Title
Emerging Topics in Food Insecurity: An Assessment of University Student Food Access and Urban Agriculture in Los Angeles

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Publication Date
2018

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

Emerging Topics in Food Insecurity:

An Assessment of University Student Food Access and Urban Agriculture in Los Angeles

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Environmental Health Sciences

by

Tyler Doyal Watson

2018

ABSTRACT OF THE DISSERTATION

Emerging Topics in Food Insecurity:

An Assessment of University Student Food Access and Urban Agriculture in Los Angeles

by

Tyler Doyal Watson

Doctor of Philosophy in Environmental Health Sciences

University of California, Los Angeles, 2018

Professor Hilary Godwin, Chair

Food insecurity, defined as an uncertain or limited ability to get adequate food due to lack of financial resources, is a persistent issue in the City of Los Angeles. Traditional food assistance programs are underutilized and inadequate, and some populations who experience food insecurity have been overlooked in survey efforts. The work presented here investigates two emerging topics in food insecurity: food insecurity among college students and the potential for urban agriculture to address food insecurity in Los Angeles.

First, focus group interviews were conducted with a diverse sample of 82 college students at the University of California, Los Angeles to explore student experiences, perceptions, and concerns related to food insecurity. We found that food insecurity is an invisible issue on campus that carries stigma, and the cost of attendance is a challenge for many students. Students who experienced food insecurity reported negative academic impacts, mental and physical health

consequences, and disaffection from the university. In general, students wanted a greater awareness around food insecurity and food resources, and opportunities to learn life skills including cooking and budgeting.

Second, a geospatial analysis was conducted to assess the extent of urban agriculture (UA) in the City of Los Angeles and theoretical vegetable production was calculated for city vacant land. While UA could not meet the need for the entire population, it could theoretically meet the need of the food insecure population. UA is unevenly distributed across the city. High need areas of the city do appear to be alleviated by the presence of UA sites, but generally have less vacant land for future UA sites. A recent tax incentive program may help increase the number of UA sites in the city.

Third, current UA policy and planning was reviewed in the City of Los Angeles including a document analysis of three recent city plans. In general, Los Angeles is behind other cities in its support of UA, but has made substantial progress in recent years. Key recommendations include updating zoning, implementing a public land leasing program, subsidizing water rates, creating a city-wide UA network, and collecting additional UA data.

The dissertation of Tyler Doyal Watson is approved.

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2018

DEDICATION

For my family, friends, colleagues, and mentors who have supported me on this journey.

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GLOSSARY

Abbreviation	Name
APC	Area Planning Commission
CFS	Community Food Security
COA	Cost of Attendance
CPA	Community Plan Area
CSA	Community Supported Agriculture
EBT	Electronic Benefit Transfer
FAR	Floor Area Ratio
GFFA	Good Food for All Agenda
HNMN	Healthy Neighborhood Market Network
LA	Los Angeles
LACGC	Los Angeles Community Garden Council
LADWP	Los Angeles Department of Water and Power
LAFPC	Los Angeles Food Policy Council
LEED	Leadership in Energy and Environmental Design
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer
NSLP	National School Lunch Program
PHLA	Plan for a Healthy Los Angeles
SCP	Sustainable City pLAn
SNAP	Supplemental Nutrition Assistance Program
SUSMP	Standard Urban Stormwater Management Plan
UA	Urban Agriculture
UAIZ	Urban Agriculture Incentive Zone

UC	University of California
UCCE	University of California Cooperative Extension
UCLA	University of California, Los Angeles
UCUES	University of California Undergraduate Experience Survey
USDA	United States Department of Agriculture
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children

ACKNOWLEDGEMENTS

I would like to thank my primary advisor, Hilary Godwin, for her support and guidance during my graduate public health career. Her enthusiastic support allowed me to pursue a range of public health research and practice opportunities and maximize my time at UCLA. I am grateful to Hilary for her holistic approach to public health research and practice, and her dedication to her students that transcends a typical advisor relationship. Your tireless dedication and support of students and teaching has inspired me throughout my graduate career.

Thank you to Wendy Slusser for mentorship and support through various research projects and the opportunity to be a longstanding part of the UCLA Health Campus Initiative. Your encouragement and contagious positivity helped keep me motivated, and I continue to be inspired by your strong and exemplary leadership. Thank you to Dr. Richard Jackson who helped recruit me to Environmental Health, sparked my interest in public health and the built environment, and supported my first research projects at UCLA that led to many miles of urban bicycle commuting.

Many colleagues provided assistance and contributed to parts of my research. Thank you to Hannah Malan for your collaboration through student focus group research and multiple Healthy Campus projects. Thank you to Suzanna Martinez, UC ANR Nutrition Policy Institute for guidance throughout qualitative research efforts. Thank you to Ruben Canedo, Tim Galarneau, and Lorrene Ritchie for expert input and manuscript review and supporting my work through the UC Global Food Initiative. Thank you to many individuals at UCLA who helped with the coordination of student focus groups including Karen Hedges, Louise Ino, Chidera Izuchukwu, Antonio Sandoval, Jeanne Roe Smith, and Gabrielle Stolwyk. I also owe a special thanks to the

UCLA students who thoughtfully shared their experiences with me. Thank you to Rachel Surls at UC Cooperative Extension for sharing data, providing insight, and reviewing my urban agriculture work. Thank you to David Cleveland at UC Santa Barbara for assistance with small scale agriculture yields, and for helping to foster my interest in food systems research as an undergraduate. Thank you to Keith Pezzoli and Thomas Whitenack at UC San Diego for assistance with urban agriculture incentive zones tax analysis. Thank you to the Los Angeles Food Policy Council Urban Agriculture Working Group for supporting and encouraging my work.

My graduate studies have been financially supported by several fellowships from the UCLA Graduate Division including:

- UCLA Dissertation Year Fellowship;
- UCLA Affiliates Fellowship;
- UCLA Charles F. Scott Fellowship;
- UCLA Dr. Ursula Mandel Scholarship;
- UCLA Graduate Research Mentorship Program Fellowship;
- UCLA Graduate Summer Research Mentorship Program Fellowship;
- UCLA Faculty Women's Club Scholarship.

I have also received financial support from the UCLA Fielding School of Health Department of Environmental Health Sciences, a UCLA Sustainable LA Grand Challenge Powell Policy Fellowship, and the UCLA Healthy Campus Initiative, envisioned and supported by Jane and Terry Semel. The research presented in this dissertation was supported by the UC Office of the President Global Food Initiative, and the UCLA Healthy Campus Initiative, envisioned and supported by Jane and Terry Semel.

Chapter 2 is a version of a manuscript that was published in *California Agriculture* in September 2017. I conducted the focus group interviewing, data analysis, and writing for the food security topic; I was also the primary correspondent throughout manuscript submission and editing. Hannah Malan facilitated focus group interviewing, data analysis, and writing for the food literacy topic. Co-authors Suzanna M. Martinez and Deborah Glik provided guidance on qualitative study design and data analysis, as well as manuscript review. Wendy Slusser also provided guidance and manuscript review. Chapter 3 is a manuscript in preparation that will be submitted in summer 2018. Rachel Surls provided urban agriculture data and research guidance, as well as reviewed an early version of the manuscript. David Cleveland assisted with the assessment of urban agriculture yield data sources. Keith Pezzoli and Thomas Whitenack provided guidance for the tax analysis. Hilary Godwin contributed to the writing and editing of the manuscript. Chapter 4 is also a manuscript in preparation that will be submitted in summer 2018. Hilary Godwin helped design the research approach and contributed to the writing and editing of the manuscript.

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- **Watson, T**, Malan, H, Glik, D, & Martinez, S. 2017. College students identify university support for basic needs and life skills as key ingredient in addressing food insecurity on campus. *California Agriculture, 71*(3), 130-138. doi: 10.3733/ca.2017a0023

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PRESENTATIONS

- "Food Insecurity Among College Students: Challenges, Consequences, and Solutions" 11th Annual Sugar, Stress, Environment & Weight (SSEW) Symposium, Invited Oral Presentation. UCLA, October 2017.
- "Urban Agriculture in Los Angeles County: An Assessment of Community Access to Local Food" UCLA Sustainable LA Grand Challenge Research Symposium, Oral Presentation. UCLA, May 2017.
- "The Student Food Struggle: Understanding Food Insecurity and Food Literacy Among University Students" Southern California Public Health Association (SCPHA) Annual Conference, Oral Presentation. Los Angeles, CA, December 2016.
- "A Collective Impact Framework in College Health and Wellness: The UCLA Healthy Campus Initiative" 144th American Public Health Association (APHA) Annual Meeting, Poster Presentation. Denver, CO, October 2016.
- "Urban Agriculture in Los Angeles County: An Assessment of the Potential to Improve Food Security" 143rd American Public Health Association (APHA) Annual Meeting, Oral Presentation. Chicago, IL, November 2015.

CHAPTER 1: INTRODUCTION AND OVERVIEW OF THE ORGANIZATION OF THE THESIS

OVERVIEW OF FOOD INSECURITY

Despite efforts over the last century to reduce and eliminate "hunger" in the U.S., food insecurity (defined as an uncertain or limited ability to get adequate food due to lack of financial and other resources) remains a persistent problem in the United States (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2017). Food insecurity is considered to be a social and economic condition typically measured at the household level, whereas hunger is a physiological condition that can result from experiencing food insecurity (USDA Economic Research Service, 2017). Food insecurity is typically assessed by survey instruments as two levels of severity: *low food security* includes reports of reduced quality, variety, or desirability of diet, and *very low food security* includes reports of multiple indications of disrupted eating patterns and reduced food intake (USDA Economic Research Service, 2017). In the most recent national survey in 2016, approximately 12.3% (15.6 million) U.S. households reported experiencing food insecurity, including 4.9% (6.1 million) households that reported experiencing very low food insecurity in which eating patterns were reduced or disrupted (Coleman-Jensen et al., 2017). A total of 41.2 million Americans live in food insecure households, including 12.9 million children (Coleman-Jensen et al., 2017). Households that do not experience food insecurity are considered to "food secure", meaning that all household members had access at all times to enough food for an active, healthy life (Anderson, 1990).

While the prevalence of food insecurity has been declining or stabilizing in recent years, it has not yet returned to pre-recession (pre-2008) levels. Like many other public health issues, food insecurity disproportionately affects vulnerable segments of the population. The national prevalence of food insecurity is 12.3% (Coleman-Jensen et al., 2017). For low-income

households with incomes less than 185% of the Federal Poverty Level, the prevalence is 31.6%. For households with children headed by a single woman, the prevalence is 31.6%, and for households headed by a single man, it is 21.7%. Households headed by Black non-Hispanics and Hispanics also report higher prevalence of food insecurity (22.5% and 18.5%, respectively), as do households with children (16.5%), men living alone (14.3%) and women living alone (13.9%). Prevalence is also higher for households in rural areas (15.0%) (Coleman-Jensen et al., 2017).

Food insecurity has a range of implications for individual and population health. A growing number of studies have found associations between food insecurity and negative health outcomes in several subpopulations in the United States and Canada. In adults, food insecurity has been linked to health problems including low nutrient intakes, micronutrient deficiencies, obesity, diabetes, hypertension, hyperlipidemia, mental health problems (including depression), poor sleep quality, oral health problems, and being in fair or poor health (Gundersen & Ziliak, 2015). In addition, food-insecure mothers are far more likely to report negative health outcomes (including mental health and oral health problems) compared to food-secure adults (Gundersen & Ziliak, 2015).

Most studies of food insecurity and the negative health outcomes of food insecurity have been focused on children. These studies have demonstrated that food insecurity among children is associated with higher rates of low nutrient intake, birth defects, anemia, poor oral health, asthma, cognitive and behavior problems, depression, aggression and anxiety, and a higher risk of being hospitalized. Children in food-insecure households have been shown to have two to three times higher odds of having anemia, two times higher odds of being in fair or poor health,

and 1.4 to 2.6 times higher odds of having asthma compared to children in food secure households (Gundersen & Ziliak, 2015).

The effects of food insecurity on health are both short term (e.g., reduced food and nutrient intake leading to anemia) and long term (e.g., higher rates of obesity and other chronic diseases) (Seligman & Schillinger, 2010). Chronic health impacts of food insecurity are theorized to result from the cyclical nature of food insecurity, in which households have alternating periods of food insecurity and food security over time. This leads to overeating when food is readily available and preferences for energy dense foods, and ultimately contributes to the development of chronic diseases such as obesity and diabetes (Seligman & Schillinger, 2010).

The poor health outcomes associated with food insecurity have a substantial impact nationwide. The health-related costs of food insecurity in the United States in 2014 were estimated to be $160 billion (Cook & Poblacion, 2016). This estimate includes direct costs of treatment for diseases and health conditions and indirect costs of lost work productivity that can be plausibly attributed to household food insecurity. When the costs of special education in public primary and secondary schools and the total cost of school dropouts are included, the total societal cost rises to $179 billion (Cook & Poblacion, 2016).

FOOD INSECURITY IN LOS ANGELES

People in the City of Los Angeles experience many health disparities and inequitable access to resources, including green spaces and healthy food. Los Angeles is part of the second largest metropolitan area in the United States, with a city population of four million people and an area sprawling 469 square miles (United States Census Bureau, 2017). Many urban census tracts in

the City of Los Angeles are federally designated food deserts. These areas lack access to grocery stores and other fresh food, and are inundated with fast food restaurants, corner stores, and other food retail outlets that typically lack healthy, affordable food (Los Angeles Department of City Planning, 2015). Los Angeles County has the largest food insecure population in the United States: 29% of Angelenos living below 300% of the Federal Poverty Level ($70,872 for a family of four) are food insecure, equivalent to about 561,000 households or 1,683,000 people (Los Angeles County Department of Public Health, 2017). In Los Angeles County, populations with higher than average prevalence of food insecurity include segments of the population with lower income, lower levels of education, higher unemployment, and a higher percent of minority residents. Latinos comprise over two-thirds of food insecure households in Los Angeles (Los Angeles County Department of Public Health, 2017). Assuming the County prevalence of food insecurity applies to the most recent population estimate for the City, there are approximately 660,000 food insecure people in the City of Los Angeles. Like many other poor social conditions and health outcomes, food insecurity is concentrated in certain geographic areas in the city, including South and Southeast Los Angeles.

FOOD INSECURITY AMONG COLLEGE STUDENTS

A population that has been overlooked until recently in food insecurity surveys and studies are young adults, particularly college students. Students have unique challenges related to food and nutrition, and common misconceptions about college students may have contributed to a lack of attention and support for student food insecurity. One misconception is that most college students are completely provided for by their family and/or academic institution. This perception ignores the reality that there is a large number of first-generation college students, many of whom are from low-income backgrounds. The rising cost of attendance for colleges and universities nationwide also may impact student food insecurity. For example, the University of

California (UC) currently enrolls over 40% first-generation students across 10 campuses. Tuition and fees in the UC system have increased by nearly 100% in the past 10 years (University of California Office of the President, 2016). Another unhelpful perception is the stereotype of the "starving student," which normalizes struggles with finances and food as part of the college experience. In addition, admitting real struggles with affording food carries stigma and shame, so the issue of food insecurity is often unseen and therefore unaddressed. These perceptions may have contributed to student food insecurity being overlooked as an issue to be seriously studied or addressed on college campuses in the United States.

A few recent studies have started to document food insecurity among college students. At the time of data collection for **Chapter 2**, only eight peer-reviewed studies had been conducted on food insecurity among college students, including five in the United States (Gaines, Robb, Knol, & Sickler, 2014; Hanna, 2014; Maroto, Snelling, & Linck, 2015; Patton-López, López-Cevallos, Cancel-Tirado, & Vazquez, 2014; Pia Chaparro, Zaghloul, Holck, & Dobbs, 2009) and three in Australia (Gallegos, Ramsey, & Ong, 2014; Hughes, Serebryanikova, Donaldson, & Leveritt, 2011; Micevski, Thornton, & Brockington, 2014). All of these prior studies were cross-sectional surveys and had relatively small sample sizes. In addition to these peer-reviewed studies, two extensive reports on food insecurity in college students had also been published in the gray literature at the time that the work in **Chapter 2** was performed (Freudenberg et al., 2011; S. Goldrick-Rab, Broton, & Eisenberg, 2015). The largest of these was conducted across 10 community college campuses and had a sample size of about 4,000 individuals, by far the largest sample in the U.S. at the time (S. Goldrick-Rab et al., 2015). Almost all of these studies indicate that food insecurity prevalence is substantially higher among college students (ranging from 14%-72%) compared to the general population (12.3% in the United States). They also reveal that food insecurity among college students is associated with low income, holding a job,

and participating in food assistance programs. Collectively, these studies suggest that elevated levels of food insecurity in college students may be caused in part by increasing financial pressures due to rising college tuition as well as inadequate financial aid, leaving students struggling to afford basic needs such as housing and food.

The studies reported to date provide only limited insights into the consequences of food insecurity for college students. Those studies that have investigated this issue reveal that food insecure students are more likely to self-report being in fair or poor health, have more mental health issues such as symptoms of depression, and have lower academic performance compared to food secure peers (Freudenberg et al., 2011; Micevski et al., 2014; Patton-López et al., 2014). These studies are consistent with studies of food-insecure school-aged children, which have shown associations between food insecurity and poor psychological and cognitive functioning as well as diminished academic performance (Gallegos et al., 2014). The limited literature suggests that food insecurity impacts for college students are likely to be profound. This literature highlights the need for further studies that would provide a more complete understanding of the factors that contribute to food insecurity in college students and how food insecurity impacts this unique population. Such studies would begin to create an essential evidence base to inform strategies to alleviate food insecurity on college campuses.

In addition to a need for more quantitative surveys, there is a need for *qualitative* data on the how college students experience food insecurity and for studies that highlight best practices for effectively addressing food insecurity among college students. Prior to the study reported in **Chapter 2**, there were no published qualitative data on the college student experience of food insecurity including perceptions, attitudes, and beliefs. Furthermore, there are still no peer-

reviewed assessments of best practices for addressing student food insecurity on college and university campuses in the United States.

In **Chapter 2**, we report on a qualitative study that utilizes focus group interviews to explore university student awareness, experiences, perceptions, and concerns related to food insecurity. The results of this study help to validate findings in the literature and also provide new insights into the student experience of food insecurity and more broadly food access in an academic environment. This work is important because it also explores potential solutions to address food insecurity among students. In contextualizing the student experience of food insecurity, the results of this chapter can help to better inform programs and resources on college campuses to better support student health and academic success.

STRATEGIES FOR ADDRESSING FOOD INSECURITY

While addressing student food insecurity is still in early stages, there have been numerous longstanding goals and strategies created to alleviate food insecurity more broadly in the United States. The U.S. Department of Health and Human Services includes food insecurity in its national Healthy People 2020 objectives, including eliminating very low food security among children (1.3% to 0.2%) and reducing household food insecurity and in doing so end hunger (14.6% to 6.0%) (U.S. Department of Health and Human Services, 2010). To provide a food and nutrition safety net and address food insecurity, the U.S. Department of Agriculture (USDA) coordinates 15 different food and nutrition assistance programs that help millions of Americans. The three largest federal food programs are the Supplemental Nutrition Assistance Program (SNAP) (formerly the Food Stamp Program), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the National School Lunch Program (NSLP); an estimated one in four Americans receives some form of federal food assistance benefits

(Oliveira, 2016). Several studies have evaluated SNAP, by far the largest federal food assistance program, and generally demonstrate that SNAP assistance helps alleviate food insecurity (Gundersen & Ziliak, 2018).

While the large federal programs, particularly SNAP, reach millions of Americans, they do not provide adequate food assistance for all participants and the programs remain vastly underutilized. According to the latest household food insecurity survey, only 59% of food-insecure households reported participating in one or more of three largest federal food assistance programs in the previous month (Coleman-Jensen et al., 2017). In Los Angeles County, only about 53% of eligible participants enroll in SNAP, and over one million income-eligible individuals do not participate in the program (Call & Shimada, 2016). Barriers to participation in SNAP and other federal assistance programs include: eligibility cutoffs (e.g. household gross income must be 130% or less of the Federal Poverty Level for SNAP enrollment); stigma associated with enrollment; transaction costs including time for travel, paperwork burden, language barriers, and fear of immigration consequences; and inadequate benefits (Gundersen & Ziliak, 2018).

Gaps left by the federal food assistance programs are met in part by the emergency food system, consisting of food banks that receive donations from multiple sources and distribute food through food pantries, soup kitchens, shelters, and other community partners. Emergency food sources can potentially reach people who are unable, unaware, or unwilling to enroll in federal programs such as SNAP and WIC and serve about as many people as these large public programs (McEntee & Naumova, 2012). Most food banks in the country (~80%) are part of the Feeding America network. This network served 46.5 million people in 2014, a number on par with the estimated 48.1 million food insecure people in America that year (Coleman-Jensen,

Rabbitt, Gregory, & Singha, 2016; Weinfield et al., 2014). Some estimates show that food banks can help reduce food insecurity, but there has been little study in this area in part due to a lack of longitudinal study data.

In recent years, the emergency food system has played a larger role than simply filling short-term gaps left by federal food assistance programs. The 2008 recession resulted in a 30%-40% increase in food insecurity, which in turn resulted in a large increase in both federal and emergency food utilization (Gundersen, 2012). While emergency food programs have historically been intended as temporary assistance for acute periods of food need, food-insecure households appear to be increasingly utilizing emergency food programs as a long-term source of supplemental food (Weinfield et al., 2014). Food banks are starting to collect more data to better understand their clients and their struggles with food insecurity. The traditional metrics for the emergency food system are pounds of food donated and distributed, and the number of people who visit (number of clients served). Starting in 2014, however, Feeding America switched to collecting more comprehensive data for their quadrennial survey, and used electronic surveys to collect information on demographics and household finances from 60,000 clients (Weinfield et al., 2014).

The quality of food that is donated to and distributed by emergency food sources is also shifting. Emergency food sources have traditionally relied primarily on food donations from government subsidy programs and large food producers (directly or indirectly via grocery stores and other retailers), and they historically have preferred donations of nonperishable or low-perishable foods for ease of storage and distribution (McEntee & Naumova, 2012). The result is the redistribution of food that provides calories but is nutrient poor, which helps food insecure people in the short term but contributes to long-term health problems (McEntee & Naumova,

2012). Recently, there has been a renewed effort to improve the quality of food available through emergency food sources. Food banks are making efforts to increase offering of fruits and vegetables, as well as provide additional services such as cooking and nutrition demonstrations and classes. A survey of 137 U.S. food banks identified that a majority of food banks had a substantial commitment to nutrition, especially fresh produce, but formal policies and organizational structures to support this commitment were rare (Campbell, Ross, & Webb, 2013). The emergency food system is expanding its reach, data collection, and quality of food in helping address persistent food insecurity in the United States. However, this charitable system is not a long term solution to food insecurity.

COMMUNITY FOOD SECURITY

In contrast to addressing food insecurity on an individual or household level, the concept of community food security expands upon the traditional short-term and charitable approaches of government food assistance and emergency food programs. Community food security (CFS) is defined as a condition in which “all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice” (Hamm & Bellows, 2003). CFS broadens the definition of food security in several ways including a focus on prevention, longer term approaches, self-reliance and empowerment, and inclusive participation in local food systems. In contrast to emergency food resources that can create dependency, community food resources aim to foster self-sufficiency in accessing healthy and affordable food (Winne, 2005). CFS also may help address the community-level issue of food deserts (i.e., low-income urban areas that lack access to supermarkets and large grocery stores).

While some strategies have attempted to attract new grocery stores or increase healthy food offered in neighborhood markets, CFS is a community building strategy to create self-sufficient access to healthy food through local food production. CFS is aligned with the theoretical approach of libertarian paternalism that recognizes the role of both the environment and the individual in public health interventions, and thereby may be more effective in long term improvements in food security and nutrition (Sadler, Gilliland, & Arku, 2016). CFS efforts are typically most effective when (1) the focus of local food production is un-commercialized; (2) the food production remains under the control of the local community; and (3) efforts focus on the health and economic well-being of community members (Sadler et al., 2016).

OVERVIEW OF URBAN AGRICULTURE

An increasingly popular strategy to help address food insecurity or build community food security is urban agriculture (UA). UA can be simply defined as the production and distribution of plants, animals, and other agricultural products in urban and peri-urban areas. A more comprehensive definition of UA utilized by the University of California Cooperative Extension is:

> *"production (beyond that which is strictly for home consumption or educational purposes), distribution and marketing of food and other products within the cores of metropolitan areas and at their edges; examples include community, school, backyard, and rooftop gardens with a purpose extending beyond home consumption and education, urban market gardens, innovative food-production methods that maximize production in a small area, community supported agriculture based in urban areas, and family farms located in metropolitan greenbelts."* (University of California, n.d.).

Many different typologies of urban agriculture (UA) exist and there is no formal classification system. Among many other characteristics, UA varies in ownership (commercial, private, public), size, productivity, crop and animal variety, activities (e.g., tours and educational

classes), and importantly, in motivation and goals. In general, UA includes urban farms, community gardens (public and private), institutional gardens (e.g., school gardens), interstitial gardens (e.g., on parkways and medians), residential/backyard gardens, rooftop gardens, hydroponics (growing plants in a water media without soil), aquaculture (a system that cycles nutrients between fish tanks and crops), and controlled environment agriculture (e.g., growing indoors with artificial light).

UA differs from conventional agriculture in several ways. UA is typically very small scale and does not involve the use of large farm equipment, and only a minority of UA sites aim to maximize production and become profitable. Advantages of UA include the ability to closely monitor and tailor crops specifically to local growing conditions, to plant more intensively (e.g., using vertical applications), to have less pressure from pests and thereby potentially less need for pesticides, and to be located closer to markets and consumers and thereby lower transportation costs and greenhouse gas emissions (De Zeeuw, 2004). UA also has several unique challenges related to urban locations, including competing urban land uses and short term land rights, pollution (including heavy metals in soil and ground level ozone in air), urban water stress, high labor costs, and scalability.

BENEFITS OF URBAN AGRICULTURE

Urban agriculture potentially provides several benefits including social, economic, environmental, and health benefits. Documented social benefits include community cohesion, cultural integration, education, and community development. In particular, UA can help facilitate community organizing that extends beyond growing food such as community land uses (Santo, Palmer, & Kim, 2016). There is some evidence that UA can help provide employment and skills training, including entrepreneurial opportunities, which can be focused on underserved

communities and populations (e.g., former inmates) (Santo et al., 2016). UA sites provide urban green spaces that have environmental benefits including urban cooling and reduced air pollution, higher biodiversity, recycling organic waste, rainwater infiltration, and greenhouse gas sequestration (Kulak, Graves, & Chatterton, 2013). The limited literature on the health benefits of urban agriculture shows that people who participate in growing food gain the most benefits. Studies have shown that UA sites help facilitate physical activity and improved mental health, including stress reduction and connection to nature (Bellows, Brown, & Smit, 2003). UA participants tend to have greater access to fresh, organic produce, save money on groceries, and have higher fruit and vegetable consumption (Alaimo, Packnett, Miles, & Kruger, 2008; Algert, Baameur, & Renvall, 2014; Santo et al., 2016). On a community level, food access and security benefits of UA are less clear. Some studies have shown that urban agriculture results in greater community access to fresh produce and that a significant portion of community produce needs could potentially be met by urban agriculture (Ackerman, 2012; Kremer & DeLiberty, 2011; McClintock, Cooper, & Khandeshi, 2013; Saha & Eckelman, 2017; Santo et al., 2016). Most studies assessing the benefits of urban agriculture have been cross-sectional case studies with very small sample sizes or have addressed only one aspect of urban agriculture (e.g., barriers to implementing a community garden). In general, there is a dearth of data on UA activity in the U.S., making it difficult or impossible to conduct rigorous, large scale studies. Thus, there is a need for studies to help establish local, realized benefits of UA including the potential to contribute to community food security.

To address this need, **Chapter 3** provides an analysis of the distribution of existing UA sites (urban farms, community gardens, and farmers markets) and vacant land in the City of Los Angeles, as well as theoretical calculations of UA vegetable production for the City. This study is the first attempt to assess UA locations throughout the City of Los Angeles relative to

underserved communities with limited access to healthy, affordable food. As a result, this study serves as a starting point for assessing to what extent UA may contribute to community food security. In addition, I identify underserved communities in Los Angeles that are lacking UA sites and that could potentially benefit from policies that prioritize UA (e.g., the recently implemented city Urban Agriculture Incentive Zones Program).

URBAN AGRICULTURE IN LOS ANGELES

Los Angeles has conditions that are highly favorable to agricultural production. The region has a Mediterranean climate with moderate weather that averages between 57-75 degrees Fahrenheit, and growing crops is not limited by seasonality like other regions of the country (T. R. Morris, n.d.). However, average annual rainfall is only about 15 inches, making water a primary concern for the city and the region (T. R. Morris, n.d.). For the first half of the twentieth century, Los Angeles County was the top agricultural producing county in the United States until its farmland was converted to urban sprawl (Surls & Gerber, 2016). Today, the county still has some commercial agriculture with an estimated 1,300 farms and over 91,000 acres of farmland that primarily produces vegetables and nursery products such as ornamental plants (California Department of Food and Agriculture, 2018).

Although the City of Los Angeles is not currently a national UA leader, it has made substantial progress to prioritize and support UA in recent years. Until 2006, Los Angeles had one of the largest urban farms in the country: the 14-acre South Central Urban Farm, which supported 350 low-income families, many of them first-generation immigrants. The farm received national attention throughout its land tenure struggle with a developer and eventual bulldozing in 2006 (Irazábal & Punja, 2009). More recently, the City of Los Angeles has promoted urban agriculture as a strategy to improve public health, increase urban sustainability, and address many of the

disparities that exist in the region, including food insecurity. City and regional planning and policies have has started to formally incorporate UA objectives. In Spring 2015, the City of Los Angeles approved two planning documents that specifically called for increases in urban agriculture activity: the Sustainable City pLAn and the Plan for a Healthy Los Angeles (Los Angeles Department of City Planning, 2015; Petersen et al., 2015). For example, one objective in the Sustainable City pLAn includes an increase in UA sites over baseline by at least 25% by 2025 and 50% by 2035 (Petersen et al., 2015). A statewide urban agriculture policy was also adopted and implemented in the City of Los Angeles in 2017. Assembly Bill 551 (AB-551) allows for the establishment of Urban Agriculture Incentive Zones (UAIZs) by providing a potential property tax break to private landowners in exchange for leasing their vacant land for farming or gardening for a minimum of five years (Ting, 2013).

Chapter 4 provides an overview and assessment of the **progress** related to UA policy, planning, and practice in Los Angeles to date. It contextualizes UA developments and provides analysis of planning strategies and several policy areas including land use. The chapter includes specific examples from current UA practice in Los Angeles as well as best practices from other leading U.S. cities. Finally, it provides specific policy recommendations for how the City and other stakeholders can best support and prioritize future UA development in Los Angeles.

Chapter 5 provides a review of the overarching conclusions of the dissertation. Since the work from Chapter 2 took place two years ago, I provide a brief review of the literature and other progress on the research and strategies around college student food insecurity. In addition, recommendations for future research are provided for student food insecurity and for urban

agriculture in Los Angeles. A data collection framework is outlined for urban agriculture, which would help to inform policy and practice in the City of Los Angeles.

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CHAPTER 2: COLLEGE STUDENTS IDENTIFY UNIVERSITY SUPPORT FOR BASIC NEEDS AND LIFE SKILLS AS KEY INGREDIENT IN ADDRESSING FOOD INSECURITY ON CAMPUS

(This chapter was published in *California Agriculture*, 2017, 71(3): 130-138)

ABSTRACT

A recent University of California (UC) system wide survey showed that 42% of UC college students experience food insecurity, consistent with other studies among U.S. college students. As part of UC's efforts to understand and address student food insecurity, we conducted 11 focus group interviews across four student subpopulations at UC Los Angeles (*n* = 82). We explored student experiences, perceptions and concerns related to both food insecurity and food literacy, which may help protect students against food insecurity. Themes around food insecurity included student awareness about food insecurity, cost of university attendance, food insecurity consequences, and coping strategies. Themes around food literacy included existing knowledge and skills, enjoyment and social cohesion, and learning in the dining halls. Unifying themes included the campus food environment not meeting student needs, a desire for practical financial and food literacy "life skills" training, and skepticism about the university's commitment to adequately address student basic needs. The results of this study broadly suggest there is opportunity for the university to address student food insecurity through providing food literacy training, among other strategies.

INTRODUCTION

Food insecurity, the uncertain or limited ability to get adequate food due to lack of financial resources, is a persistent problem in the United States. The U.S. Department of Agriculture (USDA) estimated that 13% of U.S. households were food insecure in 2015 (Coleman-Jensen

et al., 2016). Food insecurity is linked to several physical and mental health problems, such as poor self-reported health, poor diet quality, obesity, diabetes, depression and anxiety (Gundersen & Ziliak, 2015; Seligman & Schillinger, 2010).

Since the Great Recession in 2008, a rapidly growing number of U.S. studies have documented student food insecurity. Among college students, it is estimated that food insecurity ranges from 14% to 72% (Dubick, Mathews, & Cady, 2016; Freudenberg et al., 2011; Gaines et al., 2014; S. Goldrick-Rab et al., 2015; Hanna, 2014; Maroto et al., 2015; Martinez, Maynard, & Ritchie, 2016; L. M. Morris, Smith, Davis, & Null, 2016; Patton-López et al., 2014; Pia Chaparro et al., 2009). Several recent studies showed that food-insecure students were more likely to self-report being in fair or poor health, experience depressive symptoms, and perform lower academically than food-secure peers (Freudenberg et al., 2011; Martinez et al., 2016; Patton-López et al., 2014). The scale of food insecurity among students documented since the Great Recession suggests that it may be attributed to the rising cost of attendance (tuition and fees, books and supplies, housing and food, transportation, and personal expenses) and inadequate financial aid to meet basic needs, namely housing and food.

A recent UC Student Food Access and Security Study reported that 42% of UC students have experienced food insecurity (Martinez et al., 2016). That study was funded by the UC Global Food Initiative (GFI), which had as one of its goals to identify and address food insecurity across the UC system. Also with support from the GFI, we undertook our qualitative research on student food insecurity to help contextualize the issue for UC. A secondary goal was to contribute to the GFI's understanding of food literacy among college students, and to help identify opportunities to advance food literacy across the UC system. Recently, food literacy has been conceptualized as a protective factor against both food insecurity and obesogenic

environments (Cullerton et al. 2012, unpublished). Although the research is nascent, promoting food literacy among college students may be an appropriate strategy to help protect students from food insecurity.

Our study used qualitative research methods to (1) better understand how students perceive, experience and cope with food insecurity, and (2) explore opportunities to address food insecurity by improving food literacy among college students.

Food Literacy

Food literacy can be understood through the four domains established by Vidgen and Gallegos (2014) — food planning and management, selection, preparation, and eating. These domains are contextual in nature; that is, diet quality depends not only on the individual but also on the environment in which the individual lives (Vidgen & Gallegos, 2014). Like the expanded view of health literacy, food literacy can be viewed broadly as a skill set, which individuals use to navigate their food environment to enhance their well-being (Massey, Prelip, Calimlim, Quiter, & Glik, 2012; Palumbo, 2016).

METHODS

Focus Groups

We conducted 11 focus group discussions between March and June 2016 with 82 students enrolled at University of California, Los Angeles (UCLA). Students were recruited from four subpopulations: residential undergraduates (living on campus with a meal plan), nonresidential undergraduates (living off campus), graduate/professional students, and students using free food resources (e.g., Community Programs Office [CPO] Food Closet).

The first three subpopulations were recruited via emails sent out by Residential Life staff and academic department administrators. To purposively sample students using free food resources (used as a proxy for food insecurity), we obtained referrals from food program leaders and included both undergraduate and graduate students. Interested students completed an online screener so we could select a diverse student sample based on the following characteristics: gender, race/ethnicity, international student status, major/department, and year in school.

We assigned students to appropriate focus groups to ensure homogeneity among four subpopulations. We held three focus groups with residential undergraduates, three with nonresidential undergraduates, three with graduate/professional students, and two with students using free food resources. Participants within each subpopulation were assigned to groups based on availability. Participation was incentivized with dinner at the focus group location and a $30 honorarium paid via electronic transfer to students' university ID card at the conclusion of participation. The study was approved by the Institutional Review Board at UCLA.

The interview guide was informed primarily by the qualitative literature and by our practical research goals; it was reviewed by UCLA faculty and GFI leaders, including a student food insecurity expert. The script was pilot-tested with a group of eight UCLA students and modified to improve conversational flow.

Focus group interviews were conducted in English, with five to 10 participants. Upon arrival, students were asked to read and sign informed-consent documents and complete a brief survey with demographic and food insecurity questions, including the USDA six-item food security short form survey module (Blumberg, Bialostosky, Hamilton, & Briefel, 1999). Focus group interviews were 90 minutes long and were facilitated by two authors (T.W. and H.M.) who had both

completed a graduate level qualitative methodology course. Facilitators used a semi-structured interview guide, with the questions in the first half dedicated to food literacy and in the second half to food security (see **Table A.1** in Appendix A). Facilitators used probing questions to encourage focus group participants to provide detailed responses and additional information about their experiences. All discussions were audio-recorded.

Analytic Strategy

We tabulated student characteristics for all 82 students. Food insecurity was assessed using the scoring criteria from the USDA six-item food security short form.

Each focus group audio recording was divided into two files, one consisting of the discussion on food literacy and the other of the discussion on food security. All audio files were transcribed verbatim by GMR Transcription Service. Two authors (T.W. and H.M.) employed an integrated approach using an inductive (ground-up) development of codes and themes and a deductive framework for organizing the codes according to the literature and interview guide. This involved an initial identification of themes directly following each session, as well as multiple reviews of the session notes, audio recordings, and written transcriptions (Morse, 1994).

After finalizing the coding schemes, two authors (T.W. and H.M.) used ATLAS.ti Version 1.0.48 (2013, Scientific Software Development GmbH, Berlin) to code quotations within the transcripts. Different codes could be applied to the same segment of dialogue. Both authors (T.W. and H.M.) coded all transcripts and reached consensus on coding discrepancies. Ten themes were identified.

RESULTS

Low and Very Low Food Security

Participant characteristics are presented in **Table 2.1**. According to survey responses to the USDA six-item food security survey module, 44 participants, or about 54%, were classified as food insecure: 32% experienced low food security (defined as reduced diet quality, variety, or desirability) and 22% experienced very low food security (defined as skipping or reducing the size of meals).

Food Insecurity Themes

The focus groups discussed several themes around food insecurity, including student awareness, cost of university attendance, consequences, and coping. Illustrative student quotes are presented in **Table 2.2**.

Awareness of Food Insecurity

Students were very aware of socioeconomic inequality among students, which included the ability to afford food. Students did not use the term “food insecurity,” but most had heard of the term and were aware of its approximate definition. Many students had either experienced food insecurity or knew that it existed among their peers. However, students spoke about food insecurity as an invisible issue on campus that was not openly discussed, and they expressed a desire for spaces to openly discuss food insecurity and other basic needs issues (i.e., housing and finances).

Students recognized the end of the academic quarter, academic breaks/holidays, and summer as times when they were more likely to experience food insecurity. Undocumented, commuter and international students were identified as highly vulnerable to food insecurity. Many students

had heard about the CPO Food Closet but generally were not aware of other campus food resources unless they had personally used them. Students wanted more awareness and outreach around existing free food resources for struggling students.

Cost of Attendance

Students described the high cost of attendance (tuition and fees, books and supplies, housing and food, transportation, and personal expenses) as the primary cause of food insecurity either personally or among their peers. They were particularly concerned about high tuition and fees and high rents in nearby neighborhoods. For many students, financial aid was not sufficient to cover the cost of attendance, and students often prioritized food last. Many students expressed concern about not having enough money to absorb unexpected costs such as medical bills.

In general, students did not feel confident budgeting, especially because they received their financial aid disbursement in a single payment per academic quarter. There was a range of viewpoints on the acceptability of loans, with some students accepting they would have a heavy loan burden after graduation and others unwilling to accept any student loans. Graduate students generally felt they had less financial support from the university than undergraduate students had, despite often having additional financial responsibilities such as a spouse and dependents.

Consequences of Food Insecurity

Many students reported choosing cheaper, less nutritious foods and skipping meals. For struggling students, worrying about food was a persistent stressor that negatively impacted their academic performance. Some students reported spending a substantial amount of time and energy worrying about getting enough food or where their next meal would come from. They

reported both mental and physical health impacts, including stress, inability to focus on their work, fatigue and lack of energy, irregular sleep patterns, irritability, depression, headaches, and weight gain linked to inadequate food intake. Students also described missing out on social opportunities, such as eating with friends in the dining halls or at restaurants due to financial constraints (e.g., running out of meal swipes or wanting to save money).

Coping with Food Insecurity

A majority of students attended events on and near campus to get free food. Students who had experienced food insecurity reported they often relied on campus free food resources to help them get by, especially the CPO Food Closet and 580 Café, a nearby community study space that offers free snacks and meals for students. A few students discussed preparing inexpensive staple foods, such as beans and rice, or snacking on granola bars to get through the day. Some students talked about working part-time jobs to help afford food and other expenses, but this caused more stress, which impacted academic performance. Students were hesitant to ask for help, but often relied on friends for assistance. For example, “swiping” friends with campus IDs into campus dining halls was a common strategy to help friends living both on and off campus. Some students normalized the struggle to eat as part of the college experience.

Food Literacy Themes

Students discussed several themes around food literacy, including existing knowledge and skills, enjoyment and social cohesion, and learning in the dining halls. Illustrative student quotes are presented in **Table 2.3**.

Food Knowledge and Skills

Students identified numerous sources of food knowledge and skills, most often mentioning family, peers, news media, and UCLA courses. They also mentioned entertainment media (e.g., cooking shows), social media (e.g., Yelp, Facebook), smartphone applications (e.g., MyFitnessPal), scientific journals, UCLA resources (e.g., dietician), public health campaigns, advertising, travel, and K-12 education.

Students described family customs and culture as the foundation of food literacy and said they continued to develop their food knowledge and skills. Many discussed learning about food by observing others in the dining halls, discussing peers' dietary habits, and cooking with friends and roommates. Students commonly reported watching food documentaries and cooking shows, and many reported searching online for recipes, nutrition, and other food-related information. Although students cited UCLA courses as a credible and influential source of academic information about food, the large majority of students said they received little or no practical skills-based training from UCLA. Few students mentioned learning about food and nutrition as part of their K-12 education.

Students discussed their confidence and ability with respect to the food literacy domains of planning, selecting, preparing, and eating food. Many students described strategies for protecting diet quality and reducing costs. For some students, this meant prioritizing time to eat in the dining hall, while for others it involved prepping meals on Sundays or finding free food resources on campus. Others said they felt overwhelmed or time restricted and thus were less able to balance their resources with their nutritional needs. They reported skipping meals or choosing less preferable (e.g., unhealthy, low-quality, not filling) foods.

Food Enjoyment, Social Cohesion

Students referred to cooking and eating as a way to bond and express love. They also discussed college and early adulthood as an exciting and formative time in which they were able to determine their own food preferences and priorities, explore new cuisines, and build community through food. Some students said they enjoyed cooking as a way to relax, relieve stress, and be creative.

The majority of students reported spending time dining, discussing, and preparing food socially with their peers. They explained that sharing food can be a positive way for students to come together in a stressful and competitive university environment. Bonding over food and cooking was even mentioned as an opportunity to build friendships. Students struggling with food insecurity said resources that supported family-style eating provided the added value of social interaction and support.

Learning in the Dining Halls

Residential undergraduates (with campus-provided meal plans) discussed how the food and beverages offered in the dining halls not only expanded their knowledge of healthy food but also “nudged” them into healthful habits. They said signage and menu labeling improved their awareness of nutrition and sustainability issues. However, many students expressed challenges with transitioning to a new food environment and a desire for culturally familiar food described as “comfortable.” Students explained that their new independence combined with an overabundance of food in dining halls required learning and effort to self-regulate eating behaviors.

The University's Role

Students discussed several themes that overlapped both food insecurity and food literacy. Unifying themes included the campus food environment not meeting student needs, a desire for practical financial and food literacy "life skills" training, and skepticism about the university's commitment to adequately address student basic needs. Illustrative student quotes are presented in **Table 2.4**.

Campus Food Environment

Many students living in campus residence halls had positive comments about the quality of the food in the dining halls but expressed concerns about the tiered meal plan structure — having a meal plan did not guarantee food security. Students discussed choosing meal plans based on their financial means and not on nutritional needs. For instance, some students reported buying the most limited meal plan (11 meals per week) because it was the cheapest option. Students also reported they lacked access to kitchen space to prepare food to supplement meal plans or cook with friends. A majority of students also perceived large amounts of food waste on campus and felt that some food, especially in the dining halls, could be recovered and redirected to students in need.

Beyond the dining halls, students overwhelmingly said that food on and near campus did not meet their needs. Food perceived to be healthy was often cited as expensive or not "filling" (e.g., salads). Food that was affordable and "filling" was often perceived as unhealthy and low quality (e.g., $1 beefy burrito). Consequently, many students brought food from home, bought less preferable foods, found free food options, or skipped meals. Many students were willing to travel beyond the surrounding campus neighborhood to find affordable and culturally appropriate food outlets (e.g., Asian markets, discount stores).

Life Skills in College

Students identified college as an appropriate place to learn practical life skills, including food planning and preparation. They said that food-related issues became more salient in college, and they expressed the need for the university to provide additional food education and training. Many students wanted to learn to budget and cook simple nutritious meals. They were frustrated with intellectually knowing the “right choice” but not having the skills or resources to act on that knowledge.

Students discussed various formats for receiving practical food instruction, ranging from a required general education course to pop-up cooking demonstrations on campus. Many students said they thought a practical one-unit undergraduate life skills course should be required to both support health-promoting behaviors among students and demonstrate the university’s commitment to student well-being. Students identified the transition from living in university residence halls to living off campus as a critical time to receive this instruction.

Addressing Basic Needs

Many students were skeptical of the university’s commitment to adequately and effectively address student basic needs. A prevailing attitude was that the university placed too much importance on academic performance and research efforts and not enough on prioritizing struggling students and a holistic student experience. Students discussed key areas in which the university was not addressing their needs: inadequate financial aid allocations, unaffordable housing costs, inflexible meal plans, high food costs on campus, and lack of opportunities to learn life skills, including financial and food literacy. Many students did not believe the university would address these needs, which negatively affected their sense of belonging at the university.

Some students were hopeful about the increasing awareness of student food insecurity and other struggles such as homelessness.

DISCUSSION

UCLA Tuition and Living Costs

UCLA undergraduate student tuition and fees ($12,836 for the 2016–2017 academic year) are now twice what they were in 2006–2007 in absolute dollars, largely as a result of state funding cuts to the UC during the Great Recession (Mitchell, Palacios, & Leachman, 2014; University of California, 2016a). Following a 6-year tuition freeze, UC Regents have voted to increase tuition and fees by 2.5% for the 2017–2018 academic year (UC Board of Regents, 2017).

In addition to rising tuition and fees, UCLA is located in one of the highest-cost-of-living regions in Los Angeles (Apartment List Inc., 2017). According to the 2016 UC Cost of Attendance Survey, UCLA students living in a one-bedroom apartment without roommates paid $1,342 per month, and students with one roommate paid $951 per month. The all-student rent average was $840 (ranging from zero to six-plus roommates), making it the second-highest rent average in the UC system, below only UC Berkeley (University of California, 2017a).

Many students receiving financial aid felt the support was insufficient to meet the cost of attendance, currently estimated at $34,088 at UCLA (University of California Los Angeles, 2016). Their concern is consistent with Kelchen et al. (2014), who found that over half of U.S. postsecondary institutions underestimated 9-month living cost allowances for students living off campus by an average of $3,000, assuming a single-efficiency apartment (Kelchen & Hosch, 2014). These student concerns about actual cost of attendance led to improvements in how the UC system asked students about their cost of living in the 2016 UC Cost of Attendance Survey.

Specifically, the question of food expenses in the last month was updated to food expenses in the last week based on student and staff input (R. Canedo, personal communication, Mar. 15, 2017).

Food Insecurity Normalized

Taken together with the UC Student Food Access and Security Study, the findings from our study suggest that students across the UC system struggle to meet their basic needs, and food is the easiest thing to sacrifice. It is possible that struggling with food insecurity in higher education settings has been normalized among students, which may help explain why, until recently, the issue has been unacknowledged and therefore largely unaddressed.

Students in this study described struggling to afford food as a persistent stressor that affected both academic performance and mental and physical health, which is consistent with the literature (Freudenberg et al., 2011; Gundersen & Ziliak, 2015; Martinez et al., 2016; Patton-López et al., 2014; Seligman & Schillinger, 2010). A recent UC study found that students experiencing food insecurity were twice as likely to have feelings of depression than their food-secure counterparts (Martinez & Ritchie, 2016). In our study, students felt they missed out on social opportunities, such as dining with peers, which are important for building social ties in a college environment (Umberson & Montez, 2010). Limited opportunities to create social ties in college may affect a sense of belonging and increase a student's intention to drop out of college (Langhout, Drake, & Rosselli, 2009).

Food Training, Cooking Skills

A majority of students in our study discussed wanting more training and skills around food preparation and budgeting. The UC Student Food Access and Security Study also found that

across the UC system students wanted university assistance with learning to cook cheap, healthful meals and to budget with limited resources (Martinez et al., 2016). Previous research suggests people with high or moderate levels of cooking, food preparation, and financial skills are less likely to experience food insecurity than people with lower skill levels (Gorton, Bullen, & Mhurchu, 2010).

College may be a critical time for developing food literacy, as 57% of food insecure UC students reported that they were new to experiencing food insecurity (Martinez et al., 2016). Also, improving food literacy could help address the widely held student perception that healthy food is more expensive. Several UC campuses have launched academic and community programs to increase student food literacy and improve student food security.

Limitations

This study had several limitations. We used convenience and purposive sampling to recruit focus group participants, which may limit generalizability to broader student populations. Participants were more likely to be female, minority race/ethnicity and receiving financial aid than the general student population. Because two focus groups intentionally included students who use free food resources, the overall proportion of study participants who had experienced food insecurity (54%) was higher than in the UC Student Food Access and Security Study (42%) (Martinez et al., 2016); however, the prevalence of food insecurity among students in the other nine focus groups was 39%. Additionally, study participants may have been more interested in and aware of food issues. Lastly, it is important to consider issues of conformity and censoring within focus group studies. Despite efforts to maximize homogeneity within groups and the apparent range of experiences and opinions heard, some students may have

been inclined to match their experiences to those already stated or refrain from sharing unpopular attitudes or beliefs (Morse, 1994).

Statewide Challenge

Meeting student basic needs is gaining recognition as a major challenge across institutions of public higher education of all sizes, and efforts are under way to comprehensively work toward student basic needs security. With support from the UC Global Food Initiative, all 10 UC campuses are conducting academic and administrative research; implementing both short-term (e.g., food pantries) and long-term (e.g., Supplemental Nutrition Assistance Program, SNAP, registration) services; improving systems practices (e.g., contracts with food vendors); and leading policy advocacy across campus, UC system, and state government levels. In 2017, the institutions of higher education in California — UC, state universities, and community colleges — formalized a partnership to develop statewide policy solutions to improve the lives of their students. Further research is needed to better understand the student experience of food insecurity and to assess the feasibility and effectiveness of interventions aimed at reducing food insecurity among college students nationwide.

Table 2.1. Sociodemographic characteristics of UCLA focus group participants (n = 82) and the UCLA student population.

	Focus Group Students		UCLA Students*
	n	%	%
Gender			
Female	50	61%	53%
Male	31	38%	47%
Gender nonconforming	1	1%	--
Race/ethnicity			
Asian or Pacific Islander	27	33%	35%
Hispanic or Latino	23	28%	20%
White	15	18%	35%
Biracial or Multiracial**	7	9%	--
Black or African-American	5	6%	5%
Other	5	6%	4%
International student status			
Domestic	77	94%	85%
International	5	6%	15%
Year in school			
1st year undergraduate	12	15%	13%
2nd year undergraduate	7	9%	13%
3rd year undergraduate	19	23%	19%
4th year undergraduate	14	17%	18%
5th year or more undergraduate	5	6%	5%
Total undergraduate	57	70%	68%
Recently completed undergraduate	1	1%	--
Graduate or professional	24	29%	32%
Living situation			
Other off-campus housing	46	56%	60%
Campus	25	30%	27%
Off-campus university housing	11	13%	13%
Receiving financial aid†			
Yes	64	78%	65%‡
No	18	22%	35%‡
Food security status§			
Food secure	38	46%	60%
Food insecure	44	54%	40%
Low food security	26	32%	23%
Very low food security	18	22%	16%

Note: percentages may not add up to 100 due to rounding.
*Sources: (Martinez et al., 2016; University of California Los Angeles, 2015); UCLA Office of Academic Planning and Budget, personal communication, May 23, 2017.
**UCLA does not include this race/ethnicity category in its surveys.
† Students receiving any financial aid, including grants, loans, and scholarships.
‡ Percentages available for undergraduate students only.
§ Food insecurity was assessed using the scoring criteria from the USDA six-item food security short form survey module.

Table 2.2. Themes and selected quotes around food insecurity among focus group participants (n = 82)

Themes Around Food Security	Quotes
Awareness	"Food insecurity isn't something that is very obvious because . . . you can't always tell who's food insecure and who knows exactly where their next meal is coming from." — Undergraduate student "I think that term [food insecurity] is something that you wouldn't necessarily see, because food insecurity isn't something that a lot of people are very willing to openly discuss." — Graduate student "I've heard [of] it. I don't use it. It feels kind of weird to like intellectualize this process that just comes down to like, I'm hungry, and I don't have money to buy food, you know." — Undergraduate student
Cost of Attendance	"I try to allocate [my refund check] for housing because housing is like really, really important, but what's left over is like nothing for food." — Undergraduate student "You're getting aid . . . but at the same time, cost of living is going up . . . and the financial aid is not keeping up with all that." — Undergraduate student "UCLA does not pay for housing or meal plans, which does not make sense. If the school recognizes you can't afford to pay tuition, then it doesn't make sense that it expects you to be able to afford housing and meal plans." — Undergraduate student "There's nothing normal about being a starving grad student. We make sacrifices, the opportunity cost of going to school is, okay, we could have been in the workforce . . . I think it's more difficult to finance graduate school than undergrad." — Graduate student
Consequences of Food Insecurity	"I think 'getting by' is a pretty good description as opposed to excelling, which we can all do if we were properly fueled, but sometimes we're not." — Undergraduate student "Food is always on my mind like, 'What am I going to eat? Do I have enough money? Maybe I should just skip a meal today so I can have enough food for dinner.' Yeah, it's always on my mind." — Undergraduate student "The physiological effects of having poor quality of food really affects the way you think and the way you function as a student . . . because good grades, ultimately, is a function of how well you are getting your physiological needs met." — Undergraduate student "I'll just go hungry because the main goal was to get to UCLA and get my degree and make my parents proud. I can forego some meals. I know I'm still going to survive." — Undergraduate student

Themes Around Food Security	Quotes
Coping with Food Insecurity	“So I would have to buy . . . ramen and things like that so I can make sure that I have somewhere to live and I have electricity and things like that.” — Undergraduate student “I think an indirect effect that [food insecurity] has on academics is just the fact that people might feel obligated to sacrifice some of their academics to go work a secondary — a part-time — job, just to be able to afford food.” — Undergraduate student “[When I meal-prep for the week, my roommates] tell me, ‘Don’t you get tired of eating the same thing in the week?’ I’m like, ‘Yeah, but I get full, then it’s good.’ And then I’m like, ‘Hunger is the best condiment. It tastes good.’” — Undergraduate student

Table 2.3. Themes and selected quotes around food literacy among focus group participants (n = 82)

Themes Around Food Literacy	Quotes
Existing Food Knowledge and Skills	"I learned from my mom and my parents, originally, but I'm still learning, you know. You see things in the dining hall . . . people in the dining hall, and your friends kind of influence what you eat too." — Undergraduate student "I don't think there is anybody or anything [at UCLA] telling us to eat healthy . . . people who are eating healthy learned from somewhere else, or learned previously." — Undergraduate student "[Meal prepping] saves a lot of money and also time . . . it's really convenient to just have it there for you instead of having to be hungry and then worry about what you're going to eat or how much money you're going to spend." — Undergraduate student "I think that's a struggle for many of us . . . trying to find a [balance] between eating healthy, but at the same time on a budget . . . I don't know how." — Undergraduate student
Enjoyment and Social Cohesion Through Food	"I really enjoy having the freedom of choosing what I eat and deciding for myself what I wanna eat and how I want to prepare my food." — Undergraduate student "Food is such a social thing too. No one wants to say, 'Oh, I can't go out just to be with my friends just because I don't want to spend money.' No one wants to say that." — Undergraduate student "The reason why [580 Café is] so special to me is because there's a sense of community . . . I sit down. I see friendly faces. I can talk to Jeanne. Jeanne hugs everybody. And so it's more personal and intimate. And that's what eating is supposed to be." — Graduate student
Learning in the Dining Halls	"It's exciting to me . . . there's so many foods that I've tried here that I never had at home . . . I tried [quinoa] for the first time and I tried way more vegetables and fruits so . . . it's a learning experience." — Undergraduate student "My first year I was like, 'Oh, I'm gonna be healthy.' So I went [to the dining hall] and they don't have soda there, so I was like, 'Oh, okay. I won't drink soda.'" — Undergraduate student "I remember freshman year, I was so mind-blown by this concept of all-you-can-eat, all-you-can-drink, whenever, wherever. So, at dining halls, I would religiously get Coca-Cola . . . Thankfully, I eased off on that. But, I do remember the transition from being regulated on what I eat to . . . complete freedom. That really impacted my choices." — Undergraduate student

Table 2.4. Themes and selected quotes around the role of the university among focus group participants (n = 82)

Themes Around the Role of the University	Quotes
Campus Food Environment	"I feel like [commuter students] would rather starve until they go back to their room or to their apartments to not pay for food here [on campus]." — Undergraduate student "I have 11 Regular — the cheapest meal plan. I just can't afford anything else. So, I try to limit myself. If I'm going to stay over the weekend, I'm not going to eat dinner today, and I'll just have cereal, or yogurt, or something." — Undergraduate student "Dining halls waste a lot of food, and I've seen them throw it away. And it's ridiculous." — Undergraduate student
Life Skills in College	"I'm surprised we have all these GE requirements, but there's nothing about food. That's one of my pet peeves. What about food, and what about financial wellness?" — Undergraduate student "I just think more along the lines of cooking . . . It would just be better to know simple, fast ways to make certain foods without it being very time consuming and it can still be healthy for you at the same time." — Undergraduate student "I think it would be helpful if students were taught how to better allocate their money . . . [and given] cooking lessons, how to cook simple." — Undergraduate student "I can't afford to eat 100% right every day." — Undergraduate student
Addressing Basic Needs	"We're so much more than students, so the fact that this university focuses more on academic rigor and being competitive and thinking about the future and not really how to take care of yourselves now, it really affects you a lot." — Undergraduate student "There's so much money here [UCLA], all this research, all that's going on. I think hunger shouldn't really be a problem at an institution like UCLA, you know? We pride ourselves in being the best, but we can't even feed our own people." — Undergraduate student "A less obvious impact of food insecurity in the context of an institution [is] definitely disaffection from the institution, itself . . . It undermines the confidence that we have in the mission of this sort of institution — this sort of space." — Undergraduate student "It seems unfair that we're thrown into such a competitive environment with such unequal opportunities. It's not a level playing field, which I knew coming in, but it's definitely been reinforced." — Undergraduate student

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CHAPTER 3: AN ASSESSMENT OF POTENTIAL VEGETABLE PRODUCTION AND GEOSPATIAL DISTRIBUTION OF URBAN AGRICULTURE IN THE CITY OF LOS ANGELES

ABSTRACT

Background: Like many other cities in the U.S. and Canada, the City of Los Angeles is promoting urban agriculture (UA) as a community strategy to improve public health, environmental sustainability, social cohesion, and economic development among other co-benefits. In particular, UA is advocated as a mechanism to improve community food access, alleviate food deserts, and reduce food insecurity in underserved urban neighborhoods. However, there is limited assessment to date of the potential of UA production and the distribution of existing UA sites and vacant land on a city level in North America, and specifically in Los Angeles. An expanded understanding of UA in Los Angeles could help inform and guide policy and practice to better realize the stated goals of UA, especially for underserved communities.

Methods: Part I: The potential vegetable production of UA in the City of Los Angeles was calculated under different production and consumption scenarios. Part II: The geospatial distribution of existing UA sites (community gardens, farms, and farmers markets) and vacant land in the City of Los Angeles was mapped and assessed relative to (1) federally designated and (2) multi criteria designated urban areas of highest need. Vacant land and tax savings were assessed for potential to participate in the recent Urban Agriculture Incentive Zones (UAIZ) Program. Potential vegetable production was calculated for vacant land in the highest need areas.

Results: Part I: the City of Los Angeles could theoretically provide a substantial portion, but not all, of its vegetable need if UA, particularly intensive UA, was implemented on 80% of currently vacant land. If strategically implemented and distributed, UA could theoretically meet the vegetable need of the urban food insecure population. Part II: Existing UA sites are unequally distributed across the City of Los Angeles, with hot spots in West Los Angeles and Northeast Los Angeles, and cold spots in the San Fernando Valley. A substantial portion of the population in the highest need areas of the city live within 0.5 miles of a UA site, most often a community garden. However the highest need areas have very limited vacant land, and thereby could theoretically only grow a small percentage of vegetable need within the community.

Conclusions: This study provides evidence that UA could theoretically provide a substantial amount of the vegetable need for underserved communities, and existing UA sites (particularly community gardens) may be playing an important role in improving community food access by their alleviation of food deserts. To further the goals of improving urban food security and access to healthy food, UA expansion should be strategically incentivized and implemented in the highest need areas of the city, particularly in non-alleviated areas that do not have a UA site within a half mile or more.

INTRODUCTION

Urban agriculture (UA) assessment has not been conducted in Los Angeles to the extent that is has been in other major cities in the U.S. and Canada. Cities with UA assessments include Atlanta, Boston, Chicago, Cleveland, Detroit, Madison, Montreal, New York, Oakland, Philadelphia, Seattle, Toronto, and Vancouver (Ackerman et al., 2014; Colasanti, Litjens, & Hamm, 2010; Eanes & Ventura, 2015; Grewal & Grewal, 2012; Haberman et al., 2014; Kaethler,

2006; Kremer & DeLiberty, 2011; MacRae et al., 2010; McClintock et al., 2013; Richardson & Moskal, 2016; Ryerson, 2015; Saha & Eckelman, 2017; Taylor & Lovell, 2012). In general, these prior studies attempted to assess urban agriculture potential using various site suitability criteria for ground level area and rooftop area. While different criteria and methodologies were used in each of these studies, the five city-wide assessments of potential urban agriculture sites found between 2.3-7.8% of urban land could theoretically support urban agriculture activity (in one study, adding residential yard space and industrial rooftops brought the total to 37%) (Colasanti et al., 2010; Grewal & Grewal, 2012; Kremer & DeLiberty, 2011; McClintock et al., 2013; Saha & Eckelman, 2017). Some of these studies found that cities could theoretically supply their entire fruit and vegetable need or a substantial percentage of their need in idealized production scenarios. The existing studies on potential municipal UA production typically do not assess where existing urban agriculture sites or vacant land is located with respect to city and community demographics, particularly underserved areas of the city such as food deserts, which is a goal of this chapter.

The single existing urban agriculture study in Los Angeles County (known as “Cultivate LA”) was a broad assessment in 2013 that counted over 1,260 UA sites in the county including nearly 500 sites in the City of Los Angeles (Jackson et al., 2013). Given the large scope of the analysis and its focus on four types of UA sites, this is likely a significant underestimate of the actual extent of urban food growing activity. Nevertheless, Cultivate LA was the first attempt at UA assessment in the region and set a baseline for city and regional UA planning.

While the research project provided a much-needed first step and key insights into regional UA, Cultivate LA did not include elements of UA assessments in the literature including an assessment of potential UA land uses and theoretical UA production, a goal of this chapter. In

addition, several UA policy advancements have been made since Cultivate LA was published including the implementation of an Urban Agriculture Incentive Zones (UAIZ) Program. The UAIZ Program provides a property tax break incentive for private landowners who agree to lease their land for UA activity for a minimum of five years (Ting, 2013). Here, I assess the vacant land that could potentially qualify for the UAIZ Program, including potential tax savings.

Furthermore, city planning goals and objectives have included Cultivate LA and other UA data but have not been previously evaluated for their validity or progress. Two of the most relevant planning documents that include UA objectives are the Sustainable City pLAn (SCP) and the Plan for a Healthy Los Angeles (PHLA) (Los Angeles Department of City Planning, 2015; Petersen et al., 2015). These UA planning goals helped inform the present study and are mentioned in relevant sections including:

- Increase the number of community gardens so that every Community Plan Area has at least on community garden (one acre) per 2,500 households (PHLA);
- Increase the number of Angelenos who live within one mile of farmers' markets (PHLA);
- Ensure all low-income Angelenos live within 0.5 mile of fresh food by 2035 (SCP);
- Expand UA in the City's federally-designated Promise Zone (SCP).

Building upon the efforts by Cultivate LA and informed by recent city planning goals, the present study takes steps towards assessing the potential of urban agriculture (UA) in the City of Los Angeles by (1) calculating the potential vegetable production of UA on vacant land and whether it could theoretically feed the total and the food insecure population, and (2) mapping existing UA sites and determining how they are distributed across the city and whether they are co-located with the food insecure/highest need areas of the city.

METHODS

Methods for Part I. Potential Vegetable Production of Urban Agriculture in the City of Los Angeles

Calculations of Vegetable Consumption

Average per capita produce consumption was retrieved from the United States Department of Agriculture (USDA) Economic Research Services (ERS) loss-adjusted food availability data (United States Department of Agriculture, 2017). Two categories of consumption were identified including (1) recommended per capita vegetable consumption (2.5 cup-equivalents per day) and (2) actual per capita vegetable consumption (1.72 cup-equivalents per day) (Bentley, 2017; United States Department of Agriculture, 2017; United States Department of Health and Human Services & United States Department of Agriculture, 2015). Two populations were used for the analysis: the total population of the City of Los Angeles (3.98 million people) and the estimated food insecure population of the City of Los Angeles (an estimated 660,000 people using a conservative estimate of the Los Angeles County food insecurity prevalence of 16.6%) (Los Angeles County Department of Public Health, 2017; United States Census Bureau, 2017).

Calculations of Vegetable Yield

A literature review identified a total of 15 sources of yield data or yield averages for crop production in urban agriculture settings. The review found 10 peer-reviewed studies and five studies from the gray literature, which included three reports, one newsletter, and one online farm blog. The yields were compiled and overall averages and averages of upper and lower limits were calculated by data source (peer-reviewed and gray literature) and type of urban agriculture (home gardens, community gardens, farms). The calculated average yields from the

literature review were validated by primary data from five local urban agriculture sites in the Los Angeles region to define a low, productive, and intensive yield. The low yield value of 0.33 pounds per square foot per year used herein is slightly lower than the calculated average of lower yield limits and similar to an urban farm in Los Angeles that reported a substantially lower yield compared to other sites. This low yield value is similar to what is achieved through large scale conventional agriculture. The productive yield value of 0.83 pounds per square foot per year used herein is the average of all community garden sources and slightly lower than three urban farm sites in Los Angeles. A productive yield is likely to be achieved from UA sites that have experienced farmers/gardeners and are closely monitored. The intensive yield value of 1.3 pounds per square foot used herein is slightly higher than the average of upper limits in the literature, but substantially lower than a small, highly monitored urban farm in Los Angeles. This intensive yield likely represents an upper limit for most UA efforts in Los Angeles.

Calculations of Vacant Land Area

Tax assessor parcels from the 2016 tax year were downloaded from the Los Angeles County GIS Portal (Los Angeles County, 2017). County parcels were clipped to the City of Los Angeles boundary. A new field “Acres” was added, and the Calculate Geometry tool was used to generate the size in acres for each parcel. Vacant parcels were selected with the Select by Attributes tool using a general query for all land use code categories that included a “V” indicating that the parcel has been designated as vacant, and an Improvement Value equal to zero indicating that there are not structures on the parcel. The Select by Attributes tool was used to select parcels that were less than 14 acres in size. This cutoff was chosen because the few vacant land parcels above 14 acres are primarily located in the Santa Monica Mountains and/or adjacent to large parks or natural areas, and thus unlikely to be acquired and utilized for agriculture purposes. In addition, the largest urban farm in Los Angeles was approximately 14

acres in size which provides an approximate precedent for an upper limit of size. Consistent with Grewal & Grewal, it was assumed that 80% of vacant lot space could theoretically be utilized for agricultural activities (the other 20% being utilized for walkways, sheds, and other uses) (Grewal & Grewal, 2012).

Calculations of Land Area Required and Percent Vegetable Need Met

The following equation was used to calculate theoretical percent of City of Los Angeles land area required to produce enough vegetables to meet vegetable need:

$$Percent\ Land\ Area\ Required\ = \frac{(Vegetable\ Consumption)/(Yield)/(0.8)}{(Total\ Land\ Area)} \times\ 100$$

The following equation was used to calculate theoretical percent vegetable need met by UA in the City of Los Angeles:

$$Percent\ Vegetable\ Need\ Met\ = \frac{(Vacant\ Land\ Area) \times (Yield) \times (0.8)}{Vegetable\ Consumption} \times\ 100$$

Each calculation was carried out under three different yield scenarios (low yield, productive yield, intensive yield) and three consumption scenarios (recommended vegetable consumption of the city population, typical consumption of the city population, and typical consumption of the food insecure population).

Methods for Part II. Geospatial Analysis of Urban Agriculture in the City of Los Angeles

Types of Urban Agriculture Sites Analyzed in This Study

Three types of urban agriculture (UA) were selected for this study: urban farms, community gardens, and farmers markets. In addition to having location data available, these three types of UA sites provide community food access (especially vegetables) through direct sales (farms and farmers markets) or participation the growing and distribution of food (farms and community gardens). While most farmers market vendors do not grow or procure their food within the city

limits, they often source from nearby farms (often within the Los Angeles "foodshed" of 200 miles) and can be important (and popular) community food sources that supply fresh, healthy food and opportunities to engage with the food system (e.g., talking to a farmer and learning about how food is grown). In addition, interviews of urban farmers in Los Angeles County found that farmers markets were the most common model for distribution and marketing (Jackson et al., 2013). A particular advantage of these three types of sites is their presence and provision of fresh food in communities that may have limited access to traditional food outlets such as grocery stores and limited space available to participate in growing food. For example, nearly all farmers markets in the City of Los Angeles now accept CalFresh (California's version of the federal Supplemental Nutrition Assistance Program or SNAP), and many of these markets have additional incentive programs such as Market Match, which provides matching dollars for CalFresh dollars spent at a market (Petersen et al., 2017). Studies have shown that farmers market incentive programs can increase fruit and vegetable consumption among participants (McCormack, Laska, Larson, & Story, 2010). In addition to accepting federal food assistance dollars, many farmers market vendors in Los Angeles donate their unsold produce to Food Forward, a nonprofit that collects or "gleans" the surplus produce and distributes it to local hunger relief organizations ("Food Forward," n.d.). Furthermore, city planning documents have objectives to increase the number farmers markets in neighborhoods that have limited access to healthy, affordable food (Los Angeles Department of City Planning, 2015; Petersen et al., 2015).

Acquisition of Urban Agriculture Data

County farms and community gardens were obtained from the UC Cooperative Extension Sustainable Food Systems Advisor (S. Surls, personal communication, Sept. 7, 2016). Farms in this data set were almost all from a list of Los Angeles County Certified Producers List, and one farm was identified via site survey. Community gardens were cross-referenced with local

nonprofit garden websites including the Los Angeles Community Garden Council (Los Angeles Community Garden Council, n.d.-a) and the Los Angeles Neighborhood Land Trust (Los Angeles Neighborhood Land Trust, n.d.). After cleaning, eight mismatched or duplicate community gardens were identified and removed from the data set. Farmers markets were obtained from the USDA National Farmers Market Directory (United States Department of Agriculture, n.d.-b) and cross-referenced with the nonprofit Ecology Center Farmers Market Finder (Ecology Center, n.d.). After cleaning, 11 nonfunctioning or duplicate farmers markets were removed, and 14 missing farmers markets were added to the data set. The data for farms, community gardens, and farmers markets were added to ArcMap 10.3 using latitude and longitude coordinates. For sites missing coordinates, addresses were geocoded and then added. The three points (farms, community gardens, and farmers markets) were combined into a single layer for geospatial analysis. Other types and sources of geospatial data are summarized in **Table B.1** in Appendix B.

Distribution Analysis for Urban Agriculture Sites

City of Los Angeles Community Plan Areas (CPA) shapefile was joined to a spreadsheet of CPA population, and then spatially joined to UA sites to give a count of UA sites by CPA. There are 35 CPAs that subdivide the city into smaller areas for planning purposes, and they provide a useful unit of analysis for a citywide assessment. A new field was created by dividing the count of CPA UA sites by CPA population and multiplied by 10,000, giving a new quantity of UA sites per 10,000 population. This quantity was symbolized by a blue-green color ramp and divided into quintiles to visualize UA distribution per 10,000 population by CPA. The two CPAs with zero UA sites (Bel Air - Beverly Crest and Sun Valley - La Tuna Canyon) were not included in the calculation or color ramp symbolization, and were instead visualized as white to symbolize zero UA sites. A similar analysis was conducted for community gardens by CPA housing units based

on a specific recommendation in the Plan for a Healthy Los Angeles (Los Angeles Department of City Planning, 2015). The number of housing units and community garden counts were joined to a CPA shapefile. A new field was created by dividing the count of CPA community gardens by the CPA number of housing units and multiplying by 2,500, resulting in a new quantity of community gardens per 2,500 housing units. Another brief analysis was conducted based on the city planning strategy to increase the number of Angelenos who live within one mile of a farmers' market, but currently does not include a baseline (Los Angeles Department of City Planning, 2015). The buffer geoprocessing tool was used to add a one mile buffer around every farmers' market in the city. The select by locations tool was used to identify all census tracts with their centroid within the one mile farmers' market buffer, and the number of census tracts and population was calculated.

Analysis of Urban Agriculture Hot Spots

Los Angeles census tract shapefile was joined to a spreadsheet of census tract population, and then spatially joined to UA sites. The Hot Spot Analysis tool was used to calculate the Getis-Ord Gi* statistic for UA sites to determine where spatial clusters are located in the city at the census tract level. Spatial statistical significance is achieved when census tracts with a high number of UA sites are near other census tracts with a high number of UA sites (or census tracts with a low number of UA sites are near other census tracts with a low number of UA sites), and the local sum of census tract UA sites is very different from the expected sum that would result from random chance. A fixed distance band of two miles (3,219 meters) was chosen for the analysis at the neighborhood level, as nearly all UA sites have at least one neighbor UA site within two miles, and to ensure that UA points would have at least one neighbor for the analysis. A fixed distance band of five miles (8,047 meters) was chosen for an analysis at a broader regional level. The resulting significant z-scores were symbolized as positive clusters or "hot spots" and

negative clusters or “cold spots” at the 90%, 95%, and 99% confidence levels. Hot spot census tracts were symbolized with a red color ramp, and cold spot census tracts were symbolized with a blue color ramp. All non-significant census tracts were symbolized as beige.

A new field was created by dividing the count of UA sites per census tract by census tract population and multiplied by 10,000, giving a new quantity of UA sites per 10,000 population. The Hot Spot Analysis tool was used to calculate the Getis-Ord Gi* statistic for UA sites to determine where spatial clusters are located in the city at the census tract level by population. Fixed distance bands of two miles and five miles were used to analyze clusters at both the neighborhood and regional scale. The resulting significant z-scores were symbolized as positive clusters or “hot spots” and negative clusters or “cold spots” at the 90%, 95%, and 99% confidence levels. Hot spot census tracts were symbolized with a red color ramp, and cold spot census tracts were symbolized with a blue color ramp. All non-significant census tracts were symbolized as beige.

Analysis of Urban Agriculture Sites Located in Food Deserts

Food desert census tracts for 2010 were downloaded from the USDA Food Access Research Atlas (United States Department of Agriculture, n.d.-a) and added to ArcMap 10.3. Food deserts are defined as urban census tracts of low income and low access (LILA), where (1) the poverty rate for the census tract is at least 20% and (2) at least 33% of the population is greater than one or one half mile from the nearest supermarket or large grocery store (1 mi and 0.5 mi food deserts, respectively (Rhone, Ver Ploeg, Dicken, Williams, & Breneman, 2017). UA sites within “1 mile food deserts” and within “0.5 mi food deserts” were counted and identified by CPA. Any clusters of UA sites within “0.5 mi food deserts” were visually identified. Based on the city planning goal of all low-income Angelenos living within a half mile of fresh food by 2035,

population totals were also calculated for (1) total food desert census tracts; (2) food desert census tracts that were within a half mile of a UA site; and (3) food desert census tracts lacking UA sites within a half mile. The “buffer” tool was used to create a 0.5 mile buffer around to UA sites to visualize “alleviation,” or areas that lack grocery store access within 0.5 mile but do have one or more UA sites within 0.5 mile. Food desert census tracts with their centroid located within one half mile of UA sites were selected, and the total count and population of these tracts was used to calculate “alleviation,” or the proportion of half mile food desert census tracts that contain a UA site.

Multi Criteria Analysis of Highest Need Areas for Urban Agriculture

To conduct a more comprehensive and local analysis of need for access to healthy food, 10 indicators were chosen for the City of Los Angeles at the census tract level that included half mile food deserts, five socioeconomic indicators, and four self-reported health status indicators (**Table B.2** in Appendix B). All data were downloaded, cleaned, and joined to census tracts in ArcMap 10.3. Each indicator was converted to a raster and rescaled 1-10 with 10 indicating the highest relative level of need for each indicator. The 10 rasters were added to the Overlay Analysis tool and assigned equal influence of 10%. The resulting overlay raster included categorical values 1-10 and was symbolized with a yellow/brown stretched color ramp and the Boundary Clean tool was used to smooth the raster boundaries. A 0.5 mile buffer was applied to UA sites to show “alleviation” in the highest need areas.

The overlay raster cells with values 7-10 were selected to indicate the highest need areas of the city, or approximately the top 15% of the multi criteria analysis. The raster cells were converted into polygons, and census tracts with their centroid within the polygons were selected, yielding highest need census tracts. The highest need census tracts were joined with population and

spatially joined with UA sites to calculate the proportion of population and UA sites within these census tracts. Highest need census tracts within 0.5 mi of UA sites were selected using the Select by Location tool, and a new feature class was created to visualize and calculate the extent of “alleviated” high need census tracts. Conversely, high need census tracts that were not within 0.5 mi of any UA sites were selected and highlighted to visualize and calculate the extent of “non alleviated” high need census tracts.

Analysis of Vacant Land and Urban Agriculture Incentive Zones (UAIZ)

To be eligible for Urban Agriculture Incentive Zone (UAIZ) designation, vacant lots must be privately owned and between 0.1 and three acres in size among other criteria (Council of the City of Los Angeles, 2017b). Since government owned properties are not taxed, the data from the County Assessor used in this study generally does not include these public parcels. In addition, the zoning code category (miscellaneous) that would include any of these government owned lots was excluded from the analysis. A new field was added to the attribute table of vacant parcels, and the field calculator was used to calculate parcel geometry in acres. Parcels 0.1-3 acres in size were selected and a new feature class was created for “UAIZ Eligible Parcels.” Census tract polygons were joined with population tables, and these polygons were spatially joined with UAIZ eligible parcels. The total count of UAIZ eligible parcels was symbolized by quintiles using a purple color ramp. Total vacant area and total UAIZ eligible land area was calculated for the city and for highest need areas.

Tax Analysis for Urban Agriculture Incentive Zones (UAIZ)

The UAIZ designation reassesses an urban property tax to the value of irrigated agricultural land (Zigas, 2014). For most privately owned properties in the City of Los Angeles, this reassessment will result in a property tax savings, creating an incentive to agree to lease the

vacant land for farming or gardening for a minimum of five years. The most recent available land value and property tax data (2016 tax year) were downloaded from the Los Angeles County Assessor, and this data was joined to the vacant parcels feature classes. Seven new fields were created and the field calculator was used to calculate total value, total exemption, net taxable, current property tax, UAIZ tax, tax saved, and percent tax saved:

1. Total Value = (Land Value) + (Improvement Value) + (Fixture Value) + (Personal Property Value)
2. Total Exemption = (Homeowners Exemption) + (Real Estate Exemption) + (Fixture Exemption) + (Personal Property Exemption)
3. Net Taxable = (Total Value) - (Total Exemption)
4. Current Tax = (Net Taxable)*(Property Tax Rate)
5. UAIZ Tax = (Agricultural Land Value)*(Property Tax Rate)*(Acres)
6. Tax Saved = (Current Tax) – (UAIZ Tax)
7. Percent Tax Saved = 100 - (100*([UAIZ Tax] / [Current Tax]))

Property tax in the City of Los Angeles varies by tax rate area and the highest property tax of 1.220441% was used as an upper estimate of potential tax savings for this study (Los Angeles County Auditor-Controller, 2017). The most recent published per acre value of California irrigated cropland is $13,300 was used in these calculations (California State Board of Equalization, 2018). Parcels with positive tax savings were selected and a new feature class was created for positive parcels; the UAIZ program property tax break limit of $15,000 per property per year was also applied to this feature class. These UAIZ positive parcels were used to calculate annual tax savings in dollars and annual percent tax savings. Summary statistics were calculated for total UAIZ positive parcels, and the select by location tool was used to identify and summarize UAIZ positive parcels in highest need areas.

Results for UA site distribution and vacant land were summarized for a regional comparison by the city's seven Area Planning Commissions (APCs), a larger unit of analysis for city planning than the 35 Community Plan Areas (CPAs) used earlier in the analysis. UA sites and vacant land (parcels and acres) were summed by each APC using the find by location tool, and averages were calculated to show differences in regional distribution.

Analysis of the Los Angeles Promise Zone

The federally designated Los Angeles Promise Zone was chosen for a smaller scale of geospatial analysis in part due to the Sustainable City pLAn objective to "expand urban agriculture in the City's federally designated Promise Zone" (Petersen et al., 2015). The Promise Zone is an area of low income, low educational attainment, high unemployment, and low availability of affordable housing in Central Los Angeles that has been prioritized by civic leaders and institutions to provide additional support for community development (Becker, 2016). Furthermore, the 2016 Promise Zone Strategic Plan includes UA-relevant objectives to (1) improve fresh food access, (2) increase sustainable activities, and (3) develop five new parks (Becker, 2016). Similar visualizations and calculations completed for the highest need areas were conducted for the Promise Zone including distribution of UA sites, population, non-alleviated areas, UAIZ eligible lots and tax savings. An analysis of local parks was included as a potential community resource for UA development in addition to vacant parcels. An additional visual analysis was conducted to identify potential vacant lots and parks that could be prioritized for UA development based on (1) colocation in or near highest need areas and (2) not in close proximity to existing UA sites.

Calculation of Potential Vegetable Production for Urban Agriculture in Highest Need Areas

Similar to the method used in Part I, potential vegetable production was calculated for highest need census tracts, non-alleviated census tracts, and Promise Zone census tracts using the following formula:

$$Percent\ Vegetable\ Need\ Met = \frac{(Vacant\ Land\ Area) \times (Yield) \times (0.8)}{Vegetable\ Consumption} \times\ 100$$

Each calculation was carried out under three different yield scenarios (low yield, productive yield, intensive yield) and two consumption scenarios (recommended vegetable consumption and typical vegetable consumption of the city population). The calculations were also conducted for three different vacant lot conditions including total vacant lots, UAIZ eligible lots (0.1-3 acres), and UAIZ positive lots (i.e., eligible lots that would receive a positive tax benefit under a UAIZ designation).

RESULTS & DISCUSSION

Part I. Potential Vegetable Production of Urban Agriculture in the City of Los Angeles

The first part of this study was an initial analysis of the theoretical vegetable production from urban agriculture activity in the City of Los Angeles. The results shown in **Table 3.1** reveal that it would require 4.6%-26.2% of city land to meet the vegetable need for the population of Los Angeles, and it would require 0.8%-4.4% of city land to meet the vegetable need for the food-insecure population. According to the Los Angele County Tax Assessor, there is approximately 3.2% of privately owned land classified as vacant in the City of Los Angeles, indicating that there may be potential to convert some of this land into UA use especially if attempting to meet the need of specific subpopulations (such as food insecure individuals/households). If 2.6% of total municipal land area was utilized for UA (80% of current vacant land), 12%-71% of the city's

entire vegetable need could potentially be met, and 74%-426% of the city's food insecure population vegetable need could be met by UA production depending on the productivity of the sites (**Table 3.3**). In summary, using available vacant land area for UA could theoretically meet some, but not all of the vegetable need for the City of Los Angeles. However, the theoretical production is more than enough to meet the need of the food insecurity population of the city, indicating that vegetable production could be prioritized in underserved areas of the city.

There are many limitations to calculating theoretical UA vegetable yields, and the results of this analysis can be considered as a first step in calculating the aggregate potential of UA production in Los Angeles. Consistent with other studies, the calculations for potential production assumed that 80% of all currently vacant land space could be utilized in the City of Los Angeles (2.6% of the total land area), an overestimate that lacks screening criteria to identify vacant parcels that may be unsuitable for farming and gardening (Grewal & Grewal, 2012). For example, many vacant sites in the Santa Monica Mountains likely have slope that is prohibitive for most UA activity. In real world scenarios with competing land uses, it may be reasonable to expect that a much smaller percentage of total vacant land could be realistically utilized for UA. Despite the lack of rigorous site suitability criteria in the present study, the 2.6% of total land area that was used for production calculations is within the range (2.3-7.8%) of potentially suitable land found by other citywide studies that used various selection criteria (Grewal & Grewal, 2012; Kremer & DeLiberty, 2011; McClintock et al., 2013; Saha & Eckelman, 2017). A challenge for studies of potential aggregate UA production is limited data availability for UA yields; most of the literature cites a very small number of sources for yield, and typically the same few sources. Few of these sources are peer-reviewed, and there is generally a complete lack of city-specific UA yield data. The few sources that do exist vary in the type of UA site (e.g., residential gardens versus community gardens) and generally do not include details such as

cultivation methods or crop types. Even more uncertain, and yet continuously cited, are theoretical yields for hydroponic agriculture; several studies cite a single 2007 report from a nonprofit organization in Oakland that in turn cites a figure obtained via personal communication from the United Nations Food and Agriculture Organization (Bay Localize, 2007).

There are a number of reasons why the theoretical UA production values provided herein are likely to underestimate the actual aggregate potential. In this analysis, I did not quantify and account for current vegetable production from existing urban agriculture sites on a city level, which would have increased the theoretical production. I also did not take into consideration several additional potential growing areas in the City of Los Angeles including residential yards, public parks and natural areas, parkways, schoolyards and other institutions, and impermeable surfaces such as rooftops and parking lots that could be utilized by implementing raised beds and/or hydroponic crop production. The addition of these areas into the analysis could greatly increase the potential land area available for urban agriculture and thereby total theoretical vegetable production in Los Angeles. Other studies have included part or all of residential land area in potential vegetable production calculations, as well as part of industrial rooftop space (Grewal & Grewal, 2012; Haberman et al., 2014; Saha & Eckelman, 2017). Although some rooftop gardens exist in Los Angeles, they are not currently a substantial source of vegetable production on a community level (typically supplying a food outlet within the building). Furthermore, literature is lacking for rooftop hydroponic production yields. I calculated a preliminary area estimate for industrial rooftop space in the City of Los Angeles and identified nearly 11,000 acres of space, an area greater than total current ground level vacant area, indicating that there could be potential for this unique space to be utilized. This analysis also does not include the potential of controlled environment agriculture, a segment of urban agriculture that primarily consists of entrepreneurial efforts in Los Angeles but to date has not

been studied for its impact on dietary contribution. Typically, these operations are currently limited to high-value vegetables such as leafy greens that can be sold to local grocery stores and restaurants for profit.

The calculated UA production potential in this analysis could be improved by including more dietary specificity of both current and potential vegetable consumption. This study used available United States Department of Agriculture (USDA) data for overall American vegetable consumption (1.72 cup-equivalents per day) but California residents tend to consume more vegetables that the national average (Moore & Thompson, 2015). In addition, this study assumes that the actual vegetable consumption could be met by urban agriculture production, but there is a mismatch between the types of vegetables Americans consume (potatoes, tomatoes, sweet corn, onions, head lettuce) vs. what is typically grown in gardens (tomatoes, cucumbers, sweet peppers, beans, carrots, squash) (Bentley, 2017; National Gardening Association, 2009). The national consumption data also does not reflect the diversity of diets in Los Angeles that may differ from the country as a whole. Other studies have assessed potential production and dietary contributions of individual or groups of UA crops, adding specificity to aggregate estimates in the literature (MacRae et al., 2010; Ackerman et al., 2011; Grewal & Grewal, 2012; McClintock et al., 2013; Richardson & Moskal, 2016). The results from the literature suggest that UA may be well suited to supplement, but not necessarily supplant, vegetable consumption. UA could help to increase the amount and variety of nutrient dense vegetables, such as dark green and orange vegetables, that currently comprise a relatively small percentage of the average American diet but should be increased according to national dietary recommendations (United States Department of Health and Human Services & United States Department of Agriculture, 2015). In addition, UA may increase nutrition by providing opportunities for gardeners and recipients to taste and learn how to prepare unfamiliar

vegetables and possibly incorporate them into their diets. Evidence from school gardening programs and community gardens have demonstrated that participation in gardening increases the likelihood of trying new vegetables and increases overall vegetable consumption (Alaimo et al., 2008; Robinson-O'Brien, Story, & Heim, 2009).

Overall, urban agriculture appears to have potential for providing part of the vegetable need for communities in Los Angeles. Meeting the vegetable needs for the entire population would require large scale intensive UA that is far from realized. However, targeted UA development in high need communities could provide a substantial amount of healthy, accessible produce while also providing many community co-benefits beyond nutrition. However, supplying a portion of the food supply is only one of many goals of UA. Preliminary evidence I obtained from UA practitioner interviews (not presented here) points to the primary motivation as a social endeavor, and the production of food is a healthy by-product of this mission. The effort to build a local food system is also a primary strategy for community food security, and as Santo and colleagues have pointed out previously: "The criticism that cities cannot meet year-round food needs through urban agriculture underappreciates the benefits of this approach as one part of the mix of solutions to reform the food system" (Santo et al., 2016).

Part II. Geospatial Analysis of Urban Agriculture in the City of Los Angeles

The second part of this study assessed the geospatial distribution of community gardens, farmers markets, and farms in the City of Los Angeles. UA sites are often changing and some are informal efforts, which provides a challenge to obtaining accurate and up-to-date data. The data sets obtained in this study were cross referenced with non-profit websites as better sources were unavailable to confirm the accuracy of the data points. After cleaning, the data sets were found to contain several duplicate, nonexistent, or mismatched point locations. For

example, the USDA National Farmers Market Directory does not reflect the frequent changes in local farmers market locations, hours, and contact information. A comprehensive local database of existing UA sites, in progress UA sites, and suitable vacant spaces for future UA sites would be a useful asset to better understanding and expanding UA in Los Angeles. Although some efforts have mapped and made available a portion of existing UA sites, to date there does not exist a comprehensive and up-to-date database.

Distribution of Urban Agriculture in the City of Los Angeles

This analysis identified 161 UA sites in the City of Los Angeles summarized by **Table 3.3** and visualized by **Figure 3.1**. Community gardens were the most common with 71 sites, followed by farmers markets (59), and urban farms (31). There is an average of four UA sites per Community Plan Area (CPA); each CPA has a population in the tens of thousands, resulting in an average of 0.46 UA sites per 10,000 people. Two CPAs have zero UA sites, although these are partially or entirely located in the Santa Monica Mountains and may have fewer suitable sites for UA activity. When adjusted for population, UA sites are unevenly distributed across the City of Los Angeles (**Figure 3.2**). In general, fewer UA sites are located in the northern areas of the city in the San Fernando Valley. CPAs on the perimeter of the city generally have more UA sites than the urban core. Interestingly, Central City (downtown) has the highest number of UA sites per 10,000 population, but six of seven sites are farmers markets, and the registered farm is a fungi company. Overall, there are no permanent food growing spaces in Downtown Los Angeles according the data obtained for this study. The next highest prevalence of UA sites are in the relatively affluent Westside CPAs of Venice and Westchester - Playa del Rey. While the urban core CPAs including South and Southeast Los Angeles have the highest and third highest number of total UA sites respectively, they are below average when accounting for the dense population of these CPAs.

In addition, I compared community garden prevalence and distribution normalized by the number of housing units in each CPA (**Table 3.4**). The Plan for Healthy Los Angeles includes the goal for each CPA to have at least one community garden (one acre) per 2,500 housing units (Los Angeles Department of City Planning, 2015). Currently, only 25 of 35 CPAs or about 71% have any community gardens, and the highest prevalence, in Venice, is 0.46 per 2,500 housing units - less than half of the stated goal for the entire city. The nonzero average is 0.18 community gardens per 2,500 housing units. The Plan for a Healthy Los Angeles also states that the community garden should be one acre in size; while this study was unable to locate any local data on garden size, anecdotal evidence and site visits indicate that typical community gardens are much smaller than one acre, and there may be only a few gardens of this size in the entire city. This small extent of community gardens is also in the context of population growth and a severe housing shortage in Los Angeles; if housing were to increase and keep pace with population, the supply of community gardens would be even further from the goal. While competition with housing development presents additional challenges for expansion of urban gardens, it also presents opportunities to include gardens in new housing developments (**Chapter 4**). This analysis demonstrates that many more community gardens would need to be developed across the city to move anywhere near the stated goal.

An additional brief analysis based on a city planning goal identified census tracts and corresponding population that are located within one mile of a farmers' market. Currently, 422 census tracts with a population of approximately 1.6 million people live within one mile of a farmers' market, equivalent to about 42% of the 2010 city population. Since less than half of the city currently meets this planning goal, there would need to be many more additional farmers' markets strategically established throughout the city. When considering the city geographic size

(approximately 470 square miles) and population (nearly four million people), UA sites identified in this study are currently far from reaching stated objectives. A more detailed discussion of goals for UA is provided in **Chapter 4**.

The UA hot spot analysis was used to identify spatial clusters of UA sites at both a two mile (neighborhood) and five mile (regional) scale relative to population. Hot spots are statistically significant areas with more UA sites per 10,000 population relative to other nearby census tracts within either two or five miles (i.e., areas where there are an unexpectedly high number of UA sites relative to the population of the area). At the two-mile scale (akin to a neighborhood scale of analysis), four highly significant hot spots were identified: one on the Westside, one north of Downtown, one Downtown, and one in Southeast LA (in the Watts neighborhood) (**Figure 3.3**). These varied locations show that there is no one hot spot of UA activity, but rather that several UA hot spots exist near the outer limits of the City of Los Angeles. A fairly significant cold spot is evident in the eastern San Fernando Valley, with a few minor cold spots in Wilshire and South/Southeast Los Angeles.

At the five-mile scale (akin to a regional scale of analysis), most of the hot and cold spots are larger, especially the cold spots in the San Fernando Valley, and some have shifted compared to the results from the two-mile scale (**Figure 3.4**). The contrast between the cold spots of San Fernando Valley and the non-Valley hot spots is even more pronounced. While the Westside hot spot remains approximately in the same location, the Eastside hot spots have shifted: instead of Downtown and north of Downtown, they are northwest and northeast of Downtown. The hot spot in Southeast LA has become less significant and has shifted north towards the middle of the CPA. These shifts from the neighborhood (two mile) to regional (five mile) scales indicate that the clusters of UA sites in Downtown and Watts neighborhoods are less significant when compared to the broader city area. This is likely due the fact that Downtown and Watts are

very densely populated areas, and it is more expected or more likely that there would be a higher relative number of UA sites in these densely populated areas.

An additional analysis further explored the difference between CPAs in the San Fernando Valley and non-Valley CPAs by comparing total UA sites and total population of the two city regions (**Table 3.5**). The San Fernando Valley has approximately one third (36%) of the city's population but only about one quarter (24%) of the city's UA sites (0.27 UA sites per 10,000 population). This is substantially lower than the overall city average of 0.46 UA sites per 10,000. In contrast, the rest of the city has nearly two-thirds (64%) of the population and three-quarters (76%) of UA sites (an average of 0.59 UA sites per 10,000). The San Fernando Valley is clearly lacking in UA sites compared to the rest of the city, and should be prioritized for UA development and expansion - particularly in the six significant cold spot CPAs.

Co-Localization of Urban Agriculture with Areas of Greatest Need in the City of Los Angeles

This analysis identified UA sites located within USDA defined food deserts, census tracts with a poverty rate of at least 20% and more than 33% of the population living more than one mile or one half mile from the nearest large grocery store or supermarket ("1 mile food deserts" and "0.5 mile food deserts") (Rhone et al., 2017) (**Figure 3.5**). Two UA sites were located in 1 mile food deserts: a community garden in Northeast Los Angeles and farmers market in Wilmington - Harbor City (**Table 3.6; Figure 3.6**). While this is only a little over one percent (1.2%) of total UA sites, "1 mile food deserts" only comprise about two percent of the city census tracts and population. Approximately 42% of the "1 mile food desert" population is within one mile of one of these two UA sites, or is "alleviated" by these UA sites, meaning that this population does have UA site access within one mile despite not having grocery store access within one mile. This

indicates that these two sites are potentially important fresh food sources in underserved 1 mile food desert neighborhoods, a population of over 80,000 people.

This analysis identified 30 UA sites located within “0.5 mile food deserts”: 19 community gardens, six farmers markets, and five farms (**Table 3.7; Figure 3.6**). It should be noted that the two UA sites located in “1 mile food deserts” are also included in the total for “0.5 mile food desert” total, so there are 28 *additional* UA sites in 0.5 mile food deserts for a total of 30. These “0.5 mile food desert” census tracts comprise about one quarter of the total city population (nearly one million people), but only have 18.5% of total UA sites. These “0.5 mile food desert” census tracts also tend to have UA sites that are community gardens, with a higher prevalence of gardens (27%) relative to share of population, and a much lower prevalence of farms and farmers markets (16% and 10% respectively). In particular, a “0.5 mile food desert” UA cluster in the Watts Neighborhood of Southeast Los Angeles stands out as most of this region of the city is “0.5 mile food desert” census tracts. Of the UA sites in this cluster, six are community gardens and one is classified as a farm although the name is “Maria’s Garden.” Two farmers markets are in this cluster (while technically not within “0.5 mile food desert” census tracts, they are just outside the border). Collectively, these results indicate that UA sites are underrepresented in food deserts are more likely to be community gardens than farms or farmers markets.

The Los Angeles Sustainable City pLAn includes the goal, “ensure all low-income Angelenos live within half mile of fresh food by 2035” (Petersen et al., 2015). Using the USDA half mile food desert definition, this analysis showed that 969,221 people, or about a quarter of the city’s population, currently live in food deserts (i.e., do not live within a half mile of a grocery store or supermarket). Interestingly, this total population is more than two times the baseline presented in the city planning objective (Petersen et al., 2015), indicating that there is a much larger city

population living in food desert census tracts than has been previously reported. This substantial discrepancy warrants further investigation as the half mile objective is a primary objective in the Sustainable City pLAn. In the analysis provided herein, I identified 140 census tracts, nearly 600,000 people or 70% of the 0.5 mile food desert population, live within 0.5 miles of a UA site (mostly community gardens. This finding indicates that UA sites, particularly community gardens, could be playing an important role in alleviating the lack of access to fresh foods in these communities. One limitation to estimating census tracts and population within 0.5 mile of a UA site arises from the use of centroids. If the center of a census tract is located within a 0.5 mile buffer of a UA site, the entire census tract population is counted, so this is likely an overestimate of the actual population that lives within "0.5 mile food deserts". Nevertheless, the proportion is substantial.

To develop a more comprehensive separate measure of fresh food need, multi criteria analysis was used to create a composite index of need using 10 different contributing factors that have been shown in the literature to affect food need (see **Table B.2** in Appendix B). The 10 indicators of need were combined into composite scores of 1-10 to identify areas of lowest need to highest need (one being lowest need, 10 being highest need) across the city (Figure 3.7). This combination of indicators (one of which was "0.5 mile food desert") provides a more comprehensive analysis of need beyond the food desert indicators of low income and low access to grocery stores. The additional criteria included more socioeconomic indicators (median income, population density, vehicle access, percent of families receiving SNAP benefits), self-reported health behavior (percent of adults reporting to eat <1 serving of fruit/vegetable per day), and self-reported health status (obesity, diabetes, and fair or poor health). Compared to using only food deserts as indicators of need throughout the City of Los Angeles, the multi criteria analysis identified more areas in the urban core, especially South and

Southeast Los Angeles. This is likely partially due to the inclusion of population density as one of the 10 indicators. The food desert analysis, with only two indicators (low income and low access), identified more outlying census tracts including in Northeast Los Angeles and in the San Fernando Valley.

The top 15% of highest need areas (scores of 7-10 in the multi criteria analysis) are primarily located in the southeast regions of the city including Boyle Heights, South and Southeast Los Angeles, Westlake, and most of Central City and West Adams - Baldwin Hills - Leimert. These highest need areas comprise 28% of the total city population, likely partially due to the high population density of these areas (**Table 3.8**). These highest need areas also include 44 UA sites, or about 27% of total UA sites, indicating that these areas have about the same share of UA sites as the rest of the city (**Figure 3.8**). Of these UA sites, there is a higher prevalence of community gardens relative to share of population (35%), and a lower proportion of farmers markets (24%) or farms (16%). This is consistent with the results from the food desert analysis, in which a much higher proportion of community gardens (versus farmers markets and farms) were found in high need areas compared to city-wide. The multi criteria analysis identified 14 UA sites that were not within “0.5 mile food deserts”, which suggests that an expanded set of indicators may be more appropriate for identifying high need areas (compared to the two food desert indicators of low income and low access). The highest need areas include 199 census tracts with approximately 772,000 people that live within 0.5 miles of a UA site (mostly community gardens), or about 68% of the total highest need population. This percent alleviation is similar to that of the food desert analysis which found that 70% of the “0.5 mile food desert” census tract population lived with half mile of UA sites. Taken together, these analyses show that UA sites, especially community gardens, may be important food sources in high need neighborhoods in Los Angeles.

The multi criteria analysis also identified highest need census tracts and population that are not within 0.5 miles of a UA site, or non-alleviated areas of the city (**Figure 3.9**). These non-alleviated areas include 93 census tracts and approximately 366,548 people, or about 32% of the highest need population (**Table 3.9**). Non-alleviated areas also contain approximately 1,378 vacant land parcels that add up to 212 vacant acres of land, equivalent to about 46% of the vacant area in highest need census tracts. This indicates that there may be opportunity for some of the vacant land parcels in non-alleviated areas to be prioritized for UA development. With strategic implementation, UA sites in these non-alleviated neighborhoods could potentially provide much needed community access to fresh food and green space. Similar to the food desert analysis, the estimates of census tracts and population within or not within 0.5 mile of UA sites (alleviation and non-alleviation) is likely an overestimate due to the use of census track centroids in the calculations.

Potential for Vacant Land in the City of Los Angeles to be Utilized for Urban Agriculture to Meet Fresh Food Needs

Overall, the City of Los Angeles has a small amount of vacant land with just over six percent of its area categorized as vacant (**Table 3.10**). The distribution of vacant land is strongly skewed towards smaller parcels with an average of 0.63 acres. However, a small number of large parcels inflates the average. Only 182 parcels are greater than 14 acres in size (about 0.6%), and they comprise nearly half (46%) of the total vacant land. Many of these large vacant parcels are located within or adjacent to parks and natural areas and were excluded in subsequent analysis. Of the vacant parcels that are less than 14 acres in size, the average parcel size is 0.34 acres, and they collectively comprise 54% of the vacant area and about 3.2% of the total land area in the City of Los Angeles. The distribution of vacant lots by use code category shows

that most vacant areas (84%) are residential, followed by commercial (about eight percent) and industrial (about seven percent) (**Table 3.11**). Very few vacant parcels are agricultural, recreation, institutional, or miscellaneous (each less than one percent of the total).

Privately owned vacant parcels between 0.1-3.0 acres in size are potentially eligible for the city's recently implemented Urban Agriculture Incentive Zones (UAIZ) Program. The program provides a potential property tax break to private landowners if they agree to lease their land for UA for a minimum of five years. To assess financial viability and impacts of this approach, I calculated the potential change in property tax that would result from a successful UAIZ designation, and found that approximately 85% of UAIZ eligible parcels and 73% of UAIZ eligible acres would result in a positive tax savings. Within the City of Los Angeles, these parcels may represent privately owned vacant land most likely to be developed into new UA sites. The distribution of these sites is highly skewed towards the lower end of the 0.1-3 acre UAIZ size criteria range, with an average of 0.27 acres and three-fourths of parcels smaller than 0.25 acres (**Table 3.12**; **Figure 3.10**). The total potential property tax savings from UAIZ positive parcels is nearly $25 million, with an average annual savings of $1,688 or about 90% tax savings relative to current property tax (**Table 3.13; Figure 3.11; Figure 3.12**). This suggests that the policy does provide a financial incentive for most, but not all, private landowners to lease their vacant land for farming or gardening. The savings are even greater when considering that the UAIZ agreement is for a minimum of five years, which is not reflected in this annual property tax analysis.

The UAIZ eligible positive tax break parcels are unevenly distributed across Community Plan Areas (CPAs) in the City of Los Angeles (**Table 3.14**). The average CPA has approximately 415 UAIZ-eligible positive parcels and 107 UAIZ-eligible acres, and the vast majority are located in

less populated peripheral CPAs and CPAs that are located in or adjacent to the Santa Monica Mountains (**Figure 3.13**). The top 10 CPAs contain about 76% of all the UAIZ-eligible acres (**Table B.11** in Appendix B). Interestingly, the CPAs with the most vacant land do not also have the highest number of UA sites, with two of the top ten being the only CPAs with zero UA sites (Bel Air - Beverly Crest, Sun Valley - La Tuna Canyon). Given the distribution of vacant land is concentrated on the periphery of the city, there appears to be substantial land opportunity to develop peri-urban agriculture that is adjacent to but not within the city's urban core. There are far fewer vacant parcels eligible for UAIZ designation in the urban core, but many times the number of existing UA sites. This could indicate that there are some sites potentially suited for future UA expansion in the urban core.

Assessing the UAIZ positive parcels in high need areas provides a general overview of the potential for UA development in these neighborhoods (**Table 3.15**). In the multi criteria highest need areas, there are 2,150 potentially positive parcels and 402 positive acres. While this is only about 13% and 8% of all UAIZ positive parcels and acres respectively, it shows that there may be a substantial number of options, especially when considering that there are only currently 44 UA sites located in these highest need census tracts. In addition, the average tax savings for these highest need vacant parcels is $2,060 and 94%, which is about $400 higher than the average annual savings for UAIZ positive parcels overall. However, UAIZ positive parcels in highest need areas are smaller than the overall distribution, with an average of 0.19 acres compared to 0.27 acres for all parcels. Nearly one-third of the highest need UAIZ positive parcels are located in non-alleviated areas, or census tracts that are not within 0.5 mi of any UA site in the city (**Table 3.16**). These 640 parcels or 122 acres comprise about three percent of overall UAIZ positive parcels, and could be prioritized for further site analysis (e.g., ground truthing) and UA development.

A limitation to the extent of potential UAIZ implementation is the program's cumulative funding limit of $3 million for the entire county, including unincorporated areas and all 88 incorporated cities. Using the City of Los Angeles potential average annual property tax savings of $1,688, each UAIZ contract would on average cost the County $8,440 in property tax breaks over the minimum five year lease period. At this cost, the cumulative limit of $3 million would support approximately 355 five-year UAIZ contracts in Los Angeles County or 0.35 contracts per 10,000 population. Using the average available parcel size of 0.27 acres, this would potentially develop an additional 95.9 acres of urban land for short-term UA activity countywide. Assuming UAIZ contracts were equally distributed across the County by population, the City of Los Angeles would receive about 40% or 139 five-year UAIZ contracts, equivalent to 37.5 additional acres of UA activity. An addition of 139 UA sites on vacant land would nearly double the total existing UA sites identified in this study (an increase of about 86%) and would represent a 136% increase in production sites (farms and community gardens). The additional 37.5 acres is equivalent to approximately one percent of all UAIZ positive vacant acres, nine percent of UAIZ positive acres in highest need areas, and 31% of UAIZ positive acres in non-alleviated highest need areas. If all 37.5 acres were producing vegetables, it would be enough to meet the need of approximately 2,000 to 11,000 people depending on the production and consumption scenarios from Part I of this study. These results indicate that if fully implemented, the UAIZ property tax breaks are limited in their capacity to expand UA sites in the City of Los Angeles relative to the total number and acreage of eligible vacant parcels, but could nearly double the number of existing UA sites and meet the vegetable need of thousands of people. If strategically implemented in highest need areas of the city, the UAIZ program could benefit a substantial portion of vacant land, especially areas that currently lack UA sites.

A regional citywide summary of UA sites and vacant land is presented in **Table 3.17**. When presented by regions, clear trends in distribution emerge. As previously contrasted, the San Fernando Valley areas have far fewer UA sites compared to the rest of the city. Also, the most densely populated urban core areas of Central and South Los Angeles have lower population-adjusted UA prevalence compared to the peripheral areas of East, South, and West Los Angeles. The distribution of UAIZ eligible vacant parcels that would receive a positive tax break varies greatly by region. The outer areas of East, West, and North Valley have far more vacant eligible parcels compared to other areas (although West includes many parcels in the Santa Monica Mountains that are less likely to be suitable for UA activity). Central and South Valley have somewhat less, and Harbor and South Los Angeles have far less especially when accounting for population density; South Los Angeles has about four times less UAIZ eligible vacant land than the city regional average, demonstrating that there is a relatively limited available vacant land in the urban core. On average the vacant parcels in the urban core are also smaller; the average UAIZ eligible parcel in South Los Angeles is 0.18 acres compared to a regional average of 0.27 acres. However, East Los Angeles is an exception as it has the most vacant land but a low average parcel size of 0.18 acres, indicating a high number of small parcels. Overall, this summary provides additional evidence that UA and vacant land is more distributed to the outer peripheral areas of Los Angeles, and that opportunity for UA expansion in the urban core may be more limited.

Case Study: The Potential for Urban Agriculture Expansion in the Los Angeles Promise Zone

The Los Angeles Promise Zone was specifically selected for a smaller scale analysis and its preexisting designation as an area of high need. The Promise Zone is an area of low income, low educational attainment, high unemployment, and low availability of affordable housing in

Central Los Angeles that has been prioritized by civic leaders and institutions to provide additional support for community development (Becker, 2016). The Promise Zone contains eight UA sites including five community gardens and three farmers markets (**Figure 3.14**). The community gardens are distributed across the length of the zone with three in the south, one in the middle, and one in the northwest. They are also in or near highest need census tracts, indicating they may be serving part of the zone's high need population. The three farmers markets are limited to the northern border of the zone, and thus not in close proximity to much of the population. About half of the vacant parcels in the Promise Zone are eligible for UAIZ positive designation, which includes 113 parcels for a total of 20.4 acres, with an average size of 0.18 acres (**Table 3.18**). The parcels have an average property tax savings of $4,251, or about 2.5 times that of total UAIZ positive parcels. This could be viewed as a high incentive, but it could also suggest that the land is very valuable, which is reasonable since about half of the Promise Zone is in Hollywood Community Plan Area. A visual analysis of UAIZ positive parcels in the Promise Zone shows that there are five small areas with parcels that are generally in highest need areas, but outside of or at the boundary of a 0.5 mi buffer from the nearest UA site. This small group of UAIZ positive parcels may be most appropriate for prioritization of UA development in the Promise Zone.

In addition to vacant parcels, the zone has five small parks and three large parks for a total of nearly 57 acres, or nearly three times the acres of all the UAIZ positive parcels. Although not considered previously in this study, a portion of public parks could be dedicated to UA use, especially if the park is large and could accommodate multiple uses. Several of the parks in the Promise Zone are in or adjacent to highest need and/or highest need non-alleviated areas, indicating that UA activity in these parks may help increase food access for these neighborhoods. For example, MacArthur Park is completely within a non-alleviated highest need

area, and its size of nearly 30 acres suggests that part of it could potentially be developed for farming and gardening for the benefit of the surrounding community.

Potential Vegetable Production of Urban Agriculture Sites in Highest Need Areas

The vegetable production potential in highest need areas (top 15% of multi criteria analysis) of Los Angeles is low relative to the total population in these neighborhoods (**Table 3.19**; **Table 3.20**). In the highest need areas, dedicating all currently vacant land to intensive farming and gardening would theoretically only meet the need of approximately 18% of the population assuming typical vegetable consumption, and only about seven percent when considering all vacant parcels that are eligible to receive a positive tax break under the Urban Agriculture Incentive Zone (UAIZ) Program. While percentage of overall population is small, the theoretical production could potentially represent a tremendous increase in UA production relative to that which currently exists among the 44 UA sites identified in highest need areas; if all UAIZ positive sites in highest need areas were utilized for UA, this could potentially supply the typical vegetable consumption for over 76,000 people, and even more if vegetables were only supplementing part of the need. At a smaller scale, the Promise Zone could potentially meet up to seven percent of its vegetable need if all its vacant parcels were dedicated to intensive urban agriculture and under four percent if only considering potential UAIZ eligible, tax positive parcels (**Table 3.21**). In contrast, the vegetable production results on a citywide scale from Part I showed that approximately 50-74% of the city vegetable need could be met by intensive urban agriculture on all available vacant land. However similar to the potential production for highest need areas, the theoretical yield for the Promise Zone could be an extensive increase relative the production of the five community gardens. If all vacant UAIZ positive parcels were intensively producing vegetables, it could meet the typical consumption of nearly 6,000 people or more if vegetables were supplementing only a portion of diets. These results are also

representative of the unequal distribution of vacant land, as the highest need areas are some of the most densely populated areas of the city and have substantially less vacant land available. The difference in production potential by scale of analysis (i.e., highest need areas/neighborhoods vs. citywide) suggests that a highly localized UA model of production and distribution would not be adequate to meet vegetable needs.

These results, taken together with the citywide production calculations in Part I, suggest that the role and the potential of UA may be best utilized and promoted for supplementing, but not entirely supplying, vegetable consumption in the City of Los Angeles. Especially in high need communities, improved access to fresh vegetables could help supplement diets that are far below vegetable dietary recommendations; an average of nine percent of census tract populations report consuming less than one serving of fruits or vegetables per day, and in some census tracts nearly 18%. In addition, some studies have shown that exposure to new vegetables through gardening increases the likelihood of incorporating those vegetables into the diet (McCormack et al., 2010; Robinson-O'Brien et al., 2009). To significantly expand the capacity of UA at the community level in the highest need areas of the city would likely require a new distribution model that relies on a network of UA sites, including outlying areas with more vacant space for peri-urban agriculture, to distribute produce to the urban core.

CONCLUSIONS

This study was an initial effort to assess both existing and potential UA in the City of Los Angeles including (1) the potential UA vegetable production of vacant land in the City of Los Angeles under different production and consumption scenarios and (2) the geospatial distribution of UA sites and vacant land. This was the first calculation of the theoretical aggregate UA production for the City, and unique in its analysis of UA sites relative to areas of

high need in a major metropolitan area. A strength of this study was its geospatial assessment of both UA sites and vacant parcels citywide, and the inclusion of an analysis for the recently implemented Urban Agriculture Incentive Zones (UAIZ) Program.

Findings indicate that UA could theoretically provide a substantial amount of the city's vegetable need, especially if the food insecure population was prioritized. Existing UA sites are unevenly distributed across the city, with substantially fewer sites in the San Fernando Valley and hot spots in the West and Northeast areas of the city; the urban core has a lower population-adjusted UA prevalence compared to nearby areas, but some clusters exist notably in the Watts neighborhood of Southeast Los Angeles. UA sites consist mainly of community gardens, and community gardens are more likely to be the type of UA site found in food desert or highest need areas. UA sites are underrepresented in food deserts compared to the city as a whole. This study showed that existing UA sites could be playing an important role in community food access as about two-thirds of the population in food desert and highest need areas are alleviated, or within 0.5 miles, of a UA site. Vacant land is far more prevalent in peripheral areas of the city and a vast majority of vacant parcels are small in size (less than one-quarter of an acre). Based on size, about one-quarter of vacant parcels would be eligible for Urban Agriculture Incentive Zone (UAIZ) designation, and a large majority of these would receive a positive property tax break if designated. Funding limits for UAIZ property tax breaks would cover approximately one percent of all eligible sites, but would nearly double the number of existing UA sites. There is a relatively small amount of vacant land in the most dense and highest need areas of the city, and the potential vegetable production using the vacant land would only be able to meet a small percentage of vegetable need; however, the potential production could be a large increase relative to existing UA activity.

This study underscores that while UA could provide a portion of the city's produce need, it is not a panacea to the urban challenges of poverty, lack of access to healthy food, and lack of green spaces for recreation and growing food. A vast expansion of UA to maximize community food access and security would likely require a novel, networked distribution system that connects many small UA sites and links the urban core to peri-urban UA sites. However, this chapter highlights that UA expansion could be strategically incentivized and implemented in the highest need areas of the city, particularly in non-alleviated areas that do not have a UA site within a half mile or more. These non-alleviated areas can help inform city planning goals and objectives that currently do not include specific processes for identifying areas that should be prioritized for UA projects, such as the Urban Agriculture Incentive Zone Program. Prioritizing non-alleviated areas of the city would be an effective strategy to further the goals of improving urban food security and access to healthy food. With strategic implementation, there appears to be ample opportunity for UA growth in the City of Los Angeles.

Table 3.1. Potential percent of city land required for urban agriculture to meet vegetable need in the City of Los Angeles

	Recommended consumption*, total city population†	**Typical consumption**, total city population†**	**Recommended consumption*, food insecure population‡**	**Typical consumption**, food insecure population‡**
Low yield	26.2%	18.0%	4.4%	3.0%
Productive yield	10.4%	7.2%	1.7%	1.2%
Intensive yield	6.7%	4.6%	1.1%	0.8%

*2.5 cup-equivalents of vegetables per person per day
**1.72 cup-equivalents of vegetables per person per day
†3,976,621 people
‡estimated 660,000 people

Table 3.2. Potential percent vegetable need met by urban agriculture on privately owned vacant land[§] in the City of Los Angeles

	Recommended consumption*, total city population[†]	**Typical consumption**, total city population[†]**	**Recommended consumption*, food insecure population[‡]**	**Typical consumption**, food insecure population[‡]**
Low yield	12.3%	17.9%	74.4%	108%
Productive yield	31.1%	45.1%	187%	272%
Intensive yield	48.7%	70.7%	293%	426%

[§]approximately 3.2% of the City's land area
*2.5 cup-equivalents of vegetables per person per day
**1.72 cup-equivalents of vegetables per person per day
[†]3,976,621 people
[‡]estimated 660,069 people

Table 3.3. Summary statistics of urban agriculture sites by Community Plan Areas in the City of Los Angeles

Urban Agriculture Sites by Count	
Community Gardens	71
Farmers Markets	59
Farms	31
Total	161
Urban Agriculture Sites by Community Plan Areas	
Minimum	0
Maximum	13
Average	4.13
Nonzero Average	4.88
Standard Deviation	3.47
Nonzero Standard Deviation	3.25
Urban Agriculture Sites per 10,000 Population by Community Plan Areas	
Minimum	0
Maximum	2.01
Average	0.46
Nonzero Average	0.49
Nonzero Standard Deviation	0.39

Table 3.4. Summary statistics for community gardens by Community Plan Areas in the City of Los Angeles

Community Gardens by Community Plan Areas	
Populated CPAs without Community Gardens	10 (28.6%)
Populated CPAs with Community Gardens	25 (71.4%)
Minimum	1
Maximum	9
Average	2.84
Standard Deviation	1.91
Community Gardens per 2,500 Housing Units by Community Plan Areas	
Minimum	0.05
Maximum	0.46
Average	0.18
Standard Deviation	0.11

Table 3.5. Comparison of San Fernando Valley and Non-San Fernando Valley Community Plan Areas by population and urban agriculture sites in the City of Los Angeles

	Total	**Percent of City Total**
San Fernando Valley Community Plan Areas	14	40.0%
Population	1,466,205	36.1%
Urban Agriculture Sites	39	24.2%
Average Urban Agriculture Sites per 10,000*	0.27	58.7%
Non-San Fernando Valley Community Plan Areas	21	60.0%
Population	2,591,530	63.9%
Urban Agriculture Sites	122	75.8%
Average Urban Agriculture Sites per 10,000*	0.59	128%

*average compared to city average of 0.46 urban agriculture sites per 10,000

Table 3.6. Summary of urban agriculture sites located in one mile food deserts† in the City of Los Angeles

Urban Agriculture Sites Located in One Mile Food Deserts	**Total**	**Percent of City Total**
Census Tracts	21	1.80%
Population	80,228	2.06%
Urban Agriculture Sites	2	1.23%
Kaiser South Bay Farmers Market (Wilmington - Harbor City CPA)		
Ramona Gardens Community Garden (Northeast Los Angeles CPA)		
Average Urban Agriculture Sites per 10,000*	0.25	54.3%
Urban Agriculture Alleviation in One Mile Food Deserts	**Total**	**Percent of 1 mi Food Desert Total**
Census Tracts within 1 mi of UA site	9	42.9%
Population within 1 mi of UA site	33,987	42.4%

†census tracts that are low income (poverty rate of 20% or greater) and low access (at least 33% of population is greater than one mile away from the nearest supermarket or large grocery store)
*average compared to city average of 0.46 urban agriculture sites per 10,000

Table 3.7. Summary of urban agriculture sites located in half mile food deserts† in the City of Los Angeles

Urban Agriculture Sites Located in Half Mile Food Deserts	**Total**	**Percent of City Total**
Census Tracts	235	20.1%
Population	969,221	24.8%
Urban Agriculture Sites	30	18.5%
Community Gardens	19	26.8%
Farmers Markets	6	10.2%
Farms	5	16.1%
Average Urban Agriculture Sites per 10,000*	0.31	67.4%
Urban Agriculture Alleviation in Half Mile Food Deserts	**Total**	**Percent of 0.5 mi Food Desert Total**
Census Tracts within 0.5 mi of UA site	140	59.6%
Population within 0.5 mi of UA site	590,917	70.0%

†census tracts that are low income (poverty rate of 20% or greater) and low access (at least 33% of population is greater than 0.5 miles away from the nearest supermarket or large grocery store)
*average compared to city average of 0.46 urban agriculture sites per 10,000

Table 3.8. Summary of urban agriculture sites located in top 15% highest need areas† in the City of Los Angeles

Urban Agriculture Sites Located in Top 15% Highest Need Areas	**Total**	**Percent of City Total**
Census Tracts	292	28.9%
Population	1,138,577	28.1%
Urban Agriculture Sites	44	27.3%
Community Gardens	25	35.2%
Farmers Markets	14	23.7%
Farms	5	16.1%
Average Urban Agriculture Sites per 10,000*	0.39	84.8%
Urban Agriculture Alleviation in Top 15% Highest Need Areas	**Total**	**Percent of Highest Need Area Total**
Census Tracts within 0.5 mi of UA site	199	68.2%
Population within 0.5 mi of UA site	772,029	67.8%

†census tracts that scored in the top four highest categories (out of 10) in the multi criteria analysis
*average compared to city average of 0.46 urban agriculture sites per 10,000

Table 3.9. Summary of non-alleviated top 15% highest need areas† in the City of Los Angeles

Non-Alleviated Top 15% Highest Need Areas	**Total**	**Percent of Highest Need Area Total**	**Percent of City Total**
Census Tracts	93	31.8%	9.19%
Population	366,548	32.2%	9.66%

†census tracts that scored in the top four highest categories (out of 10) in the multi criteria analysis that are not located within 0.5 miles of an urban agriculture site

Table 3.10. Summary of privately owned vacant land parcels in the City of Los Angeles

Total Vacant Land Parcels	**Total**	**Percent of City Total**	
Parcel Count	28,676	3.60%	
Area Sum	18,029 acres	6.01%	
Area Maximum	558 acres		
Area Minimum	0 acres		
Area Average	0.63 acres		
Area Standard Deviation	6.51 acres		
Vacant Land Parcels >14 Acres	**Total**	**Percent of Vacant Land**	**Percent of City Total**
Parcel Count	182	0.63%	0.02%
Area Sum	8,328 acres	46.2%	2.78%
Area Average	45.8 acres		
Area Standard Deviation	66.8 acres		
Vacant Land Parcels <14 Acres	**Total**	**Percent of Vacant Land**	**Percent of City Total**
Parcel Count	28,494	99.4%	3.58%
Area Sum	9,701 acres	53.8%	3.23%
Area Average	0.34 acres		
Area Standard Deviation	1.04 acres		

Table 3.11. Privately owned vacant land parcel distribution by land use code* category in the City of Los Angeles

Use Code Category	Number of Vacant Parcels	Percent of Total Vacant Parcels	Total Number of Acres (Average Size in Acres)	Percent of Total Vacant Acres
00 - Residential	24,080	84.0%	14,110 (0.59)	78.3%
10 & 20 - Commercial	2,201	7.68%	762 (0.35)	4.23%
30 - Industrial	2,059	7.18%	1,009 (0.49)	5.60%
40 & 50 - Agricultural	70	0.24%	1,349 (19.3)	7.48%
60 - Recreational	30	0.10%	272 (9.08)	1.51%
70 - Institutional	58	0.20%	215 (3.71)	1.19%
80 - Miscellaneous	178	0.62%	313 (1.76)	1.74%
Total	28,676	100%	18,029	100%

*land use codes are used by governments to classify parcels of land for zoning purposes

Table 3.12. Summary of privately owned vacant land eligible for Urban Agriculture Incentive Zone (UAIZ) positive property tax break in the City of Los Angeles

	Total Parcels / Acres	**Percent UAIZ Eligible Parcels / Acres**
Parcel Count	14,658	85.3%
Area Sum	3,916 acres	73.3%
Area Average	0.27 acres	
Area Standard Deviation	0.33 acres	
Area Size Distribution		
≤2.0 acres	14,523 / 3,591	99.1% / 91.7%
≤1.0 acre	14,114 / 3,019	96.3% / 77.1%
≤0.5 acre	13,325 / 2,410	90.9% / 61.5%
≤0.25 acre	11,030 / 1,653	75.2% / 42.2%
≤0.20 acre	9,601 / 1,337	65.5% / 34.1%
≤0.15 acre	6,349 / 782	43.3% / 20.0%
≤0.125 acre	3,686 / 418	25.1% / 10.7%

Table 3.13. Potential annual property tax savings from privately owned vacant land area eligible for Urban Agriculture Incentive Zone (UAIZ) positive property tax break in the City of Los Angeles

	Potential Property Tax Savings (Dollars)	**Potential Property Tax Savings (Percent)**
Sum*	$24,742,476	
Minimum	$0.02	0.08%
Maximum**	$14,963	99.9%
Average	$1,688	90.1%
Standard Deviation	$2,422	

*the total funding for the UAIZ Program in Los Angeles County is $3 million
**the maximum annual property tax break under the UAIZ Program is $15,000 in Los Angeles County and was used a threshold in this analysis

Table 3.14. Summary of privately owned vacant land eligible for Urban Agriculture Incentive Zone (UAIZ)* positive property tax break incentive by Community Plan Areas in the City of Los Angeles

UAIZ Eligible Positive Vacant Parcels by Community Plan Areas	**Total**	**Percent of UAIZ Eligible Positive Parcels/Area**
Minimum Parcel Count	9 parcels	0.06%
Maximum Parcel Count	3,821 parcels	26.3%
Average Parcel Count	415 parcels	
Minimum Area Sum	2.56 acres	0.07%
Maximum Area Sum	711 acres	18.9%
Average Area Sum	107 acres	

*UAIZ eligible parcels are between 0.1 and 3 acres in size

Table 3.15. Summary of privately owned vacant land eligible for Urban Agriculture Incentive Zone (UAIZ) positive property tax breaks in top 15% highest need areas† in the City of Los Angeles

	Total	**Percent of UAIZ Positive Parcels / Acres**
Parcel Count	2,150	12.5%
Area Sum	402 acres	7.52%
Minimum	0.10 acres	
Maximum	2.47 acres	
Average	0.19 acres	
Standard Deviation	0.16 acres	
Potential Tax Savings	$4,429,657	17.9%
Minimum	$0.28	
Maximum	$14,865	
Average	$2,060	
Standard Deviation	$2,360	
Average Percent Savings	94.2%	
Minimum	1.64%	
Maximum	99.9%	

†census tracts that scored in the top four highest categories (out of 10) in the multi criteria analysis

Table 3.16. Summary of privately owned vacant land eligible for Urban Agriculture Incentive Zone (UAIZ) positive property tax breaks in top 15% highest need non-alleviated areas in the City of Los Angeles

	Total	**Percent of Top 15% Highest Need UAIZ Positive Parcels / Acres**	**Percent of UAIZ Positive Parcels / Acres**
Parcel Count	640	29.8%	3.72%
Area Sum	122 acres	30.3%	2.28%
Minimum	0.10 acres		
Maximum	2.10 acres		
Average	0.19 acres		
Standard Deviation	0.16 acres		
Potential Tax Savings	$1,189,718	26.9%	4.81%
Minimum	$0.28		
Maximum	$14,302		
Average	$1,859		
Standard Deviation	$2,058		
Average Percent Savings	93.8%		
Minimum	1.64%		
Maximum	99.7%		

†census tracts that scored in the top four highest categories (out of 10) in the multi criteria analysis that are not located within 0.5 miles of an urban agriculture site

Table 3.17. Summary of urban agriculture (UA) sites and acres of privately owned vacant land by Area Planning Commission (APC) in the City of Los Angeles

Area Planning Commission (APC)	Community Gardens	Farmers Markets	Farms	Total UA Sites	UA Sites per 10,000 Population	Acres Vacant Land	Acres UAIZ Eligible Vacant Land	Acres UAIZ Positive Vacant Land (Average)	Acres UAIZ Positive Vacant Land per 10,000 Population
North Valley	8	4	8	20	0.28	6,566	1,505	988 (0.40)	14.0
South Valley	6	9	4	19	0.25	1,568	795	639 (0.33)	8.42
Central	14	14	2	30	0.41	1,206	636	462 (0.22)	6.30
East Los Angeles	13	7	4	24	0.55	1,550	948	837 (0.19)	19.3
West Los Angeles	9	12	5	26	0.60	5,906	871	516 (0.36)	12.0
South Los Angeles	16	9	6	31	0.42	356	257	194 (0.18)	2.64
Harbor	5	4	2	11	0.54	857	252	219 (0.22)	10.8
Total	71	59	31	161		18,009	5,264	3,855	
Average	10.1	8.43	4.43	23	0.44	2,573	752	551 (0.27)	10.5

Table 3.18. Summary of privately owned vacant land located in the Los Angeles Promise Zone

Total Vacant Parcels	**Total**	
Parcel Count	261	
Area Sum	39.7 acres	
Maximum	1.38 acres	
Average	0.15 acres	
Standard Deviation	0.14 acres	
UAIZ Eligible Parcels (0.1-3 acres)	**Total**	**Percent of Total Promise Zone Vacant Parcels**
Parcel Count	174	66.7%
Area Sum	35.8 acres	90.2%
Maximum	1.38 acres	
Average	0.21 acres	
Standard Deviation	0.14 acres	
UAIZ Positive Parcels	**Total**	**Percent of Total Promise Zone Vacant Parcels**
Parcel Count	119	45.6%
Area Sum	21.3 acres	53.7%
Maximum	0.48 acres	
Average	0.18 acres	
Standard Deviation	0.07 acres	
Potential Tax Savings	$505,909	
Minimum	$259	
Maximum	$14,801	
Average	$4,251	
Standard Deviation	$3,398	
Average Percent Savings	98.5%	

Table 3.19. Potential percent of vegetable need met by urban agriculture on privately owned vacant land located in the top 15% highest need areas† in the City of Los Angeles

	Total Vacant Parcels		**UAIZ Eligible Parcels**		**UAIZ Positive Parcels**	
	Typical*	**Recom-mended****	**Typical***	**Recom-mended****	**Typical***	**Recom-mended****
Low yield UA	4.5%	3.1%	2.4%	1.6%	1.7%	1.2%
Productive yield UA	11.2%	7.7%	5.9%	4.1%	4.3%	2.9%
Intensive yield UA	17.6%	12.1%	9.3%	6.4%	6.7%	4.6%

†1,138,577 people residing in census tracts that scored in the top four highest need categories (out of 10) in the multi criteria analysis
*1.72 cup-equivalents of vegetables per person per day
**2.5 cup-equivalents of vegetables per person per day

Table 3.20. Potential percent of vegetable need met by urban agriculture on privately owned vacant land located in non-alleviated top 15% highest need areas† in the City of Los Angeles

	Total Vacant Parcels		UAIZ Eligible Parcels		UAIZ Positive Parcels	
	Typical*	**Recom-mended****	**Typical***	**Recom-mended****	**Typical***	**Recom-mended****
Low yield UA	4.6%	3.1%	2.7%	1.9%	1.9%	1.3%
Productive yield UA	11.4%	7.9%	6.8%	4.7%	4.7%	3.2%
Intensive yield UA	17.9%	12.3%	10.6%	7.3%	7.4%	5.1%

†366,548 people residing in census tracts that scored in the top four highest need categories (out of 10) in the multi criteria analysis that are not within 0.5 miles of an urban agriculture site
*1.72 cup-equivalents of vegetables per person per day
**2.5 cup-equivalents of vegetables per person per day

Table 3.21. Potential percent of vegetable need met by urban agriculture on privately owned vacant land located in the Los Angeles Promise Zone†

	Total Vacant Parcels		**UAIZ Eligible Parcels**		**UAIZ Positive Parcels**	
	Typical*	**Recom-mended****	**Typical***	**Recom-mended****	**Typical***	**Recom-mended****
Low yield UA	1.%8	1.2%	1.6%	1.1%	0.9%	0.6%
Productive yield UA	4.5%	2.5%	4.0%	2.8%	2.3%	1.6%
Intensive yield UA	7.0%	4.8%	6.3%	4.3%	3.6%	2.5%

†Approximately 165,000 people
*1.72 cup-equivalents of vegetables per person per day
**2.5 cup-equivalents of vegetables per person per day

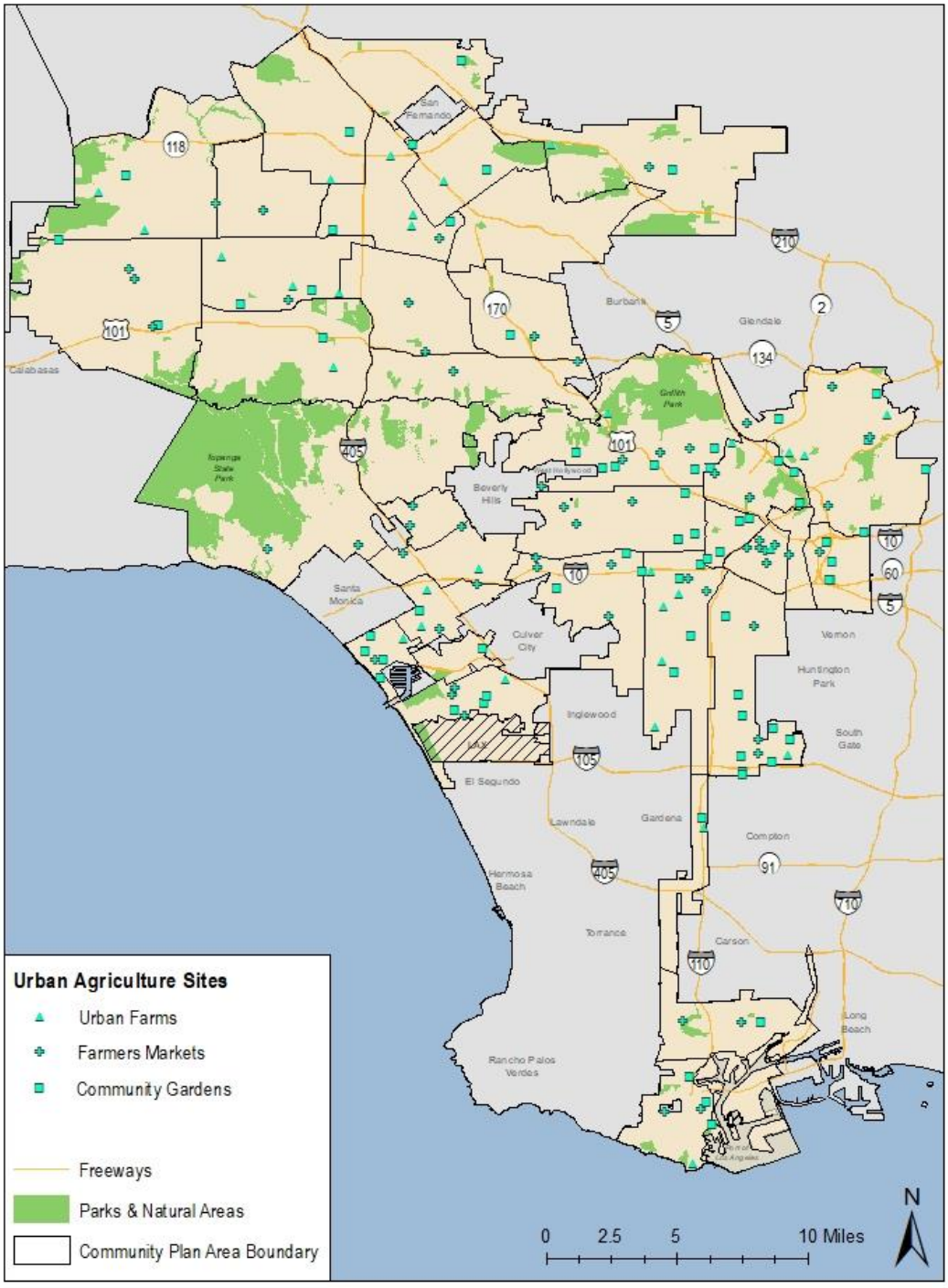

Figure 3.1. Location of urban agriculture sites (urban farms, farmers markets, and community gardens) in the City of Los Angeles

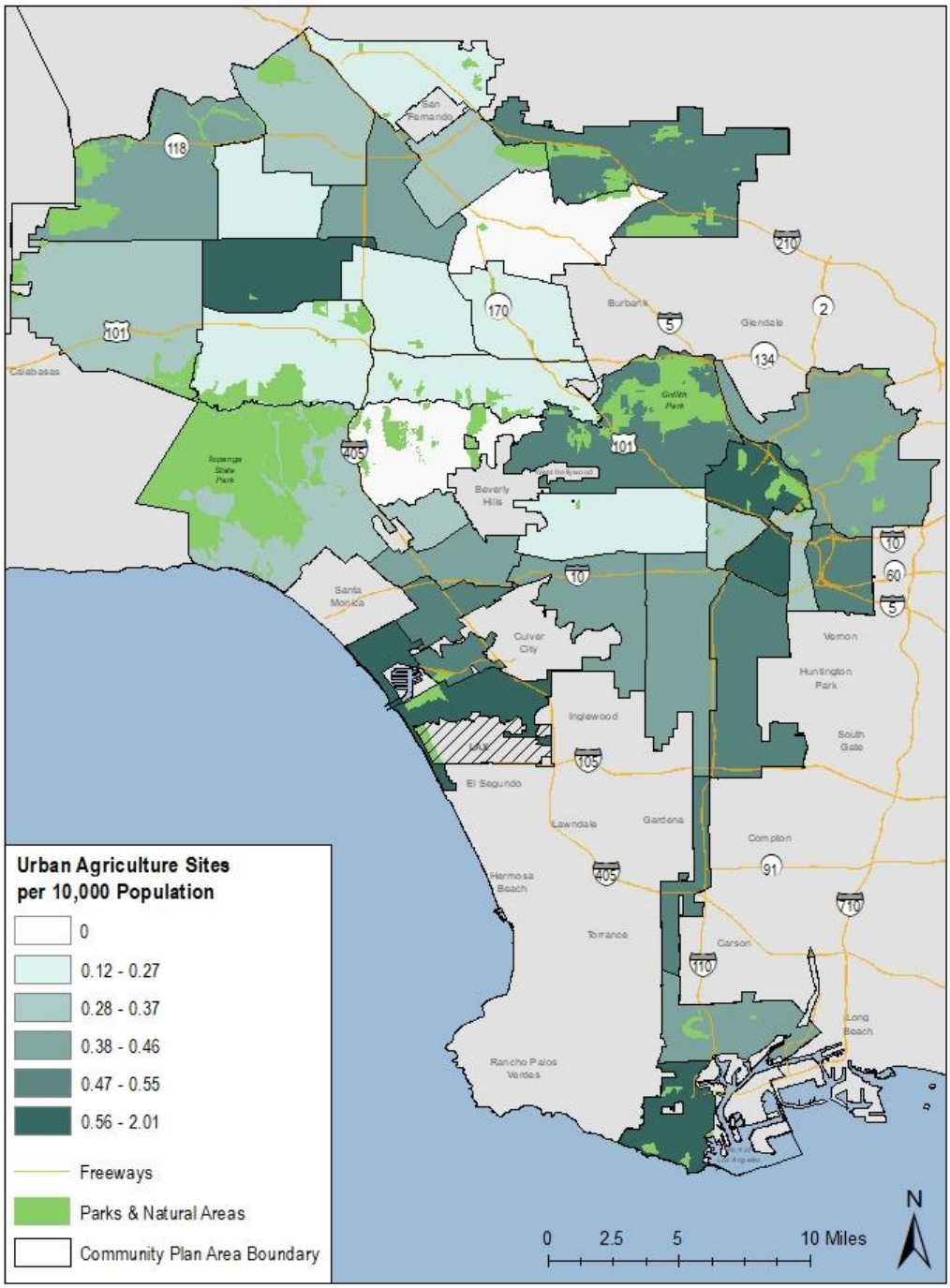

Figure 3.2. Urban agriculture site distribution per 10,000 population by Community Plan Areas in the City of Los Angeles

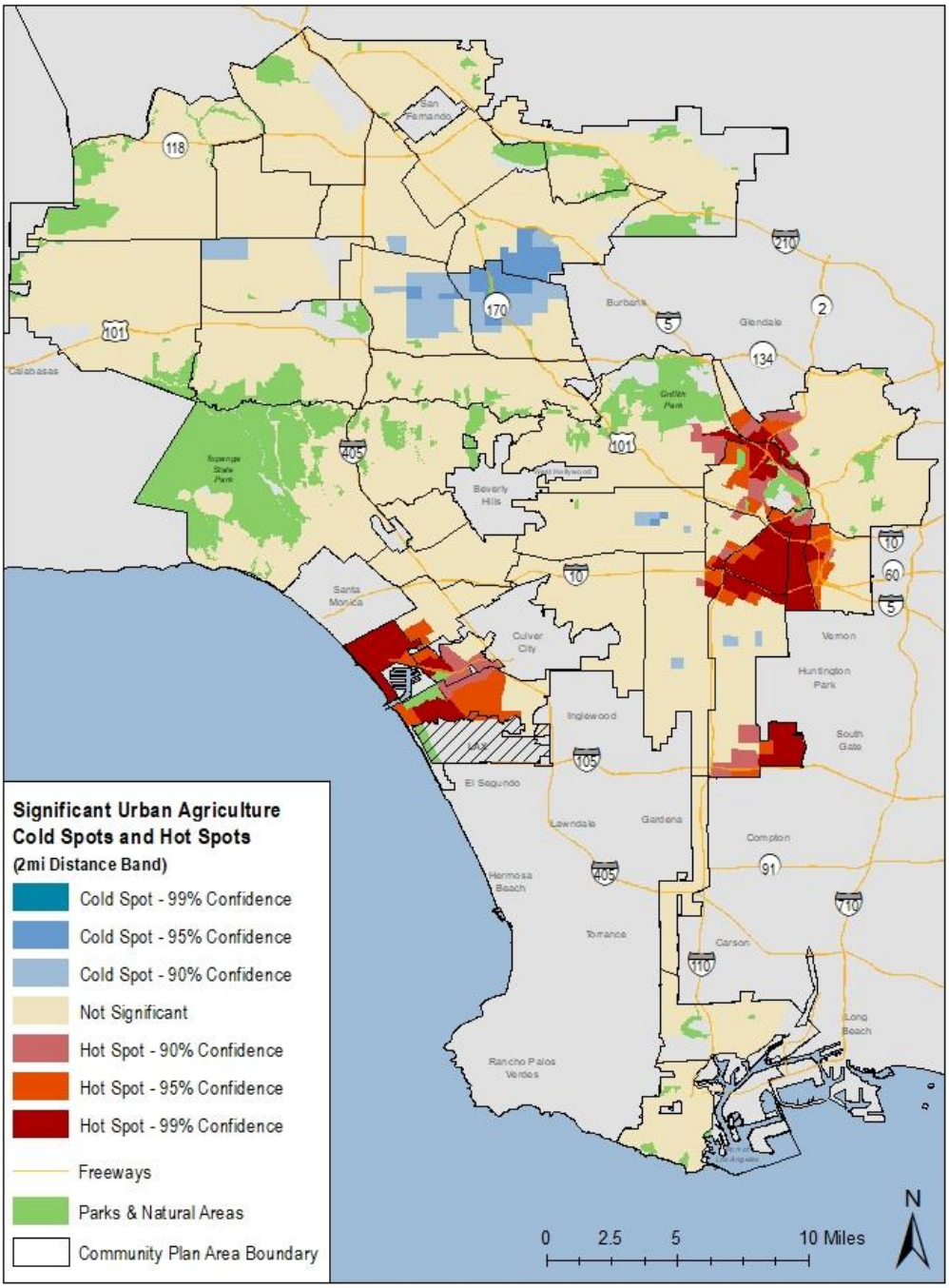

Figure 3.3. Urban agriculture hot spots and cold spots per 10,000 population at 2 mi distance band in the City of Los Angeles. The distance band compares the presence of urban agriculture sites to other sites within 2 miles. Several significant hot spots and one primary cold spot exist across the city.

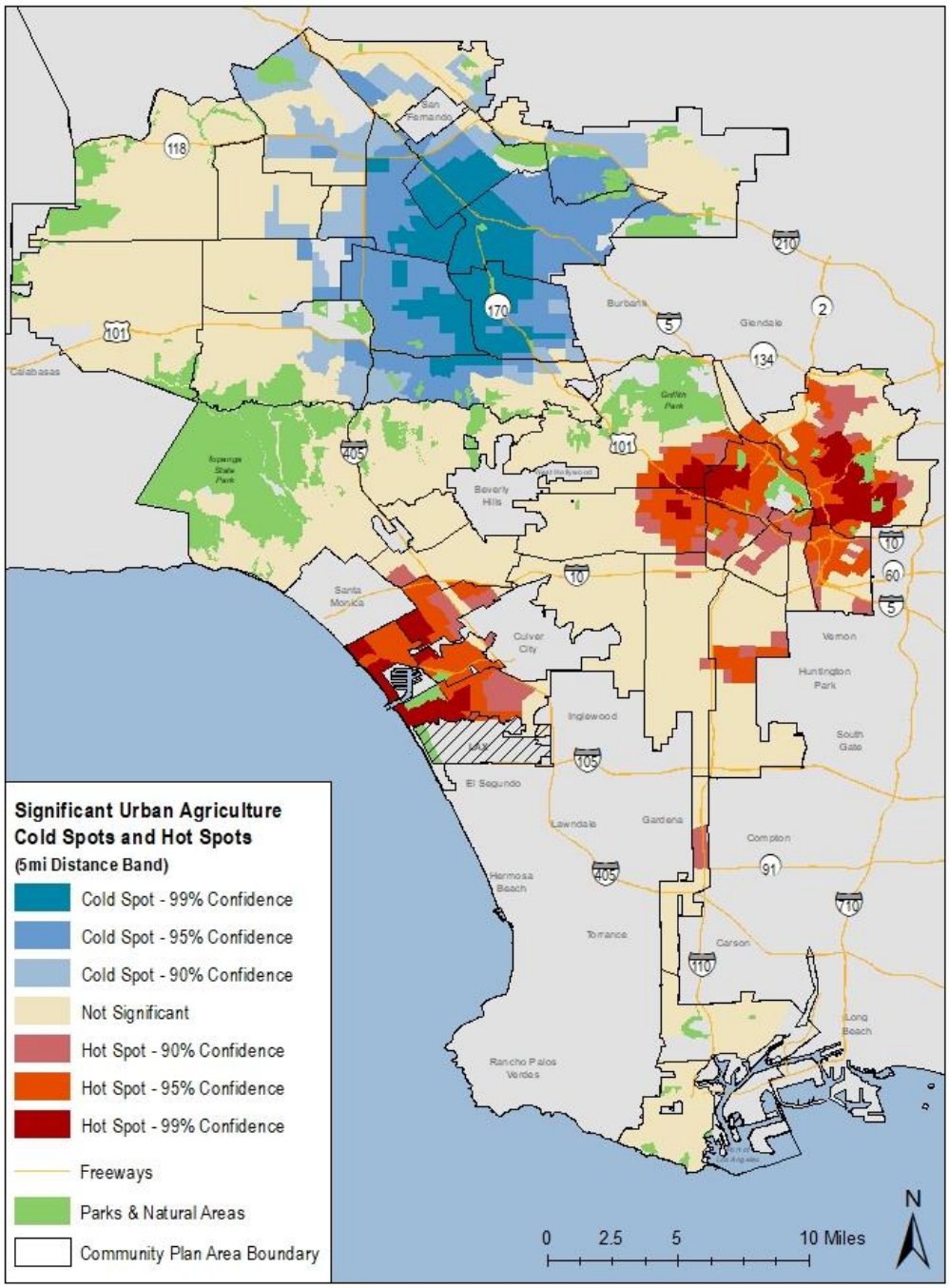

Figure 3.4. Urban agriculture hot spots and cold spots per 10,000 population at 5 mi distance band in the City of Los Angeles. The distance band compares the presence of urban agriculture sites to other sites within 5 miles. Significant hot spots and a large significant cold spot exist across the city.

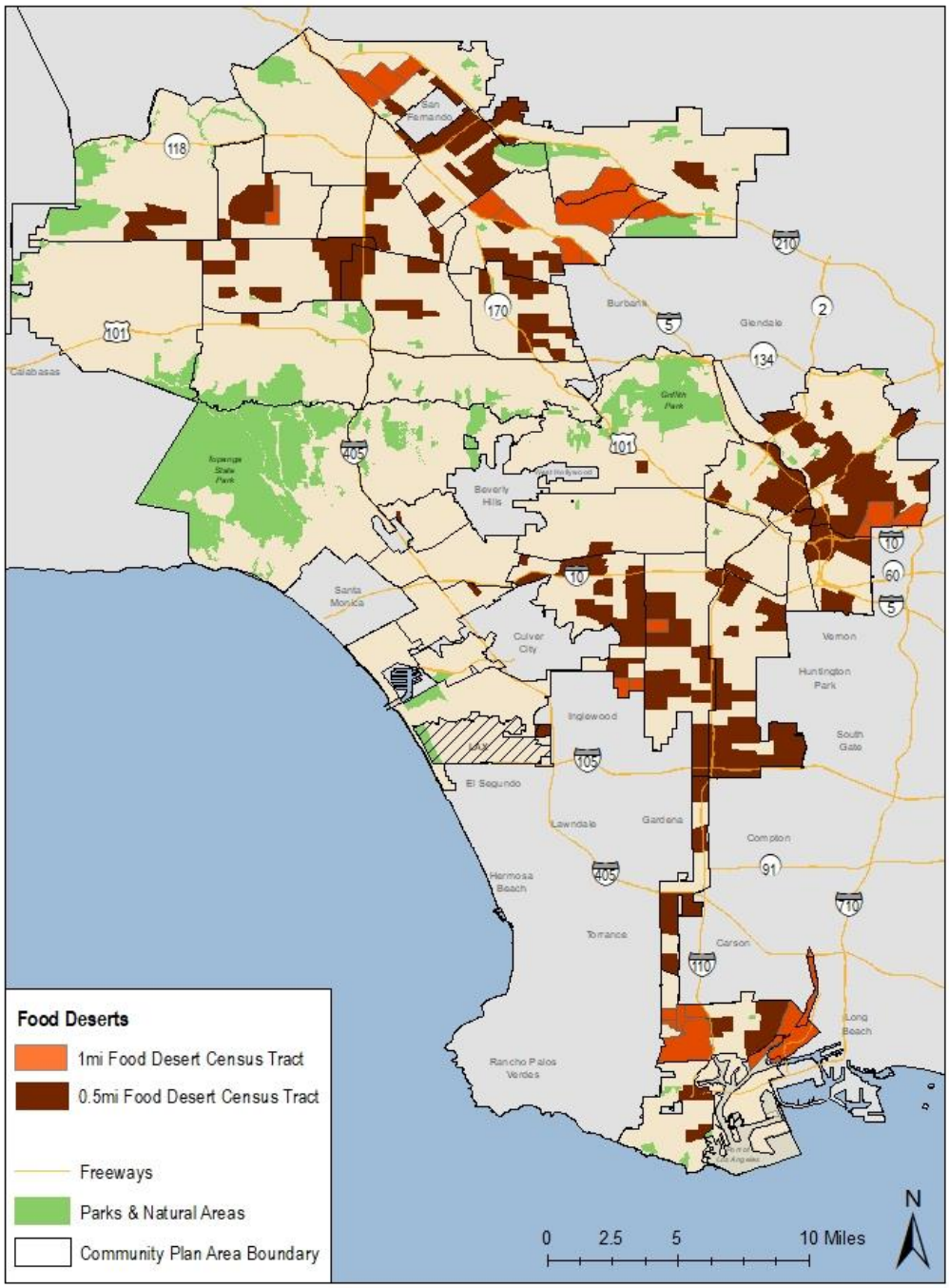

Figure 3.5. One mile and half mile food desert census tracts in the City of Los Angeles. Food desert census tracts are low income and have no grocery stores or supermarkets within one mile or one half mile. Many census tracts are classified as food deserts across the city.

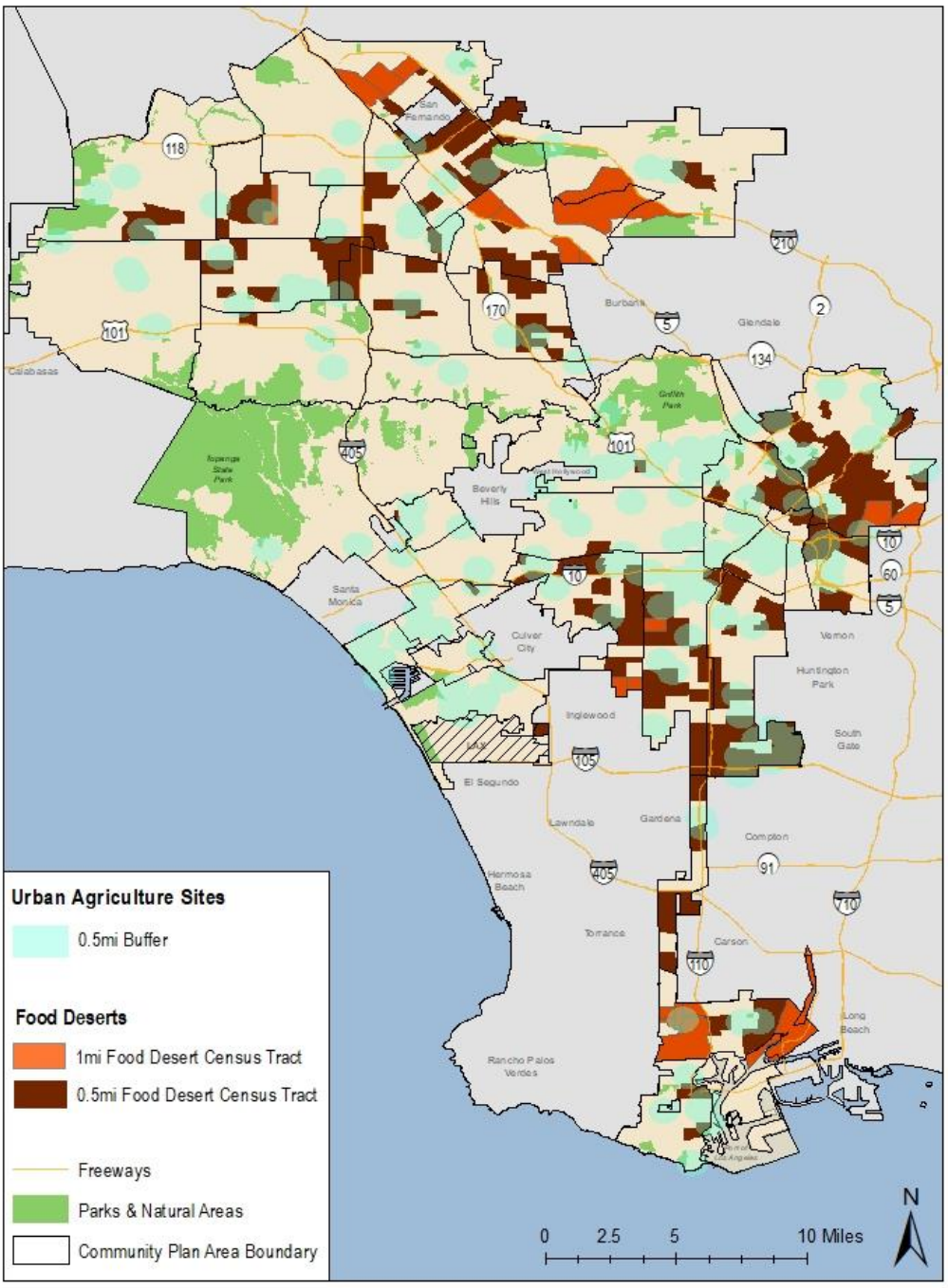

Figure 3.6. One mile and half mile food desert census tracts and urban agriculture sites half mile buffer in the City of Los Angeles. Food desert census tracts are low income and have low access to grocery stores. Many food deserts have urban agriculture sites located within a half mile.

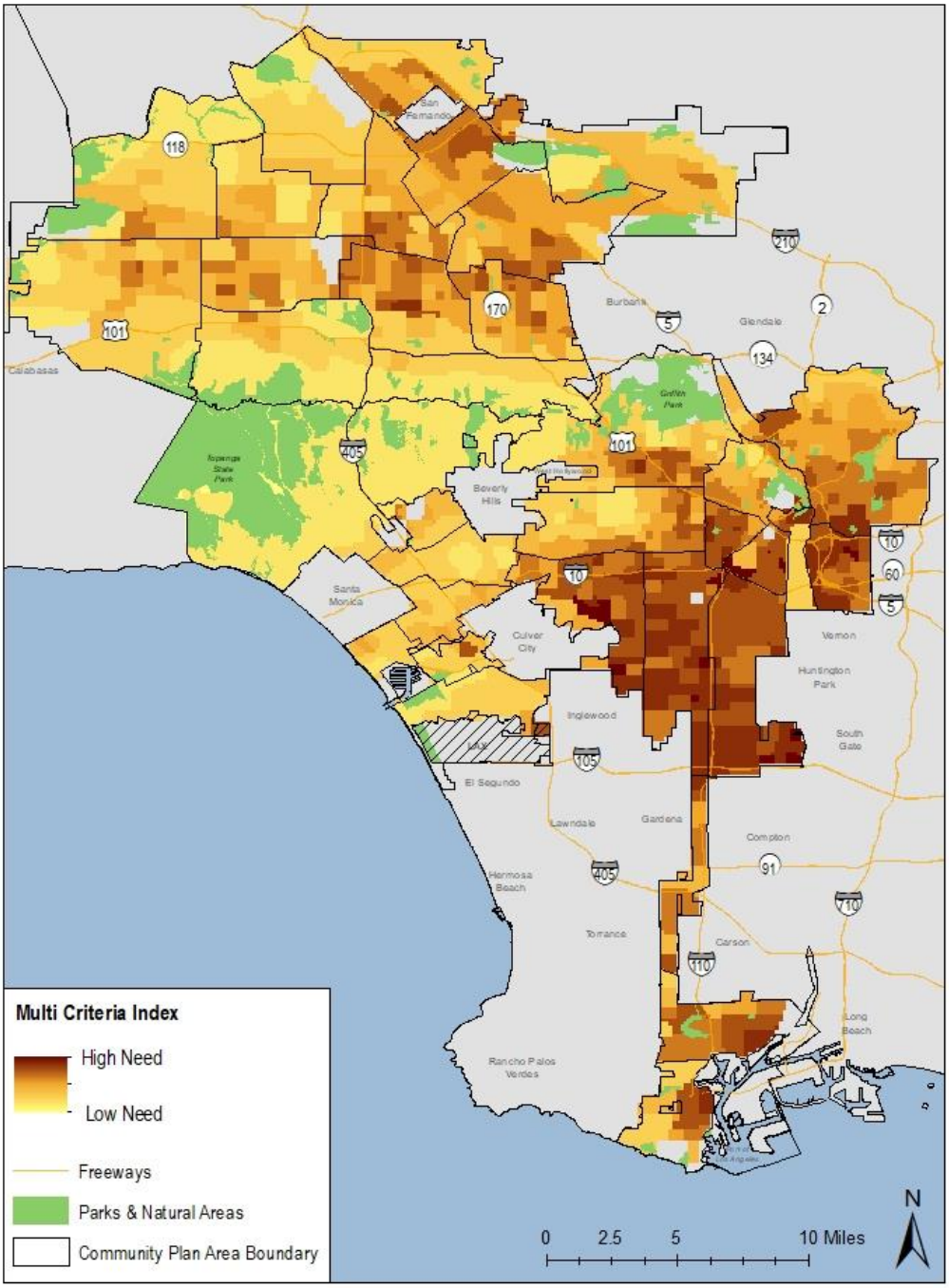

Figure 3.7. Multi criteria analysis results using 10 indicators of need in the City of Los Angeles. The analysis combines 10 indicators of need into a single index across the city to visualize areas of high and low need. Areas of highest need are concentrated in a few areas of the city.

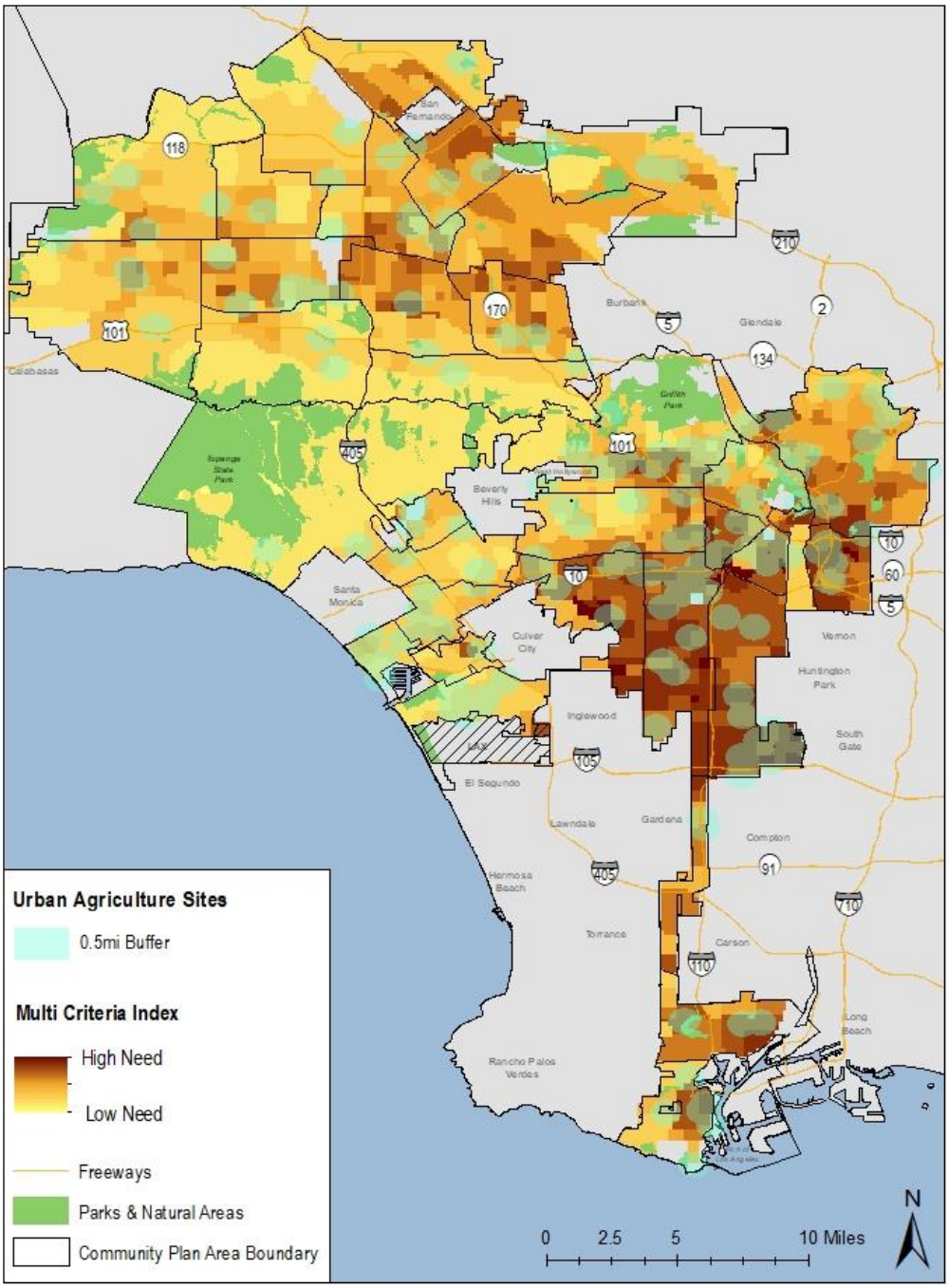

Figure 3.8. Multi criteria analysis and urban agriculture sites half mile buffer in the City of Los Angeles. The analysis combines 10 indicators of need into a single index across the city to visualize areas of high and low need. Many of the highest need areas have an urban agriculture site within one half mile.

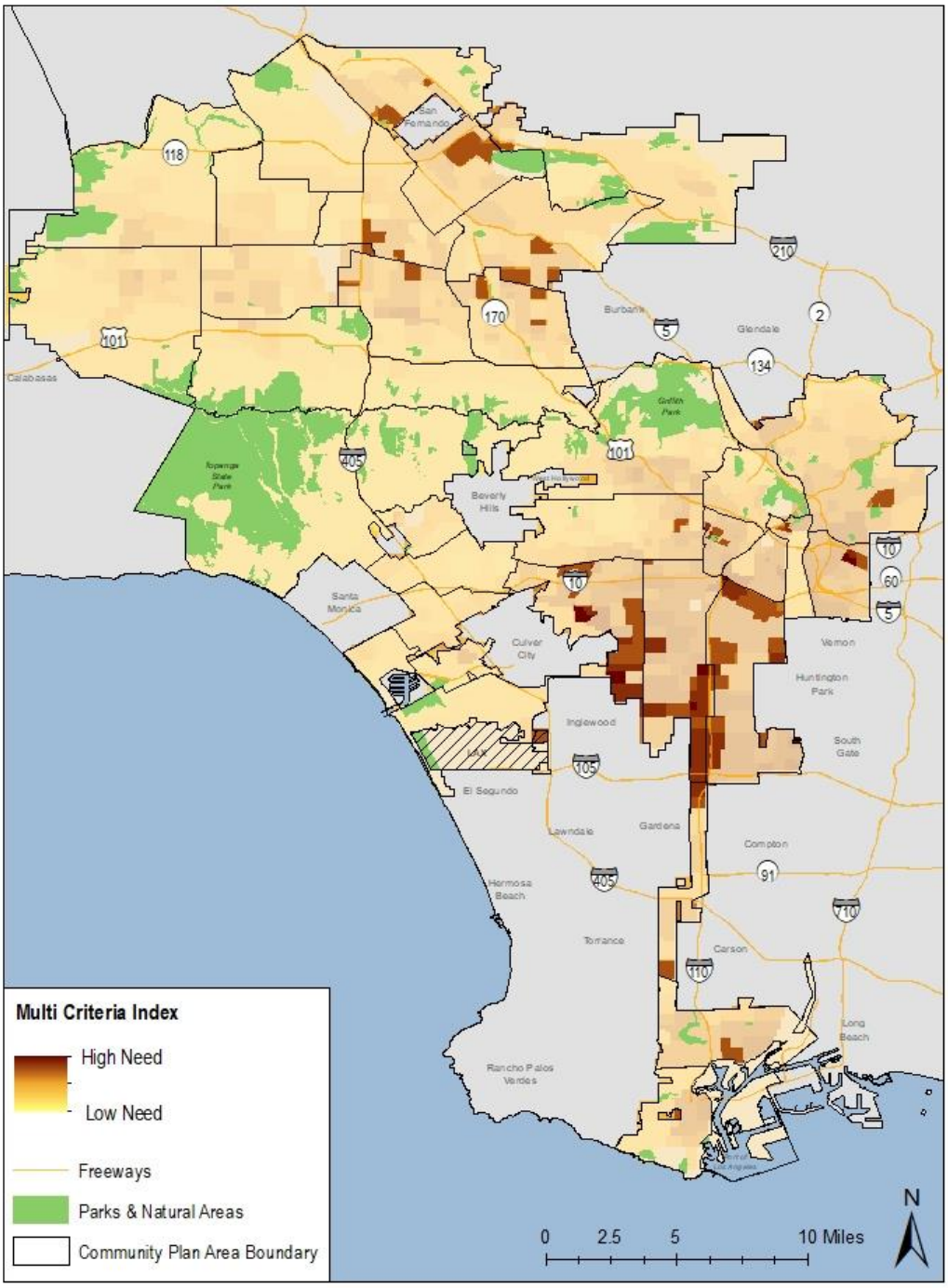

Figure 3.9. Multi criteria analysis non-alleviated areas (i.e., high need with no urban agriculture sites) in the City of Los Angeles. Non-alleviated areas could be prioritized for future urban agriculture sites.

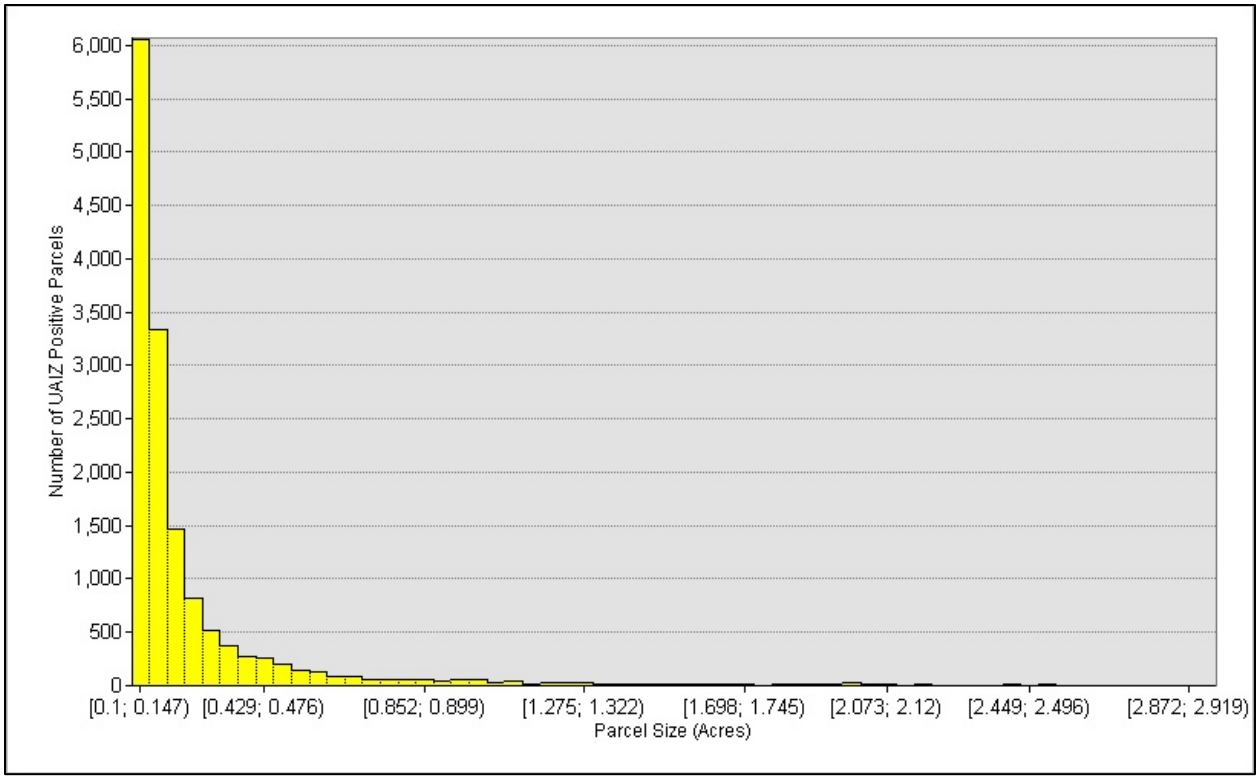

Figure 3.10. Distribution of size of vacant parcels eligible for Urban Agriculture Incentive Zone (UAIZ) designation and positive property tax break in the City of Los Angeles. The distribution is highly skewed towards small parcel sizes. Horizontal axis labels indicate the range of the labeled bar.

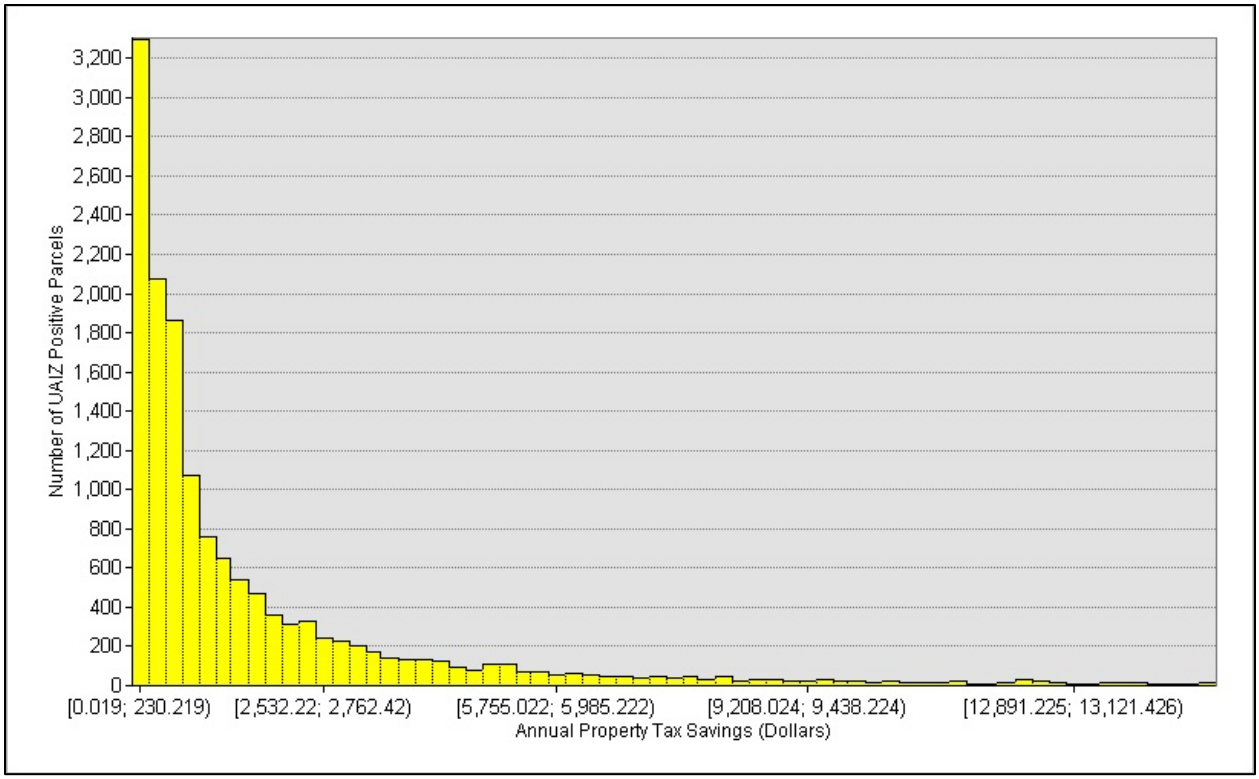

Figure 3.11. Distribution of potential annual property tax savings for vacant parcels eligible for Urban Agriculture Incentive Zone (UAIZ) designation in the City of Los Angeles. The tax savings are skewed towards lower annual savings. Horizontal axis labels indicate the range of the labeled bar.

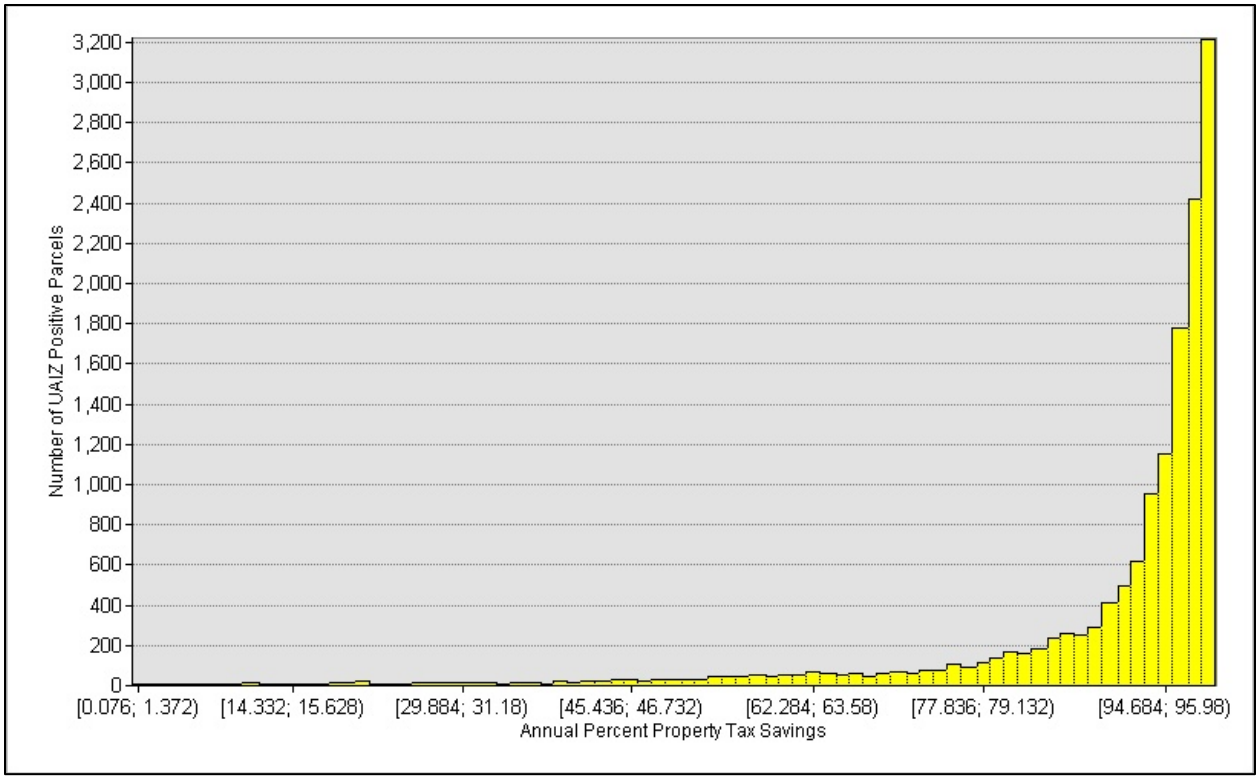

Figure 3.12. Distribution of potential annual percent property tax savings for vacant parcels eligible for Urban Agriculture Incentive Zone (UAIZ) designation in the City of Los Angeles. The distribution is highly skewed towards a greater percent savings relative to current property taxes. Horizontal axis labels indicate the range of the labeled bar.

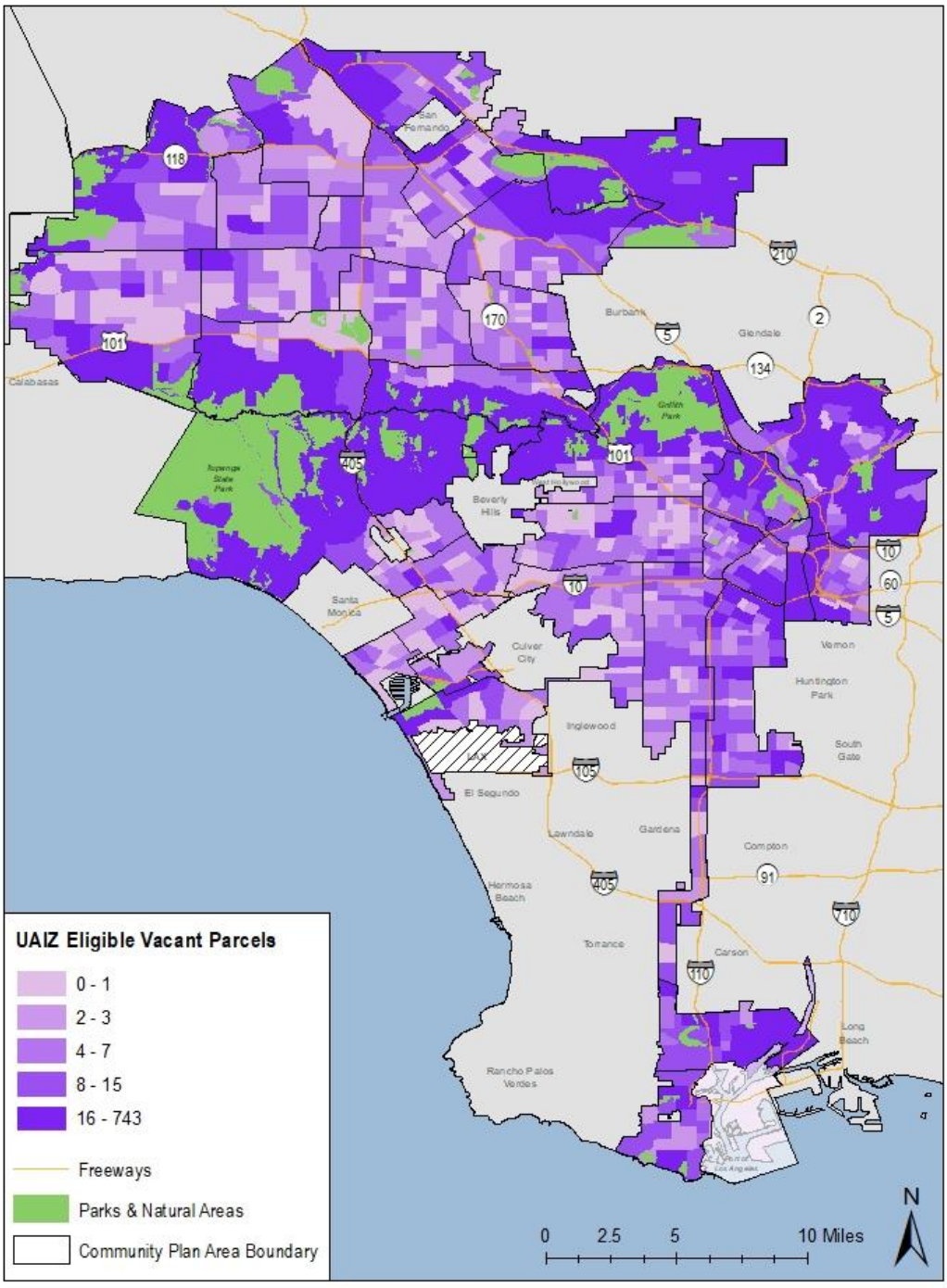

Figure 3.13. Distribution of vacant parcels eligible for Urban Agriculture Incentive Zones (UAIZ) positive tax breaks by census tract in the City of Los Angeles. Vacant parcels are primarily located in the periphery of the city, with relatively few vacant sites in the urban core.

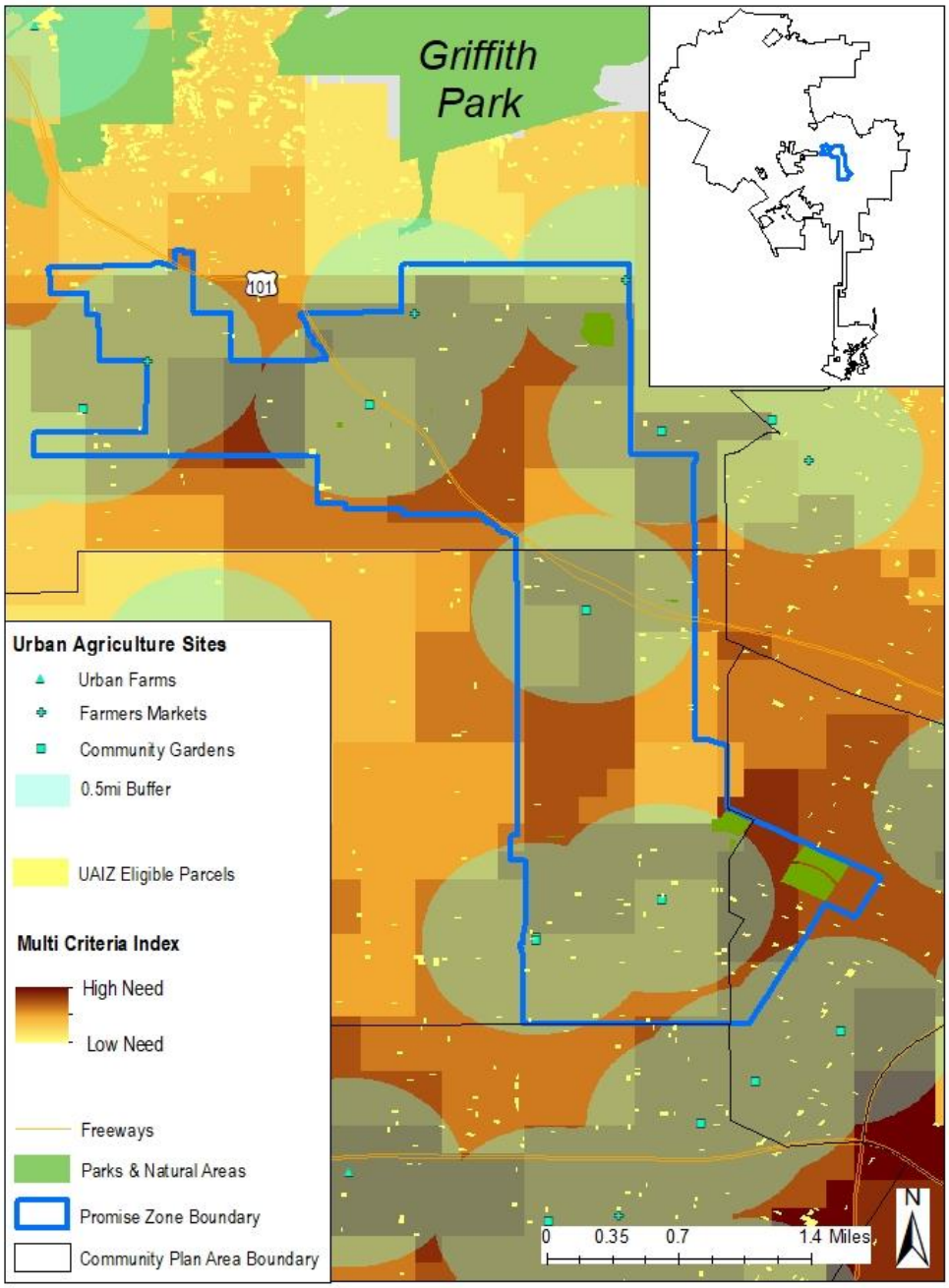

Figure 3.14. Multi criteria analysis, urban agriculture sites (half mile buffer), parks, and UAIZ eligible vacant parcels in the Los Angeles Promise Zone. Several UAIZ eligible parcels are both in high need areas and not within a half mile of an existing urban agriculture site, indicating that they could be prioritized for future urban agriculture.

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CHAPTER 4: PROGRESS AND OPPORTUNITIES FOR URBAN AGRICULTURE POLICY, PLANNING, AND PRACTICE IN THE CITY OF LOS ANGELES

ABSTRACT

Despite its rich agricultural history and mild climate, the City of Los Angeles is behind other U.S. cities in its support and development of urban agriculture (UA). However, in recent years, there has been substantial progress around UA policy and practice. Here, I review and assess municipal efforts to support UA in Los Angeles, including city plans and land use policies. I explore and analyze several key areas of UA policies, including the recently implemented Urban Agriculture Incentive Zones Program. In addition, I identify best practices from other U.S. cities. Based on the analysis in this study, I provide recommendations for specific strategies that could more effectively realize the community benefits of UA in the City of Los Angeles in the years to come.

INTRODUCTION

Despite its extensive agricultural history, Los Angeles is not currently considered a leading city in urban agriculture (UA) policy and practice (Surls & Gerber, 2016). A 2008 ranking of the most sustainable cities in the U.S. included a “local food and agriculture” category, and the City of Los Angeles was ranked 43rd out of 50 cities (Bowman, 2012). The City of Los Angeles has appeared only infrequently in academic studies, policy briefs, and case studies on UA. The exception is the case of the now-defunct 14-acre South Central Farm, which once was one of the largest urban farms in the country but was bulldozed by a developer in 2006 after a bitter property dispute (Irazábal & Punja, 2009). Los Angeles was not included in a 2011 survey of 17 cities with “long-standing urban agriculture practices or recent efforts to revise zoning ordinances”(Goldstein, Bellis, Morse, Myers, & Ura, 2011). The only city in California that was

included in the survey is San Francisco, which has typically also been the only city in California that is more broadly recognized and studied for its UA efforts. Other major cities leading the UA movement in the U.S. include Boston, Chicago, Cleveland, Detroit, Kansas City, Milwaukee, Minneapolis, New York, Philadelphia, Portland, and Seattle. The single existing assessment of UA in Los Angeles County was conducted in 2013 and identified approximately 1,200 UA sites, including nearly 500 in the City of Los Angeles. However, this assessment concluded that UA activities in Los Angeles were disconnected and uncoordinated and stated that regional planning was “woefully behind at contributing to the practice of urban agriculture” (Jackson et al., 2013).

Los Angeles as a city also presents many challenges for UA from a policy perspective. The sprawling metropolis is nearly 500 square miles in size, with a varied geography that includes the Santa Monica Mountains, extensive suburbs, and dense urban centers. The geographic size is substantially larger than almost every other major U.S. city: the City of Los Angeles is roughly one-third larger than New York City, twice as large as the city of Chicago, three times the size of Detroit, five times larger than Seattle, and ten times the size of San Francisco (United States Census Bureau, 2012). The City of Los Angeles has a highly diverse population of approximately four million people and an inequitable distribution of resources and corresponding social issues. For example, there is less than a half-acre of park space per 1,000 residents in Southeast Los Angeles compared to the city average of 8.9 acres per 1,000 residents (Los Angeles Department of City Planning, 2015). Many neighborhoods lack access to healthy, affordable food and nearly one million people live in food deserts, or low-income census tracts with no supermarket or large grocery store within a half mile (**Chapter 3**). Furthermore, the city has many competing land use interests and land is very expensive; the Los Angeles metropolitan area has the third highest property values in the U.S. (Mazur, 2010).

Despite these challenges, Los Angeles has made substantial UA progress in the past few years. This progress includes amending the City's zoning code, the creation of the Los Angeles Food Policy Council, the release of the region's first report on UA, and the inclusion of UA in city planning documents (**Table 4.1**). From 2013 to 2016, the number of community gardens in the City of Los Angeles increased by 60% (to 77 gardens), the number of farms increased by 19% (to 31 farms), and the number of nurseries increased by nine percent (to 97 nurseries) (University of California Los Angeles & University of California Cooperative Extension, n.d.). Based on these increases plus additional increases county wide, in 2017 the Los Angeles Food Policy Council (LAFPC) reported that its objective of increased farming and gardening in Los Angeles County was "significantly improving" (Los Angeles Food Policy Council, n.d.-a). Furthermore, all community gardens in the city overseen by the Los Angeles Community Garden Council have long waiting lists, and newer gardens have implemented short-term (two to three year) plot agreements to help ensure turnover for new gardeners (J. Beals, personal communication, Mar. 17, 2017).

While recent progress is encouraging, progress has not occurred across all policy and planning areas, the overall prevalence of UA is low relative to the size of the city, and there are many strategies and best practices that can be pursued to better realize the potential of UA in Los Angeles. In an effort to help move the needle on UA in LA City, I provide here a review of the most important current policy and planning areas related to UA in the City of Los Angeles including (1) municipal coordination, planning, and land use; (2) access to land and other growing spaces; (3) supporting resources; and (4) connections to the local food system. This study contextualizes UA policy and planning in Los Angeles, by assessing progress to date in the City in each area, providing examples of best practices from other municipalities, and highlighting top recommendations for future action.

METHODS

To identify current UA policies and programs in Los Angeles and in other major cities, I reviewed recent UA peer-reviewed literature and gray literature including policy briefs, reports, specific municipal policies and motions, zoning codes, as well as websites for UA organizations in the City of Los Angeles and several other cities in the U.S. that are leading in UA policy and practice. I limited my search to the past ten years, as the recent resurgence of UA interest, planning, and policy is widely considered to result in part from the economic downturn in 2008. From the results of these searches, I identified the three most recent and relevant UA planning documents for the City of Los Angeles based on (1) creation by municipal level planning processes and stakeholders; (2) recent creation within the past three years; and (3) inclusion of specific UA goals, strategies, and objectives for the City of Los Angeles. I conducted a document analysis of the three most important and current municipal planning documents. First, I compared the content of each document to determine how UA was integrated into the policy and planning goals, and how UA was identified and prioritized (e.g., standalone goals vs. part of other food-related goals). The majority of the text of the UA-relevant documents consisted of goals, objectives, and strategies related to food and UA in the city. I used a thematic analysis approach to code each goal, objective, and strategy based on the specific area of UA planning or practice that was targeted. Inclusion criteria for the analysis included specific mentions of UA or UA activity, or a goal or strategy that could reasonably apply to UA activity (e.g., funding opportunities for food entrepreneurs). From this analysis, three central strategy themes emerged: strategies for accessing growing spaces, strategies for connecting to the local food system, and strategies for providing supporting resources. In cases where the same strategy was both broadly and specifically stated, it was considered as a single strategy to avoid over counting. Strategies related to farmers' markets were included in all three documents and were counted as strategies for connecting to the local food system. Finally, I identified specific

mentions of equity in goals, objectives, and strategies including references to low-income and underserved populations.

From the literature review and document analysis, I focused on the three themes (access to growing spaces, connections to local food systems, supporting resources) that were identified in my review and used them to identify corresponding policies, plans, and practices from Los Angeles and other U.S. cities that were generally regarded as “best practices” or “innovative approaches” to supporting and expanding UA. This determination was made based on the recurrence of similar strategies across many different sources or, in some cases, the most recent literature specifically citing a policy or strategy as a best practice. Strategies were selected for further review and analysis based on the availability of information on progress to date in the City of Los Angeles, and the chapter sections are organized around these selected strategies. In cases where there was information available for a strategy area, I utilized the Centers for Disease Control and Prevention Policy Analytical Framework to analyze policy options to support UA in the City of Los Angeles. The framework includes the steps of identifying an appropriate policy solution, assessing and prioritizing policy options, and developing strategies for implementing a policy solution (Centers for Disease Control and Prevention, 2013). In some cases, information on the relevant strategy was unavailable for Los Angeles, so other cities near Los Angeles were used as regional examples. These regional examples are specifically called out when they are referred to in this chapter.

To better understand the current state of UA progress and strategies in Los Angeles, I also participated in the Los Angeles Food Policy Council (LAFPC) Urban Agriculture Working Group for over one year of bi-monthly meetings. I utilized participant observation including detailed record keeping to gain insight into the process of setting UA priorities and the context of UA policy and practice. For the few meetings I was unable to attend in person, I reviewed the

meeting minutes to stay up to date on UA developments and priorities. My participation in the working group allowed me to compare best practices in the literature with the real-world constraints of policymaking in Los Angeles, clarify the status of some areas of policy and practice, and gain access to information used in the analysis of several policy areas in this chapter. Collectively, these approaches provided an understanding of the state of UA in Los Angeles and access to information and that form the basis of this chapter.

RESULTS & DISCUSSION

The results of this UA review and analysis resulted in the identification of four important policy and planning areas in Los Angeles that form the basis of the following sections. The first section is municipal coordination and planning and includes the results of the document analysis. The following three sections were the result of the document analysis including access to land and growing spaces, providing supporting resources, and connecting to the local food system.

1. Municipal coordination, planning, and land use for urban agriculture in Los Angeles

Municipal governments have generally not kept pace with the recent increase in UA interest and activity. Challenges for UA include outdated zoning codes and lack of an organizing structure or agency within local government that specifically works with UA. Integrating UA into local government policymaking and planning can help remove regulatory barriers and support UA as part of broader municipal strategy.

Designation of a municipal coordinating structure for urban agriculture in Los Angeles: The Los Angeles Food Policy Council

Municipal coordination: progress to date. In 2011, the mayor of Los Angeles created the Los Angeles Food Policy Council (LAFPC) with the goal of working to create a regional Good Food System that is healthy, affordable, fair (Los Angeles Food Policy Council, n.d.-b). While other

coordinating structures can be used to drive municipal policy, strategy, and innovation around UA and to connect city government to UA practitioners, many cities have created similar food policy councils to help with the coordinating role. The LAFPC has a 10-person staff and a 40-member leadership board, and receives funding from a combination of agencies, foundations, and private donors in addition to receiving in-kind support from the City. The LAFPC coordinates six to eight working groups, including an Urban Agriculture Working Group, that act as "participatory policy collaboratives" (Los Angeles Food Policy Council, n.d.-b). The mission of the working group is to "increase access to nutritious food and green space, particularly in low-income neighborhoods, through policies that promote sustainable and local urban agriculture" (Los Angeles Food Policy Council, 2017a). In addition to setting policy priorities for UA in Los Angeles, the working group helps to interpret and implement existing policies, such as the recent Urban Agriculture Incentive Zones (UAIZ) Program, which is discussed below. Importantly, the working group has been able to coordinate city and regional UA efforts with the broader LAFPC structure and agenda, including access to farmers markets and food waste prevention efforts.

Municipal coordination: comparison to best practices. Insights into how the City of Los Angeles could be doing more to support coordination between stakeholders and municipal departments that oversee planning and land use can be gained from examining best practice examples from other large cities in the US. For example, the City and County of San Francisco passed a resolution in 2013 creating an Urban Agriculture Coordinator position within its Recreation and Parks Department including the duty of submitting an annual urban agriculture report to the Mayor and Board of Supervisors (San Francisco Recreation & Parks, n.d.). In Seattle, the Department of Neighborhoods P-Patch Community Gardening Program oversees 88 community gardens and cultivates or stewards a total of 32 acres of City land (Seattle Department of Neighborhoods, n.d.). The New York City Department of Parks & Recreation GreenThumb

Program is the largest community garden program in the U.S. and provides support for over 550 community gardens including materials and workshops; the program has existed since 1995 and is funded by federal Community Development Block Grants (New York City Department of Parks & Recreation, n.d.). While these cities have some of the largest and best known municipal government supported UA programs, many other cities have similar positions or departments to help oversee UA development and expansion.

Municipal coordination: recommendations. Based on these best practice examples from other cities, one of the top priorities for future action by Los Angeles in the area of municipal coordination for urban agriculture would be to allocate resources toward a city-sponsored UA program. Based on the experiences of other cities, such as program should include an Urban Agriculture Coordinator to oversee UA sites on city-owned land, identify opportunities to expand UA within the City, coordinate with the LAFPC and other UA organizations/stakeholders, apply for state and federal funding, and other functions. This recommendation is aligned with the Health and Wellness Element of the City of Los Angeles's General Plan (described below), which recommends a coordinated approach to UA including appointing a city urban agriculture liaison (Los Angeles Department of City Planning, 2015). Given the structure of the City of Los Angeles's agencies, it would probably be most effective for a city-sponsored Urban Agriculture Program to be a new division within the Department of Recreation and Parks. The Department of Recreation and Parks in Los Angeles currently does not include UA among its functions or the 444 park sites under its management, although a number of community gardens are allowed to operate on City-owned land (Los Angeles Department of Recreation and Parks, n.d.). A City-sponsored UA program would be able to implement, track, and report on many of the City's planning objectives and ordinances (described below) and offer ongoing support for UA throughout Los Angeles, particularly access to public land and developing UA in conjunction with existing parks.

Integration of urban agriculture into municipal general plans and other policies

Integration of UA into other plans and policies: progress to date. In recent years, the City of Los Angeles has made significant progress on incorporating UA elements into key municipal planning documents, with the overarching goal of fostering strong municipal support for UA and facilitating the growth of UA in the city. In 2015, the City of Los Angeles included urban agriculture strategies and objectives in two major planning documents: the Sustainable City pLAn and the Plan for a Healthy LA (**Table 4.2**) (Los Angeles Department of City Planning, 2015; Petersen et al., 2015). The Sustainable City pLAn (SCP) was created by the Mayor's Office of Sustainability and includes environment, economy, and equity objectives through 2025 and 2035. Under the Equity section, the SCP includes several specific objectives for food and urban agriculture in the subcategories of Environmental Justice and Urban Ecosystem. The SCP team in the mayor's office reports on the plan's progress annually and will conduct a major update every four years. The SCP's second annual report was released in early 2017 and identified two UA objectives had been achieved and a third was on track to be achieved on time. The Plan for a Healthy Los Angeles (PHLA) is the Health and Wellness Element of the city's general plan created by the Department of City Planning and included an extensive outreach effort to solicit feedback from community groups, city departments, an expert panel, and public participation. The PHLA includes seven goals organized into chapters with supporting objectives including the chapter "Food that Nourishes the Body, Soul, and Environment." Four of the chapter's eight sections include goals and strategies related to UA (Los Angeles Department of City Planning, 2015).

In addition to the Sustainable City pLAn (SCP) and the Plan for a Healthy Los Angeles (PHLA), the Los Angeles Food Policy Council (LAFPC) updated its original Good Food for All Agenda (GFAA) in 2017 to provide strategies and recommendations for creating a Good Food System that is healthy, sustainable, affordable, and fair for all Angelenos. The LAFPC also has created

strategic priority documents in 2012 and 2015 which are not included in this analysis. Several of the 2017 GFAA's six priority areas and many of its strategies are directly or indirectly relevant to UA, and the priority area "strengthen environmental resiliency and regeneration" includes the most relevant UA strategies for policymakers, funders, business, and the Good Food Movement (Los Angeles Food Policy Council, 2017b). Unlike the SCP (which has a sustainability focus) and PHLA (which has a health focus), the GFAA takes a food systems approach and uses food as a lens to address other issues including health, sustainability, equity, and labor. The GFAA has a broad geographic focus that includes the City of Los Angeles, Los Angeles County, and the Los Angeles "foodshed" (which it defines as a 200 mile radius from the urban core and includes 10 counties in Southern California). Compared to the two City plans, the GFAA is more specific about strategies including the actor or actors who would implement the strategies, but does not include specific time-bound objectives and instead provides a combination of general and specific strategies under each of its six priority areas. The GFAA is intended to set priorities from 2017 to 2023. Since the GFAA is a comprehensive approach to the food system, only the most UA-relevant strategies from the plan were included in this chapter.

These three different planning documents agree and overlap on several approaches to expanding and supporting UA in Los Angeles, but differ in some of their specific strategies and recommendations (**Table 4.3**). The UA content in the SCP primarily includes objectives as well as some strategies, the PHLA includes a combination of objectives and strategies, and the GFAA consists entirely of strategies. Many of the strategies are focused on access to growing spaces, which is widely considered to be the greatest challenge for UA expansion. Collectively, the plans include 14 specific strategies for increasing access to growing spaces (**Table 4.2**; **Table 4.3**). Each plan includes examples of UA sites to be expanded, and proposes increasing access to public land for UA including specifically mentioning libraries, schools, and parks. The PHLA and GFAA include process strategies for land access including disseminating information

on vacant parcels (PHLA), streamlining permitting and leasing (PHLA and GFAA), creating urban agriculture incentive zones (GFAA), and joint-use policies (GFAA). The PHLA and GFAA also mention the preservation and protection of land for UA activity.

The three plans also include a total of 14 strategies for connecting to local food systems, including both UA connections to the food system as well as consumers connecting to UA (. Many of these strategies (especially in the PHLA) are related to farmers' markets including each plan calling for increased farmers' market vouchers and the SCP specific objective of requiring all city farmers' markets to accept CalFresh Electronic Benefit Transfer (EBT) cards. However, the SCP does not include any additional strategies for local food system connections beyond its specific farmers' market objective. In contrast, the PHLA and GFAA include sections specifically related to creating economic opportunities for local food with several different strategies. Both the PHLA and GFAA include the idea of an innovative economic food cluster, as well as public education campaigns to increase awareness of healthy, local food. While several of these economic strategies are not entirely focused on UA, they either mention UA or could reasonably include UA, and highlight the importance of creating awareness and demand for local food. Specific strategies in this category are not always included in city plans in the U.S., although its importance appears to be increasingly recognized and included in planning. The inclusion of these specific strategies in the PHLA and GFAA is a particular strength among planning documents in Los Angeles.

A third category of strategies are those for providing supporting resources for UA. These resources are primarily related to UA startup and UA production, and are mentioned fewer times compared to the other categories. Community composting is mentioned in the SCP and GFAA which can help decrease urban food waste sent to landfills and also benefit UA sites, and pilot projects already exist in the City. The PHLA includes providing information on soil testing and

water safety, important UA topics that need to be readily accessible to UA practitioners. The GFAA agenda mentions mitigating water rate increases, a recent challenge for UA in Los Angeles that is analyzed later in this chapter. The GFAA also mentions financing, which can be crucial to UA sites that often have high start-up costs. Overall, the category of supporting resources could benefit from additional strategies and details.

Each plan also includes goals and strategies that specifically mention equity. These include ensuring that efforts in underserved, low-income, and impacted communities are prioritized. These communities are specifically mentioned 10 times in the three planning documents. In addition, each plan includes one or more strategies related to increasing farmers' market voucher programs, which are designed to increase equitable access to fresh fruits and vegetables. In total, the three plans make substantial progress in elevating UA goals and providing specific strategies for supporting UA in Los Angeles.

Integration of UA into other plans and policies: analysis. While the three existing UA-relevant city planning documents provide a strong foundation for supporting UA in Los Angeles, there are several areas where they could be improved. One strength is that some of the UA objectives and strategies are specific and some offer timelines (e.g., increasing the overall number of UA sites by at least 25% by 2025 and 50% by 2035 in the SCP). A strength of the SCP is that it not only includes objectives, but also includes short-term and long-term objectives, many with specific target years. However, most of the other objectives and strategies do not include timelines for implementation or completion.

The lack of timelines is likely due in part to another major challenge for UA policy and planning in Los Angeles: a lack of data to establish baselines. In general there is very little existing information about the extent of UA activity throughout the City, the notable exception to this

being the 2013 Cultivate LA project that counted the number of farms, community gardens, school gardens, and nurseries throughout the entire county (and is used as the baseline in the SCP). However, little to no information exists about these sites including size, crop types, productivity, marketing and distribution models, land ownership, training and education, sustainable practices, or any other information that would be helpful to better understand UA operations. Furthermore, there is little to no information about other types of UA sites including non-school institutional gardens (hospitals, churches, public housing, etc.), rooftop gardens, parkway gardens, hydroponic and aquaculture operations, entrepreneurial controlled environment operations, and others.

The lack of data inhibits the ability to establish baselines and set meaningful, attainable objectives, much less implement evaluation processes to measure longitudinal progress and success. As a result, some objectives may not be relevant to the current status of UA in Los Angeles or may not be particularly achievable. For example, the PHLA includes the objective of increasing the number of community gardens so the each Community Plan Area has at least one community garden (one acre) per 2,500 households. This is a concrete objective that is included in some planning documents of other U.S. cities, including Seattle. However, this objective does not include a baseline. Currently, less than three-quarters of CPAs have any community gardens, and the current average number of community gardens in Los Angeles is about 0.18 gardens per 2,500 households, indicating that the goal of one garden per 2,500 is not attainable in the near future (see **Chapter 3**). Furthermore, there is no data about size/acreage currently dedicated to community gardens in the City of Los Angeles, so including the goal of one acre of community gardens per 2,500 households is currently meaningless.

In addition to needing more data to inform policy objectives, there also needs to be careful consideration of the limited existing data that is currently used as baselines and how the data is

presented. In **Chapter 3**, I presented an analysis that is relevant to the SCP goal of ensuring all low-income Angelenos live within a half mile of fresh food by 2035. Based on my analysis, I found the total food desert census tracts population to be over twice that of the baseline cited in the city planning objective (nearly one million people or one-quarter of the city population). This discrepancy warrants further investigation, especially since updates to the SCP have considered this objective as "on track." The SCP should consider how UA sites and other sites like neighborhood markets will be counted to measure progress, as food desert definitions only include grocery stores and supermarkets as "fresh food access." Likewise, the SCP includes the objective to increase the total number of UA sites in the City by 25% by 2025 and 50% by 2035. However, the baseline for this objective is Cultivate LA, which includes urban farms, nurseries, community gardens, and school gardens. In the first update to Cultivate LA, the first three categories all increased over a three year period by 19%, 9%, and 60% respectively. However, the number of school gardens decreased by 40% over the same time period, resulting in the total number of UA sites decreasing by 17% and thus negative progress towards the SCP objective (notably, this objective is missing from the latest update to the SCP). Numbers are likely to fluctuate due to both real world changes as well as data collection limitations (e.g., whether or not schools respond to inquiries about whether they currently have an operating garden). Nevertheless, a better strategy may be to distinguish between types of UA sites to better reflect the actual changes over time, especially for sites with more reliable data.

The planning documents could more generally benefit from additional identification and detail about actors and processes required to implement stated strategies and achieve objectives. The GFAA takes a very useful step is this direction by identifying the actor or actors responsible for implementing each specific policy recommendation including policymakers, business, funders, the collective Good Food Movement, or a combination of these. In the SCP and PHLA, no such identifications are included. This may reflect that the documents intend for the City to implement

all or most of the strategies. However, it would still be helpful for the document to identify which city departments (e.g., City Planning, Recreation and Parks, Water and Power, Public Works, etc.) would be lead on each objective and strategy or whether the LAFPC or a specific community organization (e.g., Los Angeles Community Garden Council) is the best partner for a specific role.

The overall policy and planning effort related to UA could benefit from additional detail related to how UA expansion will be supported including specific resources and infrastructure. In addition to lacking delegation to specific departments and other stakeholders, the planning documents, particularly the SCP and PHLA, generally provide only a few supporting strategies and lack mention of specific resources to facilitate implementation of objectives and strategies. Even in the absence of committing specific resources, the City should still identify if and how it might provide support (e.g., through in-kind resources) for stated objectives or what funding options (e.g., grant opportunities) might be available for UA projects. The GFAA provides a more comprehensive approach by connecting specific strategies to funders and/or business.

A progressive and laudable aspect of the existing planning documents is the focus on equity and using a food justice lens to prioritize underserved communities in Los Angeles. Among existing city planning documents in the U.S., the plans for Los Angeles stand out for their explicit equity focus. All three documents aim to address inequalities in food access through objectives that increase UA in underserved communities. Each document prioritizes low-income and underserved areas and include the strategy to increase farmers' market vouchers. The SCP identifies a specific underserved geographic area through the strategy to "expand UA in the City's federally designated Promise Zone." Perhaps one of the strongest equity-specific strategies is in the Good Food for All Agenda and is aimed at funders: "Increase involvement of impacted communities in defining food access need and measures of success to inform

evaluation and funding for healthy food projects." While the strategy itself is vague, the strategy goes beyond the idea of improving access to include community participation in the decision-making and priority-setting processes related to local food projects, including UA.

Despite the equity focus in these three planning documents, all three lack processes for how UA development, particularly land access, will be prioritized in these areas beyond a general statement that they *should* be in these areas. For example, the PHLA includes the statement that a strategy will "hopefully reach areas that need improved food access." Additional detail about the process for ensuring land access in underserved communities could strengthen the concrete commitments articulated in these planning documents.

Integration of UA into other plans and policies: recommendation. To better integrate and prioritize UA in the city's framework, the City should work with the LAFPC and other stakeholders to develop a comprehensive Los Angeles Urban Agriculture Plan. A few other cities have created UA topical plans, including Minneapolis, Minnesota and Alameda, California. A UA Plan for Los Angeles should provide a clear vision for UA in the city in the short term and long term, consolidate and expand existing goals and objectives, and provide a detailed plan for how these objectives will be achieved. Strategies to achieve these goals and objectives should be assigned to the most appropriate partner or stakeholder and include details about resource allocation. A particular advantage of a comprehensive UA plan would be increased City accountability in meeting UA objectives. The SCP makes progress in this area by providing annual progress updates, despite only highlighting objectives that have been achieved or are considered to be on track. A City of Los Angeles UA Plan could provide a detailed overview of existing UA and including information missing or only briefly including in existing planning documents. The process of creating the plan could help spur additional data collection and reporting efforts that have been initiated by the LAFPC, UC Cooperative Extension (Cultivate

LA), and others. In addition to objectives and strategies, a comprehensive Los Angeles Urban Agriculture Plan could include:

- land inventory including analysis of existing sites and opportunity sites for future development (described below);
- guidelines for the creation of different types of UA sites (e.g., community gardens, urban farms, aquaculture, etc.);
- resources for starting and growing UA sites including funding models;
- clarification for how all foreseeable UA uses fit within city zoning including any potential permitting processes;
- case studies of local best practices;
- additional items identified through an iterative stakeholder planning process.

The LA UA Plan could be launched as part of a City-sponsored online UA platform that provides information on many UA topics, and would better align Los Angeles with other cities' UA websites. While a few other U.S. cities have comprehensive urban agriculture plans, a Los Angeles Urban Agriculture Plan could make a definitive statement that urban agriculture is a priority and provide a concrete road map for how Los Angeles will be an urban agriculture leader.

Updating and amending municipal land use regulations

Land use regulations: progress to date. Prior to 2010, the City of Los Angeles zoning code was unclear in its permitting of farming and gardening, including a lack of definitions and contradictory permissions that dated back to 1960. In 2010, the City Council unanimously passed an ordinance that amended the municipal code to clarify urban agriculture uses permitted in each city zone (Council of the City of Los Angeles, 2010) (**Table 4.1**). Also known as the "Food and Flowers Freedom Act," the amendments simplified nine existing agricultural

uses into two (farming and truck gardening). It also defined both of these uses, in particular clarifying that truck gardening permitted growing of produce besides vegetables. Both farming and truck gardening were defined as “the cultivation of berries, flowers, fruits, grains, herbs, mushrooms, nuts, ornamental plants, seedlings or vegetables.” The difference between the two uses is that farming allows on-site and off-site distribution and sales, and truck gardening only allows off-site distribution and sales. The zoning amendments in 2010 also clarified which zones permit farming and truck gardening as well as other uses, and are generally summarized by the following:

- Agricultural zones: farming, nurseries, aviaries, and apiaries; the keeping of farm animals and small animals;
- Manufacturing zones: farming, nurseries, aviaries, and apiaries;
- Public facilities zones: farming and nurseries under power transmission rights-of-way;
- Suburban zones: truck gardening; the keeping of farm animals or horses and small animals not for commercial use;
- Residential zones: truck gardening; the keeping of horses and small animals not for commercial use.

Two additional municipal land use policy changes were made in the City of Los Angeles in 2015. First, the City of Los Angeles amended the residential zones to permit backyard beekeeping provided that certain performance standards are met such as registering with the County Agricultural Commission and maintaining spacing requirements (Council of the City of Los Angeles, 2015b). The other 2015 ordinance allowed edible food to be planted in public parkways (the small area of land between the sidewalk and the street) without a permit (Council of the City of Los Angeles, 2015a). As part of this municipal code amendment, the Department of Public Works updated its residential parkway landscaping guidelines to exempt edible plant materials from a previously required permitting process (Department of Public Works, 2015).

The parkway ordinance was considered a victory for advocates in low-income neighborhoods including South Los Angeles. Residents in these neighborhoods typically have limited access to both healthy food options and gardening space. One of the most prominent figures in the movement for parkway gardens and other UA in South Los Angeles is Ron Finley, who has garnered international fame for his gardening and community building efforts and helped advocate for the parkways ordinance (Scattergood, 2017).

Land-use regulations: best practices and recommendations. While recent land-use policy changes have started to improve UA permission in Los Angeles, but there are many additional changes that could better clarify and support UA activity. Despite the general permission of urban agriculture in Los Angeles land-use zones, there remains a need for clarification of what and where urban agriculture activity is allowed and how this information is made available. Finding out if a parcel of land is permitted for farming or truck gardening (or more specifically, what the land is zoned for) is not a straightforward process and can require searching difficult-to-navigate City websites or making an inquiry to the Department of City Planning. The City is currently working on providing guidance, including a map showing all current farming and truck gardening zones. However, because most zones allow either farming or truck gardening, there is a need to be able to identify what a specific parcel is zoned for and what its permitted and conditional uses are. The City could improve its zoning practice by making all land use information readily available to the public. This could be achieved if the City maintained a user-friendly website interface with an interactive map that allows easy identification of which zones and uses apply throughout the City.

To improve upon recent land use changes and better facilitate UA uses in the City of Los Angeles, land uses could be further amended so that specific, easily understandable UA activities are expressly defined and permitted. Like many other cities, Los Angeles could adopt

its own local definition and categories of urban agriculture (beyond its current two) and which activities the City intends to permit and support. Examples could include home gardens, community gardens, rooftop gardens, school gardens, nurseries, urban farms, peri-urban farms, and other categories, and considerations could include land area, location, number of users of the property, and the purpose of the UA operation (Wooten & Ackerman, 2012). In addition, the zoning could specifically identify which UA activities are conditional use (and in which zones). "Conditional use" refers to activities that are not permitted by right and would need approval from the City (e.g., keeping farm animals). A best practice is Seattle's zoning code, which defines five types of UA including animal husbandry, aquaculture, community gardens, horticulture, and urban farms, and specifies where these uses are allowed by right or with conditional use approval (Dillemuth, 2017a). Taking this idea further, the City of Los Angeles could also add exclusive zoning designations for UA such as "community garden" that would protect it from future development (Broad Leib, 2012). The City could add permissions for accessory agriculture structures including greenhouses and tool sheds, agriculture equipment and machinery, and food system infrastructure (e.g., community kitchens) (Dillemuth, 2017a).

In addition to clarifying and expanding existing zoning code, the City would also benefit from the creation of overlay zones or districts that expressly support a range of UA activities. This should include co-location with commercial food processing facilities in specific areas of the city, creating "food innovation districts" and integrating UA with the local food system (Dillemuth & Hodgson, 2016; Los Angeles Food Policy Council, 2017b). The food innovation district strategy is briefly proposed in both the Plan for a Healthy Los Angeles and the Good Food for All Agenda. Food innovation districts would be conducive to supporting entrepreneurial forms of UA including hydroponics, aquaculture and aquaponics (fish farming), controlled environments (indoors, shipping containers, etc.), vertical applications, rooftops, and efforts to create value-added products (e.g., salsas) or reach high volumes of production. A best practice example is

the Rainier Beach Food Innovation District in Seattle is being planned to combine the neighborhood's urban farms, light industrial zone activity, and light rail station in a multipurpose facility with a variety of food system infrastructure including commercial and test kitchens, food production space, food research laboratory, cold storage, and education spaces (Rainier Beach Action Coalition, n.d.). With its extensive industrial infrastructure, Los Angeles has potential to facilitate co-location of UA sites with other infrastructure to create unique entrepreneurial opportunities. However, at present, these entrepreneurial efforts are largely focused on the highly technological realm of controlled environment agriculture that has high startup costs and ongoing electricity costs. One example from Los Angeles is the company Local Roots that is aeroponically growing (i.e., a version of hydroponics using small amounts of water delivered in aerosol form) a variety of green leafy vegetables inside of upcycled shipping containers (Local Roots, n.d.). Controlled environment or indoor UA is in its early stages, and it remains unclear if efforts in this area will be able to benefit underserved communities. Most of these commercial efforts are growing high-value vegetables, typically leafy green vegetables, which can be sold to upscale grocery stores and restaurants – a very different mission than growing vegetables in underserved communities for community benefit.

2. Access to land and other growing spaces

Access to land and land tenure, particularly long-term land tenure, is often cited as one of the greatest challenges for UA. While some UA sites are on public land and benefit from local government assistance, others are on privately owned land with uncertain commitment from private landowners. Some UA sites bypass any type of formal agreement and operate illegally with no support, sometimes referred to as "guerilla gardening." In most cases, UA sites have short term or uncertain land tenure. UA could benefit from increased information about available land, City support for access to public land, incentives for access to private land.

Creating a land inventory database

The creation of a land inventory database is not a new goal for Los Angeles, but it is an essential step in the intentional and strategic expansion of UA. The goal for the City of Los Angeles to create a land inventory has been articulated since at least 2010, but hasn't been realized. This goals was included in the City's 2010 Good Food for All Agenda, as well as in a 2010 City Council Motion and again in the 2015 Plan for a Healthy Los Angeles. However, despite multiple calls to action, to date such an inventory does not exist, although some progress has been made by nonprofit organizations to generally identify vacant parcels of land.

The City should conduct an assessment of all public land and create an accessible database of land and structures that are vacant, underused, or otherwise potentially suitable for UA activity. The assessment should also include park spaces that may have space and other characteristics that would be suitable for the addition of a UA site. Ideally, site suitability factors would be included in an inventory effort that would allow for a more comprehensive understanding of land resources as well as if and to what degree parcels could potentially be utilized for UA activity. By applying a suite of suitability factors, ideal candidate parcels could be selected and prioritized, perhaps even ranked, by their potential to support UA activity. Information about vacant parcels would also allow UA practitioners to choose sites that best fit their specific interests and goals, as these typically differ for each UA operation. Site suitability factors have been included in a number of studies in other cities and can include: size, slope, water access, tree cover and shading/access to sunlight, impervious surfaces, soil type and quality, land use conflicts, proximity to pollution sources, and proximity to community amenities (e.g., transit stops/routes) (Ackerman, 2012; Eanes & Ventura, 2015; Saha & Eckelman, 2017; Wooten & Ackerman, 2012). An example of such an analysis (albeit absent a consistent suite of suitability factors) is the Alameda Urban Farm and Garden Plan (Alameda, California), which identifies public sites with high potential, medium potential, and low potential urban farm and garden sites

throughout the city, including potential to integrate community gardens into existing park spaces (The Planning Center & ChangeLab Solutions, 2012).

Protecting and stewarding land for urban agriculture

If an updated land inventory was in place, the City could better partner with the LAFCP and community organizations to help strategically identify properties to protect land for UA activity. Protection and preservation of land for UA uses could help relieve the pressure of competing land uses and uncertain, short term land tenure. This strategy is articulated in both the Plan for a Healthy Los Angeles and the Good Food for All Agenda. Existing agriculture land and UA sites should be protected whenever possible, especially in Los Angeles where there are relatively few UA sites and land use is highly competitive. One specific strategy advocated by the GFAA is to include a first "right-of-refusal" option for farmers in a lease agreement so that they have the option to buy the land if it is being sold (Los Angeles Food Policy Council, 2017b). Another option for the City would be to create a land-swap program that provides alternative spaces for UA in the event that land currently supporting a UA site is taken or sold by the City (Broad Leib, 2012). To hold land for future UA sites, cities can create land banks by taking title of tax-delinquent land and making it available to UA (Wooten & Ackerman, 2012). The City of Los Angeles could pursue tax-delinquent land as part of a strategy to convert the land for community benefit, including UA. Other jurisdictions have pursued this strategy including Multnomah County, Oregon, where the Offices of Tax Title and Sustainability created the County Digs Program, which transfers tax-foreclosed properties to local governments and nonprofit organizations for UA uses (Dillemuth, 2017a).

In addition to land banking, land trusts are organizations that work to acquire, conserve, and convert land for community benefit (sometimes called "community land trusts") and can work well for establishing new UA sites. The Good Food for All Agenda includes land trusts as a

strategy to increase community ownership of food production resources, rather than being dependent upon support or leases from outside the community (such as through the municipal government) (Los Angeles Food Policy Council, 2017b). Within the city, the Los Angeles Neighborhood Land Trust has created 27 new parks and gardens over the past 15 years primarily in underserved neighborhoods, and aims to add five sites by 2019 for a total of nearly 15 acres (Los Angeles Neighborhood Land Trust, n.d.). The community land trust model may be uniquely helpful to UA because land tenure is more certain and the trust can strategically target its efforts to acquire land for UA, for example in the most underserved neighborhoods or in a way that could facilitate the networking of the trust's UA sites. Additional efforts to fund and expand community land trusts throughout the city are warranted, especially given the extent to which green space and UA is lacking in many communities in Los Angeles.

Efforts to steward municipal land should not be limited to the densely populated urban core, but should also extend to outlying areas including areas already zoned for agriculture, agriculture land currently under cultivation, and vacant land that could support peri-urban agriculture. A regional or "foodshed" focus for land stewardship can help expand efforts to conserve limited agriculture land whether it's in the urban core or larger peri-urban and rural farms that grow a majority of the food, which is the approach taken by the LAFPC. As noted in the literature, the interest and mobilization around land access for UA could also help increase attention on the broader food system issues including the loss of farmland in California and across the nation (Valley & Wittman, 2018). The City of Los Angeles has some irrigated farmland primarily in the North Valley area perimeter; however, there is currently no accessible information on needed data including (1) how much land within the City limits is zoned for agriculture (two agricultural zoning codes exist); (2) how much of the land zoned for agriculture is currently under cultivation; and (3) of the land currently under cultivation, what types of agriculture are in operation. A preliminary attempt to identify this information resulted in a collection of unclear land use

descriptions from county tax assessor parcels. More broadly, the County of Los Angeles has nearly 1,300 commercial farms, but approximately 20,000 acres or 18% less land was in farms in 2012 compared to a decade earlier (United States Department of Agriculture, 2014).

Expanding access to public land

While public land can potentially be more accessible and more secure than private land, there is currently not a process in place to facilitate the leasing of public land for UA in Los Angeles. The Los Angeles Department of Recreation and Parks could take an active role in the development of UA sites including matching potential farm and garden sites with community organizations and UA practitioners. The Plan for a Healthy Los Angeles specifically mentions public land leases for UA. Once a land inventory is conducted and potential vacant and underutilized sites are identified (and ideally ranked according to UA suitability), the City could develop a process for leasing suitable public land for UA uses. One strategy the City can take is to develop public-private partnerships in which the City can create requests for proposals (RFPs) for candidate sites and then award leases to community groups and UA practitioners who are well-matched and prepared to manage a site. This would help alleviate the City's burden of UA site liability and the costs of construction and maintenance (The Planning Center & ChangeLab Solutions, 2012). A particular area of prioritization for Los Angeles could be its public facilities or PF zones, which permit farming and nurseries under power transmission rights-of-way. The largest community garden in the city, Stanford Avalon Community Garden which spans 11 city blocks and has over 200 individual plots, exists under a power transmission line right-of-way in one of the city's poorest neighborhoods (Los Angeles Community Garden Council, n.d.-b). Additional land under power transmission lines could be identified and prioritized for public leases, potentially providing larger plots of land amendable to farming that otherwise are unavailable in the city. The model for a municipal land leasing program for UA exists in several other cities. For example, the Homegrown Minneapolis Garden Lease Program identifies vacant city-owned

parcels across six different vacant land categories each with specific lease terms; the city also has an online map that includes all available vacant city-owned sites in addition to sites already supporting gardens (Homegrown Minneapolis, 2018). The City of Los Angeles could also create criteria for prioritizing its leases to community groups and practitioners in underserved communities. Eventually, the City could conduct assessments to measure the extent of UA activity on its land and contribute to reporting progress over time. Similar to the need for land inventory, public land leasing for UA is an appropriate option that has already been prioritized by City of Los Angeles planning documents and successfully implemented in other cities; it is time for Los Angeles to initiate this strategy.

In addition to identifying available City-owned vacant and underutilized land, the City and other stakeholders could help facilitate connections to potential growing spaces at public institutions including parks, schools, libraries, public housing, and other sites; all three city planning documents identify this strategy for UA expansion. In addition to public institutions, certain private sites could also be partners in building a UA network including private schools and colleges, places of worship, country clubs, and other sites. I used publically-available data from the Los Angeles County Geospatial Information Systems (GIS) Portal to select institution point locations and land uses, and mapped these locations within the City of Los Angeles boundary and summed to total counts and land area if available (**Table 4.4**). In some cases, the data sources did not match (point sources vs. land uses) in which cases ranges were provided. The City manages hundreds of parks totaling nearly 20,000 acres, but most of the land area is in the Santa Monica Mountains and unlikely to be suitable for UA activity. Using a threshold of 14 acres, the City has approximately 285 urban parks totaling 731 acres with an average size of about 2.5 acres. As mentioned previously, the City could include parks in a land inventory to identify potential UA sites; gardens could certainly be included in the green outdoor recreation spaces of urban parks, and these spaces could be incorporated into a public land leasing

process. There is slightly more land (783 acres) covered by 103-151 recreation centers across the city that might also have some potential for UA sites.

In addition to park spaces, there are approximately 1,000-1,200 elementary, middle, and high schools located in the City of Los Angeles that could be potential school garden UA sites. About half of these school sites are public and cover roughly 4,500 acres of land. According to Cultivate LA, about 200 school gardens currently exist in the City, which is 16-20% of the total (Jackson et al., 2013). Given the number of school sites and the evidence base supporting the positive benefits of kids participating in gardening, the City and other stakeholders could pursue a “Garden in Every School” campaign to increase the prevalence of school gardens (Robinson-O’Brien et al., 2009). In addition, the LAFPC recommends pursuing joint-use policies to facilitate community access to schools on evenings and weekends and allow expansion and creation of gardens on school grounds. Joint-use policies could greatly expand the amount of land available for community recreation and UA, especially in underserved communities that lack these spaces compared to the rest of the city. One study found that opening all 122 school outdoor recreation facilities in South Los Angeles would increase the total available outdoor recreation space by 76% and would double the overall outdoor space open to the public (Murphy, 2013).

In addition to primary and secondary school sites, there are approximately 90 colleges and universities in Los Angeles, many of which have gardens, orchards, hydroponics, and other food producing sites. Higher education offer excellent opportunities to serve as UA “living labs” in which new UA ideas are implemented and tested, often at the forefront of innovation and technology. For example, the University of California, Los Angeles and University of Southern California both have recently installed hydroponic growing towers through the local company LA Urban Farms; the series of towers grow leafy greens and other vegetables that are utilized in

campus dining facilities while using up to 95% less water and 90% less land compared to soil-based gardens (LA Urban Farms, 2017).

There are many potential partner institutions across Los Angeles that could potentially host new UA sites, and some already do. On-site UA projects at other public institutions in Los Angeles could help provide fresh produce and other benefits for low-income residents. The Housing Authority of the City of Los Angeles has 15 housing sites with approximately 6,000 residents, and recently created guidelines for allowing gardening, an effort that LAFPC and partner organizations had advocated for (Los Angeles Food Policy Council, 2017a). In total, there are approximately 120 public housing sites in the city. Other public spaces include the city's 82 libraries which the LAFPC has identified as potential partner sites for establishing gardens, including a successful pilot in South Los Angeles. The Los Angeles Public Library is specifically mentioned in the Sustainable City pLAn as a potential partner on City-owned land. The City also has over 800 churches, many of which are engaged in charitable food donations/distribution and some that even have gardens. For example, the Episcopal Archdiocese of Los Angeles has a network of 80 food producing sites and 100 food distribution sites (T. Alderson, personal communication, Sept. 2, 2016). Other unique spaces might be found at the City's 31-33 golf courses and country clubs that occupy nearly 4,000 acres, and at least two country clubs have their own farms; Hillcrest Country Club in Beverly Hills has farm managed by the UA company Farmscape and supplies a portion of the club's restaurant produce (S. Coagan, personal communication, Sept. 15, 2016). This preliminary assessment identified that considering only a few categories of potential public partnerships (parks, schools, colleges, golf courses, and recreation centers), there are over 13,000 acres of public land, a total larger than all currently vacant private land (Chapter 3). A comprehensive assessment of both existing UA activity and areas for potential new UA sites, such as might be included in a comprehensive city UA plan, could consider all of these institutions.

Including urban agriculture in city planning and development

City planning and development in Los Angeles could strategically integrate UA as part of city growth to add potential growing spaces in neighborhoods, mixed use development, rooftops, and other projects. If UA information was readily available, it could become a standard part of sustainable project planning including how to integrate UA with buildings, such as green rooftops. Master plans for city and community development projects could include UA elements, which could eventually be networked to other nearby UA sites. UA could also be integrated into large scale city and regional development efforts. In Los Angeles, one particularly extensive vision for UA is embedded within the Los Angeles River Urban Agriculture Green Infrastructure Plan. This master plan was developed by an architecture and design firm and envisions UA hubs and infrastructure within an existing 660-acre city redevelopment plan in a food desert community (the Cornfield Arroyo Specific Plan) (Jao, 2015). The master plan includes a proposal to create four nodes for different UA functions include a commissary and distribution center, an incubator for UA businesses, commercial and community growing spaces, and public event spaces. In addition to large visions, UA could be integrated into new government projects and project updates including parks, public housing, libraries, and other infrastructure discussed in the previous section. UA could also be incentivized in new development, and cities in the U.S. have pursued different incentive strategies for private development including tax credits, permit fee reductions, stormwater fee credits, density bonuses, and expedited permitting (Tam, Weeks, & Zigas, 2013). A specific strategy utilized by some cities is a bonus of floor area ratio (FAR) for projects and buildings that integrate green spaces for UA (Ackerman, 2012). If UA was included in project planning and development, it could help integrate UA into the fabric of the city and become the new normal for building and design.

There is clear interest in from the City in facilitating a rooftop UA culture in Los Angeles, but little progress has been made to date. Green roofs have been incentivized and implemented in other

cities in the Midwest and Eastern United States (e.g., New York City) but far less so in Los Angeles. The lack of rooftop UA in Los Angeles is likely due in part to the mild climate in Southern California. The mild climate means that buildings do not need to be designed to bear the load weight of snow, making them less suitable for weight bearing projects like UA (Merchant, Fissore, & Duran, 2016). Despite little progress to date, there is potential for rooftop UA in Los Angeles. A City report on green roofs in 2007 identified that green roofs could achieve a point towards required Leadership in Energy and Environmental Design (LEED) certification, stormwater runoff fees are already in place but could be increased, and FAR allowances could be created which has been implemented in other cities (City of Los Angeles Environmental Affairs Department, 2007). A 2013 City Council motion specifically called for the City to implement a Green Roof Pilot Program and cites the FAR bonuses implemented in San Diego and Portland as best practices that should be implemented in Los Angeles (Parekh, Law, & Carriedo, 2016). The City of Los Angeles and Los Angeles County stormwater mitigation plan includes detailed information on green roofs as one strategy for stormwater quality control, but does not mention UA (Los Angeles County Department of Public Works, 2014). In 2017 the City released an information bulletin of guidelines and requirements for installing rooftop gardens including permitting, irrigation, maintenance, and signage (Los Angeles Department of Building and Safety, 2017). Rooftop gardens are also mentioned in a list of potential UA sites in the Plan for a Healthy Los Angeles (Los Angeles Department of City Planning, 2015).

An exception to the lack of rooftop UA in Los Angeles is the Jonathan Club, a social club in a 12-story building in downtown Los Angeles with a rooftop garden that includes 10 metal raised beds with 420 square feet of growing space. The rooftop garden can produce as much as $150,000 worth of vegetables annually and supplies the club's restaurant with fresh produce. The club's chef collaborated with Farmscape, a local UA landscaping company, to install the garden and the company provides ongoing garden management (Merchant et al., 2016). While

the Jonathan Club rooftop garden is an exceptional demonstration project for UA in Los Angeles, there is interest and support for the City to move forward with a rooftop UA program including implementing various incentives for city projects.

Incentivizing access to private land

Incentivizing access to private land in Los Angeles: AB 551

Tax incentives are one approach being implemented by states, counties, and cities in the U.S. to encourage private landowners to lease their land for UA activity. The major development for UA tax incentives in California and Los Angeles has been Assembly Bill 551 Urban Agriculture Incentive Zones Act. The predecessor of AB 551 is the 1965 Williamson Act, which allows cities and counties to enter into agricultural land preservation contracts with private landowners who agree to continue agricultural use for a minimum of 10 years. In return, landowners receive a lower property tax assessment (Ting, 2013). The goal of the Williamson Act is farmland conservation in rural and peri-urban parts of California, an effort that has only become more important as urbanization and land development pressures have increased across the state. Assembly Bill 551 (the Urban Agriculture Incentive Zones Act or AB 551) was unanimously passed by the California State Legislature in 2013, and since then has been slowly adopted by a few counties and cities in the state. The bill provides a potential property tax break to private landowners in exchange for leasing their vacant land for farming or gardening for a minimum of five years, provided certain criteria are met (Ting, 2013). The eligibility criteria adopted for the City of Los Angeles include:

- Vacant lot with no habitable structures on-site. Any on-site structures must be accessory to the urban agriculture use;
- Minimum of 0.1 acre (4,356 sq. ft.) to maximum of 3 acres (130,680 sq. ft.) in size;

- May not be located within a Significant Ecological Area, Sensitive Environmental Resource Area, or a National Recreation Area;
- May not be located on a site listed on the Department of Toxic Substances Control's Envirostor Database;
- Minimum of 5 years of commitment to urban agriculture use;
- Urban agriculture use must be in compliance with existing zoning regulations (Council of the City of Los Angeles, 2017b).

AB 551 aims to expand UA by improving access to land, one of the biggest challenges to UA growth. By potentially converting vacant, unused land to farms and gardens, the policy creates a mutually beneficial relationship for private landowners (who save money on property taxes) and UA practitioners (who gain land temporary land access). Communities also benefit from UA activity on otherwise vacant land. The bill cites several of these potential benefits, including increased access to green space and healthy food, and improved economic and social health (Ting, 2013). In 2017, another state bill was passed (AB 465) that extended AB 551 for an additional ten years (to 2029) and included an amendment to allow for contiguous vacant parcels to be combined under one contract (for example, to meet the minimum land area eligibility threshold of one-tenth of one acre) (Ting, 2017).

It is up to local jurisdictions to adopt the UAIZ policy, and several counties and cities in California have implemented a UAIZ program. These include Los Angeles, Sacramento, San Francisco, San Jose, and Santa Clara. Several other jurisdictions are either in the process or considering implementing AB 551 including Chula Vista, Long Beach, Oceanside, and San Diego. However, few UAIZ contracts have been created since the policy went into effect in 2013. As of May 2017, only four parcels across three cities were under contract (Zigas, 2017). After the City of Los Angeles approved its UAIZ Program in June 2017, the City of Los Angeles

Department of City Planning had an initial application process from August through October 2017 for the program to grant tax breaks for 2018. The City received only six applications and were the only contracts in the county to be submitted to the Los Angeles County Office of the Assessor, four of which were approved for UAIZ contracts (B. Kim, personal communication, Feb. 8, 2018; T. Tran, personal communication, Apr. 17, 2018). These four approved contracts included five parcels (with one contract covering two parcels).

Incentivizing access to private land: is AB 551 a best practice?

Overall, AB 551 provides a reasonable mechanism to achieve its stated goal of incentivizing private landowners to lease their vacant land for UA. The bill aims to increase land access and tenure, which is often cited as the biggest barrier to urban agriculture especially in historically underserved communities. The bill is a win-win-win in the sense that the landowner, the farmers/gardeners, and the community all stand to benefit. AB 551 provides an incentive to work with private landowners who own a vast majority of the vacant land parcels in the city. This could potentially promote partnerships that otherwise might not exist, and help improve the relationship between private land developers and community based organizations who can have conflicting land use priorities. The bill also includes a penalty on the landowner if the contract is terminated early, which acts as an assurance that the five year minimum will be met. If the land is sold, the UAIZ contract remains attached to the property, thereby preventing the possibility of losing the contract due to changing ownership. The tax incentive is an opt-in mechanism, which could be viewed as a conservative approach that makes the policy more politically feasible. The amendment to allow contiguous parcels in AB 465 could be helpful for meeting the minimum size eligibility threshold and facilitating clusters/networks of UA sites that can better share resources and scale their efforts/operations. In the City of Los Angeles, approximately 90% of

UAIZ-eligible sites are less than 0.5 acres in size, and 75% are less than 0.25 acres in size (**Chapter 3**).

Despite its potential, AB 551 has many shortcomings and missed opportunities in its attempt to expand UA. The bill does not include a mechanism to prioritize underserved communities that have the least amount of land available for UA and would stand to benefit the most, thereby missing an opportunity to increase the impact of the bill. The bill is a short-term solution as a five-year contract is still very limited land tenure, especially when accounting for the time and resources required to establish a new farm or garden. There is no mechanism that provides assurances that the farm or garden can be reasonably protected, relocated, or renegotiated after the minimum five years. In addition, the financial benefit is for the landowner, not the farmers/gardeners. This could be perceived as a policy that favors private landowners, a group that is historically has more wealth and power compared to urban residents who do not own land. In addition, the incentive may not be large enough to attract participation of private landowners. Property tax is slightly over one percent, and average annual savings for land in Los Angeles would be approximately $1,688 (**Chapter 3**). The small number of contracts to date statewide may be evidence that the incentive is not high enough, and that the program may essentially be relying on the benevolence of private landowners rather than providing a substantial financial incentive. However, it should be noted that Los Angeles received more applications (six) than any other city in its first year of the program. Another drawback is that vacant and underutilized land owners, whose properties may be ideal candidates for UA uses, may owe back taxes and thus would not be incentivized to participate (Havens & Roman-Alcalá, 2016). The implementation of AB 551 may be slow or unlikely because counties and cities generally do not have processes in place to support the policy beyond initial approval. For example, there is no agency or position tasked with proactively supporting contracts between private landowners and UA practitioners, placing the burden on farmers and gardeners to

identify suitable sites, make a connection with the landowner, and negotiate a contract. In Los Angeles, the LAFPC is helping to connect interested landowners with UA practitioners, as well as assisting in coordinating the lease contracts. In other jurisdictions without such assistance, the policy may not be implemented or may not be as successful. AB 465, which extended and amended AB 551, originally included but ultimately removed a provision that would have lowered the urban population threshold from 250,000 to 50,000 people. This could be viewed as a missed opportunity to expand the program to smaller cities and communities in California that are interested in implementing and expanding urban agriculture. Finally, funding limits may prevent AB 551 from becoming a long-term program as governments are already limited in their property tax revenue due to California Proposition 13. Los Angeles County implemented a limit of $3 million for the UAIZ Program which covers all unincorporated areas and 88 incorporated cities with a total population of approximately 10 million people.

Incentivizing access to private land: recommendations related to AB 551

Various strategies could be part of amendments to AB 551 or strategies for future policies for UA in Los Angeles and other jurisdictions. These include:

1. Specifically support and prioritize underserved, low-income communities. This could take different forms including tiered tax breaks, with the highest tax breaks granted to land in the highest need areas of the city. For implementation, City leaders could give preference for contracts in low-income areas and/or additional resources to the UA organizations/practitioners in these areas. If enough funding was made available, a matching program to could give the equivalent property tax break amount as a grant to the organization or practitioners that would be farming/gardening on the land. This would help better distribute financial benefits that currently only incentivize private landowners.

2. Involve multiple stakeholders in policy implementation decisions at the city level. This should include community organizations in areas where there is an interest in leasing a vacant lot.
3. Include mechanisms and guidance for the UA practitioners to extend at the end of a contract. This could include options to increase the duration of the lease, assistance in finding another suitable site to move operations if the landowner decides not to continue the lease, or a “first-right-of-refusal” offer to buy the land in the event that is being sold (Los Angeles Food Policy Council, 2017b).
4. Implement disincentives (e.g., property tax increases or other fees) for idle vacant land to further encourage participation in the UAIZ Program. The City of Long Beach is implementing a vacant lot fee that can be avoided by participating in the city’s UAIZ Program or another use for community benefit (C. Chatterson, personal communication, Feb. 12, 2018).
5. Pursue vacant and underutilized land for which back taxes are owed to raise revenue to fund AB 551 or even redistribute vacant land for UA projects in underserved neighborhoods (Havens & Roman-Alcalá, 2016). This could be one way for the City to create and maintain a land bank.
6. Require as a condition of an incentivized land lease that UA sites implement sustainable practices including water conservation (e.g., drip irrigation).
7. Require cities to dedicate process support including (1) a staff person or team to oversee city UA program and UAIZ application processes; (2) an analysis of potentially eligible vacant land parcels and an updated database of potential sites; and (3) matching suitable UAIZ parcels with community organizations. An example of a promising practice is Missouri’s Urban Agriculture Zones legislation that requires the creation of a seven-member advisory commission to oversee the zones and also reviews each zone at five and 10 years (Essex, Shinkle, & Bridges, 2015).

8. Include specific City support for UA sites that are created under the program such as reduced water rates for the property and access to other municipal services.
9. Create a funding mechanism to make the program more sustainable. For example, local sales tax revenue generated from products sold in Missouri's Urban Agriculture Zones are transferred to a UAZ fund (Essex et al., 2015)

3. Providing supporting resources

A considerable amount of resources are required to start and maintain UA sites, and urban environments can present challenges to obtaining some of these resources including low-cost water access. In addition, UA currently does not have many opportunities for new practitioners to receive reliable information and training. Municipal government and other organizations can help supply some of the critical resources to help UA sites flourish.

Improving access to water

Overall, there are several strategies that could help mitigate the relatively high municipal water rates for urban agriculture efforts in Los Angeles. Water access and affordability are a particular challenge for UA in Los Angeles. Water use and conservation are especially important as 86% of water is imported, the city receives little rainfall, and there are millions of municipal water users. The City regularly enacts and encourages water conservation measures and, like other outdoor water uses, UA is often scrutinized for its water use (Los Angeles Department of Water and Power, n.d.-a). However, many UA sites use water conservation technology (e.g., drip irrigation) and several preliminary UA case studies in Los Angeles County showed that the sites were typically using less water than a typical lawn of the same area. These case studies were part of my unpublished UA work conducted at the same time as the work for this chapter. After access to land, water access and expense is often cited as one of the biggest challenges for urban agriculture. If a land parcel does not have a connection to municipal water, installation

can be a major expense. In addition, municipal water is many times more expensive compared to agricultural water.

The Los Angeles Department of Water and Power (LADWP) provides municipal water in Los Angeles, and its current water rates present challenges for UA. The lowest water rate is for irrigation of public spaces and includes community gardens open to the public, but is approximately 38 times more expensive compared to the average agricultural water in the California Central Valley (**Table 4.5**) (Baldocchi, 2018). When UA sites are not open to the public, instead being charged the residential water rate, they can potentially be paying a water rate that is over 100 times greater than average agricultural water. In addition to the price of municipal water already being much great than agricultural water, in 2016 LADWP implemented stepwise water rate increases for all water rate categories including public irrigation that amounts to a cumulative increase of 289% by 2020 (Council of the City of Los Angeles, 2016). The Los Angeles Community Garden Council (LACGC) reports that the rate increase will force them to increase membership dues accordingly (resulting in a tripling of dues), potentially making plots unaffordable for some low-income gardeners (J. Beals, personal communication, Jun. 13, 2017). The LACGC and LAFPC have been advocating policymakers to mitigate the water rate increases for community gardens, and the LAFPC recommends offering rebates on drip irrigation and other water conservation strategies (Los Angeles Food Policy Council, 2017b).

The City could take several actions to mitigate the water rate increases for community gardens and potentially other UA sites. One approach would be to create a water subsidy for UA sites, similar to LADWP's Water Low Income Discount Program that provides a bi-monthly household subsidy up to a maximum of $20 per water bill (Los Angeles Department of Water and Power, n.d.-b). The subsidy could be formulated to at the very least offset the current water rate

increases for community gardens. Part of a UA water rate subsidy could either require or encourage water efficient irrigation strategies and equipment (e.g. drip irrigation and micro sprinklers), or it could be used towards the purchase of water efficient equipment as suggested by the Los Angeles Food Policy Council. This would help to address both the cost of water for urban farmers and gardeners while maximizing water use efficiency in an urban area that persistently faces water stress. In the event that a new UA site does not have a municipal water connection, LADWP could subsidize installation. For all UA sites, water sub-meter installation could be subsidized as this would allow site-specific data to be collected and potentially lower water bills. This strategy would be particularly helpful to urban farmers and gardeners who would benefit from the ability to monitor their water use over time and make informed decisions about water use and conservation (Merchant et al., 2016)

Another strategy to improve water access could change how water rate categories are applied to benefit UA. In 2013, a motion in the Los Angeles City Council called for an expansion of the Schedule F water rate, which currently covers community gardens open to the public, to include UA sites in public housing developments, schools, and non-profit institutions (Parekh et al., 2016). This expansion would effectively reduce the cost of gardening in many public spaces and should be pursued by the City. The City could go even further: since being granted a Schedule F water rate requires a written application and proof of the community garden's operation for public benefit, the City could broaden the application to include all food producing sites in the City, allowing all UA sites the opportunity to pay the lowest municipal water rate possible. Similar to the subsidy strategy described above, the option to apply for Schedule F water rates could require the use of water saving technology such as drip irrigation. An expansion in the application of public irrigation water rates to include UA would be a strong showing of support from the City that growing food is a valued and encouraged community benefit.

To create an incentive for the expansion of UA and other permeable land uses, the City could add or increase its water rate charge for stormwater based on the impermeable area of a property. This charge could possibly incentivize landowners with large impermeable surface areas to add green spaces such as rooftop gardens (Ackerman, 2012). A stormwater charge would benefit UA sites that would not have pay the charge and value the contribution of UA and other green space contribution to stormwater capture. This effort could be combined with stormwater capture technology; the City already requires projects to mitigate stormwater runoff under its Standard Urban Stormwater Management Plan (SUSMP). However, the SUSMP guidelines do not specifically mention UA although five vegetation-based options are included as possible stormwater quality control measures (Los Angeles County Department of Public Works, 2014). In addition, a 2010 City Council motion included the idea for the City in install rain barrels at all community gardens operating on public land, which would specifically help with stormwater capture at UA sites as a best practice (Parekh et al., 2016). This incentive strategy is aligned with the City's goal to expand stormwater capture and decrease its reliance on imported water supplies (Cousins, 2017).

Improving access to education and training

Although efforts to support UA in Los Angeles are starting to increase, there is a great need for additional UA education and training to facilitate a greater expansion of UA throughout the city. Reliable and accessible sources of relevant information, training, and technical support for UA have been slow to develop in Los Angeles. The Plan for a Healthy Los Angeles includes the strategy to "foster and promote local initiatives and partnerships that empower, educate, and train Angelenos to grow and eat healthy food (Los Angeles Department of City Planning, 2015). Many urban farmers and gardeners have no agricultural background or experience and must seek information and training on their own. In a survey and interviews with UA practitioners across California, researchers found that many were unsure how to locate reliable UA resources

and would like to receive information and training on a range of topics including production, marketing opportunities, water and pest management, and project design (Surls et al., 2015). In Los Angeles, few region-specific UA resources have existed outside of the Los Angeles Food Policy Council UA Working Group and a few organizations that host training and workshops, and many of these are not located within the City of Los Angeles. For example, The Growing Club / Sarvodaya Farms in Pomona, California (about 32 miles east of downtown Los Angeles) recently offered a three-day regenerative urban farming intensive workshop that aimed to provide relevant knowledge, skills, and resources to start and operate an urban farm; the farm also coordinates a four-month farmer training internship and a volunteer program as part of its mission to provide community education and training (The Growing Club, n.d.-b). The Growing Club is unique in its focus on farmer training and education, and it's website includes the statement, "apply for LA's only Urban Farmer Training Program" (The Growing Club, n.d.-b) While there are some other regional sites that provide UA training, they generally are not open to the public and/or only serve a specific population. There is a need for publicly available UA education and training.

While widespread support for UA education and training has been slow to develop, some progress has been made. The University of California Cooperative Extension (UCCE) provides support to gardeners and farmers throughout the state, but a recent needs assessment identified that specific support for UA had not kept up with the increasing need for assistance (Surls et al., 2015). In the past few years, UCCE has made progress by making information available on its website, organizing tours of local UA sites, and hosting a UA workshop series throughout the state. In the summer of 2017, UCCE hosted four Los Angeles area UA workshops covering topics of legal issues, production, marketing and business management, and food safety basics (University of California, 2017b). While this is a good start, the training and education opportunities could be vastly expanded to support UA in a county of 10 million

people. As UCCE increases its support for UA in Los Angeles, it could partner with regional UA stakeholders to create and maintain an incubator farm to provide hands-on training for beginning urban farmers. One example of this type of extensive UA training support is the Oregon State University Extension beginner urban farmer apprenticeship program that trains new urban farmers (Dillemuth & Hodgson, 2016). Centers for UA and UA training could be based at local colleges and universities that have the interest and space for such a program. In Los Angeles County, Cal Poly Pomona is working on establishing the region's first Urban Agriculture Center to train students, conduct research, develop best practices, and collaborate with UA efforts in Los Angeles; the college is also launching a minor in urban and community agriculture starting in Fall 2018 (R. Franco, personal communication, Feb. 16, 2018).

4. Connecting to the local food system

Supporting UA through access to growing space and provisioning of resources helps the supply side of UA, but the demand side also needs to be supported to allow UA expansion into the local Los Angeles food economy. Distribution and marketing of UA products is critical to grow UA businesses and generally reach the broader community. To this end, local economies need to be able to accommodate and support urban farmers who have constraints including the smaller volume of production, but can also offer unique benefits such as freshly harvested products and unusual produce that is not readily available in mainstream markets. Strategies to grow the local food economy can help integrate UA into the city food system. The Good Food for All Agenda acknowledges the need to develop supply side approaches through several strategies under its priority areas to "promote a good food economy for all" and "create a culture shift for good food" (Los Angeles Food Policy Council, 2017b). The Plan for Healthy Los Angeles includes a subsection "local food systems, connections, and industry" which also includes general strategies for connecting to food systems. While many of these approaches are not specifically aimed at UA, or are not yet applicable because for-profit urban farms are not

yet able to participate in some strategies, there may be future potential. While some UA operations currently connect to farmers markets, there could be potential for connection to neighborhood markets, mobile food vending, and food banks, and a local food hub would help to coordinate distribution through all of these market opportunities.

Connecting to Farmers' Markets

Farmers' markets are one of the most accessible ways for urban farmers and gardeners to selling their products in Los Angeles because they provide direct access to a consumer base that is already interested in farm fresh produce. In Los Angeles County, Cultivate LA researchers found that farmers markets were the most common method for UA distribution and marketing and that urban farmers traveled an average of 13.9 miles to sell at farmers' markets (Jackson et al., 2013). This distance is less than one-third of the national average distance traveled by farmers' market vendors for large metropolitan areas (46.8 miles) (Lohr, Diamond, Dicken, & Marquardt, 2011). This smaller distance for UA distribution indicates that UA in Los Angeles is providing benefits of being located closer to markets/customers and thereby delivering fresher food while requiring fewer resources for transportation. However a relatively short distance to a market can still be a burden for urban farmers with limited resources including time; Cultivate LA researchers found that urban farmers are likely to do all of their own transportation and marketing including driving to farmers' markets and selling for the duration of the market (Jackson et al., 2013).

UA may be uniquely positioned to fit into strategies to increase access to fresh, healthy food in underserved communities including farmers' markets. As a first step, they can become approved to accept social benefit vouchers, an effort that has been pursued for vendors across the city. All three UA-relevant city planning documents include increasing acceptance for farmers' market vouchers, and in 2017 the Los Angeles City Council passed an ordinance that

required all certified farmers' markets that operated on City land to accept Electronic Benefit Transfer (EBT) cards, becoming the first large city in the U.S. to establish this requirement (Council of the City of Los Angeles, 2017a; Los Angeles Food Policy Council, 2017b). The ordinance helped increase EBT acceptance rate from 38% in 2013 to 96% in 2017 (Los Angeles Food Policy Council, n.d.-a). Several farmers' markets in the City also offer Market Match, a program that matches EBT dollars spent at the market and thereby further increasing access for low-income shoppers. However, Market Match only exists at 39% of farmers' markets county wide; this program should be funded and expanded to many additional markets similar to the increase for EBT (Los Angeles Food Policy Council, n.d.-a). As a first step, Market Match could be prioritized or required at all farmers' markets in or near underserved neighborhoods. Furthermore, support for additional farmers' markets could benefit more communities in Los Angeles; the Plan for a Healthy Los Angeles includes the goal of increasing the number of Angelenos living within one mile of a farmers market, and strategies including expedited permitting of markets, prioritizing markets in underserved neighborhoods, and holding markets in a range of locations and times (Los Angeles Department of City Planning, 2015). Micro markets or pop-up markets in underserved areas that could facilitate the sale and distribution of neighborhood UA sites in addition to sales at larger, more established markets; these smaller sites could be set up to accept all forms of social benefits and strategically located in areas that currently do not have a nearby established farmers' market. With an expansion in UA sites, there could be UA-focused markets on a neighborhood level for produce grown in the neighborhood, for the neighborhood.

Creating a way to distinguish urban farmers and their products could help increase visibility, demand, and sales, and a UA label could even potentially be applied to the entire UA movement. Even when urban farmers and gardeners are able to sell at a farmers' market, they are in competition with the other vendors who typically farm in peri-urban or rural areas that can

more readily benefit from economies of scale. This can make it difficult for the urban farmer or gardener to compete on price-point alone, as they may often be undersold by their competitors. Researchers who interviewed urban farmers in Los Angeles County noted that the term “local” lacks a definition and its wide usage in food retail and markets is a disadvantage to urban farmers since there is not a separate label for UA (Jackson et al., 2013). A potential solution to this would be a unique “hyper-local” branding of UA products to distinguish them from their competitors and help support their sales. A certified “Grown in LA” label or similar branding could increase visibility and help establish a customer base at farmers’ markets and through other direct sales. Some urban farmers have creatively pursued their own branding strategies. One example is Farm LA, a non-profit that creates “mini farms” on parkways in food desert neighborhoods; the organization specializes in growing lima beans and sells their lima bean kits and other Farm LA merchandise with their heart-shaped logo at the Altadena Farmers Market and a few other locations (“Farm LA,” n.d.). An example of a citywide practice is Minneapolis, which has branded its entire local food movement under the umbrella slogan “Homegrown Minneapolis” (City of Minneapolis, 2016).

Connecting to Neighborhood Markets

Los Angeles has many neighborhood markets that distribute food on a community level with relatively small volumes of inventory and might be able to incorporate UA products. While many neighborhood markets in Los Angeles currently lack affordable healthy options including fresh produce, efforts are underway to increase produce options and sales in these stores. The LAFPC Healthy Neighborhood Market Network (HNMN) is a program that works with the owners of corner stores and neighborhood markets in underserved communities to help them offer healthy food options including fruits and vegetables. The HNMN defines neighborhood markets as a category of small convenience and grocery retailers that employ one to five employees. In 2017, the program worked with 68 small businesses and 28 of them increased

produce and other healthy product options and made changes to the store layout to promote healthy purchases (Los Angeles Food Policy Council, 2017a). This program could work with local urban farmers and gardeners to help directly source vegetables and other products to neighborhood markets at a scale that could reasonably met by local UA sites. The UA products could be labeled in a creative way to encourage purchasing of community-grown products in community-run neighborhood markets; this effort could be similar to or compatible with a UA labeling effort farmers' markets such as "Grown in LA" mentioned in the previous section. This effort aligns with the LAFPC recommendation for businesses to provide in-store marketing of Good Food options, which could include UA products.

A unique benefit of UA is its ability to produce specialty produce and other products that are not sold in large grocery stores and can be grown specifically for community culture and preferences. In some cases, UA may be able to provide culturally-appropriate foods for communities that may otherwise be unable to afford or grow these items. UA connections to local neighborhood markets and stores could specifically aim to make this connection. In some cases the connection already exists: Stanford Avalon Community Garden, the largest in the city, sells directly to local ethnic stores in its low-income neighborhood. In a recent survey of regional for-profit urban farmers, researchers found an increasing production of specialty and ethnic crops including nopales (young cactus pads) and a variety of herbs and plants used in Latino, Asian, and other ethnic stores and restaurants (Merchant et al., 2016). The connection of specialty and culture-specific UA products could be supported by facilitating relationships with local market and restaurant owners who would be interested in featuring these products and enhancing neighborhood identity and pride.

Connecting to Mobile Food

There is opportunity for UA efforts to participate in and partner with the extensive mobile food vending in Los Angeles, especially if strategic regulations help prioritize healthy, local food. Mobile markets and vendors including trucks, carts, and other vehicles already exist in many neighborhoods in Los Angeles, and could be partners in the distribution and sale of fresh, local produce instead of sourcing from locations farther away. While it is unclear if this type of UA distribution is occurring in Los Angeles yet, the City has an estimated 1,000 traditional food trucks that sell a range of food items and could potentially incorporate produce from UA production (Los Angeles Food Policy Council, 2013). Until 2017, the City of Los Angeles was the only major U.S. city in which all street vending was illegal despite having approximately 50,000 street vendors including an estimated 12,000 who sell food; the City is now in the process of creating a permitting program for vendors (Los Angeles Food Policy Council, n.d.-c). The permitting program could be an opportunity for the City to include strategies that support produce and other healthy food options in underserved communities. Regulatory strategies include prioritization of healthy food vendors through permit allocations, subsidized permitting fees, and preferential locations; these strategies have been successfully implemented by the New York City Green Carts program (Tester, Stevens, Yen, & Laraia, 2010). The LA Street Vendor Campaign recommends incentivizing healthy food vendors through reduced or waived permit fees, technical assistance, priority at City-sponsored events, and Healthy Food Vending Areas (Los Angeles Street Vendor Campaign, n.d.). Mobile vendors could also be encouraged or required to accept EBT, similar to the ordinance that requires EBT at all farmers markets in Los Angeles. An additional regulatory option could be to give priority permitting to vendors who include locally grown produce including from UA operations. In San Francisco, the vendor permitting included requests for specialty food carts, and priority foods included those that are “grown or produced locally” among other criteria (Tester et al., 2010).

Connecting to Food Banks

To better connect to and provide for the food insecure population in Los Angeles, UA sites could be encouraged and incentivized to donate a portion of their production to local food banks, homeless shelters, and other emergency food programs. An effort to connect UA and food banks aligns with the recent trend of food bank efforts to improve the nutritional quality of their distributions by including more fresh produce (McEntee & Naumova, 2012; Ross, Campbell, & Webb, 2013). The Los Angeles Regional Food Bank, the largest in the region with over 600 partner agencies, identifies nutrition as one of its priorities and states that 20% of its food distribution is fruits and vegetables (Los Angeles Regional Food Bank, n.d.). In addition to providing encouragement and making connections between socially enterprising UA operations and food banks, the City could provide a financial incentive for UA donations to food banks that could have a broader impact on increasing local produce donations. For example, Washington, D.C. passed an Urban Farming and Food Security Act that provides a tax credit up to $2,500 for city-grown UA food that is donated to a food bank or shelter (Dillemuth, 2017a).

In addition to encouraging UA food donations, a unique strategy to facilitate UA connections to addressing food insecurity is a “farm to food bank” model in which existing or new UA sites could be strategically paired with food banks and other emergency food operations and shelters. For example, the Incredible Edible Farm in Irvine, California (about 44 miles southeast of downtown LA) produces food exclusively for the Second Harvest Food Bank of Orange County, Inc. and helps to feed approximately 200,000 people each month. The five acre farm was the result of a unique public-private partnership with the City of Irvine and other partners to provide free land and water. The farm also relies on a rotating roster of 6,000 volunteers, alleviating the financial burden and allowing the farm more freedom it its operations (Second Harvest Food Bank of Orange County, 2016). Another example is in Bell, California (about nine miles southeast of downtown LA) where the non-profit GrowGood, Inc. has partnered with the

Salvation Army Bell Homeless Shelter (one of the largest shelters on the West Coast) to create a 1.5 acre biodynamic farm across the street from the shelter. This farm produces about half of the produce used in the shelter kitchen (over 7,000 pounds) and provides job training, life skills classes, and therapy for up to 500 shelter residents (GrowGood, 2016). The effort to expand UA could identify similar opportunities to connect with the emergency food system in Los Angeles, including the 600+ partner agencies that work with the Los Angeles Regional Food Bank.

Scaling Up: An Urban Agriculture Food Hub

Not all UA operations have the goal of selling their products for profit, but those that do are confronted with a number of challenges in Los Angeles. In interviews with urban farmers in Los Angeles County, Jackson et al. found that difficulties included a perception that urban farms are unreliable in consistently meeting volumes needed for direct sales, limited resources for advertising, higher prices relative to larger rural farms, and lacking a convenient mechanism to sell products (Jackson et al., 2013). An overarching challenge for UA operations connecting to the local food system is a lack of a distribution and aggregation infrastructure. UA operations are commonly resource-limited, and farmers and gardeners have few options to participate in a larger distribution network or opportunities to scale their operations.

One potential solution to the challenges of distribution and scaling is the concept of a food hub. The idea of a hub network is especially relevant for Los Angeles because of the city's sprawling size; a network of neighborhood hubs would potentially help increase access to UA resources and infrastructure on a neighborhood level. A regional food hub idea has been presented and explored by the LAFPC starting in its 2010 Good Food for All Agenda and recommended in several subsequent strategic priorities (Los Angeles Food Policy Task Force, 2010). A regional food hub is "a business or organization that actively manages the aggregation, distribution, and marketing of source-identified food products primarily from local and regional producers to

strengthen their ability to satisfy wholesale, retail, and institutional demand" (Barham et al., 2012). A food hub could facilitate aggregation, marketing, and distribution opportunity including the creation of new jobs and business; small farmers and gardeners could more readily scale up their production, aggregate product with other UA operations, and more easily create value-added products to reach larger and more diverse markets (Dillemuth, 2017b). Presently, the concept of a regional food hub is probably too large-scale for UA activity and would need to also source from nearby farms in Los Angeles County or other foodshed counties. However, smaller neighborhood hubs could be established in communities throughout Los Angeles specifically to help UA farmers and gardeners, and start to create city-grown products that reach consumers beyond those who are already interested direct UA sales. When located in underserved communities, food hubs can help create infrastructure and jobs as well as generate healthy food products for the community; the local food hub could even supply neighborhood institutions with neighborhood-grown food. A food hub concept could start by identifying any community processing and storage spaces such as commercial and community kitchens, and making these spaces available to urban farmers; these spaces could eventually be expanded to include additional infrastructure. The 2017 Good Food for All Agenda includes the strategy of building more multi-tenant processing, distribution, and kitchen facilities accessible to small farms. Local government, LAFPC, and community organizations could work with local urban farmers to help pilot a UA food hub concept including permitting, financing, and technical assistance. A supported pilot project in one community could provide valuable lessons for the establishment of a hub network, which has been proposed by the LAFPC but has not yet been realized.

In addition to a food hub network, UA sites in Los Angeles could benefit from increased coordination and networking as a city community. A networking approach could help integrate UA into other larger city patterns and movements, provide mutual support across the network, and ultimately create a more resilient UA system (Matthew, 2017). The Good Food for All

Agenda calls for a UA network to better connect with the local food system including urban farmers, backyard growers, and school gardens. Urban farmers and gardeners could benefit from sharing of information and best practices, resources, and partnerships in a burgeoning industry that is spread over a large geographic area. UA expansion in Los Angeles could be more efficient if it were approached as a network of sites rather than singular neighborhood efforts, and in doing so overcome geographic barriers to create an identity as a Los Angeles Urban Agriculture Network. A network approach would allow for other distribution strategies such as community supported agriculture (CSA) programs that could source from multiple sites to fulfill subscriptions and orders of fresh produce. A coordinated network could include larger UA sites supporting smaller surrounding sites by sharing of resources and knowledge and potentially aggregating production. This could benefit communities that may have fewer resources to start or maintain a new UA project.

CONCLUSIONS

Los Angeles has been behind the national curve in municipal policy and planning, and despite having made a substantial amount of progress in support of UA in recent years, much more could be done. Important advances have included the founding of the Los Angeles Food Policy Council in 2011 and its Urban Agriculture Working Group that has acted as the regional coordinator for UA efforts. However, the City could benefit from a city UA coordinator to facilitate important functions such as implementing City policies and plans. In 2015 two different city plans included UA and specifically prioritized underserved communities, and the LAFPC Good Food for All Agenda in 2017 included additional specific strategies. However, a comprehensive UA plan for the city could help elevate UA as a top municipal priority. While some zoning codes have been updated, additional definitions and clarification of uses would be helpful. The City is behind on creating a much-needed land inventory, and could be doing more to steward various types of land in the city. The City also should implement a public land leasing program that

prioritizes low income communities, identify partnerships for UA at public institutions, and incentivize UA in new city development projects including rooftop UA. The Urban Agriculture Incentive Zones Program is a good start but may not be able to realize its potential; it is also a missed opportunity to prioritize underserved communities. The City has several options to offset water rate increases, and could effectively subsidize water for all UA operations. Accessible education and training is needed for new urban farmers and gardeners. Several opportunities exist for UA to connect to the local food system, but there is no distribution or aggregation infrastructure in place to facilitate market access beyond direct to consumer strategies such as farmers markets.

The potential for UA has yet to be realized in Los Angeles. Many policy, planning, and practice efforts have been developed and implemented in other North American cities, most of which do not have the moderate weather and year-round growing potential of Southern California. While Los Angeles has made substantial progress in recent years, and even leads in a few specific areas, there are several areas that are lacking and many opportunities for further support and expansion of UA (**Table 4.6**). In summary, my key recommendations for supporting UA in the City of Los Angeles include:

1. Create a city position or task force dedicated to UA expansion, likely with the Los Angeles Department of Recreation and Parks, and a City website of UA resources;
2. Create a comprehensive topical urban agriculture plan for the City;
3. Update zoning codes to clearly define and permit UA activities and processes;
4. Conduct a land inventory and create an updated, accessible database of potential vacant parcels that could be candidates for UA development;
5. Expand protection and stewardship of urban land for UA through land banking and support for community land trusts;

6. Expand access to City-owned public land through a public land leasing process that prioritizes underserved communities;
7. Include UA in city development processes including a green roofs program;
8. Improve the Urban Agriculture Incentive Zones Program to better prioritize underserved communities;
9. Improve access to the municipal water supply through subsidizing water and expanding the City's lower cost water schedule;
10. Expand opportunities for UA education and training in the City through partnerships with UC Cooperative Extension, colleges and universities, and other stakeholders;
11. Facilitate connections to the local food system including farmers markets, neighborhood markets, mobile food, and food banks;
12. Establish an Urban Agriculture Food Hub to network and aggregate resources and scale UA distribution to connect to the local food system, and approach UA expansion as a city network.

To translate these recommendations into policies and programs, the recommendations could be efficiently presented to municipal policymakers (e.g., the Los Angeles City Council) and other stakeholders in Los Angeles. A presentation to the Los Angeles Food Policy Council Urban Agriculture Working Group would help generate support among UA leaders and practitioners and could help strategize policy advocacy efforts. Additional presentations and discussions could help increase interest and support through local conferences and symposia, stakeholder meetings and workshops (e.g., Los Angeles County Department of Public Health), foundations (e.g., California Endowment), and nonprofits (e.g., Los Angeles Neighborhood Land Trust). A policy brief on UA in Los Angeles could also be a helpful way to succinctly disseminate key recommendations to a general audience. UA policy could even be drafted based on best practices from other cities and experience of UA experts in Los Angeles. Finally, applying for

funding for specific policy priorities (e.g., urban agriculture food hub) could help establish pilot programs and inspire additional efforts to support UA through policy and programming.

Table 4.1. Municipal policies, plans, and reports related to urban agriculture from 2010-2017 in the City of Los Angeles.

Year	Policy, plan, or report	Description
2010 (Jun)	City Ordinance No. 181188 Farming and Truck Gardening or "Food & Flowers Freedom Act"	Clarified municipal zoning codes that permit farming and truck gardening in the City including adding fruits and flowers the definitions. Both farming and truck gardening were defined as "the cultivation of berries, flowers, fruits, grains herbs, mushrooms, nuts, ornamental plants, seedlings or vegetables." The difference is whether produce can be sold on site (farming) or off site (farming and truck gardening).
2010 (Jul)	Good Food for All Agenda	The Los Angeles Food Policy Task Force created a framework with recommendations and action steps to build a Good Food System that is healthy, affordable, fair, and sustainable. The Agenda recommends the creations of a Food Policy Council. Priority Action Area 5 is Grow Good Food in Our Neighborhoods and it includes five specific action steps to support local efforts to grow and sell food.
2010 (Dec)	City Council Motion for Report (expired) Gardening Fees and Available Spaces on Public Land	Motion for reports on 1) avoiding increasing gardening fees on city land; 2) informing nonprofits which City owned properties were available for gardening space; and 3) installing rain barrels at all City community gardens.
2011 (Jan)	Founding of the Los Angeles Food Policy Council (LAFPC)	LAFPC was created by Mayor Antonio Villaraigosa; it now consists of a 10-person staff, 40-member board, and 6-8 working groups including the Urban Agriculture Working Group.
2011 (Dec)	City Council Resolution Support of Local Food Systems	City's position of support for legislation and initiatives to 1) rebuild local and regional food infrastructure; 2) support small and midsize producers by ensuring they are fairly compensated by buyers; 3) promote sustainable and urban agriculture; and 4) increase access to healthy food for all.
2013 (May)	City Council Motion for Report (expired) Rooftop Garden Program	Motion to prepare a report with recommendations on how to implement a Rooftop Garden Program that includes land use incentives to projects in the city if they include rooftop green spaces, and the feasibility of an ordinance.
2013 (Jun)	Cultivate Los Angeles: An Assessment of Urban Agriculture in Los Angeles County	An extensive report from a research group at UC Los Angeles that included an effort to identify urban farms, community gardens, school gardens, and nurseries in Los Angeles County. Also included an effort to assess the municipal zoning codes in the County's 88 cities.
2013 (Oct)	City Council Resolution Urban Agriculture and National Food Day	Celebration of the City's support for urban agriculture and its strong commitment to ensuring a strong and sustainable local food system; declares October 23rd as National Food Day in the City of Los Angeles.
2013 (Oct)	City Council Motion for Report (expired)	Motion to request a report to assess whether reduced water rate in Los Angeles Department of Water and Power (LADWP) Schedule F, which currently applies to

Year	Policy, plan, or report	Description
	Expanding LADWP Schedule F Water Rate to Additional Public Gardens	community gardens on public land, could be extended to food production gardens on public housing developments, schools, and nonprofit sites not currently included.
2013 (Oct)	LAFPC Food System Snapshot	Report included a long-term objective to increase urban agriculture with county baseline data from Cultivate LA and other sources. Also includes a long-term objective to increase access to healthy food in underserved neighborhoods, including increasing the number of farmers markets.
2015 (Jan)	Assembly Bill 1990 Community Food Production	Los Angeles County Department of Public Health implemented AB 1990 which includes a process to register as a Community Food Producers or Gleaner, allowing the sale and distribution of whole uncut fruits and vegetables, or unrefrigerated shell eggs, directly to the public or restaurants, if specific requirements are met.
2015 (Mar)	Ordinance No. 183474 Edible Parkways	Amended the municipal code to allow edible plant material to be grown on parkways in residential zones and updated the Residential Parkway Landscaping Guidelines.
2015 (Mar)	Plan for a Healthy Los Angeles	The Los Angeles City Council adopted the Health and Wellness Element of the Los Angeles General Plan. It includes a chapter titled “Food that Nourishes the Body, Soul, and Environment” with several urban agriculture objectives.
2015 (Apr)	Sustainable City pLAn	The Mayor’s office released its first sustainability report includes several specific objectives for food and urban agriculture under its Environmental Justice and Urban Ecosystem chapters. One objective to increase the overall number of urban agriculture sites references the Cultivate LA report as a baseline.
2015 (Oct)	Ordinance No. 183920 Backyard Beekeeping	Amended municipal code and established new regulations for backyard beekeeping (beekeeping in single-family residential zones) including registering with the County Agricultural Commission and maintaining spacing requirements.
2016 (Mar)	Ordinance No. 184130 Water Rate Increases	Approved Los Angeles Department of Water and Power water rate increases for municipal water users from 2016-2020. Schedule F, a lower rate for public irrigation that includes public community gardens, will nearly triple by 2020.
2016 (Apr)	Ordinance No. 2016-0023 Urban Agriculture Incentive Zones (Los Angeles County)	The LA County Board of Supervisors passed an ordinance to implement AB 551 Urban Agriculture Incentive Zones Act, which allows UAIZs to be established in unincorporated areas and allows cities to also implement the Act. AB 551 provides a tax incentive for private landowners to lease their vacant land for urban agriculture use for a minimum of five years. The County allocated $3

Year	Policy, plan, or report	Description
		million and established a maximum of $15,000 tax incentive per site per year.
2016 (Apr)	Ordinance No. 184250 Emergency Water Conservation Plan	Created The Emergency Water Conservation Plan of the City of Los Angeles. Implemented restrictions on how Los Angeles Department of Water and Power (LADWP) customers can use water. The restrictions do not apply to "drip irrigation supplying water to a food source or to hand-held hose watering of vegetation, if the hose is equipped with a self-closing water shutoff device."
	Cultivate Los Angeles (Update)	The 2013 count of four types of UA sites was updated in 2016 and added to the website interactive map in early 2017. Additional map functionality was also added. The update showed increases in the number of community gardens, farms, and nurseries, and a decrease in the number of school gardens.
2017 (Jan)	Ordinance No. 184719 EBT at Farmers Markets	Added a new subsection to the municipal code to require Electronic Benefit Transfer (EBT) Card (CalFresh) acceptance at all certified farmers' markets operating on City-owned land.
2017 (Mar)	Sustainable City pLAn 2nd Annual Report	Updated the original report including progress on objectives. Reported two UA objectives are achieved, and another is on track to be achieved. Other UA objectives are not mentioned.
2017 (Jun)	Ordinance No. 185022 Urban Agriculture Incentive Zones (City of Los Angeles)	The City Council voted to implement the "City of Los Angeles City Urban Agriculture Incentive Zone (UAIZ) Program" in accordance with State Assembly Bill 551 and County Ordinance 2016-0023. The provisions are the same as the County ordinance. The initial application period was August through October 2017. LAFPC coordinates outreach and matchmaking for the program.
2017 (Aug)	LAFPC Food System Dashboard	LAFPC updated and expanded its 2013 Food System Snapshot and created an online dashboard to evaluate progress in achieving a Good Food System. One of the topic areas in urban agriculture, and quantitative and qualitative data is included.
2017 (Nov)	LAFPC Good Food for All Agenda (Update)	The Los Angeles Food Policy Council (LAFPC) updated the original 2010 Agenda to help guide priorities for various food system stakeholders from 2017 to 2023. The Agenda includes several urban agriculture strategies under the priority area Strengthen Environmental Resiliency and Regeneration as well as in other areas of the Agenda.

Table 4.2. Summary of existing policy and planning goals, strategies, and objectives related to urban agriculture in the City of Los Angeles.

General Goals	Specific Strategies	Specific Objectives
<u>Sustainable City pLAn, 2015</u> • Eliminate food deserts, prioritizing residents in underserved communities • Expand access to urban agriculture and community gardens (x2) <u>Plan for a Healthy Los Angeles, 2015</u> • Encourage and preserve land for urban agriculture in the city to ensure a long-term supply of locally produced healthy food, promote resiliency, green spaces, and healthy food access • Increase the number of urban agriculture sites including but not limited to: community gardens, parkway gardens, urban farms, and rooftop gardens in low-income and underserved areas • Promote the development of a local food system and industry that will increase access to affordable and fresh food in underserved communities, create jobs and economic opportunities, attract tourism, and reduce distribution costs and pollution associated with transporting food over long distances	*Access to Growing Spaces* <u>Sustainable City pLAn, 2015</u> • Expand urban agriculture in the City's federally designated Promise Zone (x2) • Pass legislation allowing for and encouraging urban agriculture in open space (e.g., medians, vacant lots, etc.) (*achieved*) • Provide access to land at LA City facilities, including the LA Public Library, to urban agriculture • Convert parkways and open lots to agriculture and gardening • Encourage urban farming through the use of yard space for urban gardens and a pilot hydroponics/aquaponics program <u>Plan for a Healthy Los Angeles, 2015</u> • Make information on vacant land parcels widely available • Streamline permitting and public land leases for urban agriculture <u>Good Food for All Agenda, 2017</u> • Increase access to land for urban agriculture by securing suitable parcels and promoting programs like Urban Agriculture Incentive Zones • Create joint-use policies at school gardens, libraries, and parks for urban farms, compost	<u>Sustainable City pLAn, 2015</u> • Ensure all low-income Angelenos live within ½ mile of fresh food by 2035; Baseline: 414,384 residents without grocery retail within ½ mile from USDA Food Research Atlas (*on track*) • Increase the number of urban agriculture sites in LA from the 2013 baseline by at least 25% by 2025 and 50% by 2035; Baseline: 494 UA sites within the city in 2013 from Cultivate LA • Require all city farmers' markets to accept CalFresh EBT; Baseline: not included in plan (*achieved*) <u>Plan for a Healthy Los Angeles, 2015</u> • Increase the number of community gardens so that every Community Plan Area has at least one community garden (one acre) per 2,500 households; Baseline: not included in plan

General Goals	Specific Strategies	Specific Objectives
• Promote targeted efforts to increase access to farmers markets in neighborhoods that have reduced access to healthy, affordable food • Foster and promote local initiatives and partnerships that empower, educate, and train Angelenos to grow and eat healthy food <u>Good Food for All Agenda, 2017</u> • Grow Good Food in our neighborhoods • Encourage food sovereignty and local control of food • Build food and organic waste recycling infrastructure • Develop zoning and policies that grow the Good Food Economy • Support small, local, early-stage Good Food entrepreneurs • Invest in infrastructure that encourages a Good Food Supply • Create economic incentives for healthy food consumption • Promote Good Food at retail and community institutions	hubs, and other activities supporting Good Food production • Streamline permitting and leases for community gardens and urban farms on both public and private land. Remove barriers to accessing land, for example by expanding the Urban Agriculture Incentive Zones to more cities in LA County • Establish clear guidelines and encourage food growing in public housing • Develop land-use strategies and incentives that support smart growth, preserve farming in the region, and protect urban farming locally • Encourage first “right-of-refusal” option for tenant farmers who wish to buy their farm when the land owner decides to sell • Support community ownership of food production resources through land trusts and cooperatives *Connecting to the local food system* <u>Plan for a Healthy Los Angeles, 2015</u> • Encourage strategic partnerships between local UA hubs, grocery stores, corner neighborhood markets, restaurants, governmental institutions, community organizations, and farmers markets to increase the capacity of a local, sustainable food system • Create an innovative food cluster that spans UA, food hub and artisanal processing, and social enterprise	

General Goals	Specific Strategies	Specific Objectives
	• Increase the number of Angelenos who live within one mile of farmers markets • Farmers' markets operating on public land should be required to accept CalFresh EBT • Increase the number of farmers markets that participate in Market Match in the City • Facilitate and expedite the permitting process for holding a farmers market on private or public land • Encourage farmers' markets to be held in a range of times and locations (schools, senior centers, parks, transit hubs, neighborhood centers) that are accessible to broad variety of residents • Marketing and educational campaigns targeted at increasing food growing and healthy eating <u>Good Food for All Agenda, 2017</u> • Establish a network of urban farmers, backyard growers, and school gardens to connect with retail and procurement opportunities at farmers' markets, healthy food retailers, community institutions, and local restaurants • Establish new zoning and permitting categories for innovative food production activities and enterprises (e.g. growing and/or selling food in shipping containers, hydroponics, aquaponics, mixed use food growing and processing, etc.) • Build more multi-tenant processing, distribution, and kitchen facilities accessible	

General Goals	Specific Strategies	Specific Objectives
	to small, mid-size, and start-up farm and food businesses • Grow Market Match and other voucher programs to increase fresh fruit and vegetable purchases by SNAP participants at farmers' markets, healthy neighborhood markets, grocery stores, community supported agriculture (CSAs), and pop-up markets • Increase involvement of impacted communities in defining food access need and measures of success to inform evaluation and funding for healthy food projects • Launch a public awareness campaign on healthy food consumption that would educate the public on healthy diets, eating locally and seasonally, and how to cook Good Food	
	Supporting Resources <u>Sustainable City pLAn, 2015</u> • Encourage urban farming through the City's compost giveaway and distribution program <u>Plan for a Healthy Los Angeles, 2015</u> • Disseminate information about funding and programs that promote soil and water safety • Appoint a city urban agriculture liaison <u>Good Food for All Agenda, 2017</u> • Mitigate negative impacts of increased water rates on low-income growers by offering rebates on water-saving technology, such as drip irrigation	

General Goals	Specific Strategies	Specific Objectives
	• Encourage seed saving and the establishment of seed banks and libraries • Increase flexible, character-based loan/financing opportunities for entrepreneurs bringing Good Food to underserved communities • Expand community compost hubs so that neighborhoods can compost food scraps at community gardens, schools, churches, or other neighborhood places	

Table 4.3. Comparison of goals, objectives, and strategies in the three selected UA-relevant city planning documents: the Sustainable City pLAn, the Plan for a Healthy Los Angeles, and the Good Food for All Agenda

Plan	**General Goals**	**Specific Objectives**	**Specific Strategies for Access to Growing Spaces**	**Specific Strategies for Connecting to Local Food Systems**	**Specific Strategies for Providing Supporting Resources**	**Specific Mentions of Equity in Goals, Objectives, and Strategies**
Sustainable City pLAn, 2015 (SCP)	2	3	5	0	1	3
Plan for a Healthy Los Angeles, 2015 (PHLA)	5	1	2	8	2	4
Good Food for All Agenda, 2017 (GFAA)	8	0	7	6	4	3
Total	**15**	**4**	**14**	**14**	**7**	**10**

Table 4.4. Summary of selected public and private land areas and points that have either existing or potential urban agriculture activity in the City of Los Angeles

Resource	Total Count	Total Area (Acres)	Percent of Total City Land Area	Additional Information/Examples
Parks (<14 acres)	359 (285)	19,899 (731)	6.63% (0.24%)	Most land area in Santa Monica Mountains and unlikely to allow UA activity; 14 acre threshold used to identify urban parks in this study (average area = 2.56 acres) (Chapter 3)
Public Schools	533-581*	4,554	1.52%	Approximately 16-20% have gardens
Golf Courses & Country Clubs	31-33*	3,883	1.29%	At least half are public; at least two country clubs have productive urban farms
Colleges & Universities	90	1,941	0.65%	Land area estimate only includes 16 campuses; several campuses have UA activities including gardens, hydroponics, orchards, and farmers markets
Private & Charter Schools	451-638*	1,264	0.42%	Approximately 16-20% have gardens
Recreation Centers	103-151*	783	0.26%	
Churches	843	N/A	N/A	Some have gardens; the Episcopal Archdiocese of Los Angeles has a network of 80 growing sites and 100 distribution sites
Food Assistance	167	N/A	N/A	Some overlap with churches; mix of nonprofit and faith-based charitable organizations
Public Housing	120	N/A	N/A	Housing Authority of the City of Los Angeles (HACLA) has 15 housing sites with approximately 6,000 residents, and recently created gardening guidelines
Libraries	82	N/A	N/A	Identified by LAFPC as potential garden sites
Total	2,848†	13,156	4.39%	

*range of site counts due to discrepancy between publicly available data sources
†averages used for sites with ranges

Table 4.5. Water use categories and cost for water purchased from the Los Angeles Department of Water and Power (LDWP) relative to the costs of California agriculture water in 2018

Water Use Category	**2018 Cost (dollars per hundred cubic feet)**	**Multiples of agriculture water rate**
Agriculture (Estimated Average of California Central Valley)	$0.092	
LADWP Schedule F (Public Irrigation including Community Gardens)	$3.50, $8.18 (two tiers)	38x, 89x
LADWP Schedule C (Commercial, Industrial, Government, Temporary Construction)	$5.30, $8.95 (two tiers)	58x, 97x
LADWP Schedule A (Residential Single-Dwelling Unit)	$6.20, $8.36, $9.48, $9.82 (four tiers)	67x, 91x, 103x, 107x
LADWP Schedule B (Residential Multi-Dwelling Unit)	$6.30, $9.86 (two tiers)	68x, 107x

Table 4.6. Summary of policy, planning, and practice progress related to urban agriculture in the City of Los Angeles

	Leading	**Progress**	**Opportunities**
Coordination	Los Angeles Food Policy Council (LAFPC) Urban Agriculture Working Group		City sponsored UA coordinator/liaison and UA program
Planning	Equity focus in planning documents	• Sustainable City pLAn, 2015 • Plan for a Healthy Los Angeles, 2015 • Good Food for All Agenda, 2017	Comprehensive Los Angeles Urban Agriculture Plan
Zoning		• Food & Flowers Freedom Act (ordinance) • Backyard Beekeeping (ordinance) • Edible Parkways (ordinance)	• Definitions of UA and categories of UA • Clearly defined zoning for each use • Distinguishing between permitted and conditional uses • Overlay zones
Public land access		Some community gardens operate on City-owned land and open to public	• Inventory of all City-owned land and identification of UA siting potential • Public land leasing program • Land banking and protection • Integrating UA into city development (e.g., green roofs)
Incentivizing private land access	Urban Agriculture Incentive Zones (UAIZ) Program (ordinance)		• Processes to ensure equitable access
Supporting resources		• Public irrigation water rate applies to public community gardens • UCCE online information, workshops	• Need to offset water rate increases • Other options to subsidize water for UA • Need to offer UA education and training
Connections to the local food system	Requirement for all farmers' markets to accept EBT (ordinance)	Market Match voucher program	• Opportunities for networking, produce aggregation, and

	Leading	Progress	Opportunities
		Potential connections: • Healthy Neighborhood Market Network (HNMN) • Healthy mobile food permitting	food processing infrastructure such as food hubs • UA marketing and branding
Data and evaluation		• LAFPC Food System Dashboard • Cultivate LA	• Lack of information and analysis on status of existing UA sites and evaluation of individual and community-level impacts • Lack of site suitability analysis

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CHAPTER 5: OVERARCHING CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

INTRODUCTION

Food insecurity remains a persistent problem in the United States and in Los Angeles, and several emerging areas of study and intervention are being pursued to determine the most effective strategies that go beyond traditional federal food assistance and emergency food programs. The goal of this dissertation was to investigate several of these emerging areas of inquiry and practice, including a previously overlooked population that experiences a high prevalence of food insecurity (college students) and an increasingly promoted community food security approach (urban agriculture) in the City of Los Angeles.

In **Chapter 2**, I report on a study in which students at the University of California, Los Angeles were interviewed in focus groups to better understand experiences, perceptions, attitudes, and ideas around student food insecurity. Themes that emerged included: food insecurity as an invisible issue on campus that carries stigma and shame; high cost of attendance and inadequate financial aid; consequences including poor diet, stress, physical health impacts, missing out on college experiences, and poor academic performance; and coping strategies, including buying cheap food, working jobs, asking friends for help or using the campus food pantry. Broader themes around the role of the university included the need to improve the campus food environment, provide life skills training, and holistically address students' basic needs, including food.

Chapter 3 provides as assessment of the potential for urban agriculture (UA) to meet the vegetable needs of the City of Los Angeles. Specifically, this chapter provides and analysis of

(1) the theoretical vegetable production for vacant land in the City of Los Angeles under different production and consumption scenarios and (2) the geospatial distribution of urban agriculture (UA) sites (urban farms, community gardens, and farmers markets) and vacant land in the City of Los Angeles. This analysis reveals that only a small percentage of the population vegetable need could theoretically be met if all vacant land was dedicated to urban agriculture. However, the entire need of the food insecure population could potentially be met. This assessment also reveals that existing UA sites and vacant land are not evenly distributed across the city, that many food desert census tracts are within 0.5 miles of a UA site, and that about one-quarter of vacant land in the City of Los Angeles would be eligible for a property tax break under a recent UA incentive program.

Chapter 4 provides a review of the urban agriculture (UA) policy, planning, and practice environment in the City of Los Angeles and evaluates recent progress, as well as conducts analysis for several policy areas including land use. This review identifies best practices from other leading U.S. cities and provides specific recommendations for how the City might better support UA. These recommendations include: creating a UA coordinator and comprehensive UA plan, implementing a land inventory and a public land leasing program, subsidizing water rates, and generally prioritizing underserved communities through UA policy, planning, and practice.

STUDENT FOOD INSECURITY: OVERARCHING CONCLUSIONS FROM FOCUS GROUPS AT UCLA

This study presented in **Chapter 2** was one of the first efforts to collect, analyze, and publish qualitative data on college student food insecurity. Food insecurity appears to be a fairly common but seldom acknowledged experience among college students at UCLA. Students who were interviewed were highly aware of socioeconomic inequality among their peers, and many

students had either experienced food insecurity or knew of peers who had experienced food insecurity. However, students reported that struggles like food insecurity were not openly acknowledged and discussed, although most students stated they would like opportunities to have discussions about these struggles. A general consensus was that a greater awareness of student struggles would be helpful, as would more information about resources that are available for struggling students.

The high cost of attendance is a challenge for many students at UCLA, including the high cost of living on and near campus – students reported that campus food options, especially healthy options, were too expensive. Many students do not feel like their financial aid adequately covers the actual cost of living, causing them to prioritize food last to make ends meet. Many students stated that they lived on the edge of food or housing insecurity, as they did not have the resources to absorb unexpected costs such as a medical bill. This indicates that even students who would not necessarily be classified as food insecure in a survey module may be at risk of food insecurity.

The experience of food insecurity appears to cause additional stress for already-stressed students, resulting in negative impacts on academic performance and for some students, mental and physical health consequences. It was clear that students who are struggling are missing out on extracurricular opportunities that other students benefit from, such as socialization in dining halls. A particularly concerning finding was the normalization of food insecurity as part of the college experience. Some students find themselves in the difficult position of willing to make sacrifices such as food and other expenses to ensure that they can stay in college, but they are incurring additional costs of academic performance and, in some cases, physical and mental health.

Students in general are reluctant to ask for help with food struggles, but appear willing to rely on friends before seeking any university assistance. Many students generally were unaware or confused about the university resources available to students in need of food assistance, but students who had experienced food insecurity were generally aware of the university food pantry. There was a high level of interest in receiving life skills training including budgeting and cooking. An overarching idea generated from the focus groups was to provide life skills training at on-campus residence halls. However, at the time of this study, most residence halls at UCLA lacked accessible kitchen facilities for students.

It was clear that the experience of food insecurity negatively impacted students' sense of belonging at the university, and in some cases students felt that their struggles were disregarded by the university. Overall, students could benefit from increased transparency and communication around university resources as well as university efforts to ensure student basic needs. Fortunately, both UCLA and the University of California are responding to students' needs through the creation of task forces and funding specifically to assist students in need and identify best practices (UC Office of the President, 2017b).

STUDENT FOOD INSECURITY: SUBSEQUENT WORK IN HIGHER EDUCATION

Since the data collection and analysis for this chapter was conducted in 2016, the study of student food insecurity on college campuses in the U.S. has rapidly expanded. The number of peer-reviewed studies has tripled from five to 15 studies, and a systematic review was published in 2017. The methods of the new studies remain similar to previous ones. Typically, survey instruments are used to obtain cross-sectional data of a segment of a student population to determine the prevalence of food insecurity and associated risk factors. However, sample sizes are becoming larger and sampling and analysis is becoming more sophisticated, including more questions and analyses of the academic and health consequences of experiencing food

insecurity. The studies have continued to consistently establish that the prevalence of food insecurity is much higher among college students compared to the general population (12%) (Coleman-Jensen et al., 2017). In a 2017 review of food insecurity among college students, the range of student food insecurity in the nine U.S. peer-reviewed studies was found to be 14%-59%, with an average of 33% (Bruening, Argo, Payne-Sturges, & Laska, 2017). Since then, five additional peer-reviewed studies have reported food insecurity among college students that are between 28%-43% with an average of 38% (Bruening, van Woerden, Todd, & Laska, 2018; Hagedorn & Olfert, 2018; Knol, Robb, McKinley, & Wood, 2017; Miles, McBeath, Brockett, & Sorenson, 2017; Mirabitur, Peterson, Rathz, Matlen, & Kasper, 2016; Payne-Sturges, Tjaden, Caldeira, Vincent, & Arria, 2018). The overall results consistently show that the prevalence of food insecurity among college students is, on average, approximately three times greater than that of the general population. The peer-reviewed literature continues to show that food insecurity is higher among students of color, students receiving financial aid, students living independently from parents, younger students, and students with children (Bruening et al., 2017). Several studies have also linked student food insecurity to adverse health behaviors and outcomes including skipping meals or cutting meal size, lower fruit and vegetable intake, fewer healthy eating or exercise habits, poor/fair self-reported health, experiencing stress, and experiencing depression (Bruening et al., 2018; Hagedorn & Olfert, 2018; Knol et al., 2017; Mirabitur et al., 2016; Payne-Sturges et al., 2018). Nearly all studies published to date have reported that the student experience of food insecurity has negative academic consequences for college students.

Since the study for **Chapter 2** was conducted, there also has been one additional qualitative study published in the peer-reviewed literature. In this study, the author interviewed 27 food insecure students and conducted five focus group interviews with food secure at the University of North Texas (Henry, 2017). The Texas study found themes that largely corroborated the

findings reported in **Chapter 2**, as well as some additional insights. Themes that were consistent across both studies included stigma and shame, reluctance to seek assistance, reliance on financial aid, prioritization of other expenses before food, impacts on concentration and academic performance, missing out on college extracurricular activities, and willingness to sacrifice for the opportunity to earn a college degree. Both studies found that students with food insecurity coped by choosing cheaper food options and sharing food resources with peers, and reported potential solutions that included awareness of the issue, food pantries, food recovery, meal vouchers, and meal plan modifications. However, the Texas study found new themes including the solution of work-for-food programs and the coping mechanism of excessive fluid intake. In addition, the study emphasized the idea of "tipping points" in which students experience events such as loss of employment that prevent them from being able to adequately manage their resources (Henry, 2017). The Texas study also highlighted that strategies to help address student food insecurity should be discreet and confidential.

Since the study in **Chapter 2** was published, studies of student food insecurity have also increased in the gray literature. These include many additional theses and reports on the topic, which are too numerous to summarize here. The gray literature reflects a growing trend of studying student "basic needs insecurity", which typically includes both food insecurity and housing insecurity. The latter is defined as housing challenges such as the inability to pay rent or utilities or the need to move frequently (Sara Goldrick-Rab, Richardson, & Hernandez, 2017). The most comprehensive reports in the gray literature (and largest surveys of student basic needs insecurity in the U.S.) have been conducted by the Wisconsin HOPE Lab at the University of Wisconsin-Madison. In 2016, the HOPE Lab expanded its original 2015 study of 4,000 community college students at 10 community colleges in seven states to a sample of over 33,000 students at 70 community colleges in 24 states. The results of this study revealed that about 56% of community college students had experienced food insecurity, and students at

higher risk included former foster youth, students with children, independent students (not receiving financial assistance from parents), and Pell Grant eligible students. In addition, community colleges with lower costs of attendance and higher proportions of students of color had a higher prevalence of food insecurity (Sara Goldrick-Rab et al., 2017). The HOPE Lab expanded its efforts even further the following year to a survey of 43,000 students at 66 at community colleges and four-year universities in 20 states (by far the largest study to date). This study revealed that 36% of university students and 42% of community college students had experienced food insecurity in the past 30 days. The report indicated that food insecurity is higher among former foster youth, female and LGBTQ students, students of color, students receiving Pell Grants, students living off campus, and students working longer hours at their job. Students who experience basic needs insecurity report similar levels of commitment to college compared to their secure peers, but they typically receive lower grades (Goldrick-rab, Richardson, Schneider, Hernandez, & Cady, 2018).

Since our work was initiated, the University of California (UC) has started to systematically study student basic needs insecurity and include basic needs questions in its institutional surveys. In 2016, the UC Student Food Access and Security Study (FASS) (the first effort to assess student food insecurity in the UC) found that 48% of undergraduate students and 25% of graduate students had experienced food insecurity across the 10 campus system (an overall prevalence of 42%) (Martinez et al., 2016). An important insight from this study was that most students were new to food insecurity: 57% of food insecure students reported they had not experienced food insecurity as children (Martinez et al., 2016). In addition, the UC has incorporated a two-question food insecurity module into its major institutional surveys including the UC Undergraduate Experience Survey (UCUES) and the UC Graduate Student Well-Being Survey. The UC has also modified its question about food expenditures in the UC Cost of Attendance (COA) survey. The most recent UCUES from 2016 indicated a cumulative food insecurity

prevalence of 44% across all 10 campuses, and the prevalence found in the Graduate Student Survey was 26%. These results are similar to those reported in the 2016 UC FASS study (UC Office of the President, 2017a; University of California, 2016b). In addition, the UC COA survey indicated that student expenditures for weekly groceries and snacks increased 59% for off-campus students and 86% for commuter students compared to the previous survey three years earlier. The question has previously been asked for monthly expenses, and the new results suggest that this expenditure had been previously under-reported (University of California, 2017a). In December 2017, the UC created its first comprehensive report on student food and housing security to summarize and report on the most recent surveys and studies, as well as strategies to address basic needs insecurity (UC Office of the President, 2017b).

The results from the different UC surveys are largely consistent with both the peer-reviewed and gray literature including finding a higher prevalence of food insecurity among students of color, LGBTQ students, independent students, low socioeconomic status students, former foster care youth, and students with less economic stability. However, a difference between the UC surveys and the literature was the UC finding that older undergraduate students and transfer students are more likely to experience food insecurity compared to younger or freshman students (UC Office of the President, 2017b). A strength of the UC data and reporting is the full consideration of graduate students, who experience food insecurity less frequently than undergraduates but still at more than twice the prevalence of the general population. Risk factors for graduate students are overall similar to those for undergraduate students. In addition, there is a higher prevalence of food insecurity among academic master's and doctoral students who have not advanced to candidacy (compared to professional students and doctoral candidates, respectively). Food insecurity is also higher among graduate students in the humanities and social sciences compared to STEM and professional students (UC Office of the President, 2017a).

STUDENT FOOD INSECURITY: RECOMMENDATIONS FOR FUTURE RESEARCH

Although the effort better understand and address student food insecurity has grown immensely over the past few years, there is a need for additional research that expands upon the methods and themes explained in **Chapter 2**. The study reported in **Chapter 2** used purposive sampling to conduct focus group interviews with a broad range of students that approximated the student body, including two focus groups exclusively with students who had experienced food insecurity. Additional research could specifically recruit and interview students who had experienced food insecurity to allow for a more in-depth exploration of the experience of student food insecurity. In addition to focus groups interviews, individual semi-structured interviews would help add depth and richness to qualitative data collection among students and more fully capture student experiences; an individual interviewing approach was combined with focus groups in a subsequently published peer-reviewed study (Henry, 2017). Individual interviews could also further exploration of sensitive topics that would be less likely to be discussed in a group setting. For instance, consistent with efforts across the UC system and national surveys by the Wisconsin HOPE Lab, interview topics and questions could be expanded to include basic needs insecurity by asking students about housing insecurity and homelessness. This would help to provide a more comprehensive understanding of struggling college students and help inform holistic approaches to supporting these students.

Since virtually all existing studies of student food insecurity and basic needs insecurity rely on surveys, there is a need for additional qualitative efforts to help provide student perspectives and insights, and add context to survey efforts. After completing the focus groups for this study, I was able to help inform similar qualitative efforts on other UC campuses including UC Irvine, UC Riverside, and UC Berkeley. In the case of the UC Irvine effort, I helped with their study design, data analysis, and reporting. In general, studies taking place at the campus or multi-campus level could benefit from including more mixed method approaches, such as combining

survey results with focus group interviews or individual interviews. In addition to adding depth to survey reporting, qualitative data could also help better inform survey questions.

The study reported in **Chapter 2** included a short survey at the start of each focus group to both assess food insecurity using a validated survey instrument, as well as explore additional questions related to food access and food literacy. This helped the study by (1) ensuring that there was a baseline of information for each participant (as participation inevitably varies in a group setting); (2) gaining demographic information and food security status that was used to compare the focus group sample population to the campus population; and (3) allowing access to information that students may not have been comfortable sharing in the group setting.

Additional research is also needed to evaluate specific interventions to address student food insecurity ranging from short-term strategies (e.g., food pantries) to longer term strategies (e.g., enrollment in federal food assistance programs). Program evaluation efforts could include participation data, surveys, and interviews to assess whether interventions were helping students avoid or lessen food insecurity, and if students perceive these strategies to be helpful. Some evaluation efforts are underway at campus food pantries in the UC system, such as tracking student IDs for each pantry visit. All UC campuses are implementing efforts to increase and track student enrollment in CalFresh, which will provide additional data that is comparable across campuses. However, it would be helpful to also implement student interviews to help answer questions about (1) the process of enrollment, including obstacles; (2) the level of benefits and whether they are perceived as adequate; (3) the duration of benefits (e.g., whether students only needed assistance to get through a difficult period of the year or if they were utilized for longer durations); and (4) student perspectives on how receiving benefits impacted their overall well-being including academic success. In addition, there is currently no research on whether skills-based assistance is helpful for students who have experienced food insecurity

even though many students in the study for this chapter identified that they would like the university to provide opportunities to learn life skills including cooking and budgeting. Such studies would help inform institutions how to better equip students to allocate their resources effectively and prevent struggles with basic need insecurity.

Another area of inquiry for understanding student food insecurity that would be beneficial is related to how food assistance programs can be integrated with other campus services, such as financial aid and student health. Combining quantitative student financial information with utilization of food assistance programs would help provide a more complete picture of student financial struggles. Food insecurity has also been linked to adverse mental health outcomes, including stress and depression (Bruening, Brennhofer, van Woerden, Todd, & Laska, 2016; Payne-Sturges et al., 2018). Student health and mental health services could include a food insecurity screener as part of their intake process to yield a better understanding of the student patient population and help identify students who should be referred to campus food resources. Efforts to study integration of campus services could also include interviews of campus faculty and staff who assist students. Such studies would add helpful insights into the delivery of student services, including what is currently considered best practices among campus services providers. For example, the priorities and perceptions of students and staff may not align, and these gaps in service could be better identified and ameliorated with input from across campus.

Ultimately, a longitudinal study design would be most helpful to providing a better understanding of the student experience of food insecurity. This is critical because student food insecurity is often periodic or cyclical. Such as study would also provide key insights into the effectiveness of interventions over time. Students could be enrolled at the beginning of an academic quarter, academic year, or when they register their first year and then followed through a variety of methods including surveys. One recent study at the University of Arizona was the first effort to

study student food insecurity over time, administering a survey for on-campus freshman students at four points over a year. This study revealed an increase in food insecurity at the end of academic terms (Bruening et al., 2018). This finding is consistent with qualitative data reported in **Chapter 2** that indicated that students were more likely to struggle to afford food at the end of academic terms and during academic breaks. Additional longitudinal studies are needed to better assess college student food insecurity and develop more effective interventions.

URBAN AGRICULTURE IN LOS ANGELES: OVERARCHING CONCLUSIONS FROM GEOSPATIAL ANALYSIS

Assessment of urban agriculture (UA) potential in Los Angeles is still in early stages, and the study reported in **Chapter 3** was the second effort to study UA in the region. In many ways, this study was the first to comprehensively assess UA in the City of Los Angeles including (1) calculating production potential; (2) spatially analyzing the location of three types of UA sites including their spatial relationship to food deserts and highest need areas; and (3) determining the potential for a recently implemented Urban Agriculture Incentive Zones Program. The calculated production potentials revealed that even if all vacant land in the city was converted to UA, this would only provide a portion of the city's vegetable need. However, the theoretical production could provide more than enough to meet the vegetable need of the city's food insecure population, which supports the idea that strategic implementation and distribution of UA could benefit high need areas of the city and potentially improve community food security.

Like many other resources, UA sites are disproportionately distributed across the City of Los Angeles. When adjusting for population, there are also fewer UA sites in the urban core compared to communities on the perimeter and coastal areas of the city. Compared to the city's stated community garden objective to have one garden per 2,500 housing units, there are very

few community gardens in the city when normalized by population or housing unit. Hot spots of UA activity relative to population at the neighborhood level include clusters in the West, Southeast, Downtown, and North of Downtown; cold spots include the San Fernando Valley. The main theme that emerged from this analysis is that both the dense urban core and the San Fernando Valley are both currently underserved by UA relative to the rest of the city, and should be prioritized for UA expansion.

UA sites are underrepresented in city food deserts where residents lack access to grocery stores. Furthermore, UA sites in food deserts and high need areas are more likely to be community gardens (as opposed to urban farms or farmers markets) than in other areas of the city. However, a promising finding is that about two-thirds of the populations living in food deserts and/or the top 15% highest need areas live within 0.5 miles of a UA site. This indicates that a substantial amount of "geographic need" for access to fresh food in the City of Los Angeles could potentially be alleviated by UA, and that UA could become an important food source in these communities. In addition, this analysis revealed several "non-alleviated" areas that are high need but not within 0.5 miles of a UA site have a number of vacant land parcels, suggesting that these prioritizing these areas for UA development could be an effective strategy.

As with existing UA sites, most vacant land parcels in the City of Los Angeles are distributed unevenly, and there is far more vacant land in the periphery of the city. The vast majority of vacant parcels are small, an average of about a third of an acre. Approximately one half of vacant parcels and one quarter of vacant land meet the area criteria for the city's recently implemented Urban Agriculture Incentive Zones (UAIZ) Program, and most of these sites would receive a tax break based on current property tax rates. The average UAIZ site would receive an annual tax break of about $1,700 or a 90% savings. A small percentage of these UAIZ-eligible sites of located in highest need areas and they are smaller than average area, and

about one third of these are in non-alleviated areas (lacking UA sites). South Los Angeles has about 4.5 times less UAIZ eligible vacant land than the city average. If all of the potential UAIZ funding was utilized in Los Angeles, it would roughly double the number of UA sites and increase growing sites (farms and community gardens) by about 150%. However, even if all vacant land was utilized for UA in highest need areas, it would only supply a small percentage of the population vegetable need. Nonetheless UA could provide enough for tens of thousands of people, or many more people if vegetables were supplementing and not replacing need. Collectively, the analysis illustrates that there may be opportunities for strategic UA development in some of the city's most underserved neighborhoods.

URBAN AGRICULTURE IN LOS ANGELES: OVERARCHING CONCLUSIONS FROM POLICY ANALYSIS

While Los Angeles is behind other cities in its support of UA, it has made substantial progress in the past 10 years including the establishment of the Los Angeles Food Policy Council, development of planning documents, updates to zoning, and the implementation of an Urban Agriculture Incentive Zones (UAIZ) Program. **Chapter 4** identified key areas where the city has made progress as well as recommendations for additional actions and priorities. The City currently lacks a dedicated UA coordination, comprehensive city UA plan, and resources to fully prioritize and support UA growth throughout the city.

The City is generally behind its own land use goals as well as land use strategies being implemented in other U.S. cities. The City has made a few recent zoning updates, but additional clarification and amendments could further assist UA expansion. A land inventory and public land leasing program are among the most needed, but missing, strategies to help increase land availability for UA. The City also has many opportunities to integrate UA within its spaces and development including requiring, incentivizing, and otherwise encouraging UA at a number of

public spaces and private projects. The City also has several options to assist UA water access; at the very least, it can subsidize water rates for low-income community gardeners, but can really improve access for all UA sites in the city. Opportunities for UA education are generally lacking in the city, although support is slowly increasing in this area.

Although there are many different economic strategies in planning documents in the City of Los Angeles, there is currently no infrastructure for UA distribution or aggregation that would better connect UA to the local food system in Los Angeles. A coordinated city UA network, perhaps including UA-specific food hubs, could help strategically scale UA across the sprawling City of Los Angeles. If UA was increased, several potential connections exist including neighborhood markets and mobile food, the latter of which is about to be permitted across the city. Overall, the UA movement is in need of its own “Grown in LA” brand to distinguish urban farmers and gardeners and generate recognition and pride for growing food in a region that historically produced more food than anywhere else in the U.S.

URBAN AGRICULTURE IN LOS ANGELES: RECOMMENDATIONS FOR FUTURE RESEARCH

UA research in Los Angeles is still in its early stages and very little data exists on the extent of UA activity, presenting many opportunities to expand future research. The only prior source of UA data is from the 2013 Cultivate LA project that included a count of four types of UA sites in Los Angeles County including urban farms, community gardens, school garden, and nurseries (Jackson et al., 2013). A strength of the Cultivate LA project is a public online map tool that allows easy identification of all identified UA sites (University of California Los Angeles & University of California Cooperative Extension, n.d.). **Chapter 3** utilized the data from this project on urban farms and community gardens. However, this data was limited to site locations and much more data could be collected to help better understand UA in Los Angeles.

The overarching need for UA research, policy, and practice is a coordinated data collection effort for both existing UA sites and potential UA site locations. Ideally, a city- or region-specific data collection framework could be created with stakeholder input such as through the Los Angeles Food Policy Council Urban Agriculture Working Group (**Table 5.1**). Such a framework could include several data categories that would be helpful to begin to establish a database of the extent of UA activity in Los Angeles. This framework could be widely disseminated to identified UA sites as an online toolkit, and urban farmers and gardeners could input available data over time. A preliminary effort to identify data-collecting UA sites in Los Angeles (data not presented here) revealed only a few in the entire region, and data from these sites were utilized for production calculations provided in **Chapter 3**. Among many other research benefits, the collection of site-specific data would allow for regional yields to be established to help better inform theoretical UA production, as was described in **Chapter 3**. While extensive data is also generally not available in other U.S. cities, there is typically more than currently exists in Los Angeles including acres of municipal land being utilized for UA. This is likely in part due to the fact that other cities are much smaller and have more coordinated UA efforts.

Two notable best practice examples exist for UA data collection: one started in New York and one on an urban farm in Los Angeles County. The New York City Community Garden Coalition sponsored the creation of Farming Concrete, an “open, community-based research project to measure how much food is grown in community gardens and urban farms” (Farming Concrete, n.d.-b). The Farming Concrete project includes a downloadable toolkit, videos, and an online data collection platform that has expanded to include UA sites across the U.S. and the world. Currently, the website lists 378 gardens collecting data across 76 cities worldwide (Farming Concrete, n.d.-a). The preliminary data collection framework in **Table 5.1** was modeled after the Farming Concrete Toolkit, including topic areas of food production, environment, social, and

economic data. UA sites in Los Angeles could participate in the Farming Concrete global UA data collection effort and/or create a database specifically for the city. Although UA sites in Los Angeles are generally not tracking data, a coordinated UA effort that included promotion of a data collection platform could start to increase the number of sites participating in data collection. The best local example of a data collection effort is The Growing Club / Sarvodaya Farms, which was included in **Chapter 4** for its urban farmer training program. This farming operation, located in Pomona, California, currently tracks many of its activities including resource use and production, and makes some of its data available on its website (The Growing Club, n.d.-b). To help other small urban farmers manage their operations, Sarvodaya has developed an online spreadsheet tool called “Farmzio” that is available on its website (The Growing Club, n.d.-a). Although Farmzio is specifically built for farmers, if widely utilized the data collection could help inform UA research in the Los Angeles region.

In addition to efforts to collect data on existing UA sites, future studies could expand on the preliminary vacant land inventory included in **Chapter 3** to better identify potential UA sites across the City of Los Angeles. Several other studies in the U.S. have conducted geospatial analyses of UA potential with more sophisticated methods that could be employed in an expanded study of Los Angeles, specifically including the use of remote sensing imagery (Kremer & DeLiberty, 2011; McClintock et al., 2013; Richardson & Moskal, 2016; Saha & Eckelman, 2017). The use of remote sensing would allow for additional screening of vacant land area and other areas such as grassland and rooftops. As stated in **Chapter 4**, various site suitability criteria could be used in a land inventory analysis including land area, slope, water access, tree cover and shading/access to sunlight, impervious surfaces, soil type and quality, land use conflicts, proximity to pollution sources, and proximity to community amenities (e.g., transit stops/routes) (Ackerman, 2012; Eanes & Ventura, 2015; Saha & Eckelman, 2017; Wooten & Ackerman, 2012). Including some or all of these criteria would help refine the process

of identifying land that would be most suitable for UA. For many of these sites, further ground truthing efforts would be required to determine site suitability in person. Overall, additional analysis of potential UA locations would help better inform the expansion of UA in Los Angeles, as well as help the City with a much-needed land inventory effort.

Qualitative and mixed-methods approaches would also help provide a better understanding the current extent and impact of UA in Los Angeles. One option would be to sample a small number of UA sites for follow up interviews in coordination with a data collection framework mentioned previously. UA farmers and gardeners could be strategically sampled for interviews based on use of best practices, presence in underserved communities, participation in local markets, and other criteria. In particular, UA sites in underserved communities including food deserts should be a focus of investigation. In **Chapter 3**, I identified that these sites may be important food sources based on their geographic distribution in high need areas. Future study of UA sites located in food deserts in Los Angeles could help determine to what extent UA is contributing to community food distribution and security. It would be important to explore if residents from the community are participating in UA sites and if the food produced at these UA sites stays the community. Questions for urban farmers and gardeners could include motivations, goals, challenges, lessons learned, resource use and need, and other topics that would not fit into a survey data collection framework mentioned previously. Importantly, interviews could help determine the extent of community impact including how produce is distributed, who participates in UA activities, neighborhood perceptions of the UA site, and produce consumption among other areas of inquiry. To begin this work, I conducted preliminary interviews with UA practitioners and content experts in Los Angeles. A key preliminary finding was that UA efforts in Los Angeles are primarily motivated by social causes including community building and empowerment, education and skill development, and connection to nature and the food system (results not presented herein).

More extensive UA research efforts could investigate how participation in urban farms and gardens contributes to individual and community health behaviors. Prior research on the health benefits of UA generally shows positive benefits but it is limited. This research has primarily focused on school gardens and was not specific to Los Angeles (Alaimo et al., 2008; McCormack et al., 2010; Robinson-O'Brien et al., 2009). Longitudinal studies could track behaviors including overall vegetable consumption, trying and consuming new vegetables, cooking, exercise habits, as well as knowledge and skills. Health outcomes could be assessed including self-reported health status, body mass index, and disease diagnoses. Ideally, future study designs would include control groups to better assess the impact of UA participation vs. non-participation. A local example of well-designed garden-based research is LA Sprouts, a 12-week nutrition, cooking, and gardening trial among predominantly Latino elementary school students; the randomized controlled trials of this program have shown that it increases healthy behaviors and outcomes among students including improved identification of vegetables, greater nutrition and garden knowledge, and higher likelihood to garden at home (Davis, Martinez, Spruijt-Metz, & Gatto, 2016). Similar approaches to the LA Sprouts program could be applied to urban farmers and gardeners. For example, waiting lists for community gardens could be used to recruit participants and then following up with them periodically once they have a garden plot to measure effects before and after participation in gardening.

Ideally, future UA studies in Los Angeles should be collaborative and include many different stakeholders to help guide research priorities and processes so that they can benefit the communities with the greatest need. Researchers from New York City recommend three collaborative approaches including (1) involvement of stakeholders to develop research questions; (2) working across government, nonprofit, and academic sectors to design research processes that are relevant to city mandates; and (3) conducting participatory action research

that involves community members (Cohen & Reynolds, 2014). This dissertation was an initial effort to work towards the first two of these collaborative approaches, primarily through coordination with The Los Angeles Food Policy Council Urban Agriculture Working Group that is comprised of local UA stakeholders. Future research could build on this initial effort to continue investigating UA, including implementing many of the recommendations mentioned previously. While the potential benefits of UA are currently far from realized, there are opportunities for strategic and collaborative research that can contribute to the growth of UA in Los Angeles.

Table 5.1. Preliminary data collection framework for urban agriculture sites in the City of Los Angeles

Data Category and Description	**Data Types and Examples**
General Site Data	
Name, address, hours, contact	
Category of UA site	Include list of possible categories; nonprofit or for profit
Primary motivation(s)	Descriptive (e.g., profit, community benefit, healthy eating, land stewardship, training, etc.)
Total land area, total land area under cultivation	Acres and square feet, number of plots
Land tenure	Descriptive (ownership, length of lease, etc.)
Growing methods	Descriptive (in ground, raised beds, greenhouse, hydroponics, aquaculture, etc.)
Production Data	
Crop categories	List of crops and count
Non-crop categories (e.g., animals, beekeeping, aquaculture, etc.)	List of categories/animals and count
Yield	Pounds per square foot by crop type; any animal products such as eggs
Environmental Data	
Irrigation methods	Descriptive (hose, drip irrigation, micro sprinklers, timers, etc.)
Water consumption	Measured (sub meter) or estimated (e.g., water bills) in gallons or hundred cubic feet
Composting	Pounds of food waste and organic waste composted, pounds of compost produced
Other conservation efforts	Descriptive (rainwater harvesting, tree planting, land remediation, etc.)
Social Data	
Employees and volunteers	Full time, part time, work and volunteer hours
Visitation	Visitor logs
Programming (training, workshops, cooking classes, educational tours, etc.)	Program participation and evaluation
Economic Data	
Distribution strategies	Descriptive (gardeners, farmers markets, CSA, restaurants, neighborhood market, etc.)
Market sales	Sales in dollars
Food donations	Receiving agencies, pounds of food

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APPENDIX A: SUPPORTING INFORMATION FOR CHAPTER 2

Table A.1. Focus group questions used to guide discussions with students about food literacy and food insecurity at UCLA

Food Literacy
• Where do you usually eat or get food? • What is most important to you when deciding what and where to eat? • Now that you're a UCLA student, how are your food choices different than they were growing up? • Over the course of your life, how have you learned about food and nutrition? • Can you think of any examples of when you've gotten mixed messages about food? • What do you think about receiving training or education around food as a UCLA student? • What would it mean for someone to be food literate? • Would you consider yourself to be food literate? Why or why not?
Food Security
• Please describe what you know about student food insecurity at UCLA. • Why do you think some students are food insecure at UCLA? Please feel free to share your personal experiences or experiences of your peers. • How does the cost of living, including tuition, housing and meal plan, supplies, etc., impact your access to food? • If you receive financial aid, how does this impact your access to food? • If you or another student you know has experienced food insecurity, how were you or someone you know affected? • Do you know about any campus resources available to UCLA students in need of food? • What are some solutions that could be implemented at UCLA to help overcome student food insecurity?

APPENDIX B: SUPPORTING INFORMATION FOR CHAPTER 3

Table B.1. Summary of data sources for geospatial analysis

Name	Type of Data	Data Source
Urban Farms	Points	UC Cooperative Extension
Community Gardens	Points	UC Cooperative Extension
Farmers Markets	Points	USDA National Farmers Market Directory
California County Boundaries	Polygons	Los Angeles County GIS Data Portal
Southern California Association of Governments (SCAG) City Boundaries	Polygons	Los Angeles County GIS Data Portal
City of Los Angeles Community Plan Areas (CPAs)	Polygons	Los Angeles County GIS Data Portal
U.S. Census Tracts (2010)	Polygons	Los Angeles County GIS Data Portal
City of Los Angeles Federally Designated Promise Zone (2009)	Polygon	Los Angeles County GIS Data Portal
City of Los Angeles Land Uses (parks, natural areas, airports, golf courses)	Polygons	Los Angeles County GIS Data Portal
Half Mile Food Deserts (Low Income, Low Access Census Tracts) (2010)	Polygons	USDA Food Access Research Atlas
City of Los Angeles Land Parcels (2016)	Polygons	Los Angeles County Assessor
City of Los Angeles Land Values (2017)	Numerical	Los Angeles County Assessor
City of Los Angeles Community Plan Area population (2009)	Numerical	Los Angeles Department of City Planning
City of Los Angeles Community Plan Area housing units (2009)	Numerical	Los Angeles Department of City Planning

Table B.2. Indicators and data sources used in multi criteria analysis

Indicator	**Data Source**
Food Access	
Half mile food deserts (low income, low access)	U.S. Department of Agriculture
Population/Socioeconomic Status	
Estimated population density between 2012-2016	U.S. Census
Estimated percent of all people that are living in poverty as of 2012-2016	U.S. Census
Estimated typical (median) household income 2012-2016	U.S. Census
Estimated percent of housing units for which no vehicles are available in 2012-2016	U.S. Census
Estimated percent of all families receiving SNAP benefits 2012-2016	U.S. Census
Health Status	
Estimated percent of adults reporting to be obese (BMI>30) in 2013	CDC Behavioral Risk Factor Surveillance System
Estimated percent of adults ever diagnosed with diabetes in 2013	CDC Behavioral Risk Factor Surveillance System
Estimated percent of adults reporting fair or poor health in the past 30 days in 2013	CDC Behavioral Risk Factor Surveillance System
Estimated percent of adults reporting to eat <1 serving of fruit/vegetable per day in 2013	CDC Behavioral Risk Factor Surveillance System

Table B.3. Community Plan Areas by type and number of urban agriculture sites in the City of Los Angeles

Rank	Community Plan Area	Community Gardens	Farmers Markets	Farms	Total UA Sites
1	Southeast Los Angeles	9	3	1	13
2	Northeast Los Angeles	5	4	3	12
3	Hollywood	6	4	1	11
	South Los Angeles	4	2	5	11
4	Central City	0	6	1	7
	Silver Lake - Echo Park - Elysian Valley	4	2	1	7
	West Adams - Baldwin Hills - Leimert	3	4	0	7
	Westchester - Playa del Rey	3	3	1	7
	Wilshire	4	3	0	7
5	Mission Hills - Panorama City - North Hills	2	1	3	6
	Palms - Mar Vista - Del Rey	2	2	2	6
	Reseda - West Van Nuys	2	1	3	6
	San Pedro	3	2	1	6
	Venice	4	1	1	6
6	Boyle Heights	4	1	0	5
	Canoga Park - Winnetka - Woodland Hills - West Hills	2	3	0	5
7	Chatsworth - Porter Ranch	1	1	2	**4 (Average)**
	Westlake	4	0	0	**4 (Average)**
8	Arleta - Pacoima	2	0	1	3

Rank	Community Plan Area	Community Gardens	Farmers Markets	Farms	Total UA Sites
	Sunland - Tujunga - Lake View Terrace - Shadow Hills - East La Tuna Canyon	1	1	1	3
	West Los Angeles	0	2	1	3
	Wilmington - Harbor City	1	2	0	3
9	Brentwood - Pacific Palisades	0	2	0	2
	Encino - Tarzana	1	0	1	2
	Granada Hills - Knollwood	1	0	1	2
	Harbor Gateway	1	0	1	2
	North Hollywood - Valley Village	1	1	0	2
	Sherman Oaks - Studio City - Toluca Lake - Cahuenga Pass	0	2	0	2
	Van Nuys - North Sherman Oaks	0	2	0	2
	Westwood	0	2	0	2
10	Central City North	0	1	0	1
	Northridge	0	1	0	1
	Sylmar	1	0	0	1
11	Bel Air - Beverly Crest	0	0	0	0
	Sun Valley - La Tuna Canyon	0	0	0	0

Table B.4. Community Plan Areas in the City of Los Angeles ranked by number of urban agriculture sites per 10,000 population (largest number of urban agriculture to smallest)

Rank	Community Plan Area	Number of UA Sites per 10,000 Population*
1	Central City	2.01
2	Venice	1.42
3	Westchester - Playa del Rey	1.29
4	Silver Lake - Echo Park - Elysian Valley	0.85
5	San Pedro	0.74
6	Reseda - West Van Nuys	0.57
7	Boyle Heights	0.55
8	Palms - Mar Vista - Del Rey	0.49
9	Hollywood	0.48
10	Harbor Gateway	0.48
11	Sunland - Tujunga - Lake View Terrace - Shadow Hills - East La Tuna Canyon	0.48
12	Southeast Los Angeles	0.47
13	Northeast Los Angeles	0.46
14	Chatsworth - Porter Ranch	0.41
15	Mission Hills - Panorama City - North Hills	0.41
16	South Los Angeles	0.40
17	West Los Angeles	0.39
18	West Adams - Baldwin Hills - Leimert	0.38
19	Wilmington - Harbor City	0.38
20	Westwood	0.37
21	Brentwood - Pacific Palisades	0.34
22	Granada Hills - Knollwood	0.33
23	Westlake	0.33

Rank	Community Plan Area	Number of UA Sites per 10,000 Population*
24	Central City North	0.30
25	Arleta - Pacoima	0.29
26	Canoga Park - Winnetka - Woodland Hills - West Hills	0.27
27	Encino - Tarzana	0.27
28	Sherman Oaks - Studio City - Toluca Lake - Cahuenga Pass	0.25
29	Wilshire	0.22
30	Northridge	0.15
31	North Hollywood - Valley Village	0.14
32	Sylmar	0.13
33	Van Nuys - North Sherman Oaks	0.12
34	Bel Air - Beverly Crest	0
	Sun Valley - La Tuna Canyon	0

*average number of urban agriculture sites per 10,000

Table B.5. Community Plan Areas in the City of Los Angeles ranked by number of community gardens and community gardens per 2,500 housing units (ranked highest to lowest)

Rank	Community Plan Area	Community Gardens	Community Gardens per 2,500 Housing Units*
1	Venice	4	0.46
2	Boyle Heights	4	0.43
3	Silver Lake - Echo Park - Elysian Valley	4	0.33
	Southeast Los Angeles	9	0.33
4	Westchester - Playa Del Rey	3	0.32
5	Westlake	4	0.26
6	San Pedro	3	0.24
7	Arleta - Pacoima	2	0.22
8	Harbor Gateway	1	0.20
9	Northeast Los Angeles	5	0.16
10	Hollywood	6	0.14
	Reseda - West Van Nuys	2	0.14
11	Mission Hills - Panorama City - North Hills	2	0.13
12	Granada Hills - Knollwood	1	0.12
	South Los Angeles	4	0.12
	Sunland - Tujunga - Lake View Terrace - Shadow Hills - East La Tuna Canyon	1	0.12
	Sylmar	1	0.12
13	West Adams - Baldwin Hills - Leimert	3	0.11
	Wilmington - Harbor City	1	0.11
14	Palms - Mar Vista - Del Rey	2	0.09
15	Canoga Park - Winnetka - Woodland Hills - West Hills	2	0.08
	Chatsworth - Porter Ranch	1	0.08
	Encino - Tarzana	1	0.08

Rank	Community Plan Area	Community Gardens	Community Gardens per 2,500 Housing Units*
	Wilshire	4	0.08
16	North Hollywood - Valley Village	1	0.05
17	Bel Air - Beverly Crest	0	0
	Brentwood - Pacific Palisades	0	0
	Central City	0	0
	Central City North	0	0
	Northridge	0	0
	Sherman Oaks - Studio City - Toluca Lake - Cahuenga Pass	0	0
	Sun Valley - La Tuna Canyon	0	0
	Van Nuys - North Sherman Oaks	0	0
	West Los Angeles	0	0
	Westwood	0	0

*city average is 0.18 community gardens per 2,500 housing units

Table B.6. List of urban agriculture hot spots and cold spots (2 mi distance band) by Community Plan Areas in the City of Los Angeles

Community Plan Area (CPA)	**Portion of CPA Covered (if not entire CPA)**
Hot Spots (>50% CPA area significance)	
Silver Lake - Echo Park - Elysian Valley	
Central City	
Central City North	
Venice	
Westchester - Playa del Rey	
Hot Spots (<50% CPA area significance)	
Northeast Los Angeles	west corner
Palms - Mar Vista - Del Rey	western corner
South Los Angeles	northeast corner
Southeast Los Angeles	north corner, southeast corner
Cold Spots (*<50% of CPA area significance*)	
North Hollywood - Valley Village	northern half
Sun Valley - La Tuna Canyon	southern portion
Van Nuys - North Sherman Oaks	eastern portion

Table B.7. List of urban agriculture hot spots and cold spots (5 mi distance band) by Community Plan Areas in the City of Los Angeles

Community Plan Area (CPA)	**Portion of CPA Covered (if not entire CPA)**
Hot Spots (>50% CPA area significance)	
Boyle Heights	
Northeast Los Angeles	
Palms - Mar Vista - Del Rey	
Silver Lake - Echo Park - Elysian Valley	
Venice	
Westchester - Playa del Rey	
Westlake	
Hot Spots (<50% CPA area significance)	
Hollywood	eastern portion
Southeast Los Angeles	middle pocket
Wilshire	eastern portion
Cold Spots (>50% CPA area significance)	
Arleta - Pacoima	
Mission Hills - Panorama City - North Hills	
North Hollywood - Valley Village	
Sherman Oaks - Studio City - Toluca Lake - Cahuenga Pass	
Sun Valley - La Tuna Canyon	
Van Nuys - North Sherman Oaks	
Cold Spots (<50% CPA area significance)	
Encino - Tarzana	eastern portion
Granada Hills - Knollwood	southern and eastern pockets
Reseda - West Van Nuys	eastern corner
Sunland - Tujunga - Lake View Terrace - Shadow Hills - East La Tuna Canyon	western portion

Table B.8. Urban agriculture sites located in half mile food deserts† by Community Plan Areas in the City of Los Angeles

Community Plan Area (CPA)	**Urban Agriculture Sites Located in 0.5 mile Food Desert**
Community Gardens (19)	
Southeast Los Angeles (7)	Bougainvillea Community Garden
	Florence-Firestone Community Garden
	Fremont Wellness Center & Community Garden
	Greater Watts Community Garden
	Stanford Avalon Community Garden
	Vista Hermosa Gardens
	Willowbrook Community Garden
Northeast Los Angeles (3)	El Sereno Community Garden
	Glassell Park Community Garden
	Ramona Gardens Community Garden*
Silver Lake - Echo Park - Elysian Valley (3)	Elysian Valley Community Garden
	Jardín Del Rio
	Solano Canyon Community Garden
Arleta - Pacoima (2)	Fox & Laurel Park and Community Garden
	Project Youth Green
Boyle Heights	Proyecto Jardín
South Los Angeles	Epworth Community Garden
West Adams - Baldwin Hills - Leimert	Seeds of Carver Community Garden
Wilmington - Harbor City	Wilmington Community Garden
Farmers Markets (6)	
Boyle Heights (1)	Boyle Heights Farmers Market
Mission Hills - Panorama City - North Hills (1)	Kaiser Panorama City Farmers Market
Northridge (1)	CSUN Farmers Market

Community Plan Area (CPA)	**Urban Agriculture Sites Located in 0.5 mile Food Desert**
Van Nuys - North Sherman Oaks (1)	Van Nuys Farmers Market
West Adams - Baldwin Hills - Leimert (1)	Crenshaw Farmers Market
Wilmington - Harbor City (1)	Kaiser South Bay Farmers Market*
Farms (5)	
Chatsworth - Porter Ranch (1)	Harry's Honey
Harbor Gateway (1)	Environmental Arts
Reseda - West Van Nuys (1)	Roots Brothers Growers LLC
South Los Angeles (1)	Harvard Farms
Southeast Los Angeles (1)	Maria's Garden

†census tracts that are low income (poverty rate of 20% or greater) and low access (at least 33% of population is greater than 0.5 miles away from the nearest supermarket or large grocery store)
*site is also located in 1 mi food desert

Table B.9. Identities of the nine urban agriculture sites clustered in Southeast Los Angeles 0.5 mile food desert† (Watts Neighborhood)

Community Gardens (6)
Bougainvillea Community Garden
Florence-Firestone Community Garden
Greater Watts Community Garden
Stanford Avalon Community Garden
Vista Hermosa Gardens
Willowbrook Community Garden
Farmers Markets (2)
Los Angeles Mudtown Certified Farmers Market*
Watts Healthy Certified Farmers Market*
Farms (1)
Maria's Garden

†census tracts that are low income (poverty rate of 20% or greater) and low access (at least 33% of population is greater than 0.5 miles away from the nearest supermarket or large grocery store)
*site adjacent to, not fully within, 0.5 mi food desert census tracts

Table B.10. Identities of urban agriculture sites located in top 15% highest need areas† by Community Plan Areas in the City of Los Angeles

Community Plan Area (CPA)	**Urban Agriculture Sites Located in Top 15% Highest Need Areas**
Community Gardens (25)	
Southeast Los Angeles (9)	Avalon Gardens Public Housing Community Garden*
	Bougainvillea Community Garden
	Florence-Firestone Community Garden
	Fremont Wellness Center & Community Garden
	Greater Watts Community Garden
	Growing Great Dreams*
	Stanford Avalon Community Garden
	Vista Hermosa Gardens
	Willowbrook Community Garden
South Los Angeles (4)	Epworth Community Garden
	Erika J. Glazer Community Garden
	Magnolia Place Children's Bureau*
	Vermont Square Community Garden*
Westlake (3)	The Learning Garden*
	Unidad Park and Community Garden*
	Union Avenue/Cesar Chavez Community Garden*
Boyle Heights (2)	Proyecto Jardín
	Salesian Boys & Girls Club Community Garden*
Northeast Los Angeles (2)	Glassell Park Community Garden
	Ramona Gardens Community Garden
Hollywood (1)	East Hollywood Garden Achievement Center*
San Pedro (1)	Rancho San Pedro Community Garden*
Silver Lake - Echo Park - Elysian Valley (1)	Solano Canyon Community Garden

Community Plan Area (CPA)	**Urban Agriculture Sites Located in Top 15% Highest Need Areas**
West Adams - Baldwin Hills - Leimert (1)	Seeds of Carver Community Garden
Wilmington - Harbor City (1)	Wilmington Community Garden
Farmers Markets (14)	
Southeast Los Angeles (4)	Adams - Vermont Farmers Market*
	Central Avenue Farmers Market*
	Los Angeles Mudtown Farmers Market*
	Watts Healthy Farmers Market*
Central City (3)	Historic Downtown Farmers Market*
	The City Hall Farmers Market*
	The WALL Food + Flowers + Farmers Market*
Wilmington - Harbor City (2)	Kaiser South Bay Farmers Market
	Wilmington Farmers Market*
Boyle Heights (1)	Boyle Heights Farmers Market
Hollywood (1)	East Hollywood Farmers Market*
San Pedro (1)	San Pedro Farmers Market*
Van Nuys - North Sherman Oaks (1)	Van Nuys Farmers Market
West Adams - Baldwin Hills - Leimert (1)	Crenshaw Farmers Market
Farms (5)	
South Los Angeles (3)	Balanos Family Sprouts*
	Garden School Foundation*
	Harvard Farms
Central City	La Funghi*
Southeast Los Angeles	Maria's Garden

†census tracts that scored in the top four highest categories (out of 10) in the multi criteria analysis
*site not located in half mile food desert

Table B.11. Urban Agriculture Incentive Zone (UAIZ) eligible (0.1-3 acres) positive tax break parcel distribution by Community Plan Areas in the City of Los Angeles

Rank (Area)	Community Plan Area	UAIZ Eligible Positive Parcels	UAIZ Eligible Positive Parcel Area (Average Size in Acres)	UA Sites
1	Northeast Los Angeles	3,821	711 (0.19)	12
2	Sunland - Tujunga - Lake View Terrace - Shadow Hills - East La Tuna Canyon	845	370 (0.44)	3
3	Hollywood	1,550	350 (0.23)	11
4	Bel Air - Beverly Crest	827	304 (0.37)	0
5	Chatsworth - Porter Ranch	867	289 (0.33)	4
6	Sherman Oaks - Studio City - Toluca Lake - Cahuenga Pass	718	256 (0.36)	2
7	Canoga Park - Winnetka - Woodland Hills - West Hills	653	176 (0.27)	5
8	Wilmington - Harbor City	779	149 (0.19)	3
9	Brentwood - Pacific Palisades	350	147 (0.42)	2
10	Encino - Tarzana	203	114 (0.56)	2
11	Southeast Los Angeles	616	104 (0.17)	13
12	Sun Valley - La Tuna Canyon	228	104 (0.45)	0
13	Silver Lake - Echo Park - Elysian Valley	505	92.3 (0.18)	7
14	Sylmar	134	60.2 (0.45)	1
15	Granada Hills - Knollwood	93	57.1 (0.61)	2
16	South Los Angeles	302	55.0 (0.18)	11
17	Arleta - Pacoima	133	44.4 (0.33)	3
18	Mission Hills - Panorama City - North Hills	124	43.1 (0.35)	6
19	San Pedro	171	42.1 (0.25)	6

20	Reseda - West Van Nuys	101	36.5 (0.36)	6
21	Van Nuys - North Sherman Oaks	147	36.4 (0.25)	2
22	Boyle Heights	143	36.0 (0.25)	5
23	Wilshire	185	35.3 (0.19)	7
24	West Adams - Baldwin Hills - Leimert	153	34.0 (0.22)	7
25	North Hollywood - Valley Village	153	28.9 (0.19)	2
26	Westchester - Playa del Rey	74	27.2 (0.37)	7
27	Westlake	166	27.2 (0.16)	4
28	Harbor Gateway	56	26.2 (0.47)	2
29	Central City North	105	25.1 (0.24)	1
30	Central City	80	24.6 (0.31)	7
31	Palms - Mar Vista - Del Rey	96	22.7 (0.24)	6
32	Northridge	58	21.3 (0.37)	1
33	West Los Angeles	47	8.69 (0.18)	3
34	Venice	24	3.41 (0.14)	6
35	Westwood	9	2.56 (0.28)	2

Table B.12. Identities of the eight urban agriculture sites located in the Los Angeles Promise Zone

Community Gardens (5)
Fountain Community Garden
Mariposa Little Green Fingers Children's Garden
MC Francis Community Garden
Rosewood Gardens
Yamazaki Memorial Community Garden
Farmers Markets (3)
East Hollywood Farmers Market
Hollywood Farmers Market
Los Feliz Village Farmers Market

Table B.13. Summary of parks located in the Los Angeles Promise Zone

Small Parks (5)	**Area**
Lexington Avenue Pocket Park	0.17 acres
La Mirada Acquisition Site	0.17 acres
Seily Rodriguez Park	0.34 acres
Robert F. Kennedy Park	0.45 acres
Madison West Park	0.52 acres
Large Parks (3)	**Area**
Lafayette Park	10.4 acres
Barnsdall Park	14.5 acres
MacArthur Park	29.9 acres
Total Area	*56.6 acres*
Average Area	*5.66 acres*

Table B.14. Examples of vacant parcel and park areas that could be prioritized for urban agriculture expansion in the Los Angeles Promise Zone

UAIZ Positive Vacant Parcels
Parcel 5502-019-002 • One of only two vacant parcels located completely within a non-alleviated high need area • Area of 0.17 acres, potential tax savings of approximately $4,439 (99.4%)
Parcels 5534-014-021, 5534-011-020, 5545-014-024, 5545-014-025 • All four parcels in a highest need area • Parcels are at the 0.5 mi boundary of Fountain Community Garden • Combined area of 0.61 acres, combined savings of $30,937 (96%-99% savings)
Parcels 5537-025-008, 5536-026-007, 5537-015-030, 5537-010-022, 5544-037-033 • All five parcels in a high need area • Parcels are at or outside 0.5 mi boundary of nearest UA sites • Combined area of 0.75 acres, combined savings of $21,448 (97%-99% savings)
Parcels 5136-016-006; 5136-014-017; 5136-014-018; 5136-005-004; 5136-005-005; 5141-021-010; 5141-018-013; 5141-022-018 • All are in high or highest need areas • All are at or outside 0.5 mi boundary of nearest UA sites • Combined area of 1.36 acres, combined savings of $40,168 (98%-99% savings)
Parks
MacArthur Park (29.9 acres) in southeast corner • Completely within a non-alleviated highest need area • Enough land area that a portion could be dedicated to UA activity
Barnsdall Park (14.5 acres) in northeast corner • Only park in this corner of Promise Zone • Located in a high need area • Enough land area that a portion could be dedicated to UA activity
Lafayette Park (10.4 acres) in southeast corner • Located in a highest need area, and adjacent to a non-alleviated area • On the 0.5 mi border of MC Francis Community Garden • Enough land area that a portion could be dedicated to UA activity
Madison West Park (0.52 acres) on middle east side • Only park located in middle of Promise Zone • Located within a relatively high need area and adjacent to a highest need area • Several vacant parcels around it that could be networked
Robert F. Kennedy Park (0.45 acres) on lower west side • Located in a high need area and adjacent to a non-alleviated area • Few vacant lots nearby

APPENDIX C: SUPPORTING INFORMATION FOR CHAPTER 4

Table C.1. Zones and permitted activities relevant to urban agriculture in the City of Los Angeles (year of most recent zoning change)

General Category	Specific Zones	Permitted UA types/activities (year of permission)
Farming	A1 Agricultural Zone	• Farming, nurseries, aviaries, and apiaries (2010); • The keeping of equines, bovines, goats or other domestic livestock, and not to exceed five swine, and the keeping of poultry, fowl, rabbits, fish or frogs, chinchillas and other small animals in conjunction with the residential use of the lot, provided…(1983)
	A2 Agricultural Zone	• Farming, nurseries, aviaries, and apiaries (2010); • The keeping of equines, bovines, goats or other domestic livestock (other than swine), poultry, fowl, rabbits, fish or frogs, chinchillas and other small animals, in conjunction with the residential use of the lot provided…(1983)
	MR1 Restricted Industrial Zone M1 Limited Industrial Zone MR2 Restricted Light Industrial Zone M2 Light Industrial Zone M3 Heavy Industrial Zone	Farming, nurseries, aviaries and apiaries (2010).
	PF Public Facilities Zone	Farming and nurseries, under power transmission rights-of-way (2010).

General Category	Specific Zones	Permitted UA types/activities (year of permission)
Truck Gardening	RA Suburban Zone	• Truck gardening and nurseries (2010); • The keeping of equines, bovines, goats or other domestic livestock (other than swine), poultry, fowl, rabbits, chinchillas and other small animals, in conjunction with the residential use of the lot, provided that: ○ That these activities are not for commercial purposes, except that a maximum of two currently licensed equines not owned by the resident of the involved property may be boarded (for which monetary compensation may be paid) or kept on that property as an accessory use. ○ The keeping of equines, bovines, goats or other domestic livestock (other than swine) shall be permitted only on lots having an area of 17,500 square feet or more; where equines and/or bovines are being kept, the number shall not exceed one equine or bovine for each 4,000 square feet of lot area (1984). • Backyard beekeeping, as an accessory use, provided that the activity complies with performance standards…(2015).

General Category	Specific Zones	Permitted UA types/activities (year of permission)

	RE Residential Estate Zone	• Truck gardening (2010);
		• The keeping of equines, poultry, rabbits and chinchillas in conjunction with the residential use of the lot, provided that…
		  ○ Such animal keeping is not for commercial purposes.
		  ○ The keeping of equines shall be permitted only on lots having an area of 17,500 square feet or more. Where equines are being kept, the number of such animals being kept shall not exceed one for each 4,000 square feet of lot area (2010).
		• Backyard beekeeping, as an accessory use, provided that the activity complies with performance standards…(2015).

	RS Suburban Zone
	R1 One-Family Zone
	R2 Two-Family Zone
	R3 Multiple Dwelling Zone
	RAS3 Residential/Accessory Services Zone
	R4 Multiple Dwelling Zone
	RAS4 Residential/Accessory Services Zone
		• Truck gardening (2010);
		• The keeping of equines, poultry, rabbits and chinchillas in conjunction with the residential use of the lot, provided that:
		  ○ Such animal keeping is not for commercial purposes.
		  ○ The keeping of equines shall be permitted only on lots having an area of 20,000 square feet or more. Where equines are being kept, the number of such animals being kept shall not exceed one for each 5,000 square feet of lot area (2010).
		• Backyard beekeeping, as an accessory use, provided that the activity complies with performance standards…(2015).

General Category	Specific Zones	Permitted UA types/activities (year of permission)
	RD Restricted Density Multiple Dwelling Zone	• The keeping of equines, in conjunction with the residential use of the lot, and subject to the following limitations: ○ Such activities are not for commercial purposes. ○ The keeping of equines shall be permitted only on lots having an area of 20,000 square feet or more. Where equines are being kept, the number of such animals being kept shall not exceed one for each 5,000 square feet of lot area (1982).
	RMP Mobilehome Park Zone	• Truck gardening (2010); • The keeping of equines, poultry, rabbits and chinchillas, in conjunction with the residential use of the lot, provided that such animal keeping is not for commercial purposes (2010).
Other	C2 Commercial Zone C4 Commercial Zone C5 Commercial Zone CM Commercial Manufacturing Zone	Nursery, flower or plant, provided that all incidental equipment and supplies, including fertilizer and empty cans, are kept within a building.