Food Insecurity and an Urban American Elementary School: Development of a Community Based Research and Service-Learning Partnership

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Undergraduate students in *Field Methods in Cultural Anthropology* established a partnership with a teacher and students at an urban elementary school to study food insecurity. This paper describes how the project was formulated, the roles undergraduate researchers and community partners played, research findings, some of the consequences of participating in the research process, and a programmatic outcome of the research. The goals of the research were developed in consultation with the elementary school's child nutrition specialist (the "Lunch Lady") who expressed concern about food insecurity among the students who live in an extremely low-income, urban neighborhood. The university students developed a research design that incorporated 5th grade math students as research partners. The results clearly demonstrated increased food consumption at the end of the month, a time of resource depletion for many of the students' households. Participation in the project expanded the active community awareness of both the undergraduates and 5th grade partners. Findings from the study were used by a local food pantry in adapting food distribution practices that specifically target children's needs in an ongoing collaborative program of food supplementation.

The course "Field Methods in Cultural Anthropology" at the University of Akron has ambitious goals for a single semester: to learn social science research methods by designing, implementing and analyzing the findings of a community-based research and service-learning

(CBRSL) project. The course typically begins with classroom study of research methods and a series of exploratory meetings with potential community partners. In the spring semester of 2009, after such a meeting in a local elementary school, university students were introduced in the hallway to the school's child nutrition specialist – the self-described "Lunch Lady." When asked whether she had a question that, if explored by the university students, might generate data that would improve conditions at the school, the Lunch Lady raised the subject of hunger. She explained that she believed many of "her children" were "power-eating" at the end of each month. It seemed to her, she said, that children in the cafeteria were eating more at breakfast and lunch. In addition, they seemed more intent on their food; even the noise level in the cafeteria appeared to fall in the final days of the month as students concentrated on eating. Finally, the Lunch Lady suspected that some children were pocketing uneaten food to eat later, a specific violation of school district's written policy. She hypothesized that this was because poorer families' resources were often depleted toward the end of monthly earnings and public assistance cycles. What the Lunch Lady was describing appeared to be food insecurity. In light of her concerns, the university students elected to explore food and eating in this school setting for their CBRSL project.

The purpose of this paper is two-fold. First, we will lay out the development of this CBRSL partnership and project in a way we hope will support others if they choose to develop something similar. Second, we will report on the results of our research and reflect on the implications of participation for the various team members.

Food Insecurity and its Impacts

Food insecurity is defined as (a) uncertainty about future availability of food, (b) insufficiency in quantity or quality of food, and (c) a need to procure food in socially unacceptable ways (Cohen 2002). Until 2006, health and policy experts framed the issues of food security in terms of four degrees: food insecure with severe hunger, food insecure with hunger, food insecure without hunger, and food secure (Maxwell & Frankenberger 1992).

Globally, the first two of these degrees have been the focus of innumerable World Health Organization (WHO) and smaller non-governmental organization (NGO) efforts. In recognition of hunger concerns in the U.S., the federal government implemented the National School Lunch Program in 1946 and the School Breakfast Program in 1968 (USDA-ERS 2000).

A great deal of excellent work has been done in engaged, participatory and action research, as well as CBRSL addressing food and food-related health issues from culture-centered perspectives (Dutta & Basu, 2008). A few engaging examples include the work of Giachello et al. (2003) and Vásquez et al. (2006) in public health, Israel et al. (2006) in urban studies, Lueng et al. (2004) in epidemiology, Chen et al. (2012) and Koenig et al. (2012) in communication, Meenar and Hoover (2012) in planning and design, and Aftandilian and Dart (2013) in anthropology.

The current approach to categorizing food insecurity by the USDA defines households as either secure or insecure on the basis of answers to a series of questions. It further subdivides food insecure households into the categories *low* and *very low* food security. Food secure households report none, one or two food-insecure conditions. Food insecure households report three or more conditions (Coleman-Jensen, Gregory & Singh 2014, p. 3). Low and very low food security categories identify households in which food intake was reduced or disrupted by insufficient resources to procure or produce food. The two categories are distinguished by the severity of disruption based on the number of insecure conditions identified through the questionnaire (e.g., felt hungry, skipped a meal, could not acquire a nutritious meal, and did not eat for a full day). In general, low security is characterized by compromised quality and difficult access to food; and very low security is characterized by reduction in intake and disrupted eating patterns for the household or specific household members (Coleman-Jensen et al., 2014, pp. 4-5).

In 2013, the USDA's Economic Research Service reported the results of their annual survey of household food security and found roughly 14.3% or 17.5 million U.S. households were food insecure. In households with children, 9.9% were classified as having low or very low food security based on reported inability to provide adequate, nutritious food to their children at some time in the 12-month period covered by the survey. This number has remained essentially unchanged from the reports of 2010, 2011, and 2012 USDA-ERS survey data (Coleman-Jensen et al., 2014).

The geographic patterning of household food insecurity shows states along the Western and Southern borders of the U.S. experiencing rates significantly higher than the national average. While Midwestern and Great Lakes region rates are lower than those in the West and South (prevalence of food insecure households in Arizona was 21.2% while Ohio household prevalence was 16%), Ohio's overall prevalence of food insecurity is still significantly higher than the national average. When comparing data from 2001-2003, 2008-2010, and 2011-2013, Coleman-Jensen et al. (2014) found that food insecurity in Ohio has worsened, nearly doubling from the earliest to most recent data, with urban and rural areas experiencing more acute conditions than suburbs.

A study of food deserts, geographic areas in which fresh, affordable food is difficult to obtain; and food insecurity that included the low-income urban neighborhood surrounding the elementary school where our research took place; found that food resources in area shops and grocery stores were weak in relation to USDA nutrient requirements and therefore contribute to an overall food insecure environment (Williams, 2002). According to the Ohio Department of Education, 100% of the children in the urban elementary school we studied are from economically disadvantaged homes (ODE 2012). This status is determined by demonstrating a family is at or below 130% of the federal poverty line and is represented by an annual income of $32,850 for a family of four in 2014 (USDHHS 2014). This extremely high level of poverty offers insight into the resource level of the school's neighborhood and the likelihood that students may experience food insecurity. In addition to economic disadvantage, Coleman-

Jensen et al. (2014) found single-parent households and black racial status increased the likelihood of food insecurity in their samples. At the school we studied, the population was 60.7% black or biracial (ODE 2012). Further, the school's principal estimated that "well over half" of the children in the cohort we studied came from single parent households (personal communication).

Low and very low food security have been shown to affect memory, cognitive functions, language, motor skills and social interaction with other children (Aliamo, Olsen & Frongillo (2001). Behavioral problems are also linked to food insecurity, including irritability, fatigue, and difficulty concentrating in a classroom setting (Jyoti, Frongillo & Jones, 2005). During developmental stages, children at high risk for food insecurity have problems learning certain language and motor skills. In contrast, children from food secure households generally have better attendance records and lower incidents of tardiness (Ashiabi 2005; Feeding America, 2009).

Looking directly at school performance, connections have been drawn between food insecurity-related behavioral problems and lower test scores (Alaimo et al. 2001). Children ages 6 to 11 years old from food-insecure households were more likely to be reprimanded, more likely to receive special education services, scored less well on math tests, and were 1.44 times more likely to repeat grades. They were also 1.89 times more likely to be referred to the school psychologist (Alaimo et al. 2001). While it is extremely important to recognize that food insecurity is not a direct cause of any of these concerns, it is a salient variable in the complex relationship between individual circumstances and school-readiness. Understanding the potential impact of food insecurity for children at this school added a strong sense of purpose and even urgency to the study for the university students.

Setting

This study took place in a public, urban elementary school in Akron, Ohio, a mid-sized, Midwestern, rust-belt city. The city's current population of approximately 200,000 has decreased since the 1960 Census. About 14% of families and 17.5% of the total population live below the poverty line, including 25.7% under the age of 18. Residents average one of the smallest median yearly incomes in the country ($31,835). The city has experienced a steady loss of jobs over the past 50 years and with the recent recession, the rate of loss has been more precipitous (U.S. Census, 2010; Gundersen, Waxman, Engelhard & Del Vecchio, 2012).

Most of the children live within walking distance of the school in a neighborhood with a relatively high crime rate compared to other areas in the city. The school staff, families and members of a community block watch identified a range of concerns including drug, gang and prostitution activities in the area. The school was K-5 at the time of the study with an on-site preschool. All of the approximately 300 students, because of the overall low-income status in the school's catchment area, are offered free breakfast and lunch.

Research Team, Partners and the Partnership

The university team consisted of one faculty member and 14 advanced undergraduate anthropology students, including this paper's co-authors. In keeping with CBRSL goals that emphasize engaging community partners as active participants in the research process, a math teacher at the school sat down with the university team and worked out a plan that would allow 12 advanced 5th graders and university students to work together. We all agreed that 5th graders would not be involved in direct interviews with other students but instead primarily engaged with cafeteria-based collection of food data (the garbology component of the study). The team identified specific components of the state-mandated math and science curriculum that our study activities could effectively reinforce (multiplication, percentage calculation, weights and measures, and the scientific method). Given her classroom responsibilities and in light of a grueling testing regime imposed by the State of Ohio, the teacher did not participate in the study itself but supported the combined university/5th grade team by coordinating meeting times, arranging meeting spaces, and adjusting part of her curriculum to align with the study timetable. Parental permission for the 5th graders was sought and acquired and the full team met twice a week at the elementary school for six weeks.

The partnership also included the Lunch Lady and the building custodian. Once briefed on the study goals, these two dedicated staff members helped the team design and facilitate a practical plan for food data collection in the lunchroom, and, as will be detailed later in this article, collected additional data that substantively contributed to the study. This partnership, as they often are, was a coalition of the willing. While each party that became involved brought specific skills and goals to the table they also came with constraints that required the partnership to make accommodations.

Questions and Methods

The specific research question developed in a dialogue between university team members and adult partners at the elementary school was: Do the amounts of food, eating habits, and nutritional intakes of 4th graders differ significantly in a comparison between the beginning and end of the month? The comparative design was logical given the Lunch Lady's initial observation and was confirmed as a reasonable design choice by the principal who informed us that a great many of her school's families were on some form of public assistance or worked low-wage jobs that often meant resources were running low or were depleted once rents and bills were covered in the early to middle portions of each month. We did not include the 5th graders in these discussions first because their teacher had not yet completed the process of selecting the students and securing permission from their parents, but also because we chose to keep their involvement in the study focused on learning about what foods people were eating rather than on the issue of food security.

The data collection for the garbology component of the project was confined to just two days, one at the start and one at the end of a month in the early Spring. The primary reasons for this

sub-optimal design were time constraint and bureaucratic necessity. In terms of time, the project had to fall within a single semester, during which the university students needed to learn about their research methods, gain an understanding of food insecurity and the other issues the study questions raised, and have time after data were collected for analysis and report writing. In addition, it was necessary to apply for and receive approval from the university and school system's Institutional Review Boards for Research with Human Subjects (IRBs). This is obviously a limitation of the study; we cannot be sure that we would get the same results on a different pair of similarly spaced days. We did our best to minimize this limitation by choosing days that were in reality only a week apart (the end of one month followed by the beginning of another). This cut down on the possible impact of significant temperature and activity differences. We selected two meals that our 5th grade partners, the Lunch Lady, and the custodian felt were comparably popular.

In consultation with the Lunch Lady, custodian, and 5th grade math teacher, we developed a study plan that would minimally disrupt school routines, engage 5th graders actively in the research process, fit within our semester time frame, and effectively address our research question. We selected four research methods (interviewing, 24-hour dietary recalls, participant observation, and garbology) and created appropriate tools for gathering data. IRB approval was obtained from the university and the research office of the public school system (protocol #20090106). The principal agreed that data collection could take place during lunch and recess periods.

First, we created an interview protocol using food cards created from a food inventory conducted by the 5th graders of their own home pantries and refrigerators. In an effort to understand the food environment in which the children live, we crafted a general interview with open-ended questions (some relying on the food cards) about individual food preferences, typical foods at home, and foods eaten outside the home. We also included questions adapted from the USDA's questionnaire on food insecurity (Coleman-Jensen et al. 2013). While interview questions were designed with the USDA questionnaire in mind, our questions were written in a manner that minimized potential harm to the children as recommended by Schensul et al. (1999). Second, we conducted a 24-hour dietary recall interview in accordance with the suggestions of Baxter et al. (2003) for research with children. The purpose of the dietary recall was to enumerate the types of foods, estimate quantity of food, and record the number of times children eat across a given day. Third, we employed participant observation. The undergraduate students sat with elementary school students from all grades at lunch over a span of six weeks. In analyzing our field notes we compared our observations on a number of concerns. Looking at how lunch periods were conducted we noted the highly regimented structure of the very short time period (25 minutes). We also noted the ways that adults and children organized the space using a monitor with a microphone to remind children where they were and were not supposed to be. We noted the ways adults in the room and some children highlighted certain behaviors that were considered "good" (getting up to throw trash away, asking for paper towels to clear eating spaces) and pointed out or punished undesirable behaviors (spilling, getting up for social reasons, talking

to table mates, trading food). Then we pulled a list from across our field notes of all food-related behaviors by children that we observed (Schensul et al., 1999).

Finally, we adapted the technique known as garbology. Garbology, or the use of trash to study human behavior, has a long and rich history. Perhaps the most well-known trash archaeologist is William Rathje, whose pioneering work in the 1980s examined contemporary trash to improve our understanding of human cast-off behavior. His work is well described in *Rubbish!: The Archaeology of Garbage* (Rathje & Murphy 2001). Systematic examinations of trash exist in many social science arenas. Charlin et al. (1990) developed a garbology technique to explore teenage tobacco product use. In fields as disparate as consumer sciences and marine education, researchers have fruitfully adapted Rathje's general approach. Previously, we explored the potential application of a garbology approach to nutritional anthropology in a CBRSL setting at the University of Pennsylvania in the 1990s and then conducted a new study of nutritional intake and physical activity at a largely middle-class Ohio elementary school in 2005. In that case, we systematically measured and recorded all food brought from home to the cafeteria or taken in the cafeteria by a cohort of 4th graders. We then measured and recorded the trash thrown away by the 4th graders in order to determine how much food the cohort under study actually ate during selected lunch periods and the nutritional components of the diet (Behrman and Waggoner n.d.). In this study we replicated the garbology project described above with our 5th grade team members as full partners in the garbology component of the study. In non-latex gloves and lab coats, they worked with university students in the careful measurement and recording of data. The work reinforced measurement, the scientific method, and skills in the calculation of fractions and percentages as before/after data were processed.

Findings: Garbology

The findings from all the data collection methods are reviewed here, with an emphasis on the garbology component. Below we detail the process of engaging in research with the 5th graders, actual data collection and analysis, and the interpretation of findings.

University students and 5th graders met twice during lunch periods in the 5th grade classroom to develop a data collection plan. The 5th graders felt there were certain days that were not wise choices (for example, Wednesdays are popular "pizza days" when the students believed there would be no leftovers to measure). Similarly, as we explored the school's monthly menus, 5th graders felt some days' food choices were not fair comparisons to others. We finally settled on the last Friday and first Friday when lunch menus were deemed equally desirable in the opinions of our younger team members.

The team worked together to develop the data collection protocol including defined tasks and a rotation schedule. The cafeteria personnel and custodian were consulted about the best locations in the cafeteria to set up waste collection and weigh-stations. An equipment and

supplies list was drawn up: scales, lab coats, gloves, markers and post-its. Tables and trashcans were reserved with the custodian.

On the first day of data collection, the team met in the cafeteria before the lunch period to suit-up and confirm tasks for each worker. Lunch food is not cooked in the cafeteria in this school system but prepared by a contractor and delivered in pre-packaged individual serving containers. A random sample of each food item being offered for lunch was weighed and recorded. Next, as lunchtime was underway, a team of university students and 5th graders quickly enumerated each 4th graders' tray contents as they exited the food line. Children were left alone to eat their lunches but team members collected trays from 4th graders as they finished eating. The trays were brought to one of three weighing stations. Here other team members weighed and recorded the food containers, wrappers and uneaten food from each tray. After all of the data were recorded, weights of the eaten food were calculated by subtracting uneaten weights from the sample items' weights taken at the start of the lunch period. Researchers then calculated the percentage of each item eaten and the percentage of the full complement of food taken that was consumed by each child as represented by their tray.

A simple comparison of total percentage of food eaten divided by food taken showed that these 4th graders ate a statistically significantly greater amount of food on the last Friday of the month than on the first ($p<.05$). Specifically, the average consumption by each child at the beginning of the month was 65.47% (Table 1) of the food brought or taken in the cafeteria and at the end of the month this increased to 75.92% (Table 2). Sample sizes were comparable ($n=49$ and $n=53$) and the distribution of percentage of food eaten varied across the cohort. It is important to note that children take food in pre-prepared servings. Any extra food that is not yet open is redistributed. So a child might have taken two sandwiches and eaten all but one half. This would result in a record of that child having "consumed 75% of sandwiches taken." Total volume of food eaten by weight for the cohort is also striking. Comparing beginning of month to end, we found that 4th graders ate more than 17 pounds more food at the end of the month.

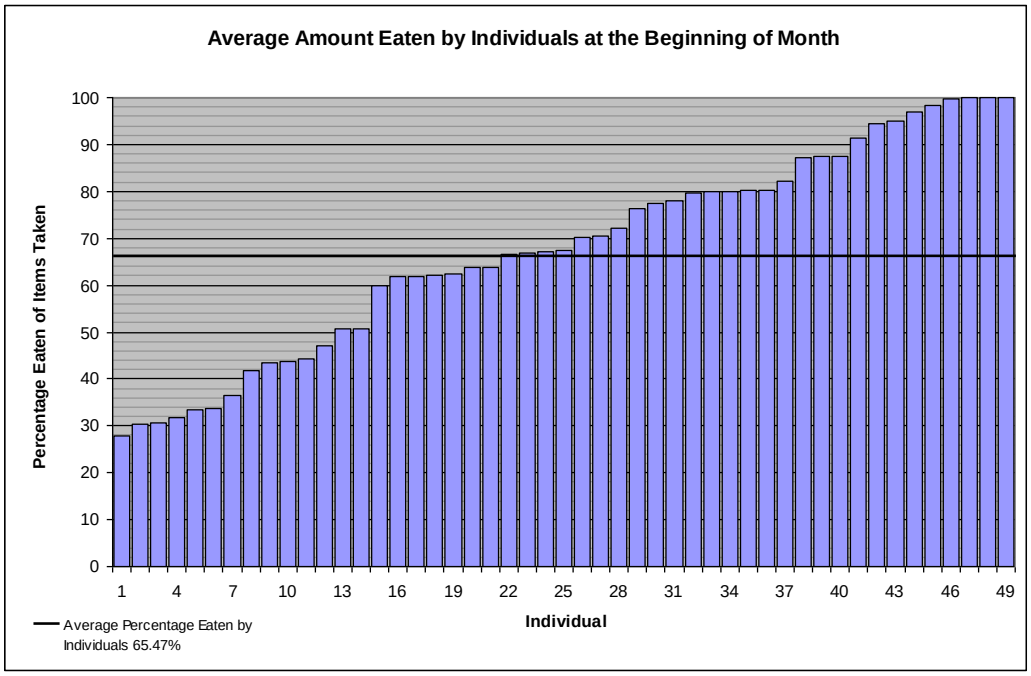

Table 1

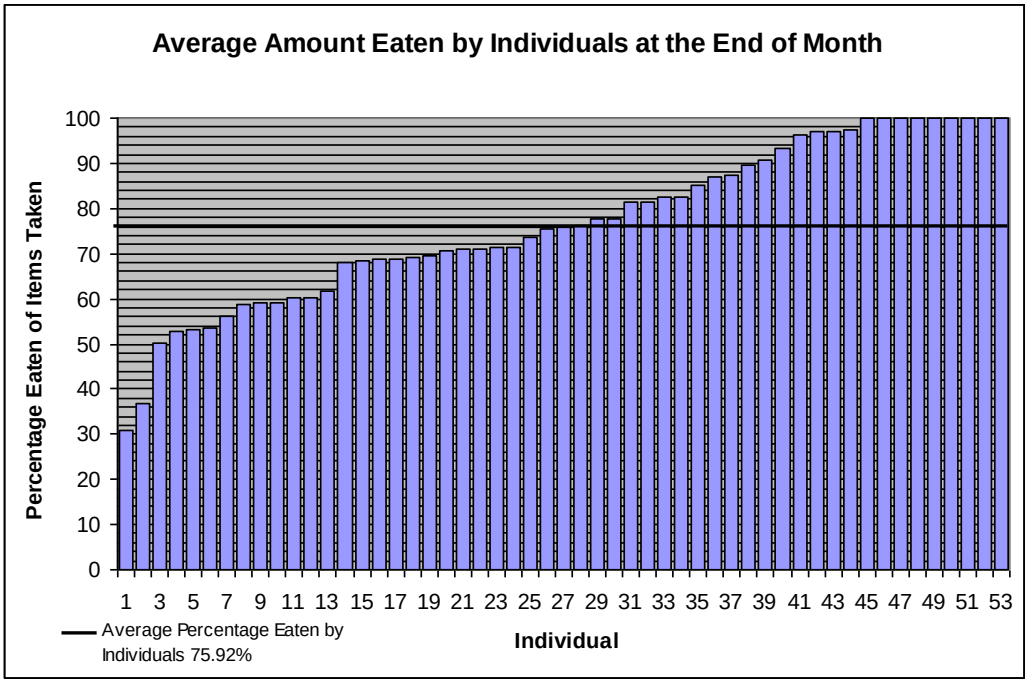

Table 2

As often happens with community-based research, things do not always go as planned. On our data collection for the first day of the month, we learned upon our arrival that elementary students with good attendance were to receive a reward. Carry-out pizza slices were served to five students with perfect attendance in addition to regular lunch. Pizza slices were dutifully added in to our calculations. Despite the addition of this highly attractive dietary supplement on the day we had hypothesized children would eat less, our aggregated data still showed that more food was consumed at the end of the month.

Consequences

In this section we turn to the outcomes of what we consider to be a successful endeavor. The results of the garbology study were supported by findings from the 24-hour dietary recalls, the latter of which showed a drop of roughly 20% in caloric intake outside of school by students from the beginning to end of the month. Our interviews and participant observations helped fill out the research experience for the anthropologists-in-training and gave context to help us understand the results of the study. The 5th graders gained a better understanding of scientific research though working closely with university students in systematic data collection and the research process, as well as practicing applied mathematics. Students in the university anthropology class demonstrated competence in research design, data collection, and data analysis.

We deem the CBRSL project also a success. A core tenet of good CBRSL is that it generates dialogue and inspires further inquiry on a focal issue at the local level (Behrman 2004). As a supplement to our research, our Lunch Lady and custodian examined data on numbers of free breakfasts served in the last and first week of the month. In averaging the number of free breakfasts taken per day for each week, they found that students took 220 free breakfasts per day during the last week compared to 185 per day for the first. This is more statistically significant than our garbology finding!

Continuing in this vein of engaged community-oriented consequences, a specific recommendation from the university students at the end of their semester was that some effort be made to act on the findings. The students produced a final report as a requirement of the class that was presented to the school principal, the 5th grade teacher, Lunch Lady, and custodian. The Lunch Lady suggested that supplementary food could be distributed to children in need at the close of the month through a community center adjacent to the school. The community center director steered the conversation to the director of a nearby church-based food pantry. And, in the summer after the research project, the wife of the pantry director took the reins and launched what she called the PB&J Supplemental Food Program. Although our PB&J program has not been formally published, another similar "backpack" food program was evaluated in Rodgers and Milewska (2007).

As the director of the PB&J program, she set out to gather resources and organize volunteers to pack and deliver "kid-friendly" bags of food (no-heat and no knife required) to the community center connected to the school every Friday of the school year. The PB&J director drew volunteers from the church housing the pantry and with Behrman worked hard to create relationships with student groups interested in community-service on the university campus. Starting in the fall of 2009, the school counselor identified potential candidates for the program and got parental permission. PB&J requires weekly volunteers to pack, transport, and hand out the food bags to children who leave class slightly early to pass through the attached community center and collect their food. The volunteers then wait with the children until the school bell rings for dismissal. Five years later, faculty at the university and the university's service-learning director formalized a university student-volunteer network for PB&J by enlisting a sorority's help. Although PB&J seems always to have the bare minimum of staffing, it has doubled the number of children served at the school and it has survived a transition to a new director, a change in community center directors and relocation from the food pantry to a new church. It is a scrappy, determined effort that has gained a foothold and is very popular with the children. Approximately 50 children per year on average participate, some of whom have been in the program all four and a half years to date.

In 2011, another university "Field Methods in Cultural Anthropology" class returned to the elementary school and worked with 5th grade partners to look at children's ideas about eating and healthy foods; and the quality of the foods available through the PB&J program and in school lunches. Their work eventually focused on the budding community garden projects in the neighborhood as well. In spring 2015, students from another course will return to the school community, this time perhaps asking whether food insecurity has been altered by five years in a supplemental food program and ongoing attention to community food issues like the community gardens.

Reflections

All of the partners found rewards in the hard work involved in the conception, design, and implementation of this research project, and many of those rewards are ongoing. For the university students, several continued to be engaged with the school and volunteered their time with the PB&J program. One changed her career trajectory to become a teacher; one student has continued to research the issues raised during the study, and is developing a decision model around household food security in his graduate work. The Lunch Lady saw her questions and concerns brought forward and, along with the custodian, continued engagement with data collection. This was an empowering experience for public school staff members not normally involved directly with student learning. Having that learning intersect with their workplace concerns shifted their roles and created a connection between them and the 5th grades. The 5th graders developed an interest in food and cafeteria operations, bonded as a cohort and made collegial contacts with the Lunch Lady and custodian. They also were introduced to the world of higher education when they came to the university for one day of

data analysis and a campus tour. For me as the instructor, this partnership transforms with each new class of undergraduates and each new research team. The shifting kaleidoscope of personalities, challenges and unanticipated solutions keep it interesting and the positive response of my students to hands-on learning make it worth the extra effort. All of the partners, including me, either developed new skills or enhanced their sense that the knowledge and skills they already possessed were useful tools for change.

A CBRSL research project is a great deal of work and we must ask if the energy and time expended was well spent. Was it worth it? As pedagogy and community-centered collaboration, which yielded empowerment and community-building, the answer is a firm " yes." As a way to further understand food insecurity, it is a qualified "yes," since there are limitations to the generalizability of this study. Additionally, there is some danger of stigmatization here for some participants. The principal and teacher were appropriately concerned to control the interface between the school activities and students' home lives. It is important that interaction between school and community not be interpreted as the school meddling in the affairs of home. Finally, we cannot know whether our research activities in the cafeteria and specifically our attention to food and consumption compelled some hungry children to not take the extra food they wanted. In the end, this research led to the creation of another NGO program that addresses food needs. Such programs have been evaluated and found to be effective (Roustit et al, 2012), but it is generally acknowledged that they do not address underlying causes of food insecurity. It is worth contemplating the degree to which outcomes from projects like this are valuable but also the degree to which they are counter-productive. PB&J is a combined effort that addresses an immediate local problem and to that extent everyone involved has celebrated it. It is also a program that draws on the energies of a small number of local activists, with limited resources, to spend their capital gathering and redistributing meager food stores rather than encouraging those activists to fight for lasting change in the inequalities that created the scarcities: low minimum wages, increasing debt, the crumbling ability of young workers to save or accrue capital, a weak social safety net, and the even more deeply underlying issues of inequalities patterned by race and gender.

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