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# Home garden interventions in crisis and emergency settings

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Homes gardens are a key source of food security and micronutrient-rich fruits and vegetables and are promoted by aid organizations to help households cope in humanitarian emergencies. However, there is a strong divide between the popularity of home gardens among practitioners and the academic evidence of its nutritional, economic, social and political outcomes. This review provides a comprehensive summary of the evidence about home garden interventions in crisis settings using a three-pronged approach, triangulating evidence from academic literature, expert discussion (*World Café*) and a practitioner survey. Our findings show a significant gap between existing research evidence on one hand, and the needs and current practices on the other, particularly where theories and impact pathways of home garden interventions might not hold in crises-affected settings.

## KEYWORDS

home garden intervention, crisis setting, humanitarian emergencies, impact evaluation, food security, World Café

## 1. Introduction

Home gardening has been an essential component of food and nutrition security for millennia (Galhena et al., 2013) and is key to realizing the economic and nutritional potential of vegetables (Schreinemachers et al., 2018). Also known as kitchen, backyard, farmyard, compound or homestead gardens, home gardens consist of regionally-appropriate crops grown on small plots of land or in containers adjacent to a living space. Other forms of small-scale, hyper localized vegetable and fruit production include school, community and urban gardens.

*Home garden interventions* (HGIs) require low inputs in terms of time, space and labor and hence lower budgets compared to many other development interventions; they also have a vast geographical range given the large scope of climatic conditions that support the cultivation of local flora (Galhena, 2021). Agricultural aid and humanitarian organizations implement HGIs with multiple objectives around the globe and often develop their own unique guidelines and systems for the provision of seeds, tools and training (e.g., Helen Keller, Mercy Corps, and Welthungerhilfe). HGIs also contribute to several Sustainable Development Goals, including zero hunger (SDG2), healthy lives (SDG3), the end of poverty (SDG1), gender equality (SDG5) and peace and justice (SDG16).

HGIs in settings not affected by conflict or other types of humanitarian crises have been shown to help strengthen nutritional security and buffer local food systems from global shocks (Galhena et al., 2013). Although HGIs are often implemented to help households cope in a variety of crises (e.g., climate, environmental, economic, political, violent conflict), little is known about the operational, social, economic and nutritional impacts of HGIs in *humanitarian emergency or conflict-affected settings* (HECS). HECS is a broad term we use to describe contexts

experiencing violent conflict, political and institutional fragility, displacement, and humanitarian and climatic emergencies, all of which are causally linked to severe food insecurity (Brück and d'Errico, 2019; Soffiantini, 2020). These settings require special attention given their unique conceptual, institutional and programmatic constraints (Maxwell et al., 2012). In such settings, food systems are often weakened or destroyed, access to nutritious food is severely limited (Martin-Shields and Stojetz, 2019), food production and livelihoods are undermined (Holleman et al., 2017), and households are at risk of experiencing protracted nutritional and economic crises (Laborde et al., 2021). Hence, violent conflict remains the main driver of food crises and nutritional insecurity and 80% of stunted children worldwide are countries affected by food crises (FSIN, Food Security Information Network, 2022). The United Nations Office for the Coordination of Humanitarian Affairs estimates that in 2023 339 million people worldwide will be directly or indirectly affected by humanitarian emergencies and will be in need of aid (OCHA, 2022).

Although HGIs are implemented worldwide in an array of different settings, a lack of data and rigorous empirical evidence from different contexts (including HECS) preclude a comprehensive understanding of best practices and impact pathways in crisis settings. HGIs are highly contextualized and nuanced, meaning strict statements about specific impact pathways or highly homogenized program structures would be unhelpful. It is nevertheless important to understand overarching theories of change and general best practices to ensure HGI success even in challenging conditions.

Given the lack of rigorous research about HGIs in HECS, it is *a priori* unclear if HGIs can be an effective tool to achieve food and nutrition security goals in crisis contexts. On the one hand, home gardens can function in isolation from markets; require low physical input; have short growing seasons; and require minimal land use and access. On the other hand, a certain amount of basic knowledge and experience is required to start and maintain a successful home garden; high-quality seeds may be unavailable in crises settings; agricultural extension advice may be difficult or impossible to attain; access to water and irrigation can be severely limited; even in crisis settings labor supply may be severely curtailed; and nutrition allocation decisions between and within households may be even more gendered in times of crises than in peacetime (Akter, 2021).

This paper reviews HGIs in HECS, thus identifying key issues and knowledge gaps as well as providing a roadmap for future research on the impact of HGI in HECS. We employ a three-pronged approach for this review. First, we survey the state of the art about the impacts of HGIs through a comprehensive academic literature review. Second, we observe current implementation practices through an online survey of HGI in HECS. Third, we use insights from World Café discussions conducted at the *Home Gardens for Resilience and Recovery* (HG4RR) Network<sup>1</sup> to broadly explore HGIs in HECS in terms of expected outcomes, best practices and knowledge gaps.

Across these three approaches, we find a disconnect between practitioner communities, which tend to develop programs in HECS, and academic communities, which tend to study programs in non-HECS. However, it is not known whether pathways in non-HECS are replicable in volatile and emergency settings. Instead, we posit that there may be alternative impacts and best practices in HECS that remain underexplored and mostly untested. Additionally, we identify key knowledge gaps about how HGIs in HECS might affect non-nutritional outcomes like women's empowerment, psycho-social wellbeing, peacebuilding, and social cohesion. Despite the effort of practice organizations to implement HGIs in HECS with learning components, there remain significant knowledge gaps for the research community to address.

This review paper is structured as follows: the next section outlines our research approach and methods. Section 3 explores the main findings. The discussion in section 4 conceptualizes impact pathways of HGIs in HECS and synthesizes main themes. In section 5, we conclude by highlighting opportunities to bridge the disconnect between research and practice and to close recognized knowledge gaps.

## 2. Materials and methods

We used a three-pronged approach, including a comprehensive literature review, a practitioner online survey, and World Café discussion with experts to generate a multi-angled snapshot of what is currently known about HGIs in HECS. First, we undertook a comprehensive literature review using Scopus of relevant qualitative and quantitative articles on impact evaluations of HGIs published between the years 2000 and 2023. We applied three combinations of key search terms including “home garden\*,” “kitchen garden\*,” “vegetable garden\*,” “homestead garden\*,” “home-stead garden\*” or “school garden\*”; “crisis,” “crises,” “emergenc\*,” “conflict\*,” “shock\*” or “disaster\*” and “impact evaluation\*” or “impact assessment\*” on 22 March 2023. We compare the results with the findings on scopus using the same search but excluding the key search terms on crisis and emergency. Complementary, we conducted the same research on Google Scholar, which also includes gray literature but does not allow a nested search.

We manually screened and sorted through these articles to determine relevance based on the following inclusion criteria: (i) Studies clearly specify impacts and outcomes at the household level; (ii) interventions focusing on homestead gardening; (iii) studies have a clear identification strategy, use rigorous quantitative methods, and adopt experimental or quasi-experimental designs; (iv) studies conducted in a HECS and (v) articles are written in English. Moreover, we compare the findings of this literature review vis-à-vis other academic work on HGIs in non-HECS settings. The intention of the literature review is to create a snapshot of academic consensus rather than to generate a systematic review of all research on home gardens interventions, as has already been done (Fiorella et al., 2016; Pandey et al., 2016; Ruel et al., 2018; Dizon et al., 2021; Dominguez-Hernandez et al., 2022). Hence, our comprehensive literature review compares this overall research body with the results that we extract based on crisis and emergency settings.

Second, to enrich our understanding of contemporary HGIs, we conducted an online survey of practitioners engaged in HGIs in HECS. The survey took place between 1 and 31 October 2019 and

<sup>1</sup> The HG4RR network is a group of home gardening practitioners, experts, policy-makers, and researchers from the Global North and South operating under the auspices of the Leibniz Institute of Vegetables and Ornamental Crops (IGZ) in Großbeeren, Germany, and ISDC—International Security and Development Center, based in Berlin, Germany.

included 103 existing and planned programs from 36 organizations. Questions focused on program duration, country of operation, program outcomes and the type of emergency setting. The survey was circulated by email to members of relevant global networks and organizations identified through desk review.<sup>2</sup> Since there is no global catalog of HGI programs, we relied on a snowballing technique for survey distribution: respondents were asked to share the survey with their networks and invite at least two other stakeholders to take part. This technique has a sampling bias and tends to underrepresent small organizations with limited outreach or governmental support. We do not claim that our sample is representative of all existing practices; however, given the geographic and programmatic breadth of the responses, we are confident that our findings provide important insights.

Third, we uncovered knowledge gaps about HGIs in HECS through the “World Café” method with 40 experts at the HG4RR Network Workshop in Bonn, Germany which took place in April 2019. World Café is a participatory research method that engages large groups of stakeholders in free-form conversation and knowledge exchange to produce meaningful dialog (Lorenzetti et al., 2016) as well as qualitative data (Löhr et al., 2020). Participants were assigned to one of six breakout groups with balanced representation of gender, academic background and sector, and sat at round tables resembling a café. The groups discussed a series of questions in 20-min rounds, sharing insights from their discussions with other groups and taking notes in each group. The following six questions were discussed in as many rounds: (i) How can home gardens help households in crisis? (ii) What current or historical examples of home gardens or home garden interventions have worked well? (iii) Which external factors can help or hinder program impacts? (iv) Which program components are critical for achieving impacts? (v) What remain the key knowledge gaps? (vi) What are emerging research opportunities? These questions were designed to stimulate conversation about complex issues, advance basic understanding of home gardening in HECS, and help researchers and practitioners identify best practices, contextual barriers, opportunities for success, and knowledge gaps. The discussions were not intended to comprehensively represent all HGI mechanisms or outcomes but rather a broad reflection of the ideas and perceptions of the workshop participants that will help lay the groundwork for future cross-disciplinary discussion, research and intervention. The world cafe took place over the course of the day and was moderated by the research team. Each group produced a variety of handwritten material that was collected and transcribed. We organized this material by theme, summarizing the main concepts that developed across all groups.

<sup>2</sup> Including the USAID-funded Food Security and Nutrition Network (FSNN), a global community of food and nutrition security practitioners; Agrilinks, an online group of food security and agricultural development practitioners overseen by the US Government’s Global Hunger and Food Security Initiative; the Platform for African European Partnership on Agricultural Research for Development (PAEPARD), which supports agricultural research and development partnerships between Europe and Africa, supported by the EU through its Food Security Thematic Program; and Agriculture-Nutrition Community of Practice (Ag2Nut), part of the United Nations System Standing Committee on Nutrition.

### 3. Results

In this section, we present our main findings to correspond with the three distinct research methods. Table 1 provides an overview of the results which highlights which outcomes were addressed in the literature and which are considered important by the practitioners and the experts. The results show that although the research and evidence have made considerable progress in studying the impact of home garden interventions on multiple outcomes in non-HECS, practitioners are implementing similar programs in HECS that remain vastly understudied.

Figure 1 visualizes the findings from the three methods at the country level, focussing on Africa and Asia. Countries included in the practitioner survey represent HGI in practice, and countries included in our literature review represent countries included in the literature. We used the Fragile State Index as a proxy for the existence of (humanitarian) crises, which takes a value of 0 and 120 based on multiple social, political and economic indicators to measure country risk and vulnerability (Fund for Peace, 2021). The map shows that the higher the fragility index in a given country the less likely the evidence generated in the literature. Most evidence stems from countries, which have a fragility score of 80 and below (e.g., India, Bangladesh, Kenya, Tanzania, and South Africa). Furthermore, most countries with a fragility score higher than 100 that were present in the practitioner survey, were not covered in the literature, suggesting a disconnect between practitioner and academic interest and lack of academic understanding about more fragile settings (e.g., Afghanistan, Chad, Somalia, and South Sudan).

In the rest of this section, we present the findings from each of the approaches in detail.

#### 3.1. Literature review

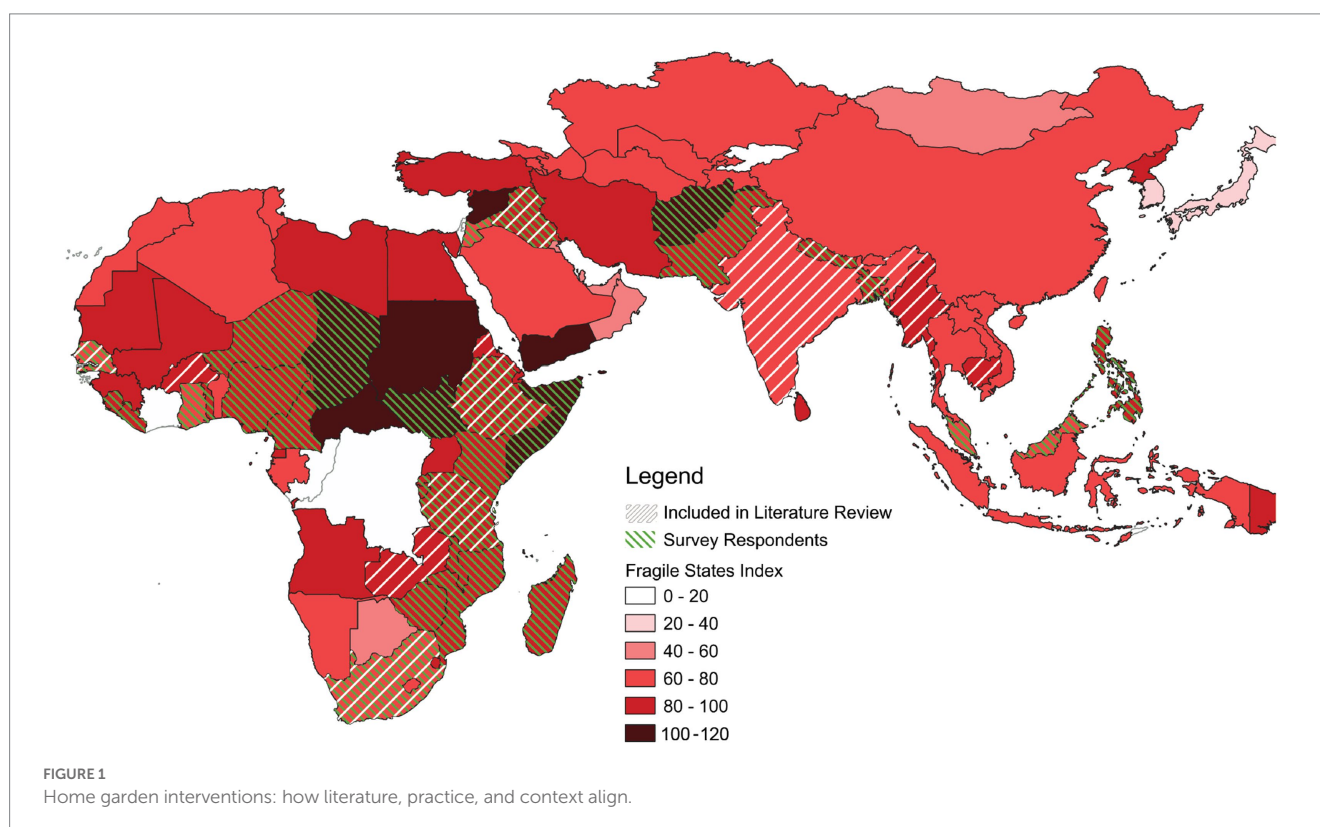
Our main query method on Scopus produced 242 articles which were largely overlapping with the results from Google Scholar. Excluding the HECS key terms, our search produced 599 results. We did not identify any article from Scopus that covers a rigorous impact evaluation on the household level of a homestead gardening intervention in a HECS in the English language.

However, emerging rigorous studies from HECS of vegetable seed transfer interventions (not explicitly HGI), show positive impacts on food security, nutritional outcomes and resilience (e.g., Baliki et al., 2018, 2022a; Kayaoglu et al., 2023) but lack assessments on other outcomes. Conflict clearly shapes the effectiveness of these support types (Weiffen et al., 2022), which underscores the lack of comparability between HECS and non-HECS. The absence of peer-reviewed research articles of HGI in HECS highlights the strong scarcity of evidence on the impacts of home garden interventions in such settings to date. Next, we discuss this gap considering other literature in non-HECS settings.

There is a nascent but growing body of research that uses rigorous assessment methods to study outcomes and impacts of nutrition-sensitive agricultural interventions like home gardens (e.g., Ruel et al., 2013; Schreinemachers et al., 2017; Baliki et al., 2019, 2022b). However, expected impact pathways of HGI are difficult to generalize given the heterogeneity of intervention tools and contexts (Fiorella et al., 2016). For example, while for many

TABLE 1 Summary of evidence on home garden interventions in humanitarian settings by outcomes from the three-pronged approach.

HGI outcomes	Literature review (HECS)	Literature review (non-HECS)	World cafe	Practitioners survey
Access to healthy food	✓	✓	✓	✓
Dietary diversity	✓	✓	✓	✓
Resilience	✓	✓	✓	✓
Women empowerment	X	✓	✓	✓
Income generation	X	✓	✓	✓
Psychosocial well-being	X	✓	✓	✓
Peacebuilding	X	X	✓	✓



Asian countries the literature provides evidence on HGIs increasing vegetable production, in Kenya and Uganda, households did not increase their vegetable production substantially through HGIs (Baliki et al., 2019, 2022b; Bird et al., 2019; Depenbusch et al., 2021, 2022). We found three major areas where HGIs have been found to have had measurable impacts on development goals: direct nutritional benefits, behavioral changes in terms of food choices, and women empowerment.

The direct nutritional benefits of HGIs are often a key point of investigation since HGIs are often conducted to improve household dietary diversity and access to micronutrients (Pritchard et al., 2019). Studies have shown that HGIs help increase consumption of nutrient-rich vegetables, including indigenous vegetables and leafy greens, in a number of countries in the Global South including Bangladesh (Bushamuka et al., 2005; Schreinemachers et al., 2016; Baliki et al., 2019, 2022b), Burkina Faso (Olney et al., 2016; Schreinemachers et al., 2019), Cambodia (Dragojlovic et al., 2020; Depenbusch et al., 2022),

India (Murty et al., 2016), Nepal (Osei et al., 2015, 2017), Tanzania (Blakstad et al., 2021, 2022) and Zambia (Kumar et al., 2018). The scarce literature on long-run nutritional impacts paints an ambiguous picture: while effects are sustained over a long period of 6 years in Bangladesh (Baliki et al., 2022b), impacts vanished in Tanzania (Blakstad et al., 2022). Although home gardens interventions have been linked to increased dietary diversity and improved consumption of nutrient-rich foods, there is little conclusive evidence that HGIs strongly influence overall household food security (Blakstad et al., 2021).

HGIs are also associated with behavioral changes in production and consumption in some settings, although short-term changes are unlikely to be sustained if implementation strategies fail to alter eating habits (Baliki et al., 2019, 2022b). For example, integrated school and home gardens were only found to have a measurable impact on children's vegetable consumption when combined with nutritional training for parents and caregivers (Schreinemachers

et al., 2020). An integrated approach combining nutritional knowledge, hands-on-training, the provision of seeds and tools, and continuous follow-ups by trainers have been shown to increase total production of vegetables grown in home gardens, such as leafy greens (Olney et al., 2016).

There are many non-nutritional impacts of HGIs that have received academic attention at the community, household, and individual levels. In households that grow an abundance of produce, selling excess or specialty foods can be an important source of supplementary income, increasing household purchasing power and indirectly improving food security through the purchase of other stable foods (Weinberger, 2013). Moreover, home gardens build up household resilience against crises like COVID-19 (Carstens et al., 2021). Finally, we find indicative evidence that community vegetable gardens can contribute to social cohesion through community engagement and organization (Veen et al., 2015) and gardening has been found to contribute to physical and emotional wellbeing in stressful and uncertain environments like refugee camps (Hartwig and Mason, 2016; Tomkins et al., 2019). The rigor of the studies that focus on non-nutritional impacts, however, remains very weak.

Another well-studied impact of HGIs is their potential to influence gender roles. Women's control of resources and decision-making is often compromised in patriarchal rural societies (Sraboni et al., 2014) but women usually play the dominant role in food preparation (Quisumbing et al., 1996) and tend to have more autonomy in home gardens (Hillenbrand, 2010; Patalagsa et al., 2015; Rybak et al., 2018). Distinct yet gradual signs of shifting gender dynamics have been observed as women received recognition because of home garden training. Since home gardens do not radically challenge traditional gender roles, women are able to incrementally gain control over income and food provision and gain self-confidence and recognition for their skillset (Patalagsa et al., 2015; Baliki et al., 2019, 2022b; Bliznashka et al., 2022). Women engaging in home gardening can improve their economic participation by bringing excess produce to markets where they can generate income and increase their influence in household decision-making, thereby improving their access to and control over resources (Bushamuka et al., 2005). Furthermore, women's economic empowerment and improved bargaining power tend to positively affect child nutritional status (Cunningham et al., 2015; Malapit et al., 2015; Santoso et al., 2019). Thus, home gardens can reinforce household nutrition both directly through the provision of fresh produce and indirectly through women's economic empowerment. However, the input of physical labor and time required for gardening activities can also add additional challenges to women's daily lives (Kjeldsberg et al., 2018). Since HGIs often target women who already carry the bulk of household labor, such interventions may reduce time available for childcare, healthcare, food preparation, and/or leisure (Cunningham et al., 2015; Carletto et al., 2017).

In summary, HGIs in non-crisis settings have been found to induce a variety of impacts including access to healthy food, dietary diversity, resilience, women empowerment, income generation and psychosocial well-being, see Table 1. However, little is known about how HGIs are influenced by external social, political, or environmental disruptions and crises, although studies in other domains have certainly explored the crossroads of conflict and food insecurity (Holleman et al., 2017). Evidence at the nexus of humanitarian emergencies and food insecurity includes access to micronutrients

(Brück et al., 2019; Brück and d'Errico, 2019) and childhood stunting (Akresh et al., 2012), but there is no evidence that directly links HGIs to food security or non-nutritional impacts in HECS.

## 3.2. Home gardens intervention in practice

Here, we present the findings from a practitioner survey of 103 home garden programs led by 36 organizations operating in 39 countries in the year 2019. Thirty four of the stated programs were still in the planning phase at the time of the survey, hence, we will only present the findings from the remaining 69 programs which were either still ongoing during the time of the survey or have been completed. HGIs were implemented by a range of diverse actors including three government-backed organizations, nine universities from both the Global North and South, 14 local or international NGOs, and seven consulting firms and other agencies.

### 3.2.1. Types of home garden intervention

The survey covered HGIs in three broad regions: sub-Saharan Africa (SSA),<sup>3</sup> Middle East and North Africa (MENA)<sup>4</sup> and South and Southeast Asia.<sup>5</sup> 74.3% of programs in the total sample were implemented in SSA, 12.9% in Asia, and 12.9% in MENA. Two thirds of the HGIs were implemented in rural areas while 22% were in urban settings and 42% were in refugee camps.<sup>6</sup> A large proportion of the programs were implemented in recent years: 90% of the interventions took place since 2010 and over half were established after 2016. One third of the interventions were completed by 2019. On average, a HGI lasts for 3.6 years.

Table 2 shows the type of home garden, the training component and the target group for the overall sample across the three geographic regions. Kitchen gardens were the most prevalent (74% of HGIs), particularly in Asia (89%). Kitchen gardens were mainly implemented in refugee camps and rural areas while urban settings tended toward school gardens. Community gardens were most prevalent in the MENA region, targeting both displaced and non-displaced communities.

A training component was used in almost all surveyed programs (94%): 83% of all interventions included technical gardening training, 70% included nutritional training, 49% included WASH components, and 64% used a combination of training styles (multiple responses permitted). Nutritional training was not universally available: while 80% of HGI in SSA included nutritional training, only 56% reported to do so in Asia, and a mere 22% of programs involved nutritional training in MENA. These differences were statistically different at the 10% level. We find no notable differences in the type and frequency of training provided across various population settings.

<sup>3</sup> Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Malawi, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Tanzania, Togo, Uganda, Zimbabwe.

<sup>4</sup> Iraq, Jordan, "Kurdistan", Lebanon, Liberia, Sudan, Turkey – and Greece for simplicity.

<sup>5</sup> Afghanistan, Bangladesh, "Kashmir", Nepal, North Korea, Malaysia, Pakistan, Philippines.

<sup>6</sup> Given that a setting can have multiple characteristics, the cumulative shares do not add up to 100%.

TABLE 2 Training and targeting characteristics of HGI.

	Geographic region				Population setting		
	Overall	SSA	Asia	MENA	Urban area	Rural area	Refugee camp
<i>n</i>	69	52	9	9	15	47	29
<b>Garden type</b>							
Small kitchen gardens	74%	73%	89%	67%	67%	72%	79%
Large integrated HG	33%	29%	33%	56%	27%	36%	45%
Community gardens	51%	51%	44%	56%	53%	53%	45%
School gardens	32%	37%	22%	11%	60%	34%	17%
<b>Training</b>							
Any training	94%	92%	100%	100%	93%	94%	97%
Gardening training	83%	86%	67%	78%	73%	85%	79%
Nutritional training	70%	80%*	56%*	22%*	67%	74%	76%
WASH training	49%	55%	44%	22%	60%	55%	48%
<b>Target group</b>							
Women	84%	88%	78%	67%	80%	94%	86%
Young children (<6)	28%	33%	11%	11%	33%	32%	28%
Children (6–12)	39%	43%	33%	22%	60%	43%	34%
Adolescents (13–18)	46%	51%	33%	33%	73%	53%	41%
IDPs	29%	24%	44%	44%	40%	26%	38%
Refugees	46%	41%	44%	78%	7%	38%	100%

As programs can be implemented in various settings, the cumulative shares do not necessarily add up to 100%. Values highlighted with \* imply that the difference is statistically significant at 10% level using Pearson Chi-squared test.

We observe strong geographic differences in targeting (see Table 2). Programs in SSA prioritized women and young children while those implemented in MENA focused more on refugees and IDPs. Children above the age of six were more likely to be targeted in urban settings than in rural ones or in refugee camps, correlating with the prevalence of school garden interventions in urban settings.

### 3.2.2. Home gardens and crises

Table 3 summarizes the share of the HGI surveyed operating under five pre-defined crisis categories (climate, political, economic, protracted and health crises), which respondents classified by prevalence and severity. A majority of HGI operated in countries experiencing multiple simultaneous crises. On average, the countries face four out of the five pre-specified crises. 85% of HGIs in the survey were in settings experiencing protracted crises, 49% of which were classified as critical. At least one emergency type could be classified as high or critical in 71% of the countries where our survey programs are implemented, including 67% of the reported programs operating in countries experiencing severe economic emergencies. In the MENA region, 78% of the programs were implemented in areas experiencing climatic, political, economic, and protracted crises at the same time, and 67% of the programs were in IDP or refugee camps. Health crises were less prevalent in our sample than other emergency types, but it is worth noting that our survey was completed before the start of the COVID-19 pandemic.

### 3.2.3. Home garden intervention impacts

All the programs aimed to achieve multiple outcomes. Table 4 lists the major intended outcomes across our sample. These

include: access to healthy food (81%), income generation (77%), women empowerment (75%), and dietary diversity (71%). Roughly 40% of the programs aimed to improve all four of these outcomes simultaneously. Other less common outcomes were strengthening resilience (62%), improving psychosocial well-being (38%), and peacebuilding (28%). On average, a program intends to achieve 4.3 out of the seven pre-specified outcomes. In terms of variation of program outcomes by region, we find that interventions which focused on women empowerment were more prevalent in Asia (78%) and SSA (80%) than in MENA (44%). Impact on dietary diversity was especially considered in programs implemented in SSA (78%) in comparison to Asia (56%) and MENA (44%), where diverse consumption of vegetables is traditionally higher than in SSA. Impacts on psychosocial well-being and peacebuilding were less prevalent, and with no strong differences across the regions.

The results of the survey reveal differences at the regional level among the participating HGIs. They also underscore universal themes across all regions in terms of target groups, contextual factors (i.e., presence and type of crisis), the inclusion of training and the type of intended outcomes (i.e., nutritional, social, economic, etc.).

## 3.3. World Café of home garden interventions

We next synthesize the main themes of the World Café discussions through a thematic analysis of transcribed notes (for guiding questions see section 2.3) with the purpose of highlighting factors and best

TABLE 3 Prevalence and severity of crises across HGI.

	Geographic region				Population settings		
	Overall	SSA	Asia	MENA	Urban area	Rural area	Refugee camp
<i>n</i>	67	49	9	9	14	46	29
<b>Crisis of any severity</b>							
Climatic	87%	84%	100%	89%	86%	89%	83%
Political	76%	71%	78%	100%	79%	72%	86%
Economic	90%	88%	100%	89%	93%	91%	90%
Protracted	85%	84%	89%	89%	93%	85%	90%
Health	75%	78%	56%	78%	86%	70%	69%
<b>Crisis of high and critical severity</b>							
Climatic	34%	33%	44%	33%	29%	33%	28%
Political	39%	37%	44%	44%	36%	28%	41%
Economic	67%	73%	44%	56%	79%	67%	55%
Protracted	49%	47%	44%	67%	57%	43%	52%
Health	24%	31%	0%	11%	21%	22%	17%

As programs can be implemented in various settings, the cumulative shares do not necessarily add up to 100%.

TABLE 4 Intended outcomes of the home garden interventions.

	Geographic region				Population setting		
	Overall	SSA	Asia	MENA	Urban area	Rural area	Refugee camp
<i>n</i>	69	51	9	9	15	47	29
<b>Desired outcomes</b>							
Access to healthy food	81%	80%	89%	78%	87%	81%	90%
Dietary diversity	71%	<b>78%*</b>	<b>56%*</b>	<b>44%*</b>	60%	70%	86%
Resilience	62%	63%	67%	56%	60%	60%	79%
Women empowerment	75%	<b>80%*</b>	<b>78%*</b>	<b>44%*</b>	93%	77%	66%
Income generation	77%	76%	89%	67%	87%	81%	76%
Well-being	38%	35%	56%	33%	67%	32%	31%
Peacebuilding	28%	25%	38%	33%	47%	22%	28%

As several programs can be implemented in various settings, the cumulative shares do not necessarily add up to 100%. Values highlighted with \* imply that the difference is statistically significant at 10% level using Pearson Chi-squared test.

practices that are critical for achieving impacts of HGI in HECS and consequently identifying knowledge gaps.

The discussants talked through the dynamic influence of factors on HGIs, creating broad pathways that tether approaches and aims of HGIs to different types of HECS. We found the following key themes: climate/weather/environmental emergency settings that employ specialized garden designs to resist flooding or drought conditions; HGIs focused on ecological resilience and diversity in the face of pests and diseases; both income-generation and market-independence for settings experiencing economic crises; and community-building and identity-construction for groups experiencing mental health crises in violent or post-war settings.

Program success of HGI, according to World Café participants, is dependent on key components including existing household food and meal preferences, health consciousness, levels of knowledge about gardening, as well as adequate land and seed access, sufficient program duration, and the extent of the involvement of men in the intervention. Influential external economic and political factors included

connections to research hubs, the local influence of agricultural cooperatives, the stability of governments and/or existing policies, the presence of or lack of cooperation and coordination between sectors, and access to government or nongovernmental program funding.

Regardless of the type of crisis, two important aspects were underscored in the discussions which were seen as fundamental to program success. First, a participatory planning and implementation approach was flagged as a key element for program success. Without the inclusion of target communities in the planning process, a program would likely fail to meet community needs and would not be sustainable. Practitioners and researchers equally agreed that this approach also requires the inclusion of multi-sectoral stakeholders and an interdisciplinarity to the program design. Second, a deep understanding of local context is equally crucial to achieve the intended outcomes of home gardens interventions. Understanding the specific needs of the target group would require learning how home gardening may be perceived in the community, how produce could be incorporated into dietary preferences, and how the garden would

impact household workloads or gender dynamics. How to approach these influences in times of stress, conflict, or violence remains a key knowledge gap.

Building on these elements, key knowledge and evidence gaps of HGI in HECS on multiple fronts have emerged.

First, in terms of program impact and mechanisms, there is still a lack of understanding on if and how home garden interventions contribute to social and political outcomes like peacebuilding, integration and cohesion. Moreover, how can interventions contribute to the maintenance of skills and traditions and food preferences in times of crises and what are the trade-offs that women participating in home gardens must make under such challenging settings?

Second, in terms of methods and approaches, it remains unclear what the best methods required to develop a more thorough understanding of short- and long-term impacts are, and how can reliable studies be designed and implemented in such difficult settings?

Third, in terms of multi-stakeholder collaboration, how can home gardens be sustainably funded and accessible to target groups in times of crises? And what ways to permanently bridge the gap between practitioners and scientists working in this field.

## 4. Discussion

Small-scale agriculture can be a vital crisis response strategy across humanitarian and development settings, and new evidence does explore home gardening's positive psychosocial and community impacts in refugee camps despite the lack of institutional support (Tomkins et al., 2019). However, and in line with Galhena et al. (2013), we have found little rigorous research that explored how outcomes observed in non-crisis settings may function in active HECS. Suggestive evidence indicates that HGIs contribute to recovery after climatic shocks and conflict. However, strong evidence is still absent (Galhena et al., 2020).

Based on this key disconnect, we suggest future research on HGI in HECS to focus on sustainability and effectiveness – exploring how context influences impacts, including social and political impacts – with an integrated approach to practice and research.

### 4.1. Sustainability and effectiveness

The diversity of HGIs types and outcomes in different contexts compounded by unique institutional challenges of HECS makes this a complex area of research. Understanding the contextual factors of HECS that disrupt HGI efficacy is vital to creating more resilient and beneficial programs. With this review, we have identified existing evidence about HGIs and found that although HGIs are implemented widely in HECS, there is little evidence that interrogates program impacts and pathways in these settings. The variety of program goals and impact evaluation methods used by multidisciplinary researchers and practitioners working in these heterogeneous settings means there is little consensus in terms of best practices. On the other hand, the evidence on HGI from other development settings that do not fall within HECS is fine-tuning methods to look beyond immediate nutritional benefits at downstream social and

economic impacts. Only a handful of studies have identified long-term impacts of HGIs, raising questions about their effectiveness and sustainability in highly volatile contexts such as HECS. Research about the long-term impacts is crucial to understanding whether interventions in HECS are sustainable in terms of cost–benefit, accessibility, and replicability.

### 4.2. Context matters

Within the practitioner and research communities it is understood that context is vital to understanding potential program impacts. Similarly, research on HGI has thus far ignored the contextual factors that might shape how program impacts are actualized and sustained. The lack of such analysis is likely to be detrimental to the design of future HGIs as it could underestimate the magnitude of HGIs as a coping mechanism against severe episodes of shocks and food insecurity.

### 4.3. Social and political impacts

While peace-building and social cohesion opportunities of HGIs in HECS were emphasized in the World Café discussions, the dominant motivations of the sampled programs were nutritional, economic, or empowerment-based. Impacts like resilience, well-being, and peacebuilding were observed in less than half of the interventions and peace-building was only targeted in 25% of observed programs. This suggests that HGIs in HECS are more focused on food security and reducing malnutrition than engaging in indirect psychosocial aims or that implementing groups rely on more tangible nutritional targets to achieve program funding. Since the non-nutritional aspects of HGIs are not primary features in program development, is it possible that they tend to be neglected in evaluation as well. Any significant impact on well-being and peacebuilding is likely to be underestimated if there are few empirical studies interrogating it. To ensure the achievement of the nutritional and food security goals, programs need to strengthen other outcomes and pathways beyond the plate.

### 4.4. External validity

The dominance of case-study-based evaluation and research implies that it is difficult to determine broad themes to lead to generic policy implications valid for HGIs across different settings. There is a lack of consistent assessment methods across HGIs in all settings, with only about one fifth of surveyed programs reporting the use of qualitative and quantitative impact assessment tools, and overall limited long-term impact assessment of HGIs after initial implementation.

### 4.5. Integrating research

World Café discussions helped bridge research-practice disconnects and illuminate opportunities for future research by



bringing practitioners and researchers together in conversation. This type of interaction should continue as key knowledge gaps in terms of implementation, impact, sustainability, and formulation of impact evaluation are addressed. Such information is fundamental to understanding how HGIs contribute to strategic food security goals, including global SDGs, in these vulnerable settings and will help future programs maximize positive impacts.

## 5. Conclusion

Home gardens are a simple, adaptable and often used tool to try and improve household access to micronutrients and provide tangential, yet potentially powerful, individual-, household-, and community-level impacts. In HECS with little institutional stability where individuals endure protracted duress and sustained trauma, HGIs could additionally contribute to empowerment and psychosocial well-being. The absence of a well-developed theory of change for HGIs in HECS impedes system-wide learning in the sector. However, core elements of such a theory would need to differ from non-HECS settings. This review underscores the need for more targeted empirical research that addresses multiple points along HGI pathways, including program implementation and long-term garden care and sustainability; the type inputs and support required in different HECS; the integration of contextual factors and the development of testable linkages between direct (nutrition and food security) and indirect (economic empowerment, psychosocial well-being, women's empowerment, intra-household and community gender relations) program effects and pathways. The lack of coherent assessment regarding implementation and impact of HGIs in HECS means that programs may be under-utilized or ineffective in these settings.

It is important to substantiate programming efforts with methodologically rigorous studies to ensure an effective human-scale response to food insecurity, micronutrient deficiency, and/or a tool for peacebuilding, empowerment, and knowledge-sharing. Rigorous research can be challenging in HECS, but improving or systematizing assessment techniques will help to explain how HGIs function in these settings and may contribute to improved design and greater impacts. Such evidence is crucial for future programming and development policy in the wake of the COVID-19 pandemic, which has disrupted food systems and increased food and nutrition insecurity worldwide. There is an urgent need for researcher-practitioner collaboration to generate evidence to improve the effectiveness of home gardening interventions in the future and accelerate the achievement of the Sustainable Development Goals.

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## Author contributions

GB and TB raised the funds and conceptualized the study. GB, DW, and GM collected and analyzed the data and drafted the text. TB supervised the study and reviewed and edited the text. GM also provided administrative support. All authors contributed to the article and approved the submitted version.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fsufs.2023.1138558/full#supplementary-material>

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