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Sustaining Urban Home Gardening for Enhancing Food Security: A Study in Sri Lanka during the COVID-19 Pandemic

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This thesis is submitted in fulfillment of the Master of Science degree awarded as a result of successful completion of the Erasmus Mundus Masters course in Environmental Sciences, Policy and Management (MESPOM) jointly operated by the University of the Aegean (Greece), Central European University (Hungary), Lund University (Sweden) and the University of Manchester (United Kingdom).

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Author's declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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ABSTRACT OF THESIS submitted by:
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The COVID-19 pandemic had been a “threat-multiplier” of food security, which had pushed already vulnerable food system to a more vulnerable condition. Urban home gardening has a potential for enhancing food security of communities through improved access to quality and nutritious food, and financial saving.

The popularity in urban home gardening, which believed to have occurred during the first wave of COVID-19 pandemic in Sri Lanka, provides an opportunity to study how COVID-19, as an external perturbation, impacted the home gardening practices of urban communities. This research aimed at identifying motives, enablers, barriers, and benefits that the community in Colombo, Sri Lanka experienced with urban home gardening; its impact on household food security; and institutional assistance required to make urban home gardening feasible. The research took a grounded theory approach and is based on a discourse analysis of urban home gardener and expert interviews.

The motives for urban home gardening during the pandemic had predominantly led by attributes that reflect the specific conditions and practitioners’ concerns prevailed during the lockdown. The results also reveal how time availability during the lockdown became an enabler to facilitate practitioners’ motives to realize the practice of home gardening. Also, personal traits and physical resources appears to behave either as enablers or barriers for gardeners and non-gardeners.

Home gardening delivers both food and non-food benefits, while contributing to household food security through increased access to food and reducing food expenditure. The institutional assistance required includes enhancing awareness and knowledge through facilitation, providing material, networking, and regulatory measures.

Key words: Urban home gardening; COVID-19; Sri Lanka

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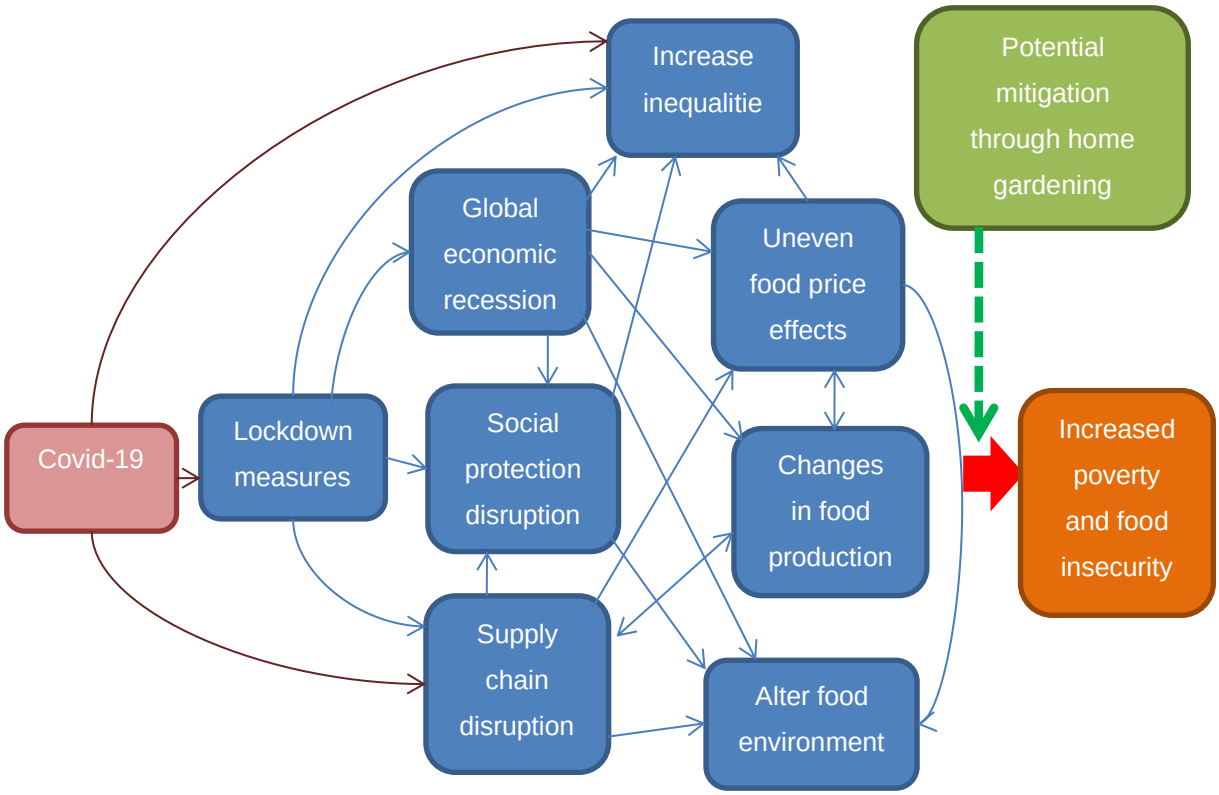
1. Introduction

1.1. Background and Significance

The global population is anticipated to grow by two billion within the next 30 years (UN 2019a). This growth would exert an enormous pressure on the agricultural systems in order to meet the growing demand for food. Moreover, the urban population is expected to increase by 2.5 billion by 2050, with a staggering 90% of this represented by Asia and Africa (UN 2019b). Due to high population density and relatively less food production in urban areas, those communities are dependent on external sources to meet their food requirements. Usually, these requirements are met through rural and peri-urban food production systems. On the other hand, factors such as rapid aging of the farming population, displacement of traditional small-holder farmers through capital-intensive development of agriculture systems, the fragmentation and the depletion of the productivity of farmlands could result socio-economic changes among rural communities in terms of agricultural labor and rural agricultural production (FAO 2017), particularly in the developing world. These factors along with climate change, natural disasters, conflicts, and crisis can further enhance the food insecurity of the urban communities of the Global South. The COVID-19 pandemic had been a “threat-multiplier” which had pushed already vulnerable system to a more vulnerable condition.

The COVID-19 pandemic had not only caused a devastating health crisis around the world but also had brought about economic and social consequences. A preliminary assessment conducted by the International Labor Organization (ILO), on the impacts of COVID-19 on socio-economic sectors, had identified agriculture and food security as vulnerable sectors (ILO 2020). During the pandemic, food supply chains; from farm to fork, have been severely affected due to various reasons such as disruptions to food production systems, trade barriers, and financial constraints (Aday and Aday 2020; OECD 2020). The Food and Agriculture Organization of United Nations (FAO) has identified multiple dynamics of how the COVID-19 crisis may lead to food insecurity in global and national contexts (FAO 2020). One such pathway of food insecurity (Figure 1) is the disruption of supply chains caused by lockdown policies, which ultimately affect the availability, quality, and price of food (Clapp and Moseley 2020; FAO 2020; Labored *et al*. 2020).



Adopted from FAO, 2020 and modified

Figure 1: Mitigation of COVID-19 caused food insecurity through home gardening

In the case of perishable food such as vegetables, fish, poultry, meat, and dairy products, domestic food supply chains are more important than global chains. This is particularly valid in South Asia and sub-Saharan Africa where the local chains account for about 75% to 90% of food consumption (Clapp and Moseley 2020). Shorter local supply chains can often be more resilient than trans-boundary or international chains. However, local supply chains still have limitations in reaching urban communities. About 70% of the food economy in South Asia and Africa is based on fragmented and labor-intensive transitional food supply chains that are extending from rural to urban areas (Reardon *et al*. 2020). Therefore, supply chain disruptions caused by COVID-19 lockdown measures tend to make urban and peri-urban communities more vulnerable to food insecurity, rather than the rural. This phenomenon was evident in Myanmar, where a survey conducted by the International Food Policy Research Institute (IFPRI) shows that the food security of urban respondents has been impacted by the pandemic more than that of their rural counterparts (Headey *et al*. 2020). One potential alternative to improve urban resilience is enhancing local food production (Nicola *et al*. 2020).

Many countries have experienced COVID-19 driven lockdown measures during the period of March to May in 2020 (FAO 2020). With the emergence of COVID-19 cases in Sri Lanka in mid-March 2020, the government imposed a curfew for the entire island which went on for almost two months in several areas including the commercial capital, Colombo (CPA 2020; Outlook India 2020). Another surge in October 2020 affected certain parts of the country, including the Colombo District, which led to several intermittent events of curfew, even longer than ten days at a stretch (Srinivasan 2020; Xinhua News 2020). Even though there was no immediate decline in food production, supply chains interruptions and reduced market activities were observed (Zaken 2020), as the food supply reaches Colombo through various channels originating from rural areas (FAO 2018). Curfews and closure of markets have also restricted the public from accessing their regular fresh food supplies. The closure of weekly fresh food markets (open air markets), which is a predominant marketplace for fresh food for a lot of lower- and middle-income communities, is one such example. Restrictions were also observed in supermarkets due to limited access to and availability of fresh food.

As there was no guarantee when the pandemic dies down and socio-economic activities would be normalized, the government had encouraged citizens to cultivate their own food to the best of their abilities, as a strategy for adopting to the situation (News.lk, 2020; Weerahewa *et al*. 2020). A preliminary study conducted by the author, which is discussed further in the Chapter 4 of this thesis, indicates that there would have been a movement in urban home gardening during the first wave of COVID-19 in Sri Lanka between March to May 2020.

Urban home gardening, which is one of the several types of urban agriculture, has a potential for enhancing the food security of urban communities through enhanced access to quality and nutritious food. Furthermore, it also has the potential for generating economic benefits through savings on food purchase and income generation. Home gardening is often seen as a way of enhancing food security in a nutritionally and economically significant way, both for the rural poor and urban households (Algert *et al*. 2014; Galhena *et al*. 2013; Mougeot 2000; Porter 2018). Furthermore, home gardening has been adopted as a crisis and post-crisis response for enhancing food security and economic stability (Buchmann 2009; Calvet-Mir and March 2019; Mejia *et al*. 2020).

In addition, home gardening can be a pro-environmental behaviour. It can bring about numerous social, economic, and environmental benefits (Artmann and Sartison 2018) such as providing nutritious food and saving cost spent on food (Algert *et al*. 2014; Porter 2018), improve social wellbeing and social cohesion (Galhena *et al*. 2013), increase "green infrastructure" and contribute to enhanced ecosystem services and urban resilience (Cameron *et al*. 2012; Mougeot 2000). As intensified agriculture in urban areas could lead to certain ecological disservices - such as public health risk due to mosquito breeding, attraction of pests and pathogens, increase demand for water, and soil and water pollution by nutrients and agrochemicals (Lin *et al*. 2015; Taylor and Lovell 2015), small-scale home gardens could be a better alternative for urban areas.

Failure and abandonment of urban home gardening, sustainability (longevity) of the outcomes, and the societal benefits of urban gardening on food security are found to be some key areas which are so far understudied. Failure and abandonment of urban home gardening is mostly a problem at the practitioners' level. Lack of knowledge, barriers for input (resources, cost, time, etc.), and external factors such as weather and pests could be main reasons for failures. Depreciated enthusiasm, lack of time, lack of resources, and poor returns are some potential reasons for abandonment. Furthermore, cultural factors - such as shifting generational interests and breaking the chain of knowledge transmission across generations and within families, could indirectly contribute to failure. Therefore, understanding the practitioners' motives, enablers, and barriers for urban home gardening is vital to reduce these failures and to achieve its full socio-economic and environmental potential. In addition to that, types of urban home gardening practiced, crops that are grown, the ways and means of gardening, the participants, the freshness and availability of food, frequency of consumption, and the farm to fork pathway for home gardening can be useful information for understanding and enhancing urban home gardening.

The home gardening movement in Sri Lanka, which believed to have occurred during the first wave of the COVID-19 pandemic, provides an opportunity to study how COVID-19, as an external perturbation, impacted the practice of home gardening by urban communities. With this background, the proposed research was conducted to identify the motives, enablers, barriers, and benefits that the target community experience with urban home gardening, if urban home gardening had enhanced food

security of households, and to identify state and organizational level assistance required to promote, support, and sustain urban home gardening. Based on the recognition that home gardening requires capacity and if such capacity is provided, home gardening could be practiced at a more extensive level for its wider benefits.

Selecting this topic for my thesis was led by my personal interest on urban agriculture as a nature-based solution for urban socio-ecological problem, and the potential for contributing to the scientific knowledge base for academic and practical use.

1.2. Research Questions

The following specific research questions were derived from the research aim described above. These were then used for the formulation of the research objectives.

RQ 1. Had home gardening been practiced more during the first wave of COVID-19 pandemic in Sri Lanka?

RQ 2. What were the motives for the urban communities in Colombo, Sri Lanka to adopt home gardening during the first wave of COVID-19 pandemic?

RQ3. What are the barriers and enablers for urban communities to adopt and continue home gardening? What benefits do the communities receive from urban home gardening?

RQ 4. Has home gardening enhanced urban food security of communities in Colombo, Sri Lanka during the pandemic? Why or why not?

RQ 5. What support by government and NGOs can make urban home gardening more feasible?

1.3. Research Objectives

Following are the objectives of this research.

1.3.1. Objective 1: Collect and analyze evidence to identify if home gardening had been more popularly practiced during COVID-19 pandemic

This study is designed based on the understanding that home gardening became more popular in Sri Lanka during the COVID-19 pandemic. Therefore, the first objective of the research to collect and analyze information for find evidence to determine whether the above assumption is acceptable.

1.3.2. Objective 2: Analyze the motives, enablers, and barriers for post COVID-19 urban home gardening in Colombo, Sri Lanka

The second objective of the research is to find out the motives, enablers, and barriers that the urban community in Colombo experienced in adopting home gardening during the pandemic. It is also aimed to identify background criteria, such as previous knowledge, cultural values, sharing of work, etc., that could be relevant for the practitioners' perspectives of motives, enablers, and barriers.

1.3.3. Objective 3: Analyze the potential benefits of urban home gardens and its contribution to enhance food security during the COVID-19 pandemic

The third objective is to identify benefits of urban home gardening realized by the target community. The contribution of urban home gardening to food security is assessed by considering the benefits that practitioners might have received through increased availability of food (in terms of quantity, accessibility, and nutritional value) and financial saving and/or gaining obtained, which they would have spent on additional food. Thereby, the potential of urban home gardening in enhancing resilience against the food crisis is assessed. Food security is accessed at the individual household level.

1.3.4. Objective 4: Analyze the institutional support required for promoting and sustaining urban home gardening

The fourth objective of the research is to identify what state and other institutional interventions are available in terms of support, how such support could work, and what effects those can have on popularizing urban home gardening.

1.4. Research Design and Methodological Overview

This research took an inductive and qualitative approach to derive outcomes from the data collected through interviews conducted with selected individuals. The composition of the pool of respondents included seven urban home gardening practitioners in Colombo, Sri Lanka; and three experts of urban home gardening, who represent government and non-governmental institutes. The interviews followed a mix of semi-structured and in-depth approach, where the respondents' feedback is guided towards the research objectives while allowing to capture the potential underlying reasons for interviewees' response.

Discourse analysis was carried out using the interview transcripts to categorize data to broader themes and then to identify relationships among those categories. NVivo 12 software was used for data analysis.

1.5. Limitations

Even though the study provides valuable insight to urban home gardening research in Sri Lanka, there are number of limitations. The research took a qualitative approach with no statistical analysis. The results were drawn based on the perception of the respondents, therefore are subjective in nature. Furthermore, the sample of respondents used in the research is very small, which is limited to seven practitioners from a single district and three national experts. Therefore, the ability to generalize the results to a large population is limited.

Even though the sample of practitioners is heterogenic in terms of gender, age, occupation, property type, gardening space, etc. the demographic characters of the respondents or households were not used in the analysis. Therefore, the influence of demographic characters on the practitioners' views and practices is not captured.

The private sector has a potential to influence home gardening practices through the market. However, private sector or market influences are not assessed in this research.

Triangulation of data is done whenever possible to validate the results.

1.6. Thesis Structure

This thesis includes six chapters. The first chapter introduces the research. It starts with the research background, including problem definition, and then leads to the research aims, objectives and the specific research questions. The chapter also includes an overview of the scope, methodology, and limitation of the research.

The second chapter reviews various literature related to the background and objectives of the research. The latter part of this chapter discusses the definitions and frameworks used by previous researchers which ultimately leads to the scope and the conceptual framework of this research.

The third chapter starts with a review of research methodologies followed by previous scholars and then describes the research design and methodology for this research. The chapter also looks at methodological limitation.

The fourth chapter presents the results of the research, whereas the fifth chapter discusses the results from the perspectives of research questions and the conceptual framework. The sixth and the last chapter is the conclusion of the research.

2. Literature Review

2.1. Home Gardening in Sri Lanka

Home gardening is identified as one of the oldest forms of land use types in the world which has been used to obtain food and other useful materials (Kumar and Nair 2006). Similarly, in Sri Lanka, home gardens have been an important part of the "landscape and culture" for centuries (Pushpakumara *et al*. 2012). In such a background, urban home gardening is well accepted among Sri Lankan communities rather than a "radical act" as seen by some communities, for example in the United States (Kopiyawattage *et al*. 2019).

The definition of home garden varies drastically with the researcher and the context of the publication. In Sri Lanka the widely used definition of a home garden is "complex sustainable land use system that combines multiple farming components, such as annual and perennial crops, livestock and occasionally fish, which provides environmental services, household needs, as well as employment and income generation opportunities" (Weerahewa *et al*. 2012). However, this definition is mostly limited to the traditional agroforestry[1] type multi-functional gardens associated with households. Such home gardens are common in non-urban areas and have been widely identified as "sustainable food production systems" (Pushpakumara *et al*. 2012), which are "safety-nets" of poor farmers in food crisis situations (Mattson *et al*. 2017). In addition, those home garden systems provide a variety of socio-economic and environmental benefits such as provision of timber, firewood, building material, medicines, etc., conservation of biodiversity (Pushpakumara *et al*. 2012), as a carbon sinks (Mattson *et al*. 2013), and enhancing resilience to climate change (Weerahewa *et al*. 2012).

Nevertheless, these traditional home garden systems are altered to small-scale food gardens and ornamental gardens due to the limitation of land owing to urbanization (Bandara 2015). Even though these small-scale gardens are also called as home gardens, those are considerably different from the traditional home gardens due to the

[1] Agroforestry is defined as "purposeful growing of trees and crops in interacting combinations" (Kumar and Nair 2006).

simple structure, limited vegetation composition (mostly annual crops such as vegetables, fruits, spices) and limited farming practices. Therefore, the urban and non-urban home gardens systems in Sri Lanka are structurally and functionally different from each other. In his research Bandara (2015) had classified these gardens as "kitchen gardens" for the convenience of differentiation from agroforestry type home gardens. However, the term kitchen garden is not commonly used in the scientific or grey literature in the Sri Lankan context.

Various publications on home garden research in Sri Lanka have indicated that there is an ambiguity in the extent of home gardens, ranging from about 1.2 to 14 percent of the total land area of Sri Lanka (Mattson *et al*. 2013; Pushpakumara *et al*. 2012; Weerahewa *et al*. 2012). The latest national agricultural statistics reports that the extent of home gardens is about 18% of the total land extent of the country (DoA 2019). This is a large figure compared to the national forest cover, which is 29.7% of the total land area (SL UNRDD 2017). The vagueness in reported extents has been mainly attributed to different definitions of the size of a home garden. For example, the extent of home gardens which are less than 0.1 ha (1000m^2) is only 1.2% of the total land area of Sri Lanka in 2002 (Pushpakumara *et al*. 2012). This indicates the lack of classification and differentiation of traditional home gardens and small-scale urban home gardens in existing literature. A review on home garden research carried out by Pushpakumara *et al*. (2012) shows that there has been a steady growth of the extent of home gardens in Sri Lanka by about 1 to 1.6 percent, annually. However, these statistics are at the national scale, thus mainly focuses on the agroforestry type home garden systems that may or may not include small-scale gardens with vegetable plots and potting of edible plants. Therefore, the available literature is not sufficient for the researcher to differentiate and determine the extents and trends of small-scale urban home gardens, which are focused in this research.

Agroforestry type home garden is a long-term land use which has been developed over years. In a resilience point of view, these home gardens provide a long-term and stable safety-nets to the household in terms of providing food, firewood, livelihoods, and other economic benefits. However, small-scale home gardens for fruits and vegetables are more practical to adopt or to scale up as a rapid response strategy to a crisis situation, because of the immediate benefits. Thus, both garden types have their own pros and cons in terms of food security. Furthermore, on many occasions, traditional home

garden is not an alternative to a small-scale urban home garden due to spatial limitations. Therefore, it is important to clearly differentiate the type of home garden that is researched in this study.

2.2. Home Gardening and Food Security

Localized food production systems safeguard food supplies to urban communities by reducing delays and cost incurred by transportation, and by reducing crop losses from farm to fork. Urban home gardening provides the opportunity to grow fruits, vegetables and herbs and increases easy access to fresh and nutritious food. The quality and nutrition of the food are vital in assuring food security. Fruits and vegetables are essential components of a staple diet. According to literature, the minimum daily dietary recommendation of fruits and vegetables for a person in order to avoid chronic diseases is 400 g (WHO 2002). The enhanced availability of fruits, vegetables and herbs through home gardening can boost the frequency of consumption and improves the micronutrient intake (Ngongi *et al*. 2018).

Numerous research findings show that home gardening can enhance food security of both the rural poor and urban households in a nutritionally and economically significant way. An early research review on Javanese home gardens conducted by Soemarwoto and Conway (1992) reveals that home gardens have a positive impact on household food consumption and nutrition status. A study conducted in Guelph, Canada shows that self-provisioning through urban home gardening is capable of producing about 200,000 kg of food which fulfills the annual vegetable requirement of 2900 individuals (CoDyre *et al*. 2015). Studies show that home gardening not only supports the provision of supplementary food, but also the provision of staple foods such as yams (Thaman 1995). Marsh (1998) states that a typical home garden improves access to a variety of food such as fruits, vegetables, and yams and thereby increased household consumption of those food by about 50 percent. Results of an assessment conducted in Michigan show that having access to a community garden increases vegetable and fruit intake of a family by about 1.4 times (Alaimo *et al*. 2008). On the contrary, according to the findings of their research conducted in Guelph, CoDyre *et al*. (2015) suggest that having access to a home garden may not assure the daily intake of fruits and vegetables.

A study conducted in Mekelle, Ethiopia shows that the annual household income from home gardening ranges from Euro 13 to 790, with an average of Euro 195 per household (Legesse *et al*. 2016). The study further shows that availability of water, planting material, and incidents of pest attacks are the crucial determinant factors for sustaining urban home gardening.

Urban home gardens have a large potential for producing food items, not only for household self-sufficiency but also for enhancing the food security of cities. International Development Research Centre (2005) has done a data compilation of existing literature on the contribution of urban food production to the urban food supply during the late 1990s. According to this literature, in Antananarivo, Madagascar, urban food production had contributed to 90% of the leafy vegetables supply to the city and 50% of this amount was grown by urban households. Similarly, in the late 1990s, the capital of Guinea Bissau had got 90% of the city's supply of leafy vegetables through urban agriculture and 30% of this amount had been supplied by home gardens (IDRC, 2005). In Dar es Salaam (in Tanzania) income generated through fruits and vegetable productions contributed to 30% of the average salary of 35000 urban households.

2.3. Urban Home Gardening as a Crisis Response

Home gardening programmes could also contribute to enhance social-ecological resilience during crisis situations. Smart *et al*. (2015) claims that urban agriculture has helped to enhance the adaptability of communities in the Copperbelt province of Zambia, during the face of economic crisis, by assuring food security and diversifying livelihoods. The study reports that 84% of households have practiced urban agriculture, either as backyard home gardening or off-plot agriculture. About 63% of the respondents have stated that their basic food requirement has been met through urban agriculture. Furthermore, the study claims that urban agriculture had benefitted more towards household consumption as only 35% of the practitioners were selling their produce. However, household benefits through increased savings from food have not been accounted in the study.

The Cuban Home Garden programme, which was initiated during the political and economic isolation of Cuba, shows that home gardens have helped communities to ensure food security and wellbeing by increasing the access to food and medicinal

plants, and also enabling them to generate income by selling the excess (Buchmann, 2009). Even though COVID-19 is a fairly recent crisis, a number of researches have been conducted to study the potential of urban agriculture in enhancing food security of communities. In his review on urban agriculture for enhancing food security as a response to the COVID-19 pandemic, Lal (2020) shows that home gardens and other forms of urban agriculture systems are required in order to meet large food demands in mega cites, reduce the losses in supply chains, enhance the quality of the food, and to generate income. A study conducted by Dissanayake and Dilini (2020) in Kandy, Sri Lanka during the COVID-19 pandemic shows that assistance to cope with anxiety, family and social cohesion, physical exercise, and improved access to food are benefits that the communities have received through urban home gardening.

2.4. Motives, Barriers, and Institutional Support for Home Gardening

Many researchers have analyzed the motive of the communities for adopting urban gardening. Improved access to quality food in terms of nutrition (Al-Mayahi *et al*. 2019; Conway 2016; Kirkpatrick and Davidson 2017; Pourias and Duchemin 2016; Sanyé-Mengual *et al*. 2015; Trendov 2018), economic saving from food (Hussain *et al*. 2019 Kirkpatrick and Davidson 2017), appreciating nature (Al-Mayahi *et al*. 2019; Clayton 2007; Scheromm 2015; Pourias and Duchemin 2016), passion and pleasure in gardening (Al-Mayahi *et al*., 2019; Conway 2016; Scheromm 2015; Rodríguez *et al*. 2020; Trendov 2018), physical exercise (Al-Mayahi *et al*., 2019;), social cohesion (Clayton 2007; McVey *et al*. 2018; Sanyé-Mengual *et al*. 2015; Trendov 2018), and environmental considerations (Al-Mayahi *et al*. 2019; Kirkpatrick and Davidson 2017; Scheromm 2015; Trendov 2018) were found to be the most prominent reasons for adopting urban gardening. In addition, cultural significance (Corlett *et al*. 2003; Trendov 2018) is also a noteworthy component in urban home gardening. For example, some researchers have shown the cultural preference of consuming certain fruits, vegetables and spices determines the need of a home garden, its structure and composition (Pushpakumara *et al*. 2012; Corlett *et al*. 2003). Previous experience and memories from the young age and having a pro-environmental mindset about gardening (Gross and Lane 2007; Langemeyer *et al*. 2018) were found to be significant enablers for engaging urban home gardening. While the motives are relatively similar

in the outcomes of many researches the ranking differs with factors including but not limited to the country, gender, occupation and status, income, ethnicity, and culture (Al-Mayahi *et al*. 2019).

However, the sustainability of home garden programmes is highly questionable. A study conducted in Mexico by Rodríguez *et al*. (2020) shows that only less than 7.5% of urban gardens remain in proper condition two years after their commencement. The study further reveals that satisfaction in cultivation, engagement of the family, need for gardening, and technological capacity are factors determining the performance of urban gardens.

The existing literature identifies a number of common barriers for operationalizing urban home gardening – such as difficulty of maintaining the garden due to need of excessive time and cost (Clayton 2007; Conway 2016), poor agriculture practices, lack of knowledge, lack of water and land resources (Al-Mayahi *et al*., 2019; Conway 2016), lack of access to land (Conway 2016; McVey *et al*. 2018), difficulty of providing labor, and attraction of animals (Conway 2016). Poor climatic and weather conditions, unfavorable soil properties, and shade from the surrounding areas has been identified as some of the external barriers (Conway 2016).

Additionally, Conway (2016) has identified the barriers experienced by growers and non-growers. Interestingly, lack of knowledge had been mentioned as a barrier by the growers rather than non-growers. Both growers and non-growers have concerns about crop failure as a barrier. Inability to engage in gardening activities due to old age had been mentioned as a barrier, mostly by the non-growers. Environmental considerations have not been identified as motivative factor, neither by the growers or non-growers. The results further suggest that the motives for urban home gardening are more clearly related to personal and household characters rather than “broader sustainability arguments”. The study also highlights the relatively high rate of abandonment of home gardening, indicating the significance of barriers.

It is important to notice that some practitioners have found home gardening a costly activity (Clayton 2007; Conway 2016). This is contradictory to the broader sustainability concept that home gardening enhances food security through cost saving. Enhancing community resource sharing (such as gardening tools), improved neighborhood interactions, and change of perception and flexibility in residential landscape norms for

using front yards for gardening have been suggested as strategies for overcoming cost, space, labor, and knowledge related barriers (Conway 2016). Fox-Kamper *et al*. (2018) has identified lack of land tenure security, lack of motivation, and lack of government support as barriers for common gardens.

Drescher *et al*. (2006) stress the importance of recognizing institutional hindrances and supports required for promoting urban agricultural systems. According to their findings home gardening programmes need public advocacy and agriculture extension services while common urban gardening systems require additional political support to secure access to land. Montefrio (2020), who studied home gardening in the Philippines during the pandemic, has signified the importance of recognizing the efforts of the practitioners, and providing knowledge and material to support home gardening. Several researchers have also suggested that understanding the motives and needs of the practitioners provides information that is useful to promote and sustain urban agriculture and urban greening (Al-Mayahi *et al*. 2019; Clayton 2007; Pourias and Duchemin 2016). Identifying barriers to home gardening, through a participatory approach that involves all relevant stakeholders, is required for developing robust home gardening programmes (CoDyre *et al*. 2015).

A review conducted by Artmann and Sartison (2018) shows that urban and peri-urban agriculture should be considered as a nature-based solution which can support several societal issues of urbanization such as food security, ecosystem services, urban regeneration, climate change, intensification of agriculture, economic growth, and social bonding. The authors further suggest that urban agriculture should be strengthened with political endorsement and supportive legislations.

2.5. Key Concepts and Frameworks

2.5.1. The scope and definitions of urban agriculture and urban home gardening

According to the FAO (1996) the definition for urban agriculture is the food production that takes place in "confines of cities" and in spaces such as rooftops, backyards, community gardens, and vacant or public spaces. Urban agriculture is often carried out in small-scale with short-lived food products such as fruits and vegetables; however,

it may also include commercial productions (FAO 1996). As per the definition by Mougeot (2000), urban agriculture is carried out either within or at the periphery of "a town, a city or a metropolis", and produces a variety of "food and non-food products" using human and physical resources associated with that particular area. These definitions are widely used in the literature; however, they do not provide a clear differentiation between urban home gardens and other types of urban farming methods.

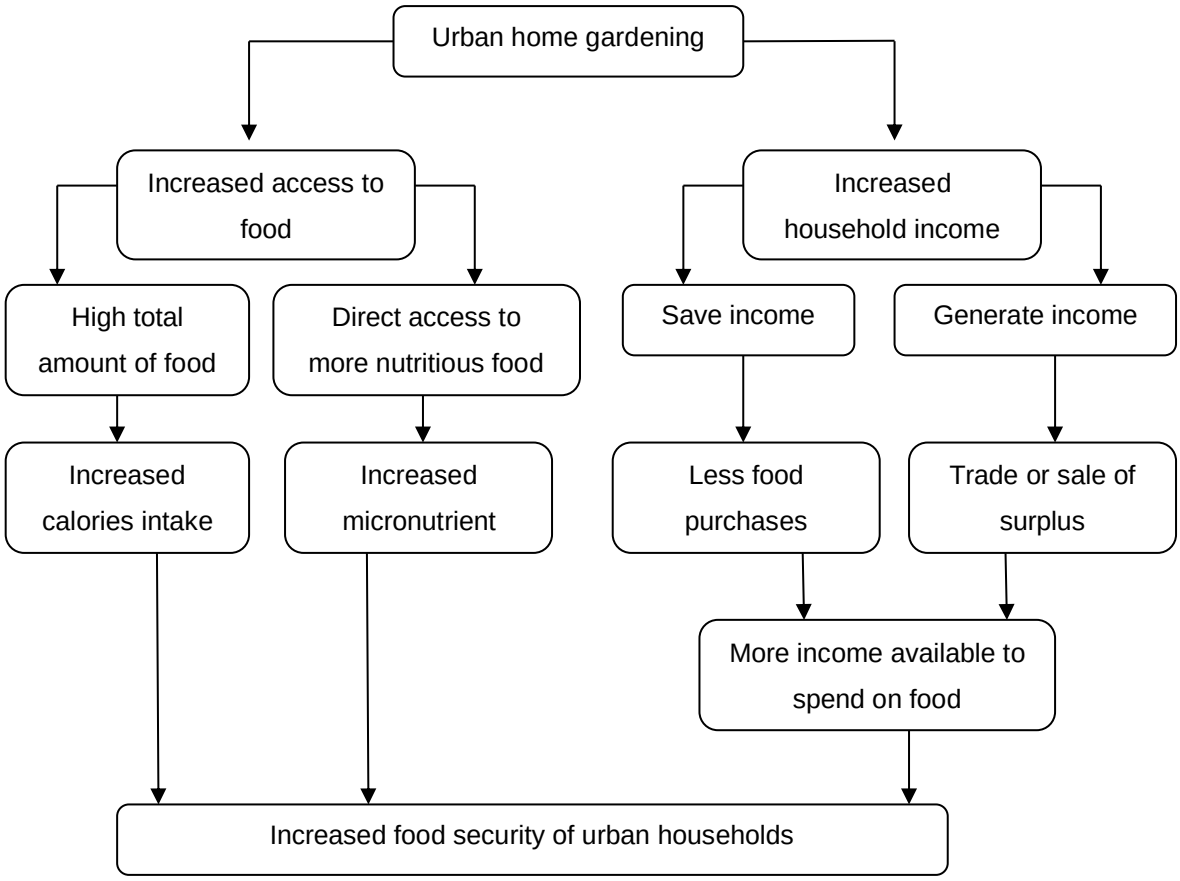
The definition of a home garden, stated in academic publications in relation to urban agriculture, largely depends on the context or the objectives of the research. However, the basic characteristics that most researchers agreed upon are that home gardens are small-scale, subsistent farming systems practiced by individual households as a source of food (Galhena *et al*. 2013; Taylor and Lovell 2015; Buchmann 2009; Drescher *et al*. 2006), and on some occasions, as a source of income (Galhena *et al*. 2013; Drescher *et al*. 2006). Home gardens can be predominantly differentiated into two types. That is, the garden which is in the immediate surrounding of the house (Drescher *et al*. 2006; Buchmann 2009) or the land parcels which are away from the housing compound but are allocated for households to cultivate (Drescher *et al*. 2006; Taylor and Lovell 2015). The latter is also called allotment gardens (Acton 2011; Drescher *et al*. 2006). The other type of space which is commonly used in urban agriculture is community garden, which is a shared plot. A community garden is defined as "a garden where people share the basic resources of land, water, and sunlight" (MacNair 2002). As described in the section 2.1, the term home garden in Sri Lankan scientific literature generally refers to an agroforestry type land use associated with the household. However, this definition is less practical in a congested urban setting and for the context of this research.

Since the focus of this research is on home gardening initiatives arose during the COVID-19 lockdown period, the appropriate scope of urban home gardening for this study is defined as "small-scale private home gardens within the housing unit (such as rooftop, balconies, verandahs, porches, etc.) and the immediate perimeter of the house (front yard, backyard, etc.) up to the legal boundary of the property. Therefore, allotment gardens or community gardens are not considered in this research. Furthermore, the types of crops focused in this study are short-term crops such as leafy-greens and vegetables. Perennial crops such as large fruit trees (coconut, mango,

banana, etc.) are excluded from the study. Livestock raring is excluded from the research as it is not a common practice in the urban areas of the study area.

2.5.2. Role of urban agriculture in enhancing food security

According to the definition put forward at the World Food Summit in 1996 by the United Nations Committee on Food Security, the state of food security exists "*when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*" (FAO, 2006). As further described by FAO (2006), food security has four dimensions; availability of food, access to food, sufficient utilization of food, and stability of access to food. Therefore, food security is a wider concept which makes addressing all its aspects within the analysis of this study difficult.



Source: Adopted and modified from Korth *et al*. (2014)

Figure 2: Pathways of increasing food security through urban agriculture

Korth *et al*. (2014) have described two pathways through which urban agriculture leads to food security of urban households (Figure 2). One pathway is through increased access to food by enhancing the total amount of food available to the households. The quality and nutrition of the food also play a key role in enhancing food security.

The other pathway is through increasing the household income available for spending on food. Urban agriculture could contribute to household income generation either by increasing savings through having to buy less food, or by generating an income through selling surplus produce.

2.5.3. Home gardening and resilience

Adopting from the definition of resilience from the Stockholm Resilience Center (2015), resilience against food security could be defined as the capacity of a community to "withstand and recover from a stress" on the food system. Several researchers have shown the contribution of "food self-provisioning" (Jehlicka *et al*. 2019) or home gardening (Buchmann 2009) for enhancing resilience of communities.

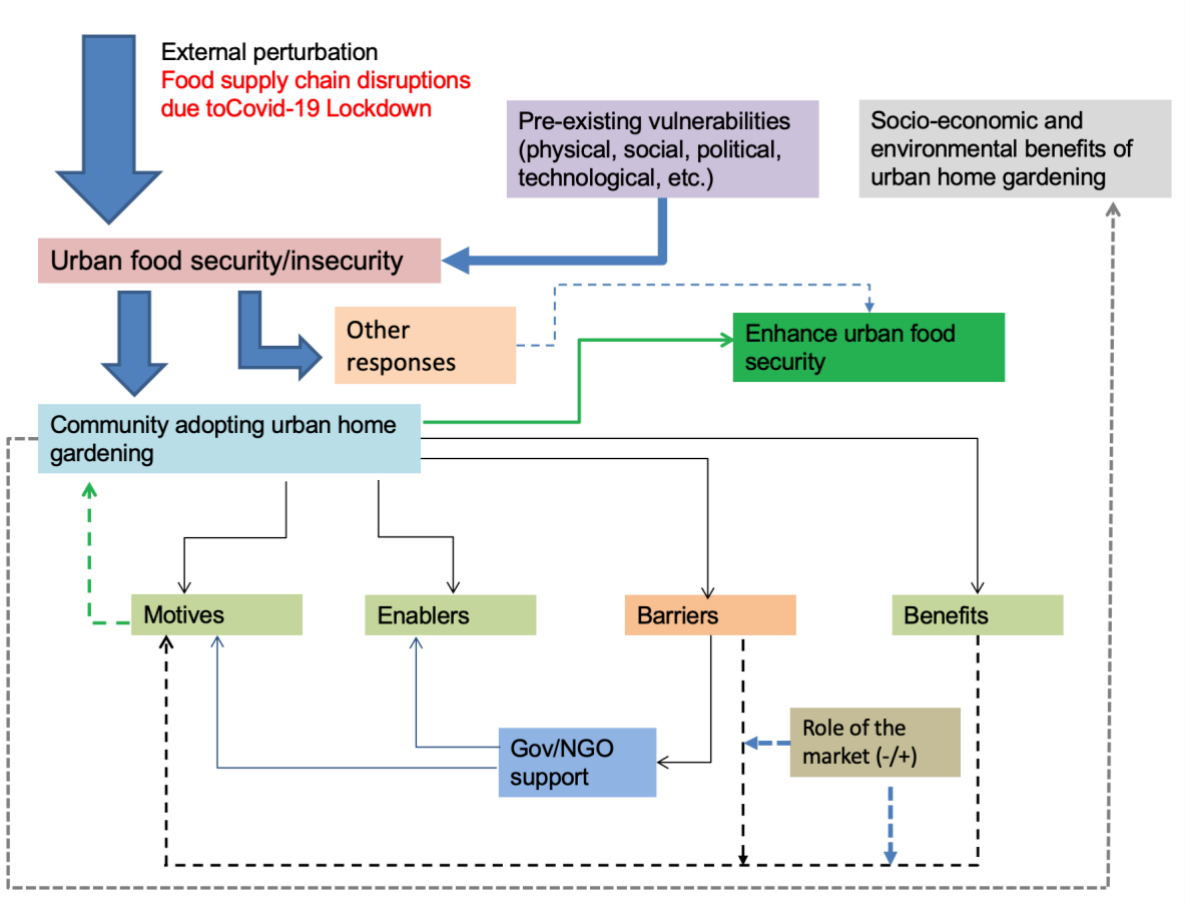
Buchmann (2009) shows that home gardening could enhance the resilience of communities through securing access to food by growing food crops in home gardens, increase access to money by selling the surplus food at the local market, and sharing food with neighbors through enhanced community network, trust, and reciprocity. Jehlicka *et al*. (2019) also shows that non-market "food self-provision" - in other words production of food for consumption and sharing of food enhance food security of communities through improving the diversity and availability of food.

2.6. The Conceptual Framework of the Research

Many publications are available about the role of urban agriculture on food security, motives of practitioners, barriers for operationalizing, and external support required for its sustainability. However, most of the literature is either based on communal gardening systems, which are different from home gardens, or is under the umbrella term of urban agriculture. Therefore, there is a need for specific research on home gardens, particularly for countries like Sri Lanka where communal gardens are not common. Furthermore, there are more opportunities for scaling up home gardens in

an urban area compared to community gardens due to the limitation of urban common space, convenience to access, and legal constraints. Hence, the proposed research focuses on addressing the existing gap for promoting and sustaining urban home gardening.

Based on this background a conceptual framework for the research was developed. The illustration of the framework (Figure 3) depicts the strains on urban food security, adopting urban home gardening as a response, a package of interrelated factors which affect the adoption of urban home gardening, and the potential benefits beyond the household level. The thick arrows represent external perturbation and the adaptive response. The thin arrows represent the relationships among the perceived factor affecting the adoption of urban home gardening and the perceived outcomes.



Author's diagram

Figure 3: Conceptual framework of the research

3. Research Design and Methodology

3.1. Review of Research Methodologies

As the first step, a review was conducted on research methodologies adopted by previous researchers on analyzing motive and barriers for urban home gardening. Both qualitative (Chenarides *et al*. 2020; Conway 2016; Fox-Kamper *et al*. 2018; Kopiyawattage *et al*. 2019; Momenee 2017; Wikström 2017) and quantitative (Clayton 2007; Scheromm 2015) assessment methodologies have been followed by previous scholars. In these assessments either semi-structured interviews (Conway 2016; Fox-Kamper *et al*. 2018; Kopiyawattage *et al*. 2019; Momenee 2017; Pourias and Duchemin 2016; Scheromm 2015; Wikström 2017) and/or questionnaire surveys (Chenarides *et al*. 2020; Clayton 2007; Pourias and Duchemin 2016) have been adopted for data collection. Field observations have also been made to support and verify the data gathered through interviews (Kopiyawattage *et al*. 2019; Pourias and Duchemin 2016; Wikström 2017).

Social media has been used by several researchers for identifying and selecting respondents for their interviews (Montefrio 2020; Wikström 2017). Snowball sampling is another method that has been used in identifying respondents (Wikström 2017; Kopiyawattage *et al*. 2019). In addition to urban gardening practitioners, Fox-Kamper *et al*. (2018) has interviewed officials of government institutes at local, regional and national levels, and academics from universities, in their research on identifying barriers and enablers in the governance approach in urban gardens.

3.1.1. Interviews

Interviews are the most common method of qualitative data collection in social science-based investigations (Briggs 1986). According to Cropley (2015), the fundamental requirements for conducting a successful interview include friendly yet professional interactions, and properly formulated questions that do not distort the respondent's idea in the process of answering.

Unstructured interviews result in data that are authentic to the respondent with minimal influence. However, the communications could be long and complex (Cropley 2015)

and may take more time and effort in data analysis. On the other hand, semi structured interviews allow the researcher to have some level of focus in the interview. This research focuses on practitioners' responses to pre-determined elements such as motives, enablers, etc. Therefore, semi structured interviews were used as the mode of data collection. The interviews also had an in-depth angle to it, as the researcher tried to discover background information such as knowledge, previous experience and attitudes which leads to motives, enablers, and barriers for home urban gardening.

3.1.2. Determination of sample size

Sample size selection and validation is an important step in any scientific research. Principle of data saturation and "pragmatic considerations" are two commonly used rationale for sample size determination in qualitative research (Dworkin 2012; Vasileiou *et al*. 2018). Data saturation in qualitative research methodology is defined as the point beyond which there is no new data in generated from the data collection process (Dworkin 2012). The state of data saturation depends on a number of factors such as the heterogeneity of the population, criteria for sample selection, researcher's judgement on the point of saturation (Dworkin 2012). Factors such as resource availability and time allocation are more relevant to pragmatic considerations. The sufficient number of interviews for a given research generally depends on the scope and nature of the research, the quality of data acquired, and also external factors such as publication requirements. However, many publications recommend a number between 5-50 (Dworkin 2012). On the contrary, some scientists argue that the determination of a sample size prior to data collection is contradictory to the principle of data saturation (Charmaz 1990; Sim *et al*. 2018). And it could also be problematic particularly in inductive research, which requires exploration of emerging themes in order to explain the outcomes (Sim *et al*. 2018). Even though sample size justification has not been provided in many urban home gardening research Kopiyawattage *et al*. 2019 have used the logic of data saturation to justify their sample.

3.1.3. Discourse analysis

A discourse analysis is essentially associated with a stepwise coding process. The literature shows three basic levels of coding: initial, intermediate, and advanced coding (Biaggi and Wa-Mbaleka 2018). Saldana (2013) discusses two main cycles of coding:

the first cycle and the second cycle, which may be followed by several other cycles as required. In the process of coding, the emerging themes are gradually developed from a narrow and specific form of individual ideas into more refined and best fitting broader concepts. In a grounded theory approach where the researcher aims to discover concept or theories rooted to original data in vivo coding, initial coding and process coding could be used as first cycle coding methods (Saldana 2013). Appropriate second cycle coding for the same approach includes axial and theoretical coding. Elliott and Higgins (2012) suggest using in vivo coding at the initial stage to root the themes more to the data, and to minimize the influence of literature. Such literature influence could cause the researcher to leap at broader themes and losing participants' original ideas in the research output. Initial or open coding is another useful first cycle coding method that can be used to analyze interviews. It allows the researcher to breakdown data into distinct fragments and to identify features that have the potential of evolving into categories later (Charmaz 2006; Saldana 2013).

NVivo software has been used for discourse analysis of transcripts by Conway (2016) and Momenee (2017) in their research on analyzing motives for urban gardening. In her research Momenee (2017) has applied two steps of coding, that is initial and axial coding, to identify the emerging themes. Similarly, Conway's research (2016) has also used at least two stages of coding, even though it is not specifically mentioned in the literature.

3.2. Research Design

This research adopts an inductive logic of inquiry and a qualitative approach in answering the research questions. Thus, the outcomes have been derived from the interviewees' responses, rather than being based on a hypothesis or a theory. The research paradigm can be classified as interpretivism.

Several factors limit the possibility of taking a quantitative research approach in this study. Firstly, the absence of a record on the households which conduct post-COVID-19 home gardening in Colombo District (or any other part of the country), makes it unable to estimate or identify the total population addressed by the research question. Thus, it is unable to draw a representative sample. Secondly, the COVID-19 related travel restrictions and restricted physical contact limits the potential for conducting a

questionnaire survey. The possibility of conducting an online questionnaire survey is restricted due to difficulty in identifying a sufficient number of practitioners and the practitioners' limitation for taking part in an online survey. Therefore, the data collection is done through interviews. The interviews took a mix of both semi-structured and in-depth type, where the researcher used an interview guide to direct the discussion, yet the interviews were conducted in a conversational manner (Longhurst 2009). This allowed the respondents to talk freely, unfolding the underlying reasons for their responses.

3.3. Geographic Region

Colombo district (Figure 4) consists of the highest population in a single district in Sri Lanka (11.4% of the total population). It also accommodates the highest urban population; that is 48.7% of the total urban population of the country according to the latest census data (DCSSL 2012). Furthermore, Colombo is one of districts that had been consistently affected by COVID-19 related lockdown during the period of March to May 2020 (Srinivasan 2020; Xinhua News 2020). Therefore, Colombo district has been selected as the geographic region for this research.

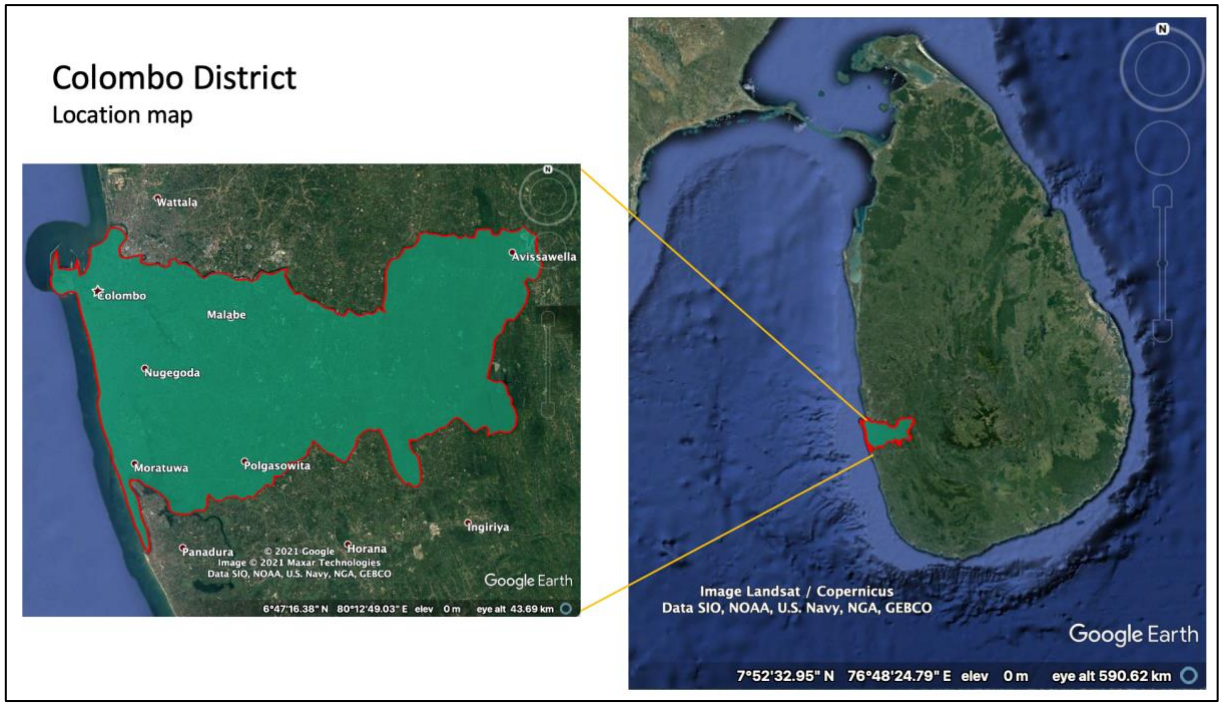


Figure 4: Colombo district location map
(Author's diagram based on Google Earth images)

3.4. Practitioner Interviews

3.4.1. Sample selection

Seven practitioners from Colombo district, who had started or significantly scaled up practicing home gardening during the first wave of COVID-19 pandemic in Sri Lanka (from March to May 2020), were interviewed. The number of respondents was determined using a mixed approach of data saturation and pragmatic consideration of the time availability. Non-representative and purposeful sampling was done in order to capture the individuals who fulfill the above-mentioned criteria.

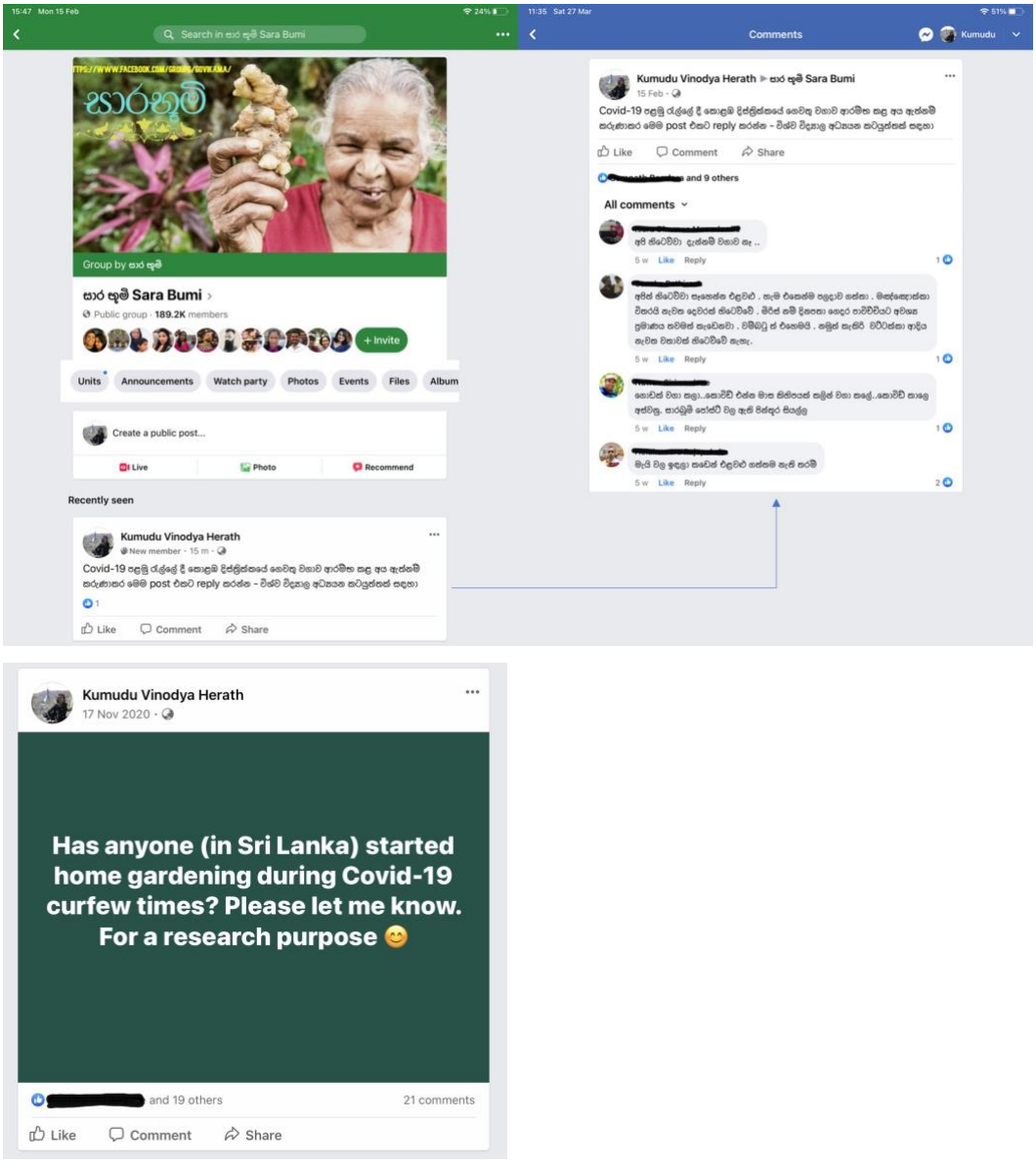


Figure 5: The Facebook posts used to identify practitioners

The potential interviewees were identified through social networks such as social media and informal contacts. A post was made on the researcher's Facebook page and on a local agriculture group on Facebook called "*Sara Bumi*[2]" (Figure 5) to identify people who have started home gardening during the pandemic. The researcher's post was made publicly available to all Facebook users while the local agriculture group is a closed group with about 189200 members at the time of publishing the post. The respondents to the posts were contacted separately and the relevant respondents who were willing to take part in an interview for the research were identified.

3.4.2. Interview guide

The objective of the practitioner interview is to understand the motives, enablers, benefits, barriers, and external assistance required for promoting and sustaining urban home gardening. A detailed interview guide (Appendix 1) was prepared with questions capturing all the above topics. In addition, questions that capture the respondents' previous experience with gardening, knowledge, attitudes, and environmental concerns were also included. These questions identify any responses linked to the aforementioned key parameters assessed through this research.

The interviews consist of both directive and non-directive questions. The latter is limited in number and mostly confined to the beginning of the interview, which included participant identification and their experience with COVID-19. The questions are mostly open-ended, and when it is not, follow-up questions were asked giving the respondent the opportunity to elaborate.

The questions used by previous researchers, who carried out similar studies, were referred in validating the interview guide. Some common question ideas that were used in previous studies are type of crops grown; main reasons for gardening; the strengths and barriers for practicing gardening (Momenee 2017; Wikström 2017); family or cultural influence for motivation; what is gained from gardening; and the impact of gardening on the quality and quantity of household food consumption (Momenee 2017). As per the research aim, the above questions were modified and linked to the COVID-19 pandemic. Furthermore, specific questions related to the pandemic, such

[2] Meaning "fertile land" in local language

as the impact of the pandemic on general lifestyle and food security, were also included. The interview guide was pre-tested during the author's pre-study.

The interview guide (Appendix 1) contains the list of questions used by the researcher to guide the interview. Nevertheless, the actual interview questions asked from each respondent vary from one another as the researcher had to reformulate the questions to adopt to the flow of the conversation. However, it was assured that the overall content of the interviews is compatible with the interview guide.

3.4.3. Conducting interviews

Interviews were scheduled with the respondents at their convenience. Overall, the interviews were conducted during the period from 7th March to 21st April 2021. A consent form for participating in the interview (Appendix 2) was electronically sent to the respondent before scheduling the interviews, and their signed consent was obtained prior to conducting the interview. The consent form was not translated into the local language as all respondents had sufficient proficiency in English to read and understand the consent form. On the day of the interview, the clauses of the consent form were again briefly explained to the respondent before starting the interview.

Six out of seven respondents preferred interview via phone rather than in-person. All remote interviews were conducted via mobile phone. Calls were made by the researcher so that no mobile chargers are incurred to the respondent. The in-person interview was conducted at the respondent’s residence. The length of the interviews ranged between 27 to 48 minutes.

All practitioner interviews, except one, were conducted in the local language (Sinhalese), whereas the remaining interview was conducted in English. The selection of language was made by the respondent. The researcher used the interview guide to steer the interview towards the objectives of the research. The interviews were conducted a conversational style, with relevant follow up questions. However, care was taken to stay passive about the comments to prevent biasness. Most of the respondents were proactive and willingly provided background information, which made the interviews in-depth with only a few probing questions. All the interviews were audio recorded for the convenience of transcribing.

3.5. Expert Interviews

The objective of expert interviews is to obtain experts' views on the viability of urban home gardening initiatives, contribution of urban home gardening to food security, and the potential interventions by government and non-governmental organization in popularizing and sustaining urban home gardening. The outcomes of these interviews were used along with the practitioners' interviews in answering the research questions. Expert interviews were much shorter and more structured than the practitioner interviews – based on the following questions. The length of the interviews ranged between 15 to 22 minutes.

1. Do you think that home gardening became more popular during the first wave of the COVID-19 pandemic in Sri Lanka?
2. What is your opinion about the viability and longevity of such small-scale urban home gardening initiatives?
3. Can such small-scale home gardening contribute to urban food security?
4. What are the main barriers and opportunities for urban home gardening in Colombo?
5. In your opinion, what are the viable measures that the government and other organizations can take to promote and sustain small-scale urban home gardening?
6. Do you have personal experience on urban home gardening? If so, what are your reflections during the pandemic?

Three experts representing the state sector, the INGO sector and the academic community were selected for the interviews. These experts either have worked on urban gardening related to their routine work or have conducted work or research related urban home gardening in Sri Lanka.

The first respondent is an officer from the Urban Settlement Development Authority (USDA) of Sri Lanka. During the COVID-19 pandemic USDA, together with the Western Province [3] Ministry of Agriculture, had implement a programme called *Savbhagya*[4] to promote home gardening (USDA 2020). The respondent has worked

[3] Colombo is one of the three districts in the Western province of Sri Lanka.
[4] *Savbhagya* (also written as *Saubhagya* in some literature) means prosperity in the local language.

extensively on implementing *Savbhagya* in low-income urban communities, particularly those living in condominiums, in Colombo.

The second respondent is a professor and a senior lecturer at the Department of Agricultural Economics, Faculty of Agriculture, University of Peradeniya, Sri Lanka who is also a Collaborator of the International Food Policy Research Institute (IFPRI). The respondent has contributed to several peer reviewed publications and books specifically related to home gardening and food security in Sri Lanka (Pushpakumara *et al*. 2012; Thirumarpan *et al*. 2012; Weerahewa *et al*. 2012).

The third respondent is an emeritus scientist and a former senior researcher attached to the International Water Management Institute (IWMI). The respondent has experience working with urban agriculture and urban home gardening, particularly in Gampaha, which is the second most populated district of Sri Lanka.

After identifying the respondents, they were contacted individually, either through email or over the prone, to obtain their consent in taking part in an interview. Once their preliminary consent was received a consent form (Appendix 3) was sent to secure their formal agreement. Since the experts may require additional permission from their affiliated organizations and also due to the difficulty of securing their anonymity, a different consent form (Appendix 3) was used for them.

The interviews were conducted either in English or Sinhalese, depending on the respondent's convenience. All interviews were conducted over the phone and recorded for the convenience of transcription. All audio records of the research interviews were stored only in the hard drive of the researcher’s personal computer, which is password protected.

3.6. Publications and Grey Literature

Apart from the interviews scientific publications and several forms of grey literature such as newspapers, blogs, social media, and Google trend have been used in the analysis. The literature and outcomes of the discourse analysis were used whenever possible to triangulate the results in answering the research questions.

3.7. Data Analysis

The objective of the analysis is to build on the details and logic of the questions and conceptual framework developed for this research.

A discourse analysis was done to identify and cluster the practitioners' views on motives, enablers, benefits, and barriers into scientifically meaningful broader themes. A similar procedure was followed for the experts' interviews. Since most of the interviews were carried out in Sinhalese, translation to English is required at some point of the data analysis. Basically, the author has two options for translation: to conduct the analysis in the original language and to translate the results to English, or to translate all transcripts to English prior to conducting the analysis. The latter option was adopted in this research primarily because of two reasons; it ensures the transparency of the analysis, and it is convenient for conducting the analysis using computer-assisted analytical software, which does not support the local language. Translation and transcription were done manually by the researcher herself, without the engagement of a third person or a software.

For the convenience of accessing the data, the codes were primarily clustered under the interview questions. The analysis took a grounded approach, where the researcher tried to develop concepts "rooted" in the original data (Charmaz 2006; Saldana 2013) in participants' communications. Initial coding (Saldana 2013), also called as open coding (Charmaz 2006), was used in the first cycle of coding of data. The objective of initial coding is to code the data while being "open to all possible theoretical directions" (Charmaz 2006). Care has been taken to keep the codes closer to the actual data rather than to a preconceived or a potential category. The objective of the second cycle coding is to reanalyze and reorganize the data from the first cycle to derive a fewer, but more organized, set of broader themes that are relevant to the specific research questions. Focused coding, which is coding based on the thematic similarities (Saldana 2013), was used in the second cycle of coding. The themes were finalized after an iterative process of revisiting and regrouping the codes.

Only the verbal expressions were used in the analysis. Emotional expressions such as laughter, sigh, pause, and stuttering were not included in the analysis as these had

relatively less use in answering the research questions. NVivo 12, which is a computer-aided qualitative data analysis software (CAQDAS), was used in the analysis.

3.8. Methodological Limitations

The COVID-19 pandemic related restrictions and respondents' personal considerations prevented the opportunity for conducting in-person interviews, except for one. The audio conversations could have created a less friendly environment, compared to a face-to-face interview. However, the researcher contacted the respondents at least two times prior to the interview in order to introduce herself and also to obtain the consent for interviews. During these contacts the researcher was able to build a friendly, yet professional rapport with the respondents which helped for an open discussion during the interview.

Translation limits the opportunity to use exact phrases used by the respondent. Nevertheless, the translation was done to maintain as much as possible the nuances of the original communication, while preserving the meaning of important words and word pattern as much as possible.

Non-practitioners were not interviewed in this research. Therefore, no first-hand data is available on the barriers that had prevented individuals from adopting urban home gardening. In order to fill this data gap, the practitioners were asked about their opinion on perceived barriers for non-practitioners.

4. Results

4.1. Global and Local Home Gardening Trends during the COVID-19 Pandemic

This section addresses the first research question by exploring grey literature, Google trends, and respondents' experience on home gardening practices during the COVID-19 pandemic.

In their global review on food supply and urban agriculture during COVID-19, Nicola *et al*. (2020) has reported that lockdown measures have led communities to productively engage in home gardening. Reuters have also reported a worldwide thriving of home gardening with the onset of COVID-19 lockdown (Walljasper and Polansek 2020). Record breaking seeds sales in United States, and increased seed demand in Russia and Canada (Walljasper and Polansek 2020); shortage of planting material in UK due to demand by 3.5 million new gardeners (Marsh 2020); increased sales of seeds, plants, and potting material in Adelaide, Australia (Fleming 2020); huge spikes of views on YouTube videos related to food growing (Perrone 2020), and growing interest on home gardening as a search term on Google (Figure 6) are some facts that support the reported popularity of home gardening during COVID-19 lockdown.

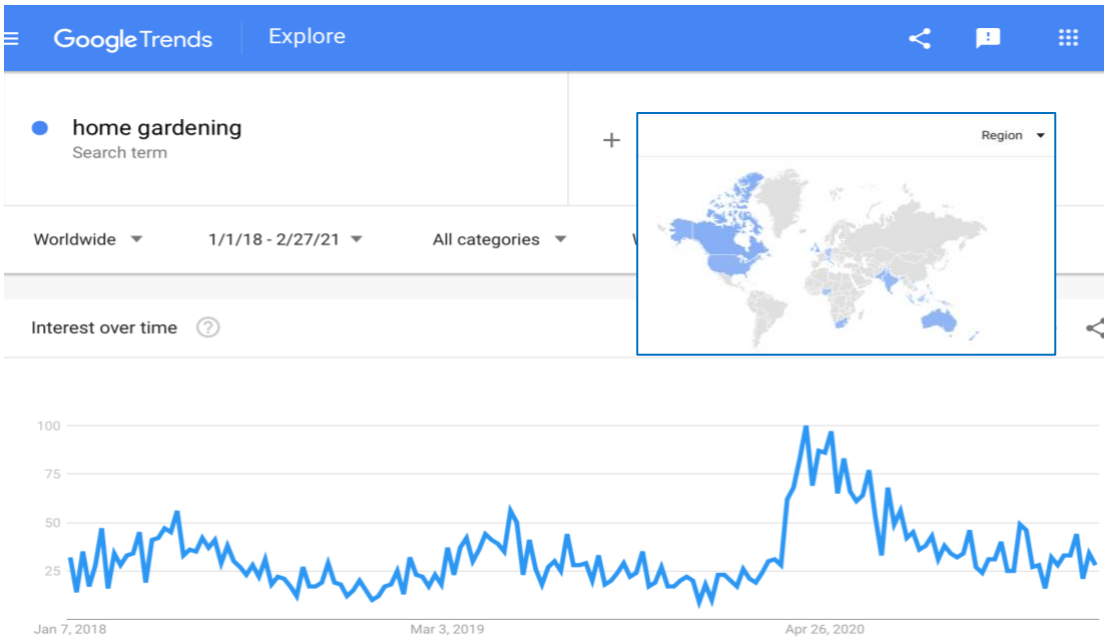


Figure 6: Worldwide interest on home gardening on Google Trends

(From January 2018 up to March 2021)

In addition, several research publications provide direct evidence for such home gardening movements. A study conducted in two major metropolitan areas in the United States indicates that urban agriculture has been increasingly practiced by households during the pandemic (Chenarides *et al*. 2020). Another study conducted in the Philippines, using two home gardening groups on Facebook, also reports an increase in home gardening during the COVID-19 lockdown (Montefrio 2020).

A preliminary mini-study conducted by the researcher indicated that there would have been a boom in home gardening in Sri Lanka during the first wave of the pandemic (March to May 2020). In this mini study, a simple social media-based survey was conducted to see if home gardening had become a popular practice during the pandemic, particularly among the urban dwellers. This was done by making a public post on the researcher's Facebook wall asking home garden practitioners, who started home gardening during the pandemic, to respond to the post for a research purpose (Figure 5). Sixteen practitioners responded to the post, which was made on 17 November 2020. Out of the 16 respondents 14 were from Colombo and Kandy Districts, which accommodates first and third highest urban populations in the country, respectively (DCSSL, 2012).

This observation was verified and further strengthened through practitioners' and experts' interview conducted in this research. Three out of the seven interviewees of the practitioner survey had started home gardening during the first wave of the pandemic, while the remaining four respondents had upscaled their home gardening practices during the same period. All these respondents claimed that many of their friends, relatives, neighbors, colleagues, and other people who are known to them have started home gardening during the first wave of COVID-19 pandemic in Sri Lanka.

> *A lot of people I know started home gardening during the lockdown. (Respondent 7)*

Furthermore, the three experts interviewed in this research had also experienced a hype in home gardening during the pandemic, even though it was short-lived. One of the experts partially attributed this hype to the government initiative on incentivizing home gardening, and the willingness of people to adopt it while being idle during the lockdown.

The government started giving seeds and fertilizers particularly for the home gardeners. …this was heavily advertised through media and people were attracted to some kind of a venture during the idle time when they were locked in their homes. (Expert 1)

Another expert identified the hype as an occasional trend which was adopted by the community while idling during the lockdown. A similar view was also expressed by a respondent.

We can identify the popularity in home gardening as a similar trend [referring to a previous trend on wall painting] that was adopted by people, because they had time to engage in it during the first wave. (Expert 3)

It [home gardening] became a trend. Because in Sri Lanka popular things and habits become trends very easily. (Respondent 2)

A recent research publication by Dissanayake and Dilini (2020) also provides indirect evidence for enhanced engagement of urban communities in home gardening. This study has been conducted to identify the relationships between urban gardening, food security and quality of life among the urban community in Kandy, Sri Lanka. The results reveal that physical and material inputs that were invested in urban gardening are higher during the pandemic than before. The study has been conducted focusing the first wave of the pandemic.

A Google Trend analysis for search terms “home gardening” and *gewathu wagawa*[5] (Figure 7) shows that there has been a clear spike in interest on Google web searches related to home gardening in Sri Lanka, during March to May 2020. This period coincides with the timing of the COVID-19 first wave in Sri Lanka and the island-wide lockdown. This information also suggests a popularity in home gardening among the citizens and a potential increase in post-COVID-19 home gardening activities.

[5] The term for home gardening in local language; Sinhalese.

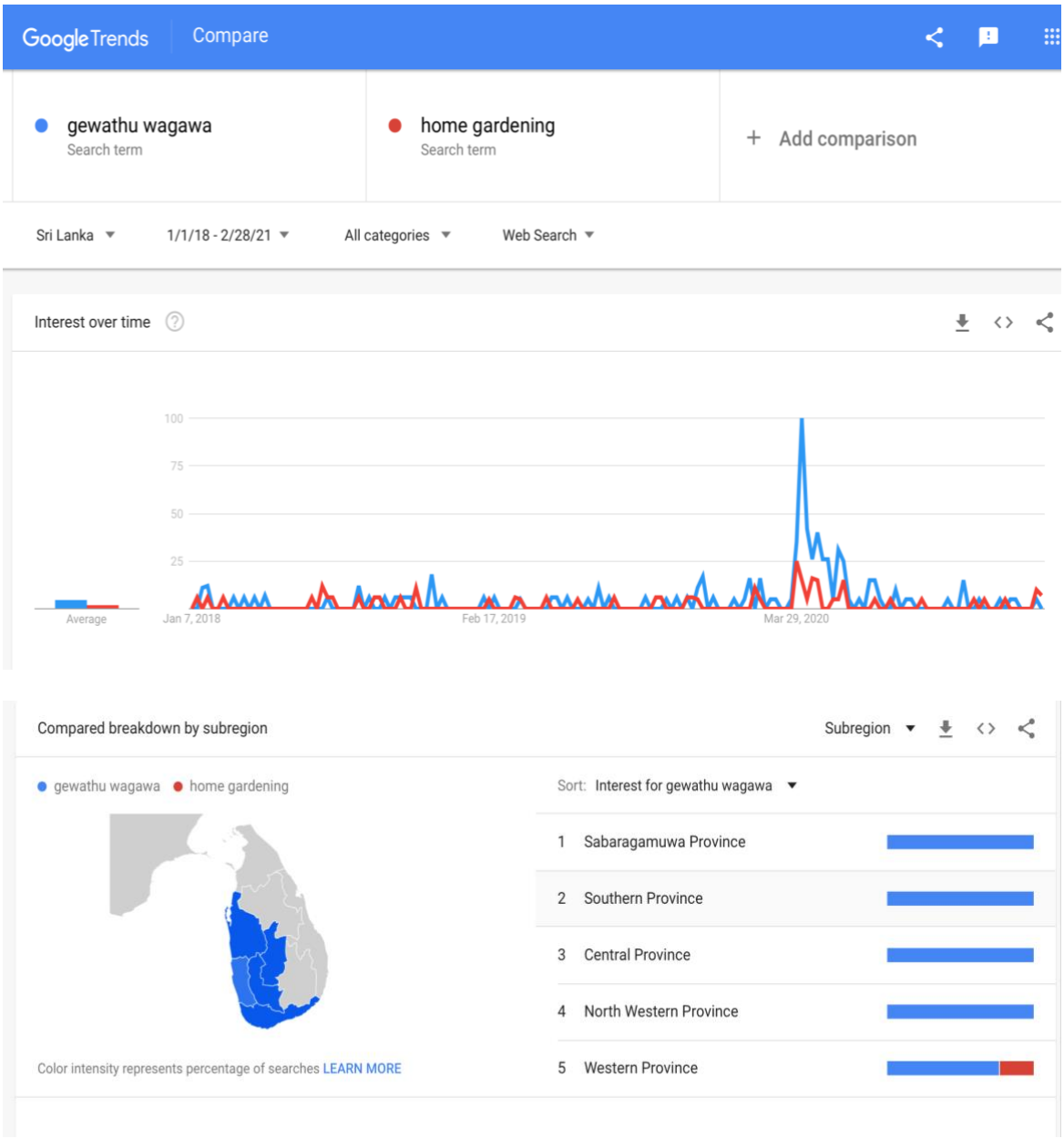


Figure 7: Interest in home gardening in Sri Lanka on Google Trends

(From January 2018 up to March 2021)

All seven urban home garden practitioners – three fresh starters and four who upscaled home gardening during the lockdown, were continuing their gardening practices in March 2021. Furthermore, all respondents expressed their willingness in continuing home gardening. However, five respondents stated that there has been a decrease in the home gardening activities after the lockdown was lifted. The main reason for this decrease was attributed to the difficulty of allocating sufficient time and effort for home gardening due to occupation and other day-to-day commitments. The post-lockdown decrease in home gardening has also resonated with the views of two experts.

When that [lockdown] changed and things went back to normal, I did not get enough time to get engaged in gardening as I did… (Respondent 7)

However, when the lockdown faded away, people started working and they actually went back to their normal life… we actually didn't see much of a boom thereafter. (Expert 1)

Therefore, the research provides different sources of information indicating that there could have been a popularity in urban home gardening during the first wave of the COVID-19 pandemic in Sri Lanka. The information also suggests that it may have faded away with time. However, considering the limitations of the study, further investigations with reliable statistics and empirical evidence are required to generalize this observation to a wider community. Furthermore, it is relevant to investigate how people have reacted, in terms of home gardening, to the recent and much more serious second and third waves of the pandemic in Sri Lanka.

4.2. Profiling the Practitioners and Home Gardens

4.2.1. Practitioners

Seven practitioners - three females and four males, were interviewed in this research. The respondents' age ranges from 37 to 53 years. All respondents are married and living with their spouses. Two families have members from the older generation living with them in the same household. Six out of the seven respondents are employees of private firms, financial institutes, and international organizations. The occupational levels of the respondents include a non-executive, junior executives, mid-level managers, and senior managers. The remaining respondent is a housewife.

Four out of the seven respondents have been doing some sort of home gardening before the pandemic and have significantly increased their practice during the lockdown. The three remaining respondents have started home gardening during the pandemic lockdown. Two male and one female respondents carry out home gardening on their own, without the support of their spouse, whereas the remaining are assisted by their spouses. Two respondents get their parents' assistance with gardening, while

one has got their young children also engaged. Two respondents reported to have additional paid support occasionally for garden maintenance.

4.2.2. Home gardens

The size of the gardening plot varies from 1 to 20 perches, that is roughly between 25m^2 to 500m^2. The type of gardening includes planting beds, pots, and simple vertical gardening (Figure 8). Vegetables, leafy greens, and spices are the most common crops that are cultivated. Some fruit trees have also been cultivated by most of the practitioners. Most of the fruit trees mentioned by the practitioners are perennials. As the research scope is limited to short term crops, perennial fruit trees were excluded from the analysis.

(a). Simple vertical gardening and pots

(b). Cabbage grown in a pot

(c). Gardening on ground

(d). Chili in pots

Figure 8: Types of practitioners' home gardens and crops

Photographs are by Respondents 2, 3, and 7.

Brinjal, green beans, bitter gourd, okra, and winged beans were the commonly grown vegetables, whereas *mukunuwanna*[6] and *gotukola*[7] were the most grown leafy greens. Chili, ginger, pandan, and turmeric were the commonly grown spices.

4.3. Background and Supporting Information

4.3.1. Impacts of COVID-19 pandemic on regular life and food security

Restriction of movements and thereby not being able to engage in regular day-to-day activities was the main COVID-19 lockdown experience mentioned by the practitioner. Anxiety about the future of COVID-19 situation, feeling bored, and difficulty of keeping work-life balance were mentioned as the negative impacts of the lockdown. Nevertheless, getting a chance to have a break from the busy lifestyle, ability to spend more time with the family, and being able to engage in other desired activities such as home gardening were mentioned as positive impacts.

> *With the lockdown the main worry was about what is going to happen. Because no one had experienced something like that before. (Respondent 7)*

> *… COVID-19 lockdown gave us a break from that busy lifestyle, so we could spend more time at home with our parents and loved ones. (Respondent 2)*

The practitioners' responses on the impact of COVID-19 lockdown on food security is tabulated in Table 1. According to the respondents, fresh food items had been delivered to communities via delivery trucks during the initial stage of the lockdown. Scarcity and limited access to fresh food, and the limited variety of food supplied through trucks were the main impacts identified by the respondents. In addition, two respondents mentioned that they felt insecure about the food availability as the pandemic continued. Having to limit consumption to save available food was also identified as an impact. However, two out of the seven respondents claimed that they felt no impact on food security.

[6] Scientific name *Alternanthera sessilis*
[7] Scientific name *Centella asiatica*

Limited variety: *Since the shops were closed the vegetables were distributed in lorries on a weekly basis and only a limited variety of vegetables were available. (Respondent 2)*

Feel of insecurity: *During the first wave, we were worried about the long-term availability of food supplies in the country because of COVID… (Respondent 7)*

Limited consumption: *We were cautious about our level of consumption, and we wanted to maintain our food stocks. (Respondent 2)*

Table 1: Practitioners' response on impacts of lockdown on food security

	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of respondents
Scarcity/ limited access	x	x		x		x	x	5
Limited variety	x	x		x			x	4
Feeling of insecurity		x				x		2
Limiting consumption		x		x				2
No impact			x		x			2
Poor quality of food							x	1

4.3.2. Obtaining seeds and fertilizer for home gardens

Five out of the seven respondents prepare their own compost from garden residues and kitchen waste. However, two of them mentioned that they also need to purchase additional compost to meet their requirement. Lack of space and pest attraction to the compost pit were mentioned as barriers for composting.

I used to purchase compost during the early stages of gardening. But now I make my own compost at home from garden residues and kitchen waste. (Respondent 6)

Six respondents maintain a seed stock for replanting, although they would also purchase seeds and planting material depending on the requirement and convenience.

For some plants, such as brinjal, chili, and okra, I maintain my own seeds. And I also receive seeds from my friends, we exchange seeds and plants. ...sometimes I purchase ready-to-plant saplings directly from the market. (Respondent 5)

Maintaining their own stocks of planting material and preparing their own compost could indicate the individual's willingness for continuing home gardening. However, this may depend on other factors such as availability of the resources, including time.

4.3.3. Sharing among communities associated with home gardening

All respondents claimed that they share, and sometimes, exchange their excess produce with others. Sharing knowledge related to gardening is the second most common exchange, which was claimed by six out of the seven respondents. The knowledge has been shared in the form of personal experience, advice, and discussions. The third most common exchange was planting material. Five respondents share seeds, saplings, and other planting material. Sharing of help was less common where only one interviewee claimed to do so.

Sometimes we share harvest when it is too much for us to keep for a few meals; we give away the excess to the neighbors. (Respondent 1)

We always share the excess harvests. And also, we discuss about our gardening methods, issues, tips, and we advise each other. (Respondent 6)

Motivating others for home gardening could be indirectly caused by sharing knowledge, and sometimes material. All practitioners claimed to have motivated others, such as friends, colleague, and family, to do home gardening. Some also believes that others have got inspired because of their influence.

I have spoken a lot about my home garden with my friends and colleagues, because of my interest about it. …Later they have also started home gardening and mentioned that I had inspired them to adopt gardening… (Respondent 2)

I have motivated my colleagues and our family friends to engage in home gardening as well. Some have started home gardening in small scale. (Respondent 7)

I have seen that some people who are known to me have started home gardening and I know I have inspired them. (Respondent 3)

Thus, different forms of sharing among communities were observed in practitioners' responses. On one hand this could indicate the potential of urban home gardening for enhancing social cohesion (Pourias and Duchemin 2016). On the other hand, it could also indicate the role of social cohesion - such as desire to share and inspire, for the success for urban home gardening (Momenee 2017).

4.3.4. Environmental considerations

The interview covered respondents' thoughts about environmental considerations related to home gardening. These results are summarized according to thematic areas as shown in the Table 2.

Table 2: Environmental considerations of home gardens

	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of respondents
Aesthetic and recreational value		x	x			x	x	4
Better for environment than bare land	x		x			x		3
Edible plants are more useful than ornamental plants			x		x		x	3
Home gardens support wildlife		x			x		x	3
Provision of greenery to the environment		x					x	2
Benefits to the environment are not significant	x							1

Aesthetic and recreational value were the most expressed environmental services associated with home gardening. Supporting wildlife and provision of green space were also identified as environmental benefits. Some respondents believes that edible plants could add more benefits to the environment than ornamental plants. Apparently, the respondents have only considered the edible value of plants rather than other vital

environmental services such as provision of habitats, and nectar for pollinators. One practitioner was skeptical about the contribution of small-scale urban home gardens to environmental services.

> *I wouldn't say that home gardening can give a significant benefit to the environment. By cultivating a small plot in a large, congested area we cannot expect a big difference in the ecosystem. (Respondent 1)*

Four respondents mentioned that home gardening could cause negative impacts and add stress to the environment if it is carried out intensively. Using agrochemicals and altering the natural landscape were mentioned as intensive gardening practices.

> *Of course, gardening is better than having a bare land. But there are negative impacts to the environment by gardening if it uses pesticides, fertilizers, and other chemicals. (Respondent 1)*

> *I do not know much about the environmental impacts, but I think the intensification [of home gardening] can have a negative impact on the environment. (Respondent 2)*

> *Home gardening is not something that I must do, so I don't need to put the environment under stress to do home gardening. (Respondent 5)*

One of the experts expressed concerns about intensification of home gardening to maximize benefits in a commercial perspective. The expert mentioned excessive pruning of the tree canopy to obtain sufficient space and light to support annual crops - such as vegetables and leafy greens, as an act of intensification. This could reduce the environmental services associated with the tree canopy.

> *…that way you are downgrading the ecosystem services provided by a home garden. (Expert 1)*

4.4. Results Directly Linked to Research Questions

The first research question was answered in section 4.1. The section 4.4 answers the research questions two to five, which are directly linked to the conceptual framework.

The yellow-highlighted section of the conceptual framework (Figure 9) elaborates the components and interactions addressed by the research questions two to five.

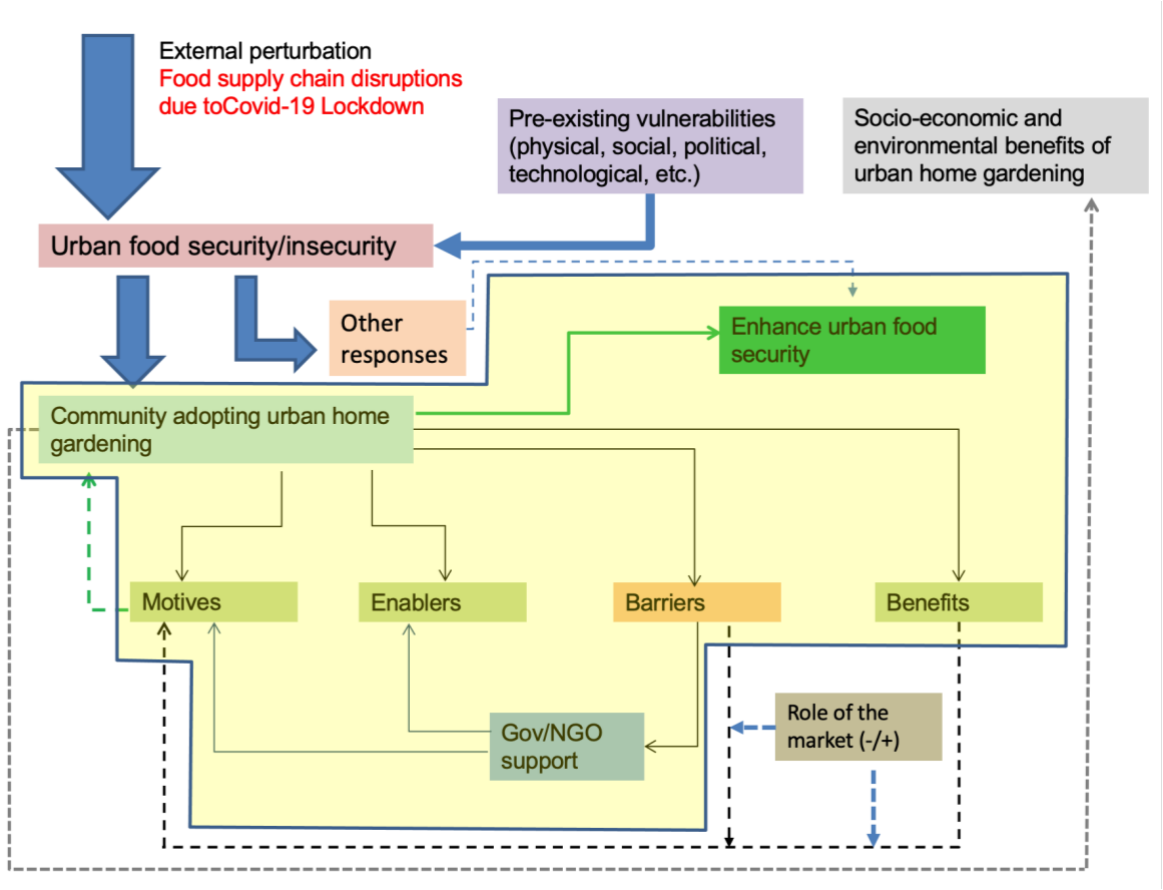


Figure 9: Research question components in the conceptual framework

The second research question is on identifying motives for starting/upscaling home gardening by the target community during the COVID-19 pandemic. The results relevant for this section are discussed in the section 4.4.1. The results for the third research question, which is on identifying enablers, barriers, and realized benefits of home gardening, are presented in the sections 4.4.2 through 4.4.4. Results for answering the fourth and fifth research question, on food security and institutional support, are discussed in sections 4.4.5 and 4.4.6, respectively.

As described in the methodology, two rounds of coding were applied in this analysis. In the first, phrases from practitioners' communications were extracted into nodes, that represent interview questions. No further classification is done in the first round. At the second stage of coding, the initial codes were clustered into themes. The following results and key themes were derived after clustering and refining the respondents'

comments in the second round. The themes were ranked based on the frequency of responses.

4.4.1. Motives

Table 3: Motives for starting/upscaling home gardening

	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of respondents
External influence	x	x	x	x			x	5
Pastime activity		x	x	x		x		4
Food source	x	x					x	3
Better food	x			x			x	3
Personal interest		x			x		x	3
Moral		x						1

The respondents' motives for home gardening, resulted from the discourse analysis, are tabulated in Table 3. External influence - such as government recommendation, media, and other practitioners, has been the most common motivational factor. The government influence was also pointed out by the experts.

> *The main reason I increased practicing home gardening is because the government warned that there could be a disruption of food supply due to COVID-19… (Respondent 7)*

> *With the pandemic we started home gardening because there was a trend in home gardening and other people were also doing it. (Respondent 1)*

Four respondents mentioned that their main motive for home gardening during the lockdown was to engage in some activity to pass time. However, selecting home gardening as a pastime activity is broadly linked to the respondents' other motives, enablers, and benefits.

> *I started home gardening as a pastime activity during COVID-19 first wave lockdown. (Respondent 3)*

When we were stuck at home for about a week it started became boring, and I needed to engage in something. So, I thought of starting vegetable cultivation in our garden. (Respondent 6)

Other motivations for home gardening had been the need to have a food source and access to better quality food. Personal interest and the moral concerns have also been motivational in taking up home gardening.

And because those [garden vegetables] were fresh stuff we could give it to our children. So that's the motivation because of health. (Respondent 4)

4.4.2. Enablers

Enablers are the factors facilitated to convert the respondents' motives for home gardening into an actual practice (Table 4).

Table 4: Enabling factors for home gardening

	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of respondents
Time availability with lockdown	x	x	x	x	x	x	x	7
Past experience and exposure	x	x	x		x		x	5
Space availability	x		x	x	x	x		5
Personal interest			x	x	x		x	4
Knowledge	x		x		x		x	4
Other resources				x		x		2
Support from family			x					1

All respondents claimed that availability of time was the main enabler to start or to upscale home gardening. Since the lockdown restricted travel to work and leisure activities the respondents claimed to have time to engage in home gardening.

I stated it [home gardening] because I was at home. I had the time, and then I just thought about doing it and started it. (Respondent 6)

During the pandemic curfew I had the time to engage in home gardening. (Respondent 7)

This shows the direct impact of COVID-19 pandemic in connecting the practitioners' motives and enablers for urban home gardening. Again, respondents' choice of spending the available time on home gardening may depend on many factors including other enablers such as personal interest, availability of resources, knowledge, and experience.

Previous experience and exposure to gardening, and availability of gardening space were identified as the second and third most common enablers. Five respondents have mentioned that they have been exposed to farming through their older generation, who had practiced some form of agriculture.

…we have that exposure and background from very young age, so gardening is not a completely new thing to us. We had that inspiration from the older generation. (Respondent 1)

Four respondents believe their knowledge on agriculture, which they have got through formal education, had also helped them in adopting home gardening. Furthermore, personal interest, which was also identified as a motive, was found to be an enabler for four respondents. Phrases such as enthusiasm for gardening, nature lover, greener environment were used by the practitioners to express the personal interest.

I am a person who loves to be close to nature, so I always had the intension to do gardening… (Respondent 3)

In addition, one of the experts mentioned the level of education and social status as enablers.

… education level and the social status of the communities living in low-facility schemes is somewhat lower than that of the middle-class communities. ...because of their [the formers'] perceptions, they are not managing time and resources to engage in home gardening. But the communities in the middle-income category have the necessary educational background and the qualities that are required to adopt and continue urban home gardening. (Expert 3)

4.4.3. Barriers

Two types of barriers have been focused during practitioner interviews. First type is the barriers experienced by practitioners themselves (Table 5). The second type is the potential barriers for others as seen by the respondents (Table 6). As non-practitioners were not interviewed, the latter was focused on capturing the barriers which may have prevented people from engaging in urban home gardening. Another set of perceived barriers were also identified though the expert interviews. Finally, all these barriers were aggregated to synthesize a general list of barriers for urban home gardening.

Barriers experienced by practitioners

Table 5: Barriers felt by the practitioners

	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of respondents
Lack of time	x	x			x	x	x	5
Pest and diseases		x	x	x	x	x		5
Lack of resources			x		x		x	3

Lack of time to engage in home gardening was mentioned as a pressing barrier felt by the practitioners. Here, the robustness of the result could be highlighted as the practitioners have claimed availability of time as the top enabler and lack of time as a main barrier. Five practitioners mentioned that it is difficult to allocating sufficient time for gardening, despite of their desire. When elaborating time as a barrier, the practitioners mentioned time commitment for occupation and family needs, and the excessive time and attention required for gardening. They also claimed that it was difficult to cope up with gardening activities when the lockdown was lifted.

> *Lack of time became a big barrier when the lockdown was lifted. (Respondent 2)*

> *Someone who is working full-time, like me, cannot afford to spend time in the garden as much as they want. (Respondent 5)*

Pests and diseases were the other most common barrier. Insects, birds, porcupines, monkeys, rats, and rabbits were some common pests identified. Three respondents claimed that they use home-made non-toxic pest repellents for insects. However, none of the respondents claimed to use chemical pesticides for pest and disease control.

> *I applied home-made sprays to get rid of pests, I learnt it from my neighbors and friends who practice gardening. (Respondent 6)*

Lack of quality and reliable labor, intermittent water supply, and lack of space were mentioned as other barriers.

> *My gardening activities are very much limited with the space. (Respondent 7)*

> *Another constraint is finding labor for agricultural work. People in Colombo has very little knowledge about agriculture. (Respondent 5)*

Potential barriers for others

Table 6: Potential barriers for gardening

	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of respondents
Attitude	x	x	x	x			x	5
Lack of exposure	x		x		x		x	4
Lack of resources		x	x			x	x	4
Lack of knowledge and awareness					x		x	2
Lack of time				x			x	2
Lack of acceptance		x					x	2
Pests							x	1

Five interview participants believed that attitude towards home gardening could be a barrier, particularly for non-practitioners. Lack of interest, Lack of commitment, and fear of failure were mentioned as attitudinal barriers. One respondent identified attitude as the prerequisite for gardening. This brings in an important consideration in promoting urban home gardening.

Home gardening only suits for people who love to engage in it. If one does not like it then better not try to do it. (Respondent 7)

Lack of previous experience and exposure to gardening was identified as a barrier. This is further supported by the practitioners' strong point of view on experience and exposure as an enabler.

I think it is very important at least to have seen someone planting a seed. Otherwise, it not easy to have the feel for it. (Respondent 3)

Lack of knowledge and awareness was raised as a barrier not only for practicing home gardening but also for reaping potential benefits. Practitioners believe that underestimating the benefits of home-grown food - such as freshness, food safety, economic benefits, is due to lack of knowledge. Furthermore, lack of knowledge to identify naturally grown edible leafy greens, and lack of knowledge on preparing uncommon food were also mentioned as knowledge barriers that prevent people from reaping potential benefits of home gardens.

People do not have the knowledge on naturally growing edible plants….These plants are there for sale in supermarkets. But what people do not know is that they may be having those plants abundantly in their backyards. (Respondent 5)

Lack of acceptance and support from the family for home gardening, and neighbor resistance were also mentioned as potential barriers. Other potential barriers such as lack of resources - in terms of gardening space, reliable water supply, and time, and pest attacks have already been identified as barriers for practitioners as well.

Potential barriers identified by experts

The barriers for urban home gardening, as identified by the three experts, are tabulated in Table 7. Lack of knowledge and awareness of the public, and lack of access to material and resources are the most common barriers identified by all three experts. Two experts signified the lack of facilitation through dedicated government institutes and other organizations. However, the knowledge transfer within families across generations have not been acknowledged by any of the respondents.

…we must deliver that required knowledge to the practitioners. I do not see a considerable engagement of either the state institutes or NGOs in delivering this knowledge. (Expert 3)

Table 7: Perceived barriers for urban home gardening

	Expert 1	Expert 2	Expert 3	Number of respondents
Lack of knowledge and awareness	x	x	x	3
Lack of material and resources	x		x	3
Affordability		x	x	2
Lack of facilitation	x		x	2

Access to input materials such as seeds and fertilizers was identified as an essential requirement and the need for facilitation in delivering these materials was highlighted.

The second thing [barrier] is planting materials. But I'm not saying that the government should distribute them freely, but the government has to make them available in the market… (Expert 1)

Interestingly, inorganic fertilizers have been identified as an important input by some of the respondents. This leads to the concern of instrumentalization of home gardening which creates a dependency, while home-based composting would be a circular solution for soil nutrient enhancement and domestic biodegradable waste management.

One expert identified gardening space as a critical resource, especially for urban home gardening in high rising buildings. They signified the requirement of sufficient space to obtain a viable crop to support household food requirement.

You have to have a sufficient space, at least half a perch [12 m^2], to get a harvest that is sufficient for a household. (Expert 3)

Affordability of input material was identified as a barrier. One expert stated household income as limitation for obtaining urban water for gardening and inorganic fertilizers. Another focused on high cost of input material required for certain crops and therefore showed the importance of selecting feasible crop to overcome this barrier.

Some additional nitrogenous fertilizers would have to be purchased. So that again [similar to urban water] related to the income level family. (Expert 2)

…if we choose to cultivate exotics like carrots, those require a lot of effort and inputs. So those are not feasible. But crops such as okra, capsicum, long beans, chili are more practical to cultivate. (Expert 3)

After collating the experienced and potential barriers, the following were identified as common barriers for urban home gardening.

- Lack of time
- Lack of resources
- Pests and diseases
- Negative attitude towards home gardening
- Lack of exposure and experience
- Lack of knowledge and awareness
- Lack of acceptance
- Lack of facilitation
- Affordability

4.4.4. Realized benefits

Benefits of home gardening that are realized by the respondents are mainly categorized into two types: food and non-food benefits (Table 8).

Food benefits

Obtaining fresh food from the garden was identified as the main food benefit, which is also linked to the second most stated benefit: the easy access to food.

The vegetables that we get from the garden are fresh and those can be picked right before cooking, so the freshness gives a whole different, better taste. (Respondent 5)

Further linking to easy access, the respondents mentioned benefits such as reduced visits to market and thereby saving time and money. Moreover, the practitioners can

harvest only what is required for a meal, and thereby reduce wastage. A respondent also linked reduced travel with the environmental footprint to point out wider social and environmental benefits. Having to obtain a variety of food from the garden and being able to grow preferred food were also mentioned as benefits.

Table 8: Food and non-food benefits realized from home gardening

		Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of respondents
Food	Freshness of food	x	x	x	x	x	x	x	7
	Easy access to food	x	x	x		x	x	x	6
	Safe food	x		x	x	x	x	x	6
	Nutrition	x	x	x					3
	Better taste				x	x			2
	Food variety		x					x	2
Non-food	Self-satisfaction	x	x	x	x	x	x	x	7
	Economic			x	x	x	x	x	5
	Relieving stress	x	x		x	x	x		5
	Leisure activity	x	x	x		x			4
	Aesthetic value		x				x		2
	Social interaction					x	x		2

Six respondents stated that safe food, that is food grown with no or minimum agrochemicals, is a benefit. None of the respondents claimed to use agrochemicals in home gardening, except for one who occasionally use synthetic fertilizers.

> *We do not know what chemicals have been used on fresh food that we buy from the market. I wanted to grow my own food so that I know what we are eating is grown without bathing in chemicals. (Respondent 7)*

Even though nutrition was identified as a benefit, its specific link to home-grown food was not clearly mentioned. However, it could be interpreted that having easy access to fresh vegetables and leafy greens would increase the frequency of nutritious food intake. Some respondents also believes that home-grown food has a better taste compared to food bought from the market. Even though these benefits are linked to

the characteristics of food, those could be identified as perceptual rather than physical benefits.

> *I think the food that we grow has a better taste than those which are brought from the market. (Respondent 5)*

> *I am happy about the quality of the food that I grow for my family. I get nutritious and safe food everyday straight from my garden. (Respondent 3)*

Food share from home garden

The share of food obtained from the home garden is an important parameter in understanding the benefits. The type of food grown, and the frequency of consumption are closely related to household food security. Five respondents mentioned that they have vegetables or leafy greens from the garden, at least for one curry[8] on daily basis. Another respondent consumes home-grown food more than three times per week, whereas the remaining respondent consumes less than three times a week.

> *I cannot say that I do not buy vegetables from the market at all. .... there is something from the garden on a daily basis. (Respondent 5)*

Some respondents have achieved self-sufficiency in terms of vegetables, leafy greens, and/or spices, from their garden.

> *I hardly buy any vegetables from the market. I have enough vegetables and leafy greens for all our meals on daily basis. (Respondent 3)*

> *There is a huge variety of green leaves coming from the garden, so we do not buy green leaves from the market at all. (Respondent 5)*

> *We have different varieties of chili in our garden, so we don't buy chili from outside. (Respondent 4)*

Two respondents thought that home gardening could contribute to reach the government's vision of a self-sufficient nation in terms of food.

[8] A typical Sri Lankan meal includes 2 or 3 curries with rice.

Non-food benefits

Self-satisfaction was the most common non-food benefit, claimed by all respondents. The respondents were satisfied with home gardening by engaging in it, seeing the outcomes, and having to consume the produce they grow.

> *It is a wonderful feeling to see the crop has grown. Watching the lush crop is so satisfying that sometimes I feel that it is too good to be plucked. And eating what I have grown makes me happy. (Respondent 7)*

None of the respondents sells their excess produce to make an income. Instead, all respondents share the excess with neighbors, colleagues, family, and friends. One respondent, as quoted below, donates the excess to less privileged people.

> *I don't sell the produce, but I give the excess leafy vegetables to a poor man, who is frequently visiting our neighborhood, to sell it for himself. He earns an income from it. (Respondent 3)*

Even though the respondents do not engage in trading food, five out of the seven respondents claim that home gardening provides them an economic benefit by reducing the expenditure on food. For some, the saving is not significant whereas the others make a considerable saving.

> *I do not get a significant saving on food expenditure because I produce only a very limited amount. Still, it is a saving. (Respondent 7)*

> *We have one curry from the garden on a daily basis. That save us about Rs. 4000 a month, which is a good thing. (Respondent 2)*

Relieving stress by engaging in home gardening as a leisure activity, is a benefit realized by most of the respondents. Mental wellbeing, deviation from routing work, and relaxation were some of the phrases used by the respondents to express their ideas about reviving stress.

> *It helps for mental wellbeing. It gives me some deviation from the daily routine life… And it is satisfying to consume what you have grown. (Respondent 6)*

Furthermore, two respondents said home gardening can add an aesthetic value to the surrounding that they live. Home gardening was also identified as an opportunity for social interaction.

> *It (home gardening) gives an aesthetic value to a land rather than having a bare land or having a garden full of weeds. (Respondent 6)*

> *My neighbors talk to me when I am in the garden, I get to know people, we exchange things, knowledge, and ideas with others… (Respondent 5)*

4.4.5. Food security

The framework put forward by Korth *et al*. (2014) describes two pathways where urban agriculture could contribute to household food security: increasing access to food and increased household income. In this framework, increased access to food includes increased food quantity and nutrition content of the food. Similarly, increase household income includes income generation through surplus sales and savings on food expenditure.

This framework was used in this research to analyze the food security. Practitioners' communications on the food share from home garden, easy access to food, and the quality of food – in terms of freshness, nutrition, and safe food, were used to analyze the improved access to food. Furthermore, perceived economic saving through reduced food purchase represents the increased household income in this analysis. However, no baseline is available to compare the incremental impacts of home gardening on food security for those who have upscaled home gardening during the pandemic. Therefore, it is assumed that these results represent the overall benefit the practitioners realized, in terms of food security, by having a home garden. Furthermore, quantitative data was not used in this analysis.

The results shows that most of the practitioners have been able to fulfil a part of their daily food requirement from the home garden (Figure 10). In addition, most respondents claimed that they could obtain safe and nutritious food freshly and easily from the garden (Figure 11).

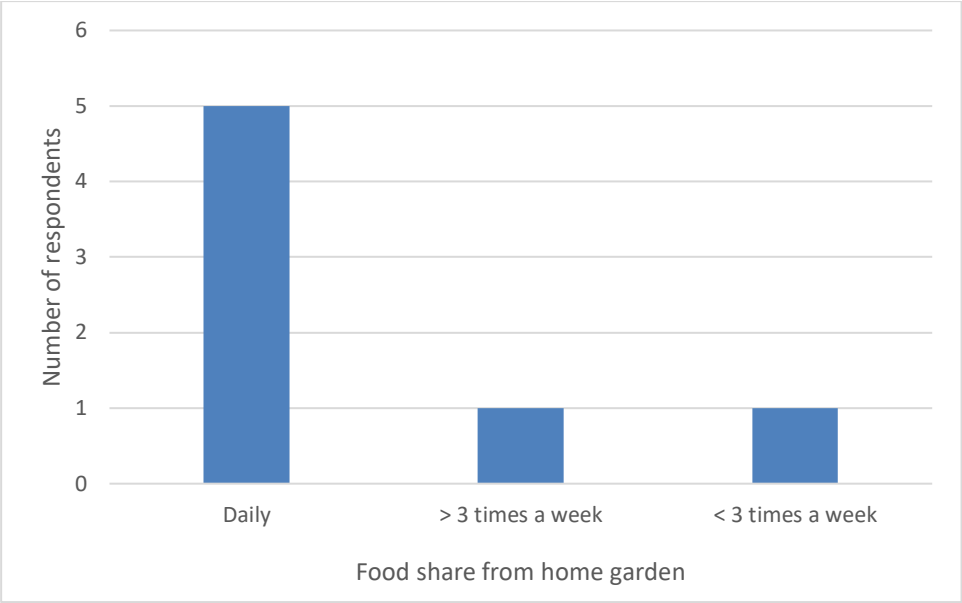


Figure 10: Food share from home garden

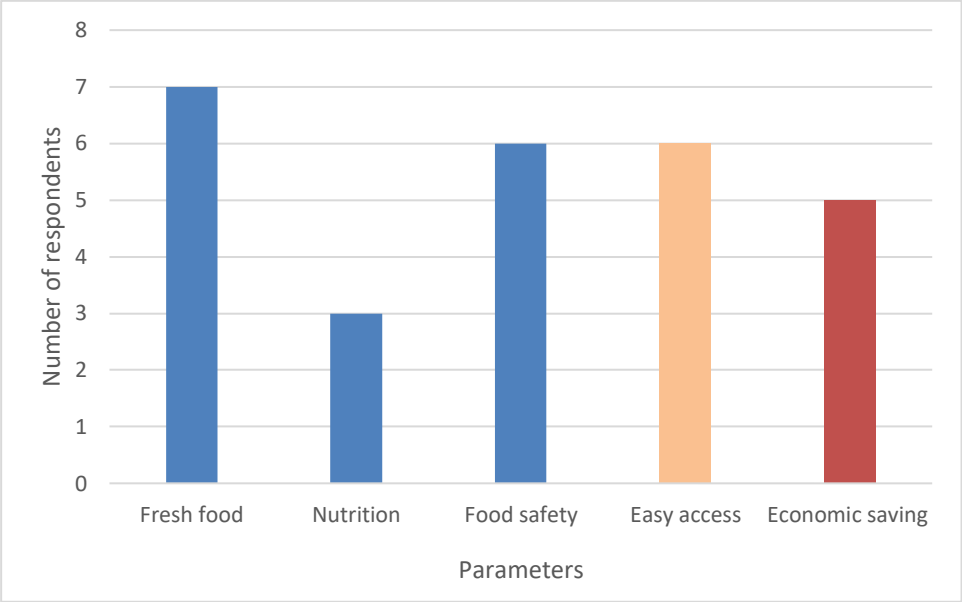


Figure 11: Access to food and economic saving from home garden

Five practitioners claimed to have save food expenditure owing to the partial fulfilment of food requirement from the garden. The significance of the saving depends on individual perception, which could be attributed to the proportion of garden food, household financial status, accuracy of the estimation, and many other subjective parameters. Most of the respondents could not quantify the economic benefit they gain from reduced food expenditure. However, one respondent estimated it to be LKR 4000

(about Euro 16) per month, which is a considerable saving as per the respondents' view.

One of the experts stated that small-scale urban home gardening could potentially contribute to food security. However, they have identified nutrition security as a vital part of the total package of food security, therefore signified the importance of reaching both food and nutrition security. Here, food security focuses on the quantity of the food whereas the nutrition security focuses on the quality of food in terms of nutrient content.

> *I think [food security is met] only partially. That's what I found in the study that I did. There is nutrition security and food security, that is only partly met. (Expert 2)*

In general, the experts have different perspectives on the potential of urban home gardening on enhancing food security. The experts believe that urban home gardening could provide substantial benefits to low-income communities who have enablers such as space and idle labor. Thus, the experts strongly believe that these communities should be focused in promoting and facilitating urban home gardening.

> *When it comes to very poor communities with abundant labor and you know, at least some space, home gardening can bring lots of benefits because there is idle labor and with some support, you can have your home production. But it won't equally be applied to all the home gardens. (Expert 1)*

> *When it comes to the viability for promoting home gardening what we have understood is that the low-facility communities are the best candidate, not the middle-income class people, because the former group fulfils the criteria that we have identified as viable. (Expert 3)*

> *We should not promote home gardening in a blanket manner among anybody and everybody. There are pockets which need attention, and you can get them to do home gardening to meet their food needs as well as an income earning operation. (Expert 1)*

The experts also stressed on the fact that these communities require certain level of facilitation in reaping the potential benefits. Transferring knowledge was identified as the main facilitation required for the practitioners. One of the experts shared their

professional experience on how urban home gardening could provide substantial benefits to communities, when those are executed with proper facilitation.

> *During the pandemic we saw the success of the programme [an urban home garden programme with 400 families]. We saw how the community reaped benefits out of it. In our evaluation we have seen that these home gardens have provided considerable financial benefits to the community. It was successful only because it was conducted along with transferring knowledge to the practitioners. (Expert 3)*

The expert also recognized selecting viable crops and having sufficient gardening space as essential success factors. The practitioners' view on having less time to engage in urban home gardening with their commitment to work complements the experts' view of capitalizing on idle labor.

4.4.6. Institutional support

Practitioners' and experts' views on institutional support that is required for promoting and sustaining urban home gardening is tabulated in Table 9.

Table 9: Institutional support required for strengthening urban home gardening

	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Number of practitioners	Expert 1	Expert 2	Expert 3	Number of experts
Provision of material		x	x		x	x		4		x		1
Raising knowledge and awareness		x		x	x		x	4	x		x	2
Policy and regulations			x	x	x			3				
Facilitation/ agriculture extension	x					x		2	x	x	x	3
Technology improvement			x					1		x		1
Networking										x		1

When it comes to institutional assistance required for promoting and sustaining urban home gardening, practitioners and experts spoke on similar themes. Four respondents stated that provision of material such as seeds, fertilizers, composting bins, tools, and agricultural machinery could be helpful. In contrast, four respondents specifically mentioned that there is no need to supply seeds, as seeds are cheaper and could be easily obtained.

> *I think if the government needs to promote home gardening, they have to provide some sort of support for the expensive things such as fertilizer and tools. (Respondent 2)*

Even though lack of input material, such as seeds and fertilizer, has been identified as a barrier, the experts had a mix of thoughts about the institutional involvement for confronting it. One expert strongly opposed subsidizing input material for home gardening. On the other hand, another considered input materials are crucial for sustaining home gardening and proposed selective subsidization for low-income groups.

> *…the government doesn't have to pour money or use scarce resources to promote all these diversified units in a large way. (Expert 1)*

> *Fertilizer could be made available through the Department of Agriculture at a subsidized rate, in certain areas. (Expert 2)*

Four respondents mentioned that raising awareness and knowledge among the public, particularly among the urban community, is the main assistance required from institutions. Importance and benefits of home gardening, selecting crops, how and when to plant, and climate prediction were stated as useful themes knowledge and awareness. Furthermore, inspection of home gardens and provision of advice through a dedicated agricultural extension service was also suggested.

> *Rather than providing material such as some seeds or some fertilizer, what the government really should do to support home gardening is to develop awareness among public. (Respondent 7)*

> *No point of providing seeds if people do not know how to plant those. That knowledge is vital for the urban community. (Respondent 5)*

The gap in knowledge and awareness, and the need of facilitation had also been raised by the experts.

> *What I feel is that the government can, you know, provide some support in the form of maybe awareness… (Expert 1)*

> *I think continuous handholding, if you really want to be a part of it as the state, is important. So, handholding is number one. (Expert 2)*

The need for policy and regulatory assistance were raised during the discourse analysis. Imposing strict regulations to allocate mandatory gardening/natural space in urban land parcels, allocating urban bare land for gardening, providing solutions for urban pest issues, and looking for integrated solutions - for example household-level composting to address urban garbage issue while supporting urban agriculture, were some of the specific suggestions made by the respondents.

> *We need some level of policy when it comes to land planning and urban planning. (Respondent 4)*

A practitioner mentioned that state and other organizations should look for technological advancement in agriculture. An expert complemented this view by stressing on the need of technology transfer.

> *We are still stuck with the old, simple but less efficient tools. We need to adopt new technology in agriculture to make our lives easy. (Respondent 3)*

The importance of networking among stakeholders – such as gardeners, suppliers, and facilitators, for the success and continuation of home gardening programmes was identified by one expert.

> *In one of the programmes we did, we got the input suppliers to very closely work with the families, the poor households. So, we got network of people, network of association, network of input suppliers, and that provide a solid base for the programme. (Expert 2)*

One expert believed that urban home gardening is being over-promoted by the government and by doing so resources have been used inefficiently. In an economic

perspective, the expert also pointed out that benefits of specialization are lost due to blanket promotion of home gardening.

> *When you encourage everybody to have diversified home garden, we really would not reap the benefits of specialization and exchange. (Expert 1)*

Rather, the experts proposed promoting home gardening for communities who have the required resources, such as idle time, and who could substantially benefit from it.

> *I think it's good for poverty-stricken areas, it is good for retired people, it is good for war affected area, is good for shanties, it is good for estate dwellers who are living in line rooms, but not to anybody and everybody. There are areas and regions, and there are communities who would benefit from this. (Expert 1)*

However, this does mean the rest of the community should be discouraged on practicing home gardening. Rather, the expert stressed on the inappropriateness of allocating government funds for promoting urban home gardening for all, as not everyone get the same economic return from such investment.

> *We should not stop that [home gardening], or we should discourage that. We should let people to do what they want to do. But what I am strongly saying is that the government doesn't have to pour money or use scarce resources to promote all these diversified units in a large way. (Expert 1)*

In one hand, this point is further reinforced by the findings of the research, as the motives and the benefits of urban home gardening were related to individual attributes rather than broader societal or environmental causes. On the other hand, these results are limited to a minute fraction of the target population. Also, this study looks at urban home gardening from the households' perspective rather than a community perspective. Therefore, a broader study with a wider community participation could provide more insight to this topic.

5. Discussion

This section summarizes and interprets the results from the perspective of research questions and the conceptual framework. Available literature was used to scrutinize the findings against similar studies.

After deriving the results, the conceptual framework (Figure 3) of the research was revisited to develop a comprehensive diagram, which further elaborates the components and linkages of the conceptual framework (Figure 12). In that, the interactions among motives, enablers, barriers, and benefits of home gardening, food security, and institutional assistance were elaborated.

5.1. Key Findings

The first research question was on the popularity of home gardening during the first wave of COVID-19 pandemic in Sri Lanka. Personal and professional experience of urban home gardening practitioners and experts, information from grey literature, and a Google trend analysis suggests that there could have been a popularity of urban home gardening during the first wave of COVID-19 pandemic in Sri Lanka. However, considering the limitations of the study, further investigations with reliable statistics are required to generalize this observation to a wider local community. The analysis also identified published (Chenarides *et al*. 2020; Montefrio 2020; Nicola *et al*. 2020) and grey literature (Fleming 2020; Marsh 2020; Perrone 2020; Walljasper and Polansek 2020) from several countries, and a global scale Google trend analysis which suggest the thriving of home gardening during COVID-19 lockdowns.

The second research question looked at the motives of urban communities in Colombo, Sri Lanka for adopting home gardening during the pandemic and the third research question identified enablers, barriers, and perceived benefits of urban home gardening. The results reveal that practitioners' motives for adopting urban home gardening included both food and non-food parameters, yet those were more prominently linked to non-food parameters such as pastime and external influence, rather than food-related parameters - such as a food source or the need for better quality food.

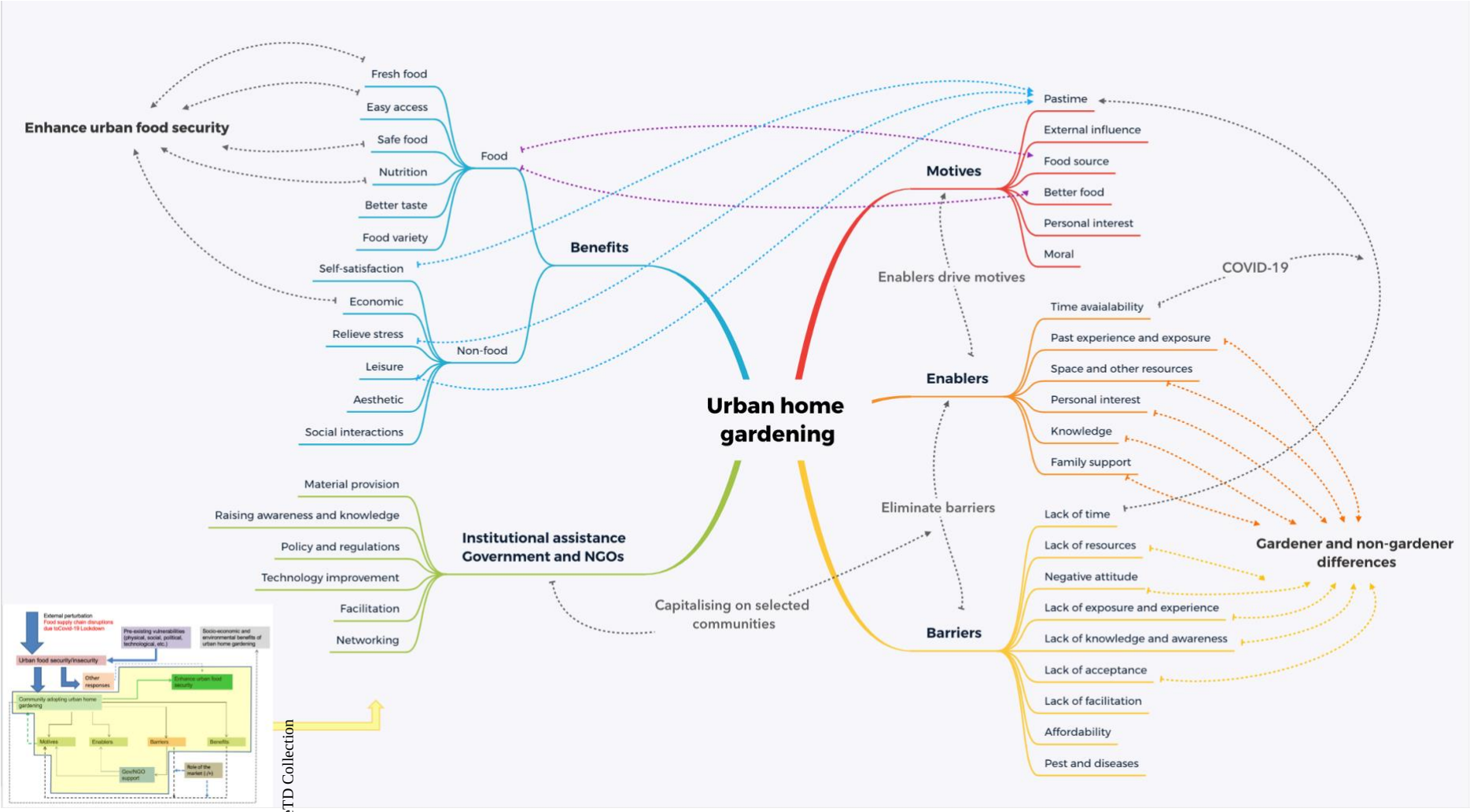


Figure 12: Conceptual framework revisited

Author's diagram

In contrast, the main motives for home gardening identified by several previous scholars are predominantly related to food (Conway 2016; Momenee 2017; Pourias and Duchemin 2016; Ruggeri *et al*. 2016). Nevertheless, leisure and pleasure were also found to be important motives for home gardening (Al-Mayahi *et al*. 2019; Conway 2016; Kirkpatrick and Davidson 2017; Momenee 2017). Furthermore, the motives are clearly related to individual attributes rather than broader societal or environmental causes. However, many other attributes - such as consumption patterns, social and environmental motivations, and household financial status, which are not included in the scope of this study, could influence the motives (Kirkpatrick and Davidson 2017).

All practitioners identified time availability during the lockdown as the main enabler for starting or upscaling their home gardening activities. Furthermore, most of the practitioners had identified lack of time as a barrier for home gardening. Therefore, it appears that the pandemic lockdown had removed the barrier of lack of time for these practitioners and enabled them to take part in urban home gardening. This link shows the robustness of the result as the practitioners have claimed availability of time as the top enabler and lack of time as a main barrier. Further strengthening the above observation, most of the practitioners recognized time as a barrier for continuing home gardening due to commitment to their occupation and other priorities, especially when the lockdown was lifted.

Past experience and exposure to gardening, personal interest, and relevant knowledge were identified as important personal traits which are enablers for urban home gardening. The availability of gardening space was the most important physical enabler. Previous scholars have also identified past experience, memories from the young age, and having a pro-environmental mindset about gardening as significant enablers for engaging urban home gardening (Gross and Lane 2007; Langemeyer *et al*. 2018; Momenee 2017).

As this research focuses on urban home gardening as a response to a crisis, the motives are expected to reflect the practitioners' concerns – such as ensuring a source of food, and specific conditions – such as availability of time and external influence, prevailed during the COVID-19 lockdown. As expected, the results show the link between the conditions prevailed during the COVID-19 lockdown and the practitioners'

motives, and how the enablers facilitated the realization of home gardening as a practice.

Lack of time, resources, knowledge, awareness, experience, and exposure; pests and diseases; negative attitude towards gardening; insufficient facilitation; and lack of acceptance were the barriers for home gardening identified in this research. The lack of personal traits - such as knowledge, experience, exposure, and interest on home gardening, were believed to be potential barriers for the non-practitioners. Interestingly, possession of these traits were enablers for practitioners. Similarly, availability of space, and support from others were strengths for the practitioners, which non-practitioners would have lacked. Conceptually, this shows how personal traits and physical resources could behave as enablers or barriers for gardeners and non-gardeners (Figure 12). However, there is a limitation for this observation as non-practitioners were not interviewed in this research. Therefore, further studies with non-practitioners are required to identify barriers directly felt by them.

Some of the barriers identified in this research resonate with the finding of previous scholars. Need of excessive time and cost (Clayton 2007; Conway 2016; Momenee 2017), lack of resources including land, water, and labor (Al-Mayahi *et al*., 2019; Conway 2016), pests (Conway 2016; Momenee), and lack of knowledge (Conway 2016; Momenee 2017) are some such common barriers. Lack of previous exposure and experience, attitudinal barriers, and lack of facilitation were the barriers identified in this study, which have not been extensively discussed in previous research. Furthermore, physical barriers such as climate, soil, and shade were some barriers identified by previous scholars (Conway 2016; Momenee 2017) which were not specifically identified in this study.

The practitioners have realized both food and non-food benefits from home gardening. The main food benefits were easy access to fresh food, safe food, and nutrition. Increased food variety and better taste were the other food benefits realized. The main non-food benefits were self-satisfaction, reviving stress, reduce food expenditure, and having gardening as a leisure activity. Aesthetic and recreational values of a home garden, and opportunity for social interaction were also identified as non-food benefits. Results show that both food and non-food benefits are linked to the motives. For example, food benefits are collectively linked to the motives for gardening as a food

source, and access to better food. Furthermore, the non-food benefits such as leisure, reviving stress, and self-satisfaction are directly linked to the motive of pastime. However, economic benefits have not been reflected on the practitioners' motives.

Even though the practitioners had prioritized non-food motives over food motives for home gardening, they appeared to have received a wide range of food benefits from their gardens, along with the non-food benefits. This result contrasts with a previous study (Momenee 2017), in which the main motive for gardening was food, yet the realized food benefits were not so prominent.

Access to food, and better quality of food were food benefits of urban home gardening identified in previous research (Momenee 2017; Wikström 2017). Previous scholars have also identified similar non-food benefits of urban home gardening, such as leisure, social interactions, destressing, and wellbeing (Dissanayake and Dilini 2020; Momenee 2017; Wikström 2017). Perceived economic benefit is an interesting finding of this analysis which was not highlighted by the above scholars.

The fourth research question focused on identifying whether urban home gardening during the COVID-19 pandemic had enhanced food security of the target community. Adopting from a framework put forward by Korth *et al*. (2014), food security was assessed in terms of increased access to food and savings on food expenditure. It was identified that five realized benefits: fresh food, easy access to food, safe food, contribution to nutrition, and economic savings, contribute to enhance household food security. Most of the practitioners fulfil a part of their daily food requirement from the home garden and claimed that they could obtain safe and nutritious food freshly and easily. Furthermore, most of the respondents claimed to have a saving on food expenditure because of home gardening. Nevertheless, many of them were unable to estimate a monthly saving in financial terms. The contribution of home gardening to the household nutrition was justified only based on respondents' perceptions.

Several previous researchers have also highlighted the contribution of home gardening to food security in terms of increased access to food and/or enhanced household economy (Galhena *et al*. 2013; Marsh 1998; Taylor and Lovell 2015). This research has two main limitations related to investigating food security. First, the results are based on the perceptions of practitioners rather than on a quantitative assessment.

Second, the research does not compare the food security of practitioners before and after establishing their home gardens.

The fifth and final research question was on identifying the state and other organizational support that could make urban home gardening more feasible. Raising awareness and knowledge; providing facilitation through relevant institutes for creating awareness and knowledge transfer; and provisioning of gardening material – such as seeds, fertilizers, tools, were identified as institutional assistance required for popularizing and sustaining urban home gardening. Furthermore, institutional engagement in establishing effective policies and strong regulations for land-use management; and developing circular solutions for biodegradable waste management and domestic food production, are also highlighted. Moreover, networking among stakeholders such as gardeners, suppliers, facilitators, and market players is crucial for sustaining urban home gardening without external assistance. Further supporting the idea on networking, Avila and Veenhuizen (2002) had also identified market proximity as an important incentive for intensifying urban agriculture systems and transferring those to more profitable ones.

A very few previous studies focus on institutional support specifically required for facilitating urban home gardening. However, previous researchers have identified the importance of knowledge transfer, skill development, and enhancing gardening space for facilitating urban gardening in general (CoDyre *et al*. 2015; Lin *et al*. 2015). Furthermore, previous scholars have also highlighted the importance of recognizing existing barriers in order to develop a robust urban gardening programmes (CoDyre *et al*. 2015; Sanyé-Mengual *et al*. 2015).

According to experts' point of view, urban home gardening could bring substantial benefits - including household food security and income generation, to marginalized or low-income communities who have enablers - such as space and idle labor. Thus, when it comes to promoting and facilitating urban home gardening, these communities should be given the priority. This is particularly important in an economic perspective when state or public resources are invested in facilitating home gardening. However, the general urban community should not be discouraged on or left out from home gardening activities. Those could be still facilitated via agriculture extension services by awareness creation and knowledge transfer.

6. Conclusion

This thesis provides qualitative insights on how COVID-19, as an external perturbation, impacted the practice of home gardening by urban community in Colombo, Sri Lanka, by collating the experience and views of seven home gardening practitioners and three experts.

The outcomes indicate a possible popularity of urban home gardening during the first wave of COVID-19 pandemic in Sri Lanka, which strengthened the basis of the research. The motives for urban home gardening during the pandemic had predominantly led by attributes that reflect the specific conditions and practitioners' concerns that prevailed during the COVID-19 lockdown. The results also reveal that time availability during the lockdown acted as an enabler to facilitate practitioners' motives to realize home gardening as a practice. Furthermore, a conceptual link on how personal traits and physical resources could behave either as enablers or barriers for gardeners and non-gardeners was established.

Home gardening delivers both food and non-food benefits. It also contributes to household food security by increasing access to food and reducing food expenditure. However, both motives and benefits of urban home gardening were related to individual attributes rather than broader societal or environmental causes.

State and non-state organizations can support urban home gardening by enhancing awareness and knowledge through proper facilitation, provisioning of gardening material, networking, and strengthening relevant policies and regulations. However, different communities have different potentials of reaping benefits from urban home gardening. Therefore, it is important to have an economic perspective, particularly when the organizations allocate scarce resources for facilitating urban home gardening.

The small sample size and the limited geographic representation of the research are the main limitations for generalizing the results to a large population. Furthermore, the research does not include demographic and socioeconomic characteristics of the respondents in the analysis. Future studies can build on this research, addressing these limitations. Contribution of small-scale urban home gardens to household nutrition security, and economic assessment of the contribution of home gardens to

low- and middle-income communities are some topics need to be further researched. Furthermore, it would be interesting to study how the target community had reacted, in terms of urban home gardening, to the more severe second and third waves of COVID-19 pandemic in Sri Lanka.

This thesis contributes to the enhancement of scientific knowledge at both local and global context. Understanding practitioners' and experts' perspectives and experiences on motives, enablers, barriers, and benefits of urban home gardening can contribute to designing further studies and local programmes for promoting community stewardship in urban greening. Furthermore, the knowledge on impacts of COVID-19 on urban home gardening practices have a potential use in resilience studies.

Bibliography

Acton, L. 2011. Allotment gardens: A reflection of history, heritage, community and self. *Papers from the Institute of Archaeology* 21: 46-58.

Aday, S. and Aday, M. S. 2020. Impact of COVID-19 on the food supply chain. *Food Quality and Safety* 4(4): 167-180.

Alaimo, K., Packnett, E., Miles, R.A., and Kruger, D.J. 2008. Fruit and vegetable intake among urban community gardeners. *Nutrition Education and Behavior* 40(2): 94-101.

Algert, S. J., Baameur, A., and Renvall, M. J. 2014. Vegetable output and cost savings of community gardens in San Jose, California. A*cademy of Nutrition and Dietetics* 114(7): 1072–76.

Al-Mayahi, A., Al-Ismaily, S., Gibreel, T., Kacimov, A., and Al-Maktoumi, A. 2019. Home gardening in Muscat, Oman: Gardeners' practices, perceptions and motivations. *Urban Forestry and Urban Greening* 38: 286-294

Artmann, M. and Sartison, K. 2018. The role of urban agriculture as a nature-based solution: A review for developing a systemic assessment framework. *Sustainability* 10(6):1937.

Avila, C.J. and Veenhuizen, R.V. 2002. The economics of urban agriculture. Urban Agriculture Magazine, No. 7, August 2002. Accessed 24 May 2020. URL: https://ruaf.org/assets/2019/12/Urban-Agriculture-Magazine-no.-7-Economic-Aspects-of-Urban-Agriculture.pdf

Bandara, T. 2015. Modern trends and distribution patterns of kitchen gardens in Sri Lanka: A case study in Biyagama area. *Social Sciences and Humanities Review* 2(2): 27-58.

Biaggi, C. and Wa-Mbaleka, S. 2018. Grounded theory: A practical overview of the Glaserian School. *JPAIR Multidisciplinary Research* 32: 1-29.

Briggs, C. 1986. *Learning how to ask: A sociolinguistic appraisal of the role of the interviewer in social science research*. Cambridge: Cambridge University Press.

Buchmann, C. 2009. Cuban home gardens and their role in social-ecological resilience. *Human Ecology* 37: 705–721.

Calvet-Mir, L. and March, H. 2019. Crisis and post-crisis urban gardening initiatives from a Southern European perspective: The case of Barcelona. *European Urban and Regional Studies* 26(1): 97-112.

Cameron, R. W. F., Blanuša, T., Taylor, J. E., Salisbury, A., Halstead, A. J., Henricot, B., and Thompson, K. 2012. The domestic garden – Its contribution to Urban Green Infrastructure. *Urban Forestry & Urban Greening* 11(2): 129-137.

Centre for Policy Alternatives (CPA). 2020. Curfew in Response to COVID-19: Legal Framework and Relevant Questions in Sri Lanka. CPA blog post April 21, 2020. Accessed 22 November, 2020. URL: https://www.cpalanka.org/curfew-in-response-to-covid-19-legal-framework-and-relevant-questions-in-sri-lanka/

Charmaz, K. 1990. 'Discovering' chronic illness: Using grounded theory. *Social Science and Medicine* 30: 1161-1172.

_____. 2006. *Constructing grounded theory*. London: Sage.

Chenarides, L., Grebitus, C., Lusk, J.L., and Printezis, I. 2020. Who practices urban agriculture? An empirical analysis of participation before and during the COVID-19 pandemic. *Agribusiness*. Accessed 8 March 2021. URL: https://doi.org/10.1002/agr.21675

Clapp, J. and Moseley, W. 2020. This food crisis is different COVID 19 and the fragility of the neoliberal food security order. *Peasant Studies*, October 11, 2020. Accessed November 21, 2020. URL: https://doi.org/10.1080/03066150.2020.1823838

Clayton, S. 2007. Domesticated nature: Motivations for gardening and perceptions of environmental impact. *Environmental Psychology*, 27(3): 215–224.

CoDyre, M., Fraser, E.D.G., and Landman, K. 2015. How does your garden grow? An empirical evaluation of the costs and potential of urban gardening. *Urban Forestry and Urban Greening* 14: 72–79.

Conway, T.M. 2016. Home-based edible gardening: Urban residents' motivations and barriers. *Cities and the Environment* 9(1)3. Accessed 10 March 2021. URL: https://digitalcommons.lmu.edu/cate/vol9/iss1/3/

Corlett, J.L., Dean, E.A., and Grivetti, L.E. 2003. Hmong Gardens: Botanical diversity in an urban setting. *Economic Botany* 57(3): 365-379.

Cropley, A.J. 2015. *Introduction to qualitative research methods*. Latvia: Zinātne. Accessed 14 January 2021. URL: https://www.researchgate.net/publication/285471178_Introduction_to_Qualitative_Research_Methods

Department of Agriculture (DoA). 2019. AgStat. Agriculture Statistics Vol XVI. Peradeniya: Socio-economic and Planning Centre, DoA. Accessed 19 February 2021. URL: https://www.doa.gov.lk/SEPC/images/PDF/AgStat.pdf

Department of Census and Statistics of Sri Lanka (DCSSL). 2012. Census of population and housing 2012. Accessed 23 November, 2020. URL: http://www.statistics.gov.lk/PopHouSat/CPH2011/index.php?fileName=FinalPopulation&gp=Activities&tpl=3

Dissanayake, L. and Dilini, S. 2020. COVID-19 outbreak and urban green space, food security, and quality of life: Case of urban home gardens in Kandy, Sri Lanka. Open Journal of Social Sciences 8 (9): 185-97.

Drescher A.W., Holmer R.J. and Iaquinta D.L. 2006. Urban Homegardens and Allotment Gardens for Sustainable Livelihoods: Management Strategies and Institutional Environments. In: *Tropical homegardens: Advances in agroforestry*, ed B.M. Kumar and P.K.R. Nair, 317-338. Dordrecht: Springer.

Dworkin, S.L. 2012. Sample size policy for qualitative studies using in-depth interviews. *Archives of Sexual Behavior* 41(6): 1319-1320.

Elliott, N. and Higgins, A. 2012. Surviving grounded theory research method in an academic world: Proposal writing and theoretical frameworks. *The Grounded Theory Review* 11(2): 1-12.

Fleming, K. 2020. The great COVID-19 gardening boom. The Adelaide Review 484. Accessed 8 March 2021. URL: https://www.adelaidereview.com.au/food-drink/2020/06/11/great-covid-19-gardening-boom/

Food and Agriculture Organization (FAO). 2020. Impacts of COVID-19 on food security and nutrition: developing effective policy responses to address the hunger and malnutrition pandemic. Committee on World Food Security: High level panel of experts on food security and nutrition. Rome: FAO. Accessed November 21, 2020. URL: http://www.fao.org/3/cb1000en/cb1000en.pdf

_____. 2018. Assessing and planning city region food system Colombo (Sri Lanka). Rome, Italy: FAO. Accessed 23 November, 2020. URL: http://www.fao.org/documents/card/en/c/I8648EN/

_____. 2017. The future of food and agriculture – Trends and challenges. Rome: FAO. Accessed 17 February 2021. URL: http://www.fao.org/3/a-i6583e.pdf

_____. 2006. Food security. FAO Policy Brief. Accessed 30 November, 2020. URL: http://www.fao.org/fileadmin/templates/faoitaly/documents/pdf/pdf_Food_Security_Cocept_Note.pdf

_____. 1996. The state of food and agriculture. Rome, Italy: FAO. Accessed November 24, 2020. URL: http://www.fao.org/3/w1358e/w1358e00.htm#TopOfPage

Fox-Kamper, R., Wesener, A., Münderlein, D., Sondermann, M., Mcwilliam, W., and Kirk, N. 2017. Urban community gardens: An evaluation of governance approaches and related enablers and barriers at different development stages. *Landscape and Urban Planning* 170: 59-68.

Galhena, D.H., Freed, R., and Maredia, K. M. 2013. Home gardens: A promising approach to enhance household food security and wellbeing. *Agriculture & Food Security* 2(8): 1-13.

Gross H and Lane N. 2007. Landscapes of the lifespan: Exploring accounts of own gardens and gardening. *Environmental Psychology* 27: 225-241.

Headey, D.D., Goudet S., Lambrecht, I., O, T. Z., Maffioli, E. M., Field, E., and Toth, R. 2020. Poverty and food insecurity during COVID-19: Evidence from the COVID-19 rural and urban food security survey (RUFSS) - June and July 2020 Round. Washington, DC: International Food Policy Research Institute. Accessed November 21, 2020. URL: https://doi.org/10.2499/p15738coll2.134013.

Hussain, M. R. M., Yusoff, N., Tukiman, I., and Samah, M. A. A. 2019. Community perception and participation of urban farming activities. *International Journal of Recent Technology and Engineering* 8(1): 341-345.

International Development Research Centre (IDRC). 2005. Agropolis: The social, political and environmental dimensions of urban agriculture. Ed. Luc J. A. Mougeot. Ottawa: Earthscan, IDRC. Accessed 1December, 2020. URL: https://www.idrc.ca/en/book/agropolis-social-political-and-environmental-dimensions-urban-agriculture.

International Labor Organization (ILO). 2020. COVID-19 and the World of Work: Sectoral impact, responses and recommendations. Accessed November 21, 2020. URL: https://www.ilo.org/global/topics/coronavirus/sectoral/lang--en/index.htm.

Jehlička, P., Daněk, P., and Vávra, J. 2019. Rethinking resilience: Home gardening, food sharing and everyday resistance. *Canadian Journal of Development Studies* 40(4): 511–527.

Kirkpatrick, J.B. and Davison, A. 2017 Home-grown: Gardens, practices and motivations in urban domestic vegetable production. *Landscape and Urban Planning* 170: 24-33.

Kopiyawattage, K., Warner, L., and Roberts, G. 2019. Barriers to urban food production: Perspectives of urban food producers. *Journal of International Agricultural and Extension Education* 26(3): 147-161.

Korth, M., Stewart, R., Langer, L., Madinga, N., Da Silva, N., Zaranyika, H., Van Rooyen, C., and De Wet, T. 2014. What are the Impacts of urban agriculture programs on food security in low and middle-income countries: A systematic review. *Environmental Evidence* 3(21): 21-32.

Kumar, B.M. and Nair, P.K.R. 2006. Introduction. In: *Tropical homegardens: A Time-tested Example of Sustainable Agroforestry*. eds. B.M. Kumar and P.K.R. Nair, 1-10. Dordrecht: Springer Science

Labored, D., Martin, W., Swinnen, J., and Vos, R. 2020. COVID-19 risks to global food security. *Science* 369: 500-502.

Lal, R. 2020. Home gardening and urban agriculture for advancing food and nutritional security in response to the COVID-19 pandemic. *Food Security* 12(4): 871-876.

Langemeyer, J., Camps-Calvet, M., Calvet-Mir, L., Barthel, S., and Gómez-Baggethun, E. 2018. Stewardship of urban ecosystem services: understanding the value(s) of urban gardens in Barcelona. *Landscape and Urban Planning* 170: 79-89.

Legesse, A., Tesfay, G., and Abay, T. 2016. The impact of urban home gardening on household socio-economy. *Arts and Design Studies* 39: 21-30.

Lin, B., Philpott, S., and Jha, S. 2015. The future of urban agriculture and biodiversity-ecosystem services: Challenges and next steps. *Basic and Applied Ecology* 16: 189-201.

Longhurst, R. 2009. In-depth, semi structured interviews. In *International Encyclopaedia of Human Geography*. eds R. Kitchin and N. Thrift. London: Elsevier

MacNair, E. 2002. The garden city Handbook: How to create and protect community gardens in Greater Victoria. Victoria BC, Canada: Polis Project on Ecological Governance. University of Victoria. Accessed 25 November, 2020. URL: https://www.polisproject.org/PDFs/the%20garden%20city%20handbook.pdf

Marsh, R. 1998. Building on traditional gardening to improve household food security. *Food Nutrition and Agriculture* 22: 4-14.

Marsh, S. 2020. Flower power: Covid restrictions fuel boom in plant and bulb sales. The Guardian International Edition. Accessed 8 March 2021. URL: https://www.theguardian.com/world/2020/oct/31/flower-power-covid-restrictions-fuel-boom-in-plant-and-bulb-sales

Mattsson, E., Ostwald, M. and Nissanka, S.P. 2017. What is good about Sri Lankan homegardens with regards to food security? A synthesis of the current scientific knowledge of a multifunctional land-use system. *Agroforestry Systems*. Accessed 5 March 2021. URL: http://dx.doi.org/10.1007/s10457-017-0093-6

Mattsson, E., Ostwald, M., Nissanka, S.P., and Marambe, B. 2013. Homegardens as a multi-functional land use strategy in Sri Lanka with focus on carbon sequestration. *AMBIO* 42(7):892–902.

McVey, D., Nash, R., and Stansbie, P. 2018. The motivations and experiences of community garden participants in Edinburgh, Scotland. Regional Studies, *Regional Science* 5(1): 40-56.

Mejia, A., Bhattacharya, M., Nigon-Crowley, A., Kirkpatrick, K., and Katoch, C. 2020. Community gardening during times of crisis. *Agriculture, Food Systems, and Community Development* 10(1): 1-7.

Momenee, M.J. 2017. Exploring the potential of home gardening to increase food access and enhance community development in low-income urban neighborhoods. Batchelor's thesis, Ohio State University, USA. Accessed 11 January 2021. URL: https://core.ac.uk/download/pdf/159596263.pdf

Montefrio, M.J.F. 2020. Interrogating the "productive" home gardener in a time of pandemic lockdown in the Philippines. *Food and Foodways* 28(3): 216-225

Mougeot, L. J. A. 2000. Urban agriculture: Definitions, presence, potentials and risks. Cities Feeding People Series Report 31. International Development Research Centre (IDRC). Accessed 24 November, 2020.URL: https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/26429/117785.pdf?sequence=1

News.lk. 2020. Special programme for food security in the face of the current crisis – Min. Ramesh Pathirana.News.lk The Government Official News Portal. Accessed November 22, 2020. URL: https://www.news.lk/news/political-current-affairs/item/29935-special-programme-for-food-security-in-the-face-of-the-current-crisis-min-ramesh-pathirana.

Ngongi, N., Pridmore, P., Drechsel, P., and Veenhuizen, R.V. 2018. Does Africa need controlled environment agriculture? In: *Agriculture for Development: Special Issue on Controlled Environment Agriculture*, ed. R. von Kaufmann. Tropical Agriculture Association

Nicola, S., Ferrante, A., Cocetta, G., Bulgari, R., Nicoletto, C., Sambo, P., and Ertani, A. 2020. Food supply and urban gardening in the time of Covid-19. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. *Horticulture* 77 (2): 141-44.

OECD. 2020. Food supply chains and COVID-19: Impacts and policy lessons. OECD Policy Responses to Coronavirus (COVID-19). Accessed November 26, 2020. URL: http://www.oecd.org/coronavirus/policy-responses/food-supply-chains-and-covid-19-impacts-and-policy-lessons-71b57aea/.

Outlook India. 2020. Sri Lanka to re-impose nationwide day-long curfew on Sunday to check Coronavirus outbreak. Accessed November 22, 2020. URL: https://www.outlookindia.com/newsscroll/sri-lanka-to-reimpose-nationwide-daylong-curfew-on-sunday-to-check-coronavirus-outbreak/1834568.

Perrone, J. 2020. How coronavirus changed gardening forever. Financial Times, 11 September 2020. Accessed 28 February 2021. URL: https://www.ft.com/content/c3abc0bb-7ade-4ae1-8d2b-d3fa6be53416#comments-anchor

Porter, C. M. 2018. What gardens grow: Outcomes from home and community gardens supported by community-based food justice organizations. *Agriculture, Food Systems, and Community Development* 8(1): 187-205.

Pourias, J., Aubry, C. and Duchemin, E. 2016. Is food a motivation for urban gardeners? Multifunctionality and the relative importance of the food function in urban collective gardens of Paris and Montreal. *Agriculture and Human Values* 33(2): 257-273.

Pushpakumara, D.K.N.G, Marambe, B., Weerahewa, J. Silva, L.L.P., and Punyawardena, B.R.V. 2012. A review research on homegardens in Sri Lanka: The status, importance and future perspectives. *Tropical Agriculturist* 160: 55-125.

Reardon, T., Bellemare, M. F., and Zilberman, D. 2020. How COVID-19 may disrupt food supply chains in developing countries, IFPRI Blog, 2 April 2020. Accessed 22 November, 2020. URL: https://www.ifpri.org/blog/how-covid-19-may-disrupt-food-supply-chains-developing-countries.

Rodríguez, M., Fernández-González, C., Aguilar-Gallegos, N., and Santiago, M. 2020. The Primacy of Politics in Public Food Security Policies: The Case of Home Gardens. Sustainability, 12, 4316. Accessed 7 January 2021. URL: https://doi.org/10.3390/su12104316

Ruggeri, G., Mazzocchi, C., and Corsi, S. 2016. Urban gardeners' motivations in a metropolitan city: The case of Milan. *Sustainability* 8(11):1-19.

Saldaña, J. 2013. *The coding manual for qualitative researchers*. 2nd ed. London: SAGE.

Sanyé-Mengual, E., Anguelovski, I., Oliver-Solà, J., Montero, J., and Rieradevall, J. 2015. Resolving differing stakeholder perceptions of urban rooftop farming in Mediterranean cities: Promoting food production as a driver for innovative forms of urban agriculture. *Agriculture and Human Values* 33: 101-120.

Scheromm, P. 2015. Motivations and practices of gardeners in urban collective gardens: The case of Montpellier. *Urban Forestry & Urban Greening* 14: 735-742.

Sim, J., Saunders, B., Waterfield, J., and Kingstone, T. 2018. Can sample size in qualitative research be determined a priori? *International Journal of Social Research Methodology* 21(5): 1-16.

Smart, J., Nel, E., and Binns, T. 2015. Economic crisis and food security in Africa: Exploring the significance of urban agriculture in Zambia's Copperbelt Province. *Geoforum* 65: 37-45.

Soemarwoto, O., and Conway, G.R. 1992. The Javanese homegarden. *Journal for Farming Systems Research-Extension* 2(3): 95-118.

Sri Lanka UNREDD Programme (SL UNREDD). 2017. Sri Lanka's forest reference level submission to the UNFCCC. UNREDD Programme. Accessed 10 May 2021. URL: https://redd.unfccc.int/files/sl_frl_modified_submission_november_2017.pdf

Srinivasan, M. 2020. Coronavirus - Sri Lanka shuts down capital following surge in cases. The Hindu. November 1, 2020, sec. International. Accessed 22 November, 2020. URL: https://www.thehindu.com/news/international/coronavirus-sri-lanka-shuts-down-capital-following-surge-in-cases/article32997106.ece.

Stockholm Resilience Centre. 2015. What is resilience. Accessed 27 May 2021. URL: https://www.stockholmresilience.org/research/research-news/2015-02-19-what-is-resilience.html

Taylor, J. R., and Lovell, S. T. 2015. Urban home gardens in the Global North: A mixed methods study of ethnic and migrant home gardens in Chicago, IL. *Renewable Agriculture and Food Systems* 30(1): 22-32.

Thaman, R.R. 1995. Urban food gardening in the Pacific Islands: A basis for food security in rapidly urbanising small-island states. *Habitat International* 19(2): 209-224.

Thirumarpan, K., Weerahewa, J., and Gunaratne, P. 2012. Role of homegardens in achieving food security in Batticaloa district, Sri Lanka. Conference paper presented at International Conference on Economics and Finance Research IPEDR, India. Accessed 30 March 2021. URL: https://www.researchgate.net/publication/301690291_Role_of_Homegardens_In_Achieving_Food_Security_In_Batticaloa_District_Sri_Lanka

Trendov, N. M. 2018. Comparative study on the motivations that drive urban community gardens in Central Eastern Europe. *Annals of Agrarian Science* 16(1): 85-89.

United Nations (UN). 2019a. Department of Economic and Social Affairs: News. Accessed 17 July 2020. URL: https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html

_____. 2019b. World Urbanization Prospects 2018: Highlights (ST/ESA/SER.A/421). New York: United Nations, Department of Economic and Social Affairs, Population Division. Accessed 17 February 2021. URL: https://population.un.org/wup/Publications/Files/WUP2018-Highlights.pdf

Urban Settlement Development Authority of Sri Lanka (USDA). 2020. "*Savbagya*" Home Gardening Programme. Accessed 30 March 2021. URL: http://usda.gov.lk/savbagya-home-gardening-programme/

Vasileiou, K., Barnett, J., Thorpe, S., and Young, T. 2018. Characterising and justifying sample size sufficiency in interview-based studies: Systematic analysis of qualitative health research over a 15-year period. *BMC Medical Research Methodology* 18 (1): 148.

Walljasper, C. and Polansek, T. 2020. Home gardening blooms around the world during coronavirus lockdowns. Reuter Environment, 20 April 2020. Accessed 28 February 2021. URL: https://www.reuters.com/article/us-health-coronavirus-gardens-idUSKBN2220D3

Weerahewa, J., Hemachandra, D., and Roy D. 2020, How agri-food chains in Sri Lanka fared during the stringent COVID-19 control measures?. IFPRI South Asia Office, May 13, 2020. Accessed 22 November, 2020. URL: http://southasia.ifpri.info/2020/05/13/how-agri-food-chains-in-sri-lanka-fared-during-the-stringent-covid-19-control-measures/.

Weerahewa, J., Pushpakumara, G., Silva, P., Daulagala, C., Punyawardena R., Premalal, S., Miah, G., and Roy, J. 2012. Are homegarden ecosystems resilient to climate change? An analysis of the adaptation strategies of homegardeners in Sri Lanka. *APN Science Bulletin* 2: 22-27

Wikström, J. 2017. Motivations behind gardening in a rapidly urbanizing landscape - a case study of urban gardening in Bangalore, India. Master's thesis, Stockholm Resilience Centre, Stockholm University, Sweden.

World Health Organization (WHO). 2002. Diet, Nutrition and the Prevention of Chronic Diseases. WHO Technical Report Series 916. Geneva: WHO. Accessed 27 July 2020. URL: http://www.fao.org/3/ac911e/ac911e00.htm#Contents

Xinhua News. 2020. Sri Lanka extends curfew in Capital, surrounding areas as COVID-19 cases surge. Xinhua English News. Accessed November 22, 2020. URL: http://www.xinhuanet.com/english/2020-11/01/c_139483537.htm.

Zaken, M. 2020. Impact of COVID19 on food supply chains in Sri Lanka - News Item. Netherlands and you. Ministry of Foreign Affairs, Kingdom of Netherlands, June 2, 2020. Accessed 22 November, 2020. URL: https://www.netherlandsandyou.nl/latest-news/news/2020/06/02/impact-of-covid19-on-food-supply-chains-in-sri-lanka.

Appendix 1: Interview Guide for the Practitioner Interviews

1. Could you give a brief introduction to yourself, please?
2. Could you tell me about your experience with COVID-19, in terms of regular life and access to food?
3. Do you think home gardening became more popular during COVID-19?
4. What do you think about home gardening?
5. When did you start practicing home gardening?
6. What do you grow and how do you grow?
7. What were the reasons for starting/scaling up home gardening during the pandemic?
8. Did someone or your past experience inspire/motivate you to start home gardening?
9. What were the things helped (enabled) you in starting home gardening?
10. Who takes part in home gardening with you?
11. What did you gain by practicing home gardening?
12. What share of your weekly requirement of vegetables and leafy greens are fulfilled by your home garden?
13. What impacts do home garden have on your household food consumption?
14. What economic benefits do you have with home gardening?
15. What barriers did you have for starting and continuing home gardening?
16. In your opinion, what other obstacles could be there for starting urban home gardening?
17. Do you make your own planting material and/or compost?
18. Do you share your produce, seeds, or knowledge with others?
19. What were the responses you got on your home gardening?
20. Did you convince or inspire others to start home gardening?
21. What environmental concerns comes to your mind when you think of home gardening in general?
22. What facilities do you think the communities could receive from government and/or other organizations for promoting and sustaining?
23. Do you have a message for the others regarding urban home gardening?

Appendix 2: Consent for Participating in a Research Interview (Practitioners)

Title of the research: Sustaining Urban Home Gardening for Enhancing Food Security: A study in Sri Lanka During COVID-19 Pandemic

Researcher: Kumudu Vinodya Herath

Thank you for your willingness in take part in this interview, which is intended to gather information on the perceptions, motivations, practices, barriers, and enablers for home gardening conducted by the urban communities during the COVID-19 pandemic. The data collected from this interview are only used for the researcher's thesis research of the Master's Degree in Environmental Sciences, Policy and Management at Central European University. The aggregated results of this interview are ultimately reported as outcomes and finding of the researcher's thesis. This interview will be conducted as per the ethical research guidelines of the Central European University, which can be made available upon request.

By signing this form and taking part in the interview you are providing the informed consent to participate in this research. Therefore, you are kindly requested to carefully read and understand the following statements and provide your consent to take part in this research.

In case you require any clarification regarding the research or about the consent form, even after the interview, please feel free to contact me via email to Kumudu.herath@mespom.eu.

Your participation is very much appreciated.

Consent of the participant:

Hereby, I declare that;

1. I understand that my participation in this interview is completely voluntary.
2. I am aware that I can choose not to answer any particular questions and/or can withdraw from the interview at any time.
3. The purpose of this interview and the nature of the research is sufficiently explained to me.

4. I give my consent to audio record the interview.
5. I give permission to take photographs of my garden and use those for the research purpose.
6. I understand that information and quotes from this interview may be anonymously used in the researcher's thesis.
7. I understand that my contribution to this research will remain confidential and anonymous.
8. I understand that I do not receive any financial or other incentive to take part in this interview.
9. I understand that I am entitled to a copy of this consent form.

Date: _____

Signature of the participant: _____

Signature of the researcher: _____

Appendix 3: Consent for Participating in a Research Interview (Experts)

Tentative title of the research: Sustaining Urban Home Gardening for Enhancing Food Security: A study in Sri Lanka During COVID-19 Pandemic

Researcher: Kumudu Vinodya Herath

Thank you for your willingness in take part in this key informant interview, which is intended to gather information on the viability of small-scale urban home gardening in Colombo, opportunities and barriers for urban home gardening, its' potential in enhancing food security, and the institutional assistance required for promoting and sustaining urban home gardening in Colombo, Sri Lanka.

The data collected from this interview will only be used for the researcher's thesis research of the Master's Degree in Environmental Sciences, Policy and Management at the Central European University. This interview will be conducted as per the ethical research guidelines of the Central European University, which can be made available upon request. The data generated from this interview will be analyzed together with other sources of data to develop collective outcomes and findings of the researcher's thesis.

By signing this form and taking part in the interview you are providing the informed consent to participate in this research. Therefore, you are kindly requested to carefully read and understand the following statements and provide your consent to take part in this research.

In case you require any clarification regarding the research or about the consent form, even after the interview, please feel free to contact me via email to Kumudu.herath@mespom.eu.

Your participation is very much appreciated.

_____

Consent of the key informant:

Name: _____

Designation: _____

Organization: _____

Hereby, I declare that;

1. I understand that my participation in this interview is completely voluntary.

2. I am aware that I can choose not to answer any particular questions and/or I can withdraw from the interview at any time.
3. The purpose of this interview and the nature of the research is sufficiently explained to me.
4. I give my consent to audio record the interview.
5. I give permission to indicate my title, name, designation, and organizational affiliation (**please strike off the items that you prefer not to share**) in profiling the key informant in the thesis publication.
6. I understand that information and quotes from this interview may be anonymously used in the researcher's thesis.
7. I understand that my contribution to this research will remain confidential and anonymous unless I have agreed to share in above section 5.
8. I understand that I do not receive any financial or other incentive to take part in this interview.
9. I understand that I am entitled to a copy of this consent form.

Date: _____

Signature of the key informant: _____

Signature of the researcher: _____