has grown rapidly over the last five years (Zhou et al., 2013)). Currently AFNs in China are local and small-scale and serve a relatively small group of consumers. This thesis aims to better understand these consumers by exploring how urban agriculture functions as an 'alternative' food source in Chinese cities. However, while empirically, small-scale farms and alternative food networks in urban China are following a developmental path that is unique (Ding, Liu, & Ravenscroft, 2018), they also replicate many of the privilege and power structures of alternative food networks seen in the Global North (Schneider, 2014; Schumilas & Scott, 2016). Schumilas and Scott (2016) suggest that the Chinese approach to food networks has fostered a new type of reflexive practice in which individuals can engage in relatively safe forms of activism that offer greater control over the food that they eat. However, research on the informal, small-scale intra-urban agriculture has been lacking.

Policies surrounding this informal economy of alternative food networks have shifted dramatically over time in China. After 1949, the Chinese government put in place strict laws that were aimed at ending all forms of informal economic activity (Dai et al., 2019). However, two decades later these rules had been lifted during market reform and while alternative food networks contributed greatly to economic development, they were restricted under national hygienic-city campaigns (Dai et al., 2019). In Dai et al.'s (2019) discussion on the informal economy for street vendors, some of who were urban farmers, the government seems to “neglect historical processes and the socioeconomic realities of specific places (p.9). Dai et al. (2019) emphasize that the implementation of a ‘soft’ approach to governance of the informal economy has resulted in policy on the legality of these actions being administered in a wide variety of ways in Nanjing. Dai et al. (2019) propose to call this “soft” approach “compensatory governance” (Dai et al., 2019, p.9), which emphasizes this rationale. This thesis found similarities to the discrepancies that this study found in laws and the governing of intra-urban agriculture in Nanjing. The government acts this way because there is an “...obligation of compensation” that “is rooted in both the injustice of rapid urbanization, and the local government’s political duty to keep residents from complaining to upper levels of government.” (Dai et al., 2019, pg.9). This has certainly impacted the function of informal economies like urban agriculture. The following section examines the current gap in intra-urban agriculture and clarifies the meaning of ‘urban agriculture’ within a Chinese context.

3.4 Urban agriculture discourse in China

Despite growing evidence of urban agriculture’s existence in China (Si & Zhong, 2018; Ding et al., 2018; Horowitz & Liu, 2017; Krul & Ho, 2017), there is little empirical documentation on the scope of urban agriculture’s impact on both participants and the urban environment. Rather, China has seen extensive research on its growing Alternative Food Networks (AFN), as a growing educated middle class continue to engage in small scale ecological farming both as a source of safe food and as a place for “...nascent activists deploying grassroots community organizing strategies” (Schumilas & Scott, 2016, p.302). Given the highly contextual nature of urban agriculture, there are relatively few comprehensive examples in China to draw from making the definition and understanding of urban agriculture in China unclear.

This section will outline the current understanding of urban agriculture, and more specifically attempt to distinguish peri- and intra- urban agriculture in a Chinese context.

3.4.1 Defining urban agriculture in China

The concept of urban agriculture was believed to be first introduced as a way of addressing food security and safety issues, and production challenges in China (Cai, 2010; Cai & Lao, 2004 – in Zhu, 2016). It is because of this that China planned to develop urban agriculture that fits within the Chinese context (Yu et al., 1998- in Zhu, 2016) and has led to a separation in definitions and motivations between China and Western understandings. In the early 2000s, urban agriculture was popularized by scholars from the Academy of Social Sciences in Beijing and Shanghai when talking about peri-urban projects that were meant to “modernize” agriculture and improve its ‘multi-functionality’ (Horowitz & Liu, 2017). This popularity resulted in dozens of cities across China developing a ‘modern urban agriculture plan’ that was loosely based on the same general formula as the peri-urban projects: “ornamental landscaping in the intra-urban area, followed by specialty crop production zones, agro-tourism, high-tech ‘demonstration’ parks in the peri-urban areas, and food-processing facilities in the rural hinterlands” (Horowitz & Liu, 2017, p.209). In Zhu’s (2016) review of urban agriculture in China there are two key points relative to this thesis regarding how China views urban agriculture.

First, the interpretation of urban agriculture is broader than in the West (Zhu, 2016). While traditional definitions of urban agriculture in the West have focused on spatial perspectives (Mougeot, 2000), in China urban agriculture also considers the economic and temporal perspectives (Zhu, 2016). This is likely because of the semantics around how urban agriculture is defined. In China, both intra and peri-urban agriculture are encompassed by the term *dushi nongye* (Horowitz & Liu, 2017). This distinction between peri- and intra- does not exist in China due to how urban is defined. In China, city or *shi* is an administrative unit that may not be entirely ‘urban’ (Horowitz & Liu, 2017) as it refers to the municipality. These administrative units also included prefecture-level cities and small country-level cities and therefore can contain a mix of urban land (owned by the state) and rural land (owned by a village council) (Horowitz & Liu, 2017). Zhu (2016) explains that urban agriculture in China is often considered ‘modern’ urban agriculture, due to its required “...intensive production, because of

limited land and water resources” and therefore “needs the support from agricultural facilities, mechanization, and high technology to increase productive urban agriculture in China” (p.37).

Urban agriculture has seen increased attention in later years. In 2006, Beijing Municipal Government integrated urban agriculture into its 11th Five-Year (2006–2010) Plan to increase the city’s food self-sufficiency ratio from 25 to 35 percent. This plan divides the city by agricultural zone (Teft et al., 2017). Leading from the build-up of ‘modern urban agriculture’, the Ministry of Agriculture in 2012 announced the development of ‘urban modern agriculture’ (*dushi xiandai nongye*) is of ‘extremely high significance’ (Ministry of Agriculture, 2012). A summary of this is found in Table 5 which demonstrates that many of the Ministry of Agriculture’s objectives align with the modes and motivations found within intra-urban agriculture including stabilizing urban food supplies, improving the natural and recreational environment for urban residents (Horowitz & Lui, 2017). However, the 5-year plan still does not mention intra-urban agriculture production in any text within the policy (Horowitz & Liu, 2017). Interestingly, in a translation of the most recent 13th Five Year Plan (2016-2020), the term ‘modern urban agriculture’ appears to be missing but does mention plans to:

“... promote the development of agricultural production and value chains, create different types of linkages between the interests of different entities, and foster entities that integrate primary, secondary, and tertiary industry operations as well as help develop new kinds of such operations in order to open up more channels through which rural residents can increase their incomes and benefit more from the resultant value-added... We will see that agriculture takes on more functions, promote close cooperation between agriculture on the one hand and leisure, tourism, education, culture, and health on the other, and develop new forms of agricultural business such as agri-tourism, agricultural experiences, and creative agriculture.” (Compilation and Translation Bureau, n.d, p.50).

This outlook on agriculture is similar to how ‘modern urban agriculture’ was perceived and remains relatable to the benefits of the multifunctionality of urban agriculture, hinting towards continued integration of urban agriculture in China. However, this understanding is emphasizing the rural and peri-urban agriculture and disregards the potential or existence of intra-urban agriculture. Moreover, it remains unclear at this time what that could look like for small-scale intra urban agriculture, as this latest Five-Year Plan emphasizes the technological side of modernizing agriculture in China. For example, this plan talks about promoting

‘mechanization’ of agriculture and hopes to achieve a mechanization of agriculture of 70%, while also emphasizing the use of “intelligent agriculture” (Compilation and Translation Bureau, n.d, p.58). As a result, intra-urban agriculture does not get the same attention, subsidies, or policy supports as is offered for its peri-urban counterpart. Aiming (2017) sees this drive for modernization as a result ‘agricultural science and technology innovation’ that has “advanced the structural reform of the agricultural supply side and vigorously promoted the ‘efficient production’” (Aiming, 2017). Interestingly, Aiming (2017) notes that the use of ‘urban modern agriculture’ will change the traditional image of ‘difficult and dirty’, and ‘low-tech and low-yield’ agriculture due to its associated product safety, resource conservation, environmental friendliness, and diversified functions and has promoted the state’s agenda of modern agriculture (Aiming, 2017; Glaros, 2018). This reinforces the State’s modernization plans and focus on peri-urban agriculture development, as opposed to intra-urban agriculture.

Table 5. The Ministry of Agriculture’s views on the rapid development of urban modern agriculture

Importance	Optimize the layout of agricultural production
	Guarantee the stable supply of fresh agricultural products for medium-sized and large cities, and guarantee a market for domestically produced agricultural products
	Improve the natural environment for city residents
	Improve the incomes of people employed in the agricultural sector
	Support the coordinated development of industrialization, urbanization and agricultural
Goals	Realize agricultural modernization
	Stabilize national grain production
	Help with the construction of the Vegetable Basket Program
	Strengthen the quality of food safety monitoring
	Actively develop recreational agriculture and ecological agriculture
	Spur development related to the food industry, including food processing and services
	Improve information technologies associated with the production and distribution of urban
Measures to adopt	Strengthen the leadership roles of municipal officials in implementing the Vegetable Basket Program
	Encourage innovation and the exploration of ‘model’ modern urban agricultural forms
	Strengthen policy and financial supports to improve safeguards and subsidies for farmers and agricultural enterprises
	Improve the flow of information regarding urban agriculture production, consumption, and the different forms of modern urban agriculture

emerging, and pay greater attention to theoretical research that can help spur innovations and guide policies regarding the development of modern urban agriculture

Source: Horowitz & Liu (2017) from The Ministry of Agriculture (2012, p.210)

Lastly, is that urban agriculture practices mainly occur in ‘suburban’ or peri-urban areas instead of ‘inner’ or intra-urban areas (Zhu, 2016). Similarly, Horowitz & Liu (2017) note that current urban agriculture scholarship in China has focused on the peri-urban component (e.g., articles in Chinese - Miao, 2003; Zhou & Yu, 2003; Cai *et al.*, 2004; Ning *et al.*, 2006; Zhang *et al.*, 2009 – as seen in Horowitz & Liu, 2017; Yang *et al.*, 2010). Zhu (2016) notes that this focus could be the result of China being in a rapid developmental state, which “leads to accelerated urban development, rapid urban sprawl, and vague urban boundar[ies] (UAE2, 2016)” (p.38). As a result of these uncertainties and risks urban agriculture remains at further periphery points around cities. Zhu does make mention of intra-urban agriculture and believes it to be initiated by “...individual hobbies or interests in China” and therefore is illegal in some instances in China (Zhu, 2016, p.38). However, the government’s position on intra-urban agriculture is vague and therefore their attitude remains neutral, without supporting nor opposing it (Zhu, 2016). While there has been an increasing interest in intra-urban agriculture from urban planners and policy makers in the Global North, particularly in North America (Thibert, 2012; Morgan, 2013), urban agriculture in China has largely been overlooked and remains at the literal and figurative periphery of its urban world (Horowitz & Liu, 2017). What remains of intra-urban agriculture scholarship in China, by Western definitions, focuses more on case studies of the Global North (e.g., articles in Chinese - Cai *et al.*, 2004; Zhang and Sun, 2011; Gao, 2012; Yi, 2012 – as seen in Horowitz & Liu, 2017). It is important when applying the definitions of urban agriculture within a Chinese context to be aware of these differences and ensure clarity while conducting future research. Therefore, this study will utilize the Western definition of intra-urban agriculture and its integration into the city to address a gap in the research.

3.4.2 Current urban agriculture in China

Currently, there is limited research on the intra-urban agriculture in China. Horowitz and Liu’s (2017) case study on Wuhan is the only accessible empirical case-study on intra-urban agriculture in a Chinese city. Their findings suggest that intra-urban agriculture remains largely an informal practice by older working class in various locations around the city (Horowitz &

Liu, 2017). Those interviewed were found to grow primarily for ‘self-provisioning’ with limited number of growers going to market (Horowitz & Liu, 2017). They also observed a growing number of middle-class families growing around residential complexes and participants were grew for “...freshness, food safety and recreation” (Horowitz & Liu, 2017, p.216). In 2015 the Hungry Cities Partnership (HCP) did a citywide survey of 1200 households in Nanjing and found that one in five households were engaged with urban agriculture in the city (Si & Zhong, 2018). In addition, this survey found that 79 percent of households that grew their own food were considered ‘food secure’ (Si & Zhong, 2018). This challenges many commonly held assumptions about urban agriculture in the Global South as being primarily an activity of the poor and those who suffer from food insecurities. Liang et al. (2019) study on peri-urban production in Beijing offers a unique insight into the sustainability of peri-urban forms of agriculture compared to conventional forms and its importance to small-holder farmers. This study found that peri-urban agriculture does have room for improvement, but it is stressed peri-urban agriculture zones are of critical importance to cities like Beijing (Liang et al., 2019). Literature on peri-urban agriculture is more prominent but remains limited to technical analysis. For example, Yang et al. (2010) analyses on peri-urban tourism identified a demand-supply relationship between urban and rural areas. Highlighting the importance of the multifunctionality of urban agriculture, albeit in peri-urban regions in China, emphasize its importance in the wider economic, environmental and social benefits that create opportunities to integrate sustainable urban-rural development (Yang et al., 2010).

The remaining literature focuses on AFNs as discussed earlier (e.g., Scott et al., 2014; Schumilas & Scott, 2016; Si & Scott, 2016b), but Krul & Hol’s (2017) empirical survey study on community supported agricultures (CSA’s) and its benefits to the urban food system are worth noting for this thesis. Krul and Hol (2017) found that food through alternative forms like CSAs add value to the food system in China. They further emphasize that CSAs are not only a good approach to ongoing food safety issues, but they can re-establish consumer trust, address sustainability through organic and environmentally friendly principles, and seemingly operate in an (urban) environment in which food demands are most critical and increasingly diverse (Krul & Hol, 2017). The challenges of CSAs in China, which may reflect similar challenges for urban agriculture, included conflicting motivations and high operational costs. Krul and Hol (2017) emphasize earlier points in this thesis about increasingly integrating food productivity into urban

food systems in order to ensure a lasting presence. Similarly, in a study on civic agriculture (centered again with the AFN movements in China), Ding et al. (2018) found while Shanghai is experiencing growth of these forms of agriculture (small scale organic farms), those involved are not primarily interested in “the civilizing mission ascribed to many such movements...” but rather these new farms attempt to transform the customer into the food network and create a co-dependent relationship that now underpins the survival of these farms. Motivations of the farms in Shanghai have been categorized into three broad types: food safety; entrepreneurialism; and care for the environment (Ding et al., 2018). In addition, most of these farms depend on hired labour and the farms’ viability is limited due to constrained access to lands and markets and a lack of technical farming skills and knowledge (Ding et al., 2018).

It is difficult to determine which case studies Chinese authorities could use as exemplars for ‘best practices’ in the implementation of intra-urban agriculture, as the context of how urban agriculture plays out is very dependent on the local realities. Section 2.2.4 also speaks in general about how urban agriculture can be better integrated into cities. For China specifically, a city that is perhaps reflective of the urbanization and environmental challenges would be Mexico City. In a case study by Dielman (2017), Mexico City has seen success through the implementation of urban agriculture into environmental policies of the city. Currently, the integration of urban agriculture in peri-urban, suburban and interurban locations in Mexico City now produces 20% of its own food (Dielman, 2017). There are also several international organizations that have done extensive research within both the Global North and South with frameworks that could apply to Chinese policies. First, the United Nations has various programs and organizations that play an important role in the development of urban agriculture. For example, the UN-Habitat’s *Urban planning and design at UN-Habitat* (2016) that has several case studies that have seen successful use of urban agriculture. Second, the Food and Agricultural Organization (FAO) has a long history in affirming the association between urban agriculture and food security and therefore has several cases that demonstrate its utility within cities in the Global South.

International examples aside, China (as highlighted earlier) does have a growing urban agriculture movement occurring within its own borders. For example, Little Donkey Farm in Beijing was started by Shi Yan – who at the time was a doctoral candidate inspired by an internship at Earthrise Farm CSA in the United States (Henderson, 2010). In 2008, Yan

established Little Donkey Farm – one of the first CSAs in China (Hitchman, 2015) - with the support of her university and multiple local authorities (Henderson, 2010). Little Donkey aims to include “agriculture in the tertiary industry of culture and heritage through mobilizing not just farmers, but citizens... and governments to join the sustainable agricultural movement” (Little Donkey, 2016). Therefore, through established CSAs such as Little Donkey, examples and leadership could come from those who have already had experience in establishing a farm like this.

3.5 Chapter summary

This chapter has highlighted how urbanization has and will continue to greatly impact how China manages its urban food systems. Therefore, ensuring food security through alternative agricultural methods like urban agriculture will remain limited, as the viability of urban agriculture, and more specifically intra-urban agriculture, is heavily influenced by ongoing urbanization and various contentious policy issues. This chapter illustrates China’s ‘incomplete’ urbanization path through the transition to a market-economy and how this rapid growth has led to several food issues and mistrust from consumers that has led to a growing number of citizens looking to alternatives that provide safe food. Lastly, this chapter contextualized the current urban agriculture discourse in China. While there is significant literature on AFN’s contributions to China’s food system, current urban agriculture discourse emphasizes peri-urban regions for robust domestic production and multi-functional urban agriculture. Therefore, empirical research on case studies in China on urban agriculture specifically are limited but few researchers have offered some insight (Ding et al., 2018; Krul & Hol, 2017) Additionally, there has been little action in terms of the proper integration of urban agriculture into Chinese cities (Zhu, 2016); therefore, intra-urban agriculture remains undervalued (Horowitz & Liu, 2016) and its role within the urban food system overlooked. Therefore, limited research has taken place on intra-urban agriculture in China, emphasizing the need for research of this nature. This research aims to address some of these gaps in knowledge.

Chapter 4: Methods and methodology

It is increasingly evident that rapid urbanization and population growth will have significant social, economic, and ecological impacts on cities. Through a case study, this research explores the modes, motivations, and challenges of urban farmers in Nanjing, China and their role within China's changing urban food system. The methodological approach for this research draws on a mix of qualitative methods: (1) questionnaires conducted with urban agriculture practitioners in neighborhood districts and urban spaces around the city where urban agriculture was observed, (2) post-questionnaire interviews with urban agriculture practitioners, and (3) key informant interviews with other people who were knowledgeable about urban agriculture. This research does not aim to engage in a full assessment of intra-urban agriculture in Nanjing and is instead explorative in nature and seeks to build on the characteristics of Chinese urban agriculture through a case study. This chapter reviews the research design, describe the neighborhoods and research sites in Nanjing, and discusses the main limitations of the study.

4.1 Research design

Research design is a framework that goes beyond just selecting research methods. It includes theory, questions, methods, and procedures (Hay, 2016). Creswell (2009) conceptualizes research design within three essential frameworks and these are used to inform this research. These frameworks include the intersection of philosophy, and strategies of inquiry that then inform the specific methods used (Creswell, 2014). This research draws on a social constructivist worldview that primarily uses qualitative inductive inquiry strategies within a case study.

4.1.1 Intersection of philosophy or 'worldview' of the researcher

Although not always explicit, academic research can stem from any number of philosophies or 'worldviews' that both influence and inform research design (Creswell, 2014). According to Creswell (2014) the term worldview is used in place of and encompasses the broad terminology around paradigms, epistemologies, and ontologies. Therefore, a worldview is seen as a "general philosophical orientation about the world and the nature of the research that a researcher brings to the study" (Creswell, 2014, p.40) and examines how people engage in

processes of constructing and reconstructing meanings through daily interactions (Leavy, 2017). Therefore, before detailing the specific methods used in this study, I will discuss the worldview that best informs this research.

Creswell (2014) identifies four unique worldviews that researchers often adopt to help frame why and how particular research methods (e.g. qualitative, quantitative, or mixed) are chosen (Table 6). Worldviews have overlapping qualities that inform meaning for both qualitative and quantitative research designs, leading to variations in their applicability to every type of research.

Table 6. Four research paradigms

Transformative	Constructivism	Postpositivism	Pragmatism
<ul style="list-style-type: none"> • Political • Empowerment issue-orientated • Collaborative • Change-oriented 	<ul style="list-style-type: none"> • Understanding • Multiple participant meanings • Social and historical construction • Theory generation 	<ul style="list-style-type: none"> • Determination • Reductionism • Empirical observation and measurement • Theory verification 	<ul style="list-style-type: none"> • Consequences of actions • Problem-centered • Pluralistic • Real-world practice orientated

Source: Adapted from Creswell (2014).

This study is shaped by a constructivism paradigm (Berger and Luckmann, 1967; Lincoln & Guba, 1985) or more specifically *social constructivism* (Creswell, 2014). *Social constructivism* was first coined in 1991 by Berger and Lukman (Lee & Stech, 2011) and asserts that “individuals seek an understanding of the world in which they live and work and how these meanings are varied and multiple, which lead the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas” (Creswell, 2014, p.42).

Therefore, a social constructivist believes that “social phenomena and their meanings are continually being accomplished by social actors...[and] implies that social phenomena and categories are not only produced through social interaction but that they are in a constant state of revision” (Bryman, 2012 p. 33). Therefore, knowledge associated with *social constructivism* is shaped by experience and context. For this research I spoke with urban farmers exclusively from Nanjing, China with the understanding that their knowledge and experiences are situational and unique from the experiences of farmers in both China and other parts of the world. The understanding of local realities is also represented in my exploration of the perception of urban agriculture from not only urban farmers but other actors (e.g. government officials, academics) in

Nanjing that may influence or impact urban agriculture. As Creswell (2014) notes, focusing on specific contexts in which people live and work are important as “we are all born into a world of meaning bestowed upon us by our culture” (p.43), which results in varied, multiple, and complex contextual meanings formed through interactions. Therefore, social constructivism can bring understanding of the historical and cultural settings of the participants due to its focus on participants views and interactions of the situation being studied (Creswell, 2014). Consequently, the researchers’ intent is to interpret meanings that inductively develop a pattern of meaning (Creswell, 2014).

4.1.2 *Strategies of inquiry*

Following Creswell (2014) the second element in the research design framework includes selecting *strategies of inquiry*, including qualitative, quantitative, or a mixed-method study to conduct. For this research, *qualitative* methods were used. Qualitative methods are can be broadly defined as research that is “concerned with elucidating human environments and human experiences within a variety of conceptual frameworks” (Winchester & Rofe, 2016, p.5). Creswell (2014) outlines several key characteristics of qualitative research, of which a few key ideas that relate to this research are as follows: relies on text and image data, is set within a natural setting, draws from multiple sources of data, uses inductive inquiry for data analysis, and emphasises participants’ meanings. Therefore, qualitative research involves unique steps in data analysis and draws on diverse strategies of inquiry when compared to quantitative research (Creswell, 2009).

For this research, inductive inquiry was primarily used as it aligns best with a social constructivist worldview. Inductive inquiry utilizes the outcome of the research to draw generalizable inferences out of observations rather than depending on an existing theory found in literature (Bryman, 2012); however, this characterization is not straightforward in qualitative research. Qualitative research “does *not* generate theory”, but theory is often used as a background to qualitative investigations (Bryman, 2012, p.27). This is seen in the initial literature review phase for this research that looked at studies related to urban agriculture that then informed the research gap of this research that resulted in a single-case study. As Creswell (2014) notes, the use of literature at the beginning of research is used sparingly in order to convey an inductive design. Therefore, as opposed to deductive research, which begins with a

hypothesis, inductive research seeks to make inferences out of observations of the research data (Bryman, 2012) and build ‘patterns of meaning’ from the bottom up (Creswell, 2014). Therefore, informed by the literature review, the following questions guided my initial research instead of a hypothesis: *In what ways does urban agriculture contribute to an urban food system? Why are people engaging in urban agriculture in China? What are the challenges of growing food in cities?* In addition, a social constructivist looks for meaning from a “complexity of views rather than a narrowing [meaning]...” and generate ‘patterns of meaning’ from research data (Creswell, 2014, p.43). Therefore, while the research objectives were equally informed by an initial literature review on urban agriculture and my own research desires and biases, they were more so informed by the experiences and knowledge of urban farming participants in Nanjing, China.

4.1.3 Case study approach

In addition to inductive inquiry, a social constructivist typically utilizes a variety of inquiry methods and for the purposes of this research a qualitative *case study* was used. A case study is often considered equivalent to participant observation, and ethnographic research and “involves the study of a single instance or small number of instances of a phenomenon in order to explore in-depth nuances of the phenomenon and the contextual influences on and explanations of that phenomenon” (Baxter, 2016, p. 130). Baxter (2016) distinguish case studies as a broad methodology that contributes to the research design, rather than as a method. This is an important distinction due to some basic philosophical assumptions about the value of single case research. For Baxter (2016), the value regarding a case study is through an idiographic process that creates an “in-depth understanding about one manifestation of a phenomenon (a case) is valuable *on its own* [emphasis added] without specific regard to how the phenomenon is manifested in cases that are not studied” (p.131). This depth of understanding allows case studies to solve practical and concrete problems and even broaden academic understanding (Baxter, 2016). As a result, this research was largely centered around the *why* questions as it sought to understand *why* participants were engaging in urban agriculture in Nanjing, China. For this research, a case study is understood as *explorative* and is guided by inductive inquiry through qualitative methods in order to build ‘patterns of meaning’ (Creswell, 2014). According to Yin (2003;2015) it is the “how” and “why” questions, the fact that you cannot manipulate behavior of those involved in the study, and when you want to cover contextual conditions that you believe are relevant to the phenomenon under study that a case study approach is most applicable.

Furthermore, Gagnon (2010) defines an explorative case study as "...a subject that is clearly important but has been previously neglected for various reasons" (p.15). In this case study, empirical data regarding the understanding of intra-urban agriculture in China is lacking (see Section 1.2). Therefore, a single-city case study is adopted, and data collection methods included questionnaires, interviews, and literature to add understanding of urban agriculture in Nanjing, China. Consequently, a case study best fits the aim of exploring the contextual conditions relevant to the multifunctionality of urban agriculture in China.

An explorative case study was chosen because of China's known social, ecological, and economic impacts of urbanization, the unique socio-political context, and the limited studies on small-scale intra-urban agriculture in Nanjing. It is this unclear situation with no clear outcomes as to why this approach was chosen (Yin, 2003;2015). This is drawn from an increased interest by academics and international communities as to the utility of urban agriculture in cities. Even though this research may not be generalized to other populations or local contexts, a case study approach provides opportunities for transferability (Baxter, 2016). Transferability is concerned with the level that the findings apply to other cases of the phenomenon in question, which is achievable by selecting cases carefully and creating useful theory or 'patterns of meaning' that is not too abstract or specific to the case (Baxter, 2016). Lastly, the data, or theory generated by case studies can serve as a falsification strategy of existing theory, while understanding that it remains inapplicable to all cases but still significant in refining existing theories (Baxter, 2016). According to George and Bennet (2005) theory development from a case study is typically an inductive process where the research can identify new variables or connections between variables. Most importantly a case study provides "detailed analysis of *why* theoretical concepts or explanations are not inherent in the context of the case" (Baxter, 2016 p.131), an important component to the initial research questions of this study. Therefore, case study approach aligns with the exploration of varied meanings and contexts associated with a social constructivist approach to research.

4.2 Study area and sites

Case study material from Nanjing, China was collected over a 12-week field season in the summer of 2017 to facilitate in-depth understanding of the modes, motivations, and challenges of urban agriculture. Nanjing is the capital of the Jiangsu province and is located on the Eastern coastal region of China (Figure 7). Jiangsu has been one of the most developed provinces in the era of China's open economy. The 1980s saw rapid economic development that accelerated urbanization, along with a decrease in arable land (Hengzhou et al., 2007).



Figure 7. Nanjing (red star) within Jiangsu province.

Source: Nanjing Maps (n.d.).

Data was collected from three districts within Nanjing: Qinhuai, Guluo, and Qixia (Figure 8). By the end of the field season I was able to conduct 56 questionnaires and 19 interviews. A breakdown of the neighbourhoods visited, and participant locations in small-scale intra-urban agriculture are seen in Table 9. Observations of growing in limited spaces around the city were seen throughout these districts. The participants involved in this study found in Gulou and Qinhuai districts were growing food exclusively within their immediate neighbourhoods and

did not require much, if any, travel. However, in Qixia, field observations found several large areas of ceased development and open spaces of land where intra-urban agriculture was taking place. This resulted in three specific areas where urban farmers were found in Qixia (Plate 1). The sites are organized as Site #1, Site #2, Site #3. Site #1 is located near Maqun rail station. This site was originally a medical center turned basketball court and football field. Urban farmers had transformed the area to suit their growing needs and no development was occurring at the time of this research. There were approximately 20 families growing for an estimated seven to eight years. Site #2 was found along Tian You Lu road and expanded along the roadside for at least a few kilometres. This site was situated across the road from several neighborhoods and had pockets of ongoing

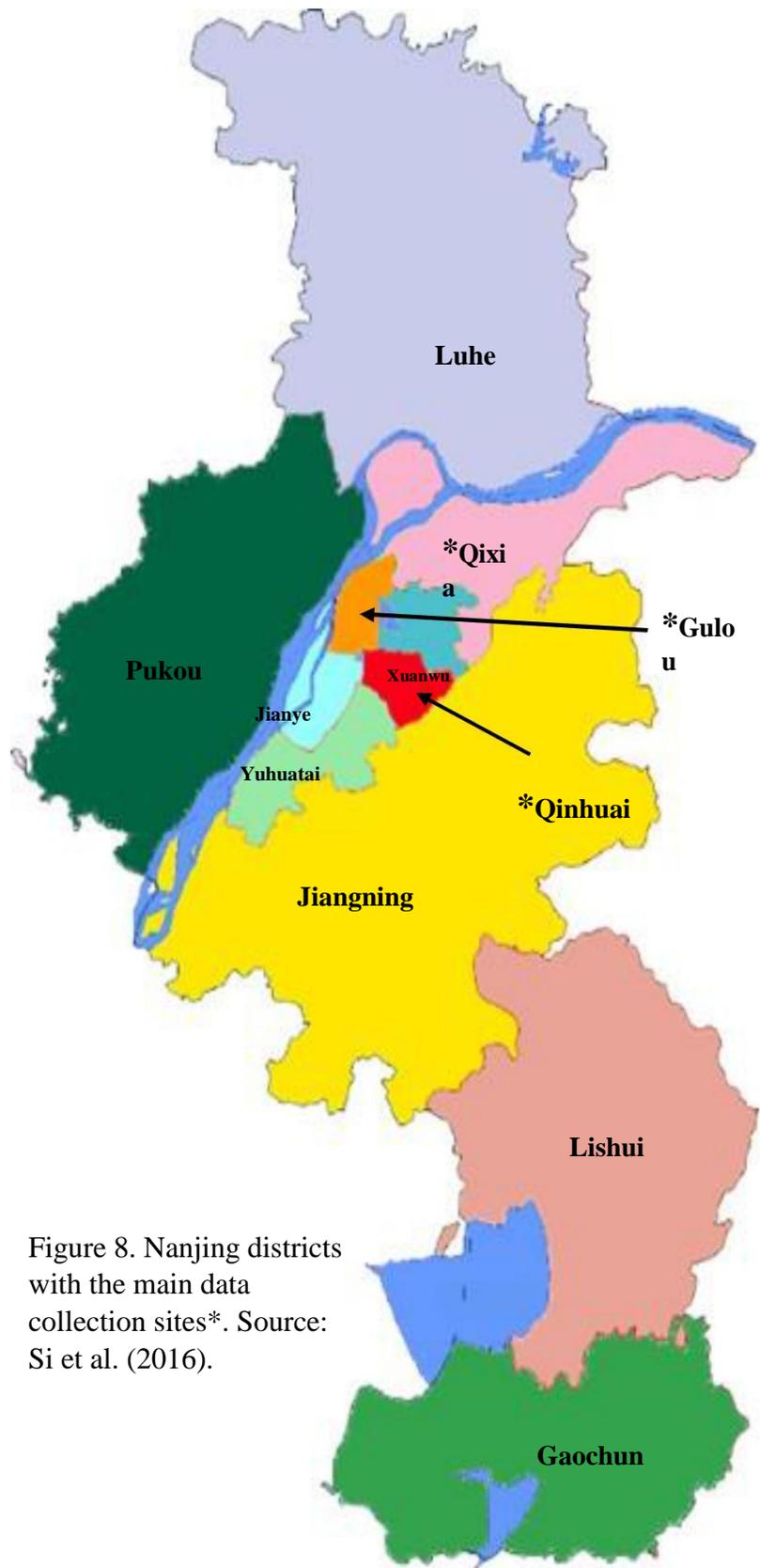


Figure 8. Nanjing districts with the main data collection sites*. Source: Si et al. (2016).

construction. Site #3 was near Magao Lu Road and Yun Shui Fang Neighborhood. This was the largest of the three sites discovered. This site was a future neighborhood development, but the developers have not completed the project. Participants had been growing on this site for about five years. Participants were unable to estimate the number of families growing but one urban farmer guesstimated over 100.

4.2.2 Site justification

There are several factors that contribute to both China and Nanjing as suitable location for this research. Firstly, China's struggles with pollution and environmental degradation, alongside increasing integration within global institutional and market networks, have resulted in increasing emphasis on ecological goals within its development agenda. In addition, there are emerging concerns from both academics and citizens over the social and environmental condition of urban areas and an increased public anxiety over food safety in China. Secondly, agricultural development has emphasized modernization and industrialization of its agriculture and the state is currently committed to supporting peri-urban agriculture (Schneider, 2014; Lang & Miao, 2010) but lack any formal support or emphasis for small-scale intra-urban agriculture (Horowitz and Liu, 2017).



Plate 1. Site #1 (Left), Site #2 (Middle) and Site 3 (Right) in the Qixia district.

Urban agriculture is still considered a rural activity in many Chinese cities as it does not fit in with the modern city model (e.g. Urban rural integration policy). However, current self-sufficiency policies (e.g. vegetable basket program) have allowed Nanjing to produce 30% of the city's vegetables and 80% of the city's leafy greens on the 460,000 mu (30,640 ha) of its municipal land (Nanjing Agricultural Committee, 2013). Nevertheless, accelerated urbanization has caused the growing of vegetables in suburbs to be completely lost (Si et al., 2016). The growing of vegetables now has to be transferred to agricultural areas far away from the city (Nanjing Agricultural Committee, 2013), placing greater pressure on maintaining agricultural land around the city. Currently, the remaining supply of vegetables for Nanjing come from distant cities, such as Anhui (80km), Zhejiang province (280km) and the Shangdong province (640km) (Si et al., 2016). Lastly, in 2015 the Hungry Cities Partnership (HCP) did a citywide survey of 1200 households in Nanjing and found that one in five households were engaged with urban agriculture in the city (Si & Zhong, 2018). For these reasons, Nanjing was chosen as the case study to investigate the modes, motivations, and challenges of intra-urban agriculture.

4.2.3 Study site information

There are 11 districts in Nanjing consisting of 100 subdistricts and townships, and 307 communities (Table 8). All three districts in this study are considered urban districts. Gulou and Qinhuai are historically older and located in downtown Nanjing or the old city center (Si et al., 2016). They are the most densely populated districts with 24,313 and 20,996 people per square kilometer respectively (Table 6). The Qixia district is more recently developed and has a population density of 1,762 people per square kilometers with multiple universities and several new and ongoing development of neighborhoods. Important to this study is the distinction of 'urban' districts vs peri-urban, as this studies focus is on intra-urban agriculture (see Section 2.2.2). Urban areas have experienced a sharp decrease in the area of farmland from 3020km² in 2000 to 2422 km² in 2010 due to ongoing urbanization and urban sprawl Nanjing (Si et al., 2016). In addition, Si et al. (2016) note that urbanization over the past decade also caused farmland in the downtown districts to decrease by more than 53 percent in five years and Qixia experienced a 39 percent decline. There are efforts to prevent further declines, as seen in recent policies aimed at strong farmland protection and increasing ecological goals of the state. It is hopeful that these policies could be the reason for future predictions of farmland in 2020 only

showing a slight decline to 2360 km², among other possibilities (Land use planning of Nanjing, 2005-2020, cited in Si et al., 2016 p.21).

Like much of the rest of China, Nanjing has seen a significant increase in migration from the countryside (Siciliano, 2012), resulting in significant increase in urbanization. In 1979 Nanjing had 3.5 million registered residents in urban and rural areas. The UN-Habitat (2015) shows a 66.6 percent change in population from 2000-2014, where it jumped from 4.2 million to 7.1 million respectively (p.29), with a projected growth to 9.7 million in 2030 (p.196). As recent as 2018, a report by Nanjing Municipal People’s Government “Nanjing Statistical Bulletin of National Economic and Social Development in 2017” projected its population will reach 8.335 million (increase of 0.79%) by the end of 2017. Of this population, 6,858,900 were registered urban ‘permanent’ (urban *hukou*) residents, which accounts for 82.9 percent of the population (an increase of 0.29 from previous year) in 2017 (Nanjing Municipal People’s Government, 2018). This migration of rural to urban has important implications to the urban food system and security and risks continuing issues associated with rapid urbanization.

The proportion of the population in each of the three main age groups (Table 7) shows Nanjing has a normal population distribution. As this study has found, age seems to be a particular determinant of those who engage in the informal sector of intra-urban agriculture in Nanjing and could offer an interesting comparison to formalized methods of urban agriculture (e.g. CSAs) that have been characterized by younger and of higher socio-economic status.

Table 7. Nanjing's Age of Population 2017

<i>Age Group</i>	Population	Percentage
0-14	904,000	10.85%
15-64	6,440,900	77.27%
65+	99,100	11.88%

Source: Nanjing Municipal People’s Government, 2018.

This Nanjing Statistical Bulletin of National Economic and Social Development in 2017 also estimated the household per capita disposable income of urban residents in Nanjing was 48,104 CNY (\$7595.20 US), an increase of 9.3 percent in 2016 (Nanjing Municipal People’s Government, 2018). The average living expense in Nanjing for urban residents is 31,385 CNY (\$4925.40 US) (5.4% increase over previous year) and rural residents was 17,155CNY

(\$2692.22 US) (8.8% increase). Of these expenses food and tobacco consumption accounted for 25.3 percent in urban areas and 29.1 percent in rural areas. The minimum living standard had been raised to 810 CNY/month (\$127.12 US/month).

Over the last decade, China has stressed the significance of its national food supply and as a result, food policies have focused on preserving farmland, subsidizing farmers, investing in agricultural facilities, and establishing food reserves (Scott et al., 2014; Chen & Scott 2014). This is seen further in the states most recent and important documents—the thirteenth five-year plan and the 2017 No.1 Document—put out by the Communist Party of China (CPC) that advocate for the advancement of ‘modern agriculture’. According to the Nanjing Municipal People’s Government (2018), the Nanjing’s Agriculture Commission has seen steady development with 11.65 million mu (776,666 ha) of “high-standard farmland” added through the year in 2017. In addition, Nanjing’s food reserve— ‘vegetable basket program’—now covers an area of 205,000 mu (13,666 ha), with more than 3,000 family farms registered and over 3,800 professional farmer cooperatives established 41 modern-level to agricultural parks and 13 municipal agricultural science and technology parks established). In fulfillment of China’s modernization mandate, this puts agricultural mechanization (modernization) in Nanjing at 86% (Nanjing Municipal People’s Government, 2018). This demonstrates China’s push to further modernize its agriculture and food system, while moving away from the dominant small-holder farms of its past. Recently, urban agriculture in Nanjing has been ranked third in terms of activity according to an ‘*urban modern agricultural development index*’ of 35 large and medium sized cities released by Ministry of Agriculture in December 2017 (Aiming, 2017). Nanjing was second only to Beijing and Shanghai, and first among 15 sub-provincial cities (Aiming, 2017). Therefore, further investigation into intra-urban agriculture practices in Nanjing will result in an interesting study.

Table 8 Nanjing Urban and Peri-Urban areas administrative divisions and population density.

Districts	Area km ²	Administrative divisions				Population Density		
		Sub-districts	Townships	Communities	Neighborhoods	Population (million)	% of Population*	Density (people/km ²)
Urban								
Gulou*	53.1	13	0	42	118	1.3	15.9	24,313
Qinhuai*	45.2	12	0	32	106	1.03	12.6	20,996
Qixia*	376.1	9	0	32	78	0.66	8.1	1,762
Xuanwu	75.2	7	0	14	58	0.66	8.1	8,779
Jianye	82.7	6	0	23	44	0.45	5.5	5,358
Yuhuatai	134.6	6	0	13	60	0.42	5.1	3,068
Subtotal	766.9	53	0	156	464	4.52 ¹	55.3	5,894
Peri-urban								
Jiangning	1572.9	10	0	30	128	1.18	14.4	746
Liuhe	1467.1	11	1	59	90	0.93	11.4	630
Pukou	912.3	9	0	19	87	0.73	8.9	795
Gaochun	792	0	8	26	10	0.42	5.1	529
Lishui	1067.3	0	8	17	69	0.42	5.1	392
Sub-total		30	17	151	384	3.68	44.9	633
Total	6582.30	83	17	307	848	8.2	100	1,240
* Districts for this study. ¹ Population of urban areas increased to 6,858,900 in 2017 Source: Adapted from Si et al. (2016)								

4.3 Research methods

The third major element of research design is the specific research methods involved in data collection, analysis, and interpretation (Creswell, 2014). For this research three phases of qualitative research methods were used:

1. **Literature review** of academic papers on urban agriculture, urbanization, global agri-food systems, urban food systems and strategies, accessible government reports, grey literature and Chinese studies related to these topics, which also informed themes for the questionnaire and an interview script;
2. **Questionnaires** (n=56) were also chosen to accompany these methods. Questionnaires were conducted in three districts of Nanjing with urban farmers observed to engage in intra-urban agriculture. Questionnaires were also used to attain and often bridged into interviews;
3. **Semi-structured interviews** (n=19) with both urban farmers and key informants, as explained in sections 4.4 and 4.5, were also used in this research.

4.3.1 Verification

To ensure rigour and the verification of data, triangulation was used for both data sources and methods used (Creswell, 2014; Stratford & Bradshaw, 2016). Data-source triangulation is the comparison of data that relate to the same phenomenon, but data is obtained from informants in various positions or different phases of the fieldwork process (Hammersley and Atkinson, 2007). For this study, the modes, motivations and challenges of intra-urban agriculture at the urban level were explored through the perspectives of various participants including residents, neighborhood committees (the most local level government), academics, and government officials in related fields. This provided useful insight into intra-urban agriculture in Nanjing, as terminology around urban agriculture (Horowitz and Liu, 2017), food security and food safety (Si et al., 2017; Regnier-Davis, 2015; Schumilas, 2014) have important local contexts. Additionally, method triangulation - which is understood as the utilization of multiple data collection techniques to find points of convergence - was used to gain a more thorough and in-depth understanding throughout the research process. Triangulation finds points of convergence among different sources of information and researchers and cross-checks results by approaching a problem from different angles and different techniques (Creswell, 2014; Hammersley and

Atkinson, 2007; Hay, 2005). The mixed methods, or triangulations, included questionnaires, semi-structured interviews, and field observations to cross-check results. Notes were also taken during interviews, and later combined with interview transcriptions to inform thematic content analysis.

4.4 Literature review

This study reviewed peer-reviewed and grey literature related to the following: (1) case studies and theories related to urban agriculture and its benefits, opportunities, and challenges from both the Global South and North; (2) scholarly articles that relate to the bodies of literature on urban food systems; (3) studies related to contemporary global and industrial agricultural and issues of urbanization; (4) the implications of urbanization in China on the use, existence and development of urban agriculture; and (5) available literature on urban agriculture discourse in China. Literature was primarily accessed online through university library databases, governmental websites, and non-governmental websites. The literature review was used to gain background knowledge and understanding of both global urban agriculture and its implications, emerging food-related issues in China, and how urban agriculture currently exists in the unique socio-political context of China. The use of a literature review is important for research, as you are not always “reinventing the wheel...[and] can learn from other researchers methodological and other lapses of judgement...” (Bryman, 2012, p.385). Therefore, the literature review was used to identify a research gap and frame the initial research questions. The literature review was also later informed and refined by data collected during field research.

The literature review enhanced both the structure of the questionnaire and interview themes by identifying the following key themes:

- Reported social, economic, and ecological benefits of urban agriculture in varying contexts
- How does China define urban agriculture given its unique context?
- Barriers that may exist for those that practice urban agriculture
- How (intra) urban agriculture is structured through urban policy in China

4.5 Questionnaires

According to McGuirk & O’Neil (2016), questionnaires can provide more in-depth perspectives on social processes, values, attitudes and context to provide “insights into social trends, processes, values attitudes, and interpretations” (p.247). Therefore, the use of questionnaires supports not only the empirical nature of this study but the social constructivist approach and the use of a case study as it directly involves participants and their experiences with urban agriculture. Questionnaires are a practical and flexible research tool that is known to compliment more intensive forms of qualitative research, such as interviews, and have been used “increasingly to gather data in relation to complex matters like the environment, social identity...quality of life and community” (McGuirk & O’Neill, 2016, p.247). For the purposes of this research, a questionnaire participant was conceptualized as any person actively participating in intra-urban agriculture in Nanjing’s urban areas. Participants engaged in intra-urban agriculture are referred to as urban farmers in this study.

4.5.1 Sampling and recruitment

Given the exploratory nature of this research, sampling for the questionnaire was important as the population criteria was very specific. This research utilized a qualitative questionnaire structure and utilized the *non-probability* sampling technique (McGuirk & O’Neil, 2016). *Non-probability* sampling is used when generalizing about a broader population is neither possible or desirable (McGuirk & O’Neil, 2016). This questionnaire method is typically used in conjunction with mixed qualitative research, as it aims to establish trends, patterns, or themes in experiences, behaviours, and understandings (McGuirk & O’Neil, 2016); subsequently, uncovering the influence of a specific context, rather than more generalizable claims (Herbert, 2012). This research aimed to obtain a sample that was diverse and “fairly represent[ed] different viewpoints among members of the social setting” (Byrman 2012, p.393). While the size of a group is more relevant in quantitative research, in qualitative research the “emphasis is usually upon an analysis of meanings in specific contexts” (Robinson, 1998, p.409), where the sample is not intended to be representative. This research aimed to understand the experiences of those engaged in urban agriculture (urban farmers) and the perspectives of government officials and academics in positions related to agriculture and urban planning. Given the research focus on intra-urban agriculture, the scope of this research was limited to urban areas and therefore three

urban districts within Nanjing were chosen (Figure 7). Data collection in district areas and neighborhoods were done in multiple ways, including: (1) door-to-door, (2) discussions with residents, and (3) observations of activity related to growing plants, vegetables and keeping of livestock. To select the participants, several purposive sampling techniques were used, including criterion, opportunistic, and snowball sampling (Patton, 2002). Criterion sampling is selecting cases that meet some

Table 9. Districts and Neighborhood areas for questionnaires and interviews

criterion (Stratford & Bradshaw, 2016). For this research, participants were selected based on whether they were growing plants or vegetables and/or keeping livestock in and around urban areas. Further sampling was achieved through *opportunistic* and *snowball* sampling methods based on field observations (Stratford & Bradshaw, 2016). Snowball sampling occurred when participants provided information on or directions to locations where urban agriculture

District	Neighborhoods	Questionnaires
<i>Qinhuai</i>	Lanqixincun	1
	Dayanggou	1
	Shan Gu Li	7
	Tie Xin Qiao	1
	Kai Yuan Xiao Qu	2
	*Fu Zi Miao (wet market)	1
	Zhi Ma Ying	1
	<i>Sub-total</i>	14
<i>Gulou</i>	Long Xin	1
	Lu Xi Ying	2
	Xian Xoa Road	2
	Tian Jin Xin Cun	1
	Lu Xun Yuan	1
	Guan Yin Li	2
	*Zhong Yang Road	1
	*Jinmao Street	1
	East Miao Feng An	2
<i>Sub-total</i>	13	
<i>Qixia</i>	Yun Shui Fang	11
	Ning Kang Yuan	1
	Bai Shui Qian Cheng	4
	*Maqun Station	5
	Qing Tian Ya Ju	3
	She Shan Xing Cheng	2
	Run Kang Yuan	1
	Yao Xin	2
<i>Sub-total</i>	29	
<i>Total</i>		56

*Location of participant, not participants neighborhood

was being practiced. 56 questionnaires were completed in three districts of Nanjing (Table 9). Table 10 outlines the number of answers received from participants for each question in the

questionnaire. If the participant ended the questionnaire early, the question was not considered unanswered and therefore was not included in the percentages.

Table 10. Tabulation of questions answered for questionnaire in percentages

Question	Total # people asked	Total # answered	Answered (%)	Question	Total # people asked	Total # people answered	Answered (%)
1	56	56	100%	18	42	42	100%
2	56	56	100%	19	42	39	92.86%
3	56	56	100%	20	42	42	100%
4	43	43	100%	21	42	42	100%
5	43	43	100%	22	42	42	100%
6	56	56	100%	23	42	42	100%
7	43	43	100%	24	42	42	100%
8	43	43	100%	25	42	42	100%
9	43	43	100%	26	42	42	100%
10	43	43	100%	27	42	42	100%
11	43	43	100%	28	42	42	100%
12	43	42	97.67%	29	42	40	95.24%
13	43	43	100%	30	42	42	100%
14	43	42	97.67%	31	42	42	100%
15	43	43	100%	32	42	42	100%
16	42	39	92.86%	33	42	42	100%
17	42	42	100%				

4.5.2 Questionnaire design

The questionnaires used in this research were structured to build an understanding of the multiple variables that can take place while growing food in an urban environment. This included the modes, motivations—further broken down into social, ecological and economic themes—and challenges. The questionnaire topics ranged from basic demographics, perceived food issues (e.g. cost, health, availability), and opinions on urban agriculture (Appendix 1).

Questionnaires were conducted on scheduled days that the research assistant was available, which typically consisted of 4 days a week for a total of 8 weeks. Given the study's focus on intra-urban agriculture, potential research districts were chosen based on their categorization as 'urban', which was informed by the initial literature review. Three districts were chosen, Qinhuai, Gulou and Qixia (Figure 7), and field observations and purposive sampling techniques (see Section 4.4.1) identified neighbourhoods within the districts to distribute questionnaires in (Table 9).

To ensure adequate informed consent, a cover letter outlining the research project, purpose, and contact information was placed at the front of each survey. A pilot survey was conducted to ensure the questionnaire was well-designed, collected valuable data, and was an appropriate length (McGuirk and O'Neil, 2016). The final format of the questionnaires was structured into two parts. Part 1 contained broader thematic questions on what participants were growing, where they were growing it, and agree or disagree statements on specific reasons why they were growing food in an urban area, while Part 2 contained more in-depth and detailed questions (Appendix 1). Participants that completed Part 1 of the questionnaire were given the option to stop participating, complete Part 2, or participate in an interview. 56 questionnaires were completed by urban farmers in Nanjing, with 56 completing Part 1, 43 completing both Parts 1 and 2, and 13 agreeing to participate in interviews (see Table 10). Participants that completed Part 1 and Part 2 or agreed to be interviewed were offered a small remuneration in the form of facial tissues, playing cards or other culturally appropriate items. The questionnaire was set up using closed and combination type questions with a limited number of open questions. This was due to time and language barriers and could have proven difficult for one research assistant to take notes during field research.

4.6 Semi-structured interviews

Interviews were chosen as a method due to their strengths in (1) filling gaps in knowledge that other methods are unable to bridge; (2) investigating complex behaviours and motivations; (3) collecting a diversity of meaning, opinion, and experiences, as they provide differing debates within a group; (4) and empowering and increasing respect of the participants who provide the data (Dunn, 2016). Semi-structured interviews were conducted using an interview guide (Appendix 2) based on key themes drawn from the literature review and

included follow-up questions based on responses to the questionnaire. Semi-structured interviews were also chosen because they maintain flexibility and allow the researcher to respond to participants and probe further when necessary (Dunn, 2016). This aligns with the social constructivist approach as it allows the researcher to rely on the participants' views of the research and gives insight to what people say or do in their life setting (Creswell,2014).

The interviews for this research were conducted in Mandarin and then summarized and translated by the research assistant immediately afterwards. Participants were also encouraged to share information that might be valid to the study and the translator actively pursued additional information. Interviews were recorded when permission was granted. Interviews were conducted with urban farmers and participants from three additional sectors: government officials, neighborhood committee members, and academics. These participants were conceptualized as key informants. Therefore, the participants for this research resulted in seventeen (n=17) semi-structured interviews with nineteen participants (n=19). The number of participants from each sector can be seen in Table 11. Urban farmers made up the majority of interviews because this research largely aimed to understand the motivations and challenges from their perspective. Additional information provided by other key informants was used to provide more context. Key informants were recruited through snowball sampling and depended largely on established contacts at Nanjing University. Urban farmers were recruited through questionnaire sampling techniques described in Section 4.4.

Table 11. Composition of participants

Interviewee	Number
<i>Urban Farmers</i>	13
Key informants:	
<i>Government Officials</i>	3
<i>Neighborhood Committees</i>	2
<i>Academics</i>	1
Total	19

4.6.1 Interview selection

The questionnaires were used to recruit urban farmers to participate in semi-structured interviews, as questionnaires "...provided a framework for the in-depth interviews, allowing key themes, concepts and meanings to be teased out and developed" (McGuirk and O'Neil, 2016, p.247). Before participants continued onto Part 2 of the questionnaire they were asked if they were willing to participate in an interview. This ensured proper time management for the participants, researcher, and research assistant. Participants that were willing to discuss the questionnaire topics further were invited to participate in an interview either immediately following the questionnaire or at a time and place that was most convenient for them.

Key informants for neighborhood committees were recruited through snowball sampling techniques by asking neighborhood residents for their location. Their locations were not commonly known but two neighborhood committee members were identified. Semi-structured interviews (n=2) focused on their thoughts and observations of growing food within neighborhoods, what challenges existed for both themselves and residents of their neighbourhood, and what rules and regulations existed around growing food. Key informants in government and academic positions were recruited through snowball sampling from established connections with professors and researchers at Nanjing University. Government officials interviewed (n=3) were from the Jiangsu Provincial Academy of Agricultural Sciences, the Agricultural Commission of Jiangsu Province, and the Development and Reform Commission of Nanjing. Newly established laws prevented government officials from conducting interviews with foreign researchers in office settings and therefore, interviews with government officials were conducted in an informal setting. In addition, one (n=1) academic from the School of Architecture and Urban Planning at Nanjing University was recruited through snowball sampling and was interviewed. These interviews focused on the definition of urban agriculture, its benefits, definition of 'modern urban agriculture' seen in government reports, policies, and projects.

Throughout the interview process, all participants were offered remuneration (e.g. maple syrup, other Canadian souvenirs, or useful household products bought at markets) as a token of appreciation for their participation in the interviews.

4.6.2 Interview design

Findings from the literature review were used to formulate the initial topics in the interview and categorized into four broad themes: social, ecological, economic, and governance. However, as questionnaires and interviews progressed and revealed new information, additional interview questions were added, modified or removed to the interview guide to maintain relevance (Dunn, 2016). Consent for audio recording was asked orally given the language barrier and at any time participants could request to stop recording. All interviews were done face-to-face and ranged anywhere from 20 minutes to 2 hours. Having interviews recorded allowed for attentive listening and note taking of observations or information that arose during the interview (Dunn, 2016). The notes taken during interviews were later combined with interview transcriptions to inform thematic content analysis. The interview process with residents typically began with a “warm up” period before the interview began, as this is a vital first step in building rapport (Dunn, 2016, p.164). This was followed by easy-to-answer questions that reflected the questionnaire and participant’s daily activities before getting into more abstract questions about ‘why’ they grow food and the challenges involved. This ‘pyramid structure’ “allows the informant to become accustomed to the interview, interviewer, and topics before they are asked questions that require deeper reflection” (Dunn, 2016, p.156).

In addition, upon completion of questionnaires’ several participants continued conversations around the questionnaire topic. Although these participants did not express interest in a formal audio recorded interview, they did agree to continue the conversation about their experiences with topic. The research assistant would translate the conversation as needed and the remaining information was captured in either notes taken on the survey itself or in a provided notepad. Follow-up questions were sometimes asked if time permitted and the participant was willing to discuss further. The notes taken were also translated by the research assistant at a later date. In an effort to capture as much detail as possible, after the questionnaire and/or conversation with the participant was finished an audio recorded ‘debrief’ between the researcher and research assistant took place and was later transcribed to supplement field observations. The use of field photography was also done (when permitted) to capture the various locations, modifications, and conditions of growing food in urban areas.

4.6.3 Transcribing interviews and data analysis

Audio-recordings from semi-structured interviews were transcribed after interviews were conducted. The names of participants in both the questionnaire and interviews was not recorded and were coded with a simple identifier (e.g. #001) to maintain anonymity. If an interview was conducted with a questionnaire participant, the transcription code would reflect the questionnaire number given in order to keep track of key themes. This also further protected the interviewees anonymity. The transcriptions were replayed and transcribed verbatim using the software program *transcribe* (Wreally Studios) into Microsoft Word. This allowed for a clearer transcription process as audio could be slowed, filtered, and paused as needed. Field notes and ‘debriefs’ were collectively added to the end of interview transcriptions. This also allowed for greater rigour as it created multiple points to cross-check information.

Transcriptions were coded and analyzed using Nvivo 11. NVivo is referred to as a code-based theory building software. Cope (2016) notes that data coding is an inductive exploratory method that can result in patterns of meaning from empirical data and is useful in data reduction, organization, and data exploration. This research utilized content analysis, which is “a system of identifying terms, phrases, or actions that appear in a text document, audio recording, or video and then counting how many times they appear and in what context” (Cope, 2016, p.378). Within this there are two main types of codes—descriptive and analytic (Cope, 2016). Descriptive codes reflect themes that are obvious on the surface or stated directly by participants in the research and analytic codes reflect a theme that the researcher is interested in and “dig deeper into the processes and into the context of phrases or actions” (Cope, 2016 p.379).

Coding involved reading each transcript and highlighting important and relevant concepts and phrases. Using Nvivo 11, colour coding and categorizing were streamlined into ‘nodes’ and clustered based analytic and descriptive code themes informed by the literature review and research objectives, as well as themes that emerged in the data (Cope, 2016). For example, barriers to intra-urban agriculture were placed under its own primary ‘node’ and then sub-nodes (e.g. economic, social, physical) were categorized under the primary node. A colour was applied to each primary node and Nvivo 11 would output all sub-categories into a one-page readable format. This informed the research results and findings in Chapter 5.

4.6.4 Translation of questionnaire and interviews

The translation of questionnaires and interview questions from one language to another raises several challenges for cross-cultural researchers, as it is often seen as the most common difficulty encountered by the researcher or commonly referred to as the ‘outsider’ (Liamputtong, 2010). A research assistant was hired from a local university, Nanjing University, and assisted with the research design (e.g. neighborhood locations) and the translation of materials used during the field research (e.g. questionnaire, cover letter etc.). They were also the key translator throughout interviews. The research assistant was compensated on an agreed daily rate and signed a confidentiality statement to ensure the protection of participants’ data (Appendix 3). For the purposes of this research, two methods were used to overcome the challenges of translation in cross-cultural research.

Firstly, Liamputtong (2010) emphasizes the use of a ‘bicultural’ (or bilingual) research assistant, as “bicultural researchers share not only the language of the participants but also many social and cultural traits” (p.138) and will likely have the best knowledge of the research group. Specifically, Lee and Ellenbecker’s (1998) study in China found that utilizing a bicultural researcher they were able to get more accurate information from participants, as experiences were told in their own language. Additionally, Shklarov (2007) noted that bicultural research assistants are able to create authentic and sound scientific results that are free of any alterations that can occur through language difficulties and increase research benefits, while also protecting participants from any possible harm in the research process. In addition, the research assistance’s role in cultural understand is not limited to data collection, as they can play a crucial role in “data management, analysis and ultimately data interpretation” (Shimpuku & Norr, 2011, p.1693).

Secondly, Brislin’s (1970) model of ‘back translation’ was used to further overcome language issues in cross-cultural research. ‘Back translation’ requires materials to be translated from their original language to the language in which they will be distributed and then back to the original language to ensure accuracy (Brislin, 1970). This model remains the most common method cited in literature. For this research, English versions of materials (e.g. cover letters, verbal consent scripts and questionnaires) were translated into Mandarin and back to English. If inconsistencies were found, further discussion and an alternate translator was used to assist until accuracy was achieved by changing the original English as necessary (Brislin, 1970). Khalaila

(2013) notes that when using back translation, “translators should consider issues of gender and age applicability and avoid any terms or dialects that might be considered offensive or unclear to the target population... [, as well as] pick out the proper terms according to the context and avoid the use of any jargon (e.g., colloquialisms, idioms, or vernacular terms) ...” (p.366). This was particularly important in the Chinese context because some definitions either do not hold the same meanings (e.g. food security- see Regnier-Davies, 2015) or were known to be inappropriate to use with the target audience (e.g. civil society). The pilot questionnaire also assisted in identifying these issues.

4.7 Ensuring research quality

4.7.1 *Positionality and reflexivity*

As a researcher, reflecting on one’s own assumptions, biases, gender, culture and values throughout the research process is important to maintain awareness of how they may shape one’s interpretations formed during research (Creswell, 2009; Dowling, 2016). Hammersley and Atkinson (2007) suggest taking an ethical situationist perspective, which understands that ethical considerations depend upon the specific context and case study of the research. An ethical situationist perspective recognizes the “[emphasis] on the avoidance of serious harm to participants and insists on the legitimacy of research and the likelihood that offence to someone cannot be avoided” (Hammersley & Atkinson, 2007, p. 219). As a researcher, I recognize my subjectivity (Dowling, 2016) and that my understandings and opinions of urban agriculture are shaped through literature based on the social, ecological, and economic benefits found in case studies from both the Global North and South, as well as urbanization, sustainability, food security, environmental and Chinese literature. In addition, working closely with scholars and researchers within similar fields of study or worldviews can influence my own assumptions. For example, I am convinced that issues of sustainability and how they relate to the impacts of contemporary industrial agriculture merits further use of approaches like urban agriculture to not only mitigate various social, economic, and ecological concerns but also improve the urban environments food systems. I recognize that urban agriculture is not a replacement or sole source of sustenance for urban dwellers but rather a measure that should be considered in future planning to both mitigate emerging urban issues and create resilient local food systems. I also acknowledge the complexity of issues within this research and the diversity of stakeholders and

ground work involved in these processes. Lastly, I acknowledge that the modes, motivations, and challenges seen in other scholarly work may not be the experiences of those in Nanjing, China. By travelling to Nanjing, China, my understandings of the cultural-context and the practice of urban agriculture in Nanjing itself has strengthened my understanding of the local context. In an effort to overcome assumptions and biases, I sought to engage with critical reflexivity throughout the research process by using a “fieldwork diary” and occasional audio logs that included observations and self-reflective conversations (Dowling, 2016, p. 35).

I further recognize my positionality as a researcher from the Global North and that I am frequently in a position of “relative power” with regard to interviewees (Turner, 2010, p. 127) that could influence the rapport with participants during fieldwork. This is due to more educational qualifications, the ability to access research funds, freedom to leave the field as I wish, and the ability to decide how research results will be portrayed and disseminated (Turner, 2010). Therefore, I recognize there are different relationships or powers structures that exist or may have existed during my fieldwork.

In the case of urban farming, the power dynamics between participants formed an asymmetrical relationship, which was “characterized by significant differences in the social positions of researcher and those being researched” (Dowel, 2016, p. 36). This needed to be considered as many of the participants were of varying socio-economic status or held positions (e.g. farmers) that are seen to be of lower status in China and influences the researcher’s positionality “by those to whom we have access in the field” (Turner, 2010, p. 126). This could be seen at the beginning of the field research in China, where visits to neighborhoods was receiving unwanted attention. It was later discovered that clipboards used caused residents to think we were ‘city officials’ from the municipal government performing inspections and therefore could have been impacting the research. To mitigate this for subsequent visits, clipboards were kept out of sight and only taken out when needed. At the same time, this curiosity of residents occasionally resulted in acquiring more participants. In contrast, the power dynamics in the field differed during the interview with government officials. Given the social setting of this interview, pressure to utilize time efficiently and ask appropriate questions whilst maintaining a social atmosphere made the interview with government officials somewhat more tense than when speaking with urban farmers. Contributing to this power dynamic was the cultural norm of respect that is held for people in positions of government in China, making the

interview processes slightly intimidating for both myself and the research assistant. This also made rapport building very difficult, as conversations were constantly being pulled in many different directions. However, I do recognize that as a male in a patriarchal society I may have been treated differently than a female researcher and participants' willingness to participate could have been related to this.

4.7.2 Cross-cultural research and limitations

Due to the research taking place in China, the cross-cultural experiences, limitations and research variables are an intricate component to the research design and process. Each fieldwork experience is unique, having its own “difficulties and opportunities, depending on the context, topic area and personalities involved” (Wesche et al., 2016, p. 61). As Heimer and Thorgersen (2006) note “doing fieldwork inside the People’s Republic of China is an eye-opening but sometimes also deeply frustrating experience” (p. 1). This is largely due to fieldwork in China being “inherently complex due in part to the cultural differences between Western and non-Western contexts” (Wesche et al., 2010, p. 60). For this research, my limited fluency in Mandarin, the primary language spoken around China, was the biggest obstacle. This proved to be a significant barrier throughout the research process, from the development of a literature review and research in the field, to data assessment and analysis of the results.

Firstly, issues with language and accessible information about China in the preliminary research stage proved difficult. This was largely due to limited grey and academic sources from Western and Chinese scholars and government reports on urban agriculture in China and more specifically Nanjing. Materials that could be found occasionally remained inaccessible as they were written in Chinese. Because of this and the exploratory nature of this study, some initial questions seemed less relevant (e.g. policy questions for urban farmers) once arriving in Nanjing. It also contributed to difficulties when searching for key themes related to urban agriculture (e.g. urbanization, food safety and urban planning). For example, government pages (e.g. Nanjing gov.cn) available in English had limited results when compared to the official Chinese pages. This made navigation both time consuming and tedious due to translation time. In addition, when relevant references were found in peer-reviewed materials more often than not these links were expired, making existing reliable data difficult to find.

Secondly, this research utilized semi-structured interviews (see 4.6), which meant that throughout the process significant time was needed for translation. This limited the number of questions asked as participants availability was time sensitive. This made it difficult to conduct follow-up interviews as well. Another challenge to conducting interviews could be seen in newly established laws that prevented a foreigner from conducting an interview with a government official in an office setting. This resulted in an informal dinner; however, while the interview provided valued insight and information about their perspectives of urban agriculture, it was also challenging given the distraction and noise levels of a social setting.

Lastly, language issues also proved difficult when ensuring the research assistant understood the goals and terminology of the research. For example, clarification was needed for defining non-academic English words (e.g. plants as vegetables vs. herbs vs. flowers), to more complex meanings (e.g. urban agriculture, food security vs food safety). This was overcome by supplying additional materials and having conversations to clarifying meanings with the research assistant. There were also several phrases or words that had a specific cultural context, but the translator struggled to find the English meaning while in the field.

As seen in the fieldwork accounts in Heimer and Thogersen (2006), the limited use and value of qualitative research in China differed greatly from its Western counterparts. I will share some of the sentiments in these accounts. When using a questionnaire to build on the empirical qualitative data on urban agriculture, I was consistently confronted with dissuasion from local assistants that the sampling size I would likely obtain would not prove ‘significant’. This led to varying levels of opposition from research assistants that I used at the beginning of the field research. Additionally, the specific criteria of this research made finding participants difficult. It was evident that these factors were affecting the motivation of these initial research assistants. The research assistant used for the majority of the research though did not question my sampling size as much and proved more enthusiastic about the research process. For example, according to the research assistant, the questionnaire prompted concerns of literacy due to participant demographics (e.g. elderly, uneducated), so when appropriate or asked of, the research assistant would clarify components of the questions.

Another significant challenge and limitation was a feeling of ‘foreignness’. As a researcher in a foreign environment, attention both during fieldwork and outside of fieldwork

were experienced. This caused me to feel like a spectacle at times. China is a country that was largely shut off from foreign visitors prior to 1978 (before open reform). This is evident even more so in Nanjing because it is not a significant tourist destination for foreigners. During fieldwork I was often referred to as *lao wai*, which means ‘foreigner’ in Mandarin. I was told this was a positive comment, but at times the context felt different. There were several positive instances of engagement with locals, mostly from young people, that would approach me in public spaces and talk simply to practice their English. In other cases, it was just staring—assumingly out of curiosity. There were also significant reactions to me as a Canadian. I learned that a Canadian doctor—Dr. Norman Bethune—played a significant role in China’s history and therefore my appeal as a Canadian brought many warm welcomes. Being a spectacle though sometimes contributed to the success of the questionnaire and interviews as it peaked curiosity. Also, several times during interviews or questionnaires I was asked (through translation) about myself or what growing food in Canada was like.

The use of a translator, although required for this research, greatly influences the research processes. Scott et al. (2006) discuss the cross-cultural experiences of several researchers and found that “interpreters’ previous experience, skills, knowledge, and perceptions of the field situation are often undervalued by researchers” (p. 38). As a new researcher and foreigner to China, reading to inform myself of both the area and cultural norms was important to pre-departure. Despite these efforts I still felt largely out of place and given the specific criteria of this research made the unfamiliarity challenging. Therefore, the value of my research assistant was significant from the start. The research assistant was from Nanjing and had valued understanding of both the history of the area and neighborhoods that may be of importance to the research objectives. However, the research assistant’s University background in English was a challenge because it differed greatly from both the project and my background. This resulted in more time being needed to ensure understanding of the research objectives by the research assistant and ‘underscored the importance’ of ‘research rigour and triangulation’ of translators in the field (Scott et al., 2006, p.38). Differing research backgrounds can also impact their appreciation for asking the same questions to different people in subsequent questionnaires and interviews, however this was not experienced in this research. Instead, the research assistant was often highly motivated, especially after becoming familiar with the material and “would even undertake their own discrete ‘factfinding’ inquiries to gather extra or sensitive information

relevant to [my] research interests” (Scott et al., 2016, p. 38). The research focus on farming proved to have personal value to the research assistant as their grandparents were farmers and still did grow food in the Nanjing district of Jiangning. The use of a local research assistant for translation allowed for less ‘othering’ or lack of respect for participants in this research.

There was also a significant advantage to using the same research assistant throughout the fieldwork. The familiarity with the material grew overtime and the questionnaire and interview processes became organic with participants. This was evident when interviewing, as the research assistant would follow up with questions I had asked in previous interviews. This allowed for smoother conversations and interviews and created a more natural conversation with participants. For researcher and research assistant relationships, while conducting fieldwork private time with the translator allowed me to develop a personal relationship with them and gain firsthand knowledge about the cultural context I was researching (Baird, 2011). Also, I tried to be sensitive to the needs of my translator whenever possible and also included them in the research process, “by valuing their insights and allowing them the opportunity to provide input into the research process...[which created] a fruitful interpreter-researcher relationship” (Scott et al., 2006, p. 39).

4.7.3 Research variables

Several research variables were found throughout the research process. Firstly, it was important to find locations that were accessible and could obtain as many potential research participants. Upon exploring the city of Nanjing, it became evident that certain urban areas were going to be more accessible than others due high numbers of ‘gated communities’ with security limited un-invited visitors. This limited the research to older neighborhoods, as I was told permission was required to access newer neighborhoods, which would have been both time consuming and complicated, again given my lack of fluency in Mandarin. However, observations showed that newer communities typically lacked any obvious food growing due to a well-planned and maintained layout and those that could be accessed further emphasized this. Therefore, if the research was able to include these neighborhoods, it is likely that the research could have been more inclusive of a diverse demographic; however, this impact would be limited based on the criterion sampling for this research, which was interested only in those that were actively growing. The specific criteria of this research proved both a variable and challenge as

(1) it required active exploring of districts and neighborhoods, which was both exhausting and time consuming, (2) people were often not willing to claim or identify who was growing when a location was found—limiting snowball sampling effectiveness, and (3) people were not always at the location(s) found or were unavailable. Wet markets were initially part of the research design, but the pilot questionnaire revealed these areas to be less significant as participants that fit the criteria were limited. Difficulties were also caused by people being in a hurry and therefore did not have time to partake in the questionnaire or interview.

Secondly, being dependent on a research assistant made the days for fieldwork highly dependent on the assistant's availability. This was a significant hurdle at the beginning of the research as pre-departure plans differed greatly upon arrival. This resulted in the need to find a new research assistant before any significant research could take place. Fortunately, due to pre-established contacts at Nanjing University this issue was able to be resolved. In addition, despite efforts to conform to a set schedule, instances did occur where the assistant was unexpectedly not available on certain days.

Lastly, the time of day that questionnaires were conducted was also a significant variable. Participants available in neighborhood locations became highly dependent on people being both present and awake. This was largely due to the common demographics of these neighborhoods (elderly), where afternoon naps and lunch time breaks were common. More so, locations found outside neighborhoods became dependent on set times during the day— either early morning or late afternoon, making the length of days variable. This was later explained to be because of the daytime temperatures would become too hot to work and therefore early mornings or evenings became a preferred time to work. In an effort to achieve maximum exposure to participants and that field research typically started at 8:00-9:00am, some days were as long as 12 hours when trying to catch people in the evening and/or resulted in early mornings for participants during the morning times. This was further complicated by many locations not being easily accessible (e.g., no road access) or were long distances on a bus. Some days were as long as 8pm or as early as 6am in order to achieve maximum exposure to participants.

5. Results and discussion

This thesis serves as an initial attempt to examine the modes and motivations of urban agriculture, since actual accounting of the activities of urban agriculture is notoriously difficult, especially in urban environments. This difficulty is due to the complexity of distinguishing agriculture from ornamental plants, street trees, or other urban vegetation that differs from the natural environment. Furthermore, urban agriculture is a broad, highly contextual topic that can vary in both location and formal or informal structure (business vs. sustenance). With respect to location, Chinese urban agriculture or *dushi nongye* refers to both peri- and intra-urban agriculture; however, research has primarily focused on what would be considered peri-urban agriculture by Western definitions (Horowitz & Liu, 2017; Jianming et al., 2012; Zhang et al., 2009). Moreover, while urban agriculture in the West is strongly driven by civil society movements critical of the industrial agricultural system (Schupp & Sharp, 2012; Morgan, 2015; Bosco & Joassart-Marcelli, 2017; Gray, Diekmann & Algert, 2017), in China the state and private sector have dominated the development of food production in cities, with urban agriculture serving as a way to “reinforc[e] the government’s priorities for agricultural modernization and neo-productivism— [that is] largely absent of any language of justice, food sovereignty, autonomy, empowerment, or fair trade” (Scott et al., 2014 p.159).

This study examined one distinct type of urban agriculture: small-scale intra-urban agriculture. This form of urban agriculture has great significance within the Chinese context, as it is primarily undertaken by local residents. Horowitz & Liu (2017) argue that small-scale intra-urban agriculture is an overlooked practice by state and is one that is in need of greater recognition. In Nanjing, observations were made of the various participants and forms of agriculture informally and spontaneously taking place across the city in intra-urban settings. This urban agriculture is occurring despite Nanjing’s bylaw that has prohibited the growing food within public green spaces in residential neighborhoods since 2013 (Si & Scott, 2016a) and has seen residents continue to grow within urban areas that operate outside of any market-oriented structure (Si et al., 2016).

Based on the objectives of this thesis, the first section will discuss the results from the surveys, semi-structured interviews, and participant observations made in the field and their significance to urban agriculture. It is first organized by the various modes, or the manner in

which intra-urban agriculture is occurring and experienced, of participants and second by their motivations, including the benefits and the challenges that exist in practicing urban agriculture in the city. This section analyzes the social, environmental, and economic motivations of participants from semi-structured interviews and discusses their thoughts and opinions on the perceived benefits and challenges of urban agriculture. In addition, whether or not the growing of food in the city of Nanjing is seen as a positive or negative is discussed. Lastly, this chapter will discuss the city government's future and current understanding of urban agriculture in Nanjing as well of government understandings of the perceived benefits of and challenges to urban agriculture, based on data gathered in semi-structured interviews with government officials and academics in positions related to the agricultural sector in the city of Nanjing and Jiangsu province. Throughout this chapter, the number of participants that responded to a question in a particular way versus the total number of participants that answered the question are displayed in parentheses (see Table 10 for further details).

5.1 The modes and motivations of urban agriculture practitioners

As highlighted in Duchemin (2008) and Mougeot (2000), the characteristics or modes of urban agriculture's multifunctionality consist of and are based on numerous factors (see Figure 2 and 4). Therefore, in an effort to understand the various modes and motivations of urban agriculture that exist, this section will analyze both the questionnaire data and semi-structured interviews with participants to determine what characteristics define urban agriculture in Nanjing. As mentioned, the questionnaire was used to gauge what benefits (social, environmental, and economic) and challenges (physical and governance barriers) existed. Appendix 1 and 2 includes original questions in English, with Mandarin translations, while Table 10 includes a tabulation of the questionnaire results.

5.1.1 *Participants modes of urban agriculture*

In determining the various ways, or modes, in which participants engaged in urban agriculture in Nanjing, several questionnaire and interview questions focused on the *location*, *economic* costs or income, and the various *environmental* impacts (positive or negative) from farming techniques or modifications to the land. Based on conversations in interviews and observations made, the majority of participants had considerable knowledge on growing food, which allowed for both creativity in designing spaces for food and increased food production.

Most participants could discuss in detail and justify their farming methods as they relate to food quality and safety. The literature identifies several different types of urban agriculture that can take place in any given location. These include rooftop, community, animal husbandry, aquaculture and other various forms of agriculture (e.g. vertical farming) that take place in either intra- or peri-urban areas at both small and large scales. In addition, empirical evidence is often lacking on these activities and therefore the questionnaire attempts to further understand the various modes taking place in Nanjing. These key questions will be discussed as relevant below.

The majority of observed urban agriculture was primarily based on accessibility and



enjoyment, where urban residents converted, or modified areas that were viewed as ‘wasted space’ into growing opportunities within residents’ neighborhoods and in various locations around the city (Plate 2). ‘Wasted space’ is loosely defined by participants as locations that have been abandoned for some time and areas

Plate 2. Various vegetable plots on ceased development land in the Qixia District of Nanjing. It was estimated that over 100 families grew on this field alone.

that were considered to be of good growing potential. The empirical research

conducted for this study in Nanjing found that intra-urban agriculture remains largely an informal practice, dominated primarily by older, working-class individuals growing primarily vegetables in “empty” non-built/communal spaces around the city and in neighborhoods (26 of 56 participants = 26/56), on areas of ceased development (24/56), rooftops (1/56), and balconies (1/56) or hanging of plants out of windows within neighborhoods throughout the urban core districts, Gulou and Qinhuai, and the new urban area Qixia. In addition, field observations saw far greater

numbers of residents growing on balconies and rooftops but challenges around access, participants being present, and contacting with follow up information provided prevented further questionnaire opportunities.

There were many elements that determined the *location* residents were able to grow food in the city. In Nanjing, resident buildings in urban areas were dominantly gated communities. This created a common element between those that grew food within neighborhoods that were visited in Qinhuai, Gulou and Qixia, as the older residential apartment buildings had better physical suitability. This was because they had more open area and lacked the formal organization or planned design of common property than what was seen in newer neighborhoods. Furthermore, municipal regulations around growing in public spaces was less restrictive as using these empty spaces around the neighborhood was seen as beautifying the area, as long as it did not interfere with the functioning of day-to-day life of both residents and those managing the neighborhood. This could be seen in an interview where one neighborhood committee member stated,

“People could grow flowers and plants around their own household, they could even grow some on the public green space, but in principle it is not allowed to grow vegetables. Even if growing some small-scale vegetables is permitted, one cannot influence other households, nor could they take up public space or parking lots, or cause any sort of inconvenience to other people, especially foul smell.”

(Neighborhood Committee Member #1, June 12th, 2017).

While the committee member recognized that this was the rule, those that did grow food made sure to either plant food crops amongst greenery/flowers or in removable containers. In contrast, new high-rises with well-planned layouts were better regulated and had younger demographics. This also made it difficult to survey people in these high-rises but based on observations alone, the level of growing activity appeared to be much lower in these neighborhoods. This was also stressed by one participant when asked about people in Nanjing ability to grow food in communities and said:

“[urban agriculture] is probably only possible to grow your own vegetables in older neighborhoods cause in new neighborhoods there are very tight security controls and the areas have been planned out, the layout has already been planned out before you even move in, so you do not have very much of a flexible space to operate or grow in those public green spaces” (Participant 25, July 25th, 2017).

It can also be suggested that this is because these communities were more affluent and the need to grow food was less pressing or that these are younger people that are working full-time and have less time, energy or interest than those found in older neighborhoods. Outside of land used within neighborhoods, several participants, especially in the Qixia district, grew food on ‘ceased development’. These are areas where construction was once taking place, but the developers had stopped. Participants did not know the exact reason for the ceased development, but the areas had been abandoned for some time. One participant noted that field site #3 in Qixia “[had] not been used or developed for 15 years” and field site #2 in Qixia had been idle “for at least 8-10 years” (Participant 54, June 20th, 2017). This was an interesting length of time as land laws in China say that extended periods of time like this, where the land is not being used, the land should be taken back by the state from the land users.

Fifty percent of participants grew food on less than 50²₁ (21/42) with the highest estimated land size being grown on over 2500² (1/42). These spaces were typically used just for growing plants and vegetables and some (12/42) saw it as an educational opportunity. The restrictive nature of growing larger quantities of plants and vegetables in neighborhoods was, according to one neighborhood committee member, to “keep the city environment clean and tidy, avoid bad smell, and if one household is tolerated, then all households would strive to grow, it would be a huge mess and cause great difficulty for management” (Neighborhood Committee #2 June 2017). If someone was caught growing larger quantities, the committee would approach the individual first and try to encourage removal before reporting to their superiors. This was important as “neighborhood environment hygiene management is a huge factor in the assessment of neighborhood management” (Neighborhood Committee #2 June 2017). Interestingly, when asked if the farmers would grow more food if green spaces were made available in the city to use, 60 percent (34/56) agreed that they would make use of these areas, but many expressed concerns in interviews of the utility of these spaces if they were far from their homes. One neighborhood—Lu Xun Yuan—made available seven or eight pieces of land around a building that used to be the home of a famous writer/poet free of charge for growing. The project was well received and was mostly used by people with previous farming experience and who lived in

¹ Measurements were converted from the traditional measurement of Mu to square meters. Mu is a Chinese unit of land measurement that varies with location. It is commonly considered 666.7 square meters (Britannica, 2019).

close proximity to the land. While regulations do not allow the growing of vegetables freely in neighborhoods, according to the committee member interviewed at Lu Xun Yuan neighborhood “the committee had to report [to officials and], write their statements and wait for approval [for this project]. They received approval from upper division in April or May this year earlier [2017]” (Neighborhood Committee #2 June 2017).

The years of farming experience for participants was also significant and it became evident that previous farming knowledge helped to grow food in the city. As seen in Figure 9, the majority of participants (36/43) had been growing in the city itself for more than 5 years and some greater than 20 years. Participants typically demonstrated an intricate knowledge of plant properties, utilized recycled materials, and made creative adaptations to spaces to add structural support, water collection and fertilization of the soil, to name a few. Farmers typically grew vertically using wooden structures or wire within the core districts of Nanjing, given space constraints, but farmers in the new urban area of Qixia had larger spaces and therefore did not need to grow vertically as often.

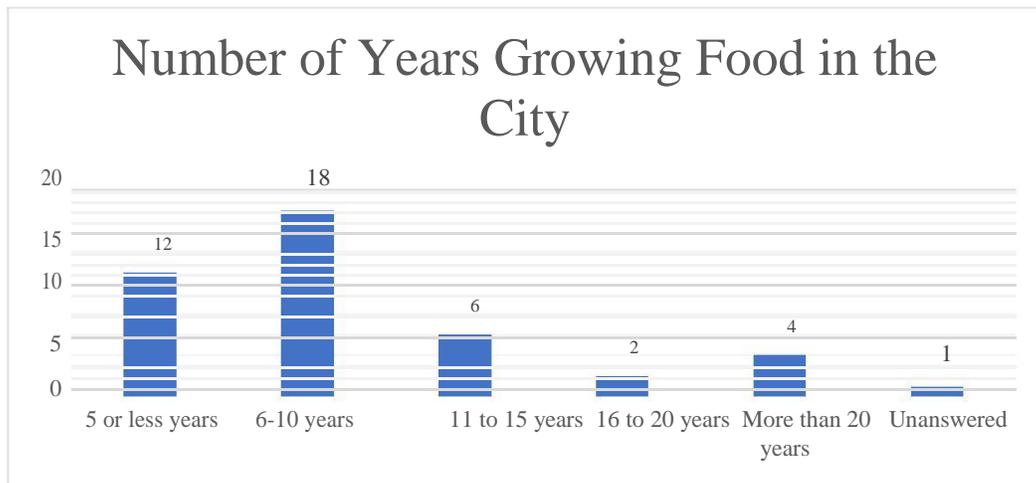


Figure 9. The number of years a practitioner had been growing in the city of Nanjing, China.

The types of food grown varied slightly across participants, but the majority grew vegetables (50/56) including cucumber, eggplant, and Chinese long bean to name a few. In addition, many grew herbs (13/56) and flowers (21/56). Growing additional flowers and plants, including chrysanthemum, *Kalimeris indica* and amaranth, had two main purposes for participants. First,

participants knew that by growing more flowers and plants they could hide any food being grown from both the neighborhood committee and municipal enforcement. Secondly, participants knew that growing additional plants would make the neighborhood look aesthetically better and to contribute to urban green space, making it more acceptable for them to grow. In fact, many neighborhood committees had guidelines which emphasized common areas looking presentable and not messy. Respondents also chose to grow quick-growing plants for easy harvest in the event of complaints or inspections. Although rare, one resident had a baby chicken (1/56) and another raised fish (1/56) on their rooftop. Regardless of regulations around keeping livestock in neighborhood areas, the participant that had a chicken was very cautious with it and knew not to let the chicken go outside (Participant 25, May 22nd, 2017).

5.1.2 *Economic modes*

Economic modes of urban agriculture were found to either be quite neutral in terms of cost or allowed for slight surpluses in income. In an effort to determine potential *economic* burden of growing your own food, the questionnaire question asked, ‘*How much money do you spend in a month to grow your own food?*’ and ‘*If you sell your food/plants, what is your income in a year from growing your own food?*’. Despite respondents being of a lower socio-economic bracket, the costs associated with growing food in urban areas were not prohibitive. Participants were able to give monthly and yearly estimates. Amounts that were given in yearly estimates were broken down into a monthly average to allow comparison between expenditures and income. As seen in Table 12, expenditures were more often minimal and additional income often outweighed them. Moreover, many respondents stressed that health benefits and increased access to safe food outweighed any costs that do exist (discussed further in section 5.1.2 and 5.1.3). Water and soil nutrient recycling further mitigated these costs and is discussed further in section 5.1.1. There were no reported land-use fees, as all respondents utilized spaces around the city without formal permissions.

For those that did sell what they grew, it was often not a primary source of income (38/56) or seen as necessary. As one participant stated,

Table 12. Practitioners’ expenditures on and income from urban agriculture, by district in the city.

District	Qinhuai (n=14)	Gulou (n=13)	Qixia (n=29)	Total (n=56)
Expenditures *				
Minimal ¹	4	3	4	11
>100	4	3	13	20
100-200	3	N/A	4	7
<200	N/A	2	N/A	2
Unanswered	3	5	8	16
Income *				
Minimal ¹	1	N/A	3	4
>100	N/A	N/A	4	4
100-200	N/A	N/A	3	3
<200	1	1	1	3
Did not sell	9	7	9	25
Unanswered	3	5	9	17
* In RMB and based on monthly averages given by participants				
¹ Minimal was based on respondents unable to quantify the amount and was seen as an insignificant amount but knew some expenditures and/or income took place.				

“If I could not finish the vegetables myself within the family, I would sell the rest of them... in front of the wet market, in front of the supermarket or just in the street” (Participant 50, June 29th, 2017)

For other participants, whether or not they sold products was determined more by yield,

“If the climate, the weather is suitable they have a large area of vegetables that have come out then it’s the overall affect is great, and they will probably sell more, like 60-70% of the total vegetables...but when the weather is not suitable they would eat the majority and sell only 20-30%” (Participant 38, June 27th, 2017)

Twelve participants did consider ‘farming or gardening’ to be a component of their household income. Other sources of income included formal jobs (3/42) and informal jobs (3/42),

retirement pensions (27/42), government subsidies (9/42), and support from family and children (7/42). Interestingly one participant made mention of charging more money than the wet markets for their vegetables they were selling for two reasons - ‘*freshness*’ and ‘*convenience*’. This participant felt that people are willing to pay a bit more for these benefits and the convenience of being able to buy the food close to home, despite some mention of customers that “*feel that her pricing is a little bit high but still like considering leveraging all these things that they would still choose to buy from her*” (Participant 38, June 27th, 2017).

The high number of people who do not sell (25/42) makes a strong argument against the common assumptions that urban agriculture is partly done for economic gain. This also reinforces findings from the previous survey done by the Hungry Cities Project (HCP, 2016), that found that of the 22.1% of respondents (253/1210) who grew food in the city, 77.7 percent felt food access was not an issue and a further 14.7 percent felt only mildly food insecure, despite it being well established that households in many cities in the world engage in urban agriculture to improve food security (MacRae et al, 1999). Within this context, the motivation to grow food varied and presented a unique context within Nanjing, which is further discussed in section 5.1.2.

In addition, participants mentioned the limited space and crop size as major factors in whether they sell. One participant mentioned that, “if you’re growing a large area of land, you’re expecting to get more income, but is not really something you could do within this limited land...” (Participant 8, June 8th, 2017). In addition, participants mentioned the lack of channels for selling these days and the cost of being able to sell in wet markets, which has gone up to 1000 RMB/month (Participant 54, July 13th, 2017), as a barrier to selling even if they wanted to. This means that most who do sell find locations outside wet markets, such as on sidewalks or right in their neighborhood. Commonly, under certain urban agriculture types (e.g., community serviced gardens) (e.g., Pole & Gray, 2013; Patel & MacRae, 2012) there is a cost associated with either receiving vegetables or renting the land to grow your own. However, when participants were asked if there was any fee for renting the land being used, no one was making payments (0/42). This was not surprising within the urban core districts of Gulou and Qinhuai as the areas being grown on were typically close to their own property, or modifications were made to common property in the neighborhood that was not actively patrolled by the neighbourhood

committee. However, it was surprising to find that the land in the Qixia district where participants were growing on large lots of former or ceased development were also not being rented or leased out by the developers or city. Interestingly, despite any formal agreements or structures in place, participants demonstrated a sense of ownership over the land. Three participants mentioned receiving permission from the previous farmer who ‘broke the land first’ to grow plants and vegetables. This carried enough mutual respect that any compensation that may result from the developers for destroying or removing plants and vegetables that had been grown, specifically in site 3 in the Qixia district, was given to the original ‘owner’. One participant noted,

“He gives the field to him but of course he as a farmer will not receive the compensation from the developer but the person who gave the field to him will get the money from the developer... and he is fine with that because he already gave the field for him to grow” (Participant 49, June 30th, 2017)

Most notably, the participants who were most active in selling were in the Qixia district. This district is a new urban area that has a large ‘landless farmer’ population with greater open areas for farming to take place due to more recent unfinished commercial development.

5.1.3 Environmental modes

Lastly, participants were asked “Do you reuse/recycle any of the following materials to help you grow?”, which included water, food waste, soil, urban waste (e.g., construction hats, construction materials, ‘garbage’) or others. A number of participants used both household waste and food scraps to compensate for low soil nutrients, and also took advantage of several other

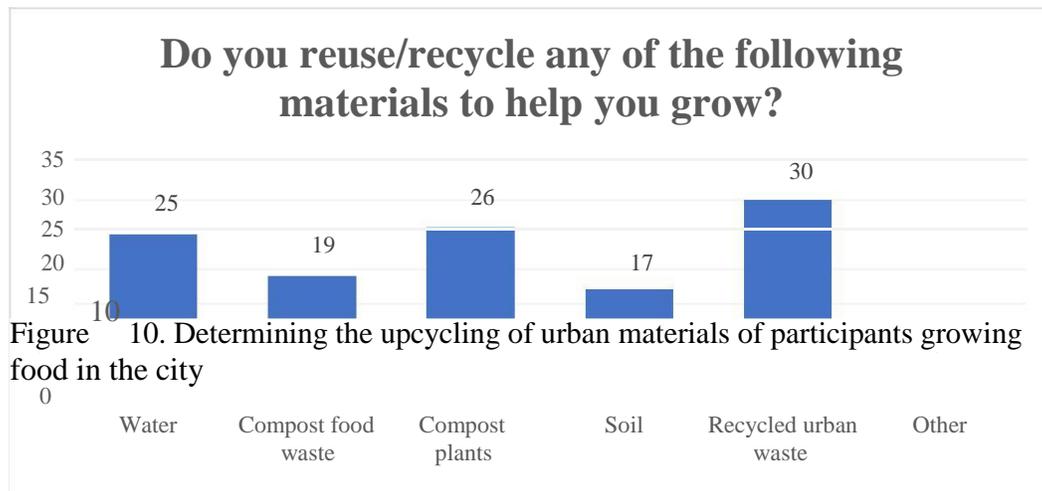


Figure 10. Determining the upcycling of urban materials of participants growing food in the city

materials to help them grow as seen in Figure 10 below. Twenty-five (25/42) participants re-used household water to water plants.

When asked about what season(s) they grow food, the majority grew all year (38/42), while only a few (4/42) grew only during certain seasons. Of these four, spring and summer were the most popular times to grow. Of these seasons, spring was the most productive for food (31/42), and second was summer (19/42), whereas fall (12/42) and winter (1/42) were considered the least productive. Most participants grew a large variety of plants and vegetables with 15 participants (15/42) growing at least 10-15 different varieties and a further 12 participants (12/42) growing more than 15 varieties. An important environmental argument for urban agriculture is that it can increase indigenous biodiversity (Lin & Fuller 2013; Clarke et al. 2014) and therefore, participants that were asked “*Do you grow native/indigenous/locally found species of plants or vegetables?*”. Of those surveyed 31 percent (13/42) ‘always’ grew native plants and a further 57 percent (24/42) grew them ‘most of the time’. Only 5 percent (2/42) of participants mentioned growing native species of plants ‘rarely’. This finding reinforces the idea of increased biodiversity when urban agriculture takes place. One participant (15, July 3rd, 2017) mentioned growing as many as 35 different varieties of vegetables and still did not think this was very many.

5.1.3.1 – Modifications and the land use of ‘wasted space’ for UA in Nanjing

As part of this research, it was important to understand how participants were managing and modifying areas intended to grow food and how they adapted to the urban environment, particularly given the informality of and the laws and regulations surrounding urban agriculture in Nanjing. Participants were first asked “*Have you had to make any changes or added materials to the location/area where you grow food to allow food to grow?*”. The questionnaire found that nearly all participants (N=40) had to make modifications to allow food to grow. There were several modifications and adjustments made by participants in an effort to both maximize growth (e.g., soil nutrients) and minimize conflict with neighbors, neighborhood committees, and urban management teams. Some examples can be seen in Plate 3 and include fencing, water collection areas, vertical structure to maximize space, and out-houses. The modifications also varied between the districts. Qixia saw fewer physical modifications or including additional infrastructure due to increased space, rather participants were faced with issues of sourcing water



Plate 3. Various modifications utilized by urban cultivators, which include: (top left) piping to bring water, (middle top) urban waste used to scoop and capture water, (top right) a well dug and reinforced with rocks, (middle left) various structures and modifications to enhance growing, (middle) bathroom constructed to increase access to human waste for fertilizer, (middle right) various modifications to enhance growing, (bottom left) various alterations to growing area, (bottom middle) vertical constructions to increase growing capacity and (bottom right) constructed ladder to get into an area of ceased development to grow.

and combating soil nutrients. In Qinhuai and Gulou, participants used bricks and bamboo to construct fences and vertical structures, and even made extensions to increase the distance household water could be used. Others simply carried household water (often recycled) to the plants.

To overcome issues of soil nutrients, participants obtained additional mud and soil that was often dug from surrounding riverbanks or sewage drainage spots in the city. It was consistently emphasized that they wanted to avoid using chemical fertilizers, again likely reflecting the idea of increased food safety. One participant mentioned receiving help from city workers, people that were doing construction nearby, to bring her the mud she needed (Participant 8, June 8th, 2017). In addition to mud and soil, a substantial number of participants



Plate 4. Pot holding what appears to be household human waste for fertilizer.

used personal resources (e.g., feces and urine) and household waste in all three districts included in this study. Firstly, participants often utilized fecal matter from both their homes and from public washrooms around the city (Plate 4).

For example, one participant who collected from toilets said,

“... [I collect] from the industrial sites, because they have more people there instead of just going to a random public toilet and I do this on a regular basis, so I can collect it every day to use as fertilizer”

(Participant 54, July 13th, 2017)

One participant even made their own toilet in field site 3 in Qixia district (section 4.1.2) to minimize travel (middle picture in Plate 1). Secondly and used less often, participants mentioned the use of urine to both water and fertilize the soil. Lastly, household waste was used and consisted of ash (burnt wood) and food scraps (intestines, eggshells) to enhance the soil quality. On a few occasions, participants mentioned getting food scraps (e.g., intestines) from their local

wet market, again reducing potential waste and economic costs. There was some controversy and concern within neighborhood areas for these methods of soil fertilization, as concerns of smell were often expressed and given the laws around growing vegetables, discretion is needed. To avoid drawing unwanted attention from neighborhood committees or urban management teams, participants demonstrated their farming knowledge in the methods used to apply fertilizers to their plants. Participants knew concerns of smell would attract unwanted attention, especially in neighborhoods, and therefore would often not use food scraps or fecal matter on top soil or once vegetables had started to grow (Participant 8, June 8th, 2017) and would be sure to bury any scraps used. It was less common for participants to use fertilizers, or what some called ‘nutritional water’ or phosphorous fertilizers. When considering the economic costs of urban agriculture, some participants did include these types of fertilizers as expenses and this is perhaps why others used more ‘natural’ or upcycled forms of nutrients. Interestingly, given the age of the participants, nutrient water was often bought online with family support. Even less common was the use of pesticides or ‘chemical fertilizers’ due to concerns over taste and quality of the food. As one participant noted,

“I do not use much chemical fertilizers, the reason is pretty much similar like when using the chemical fertilizers not only would it not taste as good as those who are not using chemical fertilizers and also it is not very healthy” (Participant 54, June 30th, 2017)

However, as experienced in the case study in Ghana (Cofie et al., 2006), the use of natural fertilizers for soil like urine and feces could present some serious health concerns and is an area of study that could see further research in China.

Water was obtained through several different ways, the majority of which were all forms of recycled or collected water with the exception of 2 participants that also used tap water. Firstly, most participants would put out various vessels to capture any rainfall that would occur. Secondly, several different types of greywater were kept. This included water from washing and the rinsing of meats, vegetables, and rice.

In many urban neighborhoods, plants and vegetables were typically seen growing in pots, recycled sinks, styrofoam containers, and other various urban waste (Plate 5 and 6). These were advantageous as in the event that complaints or the urban management team would come for inspections, the plants could be brought in. This is in contrast to plants or vegetables being grown in raised beds and/or on vertical structures which are far more difficult to move. Food



Plate 5. Participant 15's (July 3rd, 2017) modifications to grow vertically including adding several different cables using cords, string and bamboo. This participant also used discarded bricks found in neighborhood to build a garden bed.

crops were typically seen on ‘empty’ non-built spaces around neighborhoods, rooftops, balconies, or hanging out of windows but varied in size depending on space and accessibility.



Plate 6. Styrofoam containers being used to grow plants and food.

Moreover, I observed vegetable plots of varying sizes along sidewalks, road overpasses, under bridges, and in and around ceased development sites. While it is difficult to assess who maintains these areas given their location, it further highlights the significant motivation for citizens in Nanjing to utilize any and all spaces they can to grow food in urban areas.

5.1.4 Motivations and barriers for participants

Based on both the survey and interview data, this research was able to determine four primary motivations for participants to farm: (1) previous occupation as a farmer; (2) to enhance their health and well-being; (3) proximity of accessible land; and (4) to ensure access to safe and fresh food.

Farmers were primarily aged 55 or older with 14 percent being between 55 and 64, 50 percent being between 65 and 74, and 32 percent being 75 or older. In addition, participants were an almost equal amount of male (51%) and female (49%) and were of lower-income. As seen in Figure 12, many of the participants did not receive or complete any formal education (34/56). Participants were typically retired (31/56), with only 2 currently working full time as factory workers. For those retired, twenty-one (21/56) were also previously factory workers and a further

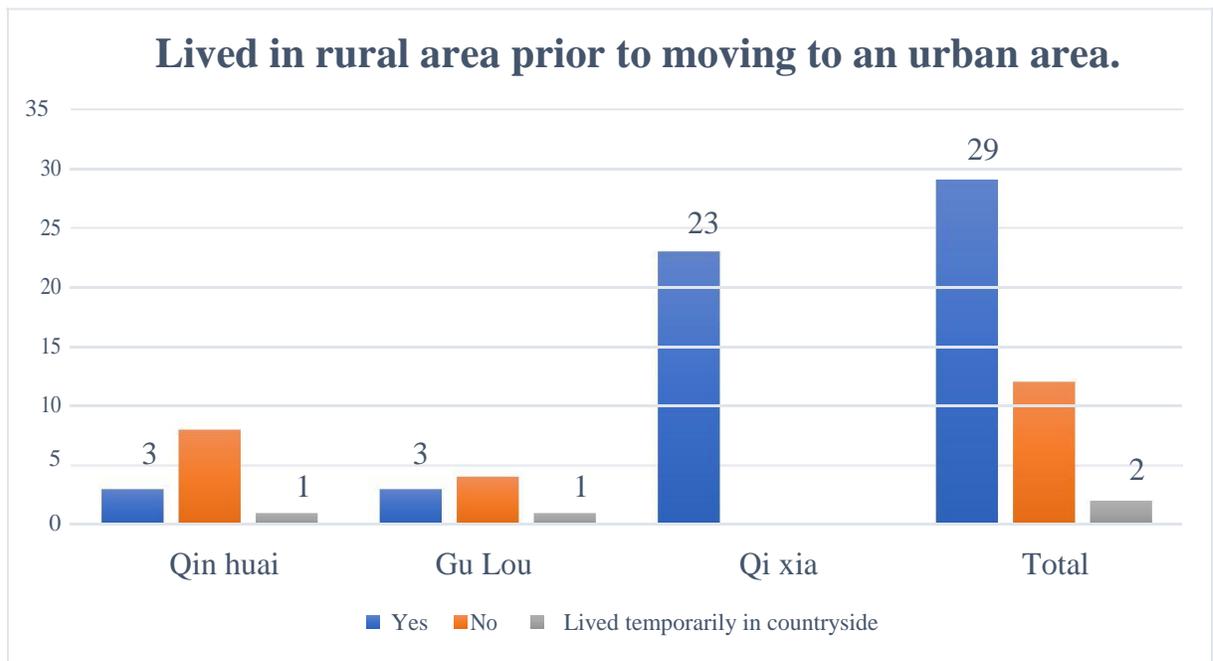
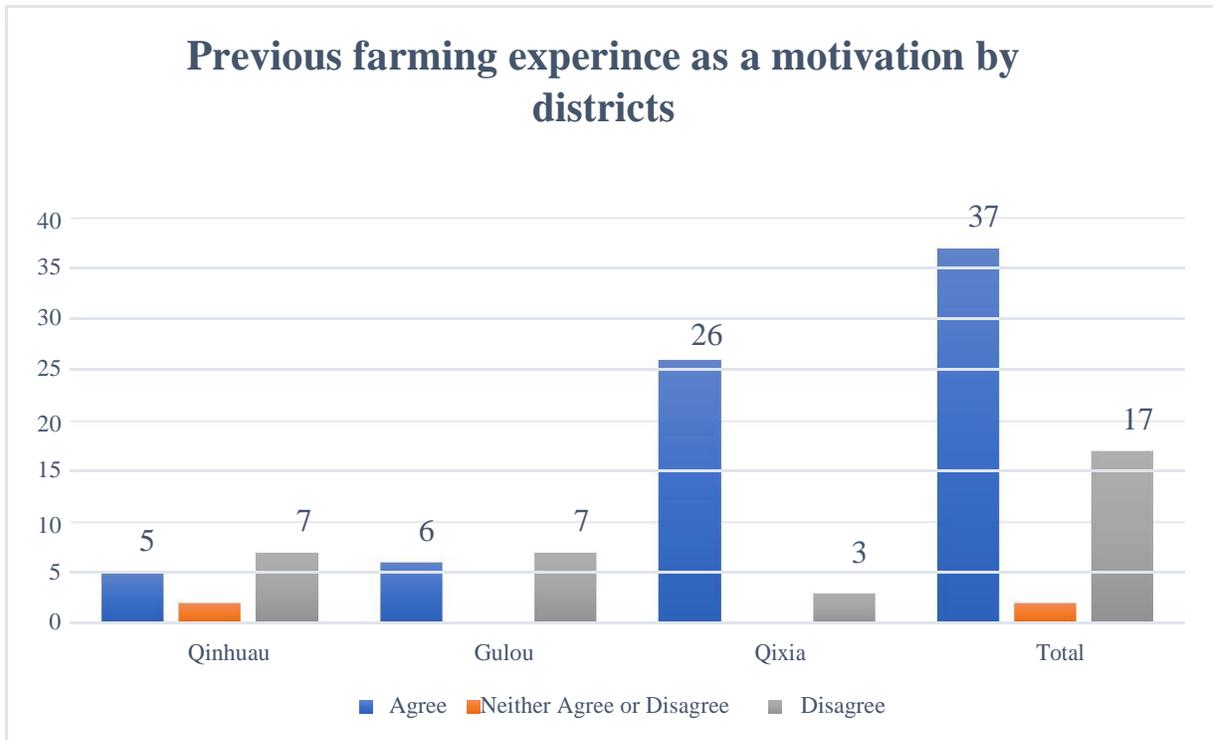


Figure 11. Participants that lived in a rural area prior to living in the city and those that saw previous farming experience as a reason to continue to grow food in the city.

sixteen (16/56) were previously farmers. In addition, 72 percent (31/56) of the participants were retired, while some did engage in temporary or part-time work in the city. Lastly, participants were primarily limited to a high school education (Figure 12). Factors such as age, education,

work status, and previous farming experience play an important role in determining the motivations for participants to continue and engage in growing food. Participants also continue to grow despite any challenges (physical, political, or social) that may present themselves and are further discussed in this section.

First, a previous farming background seemed to be a key motivator for participants to re-engage with agriculture after moving to urban areas. The questionnaire asked if participant agreed with the following statement, *I grow food/plants or raise livestock because I was a farmer before moving to the city* and asked whether or not they had lived in a rural area prior to moving to the city. This research found that 67 percent (43/56) of participants originally worked or lived in a rural area of Nanjing before moving to or have had their home now developed into an urban area. Furthermore, 66 percent (37/56) of participants had been farmers or spent time farming in their life and this was considered a motivating factor in continuing to farm in urban areas. This is an important consideration as recently there is a growing number of ‘new farmers’ in China,

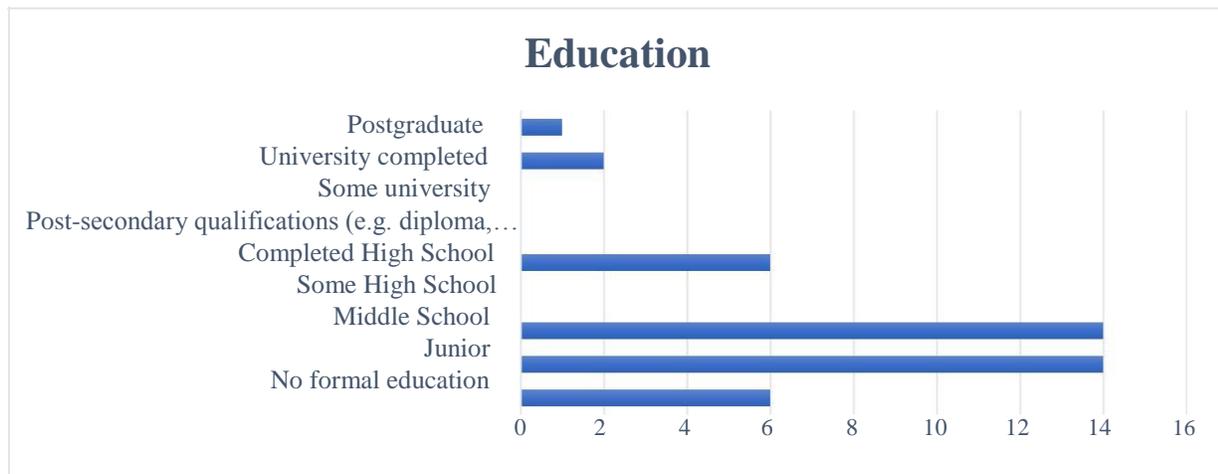


Figure 12. Education level of participants (n=43).

where people who have no farming background are beginning to participate in urban agriculture in some form. This is predicated on the idea of food sovereignty and issues with food safety that has been an ongoing matter in China for some time (see Section 3.2.1). Interestingly, previous farming experience was a stronger motivation in Qixia than it was in Qinhuai and Gulou (Figure 11). Qixia is a ‘new’ urban development area, likely resulting in higher amounts of landless farmers that have had their land expropriated by the government for a set compensation amount

living in this area. While not the focus of this study, the social significance of this on those that have been moved is important.

An important component to the urbanization process in China is the hukou status of a person as it can dictate their access to various social services. Of the participants that completed the questionnaire, 88 percent (38/42) were born in Nanjing and have lived here all their lives. As a result, residents held varying statuses of *hukou*, with six (6/42) living in the city with agricultural *hukou* and thirty-five (35/42) living in the city with non-agricultural *hukou*. Of the six participants living in the city with agricultural *hukou*, five were from the Qixia district and one lived in the Jiangning district (this participant brought food to sell in Gulou and therefore was surveyed there). As discussed in section 3.1.1.1, having agricultural *hukou* while living in the city creates serious complications for social services. Many of the participants also did not completely depend on the food that was grown, particularly in the Gulou and Qinhuai districts, where participants often still went to the wet markets for large shops and used what was grown as supplementary food. In the Qixia district, participants grew more food as the areas were less constrictive.

In an effort to understand the extent of work and the time spent maintaining and growing food, participants were asked several questions about the number of hours and days spent maintaining the area as well as whether or not they had any help. In response to the question “...have [you had] any help when growing food/plants or livestock? (Select all that apply)”, the majority of participants indicated that they are solely responsible for growing and maintaining the land (30/42). Six (6/42) participants said their family helped with the growing and a further seven (7/42) said that their spouse or partner helped out. When asked ‘How many hours a day do you work on the land?’ and “How many days a week?”, it was clear that farming was an important element in their daily or weekly routine. Most participants worked 7 days a week (32/42) on the land in which they were growing on, while others put in at least 3 days (3/42) and the remaining (6/42) 5-6 days per week. In terms of hours spent to maintain the area, most participants spent ~ 2hrs per day (40/42). This did not account for the time needed for modifications, initial setup, or any leisure time as the wording of this question is accounting only for the time spent or required to ensure the growing of food. Through interviews and field observations, it was revealed that participants also came to their areas of growing at particular

hours in the day. Participants would commonly come to check, pick, maintain their areas either early in the morning (6-8 am) or later in the evening when the sun was lower (5-6 pm). This proved true once field visits were timed around this as more people were present.

In terms of the challenges or barriers participants faced, the most common issues raised were social issues including confrontations with construction crews, urban management teams, and neighborhood committee. In addition, on rare occasions, participants had experienced theft of food. Between the three districts, there was a lack of consistency regarding enforcement by the urban management team. According to neighborhood committees and neighborhood residents, authorities cited improvised growing structures (e.g. rooftop structures and containers) as their highest concern, saying that they would impede the enjoyment, use, and safety of public space. However, there was no immediate removal in most cases, and no mention of financial penalties in any circumstances. Within the Qixia district, where respondents predominantly grew on ‘ceased development’ land, project managers and construction crews were often in conflict with the growers. In one location, the growers were given written letters indicating that they were to stop growing as the planned development was set to continue; however, this was several years ago, and no construction had begun at the time of this research. Around the same time, construction crews had come in the middle of the night and began bulldozing. This was perceived by some participants as the construction crews trying to avoid confrontation. Interestingly, some individuals were compensated for the lost food—highlighting the complexity and unique feature of land rights in Nanjing. This even extends beyond land rights. The philosophies or principles that are being used to govern urban spaces, in this manner, show the flexibility or flaws in the state on perception of its laws. In this case, in an effort avoid any conflicts, the state or municipality is flexing the laws in an effort to maintain or ensure stability concerns.

The handling of growing food on land not owned by participants often differed depending on the neighborhood you were in. In one interview, a participant mentioned that the neighborhood committee would allow growing and not interfere, if:

“You are growing properly and by properly I meant that you are growing mostly flowers and plants, but if you are growing small areas of vegetables this is fine but if you are growing large areas of vegetables that is not acceptable. By large area of vegetable there is a very clear definition of

that here in this neighborhood, that is you do not grow exceeding the limit of your own household. Like extending from both side of your door. Like if you go beyond the extension line of your door that will be considered trespassing into other people's territory and then other people would have the right to” (Participant 25, May 22nd, 2017)

Neighborhood committees and gate security would also warn those selling or growing food in neighborhoods of urban management inspections, so that they have time to harvest collect or move any food that they were growing. It would seem the neighborhood committees were more relaxed on the rules and the urban management teams were the ones who would come and enforce the ‘no growing’ rule. Through field observations, it was also found that those growing within obscure urban locations, made sure that it was known to be intentional, and that the food was owned by someone. Evidence of this was found in writings on walls or boards around Nanjing’s urban areas (Plate 7). These areas were typically found in locations outside of one’s property and therefore were using land that they did not own. It was also commonly seen in small spaces within high traffic areas.



Plate 7. Words emphasizing (or warning) that the food being grown here is intentional and asking that it not be removed or destroyed.

There were also physical challenges to growing food in the urban environment. Despite wanting to grow, many that lived on the second or higher floors were not able to grow food. This was either because there was no land and those on bottom floors got priority or going up and down the stairs to tend to the vegetables was too physically demanding.

Interestingly, as outlined in Table 13, 96 percent of participants considered growing food would ensure the quality and safety of the food was most commonly identified, while 91 percent of respondents indicated that they were growing food simply as a hobby. Additionally, 84 percent believe that the ability to grow food is an important part of their culture, which further highlights that being able to grow food is an important component to Chinese life among those surveyed.

Table 13. Motivations for Growing food in urban areas of Nanjing (N=56)

Questions	% Agree	% Neither Agree or Disagree	% Disagree
“Growing food allows me to control the quality and safety of the food”	96	4	0
“I grow food because it is good exercise”	93	8	0
“I grow food /plants or raise livestock as a hobby in my spare time”	91	2	7
“I am concerned about the decline of the environment and pollution in the city, and feel it is having an impact on the food we eat.”	88	2	11
“The food I grow at home is better quality than the wet markets or supermarkets”	86	11	4
“The ability to grow food is an important part of my life and culture”	84	11	5
“I grow food/plants because it provides additional income”	32	4	64
“I feel that food safety at wet markets and supermarkets is a concern for my household and that is why I grow food.”	21	9	70
“I feel that food prices are a concern for my household and that is why I grow food”	16	5	79
“I grow or raise food because other jobs have lower wages”	11	0	89

There were clear concerns over the impacts that the environment was having on the food supply in Nanjing; 88 percent believed that pollution in the city was impacting the food they ate. However, as highlighted in Regnier-Davies (2015), some participants had contradictory reactions to the perceived safety of food found at wet markets and/or supermarkets. While only 21 percent of participants in this study agreed that food safety was enough of a concern to grow their own food, a further 96 percent agreed that growing their own food allowed them to control the quality and safety of the food. This contradiction could be explained by the fact that many of the participants could not solely rely on the grown food for their subsistence. The majority still had to make several trips a week to the wet market to ensure an adequate food supply. In addition, participants seemed to be very aware of the impacts the environment can have on their food (88 percent). This could also be a result of several of the participants having previously been farmers. Farmers would have a first-hand understanding of the use and harm that chemicals can have on farm produce. In addition, 86 percent believed their food to be of better quality than that at wet markets or supermarkets. This research also found that participants did not seem concerned with food prices. With this, I speculate that the majority of those growing food in the city are doing so for 3 reasons: 1) previous life as a farmer; 2) to keep healthy by being active; 3) increase access to safer, fresher food. Furthermore, economic motivations seemed to be very low for participants, as seen in Table 13. Only 32 percent saw ‘additional income’ as a motivation to grow food. This was more evident in the Qixia district (see Table 8), where all the participants previously owned or lived on land that was acquired through urban expansion in the district and are now relocated and living in high rise apartments—a change in lifestyle that they did not necessarily ask for. As highlighted in Chapter 3, through rapid urban expansion, expropriation of farmers land has become all too frequent and has many social and economic implications. Frustrations over compensation were expressed by some of the participants, especially because recipients today are receiving larger compensation amounts. Interestingly, the economic motivation seemed to come more from the eventual buy-out or compensation for the lands those in the Qixia district are farming on. Despite the land not belonging directly to those farming, there were already cases of compensation for the destruction or removal of plants and vegetables, as occurred in the bulldozing incident. In understanding that buyouts can happen on these lands, one participant was planning to make the land he was growing on more valuable so when the developers come back, he (and others) will get a larger compensation, as “...people here are

planning to grow some more trees here so that when the real estate property developers really come, they can get more compensation money for tearing down their trees” (Participant 49, July 10th, 2017). The reason for this is that the participants were aware that developers and/or contractors were willing to pay “...1,500 RMB per Mu [or] 1.5 RMB per square meter” (Participant 54, July 12th, 2017). Some participants considered the bulldozing incident of this field (Site #3 in Qixia) comparable to “committing theft and stealing away other people’s properties and so the final result they agreed to pay a compensation of around 200 RMB” (Participant 54, July 12th, 2017). Therefore, despite many not growing for immediate economic gain, some participants plan to benefit from growing on these ceased development lands. While understanding land ownership rights and designation is outside the scope of this thesis, it is interesting to hear that despite the land not being owned by the participant that they are able to be compensated for the work they have put in.

Participants involved in urban agriculture often cited several social benefits from growing food. Of the food that was grown, 40.5 percent (17/42) of participants consumed greater than 90 percent of it, with a further 33 percent still consuming at least 70-80 percent of it. Of the food

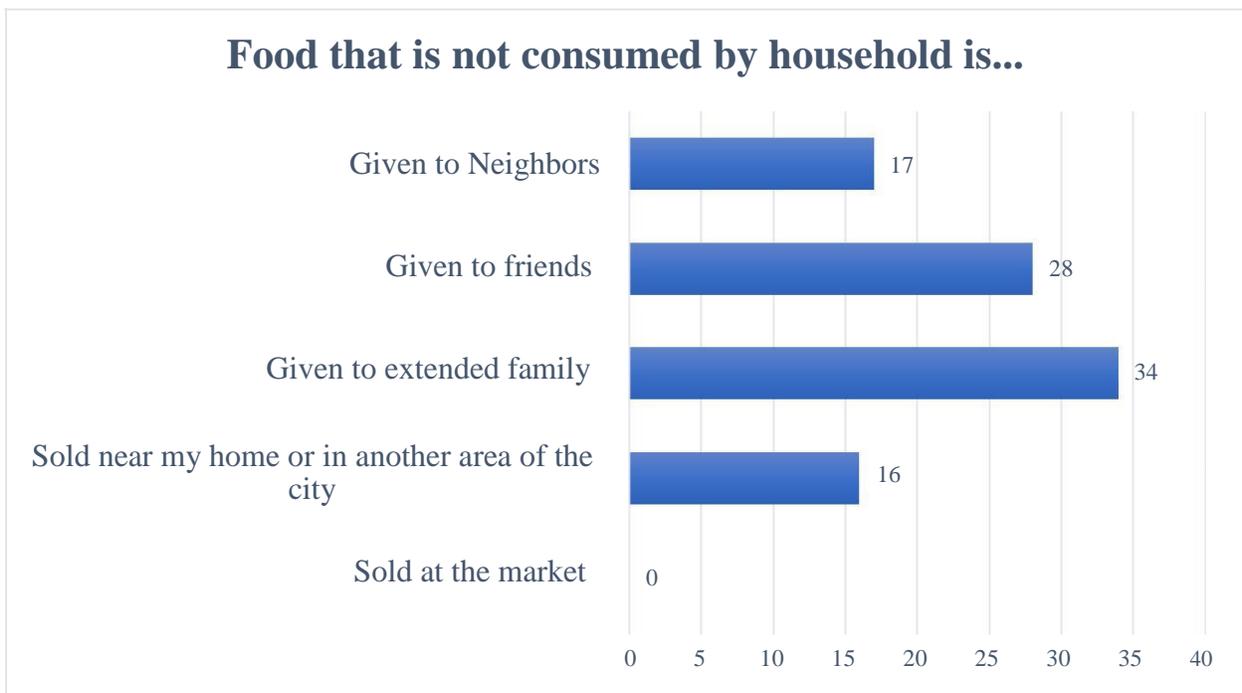


Figure 13. What participants did with the food they grew and did not consume. It was found that many shared it among family and friends.

that was not consumed, participants indicated that they shared food with extended family, friends, neighbors or sold it informally near their home or in another area of the city (Figure 13).

While sharing is a common social and cultural practice in China, sharing food of this nature is not considered the norm, especially without the expectation of something in return that many participants expressed. Therefore, this may indicate that social networks are important in building relationships in new neighborhoods and food may be seen as a way of establishing these positive relationships. Some participants explained that they shared food for economic relief not only for themselves but for their family and extended family. Participants also expressed a great deal of pride in their land, particularly in the Gulou and Qinhuai districts where most of the growing took place within close proximity to other residents. In addition, Table 13, shows that the health benefits of growing were a strong motivator for growing food. For example, 93 percent farmed to gain exercise. In addition, several participants expressed that the mental health benefits from keeping active and the sense of accomplishment from growing plants and vegetables were motivating factors.

Finally, given the importance of urban planning to integrate urban agriculture into the urban food system, participants were asked in interviews for their thoughts on growing food in the city in general and whether they would be supportive of laws or regulation changes that allowed more growing of food. Participants generally agreed that growing food in the city was a good thing and that if laws were changed to encourage urban agriculture, it would be a positive change for the urban environment. However, some participants became concerned over the idea of less regulation around growing because they felt there might be people that do not know how to grow and will not bother to learn, and therefore this will create more issues. Other participants weren't sure if urban agriculture would even catch on or change if regulations were different. Participants questioned who would benefit the most from changing the regulations around growing food in urban environments, as one participant believed that with different types of urban agriculture, like food delivery from community supported agriculture projects, it could become "too expensive to afford, for [...] ordinary citizens [and] thinks only those who are probably with higher wages, salaries could afford that" (Participant 15, July 3rd, 2017). Participants also suggested that regulation over who could grow and what is being grown would need to be tracked.

5.1.4 Motivations and the environmental impacts of urban agriculture

Participants were asked whether “...by growing your own food you can have a positive impact on the city/environment/urban food system?”; however, responses were likely limited to ‘how they perceived the impact of growing food to their immediate surrounding’ rather than overall environment or city, as the translation resulted in a loss of context on this particular question. However, the question did still draw some interesting results for discussion. The commonly associated environmental benefits of urban agriculture were not considered a clear motivation for participants interviewed in Nanjing. Participants were not motivated by the common civic movements, or environmental concerns with the industrial agri-food system commonly associated with urban agriculture in the Global North, nor were they motivated by limited access to food, as seen in the HCP survey results in 2015 (Si & Scott, 2016). Rather, participants altruistically were enhancing the environment just through their established farming practices that recycled products within the urban environment—as presented by Mougeot 2000. Some of these benefits include improved air quality, greening environments, increases in indigenous plants, recycling or both urban and household waste. This section will further highlight these actions.

The environmental improvement most commonly identified by participants was improved air quality, which is connected to the greening of the environment. This was considered to be one of the positive outcomes of growing more plants and vegetables within neighborhoods. One participant believed and emphasized that growing more plants caused them to “emit fresh oxygen and [remove] carbon dioxide” from the environment (Participant 8, May 30th, 2017), highlighting concerns over air pollution in the city. In addition to carbon dioxide reductions, participants believed that the greening itself (e.g., flowers, green plants etc.) made the environment more beautiful and would create positive mental health due to the happiness this can bring people. The flowers were also believed to limit the number of mosquitos in an area. As mentioned earlier, participants tended to grow indigenous or native species of plants. For example, one woman grew as many as 35 different varieties (Participant 15, July 3rd, 2017). Lastly, and most significantly, participants would recycle both household and urban waste. Many of the plants and vegetables grown within neighborhoods were placed in used containers (styrofoam, concrete, plastic), old household goods (e.g., sinks, bathtubs). When making modifications to allow growing more, participants also reused bricks, bamboo, string,

construction equipment, among other things. Even the soil came at times from “community people because there are the... nearby regions [where] renovating and building construction sites so the soil will be coming up and the community people would just use soil and sometimes bring it here” (Participant 8, May 30th, 2017) and it would also come from the riverbanks.

5.1.4.1 Food safety as a motivator for urban agriculture

Given the increasing amounts of literature on food safety concerns among consumers in China, several of the questions in both the questionnaire and semi-structured interviews, were designed to gauge whether the food participants were growing was in any way influenced by these concerns. As seen in Table 13, many believed that the food they grew was of better if not the same quality as that found at wet markets. This was because they “have a more confidence in the safety and quality of the food” they grow because they can control how much fertilizer, pesticides (if used) on the food (Participant 48, June 12th, 2017). Some went as far as to avoid specific types of vegetables in the wet market: “He never buys the small greenery vegetables, like small Chinese cabbages in the wet market because they tend to use a lot of these chemical fertilizers and hormones to just keep them growing quite faster and bigger” (Participant 15, July 3rd, 2017). However, when asked directly about food safety concerns, participants were mixed in how they responded, as some saw it as a concern while others expressed very little concern. Either way, for many it did not appear to be a direct motivation to grow the food in an effort to acquire safer food. The exception was one lady in the Gulou district, who was “...[very] concerned with food safety. I am concerned with chemical fertilizers, with pesticides and also water pollution” (Participant 15, May 19th, 2017). As a result, food safety was often spoken about as a concern and participants expressed a limitation to the growing of foods ability to compensate was due to the limited amount of vegetables that could be grown. Therefore, the amounts of food being grown did not cover their entire diet, but rather supplemented part of the food they needed. As a result, many still make regular visits to wet markets or supermarkets (Participant 25, May 22nd, 2017). When participants did speak directly about their concerns with food safety it appeared and was implied to be of minor concern. Participants believed and developed methods to ensure their food was safer, such as cleaning the vegetables to remove pesticides and chemicals. In addition, many participants mentioned that “soaking over and over again” (Participant 44, June 18th, 2017) also alleviated much of the concern, as this would

remove the pesticides when purchasing food from wet markets or what they saw as unreliable sources. While washing and soaking was common among participants for increased food safety, one participant expressed that:

“[food safety] will be of some concern but I have total confidence in the government that this situation will get better and better...” and that as consumers “we can also do something to make sure the quality, like we could avoid those bad quality products [by] smell[ing] the food source before buying them, judging by the look or avoiding overall those foods that doesn’t look too well or that could be like poisoned or contaminated” (Participant 22, May 20th, 2017).

Furthermore, one participant seemed to have become very confident in her ability to avoid unsafe foods because “... you could tell whether the vegetables are heavily polluted when I buy them from the wet market, so I am experienced [and]so I am not worried about [food safety]” (Participant 45, June 15th, 2017).

5.1.5 Summary of urban agriculture’s various modes and motivations in Nanjing

In summary, this section examined the various social, environmental, and economic benefits and challenges that were identified within the empirical findings this research in Nanjing. Common arguments across both the Global South and North is that urban agriculture can increase the social and economic outcomes of participants, while also improving both the immediate environment and the underlying sustainability goals of cities (Ackerman et al. 2014; Clinton et al., 2018; De Bon, Parrot and Moustier, 2008; FAO, 2008; Lovell, 2010; McClintock, 2010; Mendes et al., 2008; Mougeot, 2006; Panagopoulos et al., 2018). Therefore, this section has highlighted the results of both the survey and semi-structured interviews that were coded and classified into these three main categories. Through analysis of the semi-structured interviews and the questionnaire, several key themes emerged when discussing the elements of urban agriculture. These themes include ineffective regulation on growing food, previous farming experience is important but not essential to growing in the city, farming in the city was seen as a hobby, motivation was not a part of a wider civic movement, food sharing was an important result of urban agriculture, there was a lack of monetary motivation, concerns of food safety are not entirely alleviated by growing food, greening of the environment and exercise were seen as important to health.

5.2 Government officials' understanding and direction of UA in Nanjing

This research also sought to understand what political barriers may exist to urban agriculture in Nanjing through both a comprehensive literature review and semi-structured interviews with government officials in positions related to city planning and agriculture. This interview took place on June 28th, 2017 and was done with three different key informants. One interview participant was from the Jiangsu Academy of Agriculture Science (Key informant 1, June 28th, 2017), another was from the Ministry of Agriculture for Jiangsu province (Key informant 2), and third was an urban planner from Nanjing University. The key informant from Nanjing University was not able to be directly interviewed, but instead I was allowed to 'informally' interview him at a dinner setting due to new regulations, as discussed in Chapter 4. Therefore, this discussion will be limited to the first two key informants. This section will highlight this below.

Firstly, key informants were asked how they defined urban agriculture. Based on the literature, the understanding of urban agriculture in China is limited to that of peri-urban areas and does not fully consider the intra-urban or multifunctional benefits in policy. However, the definition given by participants was quite substantial and reflected on how peri-urban agriculture was viewed in the past and where it is headed today:

“There would be two layers of meanings. First, rural areas (countryside) should cater to the needs of the urban areas, agriculture must be developed in a way pertinent to the needs of the urban areas, in the old time, it may just be a one-way food supply, but now it has developed into various forms of leisure farming, tourism, ecosystem building, etc. The second layer of meaning focuses more on the practice of agriculture inside the city area. For instance, like growing their own food on the rooftops or the balconies inside their house. The challenge here is mainly the limitation of useable land resources” (Key informant #1, June 28th, 2017).

Despite key informants identifying several new forms of urban agriculture in the interviews, there remains an urban bias in how they saw the function of urban agriculture, particularly when considering the separation of intra-urban and peri-urban regions that persist in China. The responses from key informants on questions about how they define urban agriculture seemed to rely heavily on rural revitalization (rural communities that are moving away from extraction-based economies in an attempt to leverage their proximity to nature to develop other economic gains—e.g., tourism) that serviced the urban areas. This focus on peri-urban agriculture is at the

expense of the potential for intra-urban agriculture. In the second ‘layer’ of intra-urban agriculture, the key informant mentioned above saw the future of intra-urban agriculture to come from increased use of rooftop farms. Throughout the interview, key informants mentioned examples of the success of rooftop farming, indicating that for Nanjing and/or Jiangsu, this could be the way forward for intra-urban agriculture. The first example provided by key informants was in Chengdu, where the “local governments also make the regulation and inspection more flexible, but places restrictions on how to grow and what to grow. Local governments are also publicizing the benefits of rooftop agriculture to change people’s mindset about growing their own vegetables and fruits and so forth” (Key informant 1, June 28th, 2017). Based on the field research conducted, the comment on ‘limited useable land resources’ and conflict of land/property ownership was apparent, especially given the current ‘incomplete’ nature of urbanization that is happening in China. Key informants thought that the main concern currently in regard to rooftop agriculture is “the right to use the rooftop public space, whether it belongs to the real estate developer or the rooftop household, there are no laws or regulations to govern this issue” (Key informant 1, June 28th, 2017). They believe that if “each household can have 20 square meters to grow their own food, then to a certain extent they could solve the food supply issue and become self-sufficient” (Key informant 1, June 28th, 2017). One of their key projects that the government is working on right now at the Jiangsu Academy of Agriculture Science that could address this is building greenhouses on the top floor of buildings that use a spinning irrigation system to water plants and vegetables. The key informants saw projects like this as very promising for the future, “since land resources are so precious nowadays” (Key informant 1, June 28th, 2017). However, despite land resources being ‘precious’ current use of urban spaces for landscaping or green areas is relentless in Nanjing. The image of agriculture from an urban perspective appears to be negative; the sentiment seems to be that it should be kept in rural areas and apart from (increasingly beautified) urban areas. In terms of intra-urban agriculture, in the past, land in rural areas was abundant, which meant vegetable prices were low and the growing of food in urban areas was not necessary. However, with increasingly limited land resources, supply of vegetables dropping and prices rising, and food safety issues persisting, the city could develop “agriculture that fits under the city’s condition and caters to the need of the city, then many problems could be solved” (Key informant 1). Again, this is based on the high-tech versions of intra-urban agriculture through pre-planted seedlings that could be sold to homes for

growing (sounded like hydroponics). When asked about more traditional methods of individual small-scale intra-urban agriculture, the idea was quickly justified with why a more high-tech solution would work best:

“On one hand you have all these individual people who grow their own food inside their household or wherever possible and on the other hand you have this kind of project that he demonstrated... like 1000 square meters that to be divided into like a dozen or so square meters for each household like serving as a company. And I think that the second approach that working as some kind of a company would be a much more efficient and have the more promising future” (Key Informant 1, June 28th, 2017).

It became clear that traditional, small scale agricultural methods were not going to become a priority for intra-urban agriculture. When asked more specifically about the participants I have been interviewing up to this point, he recognized and understood their motivation to grow:

“...for these people who actually lost their land and who used to be farmers are usually the elderly and usually do not have other jobs but even then they get really high compensations from the government when they are taking their land so majority of them do not usually rely on growing food to get their income... I think that usually when their land is taken it is fine because it is more of like a leisure or hobby for them, so they do not really care about them too much” (Key Informant 1, June 28th, 2017).

While this does align with the findings of this thesis, the compensation that farmers have been receiving would be one point of contention. As the literature highlighted, many farmers are marginalized and often undercompensated when moved due to urbanization, despite the official thinking they were well compensated.

The second key informant highlighted the past versus the future and even used the term “modern urban agriculture”. This term was first seen in the 12th Five Year Plan. This key informant believed that urban agriculture had two concepts: urban agriculture and modern urban agriculture:

“The former [urban agriculture] mainly refers to the supply service of surrounding rural and sub-rural areas to the urban area. The latter [urban modern agriculture] places emphasis on the combination of three concepts, namely, production, lifestyle and ecology [emphasis added],

which include new ideas such as (1) cater to the need of urban civilians for leisure and sightseeing; (2) cater to the ecological need to build a greener environment; (3) decrease pollution, lower the use of pesticide and chemical fertilizers in the production of food.” (Key Informant 2, June 28th, 2017)

Again, while this definition felt scripted, it does highlight the continued recognition of the multifunctionality of urban agriculture, but still relied heavily on the technological side of urban agriculture. This key informant believed “in terms of technology there is no such kind of challenge or difficulty [to growing food in the city] so mostly it is the limitation of the public spaces and the policy [that does not] allow grow[ing] on rooftops” (Key informant 2, June 28th, 2017). When asked to clarify what he meant by ‘modern urban agriculture’, he highlighted four main elements: (1) it is an industry that encompasses production (seedlings, animal husbandry), processing or growing, and a variety of market structures (products, food, services); (2) it is more organic, high quality; (3) it is a more technological (advanced) form of agriculture and (4) more “talent and human resources” to sell the product and services, including online or ecommerce options. The technology is being supported by several science academies around Jiangsu including Nanjing, as was highlighted in Aiming (2017). In order to have urban agriculture become successful, even while using the technological forms, the key informants saw getting the public to acknowledge and understand the benefits of these forms of agriculture as a barrier to urban agriculture’s success in Nanjing. This seemingly in contradiction to what is actually occurring on the ground where, as this study shows, people in Nanjing are already engaging in intra-urban agriculture. This again is in despite of the various restrictions the government has placed on it. Currently the government has not done much to promote it and so people do not understand its benefits. Based on the literature (Ding et al., 2018; Horowitz & Liu, 2017; Krul & Ho, 2017; Peng et al., 2015; Yanget al., 2010) and the findings of this research, the benefits of urban agriculture are subject to how it is integrated into China’s food system. In contrast, during my field research, I made a visit to Hong Kong, where urban agriculture (especially rooftop) was heavily promoted (Plate 8) and its rooftops “are turning greener and more fertile as urban farmers seek to grow crops from their homes...to create a more livable community” (Liu, 2017). While the motivations in Hong Kong are similar to that of China—limited land space, food safety concerns (Gottlieb, 2017)—there appears to be a greater presence of urban agriculture in communities and private enterprises promoting more ecological forms of urban agriculture (see



Plate 8. Urban agriculture being promoted publicly in Hong Kong. Bottom right of photo says “Be an Urban Farmer” in both English and Mandarin.

Rooftop Republic Farming). Community gardens/rooftop agriculture as forms of urban agriculture have seen an annual growth rate of 10 to 15 percent (Gottlieb, 2017). This promotion of urban agriculture seems to be in contrast to the Chinese government’s approach. Currently the policies in place by the Chinese government, and its interpretation of urbanization, for urban-rural integration or development can therefore be seen as a critical issue.

Key informant #1 also mentioned that urban agriculture could help alleviate the food safety concerns, as he highlights “[due to] lack of honesty [in organic foods in the past] homegrown food in more urban areas [allows] you to get to see the food that you grow every day. You are working together so if you’re damaging it or polluting it, everybody else sees ...so definitely if you are growing your own, there is a huge market for those have the concern of food safety and quality of the food” (Key Informant 1, June 28th, 2017). This is important as food safety is a defining issue in China’s food supply. While technological innovation can have positive outcomes for food supply and safety, the use of traditional methods in agriculture remain an important component to the many social and environmental benefits of urban agriculture. Though urban agriculture is seemingly becoming a progressive topic in Nanjing based on this interview, it seems from this brief exploration of the processes, that there are many significant concerns over both the implementation of ‘modern urban agriculture’ and the true benefits of the high-tech direction that should be considered. This is reflective of the concerns of

the participants as to how new policies that enable greater access or allow more urban agriculture in the city to take place can be of a concern. These concerns appear to be valid based on the key informants understanding of urban agriculture.

5.2.1 Summary of government's views on (intra) urban agriculture

This section has highlighted some of the current understandings and future paths of urban agriculture in Nanjing. Based on literature and interviews with government officials, it would appear that within a Chinese context the Jiangsu Provincial government and Nanjing frames urban agriculture as a means of furthering modernization, with planned mixed high-tech urban agriculture integration and rural revitalization (multifunctional) of peri-urban agriculture projects (Glaros, 2018). I believe this framing of top-down urban agriculture will not sufficiently address the issues associated with today's modern agri-food system, nor properly consider the utility of intra-urban agriculture within the urban food system. This approach to urban agriculture is done at the expense of and further marginalizes existing and potentially future populations' participation in intra-urban agriculture. Finally, these examples reveal that there is a complex relationship between informal intra-urban agriculture practices and the state's goal in modernizing its food systems. However, what is common across these two parties is that food safety can be seen as a common goal moving forward.

6. Conclusion

While the Chinese have a long-standing history with agriculture, China's development path is currently set to remove itself from small holder farms that dominant peri-urban and rural areas with increased mechanization and modernization of its food systems. In addition, rapid urbanization and a growing population have seen mixed results in China. For example, while there has been success in increasing food security, it has been done at the expense of increasingly unsustainable urban food systems stemming from food safety issues and the industrialization of agriculture that has largely focused on economic growth. The multifunctionality of urban agriculture, which allows for greater social, economic, and environmental opportunities for both the urban environment and its inhabitants, is not without its challenges. As a result, China's historic laws and regulations that restrict attempts to engage in intra-urban agriculture, combined with the government's current understanding of urban agriculture, will limit people's ability to grow in urban areas in the future. However more recently, urban food strategies like urban agriculture have been increasingly seen as one of many ways to address some of the known failures of the global food system. This research continues the discussion on both urban agriculture and food security in China and highlights the importance of using case studies to better understand how intra-urban agriculture is being used in cities undergoing rapid urban expansion and population growth. Urban agriculture can provide great social and health benefits to those that practice it and the experiences of these individuals deserve recognition.

This research had four main objectives. First, this study sought to identify the demographics of small-scale, individual intra-urban agriculture practices within Nanjing and determine where urban agriculture is taking place within the city. The second objective was to identify the various modes of intra-urban agriculture in Nanjing. This included understanding how participants grew food and plants and the steps that were necessary to be able to grow in the city. Thirdly, this research aimed to examine the motivations of populations engaging in small-scale intra-urban agriculture; and lastly, to identify how China's evolving socio-political, economic context, and increasing integration within global institutional market networks is impacting the development of urban agriculture. This study is based on a literature review combined with a case study in Nanjing, China, which involved a questionnaire with 54 city

residents, interviews with 13 urban residents and 6 with key informants from neighborhood committees, government officials, and an academic.

A review of the literature revealed that urban agriculture as a concept in China remains vague. Given the finding of this research in Nanjing, the literature does not adequately address the many ways in which urban agriculture is occurring throughout China. Based on the empirical evidence from Nanjing, China, the viability of intra-urban agriculture is heavily influenced by ongoing urbanization and various contentious policy issues. As this thesis has demonstrated, there are pockets of intra-urban agriculture happening informally and spontaneously across Nanjing that range in use and size. Therefore, intra-urban agriculture on the ground remains conceptually distinct from the government's current framing of urban agriculture that appears focused on peri-urban agriculture. Whereas intra-urban agriculture, to the extent that it exists, is seen as a form of modernization and technological growth through high-tech forms of urban agriculture (Glaros, 2018). As a result, urban agriculture as a whole is seemingly framed as a way to further modernize China's agriculture system and revitalize its peri-urban regions. Therefore, the potential of urban agriculture in Nanjing and China as a whole is being increasingly recognized by different levels of government as a way to modernize the urban food system and involve the growing middle class in food production. However, the multifunctionality of urban agriculture goes beyond that of the peri-urban and rooftop focus framed by the government official interviews in this research, but rather is strongly driven by long cultural history with agriculture and is certainly culturally significant to many of the participants of this research.

This research found, however, the reality on the ground is that those practicing urban agriculture generally have less formal education, elderly former farmers who are growing food regardless of any support from the government. Practitioners in this study predominantly practiced intra-urban agriculture simply for personal consumption rather than for selling, placing less emphasis on the ancillary social and health benefits. This research also found that intra-urban agriculture remains a largely informal 'illegitimate' urban form in Nanjing. Current regulations in the city prohibit the growing of food within public green space in residential neighborhoods.

Despite this, there exists an informal community of citizens that continue to grow within these spaces and do so largely outside of any market-orientated structure. Participants in this research primarily grew vegetables on balconies, yards, rooftops, in “empty” non-built-up spaces in and the around the city and on areas of ceased development. While some did sell to consumers, the majority grow food for self-provisioning or to share amongst family, friends, and neighbors. Little emphasis was found on potential economic value that is commonly associated with more market-orientated urban agriculture strategies (e.g. Community Supported Agriculture or selling in wet markets). Moreover, participants did note several social well-being or health benefits through staying active by farming. In addition, participants often identified that they practiced activities such as recycling water and composting food. While the questionnaire did not specifically link these activities to environmental sustainability, the fact that participants identified that they engage in these activities suggests there may be environmental benefits to the growing participants are doing even if they do not recognize these benefits. Further, interview participants rarely identified environmental benefits as a motivation to engage in intra-urban agriculture despite often using environmentally beneficial practices. Participants were also an aging population, with dominantly a background in farming already. This aging demographic of intra-urban agriculture practitioners highlights the need to engage and encourage ‘new farmers’ and gardeners that are younger in the coming decades if intra-urban agriculture is to persist. Lastly, non-monetary values associated with growing included freshness, food safety, and recreation. Challenges to growing identified by participants included space limitations, weather, soil quality, age, and confrontations with construction crews and other city officials.

Urban agriculture in general does not appear to be perceived as a strategic food security solution of participants; rather, motivations for urban agriculture are rooted to different extents within the Chinese socio-cultural context that emphasizes food safety. However, based on the literature and interviews with government officials, government motivations for urban agriculture are moving towards opportunities for economic development. It would appear that within a Chinese context, the Jiangsu Provincial government and Nanjing frames urban agriculture as a means of furthering modernization, with planned mixed high-tech urban agricultural integration and rural revitalization (multifunctional) of peri-urban agriculture projects. I believe this framing of urban agriculture will not sufficiently address the issues associated with today’s modern agriculture and is done so at the expense of and further

marginalization of existing and future populations' participation in intra-urban agriculture. In addition, the future of urban agriculture in China is heavily influenced by existing and future urban planning policies and the modernized direction of its food system that appears to be taking place. Interestingly, the majority of participants in this study are not growing food with the commonly associated movements under the urban agriculture rubric seen in a Global North context and are juxtaposed to the growing civil society or grass roots movements that are happening around China as well. Participants in this study are instead growing for a hobby, general interest, and the occasional opportunity to share foods with friends or family. These findings emphasize how the modes and motivations of urban agriculture in Nanjing are often impacted by urbanization, population growth, political structures, and continuing food security issues, creating a dynamic and complex situation.

There appears to be a significant shift in China's agri-food system and with increased research I anticipate much more critical discussion on the direction of intra-urban agriculture in China. Future research opportunities include a more in-depth look at how urban agriculture contributes to food sharing, how land management impacts those who are growing on ceased development lands, and a more thorough understanding of the role intra-urban agriculture plays in citizen's daily diets and the economic impact of this. In Nanjing, a more thorough assessment of how intra-urban agriculture may contribute to the urban food system is also warranted. In sum, despite the challenges that exist, a notable diversity of motivations behind and locations of intra-urban agriculture exist within Nanjing. These findings challenge many of the assumptions about urban food production and intra-urban agriculture as being a 'plight of the poor' in the Global South. Instead, participants in this research largely participated in intra-urban agriculture as a hobby rather than as a form of subsistence. Studies like this one are important because the increased presence of case studies on urban agriculture can "can help alter the course of 'de-agriculturalization' of cities in transitional economies" (Horowitz & Liu, 2017, p.217). Therefore, urban agriculture demonstrates an innovative approach to food safety issues and can operate in an environment where future food demands are most critical.

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Appendix 1: Questionnaire with Chinese translations

Part 1

English	Mandarin
1) What kind of food do you grow or raise?	你种植何种作物或者饲养何种禽畜？
2) If you grow your food/plants or raise livestock at home, what location(s) (Check all that apply)?	如果你种植作物或饲养禽畜，请问是在哪些地方种植/饲养（可多选）？

3). These statements will help to understand why people have chosen to grow their own food in the city. Please select one of the options (Agree, Neither Agree or Disagree or Disagree) for each statement.

English	Mandarin
1. I grow food /plants or raise livestock because I was a farmer before moving to the city	种植作物或饲养禽畜是因为我搬到城市居住前是农民。
2. I grow food /plants or raise livestock as a hobby in my spare time	在业余时间里种植作物或饲养禽畜是我的爱好。
3. I grow or raise food because my parents, relatives or friends taught me how	种植作物或饲养禽畜是因为我的父母、亲戚或朋友教会了我种植或饲养的方法。
4. I grow or raise food because I receive subsidies for doing this.	种植作物或饲养禽畜是因为我可以得到补贴。
5. I grow or raise food because other jobs have lower wages	种植作物或饲养禽畜是因为其他工作的工资较低。
6. I grow or raise food because other jobs are unstable	种植作物或饲养禽畜是因为其他工作不稳定。
7. I grow or raise food because other jobs are not flexible enough	种植作物或饲养禽畜是因为其他工作不够灵活。
8. I grow or raise food because I can see good prospects for agriculture	种植作物或饲养禽畜是因为我可以看到农业的良好前景。
9. The ability to grow food is an important part of my life and culture	种植作物或饲养禽畜是我人生和文化的重要组成部分
10. I feel that food prices are a concern for my household and that is why I grow food.	食物价格对我们家庭来说是个问题，因此我们选择自己种植作物或饲养禽畜。
11. The food I grow or raise is cheaper than buying it at supermarkets or wet markets and that is why I grow/raise it.	种植作物或饲养禽畜是因为这样比在菜市场或超市购买更便宜

12. I feel that food safety at wet markets and supermarkets is a concern for my household and that is why I grow food.	种植作物或饲养禽畜是因为我比较担心菜市场 and 超市里的食品安全问题
13. The food I grow at home is better quality than the wet markets or supermarkets	自家种植/饲养的食物比菜市场或超市里的质量更好。
14. The food I grow is not easily found in wet markets or supermarkets and that is why I grow it	种植作物或饲养禽畜是因为菜市场或超市中没有这种品种
15. I grow or raise food because it is relaxing and a good way to connect with nature	种植作物或饲养禽畜是因为它可以放松自我，亲近自然
16. I grow or raise food because it is also an enjoyable way to socialize with friends and family	种植作物或饲养禽畜是因为这是一种与朋友家人愉快相处的方式。
17. I think most people in Nanjing can afford or have access to enough food to have a healthy life, without growing food	我认为大部分南京人不需要自家种植/饲养，有能力购买或能获得足够的食物过健康的生活。
18. I am concerned about the decline of the environment and pollution in the city, and feel it is having an impact on the food we eat.	我对于环境的恶化和城市的污染感到担忧，并且认为环境恶化影响了我们的食物。
19. I grow food because it is good exercise	种植作物或饲养禽畜是因为这是一种很好的锻炼身体的方式。
20. Growing food allows me to control the quality and safety of the food	种植作物或饲养禽畜是因为这使我可以自己掌控食物质量和安全。
21. I grow food/plants because it provides additional income	种植作物/饲养禽畜是因为这样可以给家庭提供额外收入
22. If government made more green spaces in the city for growing food I would make use of these spaces	如果政府可以在城市提供更多土地，我愿意种植作物/饲养禽畜
23. I grow or raise food based on what the market demands	我会根据市场需求种植作物/饲养禽畜
24. The food I choose to grow or raise is based on my food preference	我会根据自己的喜好种植作物/饲养禽畜

Part 2

English	Mandarin
4) Check one of the following: Male Female Other	.选择以下之一： 男性, 女性
5) Age:	.年龄

6) What neighborhood do you currently live in?/ What district (居委会) do you currently live in?	.您目前住在哪个社区/您所在的社区居委会是?
7) Did you originally work and/or live in a rural area of Nanjing before moving to an urban area?	您是否曾在南京的农村工作或生活，然后搬到市区?
8) What is your current work status?	.您目前的工作状态是? (选择一个合适的选项)
9) If you are currently working, what is your occupation? (check one of the following)	.如果您正在工作，您的职业是? (选择以下之一)
10) What is your former occupation (if retired as well)?	您以前的职业是?
11) What is your highest level of education? (Check one of the following)	您的最高学历是什么? (选择以下之一)
12) Were you born in Nanjing?	.您出生在南京吗?
13) Do you currently hold Nanjing hukou status? (Select the option that applies)	请问您持有南京户口吗? (选择适用的选项)
14) How long have you been growing food in the city?	您在这个城市种植作物或饲养禽畜多久了?
15) . If the land you farm is not at your house, is the land rented?	您耕种的土地如果不在自己家里，是否是租来的?
16) Estimate how much space does the growing of your food use? (<i>Measured in Mu</i>)	估计一下您种植作物/饲养禽畜需要多少空间? (单位: 亩)
17) If you were to estimate, what percentage of food do you consume that you grow?	请您估计一下，种植的作物或饲养的禽畜有多大比例用于自家食用?
18) Which of the following applies to the food that you do not consume (meat, vegetables, plants) that you grow?	除此比例之外，剩余的部分(肉类，蔬菜，植物)您会如何如理? (两部分问题)
19) If you sell your food/plants, what is your income in a year from growing your own food?	.如果您销售您种植的作物或饲养的禽畜，一年之内您的收入是多少?
20) Which of the following are part of your household income (select all that apply)?	以下哪一项是家庭收入的一部分(多选)?
21) Is the food/plants you grow your main source of income?	您的主要收入来源是您种植的作物或饲养的禽畜吗?
22) Do you use this site for any other purposes?	.您是否使用这块地进行任何其他活动?
23) Which season(s) do you grow your own food?	您在哪个季节种植自己的食物?

24) Does the type of food you plant vary or change depending on the seasons?	您会随季节的变化改变种植的食物吗?
25) How many varieties of plants or vegetables would you say you grow?	请问您种植多少种作物或蔬菜?
26) Do you grow native/indigenous/locally found species of plants or vegetables?	您是否种植原生品种或当地的老品种(作物或蔬菜)?
27) Have you had to make any changes or added materials to the location/area where you grow food to allow food to grow?	.您是否必须对您种植食物的地方进行改良, 以使食物成长?
28) How many hours do you spend maintaining and growing your own food:	.你花多少个小时来维持和种植自己的食物:
29) How much money do you spend in a month to grow your own food?	您花了多少钱, 来种植自己的食物? 一个月之内
30) Do you reuse/recycle any of the following materials to help you grow?	您是否重复使用/回收以下资源用于种植作物或蔬菜?
31) What is your source of water for your food/plants or livestock?	.您种植作物或饲养禽畜的用水来源是什么?
32) While growing my own food, I have noticed a reduction in my household food waste (the amount of unused food that gets thrown out before being eaten)	自己种植作物或饲养禽畜的过程中, 我发现自家厨余垃圾和食物浪费减少了。食物浪费是指没有被吃掉而被丢弃的食物。
33) Do you have any help when growing food/plants or livestock? (Select all that apply)	您在种植作物或饲养牲畜时受到过什么帮助吗? (可多选)

Appendix 2: Interview guide

According to the objectives of this proposed research, two groups of people will be interviewed:

- Government officials and/or organizations, universities or colleges (in positions related to urban planning, agriculture, sustainability)
- Practitioners of urban agriculture (small farming households, farm workers, etc.)

Semi-Structured Interviews:

Themes and examples of topics and questions:

Urban Farmers:

1. Presentation and introduction

- a) How long have you been a farmer?
 - i. Where or from whom did you learn to farm?
- b) If not born in Nanjing, what was the motivation/reason for moving to it? (*in connection to the amount of time they have lived in the city from Q.9*)

- c) What does farming mean to you?
 - d) Food safety in the past compared to food safety today? What has caused that change?
- 2. The practice of growing food (*Modes, motivations and challenges*)**
- a) Why did you decide to grow food in the city?
 - i. What do you see as some benefits for growing your own food?
 - ii. Do you think growing food in the city is a growing trend?
 - iii. Is the food fresher?
 - iv. Is it an economic motivation or a social reason?
 - b) How often do you shop still even though you grow your own food?
 - c) Does your location have any impact on the reason you grow food?
 - d) How did you gain access to this space?
 - e) Do you see growing food as different in the city than in rural areas?
 - f) If you previously farmed before moving to the city—What difference are there in your practice (e.g. types of crops, inputs, ways of farming etc.)?
 - g) What kind of foods do you grow that are not easily found at the wet markets or supermarkets, if any? (Connected to Q27)
 - h) How important is it for people to be able grow their own food?
 - i) How does food safety concerns affect your decision to grow food ?
 - i. How do you ensure that the food is safe or of good quality? What kind of control or procedures do you undertake to ensure food safety or quality from pollutants or other hazardous materials?
 - 1. What do you use to fertilize the soil?
 - 2. Do you use any of the fertilizers on your foods? (Synthetic fertilizers; Biofertilizers, Insecticides, Herbicides, Fungicides, Pesticides)
- 3. What are the barriers to growing food in the city?**
- a. What are your concerns with farming in the city? Daily concerns?
 - b. Were/Are there barriers/issues with farming in this location?
 - c. Have you ever lost land to grow on due to urban expansion?
 - d. What do officials or neighborhood committees think of you growing food in the city? What is their reaction?
 - e. Have you ever had a neighbor complain about growing food?
 - f. What farming techniques do you use?
 - g. You had mentioned that you sell your food. Could expand on how this works for you?
 - h. What kind of changes or materials have you brought in? Where do you get the supplies for growing food at home? (*Connected to Q32*)
 - i. Have you ever received or heard any complaints from neighbors or neighborhood committee members about growing food where you grow?
 - j. Do you use the site you grow food for any other purposes (e.g. education)?
 - i. *Was this space used for anything prior?*
 - k. Would the opportunity to grow more food in other spaces in the city be appealing/a benefit to you?
 - l. Have you ever moved to obtain more land? - Where did you move from? How long ago? And made you move?
- 4. Social/Well-being**
- a) Do you see farming or gardening as a space for gathering and socializing?
 - i. *Do you see farming in the city the same way?*
 - b) Do you see growing your own food as a health benefit?
 - c) Have you noticed an increase in your well-being/health since growing your own food?
 - i. If you couldn't grow food how would it impact you?

- d) Do you use farming in the city as a way of passing down your farming knowledge? What is the importance of this? How has this changed in China? (Social Capital)
- e) How does farming or gardening impact you emotionally? Do you find you are happier when farming or gardening?
- f) If farming on land, how do you share the space? Does everyone share the food?
- g) Do you think farming in spaces outside the home add an aesthetics to the city? Are green spaces positive for the city? Would you like to see more spaces?
- h) Do you find the farming provides a form of relaxation? Physical exercise?
- i) Do you take pride in your garden/farm?
- j) Do you consume more vegetables or fruit because of growing your own food?
- k) Do you use what could be considered traditional Chinese techniques for farming?
- l) What is your experience with the Chinese organic or green food standards and the certification process? Does this have any influence on you decision to grow food?
- m) Of the food you do not consume or sell. How do you decide who you gift the rest to?
 - i. *Who do you share your food with? Or do you sell most of it?*
- n) Do you consider growing food in the city important to the food system of Nanjing?

5. Environment

- a) Can you share your experience with growing food in the city from an environmental perspective?
 - i. How has the environment impacted how you grow?
 - ii. What do you think of modern agricultural or farming practices?
 - iii. What do you think of the governments push for modernizing agriculture in China?
- b) When you think of farming in the city of Nanjing, what comes to mind?
- c) Do you think there are advantages to growing in or near the city compared to further farm lands (or peri-urban locations)?
- d) Do believe that by growing your own food you can have a(n) (positive) impact on the city/environment/urban food system?
- e) What kind of benefits do you perceive from growing food in the city in this space?
- f) How does sustainability and growing food in the city relate?
- g) How would you describe the role of your farming practice to the surrounding neighborhood/district?
- h) Do you think growing food in the city is a sustainable way of producing food?
- i) Do you think the food you grow is better than that in the wet markets or supermarket? If so, why?

6. Economy

- a) Why did you choose farming instead of in addition to other jobs?
- b) How does your farming practice contribute to your household? What specific services (social, economic, environmental)?
- c) What are the makes up your household income? (Agricultural income, formal work, business etc.) (Question X in survey)
- d) How do you maintain your ability to afford to grow food in an urban environment?
- e) Does your income fluctuate with the season? (Connected to Question 17)
- f) What do you spend money on? What materials cost the most? What are the most difficult to find (if any)? (Connected to Q34.)

7. Policy and governance perspectives

- a) Do you consider farming in the city different from farming outside of the city?
- b) Does the Nanjing government promote/encourage the growing of food in the city?
- c) Are there any other organizations that you believe have an impact on growing food in the city?
- d) Do you think by strengthening urban farming practices food sources in Nanjing would be better?
- e) What do you think of the governments No.1 Documents plans in relation to farming?

- f) Do you think more policies are needed to support the growing of food within cities?

8. Additional points and comments

- a) Do you feel the city/state/government should provide/allow/support growing food in the city, rather than just rural? If not, why? If so, in what ways could they support?
- b) Do you have any comments or recommendations regarding policies and programs to improve the income of farmers, and support food production that does not degrade the environment?
- c) In what way can you envision farming/growing food as being part of urban development?
- d) Did you leave or lease land in a rural area before moving to the city?

Semi-structure interview probes: can you tell me about, tell me more about, how interesting, can you explain that, how do you feel about

Government officials and academics

Key terms: **Urban Agriculture, Urban-rural integration, modernization of agriculture (or modern agriculture), Nanjing's Master Land-use Plan, China's New Urbanization Plan (2016-2020), Green City or Green Economy or Forested City, Vegetable Basket Program,**

9. Introduction

- a) Position, association role, personal history etc.
- b) How would you define the term urban agriculture?

10. Urban agriculture and the city

- a. What type of dialogue is there with the city of Nanjing and those practicing urban agriculture?
- b. What is the main role of [organization] in Nanjing for food planning or policy?
- c. Would you consider growing food and participating in designated areas (green spaces) meant for farming within your neighborhood or the city of Nanjing?
- g) Modern farms and small traditional farms—how will they co-exist under China's agricultural modernization plan?
 - o Have collective farms that lease out consolidated plots
 - o Farmers do not actually own the land but is leased the land
- c) Do you consider “growing food in the city” as part of any “urban agriculture” supporting policies?
 - i. How would you describe “modern urban agriculture” as seen in the 12th and 13th 5 year plans?
- d) Do you consider farming in the city different from farming outside of the city?
- e) Growing urban population only set to continue – Will modern urban agriculture play a role in strengthening urban food systems of cities?
- f) Food safety seems to be more of a concern than access to food itself, how is food safety continuing to be dealt with?
- g) The “vegetable basket program” or “Shopping Basket Program in Nanjing”
 - i. And how UA contributes or doesn't
- h) Within the goals of the 13th 5 year plan – modern agriculture seeks to “create...areas for growing quality and distinctively local agricultural products”. What is meant by this to you? UA fit?
- i) How China defined food security changed over the last decade?
- j) What kinds of roles have been played by Chinese government in developing and promoting urban agriculture? What are the main actions? What are the barriers or causes of lack of recognition?
- k) China's *industrialization plan* led to a division of rural and urban, where each was seen to have its own role to play in development—urban is seen as the center for industry and rural is the provider of raw materials and food production. Does this persist today?
- l) China's *New Urbanization Plan*
- m) *Demonstration Zones for modern agriculture in Nanjing*

- n) How will the *modernization plan* impact all the small holder farms that exist in Nanjing?
- o) How has the recent No.1 Document include aspects of growing food in the city?
 - i. No.1 Document released this year (2017) talks about “*promoting ‘green’ production extending the sector’s industrial and value chain, boosting innovation, consolidating shared rural development and enhancing rural reforms*” (No.1 Document, 2017).
Has there been any consideration to what ‘green’ production of food within the city might offer? Or how it may help with boosting innovation and value chains?
 - ii. No.1 Document mentions encouraging “*migrant workers to return to rural areas and start businesses*”. What is meant by businesses? Why not incentivize growing food in urban areas?
 - iii. How does the plans for *modernize agriculture* impact the urban food system of a city like Nanjing? Does it include any plans for growing food in the city? Why not?
- p) 13th Five Year Plan – “We will build green cities by adjusting the scale of cities in accordance with their resource and environmental carrying capacities, using eco-friendly planning, design, and construction standards, and carrying out initiatives to build ecological corridors and restore ecosystems.”

Semi-structure interview probes: can you tell me about, tell me more about, how interesting, can you explain that, how do you feel about

Neighborhood Committee Members

- a) How long have you been a committee member of this neighborhood?
 - i. What is your main responsibility?
- b) Can you tell us any historical facts about this neighborhood?
 - i. How old is it?
 - ii. How has it changed over the years?
- c) Can you describe the growing of food you see happening in this neighborhood, what changes have occurred?
 - i. Is there green space that people grow food? What about in the past?
 - ii. Any livestock kept here?
 - iii. What are the rules around growing food in neighborhoods like this? Do you often see these rules enforced?
- d) Have you ever heard or had complaints to about people growing or keeping livestock in their homes?
- e) Do you see any benefits to growing the food?
- f) How important is it for people to be able grow their own food?
- g) Where do you think most people purchase their food from this neighborhood?
- h) How do you define growing food in the city?
 - i. Do you see it as different than growing food outside the city?
- i) What are your thoughts on food safety? Do you see this as a reason people grow their own food?
- j) Are many people here registered urban hukou?
- k) How would you define urban areas vs rural areas?
 - i. Would you consider this neighborhood an urban area?

What do you think the role of the government has or should have in food production in the city?

Appendix 3: Confidentiality statement

CONFIDENTIALITY STATEMENT Translation Services

I understand that as a translator for a study being conducted by Geoffrey Luehr of the Department of Geography and Environmental Management, University of Waterloo, Ontario, Canada under the supervision of Professor Steffanie Scott, I am privy to confidential information. I agree to keep all data collected during this study (June 1st, 2017 to July 29th, 2017) confidential and will not reveal it to anyone outside the research team.

I, _____, agree to maintain full confidentiality in regard to any and all interviews and questionnaires that I translate related to Geoffrey Luehr's Master's study on "Building Sustainable Cities: A Case Study of Urban Agriculture in Nanjing, China".

Translator's name (printed)

Translator's signature

Date

Witness' name (printed)

Witness' signature

Date