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Community-engaged learning in food systems and public health

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Abstract

Food preferences, systems, and policies influence the health of individuals and communities both directly, through food consumption choices, and indirectly, through environmental, economic, and social impacts. To aid student understanding of these complex determinants of food choice, a student-driven, community-engaged learning course on food systems and food choices was developed. Guided by the socio-ecological model for health and the goals of the Emory Sustainability Initiative and supported by the Center for Community Partnerships (CFCP), the course objectives, curriculum, and activities were determined by the students in collaboration with the faculty advisor and community partners. Two central components of the course were student-led learning modules and community-engaged research on food systems. The four learning modules included: (1) determinants of individual food preference and choice; (2) food and agriculture systems; (3) food access and food justice; and (4) agricultural policy. Community research projects

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Author note: Findings from student research projects presented here were previously presented at a community symposium at Emory University in May 2011. A presentation about the course, entitled "Community-engaged learning on food systems and public health," was presented at the American Public Health Association Meeting on November 1, 2011.

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described the role of farmers' markets, community supported agriculture, conventional markets, community gardens, and farm-to-table restaurants in the production and distribution of food in metro Atlanta, with an emphasis on locally produced fruits, vegetables, meats, and milk. Where possible the projects mapped the reach of these distribution models to low-income communities and food deserts, and identified strategies to improve access to healthy food options in these communities. The course culminated in a student-organized symposium for community members and in research reports for community partners. The symposium drew diverse participants, including growers, farmers' market managers, advocacy groups, public-health scientists, policy-makers, students, and academicians. Discussions with symposium participants assisted in refining the research reports for community partners and helped identify strategies and topics for future collaborative efforts and course improvements. A grant from Emory's CFCP facilitated collaboration with community partners, community research, and dissemination of research findings.

Keywords
community-engaged research, food policy, food systems, higher education, public health nutrition, service-learning, sustainability

Background

Food systems, policies, and individual food preferences play important roles in the health of individuals and communities. These factors act both directly through food consumption choices and indirectly through environmental, economic, and social impacts that affect the safety, availability, and accessibility of healthy foods. Despite the growing interest of the mainstream media in the relationships between food systems and individual, community, and environmental health, there is limited academic conversation on these relationships, especially in public health education. Little is written and published in peer-reviewed literature about public health education approaches to sustainable food systems and their capacity to meet the needs of low-income and food desert communities. Furthermore, academic courses and programs that address these topics are not widely reported in the literature or shared across institutions, despite their relevance to numerous fields of study, including agriculture, health, economics, community development, and environmental studies. Francis and colleagues argue that research and learning on agriculture and food systems rarely cross disciplines (Francis et al., 2008). An opportunity exists to improve interdisciplinary as well as interinstitutional collaboration on food system education and research. To address the gap in food system education, a student-driven, community-engaged learning course on food systems and the determinants of food choices was developed. The course was piloted as a two-credit directed study in the 2011 spring semester. This manuscript describes the pedagogical and theoretical frameworks that undergird the course, the student-driven development and implementation of the course, course outputs, and lessons learned during the first offering of this course.

Comparable models

A limited number of other academic institutions are addressing the larger and interrelated issues of food systems, justice, sustainability, and policy. Depending on their academic environment and resources, schools approach research and learning on food in a variety of ways. For example, the Center for a Livable Future at Johns Hopkins University is a multidisciplinary center that explicitly connects agriculture, food systems, and public health in its research, education, and community-outreach efforts, focusing on sustainable food systems and food security (Johns Hopkins University, 2011). The center offers two graduate-level courses on food. As well, the Friedman School of Nutrition Science and Policy at Tufts University includes departments for Nutrition Science as well as Food and Nutrition Policy. Tufts' Master of Public Health curriculum includes a concentration in nutrition in collaboration with the School of Nutrition Science and Policy, and food systems are addressed through some of the elective courses (Tufts University, 2012a, 2012b).

The University of Minnesota's Institute for Sustainable Agriculture fosters an interdisciplinary network of academics, sustainable agriculture practitioners, and rural communities to conduct community-based research, teaching, and outreach on sustainable agriculture. However, this institute does not appear to connect with the School of Public Health's nutrition concentration (University of Minnesota, 2011). Likewise, Cornell University's Division of Nutritional Sciences includes programs in molecular, human, and international nutrition (Cornell University, 2011a). Food policy spans several of those programs, and it has an interdisciplinary program on food systems (Cornell University, 2011b).

Other institutions lack programs in sustainable agriculture or food systems but are integrating these topics into the health curriculum. For example, a course entitled Food, Health, and Justice was recently added to the College of Health Sciences curriculum at the University of Wyoming. This course maps the national and global food systems, identifies positive and negative contributions to health outcomes, and discusses alternatives such as community-based food systems (Christine Porter, personal communication, March 9, 2012). At the University of South Carolina, a course on Nutrition and Public Health investigates the complex interactions between food, diet, and health while integrating policy, community, and environmental approaches to improve nutrition (Sonya Jones, personal communication, March 11, 2012). Unfortunately, few papers have been published to date that describe the process whereby these programs and courses are developed, implemented, and refined.

Development of a Community-engaged Public Health Course on Food Systems

Course Formation

In the fall of 2011, a group of eight graduate students in public health and nutrition began discussing the need for a course that explores food systems and food policy as they apply to public health and nutrition. Students met with a faculty advisor and began identifying the primary topics of interest and the best strategies to address those topics. After the group came to consensus on four key topics, the students assigned themselves to develop specific learning modules around each topic (described in detail under course activities). The professor and students also agreed that engaging the local food community would greatly enhance learning about food systems. Students identified appropriate community partners and developed the framework for community-engaged research projects to explore various aspects of the food system around metro Atlanta. The course was granted departmental approval as a pilot directed-study course in late fall of 2011 to be offered in the spring 2012 semester.

Theoretical Frameworks

Two overarching theoretical frameworks, the Ecological Model of Health and of Sustainability, guided course development. The Ecological Model of Health emphasizes the interrelatedness of individuals with the larger system of natural, built, policy, and legal environments within which they make health decisions (Sallis, Owen, & Fisher, 2008). This model states that healthy behaviors are possible when policies and environments provide support for and/or motivate healthy choices and when people are informed and empowered to make those choices. Guided by the framework of the Ecological Model, the course addressed food and diet choices by studying how food systems, food environments, and food policies influence an individual's ability to act on their knowledge and/or beliefs about healthy foods. The Sustainability Vision of Emory University adopts a commonly used definition of sustainability: "meeting the needs of the present generation without compromising the needs of future generations" (Emory University, 2008; World Commission on Environment and Development (WCED), 1987). Emory's commitment to sustainability includes a commitment to ensuring "a more sustainable food system" for its campuses and hospitals. In 2007 Emory University adopted as part of its strategic planning the ambitious goal to "procure 75% of ingredients from local or sustainably grown sources by 2015" (Emory University, 2008). In defining purchasing priorities for local and sustainable food, Emory University

considers environmental, social, and economic criteria while also taking into account cost and supply barriers that limit the ability of the university to source local or sustainably produced foods.[1] As part of didactic course work, students debated the priorities and definitions outlined in this document. The university's commitment to sustainability provided institutional support for students to critically consider how sustainability is integrated with food systems, food policy, and health.

Building on these two theoretical frameworks, students prioritized three key goals for the course: (1) understand how individual food preferences are formed and influenced; (2) identify how food policies and food systems influence food choices and diet behaviors, as well as the implications of these on health outcomes; and (3) explore the important issues of food justice and environmental sustainability as they relate to food production, availability, and access, and health.

Pedagogical Approaches

The course utilized three complementary pedagogies to achieve the course goals: (1) student-centered learning; (2) community-engaged service learning; and (3) transformative learning. Student-centered learning puts students in charge of identifying the topics they feel are important, deciding why those topics should be prioritized, and selecting effective strategies for teaching the material (O'Neill & McMahon, 2005). In this model, instructors are not the bearers of information on a given topic but rather serve to facilitate learning by providing students support to identify and explore their own learning objectives through student-selected learning strategies. Students share greater responsibility in the learning process and are expected to be actively engaged.

Student-centered learning was emphasized from the initial stages of course development, when students worked as a team to identify and prioritize the key concepts, relationships, and skills that they deemed important for the course and the activities they would use to engage student learning. In developing the course, students advocated for opportunities to gain practical experience related to the course topics and to further develop skills taught as part of the general public health curriculum. Through this process, students made substantial inputs and decisions on course objectives and topics, course structure, assignments and grading criteria, and student responsibilities. Student-centered learning continued to be a primary pedagogy throughout the course as students worked in teams to develop and facilitate their selected learning modules and identify, implement, and disseminate their community-engaged research.

Community-engaged learning is a unique pedagogical approach that engages students in experiential learning while contributing to community building and meeting academic learning objectives (Howard, 1998). In the case of public health education, students utilize skills and content acquired in the academic institution to identify and address community needs with community partners, to learn about the varied and unique perspectives of public health issues, and to engage with partners to identify and mobilize community assets, wisdom, and strategies. Early in course development, students recognized the importance of engaging with community partners and prioritizing their needs and interests. Partners, including a local food advocacy group and the local board of health, contributed to identifying and prioritizing course goals and objectives, developing course activities, and also served as guest speakers and mentored community-engaged research projects.

The course also emphasized transformative learning, defined as "the process by which previously uncritically assimilated assumptions, beliefs, values and perspectives are questioned and thereby become more open, permeable and better justified" (Cranton, 2006, p. vi). Transformative learning is a voluntary process of being critically

[1] Emory University's "Sustainability Guidelines for Food Purchasing" provides detailed information on the definitions of sustainable and local. This document and information on Emory's progress towards its sustainability goals can be found at http://sustainability.emory.edu/page/1008/Sustainable-Food. It should be noted that the document outlining the Sustainability Guidelines is a dynamic one and is periodically revised by the Sustainable Food Committee to reflect evolving certifications, fluctuations in costs, and changes in supply.

self-reflective by integrating personal experience with critical reflection to generate learning (Kolb, Boyatzis, & Mainemelis, 2000). In this course, reflection, defined as the "intentional consideration of an experience in light of particular learning objectives" (Bringle & Hatcher, 1997, p. 153) allowed students to link their experiences in community-engaged learning and research back to course content and, in the process, examine their own beliefs, assumptions, and biases.

These pedagogical approaches were realized through key activities undertaken to achieve content and skills objectives. Activities included development of student-led learning modules, community-engaged research projects, in-class discussions and written reflections, a food insecurity experience, and organization of a Local Food Systems symposium. Activities are discussed in the next section and briefly summarized in Box 1.

Box 1. Course Activities for a Directed Study on Food Systems

1. Student-led Learning Modules: Students worked in teams of two to three to facilitate a learning module of their choice. They were responsible for inviting speakers, providing background readings, facilitating group discussions, and /or designing community-based activities that linked classroom learning with community-based experiences such as volunteer activities.

2. Community-Engaged Research: Students worked in teams of two on a semester-long project to map the reach of local foods systems in DeKalb County and metro Atlanta. Students also documented challenges faced by producers in providing healthy and sustainable food through the various food systems, especially in low-income communities. The project culminated in student presentations and facilitated discussions at a community-wide symposium on Local Food Systems and a white paper for the DeKalb County Board of Health.

3. Reflections: During the semester, students periodically reflected, through short essays and discussion, on the evolution of their beliefs about and understanding of the complexities of food intake and food systems, including effective, feasible, and empowering strategies to improve access to healthy food in all communities, especially marginalized communities. Students also participated in and reflected on a month-long food insecurity project in which they lived on a predetermined "food stamp budget."

Course Activities

Learning Modules

Didactic coursework to accomplish the three key course goals was facilitated through student-led learning modules (see Box 2 for a description of the learning modules). Students were responsible for all aspects of developing and delivering the learning modules to their peers, including choosing the discussion topics, selecting relevant readings, coordinating guest speakers or developing other content materials, and facilitating discussion. Within each module students explored the implications of the module topic on health outcomes, especially in relation to chronic diseases such as obesity and cancer. The implications of the module topic on sustainable production of food and for environmental health were also explored. In addition, as part of module 2 specifically, two

Box 2. Didactic Learning Modules for a Directed Study on Food Systems

1. Development of Individual Food Preference
   - Biological determinants of food intake and dietary choices
   - Psychosocial determinants of food intake and dietary choices
   - Environmental determinants of food intake and dietary choices
   - Food marketing

2. Food Systems
   - Evolution of agriculture systems in the United States
   - Overview of industrial food systems
   - Overview of alternatives to industrial food systems
   - Food labeling, certifications, terminology and regulations

3. Food Justice
   - Food security: availability, accessibility, quality
   - Nutrition safety nets and food banks
   - Farm worker health

4. Food and Agricultural Policy
   - Dietary guidelines
   - History of the farm bill
   - Overview of farm bill nutrition title; farm bill commodities, conservation and other titles
   - The influence of agriculture policies on food systems and health
   - Local and state policies; advocacy
   - International trade and food aid

class periods facilitated by members of Emory's Sustainable Food Committee focused on the history of food production systems in the U.S., sustainable food production practices, terminology and certifications, and the processes required to obtain certification. The syllabus and additional course materials are available upon request from the authors.

Reflection

Students completed five short reflections on their learning and experiences throughout the course. Through these reflections, students integrated the content learned through class readings and discussion with their experiences conducting research, visiting a community food bank, and living on a "food stamp diet." Reflection topics encouraged students to recognize and think critically about their own assumptions and biases related to food choices and how these evolved as they engaged with course activities and community partners. A list of the reflection topics is provided in Box 3.

Box 3. Student Reflection Topics for a Directed Study on Food Systems

1. How I decide what to eat: Personal philosophy on food and how and why you prioritize food choices
2. Living on a food stamp diet — Expectations*
3. Can sustainable food systems adequately feed the US? The world? A response to *The Economist* series (*The Economist,* 2011)
4. Living on a food stamp diet — My reality*
5. Incentives vs. penalties vs. individual choice — how can we ethically legislate to influence food intake in the U.S.? Around the world? Should we?

* Reflections were based on a month long experience of students living on a "food stamp budget" based on the average monthly allotment for residents in the state of Georgia (Kaiser Family Foundation, 2011).

Community-engaged Research Projects and Partnerships

To gain experience in community-engaged research and enhance learning about food systems through practical experience, students undertook community-engaged research projects. Students expressed an interest in better understanding barriers to accessing healthy foods, namely fresh fruits and vegetables, lean meats, and milk that are locally produced and/or produced using environmentally sustainable methods. Discussions with community partners highlighted the potential influence of production and distribution barriers to availability and consumer accessibility and indicated that the impacts of production and distribution barriers on local food systems are not fully understood. As a result of these conversations, students explored four food production and distribution systems in DeKalb County and metro Atlanta communities: (1) farmers' markets and community supported agriculture operations (CSAs); (2) community gardens; (3) farm-to-table restaurants; and (4) conventional retail. Student projects sought to identify where and how these systems operated in DeKalb county and metro Atlanta, including the barriers and facilitators in the production and distribution of locally and/or sustainably produced foods,[2] how these systems reached communities, and barriers and facilitators for improving access to these systems in low-income or food-desert communities. Findings from the student projects were used by community partners to identify the areas of greatest need in the provision and access of healthy and locally and/or sustainably produced food, particularly in low-income communities, and to characterize strategies to improve production

[2] Local and sustainable foods were defined by each community partner and thus each research team differently; in some cases these definitions were formal, such as the conventional retail research group which used USDA organic certification to define organic products. In other cases definitions were less formal and more variable; for example, most community gardens reported using sustainable and organic growing practices, prohibiting pesticides and herbicides, limiting water use, and composting, but were not certified as USDA organic. Likewise, many farms interviewed were not certified organic but reported using organic production methods and emphasizing other sustainable practices to reduce erosion, minimize water requirements, and diversify crops. In terms of locality, some partners defined local foods as those grown and sold within DeKalb County or Atlanta, while others defined local as coming from the state of Georgia and /or surrounding states. Local production was not equated with sustainable production methods, although in many cases (for example farm-to-table restaurants, community gardens, farms selling at farmers' markets and CSAs) these concepts did overlap.

and access. In the next section we identify these community-engaged projects in more detail and briefly discuss the findings of each project.

Community-Engaged Learning and Research: Individual Project Methods and Findings

For each community-engaged research project, qualitative research methods, namely interviewing and observation, were the primary methods used. Project teams developed interview guides to collect information on the operation of local food systems, accessibility of local and/or sustainably produced foods, and barriers to and motivating factors for developing local food systems. Data on location of the local food resources were provided to geographic information systems (GIS) analysts at Fox Environmental and contributed to the development of a local food map for DeKalb County (Figure 1). All projects were deemed exempt by the Emory Institutional Review Board, and all participants provided informed consent. A brief summary of each project's methods and findings was drafted by each student team and is presented below.

Farmers' Markets and Community Supported Agriculture

Background: Adapted distribution systems such as farmers' markets and CSAs offer possible solutions to the lack of accessibility of local, fresh foods. Students aimed to understand from the perspective of local farmers, farm managers, and market managers how these distribution systems operate, reach the community, and affect food access through social and economic impacts.

Methods: Students completed interviews with three farmers' market managers, four CSA farmers and/ or CSA managers, and one cooperative market manager. After all interview data were collected, interview audio was used to identify themes from each interview. Themes were used to understand challenges, barriers, and successes.

Findings: Respondents perceived that consumers face a number of barriers to accessing local food, including awareness, cost, transportation, time, etc. As barriers become too great for consumers, many are driven to consume nonlocal/conventional foods. Respondents identified prohibitive policies, financial barriers to production, and limitations for marketing as some of the challenges to successfully distributing food through farmers' markets and CSAs. According to the respondents, these challenges faced in production and distribution underlie consumers' challenges in accessing local foods from markets and CSAs in terms of availability and pricing of locally grown and sustainably produced foods. Some producers and vendors have responded to these challenges by adapting their business models. For example, they have formed cooperative groups and developed mobile and online markets as ways to work with multiple farmers.

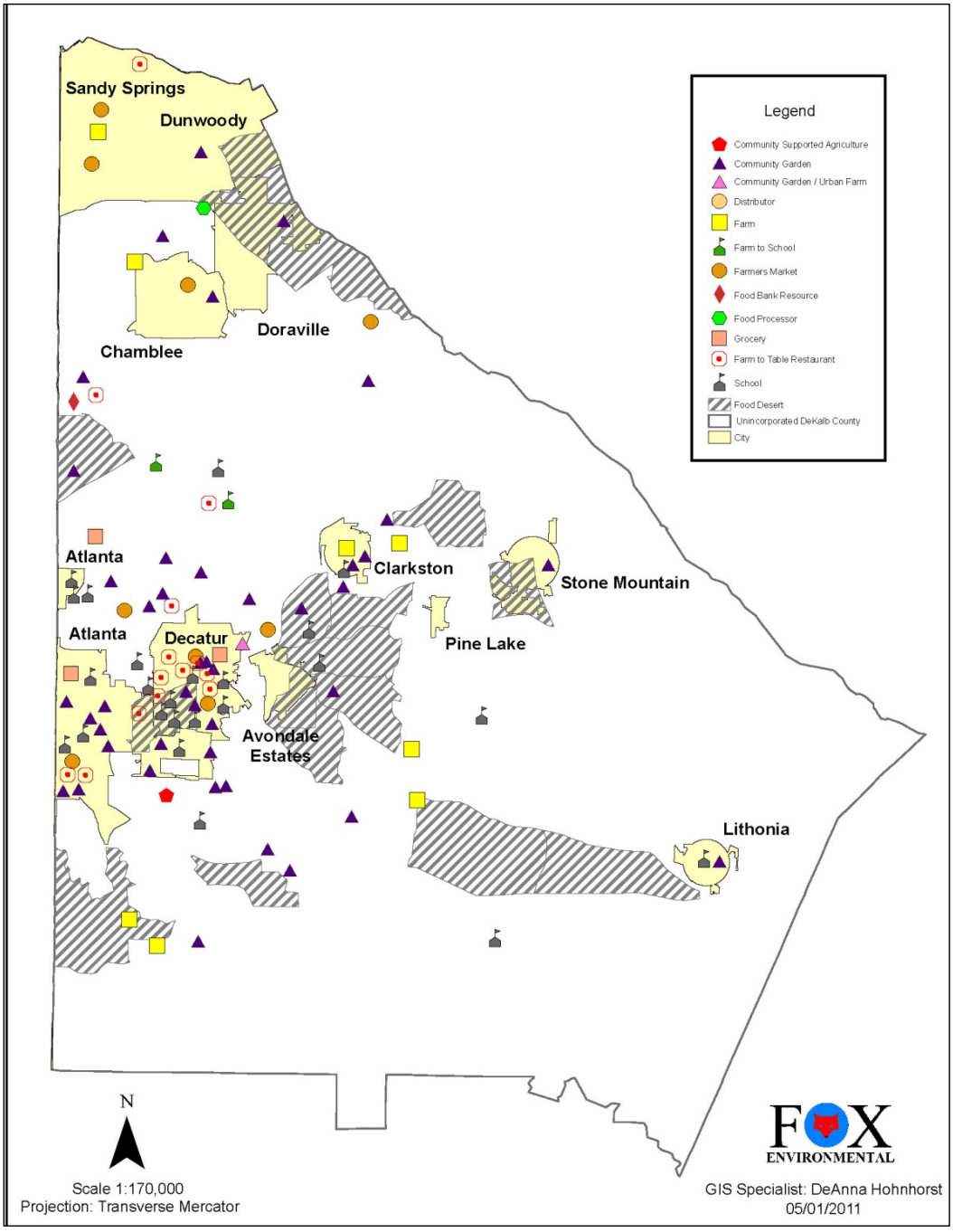
Producers perceive there to be additional barriers to accessibility of local foods for those receiving federal food assistance benefits in the form of the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). These additional barriers include operational difficulties, stigma, and lack of awareness that some markets accept federal benefits.

Interviewees also proposed possible solutions to increasing consumer access to local foods, which are summarized in Box 4. Furthermore, producers noted the importance of maintaining transparency and continuing to have open communication and collaboration between

Box 4. Solutions Proposed by Respondents To Increase Consumer Access to Foods Sold at Farmers' Markets and Through Community Sponsored Agriculture

1. Assisting with or reducing the burden of mandatory regulatory activities (permits, certifications, etc.).
2. Providing resources or alternative options to negotiate proposed regulations.
3. Drawing upon policies that other states have used and lessons learned for streamlining and simplifying processes.
4. Decreasing taxes on small farmers while increasing incentives to grow fruits and vegetables using sustainable methods.
5. Creating partnerships with low-income communities to promote availability of SNAP at markets.
6. Enabling community stakeholders to build new models and adapt old ones.

Figure 1. Map of Food Deserts and Local Food Resources in DeKalb County



Local food resources include food production, retail, or distribution sites, for example, groceries, farmers' markets, restaurants, food bank outlets, urban farms, community gardens, etc., that self-identified as producing or sourcing locally produced foods. Food retail outlets such as groceries or convenience stores not sourcing local food are not indicated. Data for local food resources included are current as of May 1, 2011, and were provided by the following organizations: Georgia Organics, Atlanta Community Food Bank, Fox Environmental, and Rollins School of Public Health at Emory University. Data on food deserts, which the USDA defines as a "*low-income census tract* where a substantial number or share of residents has *low access* to a supermarket or large grocery store" (USDA ERS, 2012a, "How is a food desert defined?") were provided by the USDA Economic Research Service and defined using 2000 census tract data (USDA ERS, 2012b). The map was developed and prepared by DeAnna Hohnhorst, Geographic Information Systems and Database Specialist (GIS/DBA) and independent contractor for Fox Environmental in Decatur, Georgia.

communities, local businesses, markets, and producers. In summary, local food distribution systems serving DeKalb County have adapted to suit the needs and resources of producers, consumers, the community, or any combination of the three, but still face multiple challenges. In order to increase access to local, healthy foods in low-income areas of DeKalb County, local- and state-level government can reduce producers' risk through funding logistical and policy support for adapted models.

Community Gardens

Background: Community gardens are an increasingly popular part of local food systems. However, little has been documented about how the gardens function, barriers to operation and uptake, what motivates communities to establish a garden, and how gardeners perceive their role in the creation of an accessible, just, and sustainable local food system.

Methods: To address these gaps, students conducted qualitative interviews with individuals representing 18 community gardens in DeKalb and Fulton counties of metro Atlanta.

Findings: Gardeners interviewed represented gardens that varied in size, location, demographic served, length of operation, and operational strategy. Primary purposes of the gardens included growing food for home consumption, growing food for donation, and any combination of these purposes. The gardens were mostly growing typical annual vegetables, with some herbs, berries, fruit, and flowers.

Primary motivators for participating in community gardens included learning more about gardening, forming community connections, growing fresh food, and saving money. Decisions about which crops to plant were determined by each plot holder, or in the case of communally managed gardens, through a group decision-making process. Crop choices were often based on what had the biggest difference in taste or price compared to store-bought alternatives.

Three general successes were highlighted by garden leaders: (1) educational impact; (2) creating neighborhood or community pride; and (3) building community connectedness. When asked about barriers to successful community gardens, participants highlighted the balance between leadership and collective responsibility, availability of natural resources such as water and appropriate land, commitment of human resources, and processes related to permits, regulations, and fees. Although not all interviewees had firsthand experience promoting gardens in low-income communities, the ones who did cited similar barriers. Even so, participants indicated that some of the barriers may be more acutely felt due to limited time, resources, experience, and capacity within low-income communities.

Four primary areas for action emerged from these interviews: (1) developing networking and communication opportunities between gardens; (2) creating zoning and other policies that explicitly support urban agriculture; (3) encouraging clear, mutually respectful communication with city and county government; and (4) increasing awareness of available resources.

Farm to Table Restaurants

Background: The farm-to-table movement in DeKalb County is playing a significant role in driving local, sustainable food production and educating consumers about healthy food choices. However, there is little information available on the process through which the farm-to-table system operates in DeKalb County, which factors enable or hinder this process, and how these influence access to locally produced, sustainable foods.

Methods: Thirteen farm-to-table restaurants were identified in DeKalb County using Internet searches and the Georgia Organics Local Food Guide (Georgia Organics, 2011). In-depth interviews were conducted with the owners or managers of the three that agreed to participate. In-depth interviews were also conducted with four suppliers, including three growers and one distributor, who were identified during the restaurant interviews.

Findings: Participants identified several challenges inherent in a farm-to-table restaurant system. Generally, the farm-to-table restaurant system operates on a smaller scale than the conventional restaurant supply system, and participants do not benefit from the same economies of scale.

Everyone involved in the system has smaller profit margins than conventional restaurants and suppliers, exacerbated by the higher cost of producing food through sustainable growing practices. Respondents also cited a high delivery cost to volume ratio, as suppliers have to expend time and money making frequent deliveries. Additionally, the consistency of the quantity and quality of locally sourced foods is variable and affected by many factors, including weather and season. The farm-to-table restaurant system requires intense logistics management to keep inconsistencies to a minimum. Lastly, the higher costs make reaching low-income communities a challenge; none of the restaurants identified by this team were located in low-income areas.

Participants also discussed factors that enabled successful farm-to-table operations. Relationships between suppliers and restaurants are critical and facilitated by direct interaction, regular and consistent communication by phone and email, and transparency about availability of foods and their use in the restaurant. Participants also emphasized flexibility since restaurants may need to change their menu or provide a substitution if an expected item is not available. Both restaurants and suppliers said that the ability to innovate and a willingness to experiment with different processes and products are keys to making the farm-to-table system work well. They also agreed that knowledge transfer between the restaurants and suppliers is essential for understanding each other's needs and challenges. Additionally, both suppliers and restaurant managers highlighted that consumer awareness about health risks associated with the industrialized food system and the benefit to the local economy of purchasing locally drives the farm-to-table restaurant trend and is critical for ongoing and future growth and support of this food system in DeKalb County.

Conventional Retail

Background: The objectives of the conventional food system project for grocery stores in DeKalb County were to (1) understand the availability of regionally produced products, (defined as those produced in Georgia, Florida, South Carolina, North Carolina, Tennessee, Kentucky, Alabama, and Mississippi); (2) understand the availability of certified USDA organic foods; (3) assess the variability of availability and pricing of regional or certified organic foods in areas classified by different income levels; (4) assess the variability of food prices between and within grocery store companies; and (5) supplement the survey research with interviews with grocery store manager.

Methods: Three national chains and two independent grocery companies in DeKalb County were identified by the researchers for surveying purposes. The percentage of students receiving free or reduced price lunch in 2011 was used as a proxy measure for the income level of a school district. The researchers classified each school district into one of three categories, high-income, middle-income, or low-income, based on tertiles of the distribution of students receiving free or reduced-price lunch. Using this breakdown, DeKalb County had one high-income school district, seven middle-income school districts, and 11 low-income school districts. For two of the three national chains, the researchers selected one store each in the high-income, middle-income, and low-income school districts for a total of six stores. The third chain did not have a sufficient number of stores to sample in this way.

Prior to surveying the stores, the researchers created a list of commonly purchased items that included fresh vegetables and fruit, meat, dairy, and grains. The specific foods were chosen to reflect items that are widely consumed and widely available in retail stores to facilitate comparisons of availability and cost and are itemized in Table 1. Items sold by weight were priced per pound, and a commonly available size was selected when pricing all other items. All identified stores were surveyed on April 8, 2011. At each store, the researchers attempted to find all 27 foods in both the conventional and organic varieties using the same brands across stores when feasible. If the product was available, the production location was recorded to assess whether the food was regionally produced. Brand and price were also recorded.

To supplement the survey data, the researchers sought to interview general and/or produce managers at grocery stores in DeKalb County. The managers of identified stores were contacted by

Table 1. Foods Assessed for the Conventional Food Distribution System Project

Fruits	Vegetables	Grains and Cereals	Dairy and Eggs	Meat
apples, **grapes**, **strawberries**, **bananas**, oranges	**plum tomatoes**, cucumbers, **green bell peppers**, carrots, iceberg lettuce, **romaine lettuce**, Idaho potatoes, **yellow onions**, cabbage, kale	**Honey Nut Cheerios–type cereal**, **Raisin Bran–type cereal**, **whole wheat bread**, **white bread**	**1% milk (½ gallon or 1.9 liters)**, 1% milk (gallon or 3.8 liters), **strawberry yogurt**, **one dozen eggs**	**ground beef**, **ground turkey**, **boneless skinless chicken breast**, whole chicken

*Items in bold were included in price comparisons.

phone to request in-person, semistructured interviews; only two consented, as many companies do not permit interviews. Both interviews were conducted at the managers' respective stores.

Findings: In DeKalb County, conventional products were widely available. The five grocery store companies stocked a mean number of 24 products from the list of 27 food items, with a range of 19 to 27 products stocked. Organic products were not as widely available, with a range of 10 to 23 products stocked. The most commonly available organic products included fresh produce and dairy items. Regionally produced products (within the eight-state area) were extremely limited, with a mean number of five products stocked and a range of two to seven. The most widely available regionally produced products were milk, chicken breasts, strawberries, and green peppers. Informant interviews with produce managers confirmed that there are several barriers to stocking organic and/or regional produce, including product price and availability, store size, and potential low consumer demand. There was no product price variability found within stores of the same grocery store chain, regardless of school district income level. This was confirmed by one interview participant, who noted that all DeKalb County stores within the chain should offer products for the same price per company policy.

In order to compare the prices between the five grocery store companies, the 27-item food list was reduced to 17. This was necessary because not all products were available at each store. The prices of organic products were not used when totaling the cost of the food list unless the store did not stock the conventional varieties. The total cost for the entire foods list ranged from USD39 to USD50. Grains were particularly expensive in some of the independent grocery stores (mean = USD13) as compared to the chain grocery stores (mean = USD7.50). This is partially due to the fact that the independent grocery stores focused on organic grains.

Community-Engaged Learning and Research: Dissemination

The community-engaged research and learning projects culminated with a symposium for community partners and other stakeholders. The symposium served as an opportunity to present findings to community partners, receive feedback on findings and implications, and engage in meaningful discussion with partners about next steps. The symposium, also student-organized, drew a large and diverse group of participants, including farmers, market managers, public health scientists, dieticians, policy-makers, staff from community-based organizations, community advocates, and students and faculty from local universities. After introductory presentations were made, each student group presented its community project and findings. Breakout sessions designed to encourage further dialogue followed the presentations. Feedback from the breakout discussions with symposium participants was incorporated into a research report for community partners, which was further adapted into a report on food systems by the local board of health (DeKalb County Board of Health, 2011). The research and feedback from the community also helped identify strategies and topics for

future collaborative efforts.

A notable theme emerged from discussions at the symposium: residents of low-income communities were not well represented. This was largely because the community-engaged research component focused predominantly on those food procurers, sellers, and producers who could potentially provide food to these communities. Participants agreed that while a focus on producers within food systems was a logical and useful starting point, future iterations of the community-engaged research and learning component of the course should strive to include the perspectives of purchasers and consumers of food and especially those in low-income or food desert communities.

Discussion

This course provided a unique opportunity for students to explore the complex relationships between food systems and policy, nutrition, health, justice, and sustainability in an academic setting, while experientially investigating these issues through direct community-engaged research and learning. Students reinforced research and critical evaluation skills developed during their public health and nutrition training by reflecting on their experiences, designing learning modules, and engaging in research. In course evaluations, students reported that the experience from this course opened their eyes to the complexity of food, nutrition, and health issues, and both challenged and prepared them to think critically about causes and consequences of food systems and food insecurity. At the end of the course, students reported having a better understanding of the relationships between food systems and policies, individual dietary choices and health outcomes, and issues of sustainability and justice, indicating that the course had achieved the desired objectives. Students also reported increased conscientiousness in their own dietary choices, concern about the difficulties in accessing quality food due to system-level barriers, and desire to emphasize a food-systems perspective in nutrition and public health research and practice. Since participating in the course, most of the students have undertaken meaningful volunteer or paid work based on their experiences in the course, some with community partners they met during the class projects and some with like-minded organizations at other locations. Several students are pursuing careers directly related to the course topics, and several other students report that the course has impacted their professional goals. Additional benefits of the course reported by students include developing the capacity to move from problem-oriented thinking to solution-oriented thinking about food systems, recognizing the potential impact of small-scale but intentional collaborations, and empowering students to be informed and engaged citizens.

Successes and Limitations of the Course

There are many important factors that contributed to the success of this course. Several limitations also emerged in the process of course development and implementation. One of the greatest strengths identified by students and faculty was that it was student-driven. It specifically addressed the needs and interests of the students and met a gap in the existing course selection in the public health curriculum. Also, this was an excellent opportunity to proactively apply the research skills gained in other courses. Because of this, students were engaged and committed to the success of the course. Secondly, the course was consistent with Emory University's principles for sustainability and student engagement, resulting in a supportive university environment and departmental buy-in. Support from Emory's Center for Community Partnerships (formerly the Office of University and Community Partnerships) facilitated the community-engaged research and learning component of the course. The purpose of the CFCP is to connect and support partnerships between Emory and the community through engaged learning, research, and community work (Emory University, 2012). CFCP offered assistance throughout the process of course development and relationship-building with community partners. Additionally, the CFCP provided financial support for student participation in a conference on sustainable food systems and dissemination of research findings at the student-organized symposium.

Lastly, the faculty advisor was committed to ongoing collaborations with the community part-

ners beyond the tenure of the course. Community partners were encouraged to view themselves as partners in the success of the course and projects and as stakeholders in deciding the direction and focus of future iterations of the course. This commitment has resulted in the development of relationships that ideally will foster long-term collaborations with mutual benefit for and engagement with community partners.

Despite the identified successes, there were certainly some constraints. First, developing a new course required a significant time commitment, both for faculty and students. Although the advance planning during the fall semester contributed to a successful course, without that additional commitment, it would have been difficult to develop meaningful partnerships and design community-engaged research. The time commitment during the semester was also substantial, especially for a two-credit course. When making recommendations about how to manage the time commitments required by the course in the future, students emphasized the importance of retaining all components of the community-engaged portion. Students felt that maintaining both the extensive didactic component and community-engaged project would require the course to be offered for three credits. Conversely, if the course were to be offered as a two-credit then the didactic portion would need modification in order to retain all of the community-engaged work.

Another challenge encountered throughout the semester was keeping each class session focused on the given topic. For example, it is difficult to address food justice and sustainability without discussing food and agriculture policy, so those topics overlapped in multiple modules. This presented a logistical challenge because it required students to remain flexible and frequently collaborate in the development of their course modules. The overlap was also positive because it reinforced the interconnected nature of these issues and allowed the students to revisit key topics and relationships throughout the course activities. Utilizing a complex case study approach to teaching these principles in the future, rather than trying to teach them through distinct learning modules, may be a more appropriate pedagogical approach and will be tested in future course offerings. Lastly, conventions and definitions of key terms, such as health and sustainability, vary between and among different fields. This posed a problem for clarity and consistency in defining sustainable foods, but it also created a rich opportunity for discussion of the importance of terminology, labeling, and marketing in food systems and policy. In conducting the community-engaged research projects, definitions for local and sustainable foods were fluid and dependent on the definitions provided by community partners or by participants who self-identified as providing locally sourced or sustainably produced foods based on their own understandings of what these terms mean.

Future Plans

In future years, we anticipate the course will be offered as a three-credit course due to the time commitment of community-engaged work. To continue the student-centered approach that is critical to its success, the course content and format will be adapted each year according to student interests and academic needs. However, based on feedback from students and community partners, future iterations of the course will have a greater emphasis on the causes of food insecurity and community-based strategies to improve access to healthy and sustainably produced food. Case-based learning strategies will be utilized to emphasize the integrated and complex relationships between food security, agriculture, food policy, and food systems. Community-engaged research will strive to partner with residents of low-income and food desert communities to document their challenges and strategies for purchasing and consuming healthy, sustainably produced foods.

The interdisciplinary nature of food systems suggests that a course on food systems would benefit from a diverse set of student backgrounds, not just those in public health. Therefore future offerings will be open to students across the various disciplines and schools within the university system. Engaging students early in their graduate career may provide opportunities for students to develop a more sustained engagement with communities and community partners.

Conclusion

This student-led, community-engaged pilot course on food systems allowed students an opportunity to explore a topic of great interest in an academic setting while simultaneously engaging with active community partners. Community-engaged learning courses often struggle to balance the service and the scholarship aspects of a course. However, because this was a student-driven course, students were successfully able to engage with both the academic and the community perspectives on food systems. With students as a conduit, this course structure allowed the academic sphere to interact and build relationships with the public/private sphere. Through collaboration, the students, faculty, and community partners were able to expand the body of knowledge relating to local food systems to continue to support the development of a healthier, more sustainable food environment in DeKalb County, the metro Atlanta area, and beyond.

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