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**Urban Agriculture in Thika, Kenya: the Case of Small Ruminant Production
in the Perspective of the Sustainable Livelihood Framework**

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Abstract

Despite the millenary practice of urban agriculture (UA) in Sub-Saharan African (SSA) cities, research conducted on the topic is much more recent and still little is known on the impact UA has on the engaged households in terms of food security, nutrition and health. The overall picture that emerges from the literature is one of stark contrasts; some advocate UA as a tool of empowerment, capable to eradicate hunger and poverty for the most vulnerable, while others do not consider UA as a way for sustainable development. With the help of qualitative interviews and informal dialogues this study investigates on some aspects of UA as seen from the perspective of 33 small ruminants urban farmers in the medium-sized city of Thika in inland Kenya. Moreover, an interview with the local livestock authority and two extension officers further clarifies the understanding of urban farming practices and environment in the city also from a governmental perspective. An analysis of these interviews using the Sustainable Development Approach renders the urban farmers' own perception of the benefits of engaging in small ruminants production within the city, as well as of the limitations in conducting it. Urban farming, besides creating additional income and/or additional food to urban households, contributes also in three other different ways, including (1) the improvement of resiliency towards external factors (e.g. food price fluctuations), (2) the improvement of self-sufficiency (e.g. rely less on food transfers) and (3) the easiness in selling the agricultural production (at farm-gates or local markets). Being part of a growing body of research on UA practices, the present study's purpose is to explore and analyze the role of urban agriculture in contributing to food security, within the larger framework of sustainable development in SSA. By using a largely new and untapped source of oral histories on urban farming practices, this project also aims to contribute to future research on similar topics.

Key Words: Urban Agriculture, Food Security, Kenya, Sustainable Development Framework, Urbanization

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Leandro Savino

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Chapter one: Introduction

1.1 Project outline and research questions

This master thesis aims to investigate the phenomenon of urban agriculture within the city of Thika, Kenya, as part of a wider *African urban agriculture: social, economic and environmental challenges and prospects under changing global and demographic realities* research project undertaken in cooperation between Lund University, Sweden, Swedish University of Life Sciences, Sweden and the University of Nairobi, Kenya. In the specific, this thesis will analyze the role of small ruminants production in urban farmers' livelihoods in Thika using a qualitative-based approach that integrates semi-structured interviews and dialogues conducted during a four-week fieldwork with academic theory. Findings and primary data gained during this master thesis will contribute to a broader understanding of UA practices within the local context of Thika, Kenya.

Given these premises, it seemed useful to divide the research questions driving my thesis into two sections, (a) regarding UA in relation to development studies and (b) regarding livestock production of small ruminants in Thika.

a) Urban agriculture and development studies:

1. How and to what extent does UA contribute to urban livelihoods, including food security in developing countries?
2. Can UA represent a tool for sustainable development as it is advocated by the UN with the sustainable development goals?

b) Small ruminants production in Thika:

1. What is the magnitude of small ruminant livestock production in Thika? (Magnitude measured in number of farmers involved, number of heads in the livestock, and value of

the production). Which are the animals most commonly raised?

2. Who is engaged in small ruminant production, what is produced, and how does it contribute to the livelihoods of the engaged households? What is the scope and final destination of small ruminant production?
3. Where do the necessary inputs (breedings, veterinary services, feedings, water) come from? How are the urban small ruminants raised?
4. Which public and/or local guidelines regulate the small ruminant livestock production?

1.2 Foreword and thesis structure

UA in African countries has been lacking attention from institutional policies and strategies in the past. (Ali Memon & Lee-Smith, 1993; Drechsel & Dongus, 2009) The development of both an institutionalized framework and the modernization of structures and practices are seen as key elements to successfully exploit the potential of UA, which includes empowerment, self-reliance, income generator and sustainable use and management of natural resources. Generally, UA is spatially divided into urban and peri-urban agricultural practices: urban agriculture indicates agricultural activities conducted within the city borders as set by the municipality, while in peri-urban agriculture agricultural practices are conducted in an area bordering the urban fringe. This is a merely spatial division, which does not consider other relevant aspects, such as the proximity to markets or land utilization, but, nonetheless, it creates the conditions to have a suitable definition for conducting research. Within this framework this study analyses the patterns between small ruminants production and the above mentioned characteristics of UA. Moreover, of particular interest is the discourse of land allocation, which generally prioritizes the economic return of land of industrial or commercial activities. By taking into account the impact of UA on the livelihoods of both the practitioners and urban residents in general, UA can compete with other uses of land (residential, industrial, commercial or institutional) with more success. The case study of small ruminants livestock production in Thika, Kenya will help highlighting the principal features of urban livestock production, in particular the value-chain of goats and sheep, by assessing the impact and the role of such practices within the urban context. Data from different sources, including surveys, interviews and time-series of satellite imagery will contribute to understand the dynamics of UA in the rapidly growing city of Thika. Urbanization, population growth and sustainability will be recurring concepts for the understanding of UA in relation to development because of the continuous transformation of livelihoods in SSA, which are ever so challenged by the socio-

environmental implications of urbanization and population growth. Of particular interest in this scenario are the Sub-Saharan African (SSA) countries, which have, according to statistics, the highest rate of urbanization and population growth¹ as well as economic growth.² Central to the understanding of UA, is the globalization framework which, alongside possibilities coming from interconnectedness and interdependency among states, poses serious challenges, especially to the most vulnerable countries. As FAO, IFAD and WFP stated in their conjoint 2015 report *The State of Food Insecurity in the World*: “As countries become more open to international trade in agricultural products, they become more exposed and potentially more vulnerable to sudden changes in global agricultural markets.”³

The thesis is divided into five chapters, which will present theories, methods, results and a discussion on the findings, before moving to the conclusion. Chapter 1 will firstly offer a literature review of UA in the different areas of interest of this research, including urbanization, population growth and food security, and secondly will present a conceptual framework, which will be used for the analysis and discussion of the findings, namely the sustainable livelihood approach. Chapter 2 will present the different methods used and the limitations they may have. In Chapter 3 a report on the fieldwork findings will be shown and used to answer the research questions. In Chapter 4 the fieldwork findings will be discussed and analyzed through the framework of the sustainable livelihood approach. Chapter 5 will conclude with some final considerations and suggestions for future research.

¹ <http://data.worldbank.org/data-catalog/population-projection-tables>

² http://databank.worldbank.org/data/reports.aspx?Code=NY.GDP.MKTP.KD.ZG&id=1ff4a498&report_name=Popular-Indicators&populartype=series&ispopular=y

³ FAO, IFAD and WFP. 2015. *The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress*. Rome, FAO.

1.3 Background, context and conceptual framework

UA comprises a myriad of interest areas, ranging from nutritional studies to environmental implications, from the human right to nutritious food to sustainable cities of the future, from the UN Sustainable Development Goals to urban planning. Given all these different aspects and the impossibility to cover all of them at the same time, this study will focus only on some of them, which are strongly interconnected: urbanization, population growth and food regime analysis.

Before moving to the research questions, a brief literature review of some of the major aspects of urban agriculture will provide a preliminary understanding of UA.

1.3.1 Urban Agriculture in the literature

The practice of urban agriculture as a source of food and/or income for those practicing it and as a contribution to the supply of some of the urban demand, not least for some high value and perishable agricultural products, is surely not new. Nevertheless, UA has been receiving much more attention worldwide since the 1996 UNDP report “Urban Agriculture: Food, Jobs and Sustainable Cities” was published. One of the first acknowledgements stated in the report is that UA is a universal activity:

Urban agriculture is an easy-in, easy-out entrepreneurial activity for people at different levels of income. For the poorest of the poor, it provides good access to food. For stable poor it provides a source of income and good-quality food at low cost. For middle-income families, it offers the possibility of savings and a return on their investment in urban property. For small and large entrepreneurs, it is a profitable business.(p.4)

Bearing in mind that for many urban farmers the scope of engaging in UA is to achieve food security, other and additional interests may be pursued, such as leisure and exercise, social interactions, environmental education, building a

framework of ecosystem services of great value for the community (Lupia and Pulighe, 2016 quoting Zasada 2011, Lachowycz and Jones 2011, Bendt et al. 2013). It is also true that much of the above mentioned differentiation is mainly contextualized within the differences between the global South and the global North. The understanding of regional differences in practicing UA is of crucial importance when it comes to research, as to avoid the trap of having a preset perception and view of why people engage in agricultural activities in the city.



Figure 1.1 Example of UA in Nairobi. It is not uncommon to spot chickens and other animals scavenging around in Kenyan cities. This picture was shot in the Kibera slum, the biggest of the several slums in Nairobi. Source: own photo

1.3.2 UA, food security and sustainability

The Rome Declaration on Food Security defines food security as “when all people at all times have access to sufficient, healthy, safe, nutritious food to maintain a healthy and active life”⁴, indicating availability, accessibility and utilization as the key elements for food security.

⁴ FAO (1996), Rome Declaration on Food Security retrieved from <http://www.fao.org/docrep/003/w3613e/w3613e00.htm>

A positive statistical association between being engaged in UA and lower levels of food insecurity indexes (HFIAS and HFIAP) or better dietary diversity scores (HDDS), is found in much of the research focusing on low-income countries (Omondi, 2017; World Bank, 2013; Zezza & Tasciotti, 2010). In particular, Zezza & Tasciotti's comparative analysis shows that UA (in the sample of 15 countries used in their analysis) is practiced largely by the poorest quantile of the population and that it plays an important role in the livelihoods and food security strategies of the urban poor. Drechsel's and Dongus' findings show that UA has a substantial advantage of market proximity on its rural counterpart when it comes to perishable cash crops and appears to be a “dynamic, viable and largely sustainable bright spot providing jobs and food for the cities” (2009, p. 77).

Within this framework urban agriculture is also connected with resilience, understood as the capacity to face challenges from the international food market. Globalization, alongside possibilities coming from interconnectedness and interdependency among countries, poses challenges, especially to the most vulnerable countries, as in the case of the 2007-2008 food price spike, which had a tremendous impact on the food security and, hence, on the livelihoods of hundreds of millions of people worldwide. In the 2015 conjoint FAO, IFAD and WFP Report “The State of Food Insecurity in the World”, the dual and opposite effects of globalization are underlined:

As countries become more open to international trade in agricultural products, they become more exposed and potentially more vulnerable to sudden changes in global agricultural markets. (p.34)

In the 2003 UN Habitat document “The Habitat Agenda Goals and Principles, Commitments and the Global Plan of Action” sustainability of urban settlements is ensured through “economic development, employment opportunities and social progress, in harmony with the environment” (p.7). Especially in developing

countries, the fast rates of population growth and urbanization⁵ hinder the effective and successful implementation of the sustainable urban settlements development of UN Habitat. In fact, in Africa today both the rural and urban population are growing, but the urban one grows faster due to a) in-migration, b) conversion of rural to urban areas, and c) natural growth (Andersson Djurfeldt A & Jirström M (2013). Generally speaking, African urbanization rate outclassed economic and employment possibilities, ending in an urbanization of poverty.⁶ As pointed out by Maxwell, “the urban poor spend a large portion of their income on food, which largely means that poverty problem appears as a food security problem” (1999, p.26). In the same way, Drechsel and Dongus emphasize that the above mentioned rapid structural transformations are “posing major challenges to environmental protection and the supply of adequate shelter, food, water and sanitation” (2009, p.69). In final analysis, the dependence on the market and its fluctuating prices combined with the high rates of urbanization (and of poverty) are increasing the concerns of urban food insecurity (Birhane et al. 2014), making the urbanization of poverty and the vulnerability to fluctuations in food prices key elements also in the studies of WB (2013, p.4).

Another interesting aspect present in the literature is the lower perception of food insecurity in relation to the practice of UA, which is considered an important livelihood strategy to overcome challenges such as changes in food prices (WB, 2013; Omondi, 2017). Hence, UA can be a coping strategy for the most vulnerable part of the population.

1.3.3 UA constraints

Alongside the possibilities and the potential of urban agriculture, the literature covers also the constraints of UA, derived mainly from a lack of institutional

⁵ <http://data.worldbank.org/data-catalog/population-projection-tables>

⁶ African Development Bank Group (2012): Urbanization in Africa retrieved from <https://www.afdb.org/en/blogs/afdb-championing-inclusive-growth-across-africa/post/urbanization-in-africa-10143/>

policy implementation. The World Bank (WB 2013) saw in the lack of access to land, of safe water irrigation, of appropriate training, of capital and of credit, the main inhibitions to exploit the potential of UA. Many researchers point to a lack of reliable and comparable data, which means that advocacy for UA (in favour or in disfavour) should not be part of the discourse yet and rather more analytical rigour should guide research (Zezza & Tasciotti, 2010; Badami & Ramankutty, 2014; Stewart et al., 2013).

Most often, lack of space is referred to as one of the major constraints of the city itself. It is assumed that in urban areas food is bought and not grown.(Deelstra & Girardet, 2000). A different point, but always inherent to space requirements for UA is highlighted by Badami & Ramankutty, whose findings show that the space for growing food for a city to be autonomous in food security exceed the space of the city. (2014) However, it must be said that none of the scholars supporting UA referred to in this review, has advocated for UA as a tool for rendering the city totally food secure on its own.

1.4 Population growth and Food Regime Analysis

This section presents the link between population growth and food regime analysis and the possible linkages with UA.

Global population is growing and according to UN sources it will rise from the currently 7.5 billion to more than 9 billion by 2050.⁷ Considering that in 1960 it was 3 billion, these numbers indicate a fast and effective progress in medicine and living standards, thus an increment in life expectancy and a reduction in mortality. At a global level, the demographic transition is translated in low fertility and low mortality rates and high life expectancy, which leads to an aging global population (see Appendix A).⁸ However, this is not the case for all the areas of the

⁷ <http://www.unfpa.org/world-population-trends>

⁸ This trend is pictured as population pyramids: from an initial large base and thin top at the beginning of the transition to a sort of column equally distributed at the end.

world. As a matter of fact, while the developed world has already completed this demographic transition, many developing countries are still growing fast. SSA is the fastest population growing area worldwide, with a population that, according to WB data, has increased 4.4 times from the originally 228 million in 1960 to over 1 billion in 2015. Moreover, the population forecasts indicate that the SSA population will likely exceed 2.2 billion by 2050.⁹

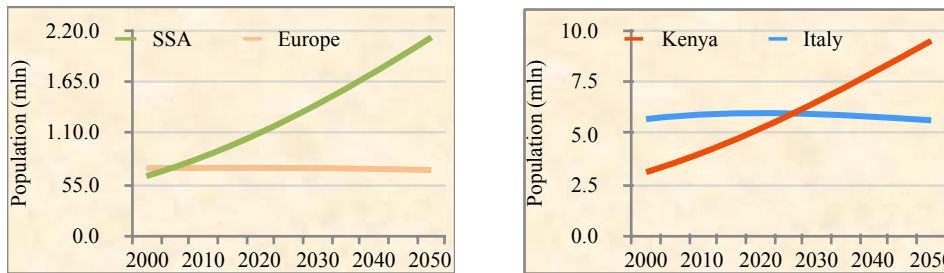


Figure 1.2 Regional population trends.

World, Sub-Saharan Africa, European populations											
Total Population (million)											
	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
World	6 126,6	6 519,6	6 929,7	7 349,5	7 758,1	8 141,7	8 500,8	8 838,9	9 157,2	9 453,9	9 725,1
SSA	642,2	733,3	840,4	962,3	1 095,7	1 240,3	1 396,9	1 565,1	1 743,7	1 930,5	2 123,2
Kenya	31,1	35,3	40,3	46,1	52,2	58,6	65,4	72,6	80,1	87,8	95,5
Europe	726,4	729,0	735,4	738,4	739,7	738,1	733,9	728,0	721,4	714,4	706,8
Italy	57,1	58,7	59,6	59,8	59,7	59,5	59,1	58,6	58,1	57,4	56,5

Green = growing population; red = decaying population.
Table 1.1 Data Source: UN Population Division

Table 1.1 and figure 1.2 help to visualize the different trends occurring in developing and developed countries. As it can be clearly observed, the population dynamics of developing countries determines the global phenomenon of population growth. Italy was chosen as an emblematic country of decaying population in Europe in opposition to the population trend of Kenya, in Sub-Saharan Africa, with the aim not to compare the two countries, but rather to

⁹ United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, custom data acquired via website.

visualize and understand the different population dynamics happening in different contexts in different parts of the world.

International organizations, as UN, FAO and the WB, have related these numbers to food security and, by taking into account possible climate change implications, they are advocating for a raise in global food production by 50% (WB¹⁰) or by 70% (FAO¹¹). However, other scholars, such as Eric Holt Gimenez, Harriet Friedmann and Phillip McMichael, sustain that global food security is inhibited mainly by the way the system works and that today's global food production can already meet the demand of food intake for 10 billion people.¹² Hence, it would be more appropriate to direct the discourse to the malfunctions of the system, rather than ignoring its effects and advocating for an increase in food production. Their final analysis concludes that the current food system and the global need for sustainable development cannot but produce a violent collision of interests, which will amplify the need for rethinking and redefining the entire food system all over again.

This debate is a hot topic within the food regime theory, a theory that “emerged to explain the strategic role of agriculture and food in the construction of the world capitalist economy” (McMichael, 2009 p.139) and how capital accumulation in agriculture constitute global power arrangements, as expressed through patterns of circulation of food (ibid. p. 140) Food regime analysis finds its roots in the 1989 work of Harriet Friedmann and Philip McMichael “Agriculture and the State System. The rise and decline of national agricultures, from 1870 to the present”, which is influenced by the system theory of Immanuel Wallerstein

¹⁰ *Food Security Overview*, retrieved from <http://www.worldbank.org/en/topic/foodsecurity/overview>

¹¹ *How to Feed the World in 2050*, retrieved from http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf

¹² Gimenez, E., *We Already Grow Enough Food For 10 Billion People — and Still Can't End Hunger* retrieved from http://www.huffingtonpost.com/eric-holt-gimenez/world-hunger_b_1463429.html

and Karl Polanyi's critique of the liberal market. According to Friedmann and McMichael it is possible to draw three different food regimes from 1870:

1. 1870-1930s: colonialist food regime (from Europe). characterized by direct importation of tropical food and externalization of seed production to the colonies, aiming at sustaining European demographic and economic growth. As a consequence, it deteriorated the ecology and the food-system of the colonies. (McMichael 2009, p.141)
2. 1950s-1970s: Green Revolution and US power, characterized by political intentions behind the food aid mask and the beginning of transnationalization of capital and corporations. Surplus of production from the developed world, in particular the US, is given as food aid to the underdeveloped world with the intention to use it as a political tool to contain communism. (ibidem) The international political framework of Cold War and the fear of communism, which led the US President Truman's to establish the Containment Doctrine, dominated the decolonization period after WWII, determining the socio-political-economical and cultural transitions, necessary and favorable for the following wave of modern and global capitalist expansion.
3. 1980s-present: neoliberal/corporate food regime, characterized by the influential presence of agribusiness corporations, which determines land acquisition and grabbing, often causing displacement and impoverishment of local rural population. Legacies from the Green Revolution continue to use production surplus to reiterate North-South dependency relations. (ibid. p.151) Most importantly, corporate power become institutionalized in the food system, towards what professor McMichael defined as the globalization project.¹³ Heavy industrialized agricultural production, jeopardizes both the environment and people, leading to dependence on

¹³ The globalization project is defined as "an emerging vision of the world and its resources as a globally organised and managed, free trade/free enterprise economy pursued by a largely unaccountable political and economical elite" (McMichael 2009, p. 150)

fossil fuels, soil desertification and destruction of biodiversity coupled with the inevitable climate change implications and the depletion of cultural and ecological local knowledges are on the discussion table of sustainability (Bernstein 2015, p.14).

Within the food regime analysis framework, two major divergent schools have taken the scene: food security and food sovereignty. The former is defined in the “Rome Declaration on Food Security” as “when all people at all times have access to sufficient, healthy, safe, nutritious food to maintain a healthy and active life”, while the latter is defined as the right of a people to determine their own food and agricultural practices: “Food sovereignty invokes the sovereign power of the state for the implementation of redistributive land reform, social protections and safety nets” (Gimenez & Shattuck 2011, p. 129). Clearly, the idea of food sovereignty clashes with the corporate food regime and its transnational corporations (ibid. p. 115). Scholars sustaining food sovereignty conclude that the current food system and the global need for sustainable development cannot but produce a violent collision of interests, which will amplify the need for rethinking and redefining the entire food system starting from its very roots.

In this context, urban agriculture can be seen easily as belonging to the food sovereignty realm, where locally-grown food meets the demand of both nutrient and cultural-connected food. Moreover, as it will be presented in chapter four under the database findings, the food grown by urban farmers and given to friends/relatives both in urban and rural area constitute a sort of informal private safety net,¹⁴ which is seen as an important and sometimes crucial factor for the livelihood strategy of the household.

¹⁴ For more information on the distinctions between formal and informal safety nets and between private and public safety nets see Paitoonpong S. et al 2008 *The meaning of “social safety nets”*

1.5 Urbanization and Food Security

Along with population growth, major challenges are deriving from the adaptation of cities to host an ever larger population without stumbling into the traps of informal sectors as it actually happens to be the case in many cities in the developing world. Moreover, even though it is true that poverty has a higher incidence in rural rather than in urban areas, the fast urbanization, especially in developing countries, has led to a large extent to growing urban poverty (Ravallion 2001; Harris 1969; Matuschke 2009; Satterthwaite 2007; Chen and Ravallion 2007). This circumstance is strengthened by data from the UN Habitat program showing that in many African countries, urban population is living in slums (see fig.2).

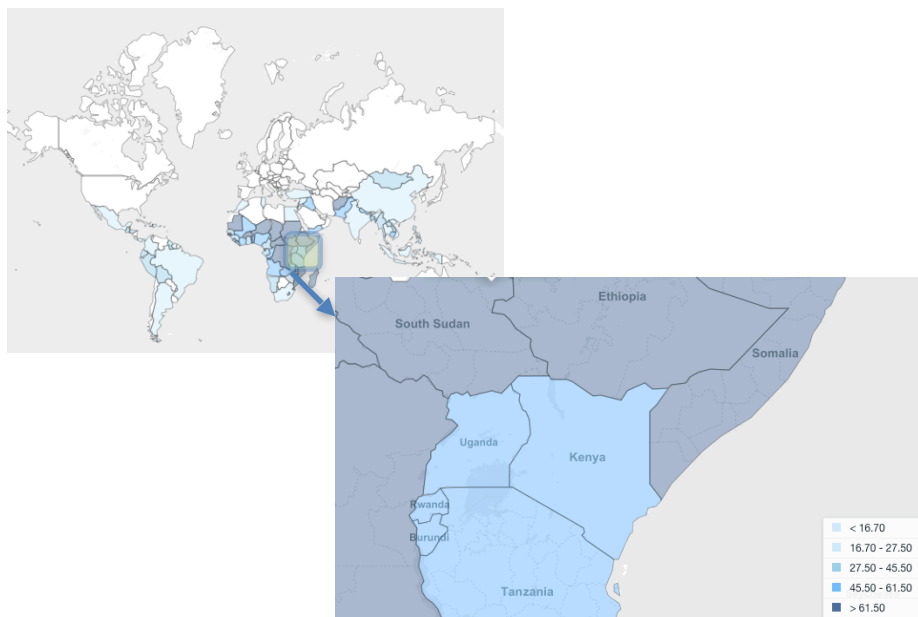


Figure 1.3 Map presenting the percentage of population living in slums on the total urban population. 56% of the Kenyan urban population lives in slums. Data and map retrieved from UN Habitat

The Harris and Todaro model of labor migration explains the chronic problem of high unemployment in urban areas as the result of push and pull factors, where the city's attractiveness of rural-to-urban migrants is determined by higher incomes and more job opportunities within the formal market, a vision that soon clashes

with the urban labor demand, generally lower than the supply, which translates into an exceeding labour force and consequently into unemployment (Harris 1969; Matuschke 2009).

Using an economic model for describing the urban labor situation, they claim that in order to reduce the high unemployment rate in developing countries, “bringing ‘city lights’ to the countryside might greatly exceed whatever net benefit might be derived from luring more peasants to the city by increasing the attractiveness of urban living conditions” (p.147). This indicates that rural areas rather than their urban counterparts are more in need of modernization in order to limit the ongoing urbanization of poverty and, above all, that also the development of rural areas contributes to the development of the country as a whole. In ultimate analysis, “the lure of relatively higher permanent incomes will continue to attract a steady stream of rural migrants into the ever more congested urban slums” (ibidem).



Figure 1.4 A glimpse of the Uganda Railway Line passing through Kibera slum. Markets and shelters are present on both railway sides.
Source: own photo

In the same fashion, Matuschke (2009, p. 2) underlined the fact that rapid urbanization, if unabsorbed “may lead to the development of slums and pose a considerable threat to all dimension of food security” and that “small to medium-sized cities [...] often lack infrastructure and basic services – like water,

sanitation, electricity, health care, and waste disposal – to absorb an ever increasing number of people” (ibid. p. 3). Moreover, a study conducted by Chen and Ravallion (2007) found that the incidence of urban poverty on the total poverty rate increased with urbanization, indicating that “the poor are urbanizing faster than the population as a whole, reflecting a lower-than-average pace of urban poverty reduction” (ibid. p. 16).

Growing population coupled with the fast urbanization and urbanization of poverty means also higher food insecurity. In this scenario urban agriculture, as shown in the academic research (Ayerakwa 2017, Omondi 2017, WB 2013), plays a determinant role in the livelihood strategies of the involved households, by enhancing both the level of food security and resiliency to market price fluctuations.



Figure 1.5 A glimpse of the Kibera slum.
Source: own photo

1.6 Sustainable Livelihood Approach

Firstly, developed by the British agency for development, DFID, and further enriched by Ian Scoones, the sustainable livelihood approach aims to conceptualize livelihoods in a holistic way, including, besides the assets of the households, also the external constraints and opportunities, which inevitably shape the environment where people live. Scoones defines livelihood as

“the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.” (p. 5)

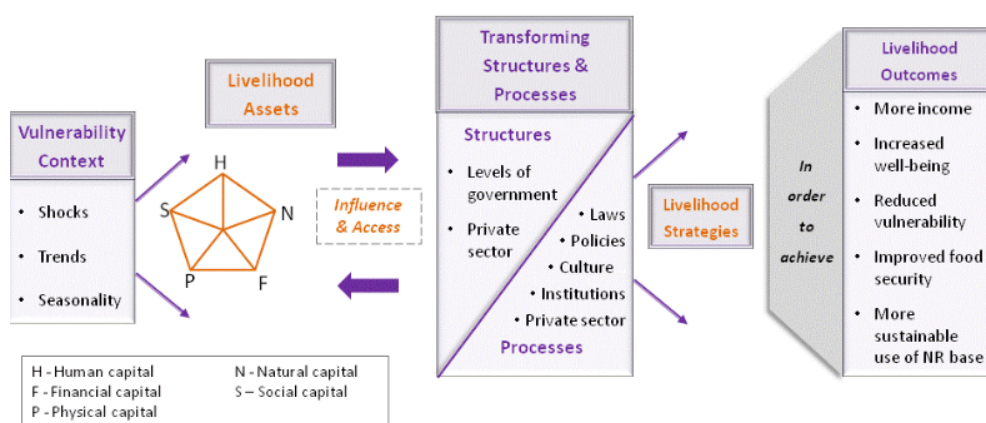


Figure 1.6 Explanation of the connections and relations in the Sustainable Livelihood Framework. Source: DFID

The sustainable livelihood framework is built upon five key elements: a) livelihood assets, b) livelihood strategies, c) livelihood outcomes, d) transforming structures within e) the vulnerability context. Explained more in detail:

a) Livelihood assets: assets or capitals are not considered to be only of economic nature (credit, savings, cash), but rather take into account several other forms of capital, including human capital (skills, knowledge, health), social capital (social relations, groups/cooperatives, networks), natural capital (natural resources such as water or soil fertility) and physical capital (shelter, available

infrastructures, transportation systems, tools). Clearly, physical capital is strongly dependent on the role played by the transforming institutions (e.g. local government), which can foster or hamper the access to other assets. Considering all these assets, the final goal is to set up a livelihood strategy able to achieve a better economic and food security situation, which also means to gain a more efficient use of natural resources and to be more resilient to the external factors.

- b) Livelihood strategies: strategies are the combination of activities run by people in order to achieve the desired outcomes. Livelihood strategies are highly dependent on the assets available and the role of transforming structures in shaping the context in which people operate. Livelihood strategies have been classified by Scoones into three different clusters: agricultural intensification; livelihood diversification and migration strategies (1998, pp. 9-11).
- c) Livelihood outcomes: outcomes are the goals to which people aim and are the results of livelihood strategies. These goals include reduced vulnerability, increased income, improved food security, a more sustainable use of natural resources. As mentioned above, the capacity of people to choose and employ a specific livelihood strategy depends also on the portfolio of assets they have at their disposition.
- d) Transforming structures: institutions, organizations and policies shape livelihood strategies, assets and type of capitals people can access to and hence, also what outcomes they can achieve (Kollmair & St. Gamber, 2002). Markets, local governments, cooperatives, community institutions are all transforming structures which can be public, private or civic (Agrawal 2008). Reassuring, transforming structures are the facilitators or inhibitors for people's pursued livelihood outcomes.
- e) Vulnerability context: external factors, such as market trends, price fluctuations, seasonality, environmental calamities all have a deep impact, (which can be either negative or positive) on people's livelihood (Scoones

1998, Jollmair & St. Gamber, 2002). Generally speaking, the vulnerability context refers to external factors, which cannot be controlled by the household and, therefore, have the power to deeply influence and shape the household livelihood strategy and its results.

Chapter two: Methods

The case study of small ruminants in Thika aims to investigate the value chain of goats and sheep in relation to urban food security and the contribution to the livestock keeping households derived from such production. This investigation will adopt a mixed methods approach, which includes qualitative and quantitative analysis based on 33 semi-structured interviews conducted on site during a 4-week fieldwork in Thika, Kenya, in May 2017 and an existing database.

2.1 Study site

The Republic of Kenya is located on the Eastern side of the African continent, lying on the Equatorial line. The country covers an area of 580,367 km², which is divided into 47 administrative counties. Kenya was a British colony until 1963, when future President Jomo Kenyatta led the country to independence. Kenya borders with the Indian Ocean and Somalia in the East, Tanzania in the South, Uganda to the West, South Sudan and Ethiopia in the North. Its total population is estimated to be 46.8 million people, split into several ethnic groups (Kikuyu, Luhya, Luo, Kalenjin, Kamba being the most numerous ones), united by the two official languages Kiswahili and English. Christianity is the most practiced religion (83%), followed by Islam (11%) and other traditional religions.

The most populated cities are Nairobi, the capital city located on a highland in the southern part of the country, Mombasa, an important sea port, Kisumu at Lake Victoria and mainland Nakuru and Eldoret. Kenya has had a steady economic growth of 5% average over the last decade, which led the country to accomplish some of the UN Millennium Development Goals and to be the second largest economy of East Africa, losing recently, however, its first position to Ethiopia.

Agriculture is the heart of the Kenyan economy, contributing to over 30% of the GDP and it is estimated that 75% of Kenyan population is involved, at least

part time, in agricultural activities.¹⁵ It is also estimated that 75% of the agricultural production derive from small-scale producers.¹⁶ Major productions are tea, cut flowers, coffee, pineapples, beans and refined petroleum. Kenya's major economic partners for exports are the US, UK, Netherlands, Uganda and Zambia and for imports China, India, Japan, Tanzania, and South Africa.

The city of Thika was chosen as the study site for this research; it is located in the southern part of Kiambu County, bordering with Nairobi to the South. According to the 2009 national population census Thika had a population of 165,342 on 217.6 km² of which 102.6 km² are potentially apt for agricultural productivity.¹⁷

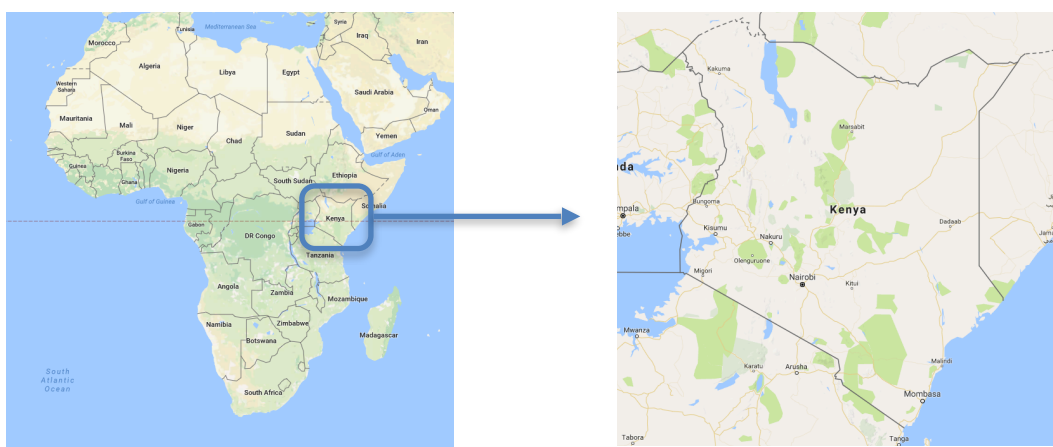


Figure 2.1 Location of Kenya. Data source: Google maps

¹⁵ Kenya, CIA Fact book, retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html>

¹⁶ Kenya, CIA Fact book, retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html>

¹⁷ This information was given by the local livestock authority.

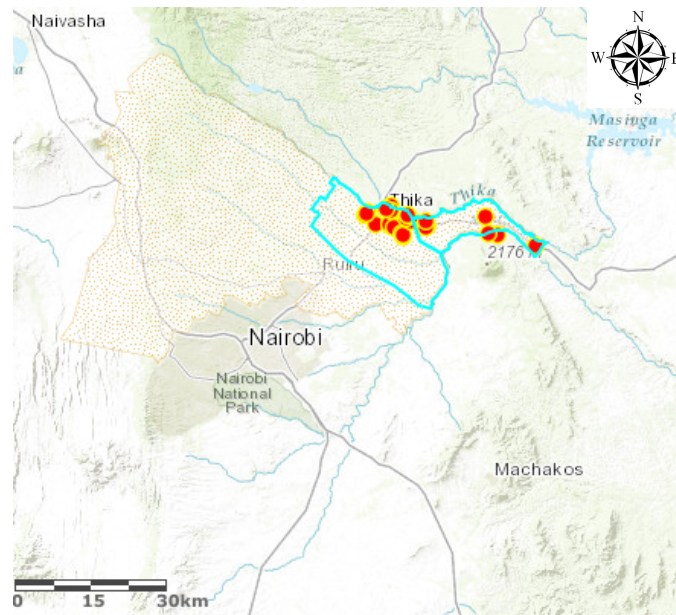


Figure 2.2 Thika area (blue selection) and interviewed households (red dots). The yellow pigmented area represents Kiambu county. Data source: ESRI maps

2.2 Working definitions

As already highlighted in the previous chapter, UA has many different connotations which may vary also in relation to the context, where the practice is conducted (i.e. in Europe or North America UA is conducted in different manners and for different reasons as compared to UA in SSA). These, often very profound distinctions can easily lead to different views and perceptions on UA, so it is important to state what is meant by UA in this research.

Given the spatial division of UA into urban and peri-urban spheres of activity, outlined in Chapter one, it is important to define what UA refers to in this research: UA is intended as whatever agricultural practice of whatever scale involving crop/vegetable production and/or raising of livestock contributing to the household in terms of additional food and/or additional income.

2.3 Database

As part of the wider *African urban agriculture: social, economic and environmental challenges and prospects under changing global and demographic realities* project, this research had access to the general database of information collected in 2013 and 2015, which includes 6051 respondents from six cities in three countries: Kenya, Uganda and Ghana. Concerning Kenya, 2009 respondents participated in the survey conducted in late 2013, of which 1005 in the city of Thika. The information collected includes household composition, household settlements, household income and expenditures, food insecurity information (HFIA, HDDS and MAHP), urban agriculture activities and rural - urban food links. Thanks to this vast and comprehensive database I am able to use descriptive statistics to present the UA situation in Thika as to who is involved, what is produced and which practices are adopted in the urban agriculture taking place within the city.

2.4 Fieldwork

Fieldwork was a necessary tool to collect primary qualitative and quantitative data on small ruminants production in Thika, so a four-week period in Kenya was included in the overall research project; it was divided into an initial phase dedicated to logistic preparation and a second, following phase spent on data collection. Fieldwork offers also the possibility to establish contacts with gate keepers and key informants, the former defined as those “people who let us in, give us permission or grant access” (O’Reilly 2009, p.132) and the latter as persons who become central to the research (ibidem).

The first ten days were spent in Nairobi to complete all the necessary logistic and bureaucratic issues (university statement, government permission, outlining a program with the local research assistant and transportation) before going to the field. Afterwards, in order to avoid losing time in commuting between the two cities, Thika was chosen as the place to stay during the data

collection. Small ruminant farmers interviewed during the previous research conducted for the wider *African urban agriculture: social, economic and environmental challenges and prospects under changing global and demographic realities project*, represented the first farmers to contact in order to collect more qualitative data on small ruminants in Thika. However, due to the fast changing urban context, many of them had moved elsewhere and so it became necessary to adopt the snowballing technique, that is to ask a farmer to indicate other farmers he knows in the area. This was the easiest and most effective way to identify other small ruminants producers.



Figure 2.3 The research team while conducting a questionnaire and a semi-structure interview with a urban farmer. From left to right: urban farmer, the local livestock authority, Dorcas (the research assistant), me and one of the local extension officers.

During fieldwork, I was assisted by Samuel Omondi, a Phd student from the University of Nairobi and Lund University, who helped me to gain important insights on UA in the area, being himself involved in conducting research on the chicken value chain in Kenya, and by the research assistant Dorcas Jalang’o, who, besides acting as translator during the interviews, also possessed comprehensive knowledge of the area.

In order to comprehend both the general situation of the farmers and to be able to start a conversation on different topics related to UA activities, a basic questionnaire was designed, followed by a semi-structured interview, which was the basis for further dialogues with the farmers. For the process of collecting data, I used the ArcGIS app Survey123, which gave me the possibility to design both the introductory questionnaire and the semi-structured interview (see appendix B). Both tools also served to enhance further dialogues on diverse topics related to UA, such as access to training and capital, the relationship with the local government officers and how they perceive UA. Furthermore, GIS enabled the mapping of previous respondents using the geospatial coordinates on Google Earth. In this way collecting data became less time consuming and more efficient in general.

2.5 Remote sensing

Using satellite imagery it is possible to visualize existing open-space UA sites in time-series that capture both the changes in size and location of agricultural sites occurred in time, as well as the rate of city expansion. Of course, this methodology is limiting, since closed animal shelters, small backyard farming or rearing areas are not clearly visible, but nevertheless it provides a picture of the urbanization in Thika.

The fast urbanization process and the consequent expansion of the city are affecting UA, which competes with other forms of land usage (industrial, commercial, real-estates) for a spot in the urban and peri-urban areas. During conversations with extension officers and local officials, satellite imagery has been used to better understand the position of the local government on UA and what are their main considerations when it comes to policy making. Using two different time frames, 2003 and 2016, with a satellite imagery software (Google Earth in this case) it is possible to see the urbanization of the area during that period.

2003



Figure 2.4 Ngoingwa area, Thika, in 2003 and 2016.
Data Source: Google Earth

2003



Figure 2.5 Kisii area, Thika, in 2003 and 2016.
Data Source: Google Earth

2.6 Qualitative data

This research also benefits from the qualitative data collected during fieldwork in Thika. The information focuses on the small ruminants farming practices, collecting data on the value chain of goats and sheep production and its impact on household food security in general, including rural/urban linkages of food transfers, the value of their production and their perception of UA in Thika. Access to credit, veterinary services, training, obstacles in rearing small ruminants, the relationship with the municipality, pros and cons of farming in urban areas and the transformations farmers have experienced were all topics of discussion during the interviews with farmers. In addition, an interview with a local urban agricultural authority and some informal dialogues with both the authority and two extension officers provided meaningful insights on some of the above-mentioned issues. The interview with the local UA authority covered the following topics: training, credit and veterinary services available for small-scale urban farmers, costs of inputs (feedings in particular), the nature of the hurdles for UA in Thika and how the local government views UA in relation to the fast urbanizing and expanding city of Thika. (See Appendix C for the complete list of questions).

2.7 Informations on the interviews

All qualitative data were personally collected with the support of the research assistant who translated from English into Kiswahili and *vice-versa*¹⁸. Overall, farmers had interest in the research, mainly because they wanted to explain what aspects in their UA activities needed to be improved what problematics were hindering or cumbersome in conducting urban farming. However, not all urban farmers had time or wanted to spend some time in doing interviews and thus they did not always welcome a researcher asking questions. Nonetheless, this situation has been very sporadic and did not affect neither the development nor the validity

¹⁸ Interviews were mainly conducted in the local languages Kiswahili and English.

of the research. Practicing UA seemed not to imply a gender issue in the sense that both women and men are involved in its practice. In the case of a male-headed household with the man pursuing also another job and, therefore, was away from home, his wife, if knowledgeable on the UA activity, took the interview in his place. Single headed households were an exception among the respondents (2 out of 33 farmers, both female).

As presented above, snowballing technique was used to overcome the fact that in the fast growing and changing city of Thika, many farmers interviewed during the first phase of the *African urban agriculture: social, economic and environmental challenges and prospects under changing global and demographic realities* project had moved from the original location, which meant that the follow-up of the same urban farmers interviewed in 2013 was not always possible. Nevertheless, the 2013 respondents represented an optimal way to start collecting data. Given the geography of Thika and the socio-economic as well as the spatial differences among the different areas, I aimed, when possible, to collect a similar number of respondents across the districts in order to observe and understand the above mentioned differences.

2.8 Data reliability and validity

Regarding primary data, data collected during the interviews was made as consistent, reliable and valid as possible thanks to the participation of a local research assistant, Dorcas Jalango'o, who speaks both Kiswahili and English. Even though the largest majority of the population understands and speaks English, some of the technical issues regarding farming were easier for them to explain in the language they were most comfortable with, which often was Kiswahili. In this scenario the research assistant translated the questions and answers into English and thus assured that the respondents understood the questions. Regarding secondary data, the database, satellite imageries and

software used in the field come from authoritative and reputable sources including, Lund University, Nairobi University, Google Earth and ESRI.

It should be made clear that the data collected during fieldwork cannot be used to make generalization on the entire city of Thika, rather they should be understood as valid for the 33 households interviewed, which are, however, representative of the small-scale urban farmers active in Thika, and thus do permit indicative interpretations.

2.9 Ethical considerations

Confidentiality of respondents has been guaranteed at all times. Third parties do not have the possibility to identify any of the participants by name, gender or location.



Figure 2.6 Thika is considered an important market place for small ruminants producers coming from different regions of the country. In the picture: a flock of sheep and goats raised by a group of farmers coming from the Lake Turkana region in the Northern part of Kenya. Farmers come down to Thika in order to sell their animals in the city. They can stay freely in that plot and usually they do not go back home until they have sold all the heads of the flock. Source: own photo

Chapter 3: Results

This chapter presents the results of both the database analysis and the analysis of data collected during my field-trip to Thika. My initial research questions will structure the presentation while a contextual discussion of the findings will follow in Chapter 4.

3.1 Kenya and Thika: a brief overview

As already mentioned, about 75% of Kenyan population is engaged, at least part-time, in agricultural activities.¹⁹ From the sample of primary data collected during the baseline research in 2013, it emerged that 54.9% of the urban population in Kisumu and Thika were involved in agricultural activities. 17,7% of the respondents were engaged in urban agricultural activities, 29,5% in rural agriculture (7.7% of them conducted both urban and rural agriculture). Being engaged in agricultural activities in rural areas indicates that multi-spatial/multi-dimensional livelihoods are a common strategy for urban citizens.

Sheep and goats counted for 1364 heads, 294 and 1070 respectively. There were 116 urban farmers raising small ruminants, 73 having goats only, 13 having sheep only and 30 having both. Of the 116 small ruminants' producers, 17 were involved also in crop/horticulture production. 74.1% of the small ruminants' farmers used manure as fertilizer, making it an important and valuable item for the household, thus avoiding or reducing buying fertilizers from external sources. For what regards milk production, 63 farmers (54.3%) produced milk. 30 of them (25.9% of all the farmers) sold at least part of the milk produced contributing to the general household income. 33 of them (28.4% of the farmers) used milk only for their own consumption. Regarding the city of Thika, out of the 41 urban farmers involved in small ruminants production 4 had sheep only, 37 had goats

¹⁹ CIA World Factbook, Kenya, retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/print_ke.html

only and 5 had both. 18 out of the 41 small ruminants producers were involved in milk production.

For what regards, who is involved in small ruminant production, as well as for UA in general, from the database it emerged that urban farming is a cross-sectional activity among the different income groups. This research, has not looked at income levels (also for the difficulty in measured it in a limited time). Observations conducted during fieldwork indicate that conducting UA is a common activity independently from the income group. However, differences in the way it is conducted, the level of organization and the structure of it were observed among the different households and different areas of the city.

3.2 Data collected during fieldwork in Thika

Research question #1: *What is the magnitude of small ruminants livestock production in Thika? (Magnitude measured in number of farmers involved, number of heads in the livestock, value of the production) What are the most commonly raised animals?*

From fieldwork collected information, goats appeared to be the most common of the small ruminants, mainly thanks to the easiness and affordability in raising this animal. Moreover, goats are also climate resilient, being able to resist in harsh conditions. Out of the 33 interviewed farmers, 2 have only sheep, 27 have only goats while 4 raise both. None of them addressed complications or difficulties in raising the animals, but rather, indicated the external factors that sometimes represent a hurdle to overcome, especially thefts and feedings in times of drought. As a matter of fact, during the drought period, the availability of grass to feed the animals is low and sometimes the farmers need to go far to get it or have to pay high prices to grass sellers.²⁰ In addition, the high cost of concentrate feeds, which

²⁰ During my period in Kenya, I saw several times large group of skinny cows grazing along streets in city. I soon discovered that Masai people (who are traditionally shepherds) coming from outside the city, were allowed to bring their animals because of a long period of drought, which weakened and threatened the health of animals.

are an important component of the diet of small ruminants, especially during the first year of life, becomes a reason of complaint for farmers, whose request was to subsidize them.

Concerning flock size, 30 urban farmers have a relative small flock counting from 1 to 10 animals, mainly due to the limits of available space which is usually shared also with the farmer’s house, other livestock and/or crop/vegetable/fruit production areas. Four farmers interviewed in Ngoliba, a town 10 km away from the urban centre of Thika, but still within the fringe of the city, have larger areas for farming, a fact that is translated in a larger variety of crop, fruit and vegetable along with larger livestock productions in general. The issues of space is, hence, determinant for the size of both the livestock and crop production.

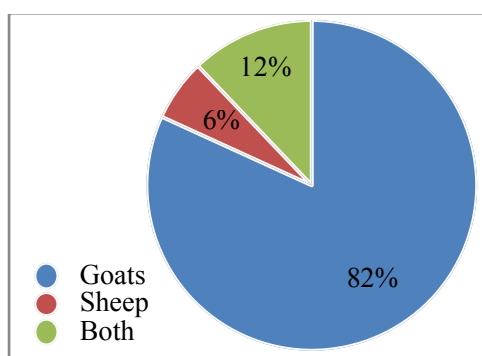


Table 3.1 Farmers involved in small ruminants production. Thika, Kenya 2017. Source: own data

Goats	27
Sheep	2
Both	4
	33

Figure 3.1 Type of small ruminants raised by urban farmer. Thika, Kenya 2017. Source: own data

In goat production, the general division of breeds is either local breed for meat production or hybrid for milk production, but most farmers do not know exactly which breed their animals are. This division has also been confirmed by two local extension officers, who joined the fieldwork for one day. Three goat breeds were identified: German Alpine and Saanen as hybrid breeds for milk production and Galla as local breed for meat production. These differences in the breeds determine also, in case of sale of the animal, different prices. A milk goat is an investment, which can bring to the household both nutritious milk for own consumption as well as income derived from its sale. An adult milk goat is sold

for a price between KES 15000 – 20000, while a kid is sold for a price between KES 5000 – 8000, though kids are rarely sold, since they become more profitable at a later stage. On the other side, meat goats are valued nearly half price of their milk counterparts, between KES 8000 – 10000 for the adult ones and between KES 2000 – 3000 for the young ones. The fluctuations in price of the animals in the same category (meat or milk), besides their size, is also determined by the distance from the city center, that is the distance from the market.

A different point must be made for milk. In fact, being the flocks of small ruminants production in urban areas limited in size due to the above mentioned issue of space, also milk production results in being limited. In fact, milk mainly contributes to the daily diet of the household and to a lesser extent to the possible income that might be generated by its sale. Especially in the areas closer to the city, fresh goat milk can be sold for KES 200 per liter, while in Ngoliba, 10 kilometers distant from the urban centre, the price goes down to KES 100 per liter.

The interviewed farmers were in most cases (27/33) also the owners of the plot they were farming, while none of them declared to farm on institutional land or illegally on other areas.

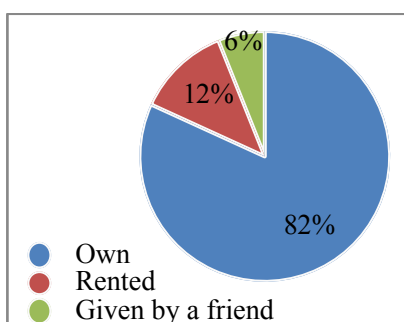


Table 3.2 Farmers’ ownership of UA plot. Thika, Kenya 2017. Source: own data

Own	27
Rented	4
Given by a friend	2
Institutional land	0
Family land	0
Illegally farming	0
	33

Figure 3.2 Ownership of farming plot. Thika, Kenya 2017.
Source: own data

Research question #2: *Who is engaged in small ruminant production, what is produced, and how does it contribute to the livelihoods of the engaged*

households? What are the scopes and final destinations of small ruminant production?

From the 2013 guideline database, 31 out of 41 small ruminant farmers had a household structure composed by a male-female partnership with or without children or relatives and 10 were composed by a male only (2 out of 10) or a female (8 out of 10) with children and/or relatives. Similarly, the household structure of the farmers interviewed during the fieldwork was a traditional one, composed by a male and a female partner with children and, more rarely, composed by the woman only with children (2 cases out of 33). All the respondents were involved in other agricultural activities alongside small ruminants production, which was mostly an additional source of food and sometimes income rather than the primary household activity. Patterns in relation to the scale of the farm and gender seem not to be present, rather it is the distance from the town center that influences the size of the plot available for agriculture.

Regarding the contribution to the household derived from small ruminants production, different discourses on the different kinds of production must be considered. The first consideration is on the type of production (meat or milk) and, hence, accordingly to the goats breed. This differentiation characterized the following production mainly in either consumption/sale of milk or sale of live animals. The major contributions to the household from goats and sheep production derives from three major kinds of production: a) milk production; b) sale of live animals; c) manure, utilized as the main source of fertilizer for crops and vegetables production or sold to other farmers. Consumption of small ruminants meat appeared to be related only to special occasions, eaten once or twice per year during ceremonies (mainly Christmas and/or Easter). Depending on the structure of the household, goats and sheep can also be given as a dowry to the family of the son in law. From the respondents' answers and dialogues, the role of goats and sheep to the household may be seen as a complementary function to the livelihoods both in terms of food security and of income.

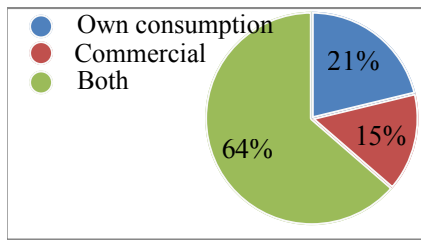


Table 3.3 Purpose of the production. Thika, Kenya 2017. Source: own data

Own consumption only	7
Commercial only	5
Both	21
	33

Figure 3.3. Purposes of small ruminants production. Thika, Kenya 2017. Source: own data

This means that even if the income generated from the sale of small ruminants production represents a small part of the total household income, it still has a role in bringing more food onto the table or more income for other expenditures.

Moreover, the majority of the respondents (20/33) have also other jobs, either in the formal (7 out of 20) or in the informal sector (13 out of 20), meaning that each household has a diversified livelihood strategy and that farming is not necessarily the only source of income. For what regards the production, wool and hide are not seen as profitable business and often discarded from the production.

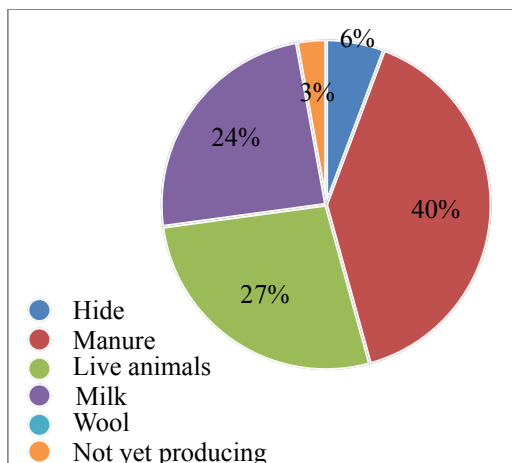


Table 3.4 Small ruminants production. Thika, Kenya 2017. Source: own data

Hide	4
Manure	28
Live animals	19
Milk	17
Wool	0
Not yet producing	2

Figure 3.4 Small ruminants production. Thika, Kenya 2017. Source: own data

The sale of live animals, manure and milk contribute in large parts to the household, though in different manners. As said previously, the sale of live animals varies accordingly to the type of breed of the goat and to the intentions of farmers (at the initial stage farmers are willing to expand the flocks so they do not

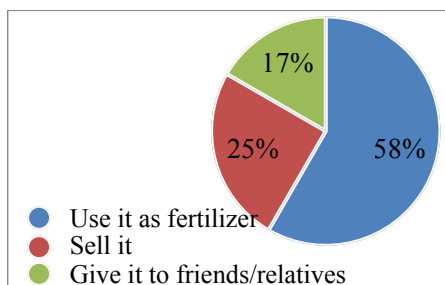


Table 3.5 Manure management (multiple choice) Thika, Kenya 2017. Source: own data

Use it as fertilizer	28
Sell it	12
Give it to friends/relatives	8

Figure 3.5 Manure management. Thika, Kenya 2017. Source: own data

sell any animal). Manure can contribute in two different ways, either by providing the main source of fertilizers for crop or vegetable production or by providing income in case of selling it.

Regarding milk production, a similar discourse on the intentions of farmers can be made: if the farmer wants to expand his or her flock, the milk is neither sold nor consumed. If expansion is not the farmer's interest, milk is either consumed or sold at the farm gate or at local markets. Small-scale farmers do not have the capacity for storing safely fresh products like milk, which, hence, must be consumed daily. This lack of effective storage means that those farmers without a steady output market have to consume all of their own milk production, which in

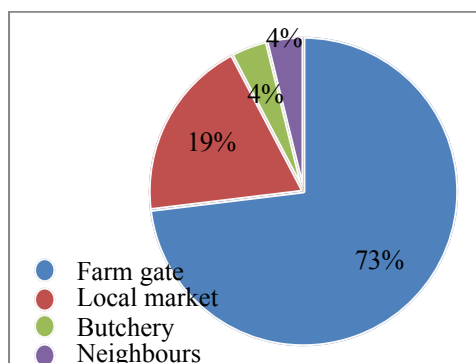


Table 3.6 Selling location for UA outputs. Thika, Kenya 2017. Source: own data

Farm gate	19
Local market	5
Butchery	1
Neighbours	1
Other markets	0
	26

Figure 3.6 Selling location for UA outputs. Thika, Kenya 2017. Source: own data

some cases means to drink up to 2 liters of goat milk per day. All the small scale farmers interviewed and involved in commerce of their UA products sold their products locally, either to a local market/butchery or directly from their farm gate, meaning that small scale urban farmers adopt a short food supply chain, which in most cases is constituted of a personal network of customers. One of the interviewed UA farmers reported that she has a network of buyers for goat milk, so that she is able to count on a stable and constant market for her production.

The majority of the households (20/33) transfers part of the production to friends and/or relatives living either in urban and/or rural areas. The role of these food transfers may be connected to the establishment of new social relationships with relatives and friends or the strengthening of already existing ones.

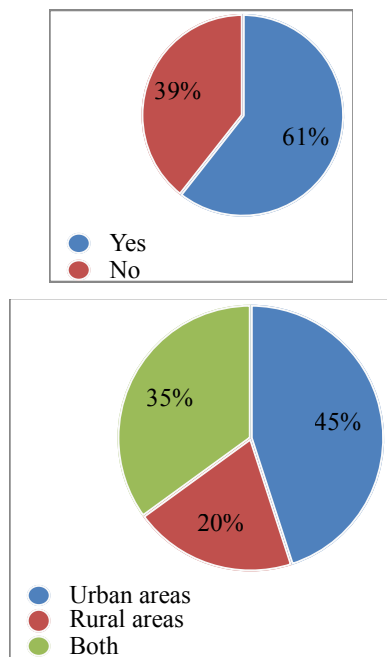


Table 3.7 Food transfers. Thika, Kenya 2017. Source: own data

Yes	20
No	13
	33
Location of transfers	
Urban areas	9
Rural areas	4
Both	7
	20

Figure 3.7 Food transfers. Thika, Kenya 2017. Source: own data

Research question #3: *Where are the necessary inputs (breedings, veterinary services, feedings, water) taken from? How are the urban small ruminants raised?*

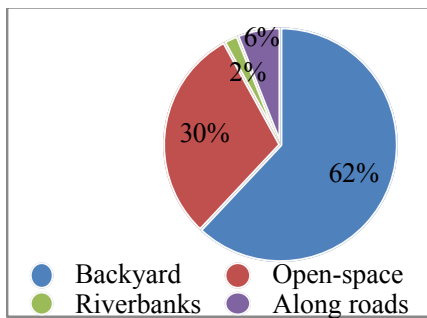


Table 3.8 Location of goats rearing (multiple choice) Thika, Kenya 2017. Source: own data

Backyard	31
Open-space	15
Riverbanks	1
Along roads	3
Along railways	0

Figure 3.8 Location of goats rearing. Thika, Kenya 2017. Source: own data

This question examines both the location of urban small ruminants production and the sources of the inputs needed by urban farmers for their activity, including veterinary services, feedings and water. Mostly, urban farmers rear their small

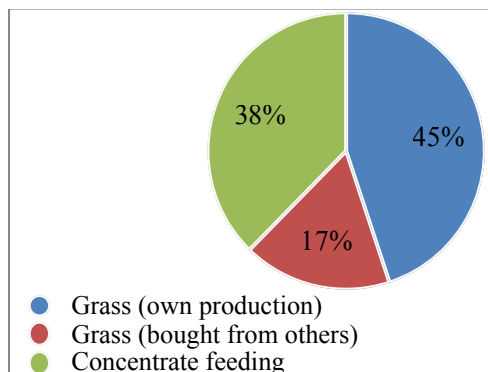


Table 3.9 Inputs: feedings (multiple choice) Thika, Kenya 2017. Source: own data

Grass (from own production)	31
Grass (bought from others)	12
Concentrate feeding	26

Figure 3.9 Inputs: Feedings Thika, Kenya 2017. Source: own data

ruminants livestock in their backyards or let them graze freely in open spaces or along roads; (usually the animal is tied to the leash at a pole or a stone to keep it from escaping).

Feedings are divided into two main categories: grass and concentrate feedings. Most farmers (27/33) use a combination of both, especially in order to sustain and push the animal growth during the first year.

Alongside feedings, veterinary services and water are crucial inputs that the farmer has to provide for his or her livestock and for crop/vegetables/fruit production if present. There are several sources, but not all of them are available

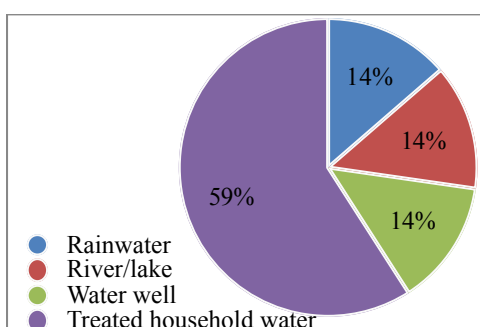


Table 3.10 Inputs: water (multiple choice)
Thika, Kenya 2017. Source: own data

Rainwater	6
River/lake	6
Sewers	0
Treated household water	26
Water well	6

Figure 3.10 Inputs: water sources
Thika, Kenya 2017. Source: own data

to all the farmers. These sources include taking or pumping water from water courses (be it a small river a lake or a pond), from underground wells, collecting rainwater and treated council water. Among all these options water courses and underground wells are used when available on or close to the farm site. Even though the farmer has to pay for treated council water, it appeared to be the most common source because of its availability.

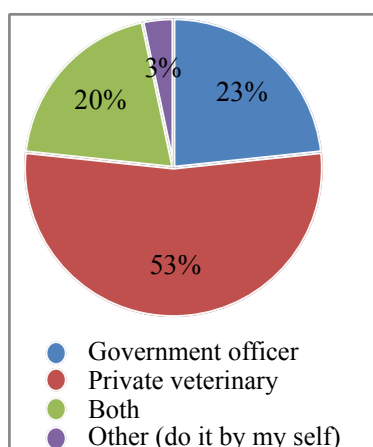


Table 3.11 Inputs: veterinary services
Thika, Kenya 2017. Source: my data

Yes	30
No	3
	33
From where?	
Government officer	7
Private veterinary	16
Both	6
Other (do it by my self)	1
	30

Figure 3.11 Inputs: veterinary services
Thika, Kenya 2017. Source: own data

Veterinary services are provided either by governmental extension officers or by private veterinaries certified by the government. Almost all the urban farmers (30/33) use veterinary services for their livestock, primarily using private services, which are considered to be faster and more reliable than the

governmental ones. A discussion on the services provided by the government will follow in the next chapter.

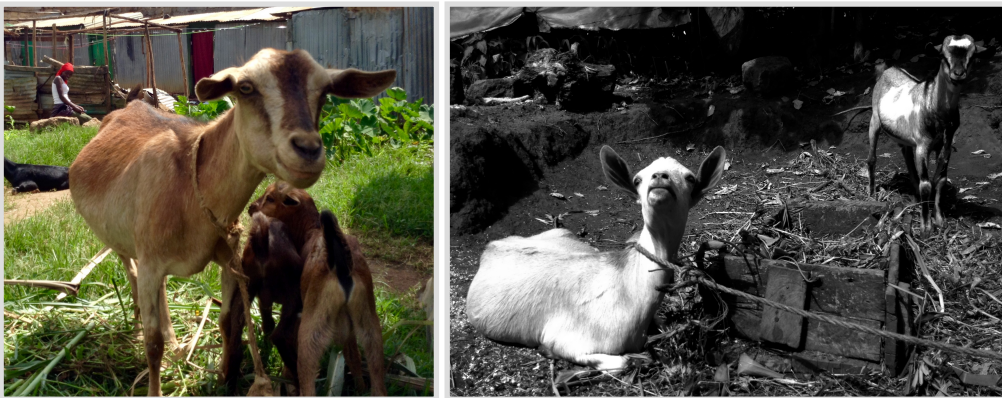


Figure 3.12 Due to the limited space availability in the city, goats are usually reared in small flocks in the backyard, either freely, in close shelters or tied to the leash. Source: own photos





Figure 3.13 Different ways of rearing chickens in the city. Through these images it is possible to see some of the myriads of different types of UA. Source: own photos



Chapter four: Discussion

This chapter will present findings and reflections based on the qualitative data collected during the fieldwork on urban small ruminants' farmers and the respective local government authority. The sustainable livelihood framework will serve as the main framework for interpreting the data. The discussion will begin with a presentation of benefits and constraints in conducting UA for urban farmers, their access to credit and training and livelihood strategies and will be followed by a closer look at the role and position of farmer groups and the local livestock authority in relation to SLF.

4.1 A qualitative discussion on urban small ruminant farmers in Thika

Data collection in the field allowed the research to benefit from 33 urban farmers interviews, formal and informal dialogues with local agricultural officials, all of them providing meaningful and qualitative insights on UA covering different topics such as benefits and constrains of conducting UA, access to credit and training, relationship with local authorities and transformations observed in agricultural activities conducted within the urban context.

4.1.1 Access to training and capital

Training and capital are critical aspects in UA, but access to them can be problematic for many urban farmers.

Regarding access to credit, out of 33 interviewed farmers, only about a third (10 out of 33) accessed credit during the past 12 months, while the remaining relied only on own savings for their activity. Only 1 farmer accessed credit from a commercial bank, while all the others relied on microcredit institution (mostly women and farmer groups). Also the interview with the local livestock authority

highlighted the fact that for small producers, the most effective and economic way to access credit is through micro-finance groups. Though other possibilities for obtaining credit are available, such as regional funds and commercial banks, they are often avoided because of the long and complicated bureaucratic procedures and difficulties in getting the collaterals for the bank. Translated into practical terms, this means less access possibilities to credit for small farmers.

In a similar way, when it comes to training, most farmers (27 out of 33) rely solely on knowledge exchange with other farmers without accessing formal training, which is organized both by farmer groups and by the local agricultural authority, the latter on a demand-driven basis, meaning that farmers have to sign up at the office in order to access it. It should be stated, however, that among those not being part of a farmer group, no one was aware of the existence of such training possibilities offered by the local government. Two problems became evident: firstly, the lack of communication between the local agricultural government and the small urban producers which resulted in not transmitting important and relevant information to the directly interested persons and secondly, as implied by some urban farmers, a lack of public administrative will or efficiency to realize proper formal training services and have them rather only on virtual display.

Notwithstanding the isolated position in which single small urban farmers operate in regard to credit and training, there are other viable solutions available for them, e.g. farmer groups. These groups have a determinant role for urban farmers, since those being part of a farmer group also had access to credit and training or gained the information on how and where to access them. Dialogues with both the farmers and the livestock authority emphasized namely the fact that for farmers it is easier to access credit and training through a farmer group, because it can provide direct services or information on where to get them. Moreover, for the local government it is easier to communicate with farmer groups rather than single farmers allowing information to be spread hierarchically

in a more efficient way. Cooperatives are believed to be the most effective organization in overcoming the difficulties of small producers through their empowerment and improved bargaining power on the market (Scramp 2007; Woldu et al. 2013; Wanyama et al. 2009). Even though farmer groups do not have the same institutional power as cooperatives, the taken interviews evidenced that cooperatives are crucial for farmers in order to access services and information as well as to improve their own production networks. Considering all these aspects and the fact that communication with local authorities is more effective if conducted via farmer groups rather than individually, it appears reasonable that farmer associations should be further promoted and encouraged by the local government.

4.1.2 Benefits of conducting UA

Starting with the benefits urban farmers obtained in conducting UA, two major categories were identified: firstly, the contribution to the household in terms of income and additional food and, secondly, the characteristics of the urban context, which serve as facilitators for urban farmers' activities. While the contribution to the household from UA have already been discussed in the previous chapter, the present one will highlight the characteristics of the urban agricultural context. These characteristics are mainly related to accessibility, either in terms of distance to markets for the UA outputs or access to services (veterinary services, training, capital possibilities) and infrastructures (transportation, household water). Several farmers have indicated these urban characteristics as facilitators for their activity, making UA not only an additional source of food and income, but also a profitable business:

- *“The selling prices are higher compared to rural areas and there is always a market for the products. Moreover, I can drink milk that I produce without buying it elsewhere and thus*

save the money for other expenses” (female farmer, age 53, education: primary school)

- *“It can be a profitable business. Good market for the products, demand is high and the selling price can be high as well” (male farmer, age 60, education: high school not completed)*

Moreover, UA is helping urban producers in being more autonomous without the need of relying on food remittances from rural areas. These urban-rural linkages constitute a vital safety net for urban households. (Ayerakwa 2017) While in the past, literature on urban-rural links have focused mainly on the cash remittances from the city to the village, more recently the emphasis has been given to food transfers from the village to the city, which is an important aspect of the livelihood strategy for urban residents. (Ibidem) This aspect of urban livelihood strategies has been found also in farmers’ responses during the fieldwork, suggesting that a livelihood strategy is composed of a mosaic of different sources. However, this rural-urban food linkage is not always considered as such a positive phenomenon as the literature seems to think. As a matter of fact, even though food transfers can represent an additional source of food for the household, they also signify that the household is not self-reliant and needs resources given from outside to fulfill its food demand. Self-sufficiency has been indicated as one of the main benefits of conducting UA, indicating the importance of feeling empowered through an occupation:

- *“For me the main benefits are the easy access to important fresh products and self sufficiency. I do not have to rely on food transfers from rural areas” (male farmer, age 94²¹, education: middle school)*
- *“With my age it helps a lot of being more autonomous and not rely on transfers from my children. Plus I get food and*

²¹ Age was estimated by himself. At the time he was born, official birth records were not common.

some income for myself and animals keep my day busy so I don't get bored" (female farmer, age 52, education: high school completed)

- *"More self-reliant without relying on food transfers from rural areas. It is locally produced, no transport is needed and the products are fresh"* (female farmer, age 26, education: primary school)

Lastly, farmers emphasized their capacity to build resiliency against external shocks (such as food prices increments) thanks to their UA activities. This resiliency allows them to plan their expenses and investments without stumbling over unforeseen obstacles, a risk perceived for those household not involved in any urban production.²²

- *"During shortages or price fluctuations of food, I do not suffer from them, because I grow my own food and I can save the money for other expenditures, like the school for mentally slow people I run"* (male farmer, age 66, education: university completed)
- *"Urban farming is very important for becoming more self-sufficient and be more resilient in general. No need to buy everything from outside"* (female farmer, age 54, education: high school completed)
- *"Shortages of food do not affect urban farmers since the food is available at home, like milk or maize"* (female farmer, age 38, education: high school not completed)

These three aspects, namely easy market accessibility, reduced need of food transfers and improved resiliency against external factors, were observed as the most important benefits from conducting urban farming and proved UA to be a viable livelihood strategy for those involved.

²² This point was particularly emphasized during interviews: due to a shortage of maize, which the Kenyan government had to balance with imports of Mexican maize from South Africa (who imported it the year before). This shortage provoked a price peak for maize which almost doubled the usual price (http://www.the-star.co.ke/news/2017/05/17/five-families-behind-maize-shortage-in-kenya-mututho-claims-demands_c1563071; <http://www.bbc.com/news/av/business-40303923/poor-harvest-causes-maize-shortages-in-kenya>).

The interviews with the urban farmers evidence a generally positive perception of UA being associated with a better food security status. This observation is in line with many research conducted on the topic (Ayekarawa 2017; Omondi 2017; Zezza & Tasciotti, 2010). However, the local livestock authority considers the above mentioned urban farming benefits connected to the engaged households only. Hence, UA is considered a mere livelihood strategy at a household level rather than a viable means for the improvement of food security at a larger city scale. In synthesis, UA contribution in terms of income and nutrition are recognized by the local government, but to what extent they can benefit the whole urban context is still debated.

4.1.3 Constraints in UA

The previous chapter mentioned space availability as the major problem of UA perceived by urban farmers, but also other issues were identified as factors constraining and inhibiting UA activities. Limited access to capital and limited knowledge about the best agricultural practices were, alongside external factors such as prices for the inputs and water infrastructures, mentioned by the respondents:

- *“The price for concentrate feed is very high and that cuts our profits a lot. Veterinary services from the government can be difficult, because they want also to be paid for the transport. Probably they are too few operators, because it takes a lot of time to get the services from the extension officer. They should visit more often, especially now that antrax is epidemic they should come and check the animals if they are ok.”* (Female farmer, age 53, education: primary school)
- *“A major concern is the cost of feeds and if it can be subsidized our profits will increase and we can expand our activity.”* (Male farmer, age 40, education: university not completed)
- *“Stabilization of market price of basic goods, so to avoid high fluctuations of egg, milk or maize prices. Access to credit at a*

better rate so to be able to expand the business and get more income.” (Female farmer, age 45, education: primary school)

- *“The major problem here is the access to water, so if the county government can improve this aspect also our production will improve and we can improve our livelihoods as well.” (Female farmer, age 44, education: primary school)*

In this scenario, the government plays the primary role in addressing the right policies for water and transport infrastructures development as well as to mitigate extreme price fluctuations as it did in spring 2017 when facing a maize shortage.

4.2 Sustainable livelihood approach: analysis

Linking the above mentioned benefits and constraints in conducting urban farming with the sustainable livelihood framework it is possible to capture, at least partly, the livelihoods of urban farmers. In the following, livelihood assets and livelihood outcomes as observed during the fieldwork will be presented, together with an analysis of the role of the institutions involved.

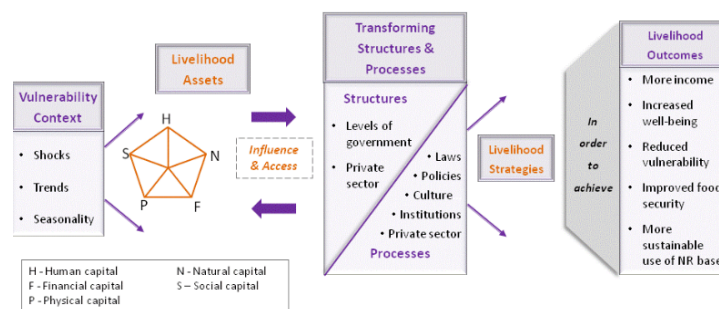


Figure 4.1 Explanation of the connections and relations in a livelihood.
Source: DFID

4.2.1 Livelihood assets, strategies and outcomes

During fieldwork some major aspects in the assets which composed the farmers’ livelihoods were identified, namely:

1. Financial asset: limited access to capital, mainly through micro-finance institution (farmer groups, women groups)
2. Natural asset: limited access to water
3. Physical asset: poor water infrastructures
4. Social asset: network of people (producers, input providers, consumers) enhanced by being part of a farmer group)
5. Human asset: limited access to training, enhanced by being part of a farmer group

The financial assets are based mainly on own savings and credit from micro-finance institutions, including farmer groups and women groups which offer better loaning conditions compared to commercial banks. Besides microcredit services, farmer groups and women groups provide also some sort of table banking which include both cash and livestock.²³

Social and human assets vary according to people own networks and social relationships. However, it was observed that farmers who were members in a group had a greater access to social networks and services (or information about them) compared to non-members.

Regarding the physical and natural assets, as mentioned in Chapter 3, water is accessed mainly via treated household water and, in some cases, via nearby water courses or water holes (with homemade pumping systems if possible, with buckets otherwise). Even though water infrastructures were missing, a government official told the research team that implementations of groundwater projects are taking place, aiming to improve the physical assets of farmers.

As mentioned previously, the benefits of conducting UA include improved food security and resiliency from external market shocks together with less reliance on food transfers. Using the SLF, these benefits are the livelihood

²³ One farmer group used goats as table banking: when a farmer is willing to start his/her activity, he/she will receive a goat from the group. When the farmer establishes him/her self, he will return to the group one goat, which will be given to a new farmer.

outcomes resulting from different livelihood strategies adopted by urban farmers. Scoones referred to three main livelihood strategies: agricultural intensification, livelihood diversification and migration, each requiring a different combination of assets (1998 p.9). Exemplifying the concept, a livelihood strategy which aims to expand the business activity, most likely will aim to enhance financial and natural capital (e.g. land, water) more than other capitals, while a migration strategy may be more oriented to social capital, connecting social relationships in different places.

During fieldwork the above mentioned livelihood strategies were identified, in particular agricultural intensification and livelihood diversification strategies. Even though migration strategies were observed as well, they were referred to as mainly old family stories about moving to the city or as observations of the increasing number of people coming to the city and starting an UA business.

1. Agricultural intensification: farmers mainly looking to enhance their financial capital in order to invest in agricultural activity:
 - *“I need more capital to increase livestock production”* (male farmer, age 45, education: high school completed)
 - *“With more capital I can expand the livestock production”* (female farmer, age 50, education: high school completed)
 - *“With lower interests on capital I can improve my business”* (female farmer, age 54, education: high school completed)
2. Livelihood diversification: as mentioned in Chapter 3, 20 out of the 33 interviewed farmers held also other jobs, either in the formal or in the informal sector, indicating diversification as a common livelihood strategy in pursuing the desired livelihood outcomes. Farmers were involved in other activities, including craftsmanship, renting out land

and/or houses, running a school for mentally slow children and other informal jobs.

3. Migration: some urban farmers reported that they saw an increment of people coming to the city attracted by UA economic possibilities.
 - *“15 years ago there were only 6 farmers, now it's full of farmers. Many came here for training from me. It expanded a lot.”* (Male farmer, age 60, education: high school not completed)
 - *“The number of urban farmers is increasing since urban agriculture can be a good business and a decent livelihood. I moved here to farm, because a friend gave me this plot.”* (Female farmer, age 26, education: primary school)

4.2.2 Transforming structures

With livelihood assets and strategies determining the livelihood outcomes, the role of institutions enabling such a process is fundamental. According to Davies

“institutions are the social cement which link stakeholders to access to capital of different kinds to means of exercising power and so define the gateways through which they pass on the route to positive or negative [livelihood] adaptation” (As quoted in Scoones 1998, p.12).

Farmer groups and local agricultural authority, are the two main institutions playing a crucial role in determining the livelihood strategy for farmers. In fact, they create possibilities to enhance the assets of urban farmers, especially the financial, social and human ones. Farmer groups can provide farmers with direct access to capital and training as well as a network of people, hence incrementing the general level of the assets with which farmers can build up more successful livelihood strategies. The emphasis is put on the major role of structures in being facilitators or inhibitors in the access to livelihood assets, hence in creating the basis for the achievement of desired livelihood outcomes.

Achieving sustainable livelihoods is not a deterministic affair; contestations, negotiations and trade-offs are evident at every-run. An

insight into social relationships, their institutional forms (both formal and informal) and the power dynamics embedded in these, is therefore vital (Scoones 1998, p.12).

Although the acknowledgment of institutions as key players in the access to livelihood resources is incontestable, several issues concerning the knowledge of the mechanism and dynamics with which they operate, remain open. Referring to the interviews conducted with urban farmers, the livestock authority and other informal dialogues with governmental officers, it became clear that farmers suffer from a severe lack of information on the services available from the institutions. As a matter of fact, the demand-driven training services offered by the local agricultural office imply that farmers are aware of that possibility, which is not the case. While relevant information might be available to farmer groups, because of a more efficient communication with the local authority, it was found that none of the single farmers was aware of such possibilities, but, ironically, those farmers demand namely training services which are already being offered, though not publicized properly. This lack of communication remarkably affects also the perception that some of the UA practitioners have on the local government officers, who sometimes are seen as slackers, perception that the government is aware of.

4.3 UA in Development studies

Global food security is one of the Sustainable Development Goals in the UN *2030 Agenda*. As discussed in Chapter 1, the problem of food security can be seen from different perspectives: either as a problem of lack of production or as a problem of redistribution of resources. In addition, population forecasts are posing even more challenges to the issue of food security. Population growth, urban expansion, migration phenomena are all part of the challenge of feeding the planet sustainably.

The increment in global food production advocated by both the WB and the FAO clashes with the analyses elaborated by leading scholars such as Harriet Friedman, Philip McMichael and Eric Holt Jiménez showing that already at present enough food is produced to satisfy the global demand. These two factions are also in contrast on how food security should be achieved. Mere food security is achieved "when all people at all times have access to sufficient, healthy, safe, nutritious food to maintain a healthy and active life" (Rome Declaration on Food Security, 1996). On the other side, the three scholars have proposed a different definition, called food sovereignty, which takes into account peoples' choices on food and agricultural practices, their own cultural context. It is implied that food is not simply a physiological need, but embraces also aspects that create social identity and belonging. Culinary traditions and customs constitute a set of diversified and meaningful practices that cannot be easily dismissed or abandoned without damaging the social community and the cultural mindset, where they developed and are deeply rooted. Hence, adequate food supply signifies also comprehension and respect for local dietary habits, norms and patterns. In this conflicting scenario, UA can play a unifying role for several reasons:

a) UA is deeply contextual itself: local traditions and cultures determine what agricultural products will be produced and what kind of animals will be raised in the area, meaning that food should be culturally adequate. As Montanari wrote in his book *Food is Culture*:

Like spoken language, the food system contains and conveys the culture of its practitioner; it is the repository of traditions and of collective identity [...] an extraordinary vehicle of self-representation and of cultural exchange. They convey symbolic and *signifying* meanings of widely differing kinds (economic, social, political, religious, ethnic, aesthetic), both inside and outside the societies that express them (pp. 133-138).

The importance of culture and traditions in farmers activities became also evident during informal dialogues with farmers. Even though, dietary patterns are

affected by globalization, urbanization and economic growth processes (Pingali 2008), the cultural roots in UA practices in Thika appeared to be still strong. For instance, agricultural products cultivated in Thika were all part of the traditional diets (maize, pulses, bananas, tubers, papayas) as well as the animals raised (chicken and goats mainly). Goats, besides being raised, are also part of the traditional cuisine, most often consumed during Christian ceremonies, either Christmas or Easter. In synthesis, food and culture are tightly linked and embedded in traditions as well as daily farming practices.

- b) Empowerment of women (goal 5 of the UN Sustainable Development Goals): as it has been observed during fieldwork and from the database analysis as well, women extensively participate in UA, either as owners of agricultural plots or involved in the production and sale phases. Their active role in UA is even more evident, when the issue of credit is taken into consideration. As a matter of fact, alongside farmer groups, the most available microcredit institutions in the observed field farms were namely women groups, organized both as way to access credit and as a landmark for the local community opening also a well functioning communication channel with the local agricultural authority, which means that information on trainings and other services can be spread efficiently to the farmers. Recognizing the private sector as the key in achieving women empowerment, the UN entity for Gender Equality and Empowerment of Women states:

Empowering women to participate fully in economic life across all sectors is essential to build stronger economies, achieve internationally agreed goals for development and sustainability, and improve the quality of life for women, men, families and communities (Women Empowerment Principles).

- c) UA proved to be a viable and sustainable livelihood strategy on itself or part of a livelihood diversification strategy for many urban households: UA practices effectively contribute to the engaged households not only in terms of

the additional food obtained through urban farming, but also in terms of the additional income generated either directly by the sale of agricultural outputs or indirectly by the savings on food expenditures, savings that can be spent on other household expenditures, including child education and business investments.

Chapter five: Conclusions and Further Research

This chapter will present a brief summary of the thesis together with concluding remarks and some suggestions for future research. The aim of this study is to contribute to a deeper understanding of the small ruminants value-chain and of the benefits generated by agricultural practices in urban areas in Sub-Saharan Africa, in this specific case, in Thika, a middle-sized town of about 140 000 inhabitants, approximately 50 kilometers northeast of Nairobi. Hopefully, results and observations can be used as a stepping stone for future research and policy implementation by the local government.

5.1 Summary and concluding remarks

This research on the small ruminant value chain in Thika, Kenya, has tried to show how complex and intricate UA practices are. UA, besides having several different typologies and goals (urban/peri-urban, market oriented, subsistence), is perceived and experienced in different manners by the different stakeholders within the context of a continuously-evolving socio-physical environment represented by the fast growing and expanding city of Thika. The role of UA in farmers' livelihood has been discussed both with the UA-engaged households and with the local livestock authority.

Chapter 1 introduced to the general aim of the research and its guiding theoretical framework, namely to investigate the role of small ruminant production in household food security within the wider framework of UA. The ever-changing environment created in the context of a fast developing urbanization, economic growth and globalization, which is present in many SSA countries, creates challenges, obstacles as well as possibilities for people, who have to struggle in order to find their own successful livelihood strategies according to the assets they can count on. The sustainable livelihood approach served as the principal key in understanding urban farmers' livelihood assets and

strategies, to get a clear picture of the possibilities and limitations of their activities and also to comprehend the role played by the government in enhancing livelihood possibilities. In Chapter 2, methods used in the research were presented with particular attention given to the undertaken fieldwork: data regarding the value chain of goats and sheep were collected on site, in Thika, during a 4-week long fieldwork during which 33 urban farmers were interviewed, but also formal as well as informal dialogues were held with the local livestock authority and extension officers. In Chapter 3, the collected information was analysed and presented with tables and figures in order to make sense of the different parts constituting the small ruminant production. A variety of aspects and arguments were covered, such as the cost of inputs, available forms of access to training and credit, market-oriented purposes vs. household consumption only, the effects of obstacles encountered in raising the animals or in communication with authorities. Chapter 4 presented a discussion of the results, including the responses given by urban farmers on the benefits and constraints of conducting UA, followed by a deeper analysis of urban farmers' livelihoods using the sustainable livelihood approach, which allows a broader comprehension of the assets farmers have at their disposal in order to choose and realize a functioning livelihood strategy with which to achieve the desired goals. In the process, the decisive role played by transforming structures, i.e. local government, farmer groups and women groups were highlighted. Finally, a brief discussion on UA as a topic in Development Studies followed, presenting some of the major characteristics and contributions UA has added to the sustainable development debate.

The sustainable livelihood approach created the condition to observe and analyse urban farmers' livelihoods under the lenses of household assets. The understanding of the crucial role played by civic groups and the local government, both powerful enough to enhance existing assets and/or help creating new ones, helps putting together the various pieces in a general, but faithful portrait of urban farmers' livelihood at the household level. Though a substantial share of

food production and income derives from UA activities (Zezza & Tasciotti 2010) , the following critical aspects emerged from the information collected during fieldwork and which need to be addressed in order to implement more effective policies:

1. Health and agro-ecological issues: besides being important for the engaged households in terms of food security and income, UA provides fresh products for local markets. This means that the cultivated products and raised animals within the urban area are mostly consumed there²⁴, but being the production in the city with its congested traffic raises also some significant health issues, which should be taken into consideration. The presence of heavy metals in UA vegetables production in SSA is well known and much research has already been produced on the subject (Obuobie et al., 2006; Qadir et al., 2008, Lente et al. 2012). Moreover, the interviews conducted during fieldwork pointed to a lack of veterinary security: animal checks carried out by the government are rare, even during times of epidemic illnesses. To pretend to check every single animal of all producers, when farmers are involved in informal activities, is not a realistic, if not impossible request, but farmer associations could help filling this gap. For this and many other reasons farmer groups should be fostered.
2. Associations: women and farmer groups proved to be the most effective way to spread local government information and to provide access to credit and trainings for urban farmers. Given also the impossibility for the government to reach all the individuals and thereby provide punctual and effective services for all in need, fostering membership in specific and relevant groups seems to be a feasible proposal to enlarge urban farmers' basket of assets and thus create better conditions for effective livelihood strategies.

²⁴ In Chapter three, data on the UA selling places showed that the large majority (73%) of the interviewed farmers sell the products at their farm gate, meaning that the city represents their primary output market.

3. Empowerment: UA is a source of empowerment for the entire household engaged in it. From women to children the benefits of having additional food and income to spend on other household expenditures, such as the highly considered education of children, create the conditions for general improvement and development. As a formidable livelihood strategy UA can be a capable means for providing food, income, education and, thus, overall empowerment to everybody involved in its practice.

5.2 Suggestions for future research

UA in Thika has a multitude of functional characteristics, ranging from subsistence to leisure, from income generator to a traditional activity of conduct. This research investigated the role of small ruminants production in terms of contribution, either on food or income, to urban farmers' livelihoods, a contribution which, as presented in the previous chapters, has a complementary role in the livelihood strategies of farmers. Through in-depth interviews with UA practitioners and the livestock authority, the impact of small ruminants production and of UA more generally, has brought forth a great number of arguments, aspects and information. However, a few words on the limitations of this research are required to suggest what other research on this topic may be conducted in the future.

Firstly, as mentioned in Chapter 2, the number of respondents and the design of the research in general are not suitable for making generalizations on small ruminant production in Kenya or Thika. Therefore, this study should be understood as a window into a series of aspects, topics, problems, worries, frustrations and satisfactions as perceived by the producers of small ruminants themselves, although the conditions they face every day in their work and lives may very well go beyond the boundaries of Thika or even Kenya. Thus, the qualitative data collected during the fieldwork can be used for further research on the topic, which would greatly benefit from additional, quantitative-based

research involving a larger and more significant number of respondents, thereby creating a basis for safer generalizations. Connecting the quantitative and the qualitative results would shape a comprehensive and detailed study on the small ruminants value chain in Thika. This type of study would also render a more detailed picture of eventual patterns of farm scale, access to training services and credit, methods of production or agricultural products related to the gender dimension.

Secondly, though the gender dimension of UA in Thika has not been fully explored in this research, observation and dialogues with urban farmers suggest that women have a major role not only at the household level, but also at the larger community level. Women groups providing table-banking, credit and trainings were identified as one of the most common and viable ways to access important services for urban farmers. Moreover, as the livestock authority explained during the interview, an already quite well established relationship between the local government and women groups allows the government to channel effective communication of services related information. Among the 33 respondents, a hierarchical spread of information proved to be the most effective method to get knowledge on the services provided by the local government.

Thirdly, and connected to the previous one, the role of farmer groups and cooperatives still needs more attention. As shown in chapter four, the access to training and capital, both being assets according to the Sustainable Livelihood Approach, can be fostered and simplified namely via those associations. Similarly, as for women groups, also communication on governmental agricultural services related information is more effective when those associations act as intermediaries between the government and the farmers.

Fourthly, a second data collection on food consumption and diet composition is suggested in order to allow a temporal analysis on these topics. The changes in diet and the socio-economic sphere as well as environmental implications have already been observed in several developing countries by many

scholars (Pingali P. 2007, 2010, 2012, Schneider M. 2014). An emblematic example is furnished by the Chinese food industry, where, starting from the late 1970s a revolution in the traditional diet has occurred, leading also to the rise of overweight and obesity, once not even imaginable in the country²⁵. To observe and analyse the development of the food sector in Kenya will also allow a comparison with other countries and observations on eventual commonalities and differences among them.

Lastly, another important future research project may very well investigate the possibilities of digitalization and connectivity to form stronger farmer groups and thus improve information as well as productive cooperation in a changing and challenging world. Without any doubt, one of the most important challenges to UA in Sub-Saharan Africa in the future will be posed by the pressure of demographic and urban growth, which, together with already visible consequences of climate change, will amplify problems and limitations of sustainable, urban agricultural practices leading to a strong demand for new food production technologies that guarantee higher yields and, therefore, are widely considered to be the only viable solution to future food security. In the wake of the ever growing automatization processes that characterize the global industry and thus also agricultural production technologies, the role of UA as an alternative or additional livelihood strategy for many individual households may significantly lose potential and risk to get absorbed by more powerful economic mechanisms, also because technology is extremely costly and thus unaffordable for small scale farmers. An injection of optimism into this rather bleak outlook might be provided by digital technology, as outlined by Ndubuisi Ekekwe in his recent

²⁵ China has witnessed over the last forty years an unprecedented rise of meat consumption in everyday diet, which has not only led to drastic changes regarding nutritional composition, social habits and status, but has also heavily impacted the entire animal farming industry (especially pork) with inevitable consequences on environment and human as animal health as well (Schneider 2011, 2015; Schneider & Sharma 2014; Jönsson, Jerneck, Arvidson & Ratford 2012).

article “How digital technology is changing farming in Africa”²⁶. Precision software along with new payment systems²⁷ and credit platforms for small-scale farmers are aimed to improve working and living conditions:

African entrepreneurs are now interested in how farmers work and how they can help improve yields. The barrier of entry into farming technology has dropped, as cloud computing, computing systems, connectivity, open-source software, and other digital tools have become increasingly affordable and accessible. Entrepreneurs can now deliver solutions to small-size African farms at cost models that farmers can afford.²⁸

5.3 On the need of linking Urban Agriculture to urban planning

The importance of integrating urban agriculture into the urban planning process should be emphasized, especially in SSA. UA has the potential to validate informal activities and allow urban farmers to make a livelihood out of it. Moreover, urban farming has the potential to change radically modern cities and make a step towards a more self-sufficient, resilient and sustainable urban agglomerate.²⁹ As Drechsel and Dongus have pointed out, UA in SSA, despite the rapid urbanization, proved to be a “dynamic, viable and largely sustainable bright spot providing jobs and food for the cities” (p. 77). However, the recognition of UA in urban planning is still absent or marginal at best, inhibiting the potential

²⁶ Retrieved from Harvard Business Review <https://hbr.org/2017/05/how-digital-technology-is-changing-farming-in-africa>

²⁷ Alternative payment systems are already a reality in Kenya, where the M-Pesa service offered by Safaricom is implementing modern, fast, secure and reliable payments at large scale through phones (other mobile companies are implementing a similar service, but M-Pesa is the most common and widely available one). This system has the advantage that everyone in the country can make monetary transactions without moving from their place at the only condition that a mobile network is available.

²⁸ *ibidem*

²⁹ Goal which is shared, among others, by the United Nations (Goal 11 of the SDGs: Sustainable cities and communities <https://unstats.un.org/sdgs/report/2016/goal-11/>) and the European Union (http://ec.europa.eu/regional_policy/en/policy/themes/urban-development/ and <http://www.sustainablecities.eu>)

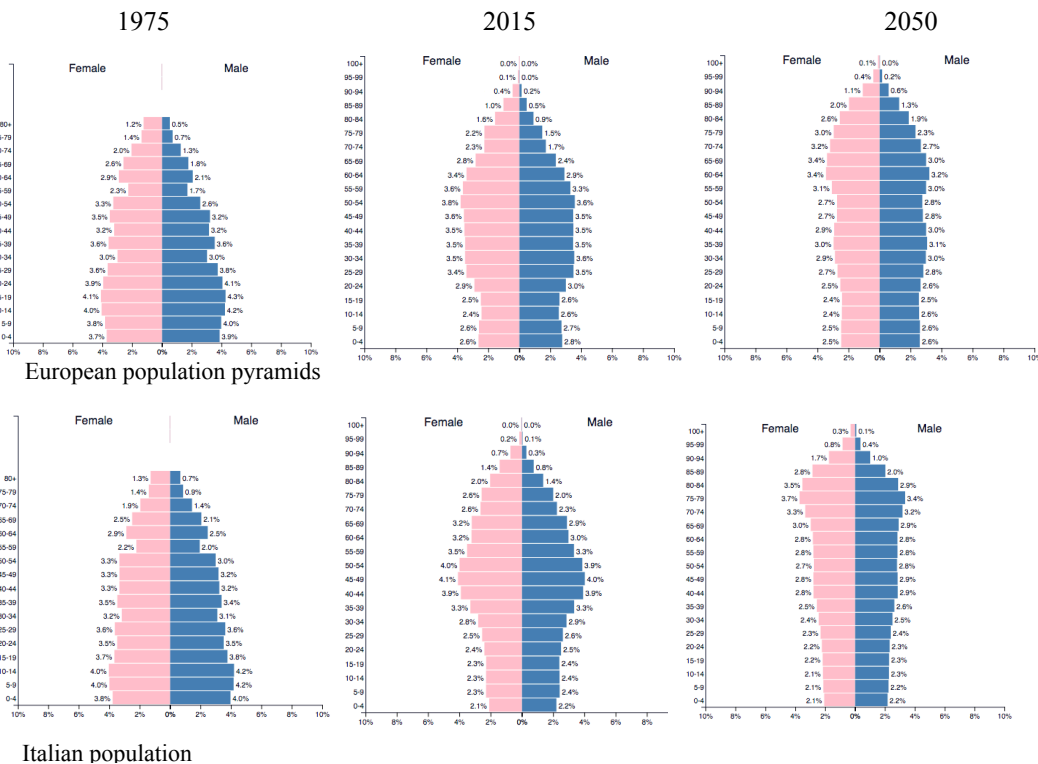
that UA could untap with appropriate institutional recognition and support (Ibidem).

Another author, David Satterthwaite, underlines the inherent social contradiction of urban dwellings: “cities may be the centers of wealth and opportunity, but they are also centers of extreme poverty and [...] growing inequality” (2007, p.57). Taking into consideration the necessities and characteristics of UA in urban planning signifies also to lift it out of the informality typical for urban farming practices, granting among others, a higher level of food safety. The understanding of the contributions that various options of urban agriculture can make to cities as they evolve must be a priority for the academic research in order to be appreciated as a reliable source of information for policy makers.

Appendix A

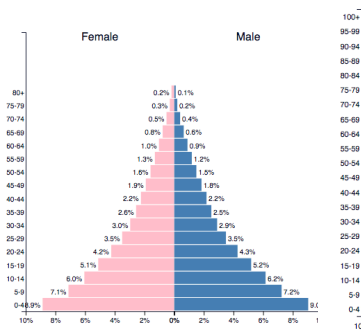
From the below age pyramids it is possible to deduce what demographic transition means and, above all, it is possible to compare how population is evolving in Europe and in Africa. In practical terms, a demographic transition signifies going from a high fertility and mortality rate to low fertility and mortality, usually passing through a phase characterized by improvement in healthcare facilities in which fertility is still high, but mortality decreases. The three timeframes used, yesterday (1975), today (2015) and tomorrow (2050) evidence also the time needed to make a demographic transition. Moreover, thanks to the age pyramids at different levels of aggregation, it is possible to see how similar the national trends are with the continental ones. Italy is an emblematic example of the overall aging Europe, Kenya on the other side is an emblematic example of a young and still expanding Africa, which, according to UN projections, is still far from completing the demographic transition. Without debating in depth the implications of such a scenario, which is not the scope of this thesis, population pyramids are a useful tool to depict the population of a country.

Data used to create the below time lapses pyramids are taken from Population Pyramids of the World from 1950 to 2100 retrieved from <https://www.populationpyramid.net/world/2050/>

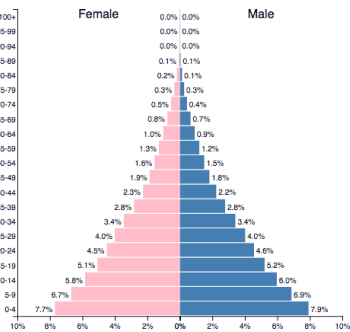


Italian population

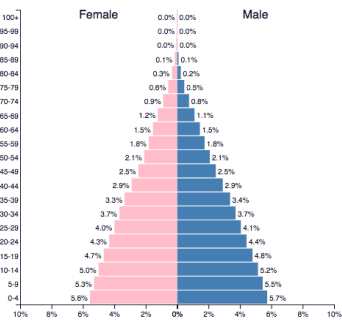
1975



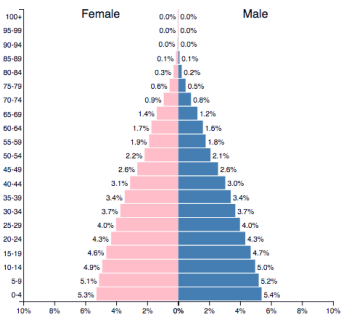
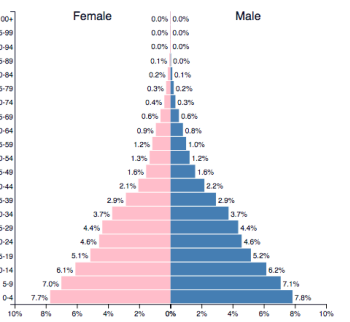
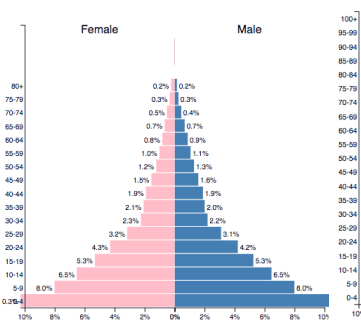
2015



2050



SSA population pyramids



Kenyan population pyramids

Appendix B

A simplified version of the questionnaire and semi-structured interview scheme is presented below.

Date
Location
Name of the community
Age
Gender
Education
Other
Is farming your only job?
What other types of jobs do you have?
What are your main reasons for farming?
How many goats do you have?
Which breeds of goats?
How much does it cost to raise goats? KES/head
How many sheep do you have?
Which breeds of sheep?
How much does it cost to raise sheep? KES/head
What does your small ruminant production consist of?
Other
Is your production meant for commercial purposes or for own consumption?
Where do you sell your products?
Other
If you sell it: how much of your income (in %) derives from the sale?
Which products do you sell?

How much milk do you sell? litre/day
At what price do you sell your milk? KES/litre
If you sell adult goats/sheep, at what price do you sell them? KES/head
If you sell baby goats/sheep, at what price do you sell them? KES/head
Which products do you consume?
How much milk do you consume for your own consumption? litre/week
If you slaughter your goats/sheep for own consumption, how often?
Do you give any of your production to friends/relatives?
Where do they live?
How much milk do you give them? litre/week
Do you have other productions besides small ruminants?
What else do you produce?
Which kind of water source for your agriculture production do you use?
Which fertilizer do you use?
Which source of feedings do you use for your livestock?
What do you do with your livestock manure?
Who is the owner of the land you farm on?
Where do you rear your animals?
Are you a member of any producers/farmers group?
What is your role and what are the main activities and services of the cooperative?
Do you have access to veterinary/extension services?
From where?
During the past year have you had access to credit?
From where?
What are the challenges you face in rearing goats and/or sheep?
In your opinion, what are the pros of urban agriculture?

In your opinion, what are the cons/problems of urban agriculture?
What is your relationship with local authorities? Do they foster or inhibit your activity?
Have you seen any transformations in the way urban agriculture is conducted? Which?
How important do you think is urban agriculture for the urban food security?
Do you want to share your contact information (name, phone number) with us?

Appendix C

In the following list of questions which served as a guide during the interview with the local livestock authority in Thika.

1. How does the local government view UA in the context of fast urbanizing and expanding city of Thika? Is UA included in spatial planning?
2. Many urban farmers stated that their knowledge on agriculture comes mainly from parents or from some sort of exchange of knowledge with other farmers and many would like to have access to formal training on different topics, from breeding to stocking the feedings for the drought season. What are the possibilities in terms of training and education the municipality offers to farmers?
3. Veterinary services are another topic in which the farmers often rely on private persons to get drugs, mainly because of their easier availability compared to governmental services. What is the position of the government on livestock health issues and which local services are present? What happens when there is an epidemic outbreak of a disease?
4. Some of the farmers we interviewed are business oriented and willing to expand, but due to the high costs of inputs, especially concentrate feeding, they found barriers in realizing their projects. Most of them use their own savings to invest in their activity, a few took a loan from the women group (microcredit institution), but none accesses to credit via commercial banks. What are the credit possibilities available to farmers?
5. What are the main hurdles for UA in Thika? Does the local government see potential benefits for the whole city community or only at an individual level?

References

- Agrawal A. (2008). The Role of Local Institutions in Adaptation to Climate Change, The Social Dimensions of Climate Change, Social Development Department, The World Bank, Washington DC, March 5-6, 2008
- Ali Memon P. & Lee-Smith D. (1993), Urban Agriculture in Kenya, *Canadian Journal of African Studies*, vol. 27, no.1, pp. 25-42
- Ayerakwa H. M. (2017), *Agricultural Production, Food Security and Multi-Spatial Livelihoods among Urban Households in Ghana*. Faculty of Social Science, Department of Human Geography, Lund University.
- Andersson Djurfeldt A. & Jirström M. (2013), Urbanization and changes in farm size in Sub-Saharan Africa and Asia from a geographical perspective, a review of the literature. A Foresight Study of the Independent Science and Partnership Council of the CGIAR. Lund University Publications. Available at: <https://lup.lub.lu.se/search/publication/4694048>
- Andersson Djurfeldt, A. (2015), Urbanization and linkages to smallholder farming in sub-Saharan Africa: Implications for food security. *Journal of Global Food Security*, 4, 1-7.
- Badami & Ramankutty (2014), Urban agriculture and food security: A critique based on assessment of urban land constraints, *Global Food Security*, vol. 4 , pp. 8-15
- Bendt P., Barthel S., Colding J. (2013), Civic greening and environmental learning in public-access community gardens in Berlin, *Landscape Urban Planning*, vol. 109, pp. 18-30
- Bernstein H. (2015), Food Regimes and Food Regime Analysis: A Selective Survey. *BICAS Working Paper Series*, BRICS Initiatives for Critical Agrarian Studies (BICAS), ISS.
- Birhane T., Shiferaw S., Hagos S., Mohindra K.S. (2014), Urban food insecurity in the context of high food prices: a community based cross sectional study in Addis Ababa, Ethiopia, *BMC Public Health*, 14:680

- Boucher, L. (2016), What are the different types of population pyramids?. Population Education. Available at: <https://www.populationeducation.org/content/what-are-different-types-population-pyramids>
- Chen, S., and M. Ravallion. (2007), Absolute poverty measures for the developing world, 1981–2004. PNAS. 104(43). 16757-167562.
- Deelstra, T. and Girardet, H., (2000), Urban agriculture and sustainable cities. Bakker N., Dubbeling M., Gündel S., Sabel-Koshella U., de Zeeuw H. *Growing cities, growing food. Urban agriculture on the policy agenda. Feldafing, Germany: Zentralstelle für Ernährung und Landwirtschaft (ZEL)*, 43-66.
- DFID (1999), *Sustainable Livelihoods Guidance Sheets*. Available at: <http://files.enonline.net/attachments/871/dfid-sustainable-livelihoods-guidance-sheet-section1.pdf>
- Drechsel P. & Dongus S. (2009) Dynamics and sustainability of urban agriculture: examples from Sub-Saharan Africa, *Sustainability Science* Vol. 5(1), pp. 69–78.
- FAO, IFAD, WFP (2015), *The state of food insecurity in the world. Meeting the 2015 international hunger targets: taking stock of uneven progress*. Rome, FAO.
- Friedmann, H. and McMichael, P. (1989), Agriculture and the State System. The rise and decline of national agricultures, from 1870 to the present. *Sociologia Ruralis*, 29: 93–117.
- Todaro M. (1969), A model of Labor Migration and Urban Unemployment in Less Developed Countries, *The American Economic Review*, Vol. 59, no.1, pp-138-148
- Holt-Giménez, E. & Shattuck, A. (2011), Food crises, food regimes and food movements: rumblings of reform or tides of transformation?. *Journal of Peasant Studies*, 38(1), 109-144.
- Jönsson, K., Jerneck, A., Arvidson, M. & Ratford, D. (2012), *Politics and development in a globalised world: an introduction*. 1st edition, Studentlitteratur AB, Department of Political Science.

- Kollmair M and Gamber St (2002) The sustainable livelihoods approach. Development study Group, University of Zurich. Input paper for the integrated training course of NCCR North- South Aeschiried, Switzerland
- Lachowycz K. & Jones A.P. (2011), Greenspace and obesity: a systematic review of the evidence, *Obesity Reviews*, 12 (5), pp. e183-e189
- Lente I, Keraita B, Drechsel P, Ofofu-Anim J, Brimah AK. 2012. Risk assessment of heavy-metal contamination on vegetables grown in long-term wastewater irrigated urban farming sites in Accra, Ghana. *Water Qual Expo Health* 4(4): 179–186.
- Matuschke I. (2009), Rapid urbanization and food security: Using food density maps to identify future food security hotspots, *Global Perspective Studies Unit*, FAO. Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China
- Maxwell D. (1999) in *For Hunger-proof Cities: Sustainable Urban Food Systems*, IDRC, Ottawa.
- McMichael, A.J. 2013, "Globalization, climate change, and human health", *The New England journal of medicine*, vol. 369, no. 1, pp. 96-96.
- McMichael, P. & Schneider, M. (2011), "Food Security Politics and the Millennium Development Goals", *Third World Quarterly*, vol. 32, no. 1, pp. 119-139.
- McMichael, P., (2009). A food regime genealogy. *The Journal of Peasant Studies*, 36(1), pp.139-169.
- Millennium Development Goals available at <http://www.un.org/millenniumgoals/>
- Montanari, M., & Sonnenfeld, A. (2006). *Food Is Culture*. Columbia University Press. Retrieved from <http://www.jstor.org/stable/10.7312/mont13790>
- Obuobie, E., Keraita, B., Danso, G., Amoah, P., Cofie, O.O., Raschid-Sally, L. and P. Drechsel. 2006. Irrigated urban vegetable production in Ghana: Characteristics, benefits and risks. IWMI-RUAF-CPWF, Accra, Ghana: IWMI, 150 pp

- Omondi S., 2017, The role of urban-based agriculture on food security: Kenyan case studies, *Geographical Research*, 55(2): 231-241
- Paitoonpong S. et al 2008 The meaning of “social safety nets available at https://www.researchgate.net/publication/23775545_The_meaning_of_social_safety_nets
- Pingali P. (2007) Westernization of Asian diets and the transformation of food systems: Implications for research and policy, *Food Policy*, Volume 32, Issue 3, 281-288
- Pingali, P. (2010) Changing food systems in the developing world, in book *Obesity Prevention*, pp.511-520 DOI: 10.1016/B978-0-12-374387-9.00041-6
- Pingali, P. (2012) Green Revolution: Impacts limits, and the path ahead. *NCBI Jul 31;109(31):12302-8. doi: 10.1073/pnas.0912953109*
- Population Pyramids of the World from 1950 to 2100. Available at <https://www.populationpyramid.net/world/2050/>
- Pulighe G., Lupia F. (2016), Mapping spatial patterns of urban agriculture in Rome (Italy) using Google Earth and web-mapping services, *Land Use Policy* 59, pp. 49-58
- Qadir M., Wichelns D. Raschid-Sally L., McCornick P.G., Drechsel P., Bahri A., Minhas P.S. 2010. The challenges of wastewater irrigation in developing countries, *Agricultural Water Management*, Vol. 97, Issue 4, pp. 561-568
- Quon S. (1999) Planning for Urban Agriculture: A Review of Tools and Strategies for Urban Planners, *International Development Research Centre - Cities Feeding People Series*, Report 28, pp. 1-50
- Ravallion M. (2001), Short communication on the urbanization of poverty, *Journal of Development Economics*, vol 68, pp. 435-442
- Rome Declaration on Food Security (1996) available at <http://www.fao.org/docrep/003/w3613e/w3613e00.HTM>
- Satterthwaite, D. (2007). The transition to a Predominantly Urban World and its Underpinnings. *Human Settlements Discussion Paper Series - International Institute for Environment and Development*. 1 (1), 1 - 61

- Schneider, M. & Sharma, S. (2014), China's Pork Miracle Agribusiness and Development in China's Pork Industry, *Global Meat Complex: The China Series*, IATP Press
- Schneider, M. (2011), Feeding China's Pigs: Implications for the environment, China's Smallholder Farmers and Food Security, IATP Press
- Schneider, M. (2015), "What, Then, Is a Chinese Peasant? Nongmin Discourses and Agroindustrialization in Contemporary China", *Agriculture and Human Values*; 32(2), 331-346
- Scoones I., (1998), "Sustainable Rural Livelihoods: A framework for Analysis", IDS Working Paper 72
- Stewart R., Korth M., Langer L., Rafferty S., Da Silva N.R., van Rooyen C. (2013), What are the impacts of urban agriculture programs on food security in low and middle-income countries?, *Environmental Evidence*, 2:7
- Turner, C., (2013) Master thesis: *Hybrid Geography: Investigating Urban Agriculture within the Ghanaian city of Techiman Integrating remote sensing and GIS within a socio- cultural political ecology perspective*, Lund University
- UN, Sustainable Development Goals available at <https://sustainabledevelopment.un.org/topics>
- UN, African Union Economic Commission for Africa (2009) *Economic Report on Africa 2009: Developing African Agriculture Through Regional Value Chains*, United Nations Economic Commission for Africa
- UN Economics and Social Affairs (2014), *World Urbanization Prospects. The 2014 Revision*. Department of Economic and Social Affairs, Population Division.
- UN HABITAT (2014) Table 2.3: Proportion of urban population living in slums and urban slum population by country, 1990-2014, available at <https://unhabitat.org/wp-content/uploads/2014/03/Table-2.3-Proportion-of-urban-population-living-in-slums-and-urban-slum-population-by-country-1990-2014.pdf>

- UN Habitat document “The Habitat Agenda Goals and Principles, Commitments and the Global Plan of Action” available at <http://habitat3.org/wp-content/uploads/The-Habitat-Agenda-Goals-and-Principles-Commitments-and-the-Global-Plan-of-Action-2003.pdf>
- UNDP, (1996), *Urban Agriculture: Food, Jobs and Sustainable Cities*
- UNPD (2014) “World Urbanization Prospects” retrieved from <https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf>
- UNPD (2015) “World Population Prospects, The 2015 Revision” retrieved from https://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf
- USAID, Nigussie M. (2010): Urban Agriculture situation analysis
- Women’s Empowerment Principles available at <http://www.unwomen.org/en/partnerships/businesses-and-foundations/womens-empowerment-principles>
- World Bank Urban Development and Resilience Unit (2013) Urban Agriculture: Findings from Four City Case Studies
- Zasada I. (2011), Multifunctional peri-urban agriculture - a review of societal demands and the provision of goods and services by farming. *Land Use Policy*, 29, pp. 639-648 as quoted in Pulighe G., Lupia F. (2016), Mapping spatial patterns of urban agriculture in Rome (Italy) using Google Earth and web-mapping services, *Land Use Policy* 59, pp. 49-58
- Zeza, A., Tasciotti, L. (2010) Urban agriculture, poverty, and food security empirical evidence from a sample of developing countries

Additional bibliography

- Barrett (2010), Measuring Food Insecurity. *Science*, Feb 12; 327(5967): 825-8
- Battersby, J. (2013), Hungry Cities: A critical review of urban food security research in sub-Saharan African cities. *Geography Compass* 7/7: 452–463
- De Haen, H., Stamoulis, K., Shetty, P. and Pingali, P. (2003), The World Food Economy in the Twenty-first Century: Challenges for International Cooperation. *Development Policy Review*, 21: 683–696
- Desai, V. & Potter, R.B. (2014), *The Companion to Development Studies*. 3rd edition. Routledge, New York
- Farrington J., Ramasaut T., Walker J. (2002), Sustainable Livelihoods Approaches in Urban Areas: General Lessons, with Illustrations from Indian Cases. SIDA Publications, Department for Infrastructure and Economic Cooperation, SIDA.
- Kollmair, M., & St. Gamper, J. (2002). Sustainable livelihoods approach. Development study group. University of Zurich, Zurich, Switzerland.
- Li, T. 2007, *The will to improve: governmentality, development, and the practice of politics*, Durham, N.C. : Duke University Press, 2007.
- Mumma et al., (2011), KENYA GROUNDWATER GOVERNANCE CASE STUDY, available at <http://www.groundwatergovernance.org/resources/case-studies/kenya/en/>
- Musa H. A. & Hiwot M. M. (2017) The impact of agricultural cooperatives membership on the wellbeing of smallholder farmers: empirical evidence from eastern Ethiopia, *Agricultural and Food Economics* 2017 5:6 DOI: 10.1186/s40100-017-0075-z
- OECD (2015), Drying Wells, Rising Stakes: Towards Sustainable Agricultural Groundwater Use, OECD Studies on Water, OECD Publishing, Paris. available at <http://dx.doi.org/10.1787/9789264238701-en>
- Popkin B. (2001), The nutrition transition and obesity in the developing world. Symposium: Obesity in Developing Countries: Biological and Ecological Factors. *JN the Journal of Nutrition*, March; 131(3)

- Popkin B. (2011), Agricultural policies, food and public health. *EMBO Reports* Jan; 12(1): 11–18
- Popkin B., Adair L., S.W. Ng: Now and Then (2012), The Global Nutrition Transition: The pandemic of Obesity in Developing Countries. *Nutr Rev* 2012; 70 (1): 3-21.
- Satterthwaite, D., McGranahan, G. & Tacoli, C. (2010) Urbanization and its Implications for Food and Farming, *Philosophical Transactions of the Royal Society*. 365 (1), 2809 - 2820
- Scrap, S., (2007) "Cooperatives: pathways to economic, democratic and social development in the global economy." *Washington: OCDC*.
- UNESCO, (2012) Kenya Groundwater Mapping Programme, available at http://www.unesco.org/fileadmin/MULTIMEDIA/FIELD/Nairobi/Kenya_Groundwater_Mapping_Programme_Infokit.pdf
- Wanyama FO, Develtere P, Pollet I (2009), Reinventing the wheel? African cooperatives in a liberalized economic environment. *Ann Public Coop Econ* 80(3):361–392. doi:10.1111/j.1467-8292.2009.00390.x
- Woldu T, Tadesse F & Waller MK (2013), Women’s participation in agricultural cooperatives in Ethiopia (No. 57). International Food Policy Research Institute (IFPRI)