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Review

The Socio-Cultural Benefits of Urban Agriculture: A Review of the Literature

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Abstract: Despite extensive literature on the socio-cultural services of urban open spaces, the role of food-producing spaces has not received sufficient attention. This hampers advocacy for preserving and growing urban agricultural activities, often dismissed on justifications that their contributions to overall food supply are negligible. To understand how the social benefits of urban agriculture have been measured, we conducted a systematic review of 272 peer-reviewed publications, which drew on insights from urban agriculture sites in 57 different countries. Through content analysis, we investigated socio-cultural benefits in four spheres: engaged and cohesive communities, health and well-being, economic opportunities, and education. The analysis revealed growth in research on the social impacts of gardens and farms, with most studies measuring the effects on community cohesion and engagement, followed by increased availability and consumption of fruits and vegetables associated with reduced food insecurity and better health. Fewer studies assessed the impact of urban farming on educational and economic outcomes. Quantifying the multiple ways in which urban agriculture provides benefits to people will empower planners and the private sector to justify future investments. These findings are also informative for research theorizing cities as socio-ecological systems and broader efforts to measure the benefits of urban agriculture, in its many forms.

Keywords: urban agriculture; socio-cultural benefits; social services; metrics; indicators; assessment; literature review

1. Introduction

In recent years, the socio-cultural services provided by urban open spaces—including parks, green spaces, and plazas—have gained prominence in urban ecosystems research

(e.g., [1,2]), yet the role of food-producing spaces (i.e., urban farms and gardens) in providing similar services has received only modest attention. In fact, ecosystems services scholarship has tended to focus on urban agriculture's food production capacity (e.g., [3,4]). This literature offers important insights, albeit into only one of a much broader set of benefits contributed by the spaces and communities growing food in cities. Since what is not measured is likely to remain undetected by policymakers, a focus on a single benefit limits public investment, regulatory protections, and the longer-term viability of these spaces, especially in cities with substantial real estate development pressures and land tenure uncertainties. Moreover, myopically focusing on urban food production can lead policymakers and the public to conclude that in comparison with conventional farming, urban agriculture is insignificant and inefficient.

Crucial, therefore, to the future viability of these spaces is how to codify, capture, and document the social and cultural benefits of urban agriculture. We conducted a systematic review of the literature to understand approaches and metrics researchers have used to analyze these social and cultural benefits. The review captured research in four overarching thematic areas: community engagement and cohesion, health and well-being, economic opportunities, and education. The term socio-cultural benefits, in our review of the literature, includes the economic and health outcomes of urban agriculture in addition to education and overall community benefits. These thematic areas were drawn from the broader scholarship on urban farming as well as the authors' own research in this field.

As it will be illustrated in this paper, there has been a growth in research on the social impacts of gardens and farms, though studies vary in scope and focus. Most measure the effects on social cohesion and community engagement, and the effects of urban agriculture on increased availability and consumption of fruits and vegetables, thereby reducing food insecurity and improving health. Fewer measure educational and economic effects. Quantifying the multiple impacts of urban agriculture is paramount as it enables planners to justify public investments in farms and gardens, and health insurance or healthcare companies to consider funding for urban farming activities and infrastructure to support individual and community well-being.

In recent years, other scholars have also systematically surveyed the literature, making important advancements and valuable contributions to this nascent realm of knowledge. For instance, in a recent scoping review, Michelle Howarth and colleagues [5] synthesized evidence from 77 studies on the physical and mental health benefits of gardens and gardening and pointed to the value of this evidence to inform decision making on the use of gardening approaches as a social prescription. In a similar vein, a systematic review by Anna Gregis and colleagues [6] assessed 84 articles, predominantly based in North America and the UK, revealing community gardens' role as an innovative urban strategy to promote psychological, social, and physical health. In another study, Pierre Paul Audate and team [7] drew insights from 101 peer-reviewed articles and focused specifically on summarizing evidence on the impacts of urban agriculture on the determinants of health.

The emphasis of most of these studies [5–7] has, however, typically been on health and well-being outcomes, only occasionally considered alongside measures of social capital. Conversely, reviews that have synthesized evidence on a broader set of outcomes pertaining well-being (e.g., including also freedom of choice and action, good social relations, sense of security, access to adequate income, household assets, food, water, and shelter, etc.)—such as the review by Rosa Reyes-Riveros and collaborators [8]—have, however, focused on urban green spaces more broadly as opposed to urban agriculture and productive landscapes specifically. To fill these gaps, this paper examines evidence on outcomes in multiple domains to include educational and economic impacts of urban food-producing spaces alongside health and community benefits.

2. Materials and Methods

2.1. Data Collection

We conducted a literature review to understand the methods used to analyze the social and cultural benefits of urban agriculture. Our definition of urban agriculture is inclusive of all food-producing urban cultivation practices, including community gardening, allotments, and urban farms, except for indoor hydroponic facilities. The review captured empirical research in four broad thematic areas drawn from the wider scholarship on urban farming: (1) engaged and cohesive communities, (2) health and well-being, (3) economic opportunities and workforce development, and (4) education. Articles were limited to peer-reviewed publications in scientific journals indexed in Academic Search Complete, Web of Science, and Gale Agriculture. The sample was supplemented with additional references identified by lead scientists assessing the food–energy–water and people-related benefits of urban agriculture in five countries (Germany, France, Poland, UK, and US) (see the FEW-meter project at <http://www.fewmeter.org> (accessed on 11 March 2022)). These expert contributions allowed for the inclusion of non-English scientific literature and thus made for a more inclusive sample. Database searches were conducted in the period November 2019–February 2020, whereas country-specific papers were elicited from experts in the period March–June 2020. Additionally, four additional references were identified during the peer-review process of the paper and reflected in the final sample, analysis, and results presented here.

The search for relevant references followed a systematic screening procedure, summarized in Figure 1, and drawing on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) searching and sifting process. Researchers used keywords and terms pertaining to the concepts of urban food growing (e.g., urban agriculture, urban farming, urban farm, community garden, urban food production, allotments, etc.), community (e.g., social cohesion, civic engagement, activism, advocacy, safety, cultural integration, sense of place, immigrant communities, cultural identity, intergenerational interactions, race/ethnicity, etc.), economic opportunities and workforce development (e.g., entrepreneurship, value added, employment, professional development, real estate, revenue, profit, gentrification, etc.), health (e.g., well-being, wellness, physical activity, mental health, stress, nutrition, fruit and vegetable consumption, hypertension, etc.), and education (e.g., education, skills, training, learning, competencies, knowledge, classes, etc.). The terms were combined through the Boolean operators specific for each database.

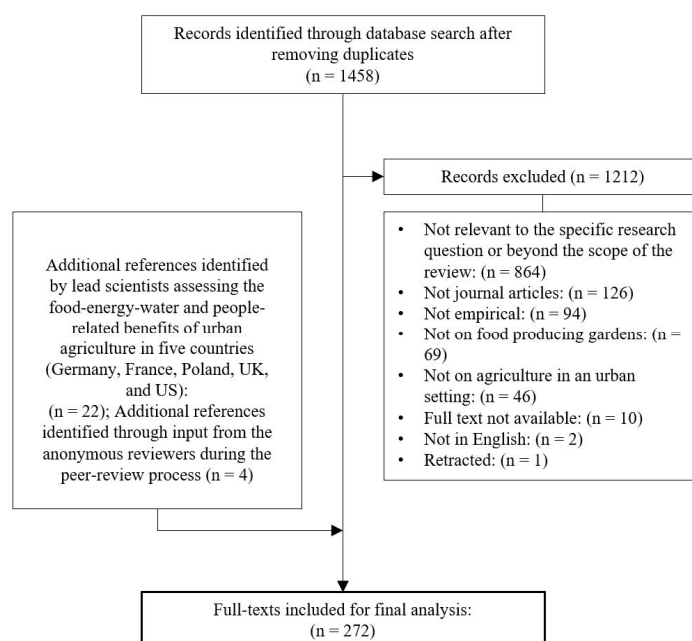


Figure 1. Searching and identification process of the full-text articles to be included in the review.

2.2. Exclusion and Inclusion Criteria

The screening of the literature for references of interest to this review was conducted using a predefined set of inclusion and exclusion criteria (Table 1). To be included in our analysis, an article had to be published in a peer-reviewed journal in the period 2009–2019 and focus on food-producing urban green spaces (e.g., urban gardens and/or farms), as opposed to green spaces or gardens more broadly. We excluded publications that were not research articles (e.g., a book review, an opinion or perspective, an editorial) and were more conceptual or theoretical in nature with no empirical analysis. The research also prioritized articles that focused on food-producing gardens and farms in urban settings and cities, and excluded those examining agricultural projects and practices in predominantly rural environments. The database search excluded articles not published in English. However, some non-English articles were later included through the input of international experts on the subject area in Germany, France, and Poland.

Table 1. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Peer-reviewed	Not a research article (e.g., a book review, opinion, editorial, etc.)
Empirical	Not focusing on urban settings
Focusing on food-producing urban green spaces (e.g., urban gardens and/or farms)	Conceptual or theoretical only
Published in the period 2009–2019	Focusing on green spaces in general
	Not in English *

* Note: this criterion was waived in part through the input of international experts on the subject area.

2.3. Data Analysis

To gain insight into the state of the art of scholarship on the different methods to measure and assess the socio-cultural benefits of urban agriculture, researchers developed a thematic matrix with the main concepts of interest to guide the content analysis e.g., [9,10]. Articles were first coded based on their primary and secondary (if applicable) thematic foci in terms of the socio-cultural benefits researchers sought to investigate. For instance, some articles focused on opportunities for social inclusion alongside mental health benefits e.g., [11], or community cohesion alongside practice-based learning and cross-cultural knowledge production e.g., [12]. The codes used to classify the data reflected the four overarching themes (engaged and cohesive communities, health and well-being, economic opportunities and workforce development, and education) that were identified at the outset of the study based on the researchers' prior work (e.g., [13,14]) and knowledge of the literature. These categories were then further detailed, through an iterative inductive process and throughout the full-text analysis phase, to reflect the specific outcomes of urban agriculture being assessed in each domain.

Key subthemes and codes identified under the engaged and cohesive communities theme included community cohesion, community engagement, diversity, cultural identity, sense of belonging, and perceived safety in the neighborhood. Health-related subthemes included fruit and vegetable consumption, healthy eating habits, emotional and mental well-being, food security, physical activity, and improved body-mass index. Papers addressing the educational and knowledge-related aspects of urban farming spaces and practices yielded analytic codes focusing on the assessment of gardening skills, healthy nutrition knowledge, personal growth, confidence, learning opportunities beyond gardening skills, and the degree to which urban gardens and farms serve as tools for student engagement. Finally, articles examining economic opportunities and impacts of urban farming led to the development of codes focusing on food production/sustenance and related cost savings, land tenure, job or income opportunities, and gentrification. Because the process of identifying the subthemes was iterative and an integral part of the qualitative data analysis process for this paper, the entire sample was recorded several times to reflect the full breadth of the main themes identified.

In addition to codes pertaining to the substantive findings on the social and cultural benefits of urban agriculture, the thematic matrix researchers used to analyze the data also included codes focusing on several key methodological aspects of the research. Methodology-oriented codes were devised *ex ante* to capture the studies' research design, sample size, sampling methodology, unit of analysis, data collection and data analysis methods, dependent and independent variables, and the nature of the relationships among the variables being examined.

All data were coded using a cloud-based relational spreadsheet-database hybrid software (Airtable) and analyzed and summarized using descriptive statistics. Two researchers (RTI and MI) coded the data and compared and cross-validated their results on a subsample comprising 10% of all references in the sample. Differences in coding were resolved through discussion between the researchers and were reflected in the final coded sample before the results were summarized.

3. Results

The literature search yielded a total of 1458 unique, non-duplicate records. After screening their titles and abstracts and evaluating them against the inclusion and exclusion criteria, 1212 of these were removed because they did not meet one or more of the criteria (Figure 1), leaving 246 studies for further analysis. After consulting with urban agriculture researchers in four countries (Germany, France, Poland, and UK), 22 additional records were included in the sample. Four additional references were identified through input from the international experts who served as anonymous reviewers during the peer-review process for this paper. The final sample of articles thus comprised 272 peer-reviewed publications. In the sections that follow, we summarize the key findings on the state of the art of academic research analyzing the social-cultural benefits of food-producing urban green spaces. We present highlights of the substantive aspects of research followed by a synthesis of some of the methodological aspects of the studies examined. When research is primarily relevant to a specific type of urban agriculture (e.g., urban gardening), we use these more specific terms; otherwise, we use the broader terms of "urban agriculture" and "food-producing urban green spaces."

3.1. Overview

Empirical scholarship seeking to capture and quantify the community, health, economic, and educational benefits of food-producing urban green spaces and urban agriculture practices has steadily been on the rise between 2009 and 2019—the decade we analyzed. During this period, the rate of peer-reviewed publications on the topic has grown threefold, from approximately ten articles published per year in 2009–2010 to an average of about thirty-four articles per year in the period 2015–2019 (Figure 2).

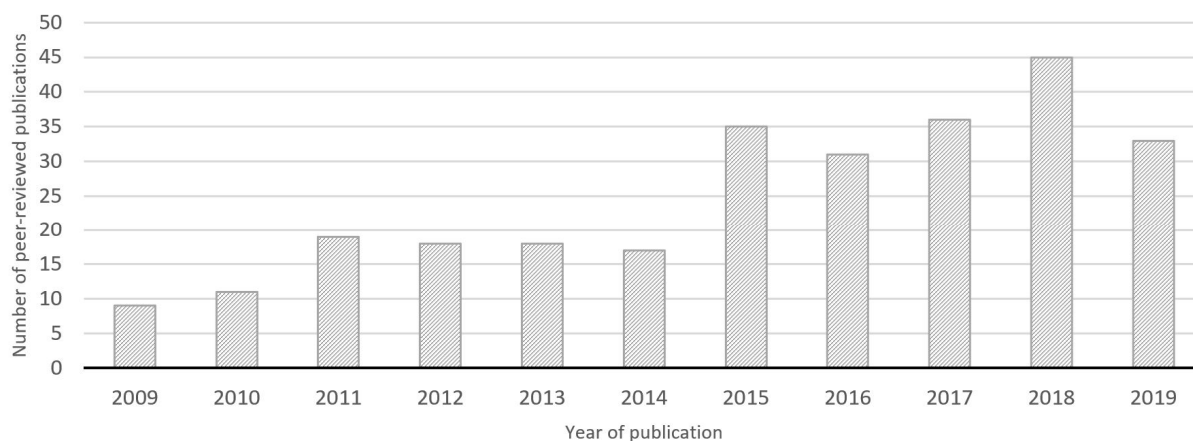


Figure 2. Number of peer-reviewed articles ($n = 272$) focusing on the measurement of one or multiple socio-cultural benefits of food-producing urban green spaces per year of publication.

Our search was skewed toward English-language studies, yet the sample of retrieved articles still points to the global reach of research in this domain. In our sample, articles draw insights from urban food production sites in 57 different countries (Figure 3), including urban areas in Europe ($n = 56$), North America ($n = 127$), South America ($n = 3$), Africa ($n = 22$), Asia ($n = 11$), Middle East ($n = 2$), and Australia and Oceania ($n = 16$). Most articles examine urban agriculture in the US, Canada, and Europe, with far fewer in the Global South.

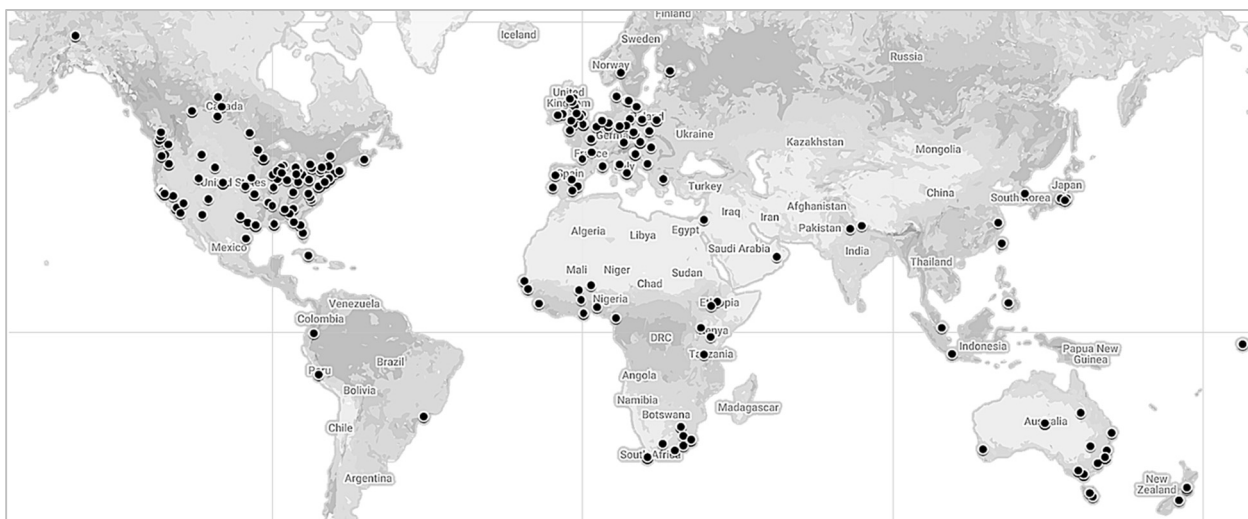


Figure 3. Studies by geographic region.

3.2. Types of Socio-Cultural Benefits and Types of Variables Being Assessed

The content analysis revealed that the academic literature on the social benefits of urban agriculture has prioritized assessments focusing on community cohesion (34% of the articles in the sample) and health and well-being outcomes (27%), which together make up more than half of the publications reviewed. To a slightly lesser extent, the articles assessed education (19%), and economic and workforce development (20%) benefits of urban agriculture, comprising about 4 out of 10 articles (Figure 4).

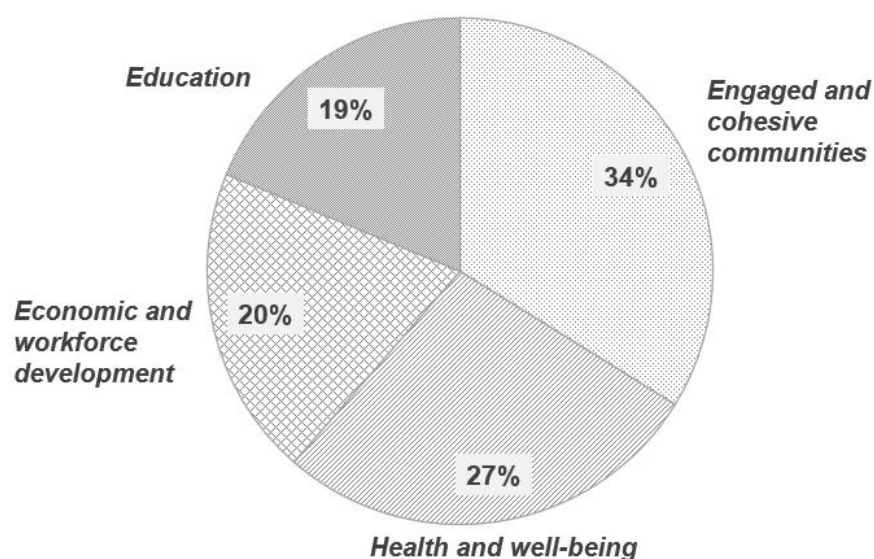


Figure 4. Studies by their primary thematic focus ($n = 272$).

In addition to the different dimensions of the social and cultural benefits of urban farms and gardens found in the sample, the articles used different independent variables

as a proxy for exposure to or engagement with urban agriculture spaces and practices (Figure 5). Overall, the most frequent independent variable used was participation in food production (gardening or farming) in community (41%) or school (15%) settings or farms, followed by participation in nutrition education activities at urban gardens (11%). One in ten articles considered the availability or access to a garden or a farm near the study participants to be a measure of exposure to or engagement with urban agriculture. A smaller set of studies assessed the socio-cultural benefits of urban farming in relation to practicing gardening at home (7%), engagement in gardening education (6%), the amount of food produced while gardening (5%), or the amount of time spent gardening (3%).

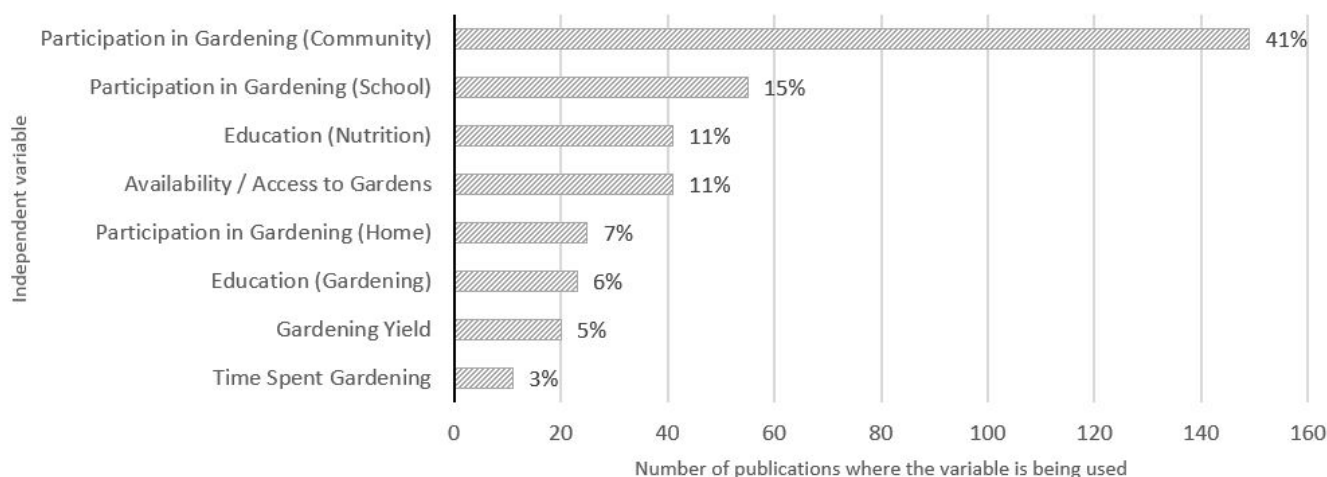


Figure 5. Studies by types of independent variable related to exposure to urban gardening spaces and/or activities. Note: Several studies in our sample ($n = 272$) used more than one measure of exposure to or involvement in urban gardening, hence the total number of studies reported in this chart is higher than the total number of studies in our sample.

In the remainder of this section, we briefly summarize key findings on some of the main definitions and the variables assessed in each of the four thematic domains. An overview of our findings is presented in Figure 5.

3.2.1. Engaged and Cohesive Communities

Among the outcome variables most frequently used by researchers to examine the value of urban gardens and farms for building stronger communities were community cohesion (33%)—broadly defined as “people in a society feeling and being connected to each other” [15]—and community engagement (30%), meaning the collaboration between institutions or individuals “for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity” [16] (Figure 6A). These were followed by studies focusing on urban agriculture’s ability to celebrate and deepen diversity (18%) as well as cultural identity and sense of belonging (15%). A small but not negligible number of studies also assessed urban farming’s potential to increase the sense of perceived safety in a community (5%).

Some of the specific aspects of community cohesion noted in the studies included increased opportunities for social bonding and the creation of social capital, which were, for instance, experienced in community gardens around the city of Nottingham in the UK [17], or the greater opportunities for social networking appreciated in food-producing spaces in Cuba and Trinidad [18], Denver, Colorado [19], Metropolitan San Francisco, California [20], Melbourne, Australia [21], and in Bordeaux, France [22]. Researchers in Germany [23] were able to gauge similar social benefits, pointing specifically to outcome variables centered on social interaction, participation, and perceived success. Of notice is also the finding that the

strength of the perceived social inclusion did not depend on the size of the gardens but on the sense of trust experienced by gardeners.

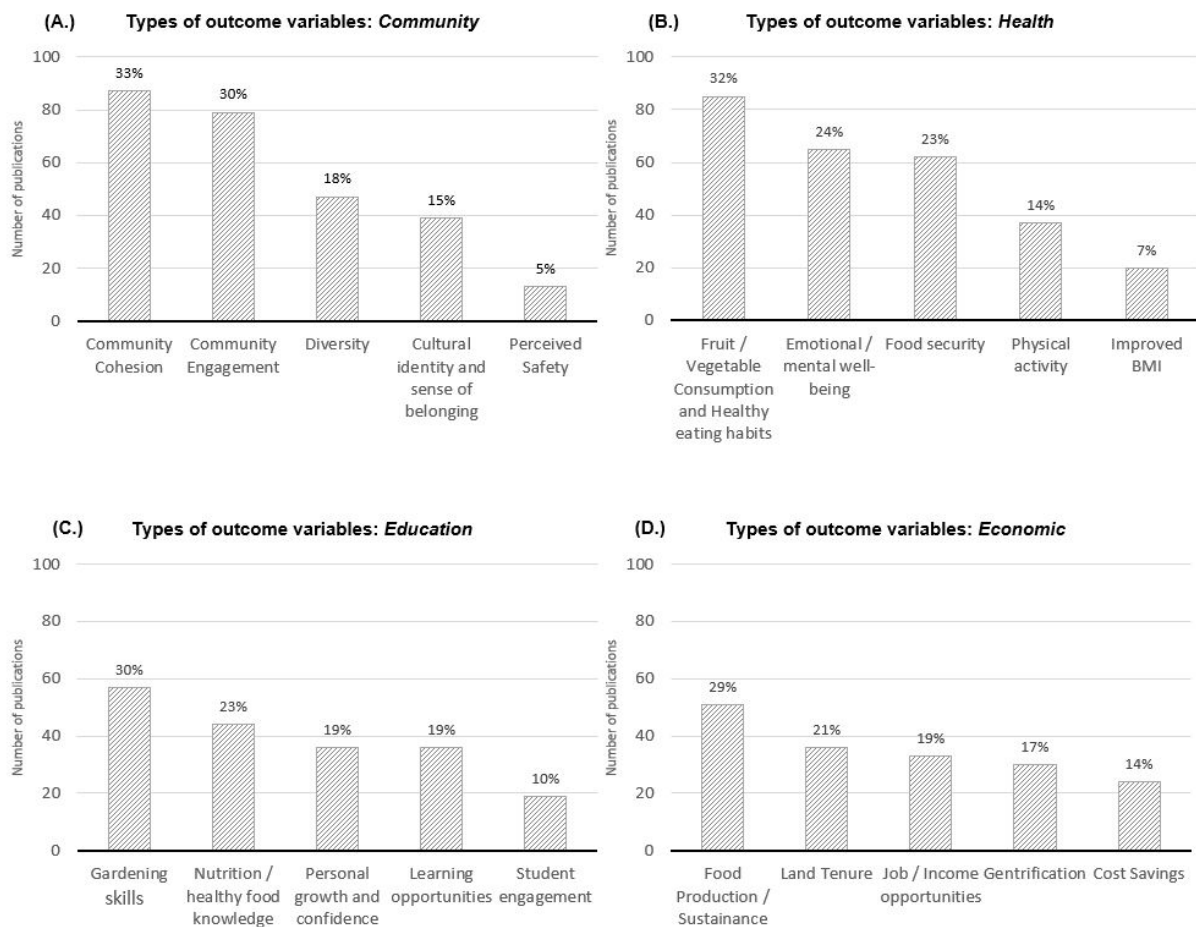


Figure 6. Types of socio-cultural outcome variables considered by category: (A.) Community; (B.) Health; (C.) Education; (D.) Economic. Note: Because papers often used more than one outcome variable to measure the benefits of urban agriculture, the total number of publications represented in this figure exceeds the total number of unique papers part of the sample of publications ($n = 272$) analyzed in this paper.

Another related sociocultural benefit reported by some of the studies is related to the ability of urban farms and gardening spaces to foster integration and cohesion in multicultural settings. These outcomes were reported, for example, by gardeners in Copenhagen, Denmark [24] and university students in California, whose participation in a gardening program led to lower ethnocentrism, or the perception of “superiority of one’s own ethnicity over other ethnic groups” [25]. As some scholars have noted, gardening and food-growing practices in a community setting could create sociocultural environments where “ethno-religious divides and social class distinctions can be challenged and transcended via conviviality and gardening practices” [26]. Further, insights from a study in Washington, DC, point to urban agriculture’s role in nurturing geographies of self-reliance and serving as a tool to address “manifestations of structural violence: racist and classist depictions of low-income and working-class people, joblessness, gentrification, and youth underdevelopment” [27]. These findings were echoed by community gardeners in Frenchtown in Tallahassee [28], deemed to be Florida’s most cohesive and oldest African-American community, where vacant lots were transformed into places of engagement and empowerment and a means to resisting systemic racism. Based on insights from New York City’s urban agriculture movement, researchers, however, also caution that when measuring

social cohesion as a sociocultural benefit of urban agriculture, there is a distinction to be made between diversity and social cohesion, and that disparities and inequities can persist despite apparent diversity [29].

Increased civic engagement and empowerment were, in fact, recurrently noted outcomes across multiple and diverse urban agriculture settings and urban areas. For instance, in Prague, Czechia [30], urban gardens play a role in community involvement and social change, in Glasgow, UK [31], food-growing spaces promote community empowerment and the recovery of individual agency, whereas in Canada, cross-cultural gardens [32] can be a vehicle for community empowerment through the use of multiple cross-cultural activities (e.g., anti-racist workshops, traditional story-sharing, land-based learning, and cross-cultural food sharing). In Melbourne, Australia, participants saw community gardens as means to participate directly in the design of their neighborhoods [33]. Community gardens in Milwaukee, Wisconsin [34], serve as spaces for citizenship, encouraging transformative and empowering forms of civic participation and engagement. Some of these outcomes were also conceptualized and synthesized through the term “political gardening” as a manifestation examined in Cologne, Germany [35], and New Orleans [36], among other places.

Urban food-growing spaces can also serve as fertile, meaningful, and safe grounds for refugees to connect to a new country [37]. From humanitarian migrants from Africa in Australia [38] to Chinese immigrants in New Zealand [39], urban agriculture spaces have proved to support a sense of connectedness and cultural identity among these communities. A study of community gardens in multiple UK cities highlighted the role of these spaces in helping marginalized residents, such as refugees, ethnic minorities, and residents with mental illness, integrate into their local communities [40]. Similar sociocultural benefits were experienced also by long-term residents in places as different as Lincoln, Nebraska [41], Western Pennsylvania [42], East Harlem in New York [43], and Melbourne, Australia [33]. Participants noted gardens’ ability to foster a sense of belonging and a sense of pride in the community they live in, and a decreased likelihood of moving out. Similarly, community gardening was associated with higher levels of neighborhood attachment in Denver [44]. Interestingly, researchers in the Netherlands [15] found that social cohesion can be an outcome of community gardening even when the gardeners are not driven by social motivations.

Another sociocultural benefit of urban farming assessed in current literature is the ability of these spaces to nurture post-disaster social resilience. Evidence from the period after Hurricane Katrina in New Orleans in 2005 [36,45], Hurricane Sandy in New York City in 2012, and the 2010/2011 Canterbury Earthquakes in Christchurch, New Zealand [46], indicates that community gardens, through the social networks and relationships of trust they nurture, can help their participants and surrounding communities to better cope with the stress and disruptions caused by such catastrophic events.

In prior urban agriculture research e.g., [47–49], beyond the time frame for the sample of studies in this paper, community gardens have been also found to affect crime rates or perceived safety in a neighborhood. This finding was confirmed by several studies in our sample as well. Gorham and colleagues, for instance, noted that study participants reported greater perceived sense of safety and immunity to crime in Houston, Texas [50]. Similar findings were noted by urban farmers in Denver, Colorado [51]. More broadly, urban gardens and farms were found to lead to increased social capital [24,52], which can be construed as the “features of the social structure, including social interactions, networks, norms, and values, that act as resources for people and/or enable people to work together for mutual benefit” [52].

3.2.2. Health and Well-Being

Studies seeking to assess and make visible the relationship between involvement in or exposure to urban food-growing practices and community health and well-being outcomes constitute the second largest group of studies in the sample of articles we examined

(Figure 6B). Among these, about a third (32%) comprised studies with outcome variables focusing on healthy eating habits and fruits and vegetable consumption. Importantly, close to a quarter of the studies (24%) included an explicit focus on the nexus between urban agriculture and its effects on the emotional and mental well-being of participants. A similar portion of the sample (23%) investigated the role of urban farming and gardening in increasing food security. Finally, several studies also examined the extent to which urban farming affects physical activity (14%) and leads to an improved body-mass index (BMI) (7%).

Gardening has been found to directly lead to improved fruit and vegetable intake in Denver, Colorado [19], and Jimma Zone, near Addis Ababa in Ethiopia, where a nutrition intervention supported with backyard gardening increased dietary diversity among school adolescents [53]. A campus–community project in Baltimore, Maryland [16] conceived as a tool for student service-learning approach also found that the garden helped increase fruit and vegetable consumption, physical activity, and environmental awareness of the students involved. School gardens, when used as a component of nutrition education, have also been found to increase fruit and vegetable knowledge and lead to behavior change among elementary school children in Auburn, Alabama [54]. A study of fifty randomly selected woman in Qwa-Qwa, Free State province, South Africa also revealed that outcomes of nutrient adequacy and overall dietary diversity can be positively influenced by holistic interventions combining vegetable gardening with nutrition education and food preparation skill training [55].

A significant number of studies (more than 60) in our sample also discussed the outcomes from and exposure to, or knowledge about, urban food-growing related to increased mental health and emotional well-being. A study of more than 100 allotment gardeners in the UK [56], for instance, indicated that urban food-growing holds promise as a preventive health measure. Compared to non-gardeners, gardeners reported greater self-esteem and mental well-being, experiencing less depression and fatigue. Interestingly, researchers also noted that the independent variables of time spent on the allotment or length of tenure affected urban gardening’s impact on the mental health outcomes of interest in a statistically significant way. A study of community gardening in Melbourne, Australia [11], mirrored these findings adding emphasizing the role of these spaces not only as a preventive measure, but also as vital spaces for people recovering from mental ill-health through social inclusion and the creation of a safe learning and occupational environment, which may not be otherwise available or accessible. Other researchers have found that emotional well-being markers such as joy and personal fulfillment were consistent and prevalent outcomes of gardening over time [57].

A subset of studies specifically focused on mental health outcomes for youth. A study on the West Coast of Canada [58], for example, using photovoice, uncovered how young people’s involvement and exposure to school or community gardens, a botanical garden and an urban farm positively affected their well-being, resiliency, inclusion, and a sense of belonging. A similar research project in Vancouver, British Columbia, Canada [59], pointed to the influence of school gardens on youth’s sense of relaxation and themes of love and connectedness, alongside the growing and cooking of food. Garden activities were also found to improve students’ self-esteem in Copenhagen, Denmark [60].

Finally, some studies used and reported on physical and mental health measures in tandem. Household gardens, for instance, were found to improve the psychological well-being in an urban slum in Lima, Peru, within a year after construction of the garden [61], whereas urban home gardens in Santa Clara County, CA, led to greater physical activity, mental health, and stress management [62]. Multiple studies in Denver noted that urban gardeners self-reported higher levels of mental and physical health [19,44,51]. Interestingly, one of these studies found that health benefits did not occur directly from participating in urban farming, but indirectly through the social and aesthetic benefits of community gardens [19]. In Japan, a survey of more than 300 individuals participating in an allotment garden revealed that allotment gardeners, when compared to non-gardeners, experienced

better general health, mental health, and social cohesion [63]. Of notice is that, in this study, there was no statistically significant difference in BMI outcomes between gardeners and non-gardeners. Lastly, a large-scale study of more than 8500 randomly selected secondary school students in New Zealand [64] revealed that involvement in home gardening was positively associated with healthy dietary habits (e.g., increased fruits and vegetable consumption), as well as improved physical activity and mental health, with students reporting lower levels of depressive symptoms.

3.2.3. Economic Opportunities and Workforce Development

An important yet underassessed socio-cultural benefit of urban food-producing spaces, and the social practices and enterprises they enable, is their role in fostering economic opportunities and workforce development. Most studies in our sample focused on household and community economic benefits derived from the production and sale (or personal consumption) of foods (29%), with some specifically focusing on cost savings (13%) to farmers and gardeners from growing their own food (Figure 6D). About a fifth of the papers also noted the link between urban farming and effects on land tenure (21%) and related economic gains. Related to the land use dimension, some studies (17%) focused explicitly on the relationship between urban food-producing spaces, including community gardens, and gentrification of the surrounding communities. Overall, about a fifth of the papers (20%) focused on outcome variables pertinent to increased job or income opportunities for the individuals engaged in urban food-growing spaces and practices.

Among the papers which investigated the relationship between urban food-growing spaces and economic outcomes or neighborhood dynamics, such as gentrification, of notice is the study by Maantay and Maroko [65] in Brooklyn, New York, which looked at changes in per capita income between 2010 and 2015 in areas in proximity to community gardens. In this setting, researchers found that proximity to food-growing spaces was associated with significant increases in per capita income over the five years examined, and was a marker for communities undergoing gentrification. Others examined the dimensions of ecological gentrification, such as the studies in St. Louis, Missouri [66], and Portland, Oregon (Goodling et al., 2015).

Some scholars captured also the negative social outcomes associated with processes of gentrification. One study, for instance, looked into the community gardening landscape of central California and revealed how gentrification had a negative impact on the social relationships in the community and caused tensions in the gardens themselves [67]. Taking a dialectic approach, another study in San Francisco, California, found that “beautification does not, in and of itself, either enhance gentrification or fend it off” but, rather, “it is the meaning that participants inscribe in their practice that endows, or fails to endow, organized garden projects with collective empowerment potential” [68].

3.2.4. Education

Education is a central aspect and socio-cultural benefit of school-based gardens and farms, but current evidence clearly indicates that it also applies to other urban food-growing settings (e.g., community gardens, urban farms), in part because these gardens and farms often host students or provide educational activities. Additionally, urban agriculture-related practices and education stretches beyond knowledge about gardening and farming alone to encompass “food civics” skills, management skills, professional skills, healthy nutrition literacy, cooking skills, an understanding of the food system, and more. In fact, from our sample, only about a third (30%) of the studies focused on education benefits directly related to the development of gardening skills and food-growing knowledge (Figure 6C). The rest of the papers emphasized opportunities for increased knowledge on healthy nutrition (23%), personal growth and confidence (19%), and learning more broadly (19%). Several of the studies also stressed the benefit of using gardening projects as tools for greater student engagement (10%).

A study of more than 300 middle school students in the Pacific Northwest, for instance, measured student engagement as it related to participation in school gardens [69], finding statistically significant associations between gardening and both potential academic outcomes such as learning and achievement as well as engagement in science and school and academic self-perceptions. Other scholars have found gardening to substantially decrease school failure, reduce the dropout rate from an initial 30% to zero, and improve disruptive episode control in the classroom [70], thanks to the increased self-esteem and self-confidence of students. Further, a research based at a teaching farm in Birmingham, Alabama, found that involvement in school-based urban farming fostered students' social-emotional growth, promoted school connectedness, and encouraged students to become agents of change in their own communities [71].

3.2.5. Relationships between Exposure and Outcomes

Current peer-reviewed literature also sheds light on whether and in what ways urban agriculture spaces and practices promote, adversely affect, or have no impact on different socio-cultural outcomes. A limitation, as noted in Section 3.2, is that most studies rely on small samples and thus primarily focus on whether a benefit was perceived or manifested, rather than assessing the statistical significance of the relationship between exposure to urban agriculture and a given outcome. Most of the studies (72%) reported a positive association between urban farming and one or more of the four outcomes of interest (Figure 7). This is consistent with findings and critiques from prior studies noting the overwhelmingly positive and celebratory assessments in the literature on urban agriculture [72], in part due to urban farming research still being a fledgling subdiscipline within the social sciences. A smaller share of studies found a mixed (16%) relationship between urban farms or gardens, and some of the socio-cultural benefits of interest. Of notice is that only 4% or around a dozen studies in our sample noted a negative relationship, mostly in the context of adverse outcomes due to "green gentrification" [73,74] and the subsequent displacement of established communities.

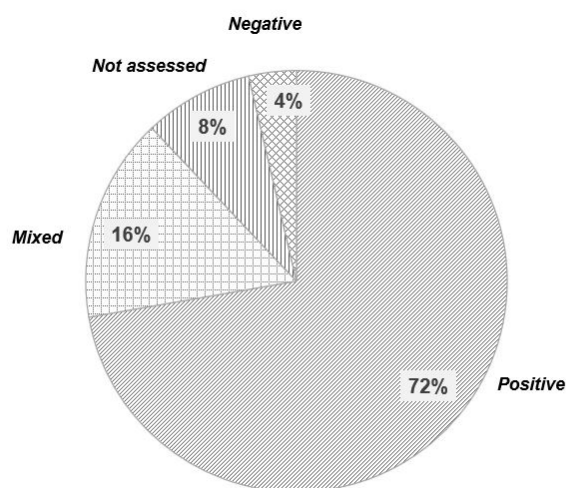


Figure 7. Studies ($n = 272$) by relationship assessed between gardening and the measured outcome/s.

3.3. Methods and Approaches Used to Explore the Social-Cultural Benefits of UA

Assessing and quantifying the socio-cultural benefits of urban agriculture is still an emerging field of research, and thus there is no established single epistemological framework or set of research procedures to adhere to. In fact, the studies analyzed in this literature review indicate a wide range of research methods and approaches being tested which reflect the different scientific fields in which they are situated (e.g., sociology, human geography, public health, economics, etc.).

Overall, in our sample, qualitative research designs were prominent (42%), though quantitative (35%) and mixed (23%) studies have been conducted as well (Figure 8A).

Among the qualitative research designs, case studies were the most common approach, adopted by almost half of the papers examined (48%), followed by ethnographies (25%) and phenomenological research (19%). Conversely, grounded theory (5%) and narrative approaches (3%) appeared in a modest share of the studies (Figure 8B). When considering the unit of analysis, the largest share of studies (70%) focused on individuals, followed by those investigating the socio-cultural benefits of urban agriculture at the organizational level (19%), or benefits among particular groups or communities (11%).

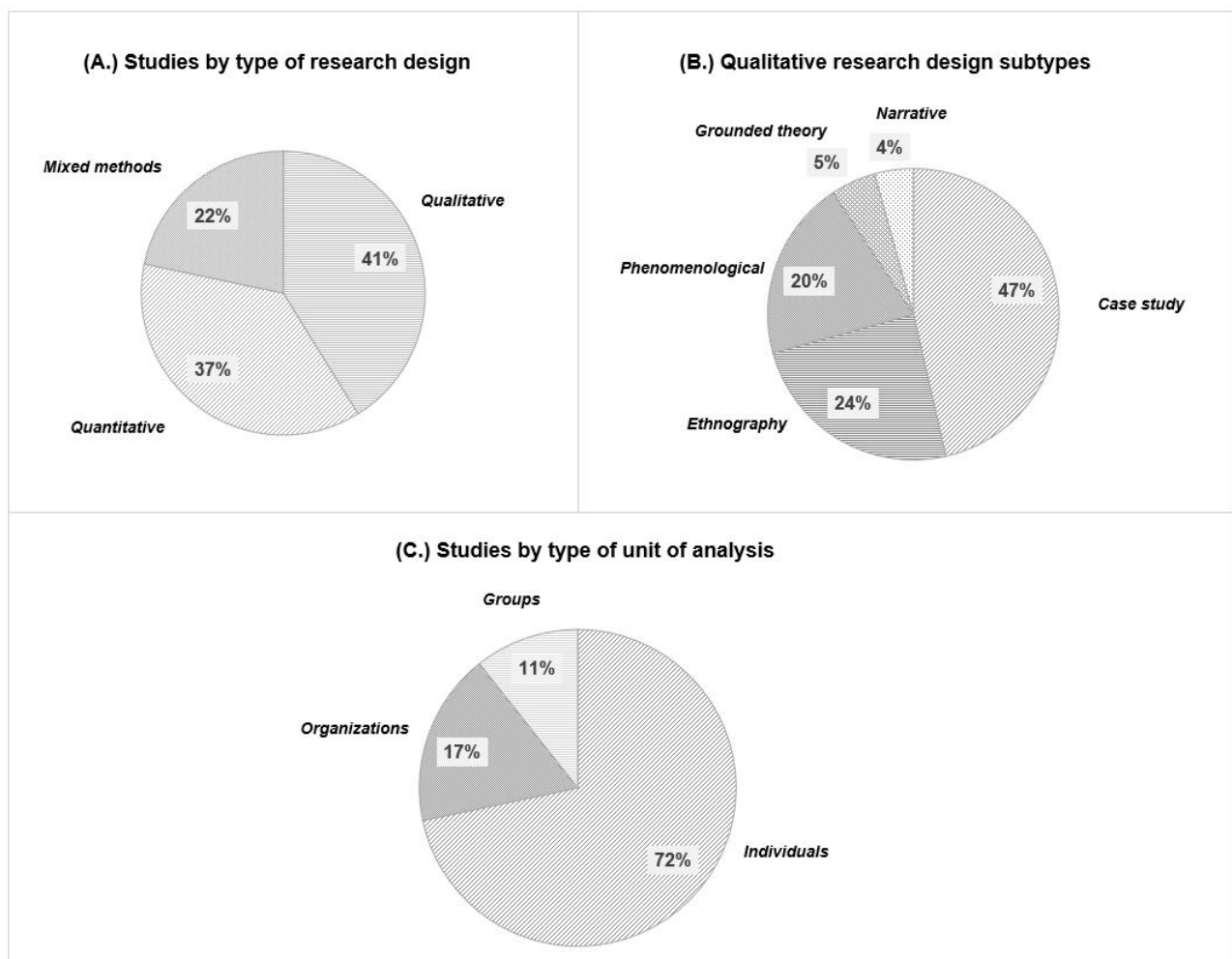


Figure 8. (A.) Studies by types of research design ($n = 272$), (B.) Qualitative research design studies sub-types ($n = 112$), (C.) Studies by unit of analysis ($n = 272$).

Data collection methods also varied across studies, and some studies deployed more than one data collection method (Figure 9). The two most common were interviews, adopted by more than half of the studies ($n = 147$), and surveys or questionnaires, used by almost half of the papers in our sample ($n = 133$). Other methods included observations ($n = 88$), document analysis ($n = 67$), focus groups ($n = 34$), geospatial analysis ($n = 11$), oral histories ($n = 6$), and photovoice ($n = 5$). Only one fifth of the studies assessed urban agriculture's socio-cultural benefits by deploying experiments or clinical trials ($n = 54$), and these were mainly carried out by scholars focusing on the measurement of health and well-being outcomes.

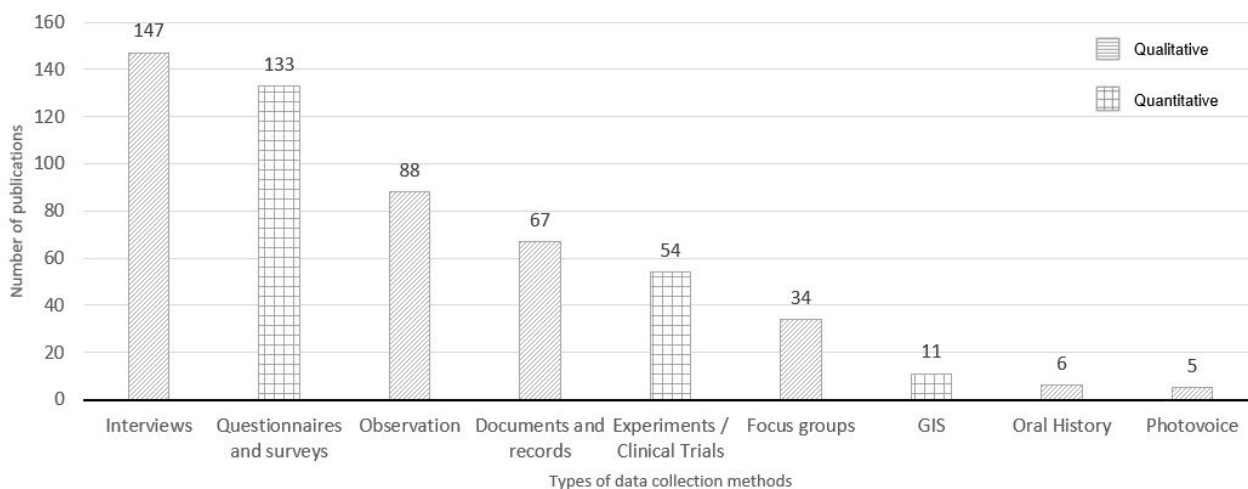


Figure 9. Types of data collection methods used in the studies examined. Note: Because many papers used more than one data collection method, the total number of publications represented in this chart exceeds the total number of unique papers part of the sample of publications ($n = 272$) analyzed in this paper.

The sample sizes and sampling methodologies on which scientists relied in their efforts to gauge the socio-cultural benefits of urban food-producing spaces offer additional insights into the types of studies carried so far and the extent to which claims about the generalizability of their findings can be made. About two thirds of the studies (67%) relied on small sample sizes, comprising less than 100 participating individuals, groups, or organizations (Figure 10), with samples under 50 participants representing almost half (49%) of all studies. About a fifth (22%) of the papers discussed findings based on samples of between 100 and 399 participants, and less than a tenth of the studies (8%) drew on samples between 400 and 1000 participants. Only about a dozen studies (5%) in our sample used large samples with more than 1000 research participants.

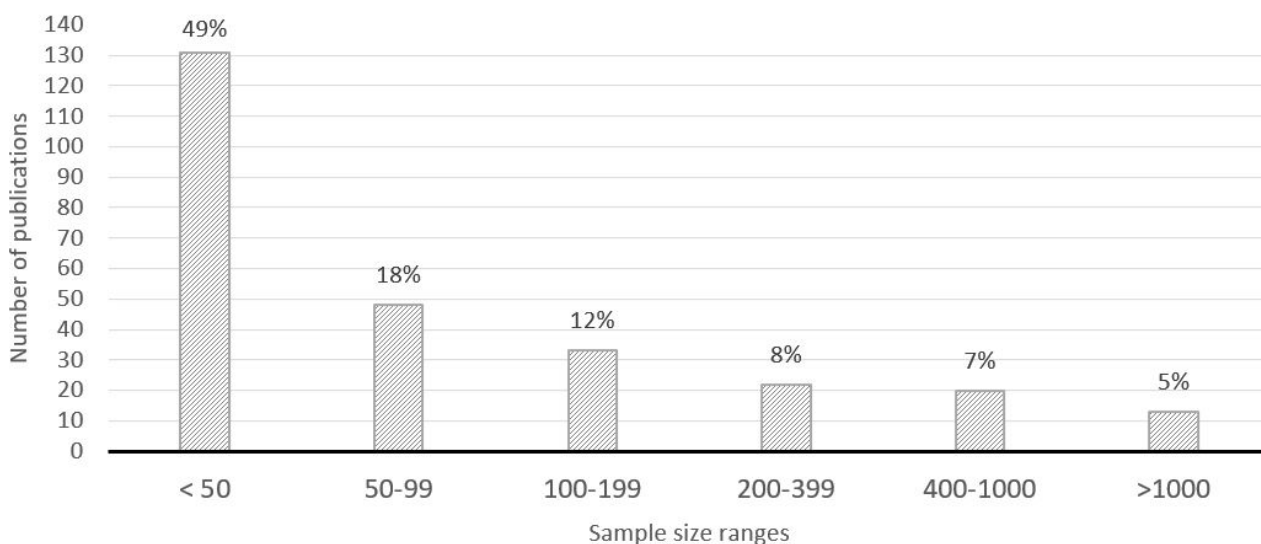


Figure 10. Types of sample sizes used in the studies examined ($n = 272$).

By large, the most common sampling method used was convenience sampling (Figure 11), adopted by more than half of the studies (53%), followed by purposive (17%) and snowball sampling (8%). Other sampling methods included simple random sampling (6%), stratified sampling (4%), and clustered sampling (4%). In a small number of isolated instances researchers used systematic (1%), multi-stage (1%), and multi-frame (0.4%) sampling.

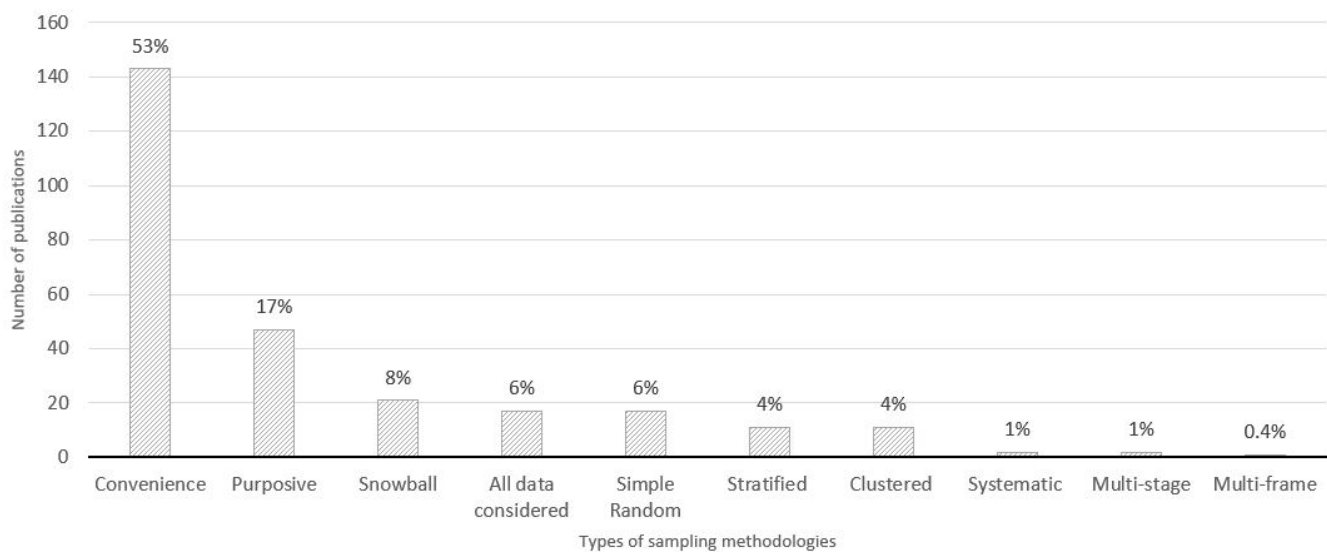


Figure 11. Types of sampling methodologies used in the studies examined ($n = 272$).

4. Discussion

The growth in urban agriculture over the past two decades has been accompanied by growing scholarly research on the effects of these projects on a wide range of outcomes. Most attention has focused on how much food urban gardens and farms grow, but increasingly this is viewed as a reductionist view of how urban agriculture affects urban life. A recognition that urban farms and gardens produce many co-benefits, some by design and some as unintended consequences, has encouraged researchers to measure and analyze these impacts. For example, reports from John Hopkins University [75], University of California [76], and Toronto Urban Growers [77] provide evidence of such co-benefits and suggest indicators to measure socio-cultural, health, economic, and environmental outcomes of urban agriculture. Scholarship has also emerged to critically assess the social justice outcomes of urban agriculture [75–77], examining the racial, ethnic, and class disparities that exist within urban agriculture organizations and farm and garden projects, examining who controls and benefits from food-growing activities, and scrutinizing instances in which urban agriculture risks perpetuating social divisions [78], with communities with a higher socio-economic status being able to access funding and land more easily than less-advantaged communities [29].

The studies we examined have been produced worldwide, yet are concentrated in high-income countries, particularly in the US, Canada, and Europe. This is likely a function of the location of urban agriculture researchers with funds to support this research, the growth of food planning in North America and Europe—that often includes policies to promote urban agriculture—and the development of socially oriented urban agriculture projects in these regions, from “care farms” in the UK to promote mental and physical health to gardens in North America designed to address various social problems. In low-income countries, urban agriculture is ubiquitous, yet these efforts are often informal and primarily aimed at food production.

While there was a growth overall in studies of the social impacts of gardens and farms, the research varied in scope and focus. Most of the studies in our sample measured the effects of gardens and farms on social cohesion and community engagement. This is not surprising given that urban gardens and farms are often civic spaces that typically allow public access, are cared for by community members, and often have activities to bring members of the project and the surrounding community together.

Although most research measured cohesion and engagement as outcomes, fewer studies in our sample analyzed the extent to which gardens encourage racial or ethnic diversity and cultural identity. Other research e.g., [13], documented gardens and farms

that engage in activities to fight racial, ethnic, gender, and class oppression, yet often these projects portray their work or are viewed by outsiders as primarily aimed at growing food, educating youth, or providing a gathering place for community members. The limited attention to issues of diversity and cultural identity may reflect less interest in this topic among researchers, or it may reflect a lack of awareness of these goals among urban farmers and gardeners. More research that explicitly examines the effects of urban agriculture on racial and ethnic solidarity, food sovereignty, and community-level racial justice would be valuable.

A particular gap in the research is on the potential for gardens and farms to affect perceived and real public safety. Studies in urban planning have examined the potential for the activation of urban spaces to reduce antisocial activity, including crimes, yet only 5% of the studies in our sample examined the effects of urban farms on the sense of safety. This is an area for potential future research, especially given the attention to public safety among urban policymakers.

Urban agriculture can mitigate obesity and diet-related health disparities by increasing the availability and consumption of fresh fruits and vegetables, and thereby reducing food insecurity and improving nutritional health [79]. The studies in our sample examining health as an outcome primarily measured the impact of urban farms and gardens on fruit and vegetable consumption and healthy eating habits. As urban farms and gardens enable individuals and non-profit organizations to produce their own food, researchers have measured food security as an outcome. These two outcomes are also theorized to lead to healthy BMI, a measure that was the outcome variable in 7% of the studies. A less prevalent outcome of analysis was emotional and physical health, which were outcomes included in only one in four studies in our sample. Quantifying the multiple and interconnected health impacts of urban agriculture can enable planners to appreciate this practice, not only in terms of food security, but also for its contribution in diverse areas [80] (Thibert, 2014) including public health. This can lead to increase public investments in farms and gardens.

Urban farms and gardens have been theorized to be effective spaces and activities for science, technology, and math (STEM) education as well as the transmission of skills and ecological knowledge across generations [81]. Yet the most common educational outcome in our sample of studies was increased gardening skills, the most direct outcome of growing food. Research studies have also measured the effects of urban agriculture on participants' knowledge of nutrition and healthy eating. Both outcomes reflect a narrow focus on food growing as the primary activity associated with urban farms and gardens rather than second-order activities involved in growing food, such as group planning and collaboration, leadership and communication, problem solving, and general opportunities to learn about nature, the community, racial justice, or other topics related to urban food systems.

Given the tendency for policymakers to evaluate urban agriculture using a cost-benefit framework, it is not surprising that 20% of the studies in our sample analyzed the economic impacts of farms and gardens. Although the diverse co-benefits of urban agriculture have monetary value, nearly one in three studies in our sample measured economic benefits associated with food production. Perhaps the focus on quantifying the value of the food grown is that food has a clear, tangible, and easily quantifiable economic value. However, the focus on the value of food production perpetuates the notion that food is the primary objective and outcome of urban farms, which shifts research attention from other important yet less easily monetizable outcomes like social cohesion or quality of life. A case in point is a cost benefit analysis study on a London community garden, demonstrating that, when physical and social benefits are accounted for (i.e., harvest and improvements in well-being of gardeners), the cost to benefit ratio reaches 1:3 [82]. Many urban agriculture projects in the Global North engage young people in skills development, workforce development, and employment training [83–85]. One in five studies in our sample measured the job and income effects of farming and gardening.

The results of most (71%) studies were positive, finding net benefits associated with urban agriculture. Only 5% of the studies in our sample reported exclusively negative social

impacts. This may be the result of urban farms and gardens being perceived as generally beneficial in communities, resulting in positive survey and interview responses. It also may reflect biases inherent in those studied, namely the farmers and gardeners who participate in these programs. As urban agriculture is a voluntary activity, participants generally engage in gardening and farming because they perceive the experience to be positive. Those who have had negative experiences are probably less likely to be sampled by researchers. Few studies examine effects on the broader community. One of the negative economic impacts of urban agriculture is its role in fostering gentrification, or increased property values that attracts more affluent residents and displaces longstanding residents. About 17% of the studies examined the potential for urban agriculture to prompt or accelerate gentrification.

The literature on the social impacts of urban agriculture would benefit from empirical studies using quantitative or mixed methods approaches [86,87]. In general, qualitative research has been common in urban agriculture research, especially studies about social and cultural impacts. Though 35% of the papers in our sample used some type of quantitative analysis, more than half were based on interview data, while only one in five used an experimental or clinical trial design. Interviews and questionnaires were the most common methods used to conduct research, with nearly half (46%) of studies examining small samples (fewer than 50 individuals). Half of the studies used convenience samples, with only about 15% using a randomized sampling method.

Furthermore, qualitative studies typically involved case study research. While valuable for in-depth analysis of the reasons why urban farms and gardens produce certain social outcomes, case studies are not generalizable to the population of urban farms and gardens. Additional larger scale and comparative cross-national studies e.g., [14], would be helpful to explain differences in physical design, location, program implementation, and other factors that may account for differences in the effects of farms and gardens.

In addition to an increase in quantitative or mixed methods research, studies should focus on the larger communities that host urban farms and gardens to understand how impacts extend beyond the participants to their networks in surrounding communities. Studies in our sample overwhelmingly (70%) examined the individuals involved in urban agriculture, rather than the organizations running farms and gardens or the groups that gardeners belong to. None of the studies that were included in our sample used the wider community or city as the unit of analysis.

Novel data collection methods might make these studies easier and less costly. Some methods might include the use of big data to measure ecological benefits from urban farms and gardens or community-scale social impacts. Crowdsourcing information on social outcomes from urban agriculture and citizen science efforts to measure benefits of importance to community members would engage practitioners in data collection (see also the FEW-meter project at <http://www.fewmeter.org> (accessed on 11 March 2022)). Studies assessing the impacts of urban agriculture on surrounding real estate values, development patterns, and displacement would also be valuable.

An emerging area of research is whether commercial urban agriculture produces socio-cultural benefits and how the social impacts of these farms compare with farms operated by non-profit organizations or collective groups of gardeners. Some of the outcomes (e.g., jobs and wages for urban farmworkers, the reuse of old industrial buildings) might be beneficial to participants and surrounding communities, yet the effects depend on many variables, such as wages and working conditions, the type of food produced and its price and distribution channel, and the extent to which local residents are involved.

This paper's findings have implications for researchers using urban agriculture as a lens to theorize cities as socio-ecological systems and working to provide empirical evidence on the socio-cultural benefits of urban agriculture. Future research on the state of the art of this field should focus on conducting meta-analyses of the quantitative studies in the sample to assess consistency and generalizability of individual findings, and should include studies on the economic dimensions of urban agriculture, including how it relates to broader processes of urban development and social equity.

Some of the limitations of this literature review include the fact that it focused on empirical studies only, thus excluding conceptual contributions and other review articles. The review also covered a limited time period between 2009 and 2019, or the decade preceding the COVID-19 pandemic, which may have further deepened scholarship on the social and cultural benefits of urban farming and gardening spaces in dense urban areas. It also has to be acknowledged that the outcomes of urban farming are related to the policy makers' decisions on the targeted people and related objectives to be achieved. Examining the degree of achievement of pre-set goals would have gone beyond the scope of this paper, but would be a valuable topic for future empirical research across the geographic contexts examined. Especially considering that these data are not readily available without additional primary data collection. Finally, the boundaries between the different social and cultural dimensions examined in this paper are inherently intertwined and therefore not always easily fall in discrete thematic categories.

5. Conclusions

In conclusion, our literature review revealed that the nascent academic literature on the social and cultural effects of urban agriculture prioritized assessments focusing on community cohesion and health and well-being outcomes, and to a slightly lesser extent on education and economic development. Much of the literature lacks empirical research and most empirical studies are qualitative, with a strong emphasis on case studies. More than half of the studies collected data through interviews and about a fifth used an experimental or clinical trial design. Few studies measured the degree of exposure to urban agriculture (e.g., through time spent gardening), instead treating participation as a dichotomous independent variable. The top two dependent variables were measures of community cohesion (e.g., perceived trust within the community) and the diets of gardeners (e.g., fruit and vegetable consumption). Despite the limitations of any literature review, our findings suggest several research gaps that need to be filled to measure social and cultural benefits more reliably: larger samples, cross-national research, and randomized control trials or similar methods to assess the effects of participation in urban agriculture activities.

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