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# A growing opportunity: Community gardens affiliated with US hospitals and academic health centers

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ABSTRACT

*Background.* Community gardens can reduce public health disparities through promoting physical activity and healthy eating, growing food for underserved populations, and accelerating healing from injury or disease. Despite their potential to contribute to comprehensive patient care, no prior studies have investigated the prevalence of community gardens affiliated with US healthcare institutions, and the demographic characteristics of communities served by these gardens.

*Methods.* In 2013, national community garden databases, scientific abstracts, and public search engines (e.g., Google Scholar) were used to identify gardens. Outcomes included the prevalence of hospital-based community gardens by US regions, and demographic characteristics (age, race/ethnicity, education, household income, and obesity rates) of communities served by gardens.

*Results.* There were 110 healthcare-based gardens, with 39 in the Midwest, 25 in the South, 24 in the Northeast, and 22 in the West. Compared to US population averages, communities served by healthcare-based gardens had similar demographic characteristics, but significantly lower rates of obesity (27% versus 34%, $P < .001$).

*Conclusions.* Healthcare-based gardens are located in regions that are demographically representative of the US population, and are associated with lower rates of obesity in communities they serve.



## Introduction

Community gardens, "single pieces of land gardened collectively (Anon., 2007)," have demonstrated multifaceted public health benefits. Recent meta-analyses and empirical studies have shown that community gardens are capable of increasing fruit and vegetable intake (Alaimo et al., 2008; Litt et al., 2011; McCormack et al., 2010; Robinson-O'Brien et al., 2009; Langellotto and Gupta, 2012), providing a venue for increased physical activity (Harris, 2009), lowering Body Mass Index and blood pressure in adults (Zick et al., 2013) and children (Davis et al., 2011) and treating chronic diseases (Weltin, 2013). Community gardens have also improved neighborhood social capital by fostering intergenerational and cross-cultural interactions, enabling the sharing of food production knowledge, improving neighborhood aesthetics, decreasing crime, and increasing property values (Anon., 2007; Twiss et al., 2003).

Given these diverse benefits, gardens would appear to be infrastructural assets for hospitals and Academic Health Centers (AHCs), which are evolving within a changing healthcare system. The recent passage of the Affordable Care Act (ACA) in the United States requires that hospitals and AHCs provide preventive care as opposed to simply treating illness, with the ultimate goal of improving health outcomes at the population level (Nabel et al., 2013). While it was previously considered sufficient to address community health needs through providing charitable care and unreimbursed Medicaid, the ACA emphasizes that comprehensive patient care must now address built and social environments that contribute to chronic disease burden (Washington et al., 2013). Indeed, the ACA and related Internal Revenue Service requirements for maintenance of tax-exempt status for hospitals and AHCs necessitate the completion of a community need assessment every three years and implementation of a plan to address the findings (Anon., 2010).

These legislative milestones have promoted the development of preventive health infrastructure, and recent efforts at tax-exempt healthcare institutions have included such projects as community gardens (George et al., 2013; Kraschniewski et al., Forthcoming). Not

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only do these "local foods" initiatives have potential to make fruits and vegetables more accessible for community members and patients – including low-income populations, and those at-risk for chronic disease – they also offer personal/professional growth opportunities for employees and students. Health professionals and trainees are provided new venues for research and grant-writing (Ahonen et al., 2012) and new opportunities emerge to provide preventive health care (Korenstein et al., 2013; George et al., 2013), for instance through programs such as Prescription Produce (Anon., 2010), in which physicians write scripts redeemable for free fruits and vegetables for at-risk patients.

Despite the potential benefits of community gardens associated with hospitals and AHCs, no prior studies have documented the prevalence of these gardens in the US or the demographic characteristics of communities they serve. We therefore investigated the prevalence, regional distribution, and demographic characteristics of communities served by gardens operating in partnership with hospitals and AHCs.

## Methods

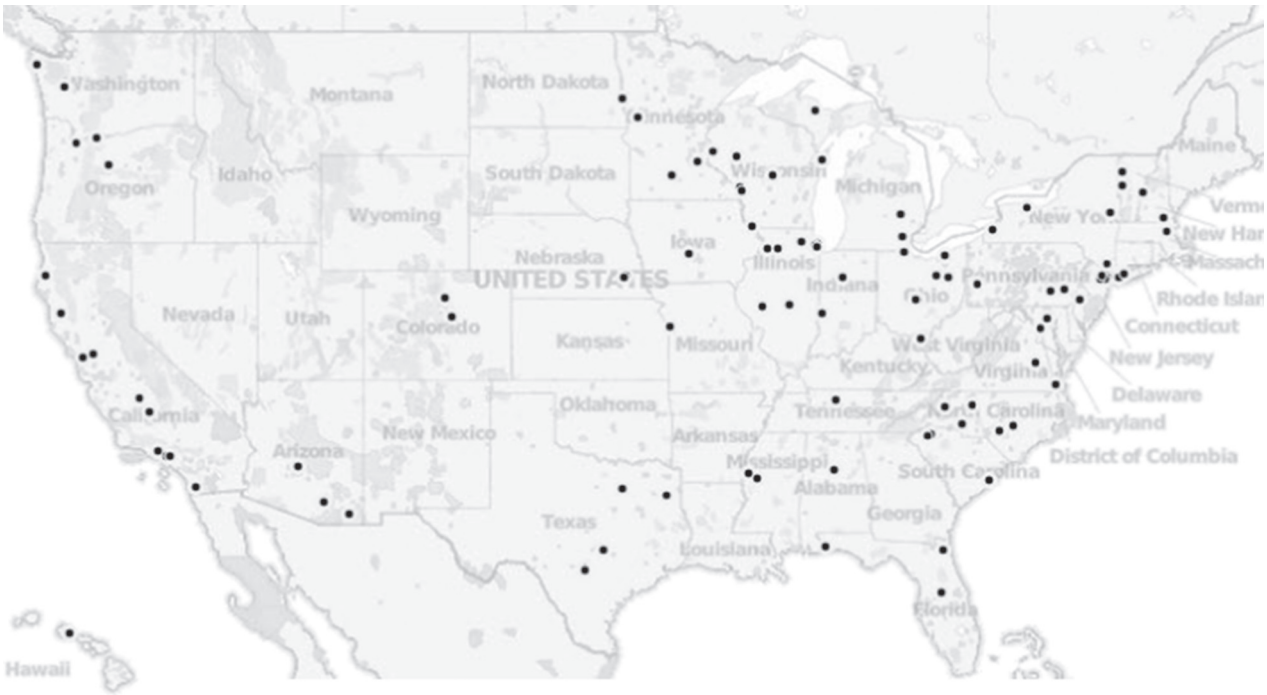
Our search strategy was developed in collaboration with a library and information science specialist, and included three approaches. First, in November 2013, three national databases – (1) the American Community Garden Association database (http://acga.localharvest.org/), (2) the Public Gardens Locator provided by the National Gardening Association and the American Public Gardens Association (http://www.garden.org/public_gardens/index.php), and (3) the Therapeutic Landscapes Network (http://www.healinglandscapes.org/gardens/map.html) – were searched using the terms "hospital," "medical center," "academic health center," "medicine," and "healthcare." Relevant citations were retrieved from Medline/Pubmed using the following combination of terms: gardening (MeSH) OR garden* (text word) AND the following terms as text words (communit*, hospital*, health, medical), limiting the search to publications from 1/1/2005 to 7/31/2014. Additional text word searching with "garden*" AND the following terms as text words (communit*, hospital*, health, medical) was performed in CINAHL (Cumulated Index to Nursing and Allied Health Literature) for the same time period. A search of Google and Google Scholar using similar search terms yielded an average of 500 search results, which were evaluated for each separate inquiry until researchers reached saturation (i.e., no new gardens identified).

Gardens were included if hospital or AHC involvement met at least one of the following criteria: donated land for the garden; repurposed existing space on campus; provided grant support, sponsorship, and/or leadership and management resources to gardens located near campus. Gardens that did not offer plots for food production (i.e., therapy, healing, atrium, butterfly, meditation, viewing, or memorial gardens) were excluded on the basis that, while these spaces contribute value for patients, families, and employees, they did not meet the abovementioned definition of community gardens as "single pieces of land gardened collectively." Data on the geographic location and healthcare-institute affiliation of gardens was collected.

To examine demographic characteristics of communities served by gardens, we extracted socio-demographic data from the zip codes in which gardens were based using 2010 US Census data (http://quickfacts.census.gov/qfd/index.html). To examine obesity rates of communities served by gardens, we used health indicator data from the Robert Wood Johnson County Health Rankings & Roadmaps database (http://www.countyhealthrankings.org/). To determine if existing gardens are using online social media resources to augment in-person communication we also investigated if gardens had a presence on Facebook or Twitter.

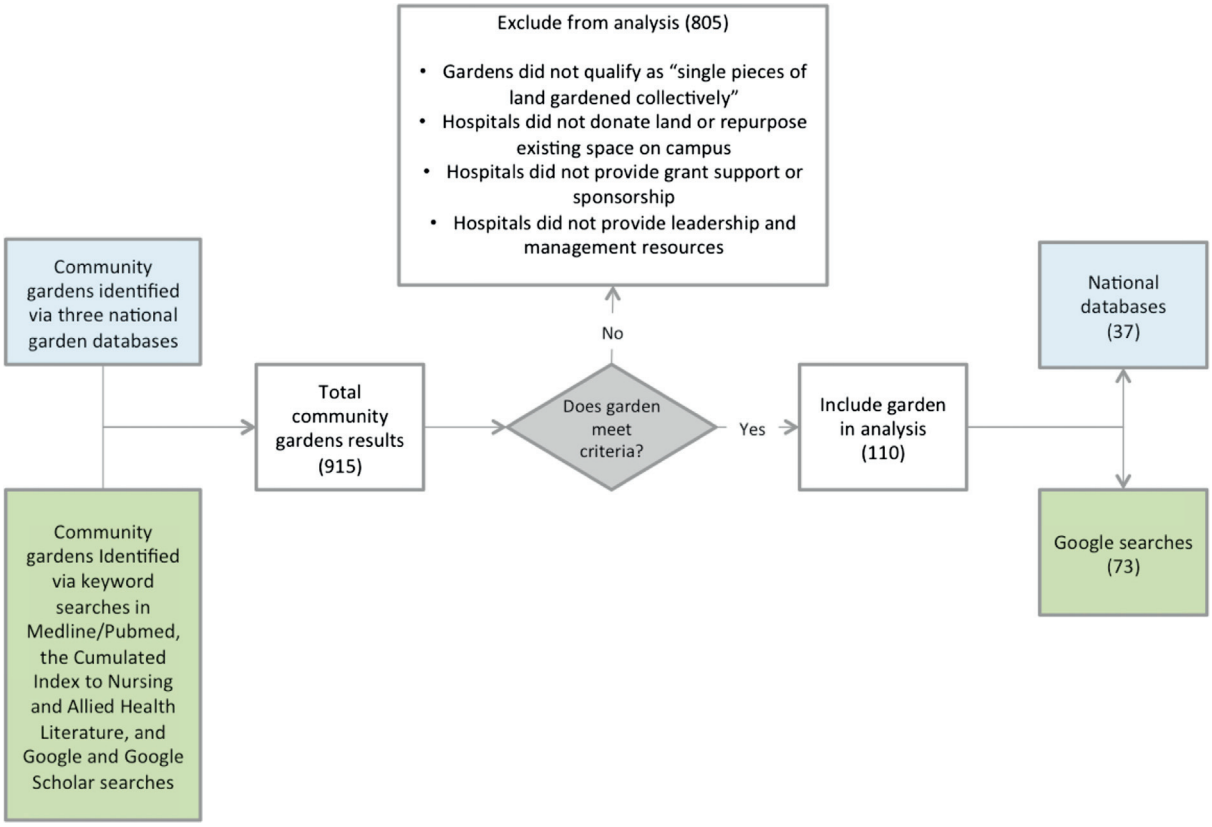
### *Data analyses*

Descriptive statistics were computed to summarize prevalence of gardens by region, and to evaluate the availability of social media-




**Legend:** In 2013, national community garden and other databases were used to identify healthcare-based gardens in the US. Each dot represents a garden.

**Fig. 1.** Geographic dispersion of communities served by gardens associated with US healthcare institutions. In 2013, national community garden and other databases were used to identify healthcare-based gardens in the US. Each dot represents a garden.




**Legend.** In 2013,915 gardens were identified, with 110 meeting study inclusion criteria. Of those, 37 were identified via the three national gardening databases, and the remaining 73 were identified via Google/Google Scholar searches.

**Fig. 2.** Flowchart for selection of eligible healthcare-based community gardens. In 2013, 915 gardens were identified, with 110 meeting study inclusion criteria. Of these, 37 were identified via the three national gardening databases, and the remaining 73 were identified via Google/Google Scholar searches.

based (Facebook and Twitter) communication by gardens. One-sample t-tests were used to compare demographic characteristics of communities served by gardens to values from US census data and county health rankings. Statistical significance was set at a two-sided $P < 0.05$. Analyses were conducted with SPSS, version 21.0.

## Results

In total, 915 gardens were identified, with 110 meeting study inclusion criteria (see Figs. 1 and 2). Of those, 37 were identified via the three national gardening databases, and the remaining 73 were identified via Google search. No additional gardens were identified through Medline/Pubmed or CINAHL.

Regionally, there were 39 gardens in the Midwest, 25 in the South, 24 in the Northeast, and 22 in the West. States with the most gardens included New York (12), California (12), Illinois (10), and Wisconsin (9). Most gardens were located in urban settings, and approximately half (48%) had a social media presence on either Facebook or Twitter. Demographically, communities served by healthcare-based gardens were similar to the overall US population. However, compared to the US population, communities served by gardens demonstrated significantly lower rates of obesity (Table 1).

## Discussion

To our knowledge, this is the first study to investigate the prevalence of community gardens affiliated with healthcare institutions and the demographic characteristics of communities served by these gardens. Our multi-database and web search identified 110 food-producing community gardens affiliated with hospitals and AHCs (George et al.,

**Table 1**
Socio-demographic characteristics of communities served by hospital and Academic Health Center gardens, by region and in-total, as compared to the United States.

| Socio-demographic characteristics | Region | | | | | USA | $P^*$ |
|---|---|---|---|---|---|---|---|
| | Northeast n = 24 | Midwest n = 39 | South n = 25 | West n = 22 | Garden total n = 110 | | |
| Adult obesity (%) | 24.2 | 28.9 | 29.4 | 24 | 27 | 34.9 | <.001 |
| High school or higher (%) | 86.9 | 89.2 | 83.7 | 84.9 | 86.6 | 85.7 | .11 |
| Bachelor degree or higher (%) | 36.6 | 27.1 | 27.6 | 29.3 | 29.7 | 28.5 | .21 |
| Hispanic/Latino (%) | 15.9 | 7.4 | 14.2 | 27.5 | 14.8 | 16.9 | .15 |
| White (non-Hispanic) (%) | 64 | 78.8 | 53.8 | 55.2 | 65.2 | 63 | .31 |
| 65 years or older (%) | 14 | 14.8 | 12.9 | 13.9 | 14 | 13.7 | .27 |
| Median household income ($) | 61,628 | 50,553 | 47,426 | 57,509 | 53,650 | 53,046 | .62 |

* *P*-value compares socio-demographic characteristics of the 110 communities served by healthcare-based gardens to average US socio-demographic characteristics based on census data (http://quickfacts.census.gov/qfd/index.html) and county health-rankings data (http://www.countyhealthrankings.org/). Data gathered in 2013.

2011). Regional distribution of gardens was relatively even, with the greatest number located in the Midwest. The South, a region with favorable growing seasons and the highest levels of obesity and preventable chronic disease in the US (May et al., 2013) had the second highest quantity of healthcare-based gardens. As part of comprehensive approaches to address chronic disease, it is possible that multiple healthcare institutions may benefit from establishing community gardens. To facilitate collaboration between healthcare sites, Appendix A reports our complete list of healthcare-based community gardens by region.

It appears that healthcare-based gardens are largely found in communities demographically representative of the US population but with lower obesity rates. This association raises questions about whether gardens are contributing to better diets and physical activity or whether they reflect healthier lifestyles in these communities — an issue that warrants further investigation. As the communities served by gardens appear demographically representative of the US population, these gardens may hold potential to reach "average" American adults — less than one-quarter of whom meet dietary guidelines for fruit and vegetable intake. More needs to be learned, however, about the demographic and health characteristics of those who actually use these gardens. As healthcare-based gardens are present throughout the US, they may hold potential to complement other strategies to reduce public health disparities through providing nutrition education, promoting physical activity among patients and hospital employees, accelerating healing from injury and disease, and growing food for medically underserved populations (Twiss et al., 2003; Ogden et al., 2014).

There are several limitations to this study. No searchable centralized database exists for community gardens associated with healthcare institutions; therefore, gardens were identified using existing national garden databases, web-based Google and Google Scholar searches, and searches of scientific abstracts. It is possible that gardens that were no longer operational but which still had an indexed web presence (e.g., web page, press releases, social media pages) may have been included in the results, while active gardens lacking a web presence may have been excluded. With regard to social media, we looked only at Facebook and Twitter on the basis that these two social networks have been the most widely used in the US. However, this precluded identification of social sites such as Google+, Instagram, and YouTube that also have large user bases. Lastly, this project was undertaken in response to US legislation that has placed greater emphasis on population health, and thereby limited its scope to evaluating community gardens in one country. Future research should evaluate other regions, and compare and contrast the US findings against an international context.

## Conclusions

This study has established an initial accounting of the prevalence of community gardens affiliated with hospitals and AHCs. Future research is necessary to identify best practices for tracking the prevalence, characteristics, and services provided by healthcare-based gardens. Better tracking could help measure the outcomes of services provided and enable communities to refine gardens to maximize public health impact — particularly with regard to risk factors such as childhood and adult obesity. For instance, it would be helpful to know: how long gardens have been in existence; where they are located; how they are funded/organized; extent to which they involve patients, employees, and community members; how care providers are incentivized to utilize gardens; and how gardens are used for food production, therapy, and preventive health programs (e.g., Prescription Produce). Further, our finding that approximately half (48%) of gardens currently use Facebook or Twitter suggests that there remain opportunities for those who manage gardens to further embrace the education and communication potential of social networking technologies.

Moreover, it is important to evaluate whether healthcare-based gardens are cost-effective and can improve patient outcomes. It is possible that greater patient exposure to green spaces may contribute to decreased recovery time, improved quality of life, and increased satisfaction with medical care. Given the greater emphasis on improved outcomes and patient satisfaction as well as reduced readmissions and costs under the ACA, it will be increasingly important for hospitals to create infrastructure to comprehensively care for individuals and populations. As community gardens exist at multiple healthcare institutions throughout the US, they hold potential to help redefine these institutions as places that promote healthier environments, in addition to managing disease.

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.pmedr.2014.12.003.

## Conflict of interest statement

We report no conflicts of interest.

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