

From Cultivation to Consumption: Linking Urban Agriculture, Nutritional Sciences, Environmental Sciences, and Telehealth to Food Deserts and the Social Determinants of Health.

Irving H. Smith, Ph.D.¹

Abstract

More than 2 million Americans live in food deserts. The U.S. Department of Agriculture (USDA, 2009) defines food deserts as those urban areas that are more than a quarter mile from a supermarket that shelves healthy food choices. In rural areas, that parameter is set at 10 miles. Food deserts contribute significantly to the social determinants of health. Not only are most individuals in food deserts economically disadvantaged and living below the Federal poverty level, poor nutrition has been linked to a number of major illnesses and diseases. In addition to malnutrition and obesity, the poor eating habits of persons in food deserts are directly linked to cardiovascular disease, hypertension, cancer, and diabetes. Cobb, LK, Anderson, CA, Appel, L, Jones-Smith, J. et al (2015) state that "poor diet was responsible for more than 600,000 U.S. deaths in 2010 alone." Coppin State University in Baltimore, Maryland, working through its newly established Health Sciences major, is offering students opportunities to improve the health and well-being of persons living in food deserts and underserved/underrepresented areas across the nation and around the world by linking coursework in urban agriculture, nutritional sciences, environmental sciences, and telehealth. These students will then be better equipped to serve and to demonstrate to individuals in the underserved/underrepresented communities of Baltimore, the nation, and the world how to manage the social determinants of health, health inequities and health disparities and how to invest in growing their own food and how to focus on making healthier food choices.

Introduction

This study was undertaken at Coppin State University, a Historically Black College/University (HBCU) in Baltimore, Maryland, to ascertain what U.S. colleges and universities are offering degree programs and coursework in urban agriculture and urban gardening, nutritional sciences, environmental sciences and telehealth; which, if any, linked these disciplines together; and to what degree food deserts, social determinants of health, and health inequities and health disparities could be managed and possibly eliminated by offering college coursework and degree programs that focus on linking urban agriculture, nutritional sciences, environment sciences, and telehealth.

Typically, food deserts are located in underserved and underrepresented urban communities. Most HBCUs are located in the very same communities as food deserts. HBCUs actually recruit most of their students from those communities and it is the HBCUs that must train and educate these students, transform them into culturally competent professionals, and dispatch them back into those underserved and underrepresented communities as ambassadors of systemic change.

More than 14 urban farms currently exist in Baltimore City according to the Farm Alliance of Baltimore (2012). The Baltimore City Office of Sustainability has developed and implemented a significant number of initiatives to assist Baltimore City residents in areas of urban agriculture.

¹ Health Sciences Chair, Coppin State University, 2500 W North Ave, Baltimore, MD 21216, USA.

Baltimore City has a land leasing initiative that allows the conversion of vacant land into urban gardens; an initiative that allows citizens to raise certain livestock; and a plan to eliminate “brown fields” and develop soil safety standards for the city. The Extension Program of University of Maryland offers workshops, trainings, and opportunities in urban farming, community gardening, and environmental stewardship. Improvements in the physical and economic health of persons living in some food deserts have been seen, but it is not enough.

More than 2 million Americans live in food deserts. The U.S. Department of Agriculture (USDA, 2009) defines food deserts as those urban neighborhoods and communities that are more than a quarter mile from a supermarket that shelves healthy food choices such as fresh fruits and vegetables; the poverty rate is extremely low; and personal transportation is minimal. In rural areas the USDA defines the parameters as those living more than 10 miles from a supermarket. Cobb et al. (2010) state that “poor diet was responsible for more than 600,000 U.S. deaths in 2010 alone.”

Study Aim and Hypothesis

The aim of this study was to ascertain what U.S. colleges and universities offered degree programs in urban agriculture and urban gardening, nutritional sciences, environmental sciences and telehealth; which, if any linked these disciplines together; which of those colleges and universities were HBCUs; and finally, which of those colleges and universities, particularly HBCUs, were focused on eliminating food deserts and the social determinants of health and those health disparities and health inequities associated with food deserts and the negative consequences of living in underserved/underrepresented urban areas. The hypothesis was that food deserts and other challenges of underserved and underrepresented communities could be better managed and possibly even eliminated if colleges and universities, especially HBCUs, were more vested in community engagement. It was postulated that if the linkage between urban agriculture, nutritional sciences, environmental sciences, and telehealth was better understood, community groups and colleges and universities could better assist individuals and groups in urban areas, food deserts, and other underserved environments, nationally and internationally, to live healthier and more productive lives.

Background and Literature Review

In 2010, the Obama Administration announced the investment of \$400 million in tax incentives to businesses that operate “healthy foods” supermarkets in food deserts with an overall goal of eliminating U.S. food deserts by 2017 (USDA, 2010). The actual number and size of U.S. food deserts is probably much larger than U.S. government estimates because of the manner in which the Federal government conducts its estimates. For example, if an urban area has no “healthy foods” supermarkets but does have two corner grocery stores, the two corner grocery stores count the same as “healthy foods” supermarkets even if those corner grocery stores also sell alcoholic beverages and unhealthy food products. According to the Johns Hopkins Center for a Livable Future (2015), one in every four residents of Baltimore City is living in a food desert. Food deserts are typically prone to more of those diseases related to poor eating habits such as heart disease and diabetes and the life expectancy of persons living in these food deserts also tends to be far less. The demographic composition of food deserts in Baltimore City is approximately 34% black in contrast to 8% white. Thirty percent of Baltimore’s school children reside in food deserts.

In comparing the availability of healthy food choices in 226 stores across 159 neighborhoods in Baltimore, Maryland, Franco, M, Diez-Roux, AV, Glass, TA, Caballero, B & Brancati, FL (2008) found a significant lack of “healthy foods” stores in 43% of the African American communities and 46% of the lower socioeconomic communities of both Baltimore City and Baltimore County. Those statistics are in comparison to 4% - 13% of the “healthy foods” stores in mostly white, middle to upper class communities. However, a more recent study conducted between 2006 - 2012 by Cobb, LK, Anderson, CA, Appel, L, Jones-Smith, J. et al (2015) found that changes in the Women, Infants, and Children (WIC) food assistance program resulted in many Baltimore corner stores offering more healthy food choices and that providing incentives for these small business owners to stock healthier foods may be a small but effective food desert solution. In another study of 65,000 rural and urban communities across the United States, Bower, KM, Thorpe, RJ, Rohde, C. & Gaskin, DJ (2013) found that fewer major (50 employees or more) “healthy foods” supermarkets and chain stores exist in mostly African American neighborhoods regardless of economic status. Freudenberg, N, Klitzman, S & Saegert, S.(2009) suggest that large chains such as Walmart hesitate to place stores in urban areas due to higher crime statistics.

Whereas individuals who live near fast food restaurants are more likely to consume more fast food, Boone-Heinonen, J, and Gordon-Larsen. P, Kiefe, CI, Shikany, JM, Lewis, CE et al (2011) found that men are more likely than others to consume more fast foods if they live in close proximity to those fast food outlets. Thorpe, R, Kennedy-Hendricks, A, Griffith, DM, Bruce, MA, Coa, K. et al. (2015) conducted a study of black men and white men living in Southwest Baltimore and found that race and socioeconomic status contributed less to the health disparities of these men than did their living environment. The study examined such factors as physical inactivity, smoking and drinking as well as income in 628 men of both races as compared to data from the 2003 National Health Interview Survey. LaVeist, T, Pollack, K, Thorpe, R, Fesahazion, R. & Gaskin, D. (2011) conducted a similar study in two Baltimore neighborhoods and found the health status of whites who live in socially and economically disadvantaged urban communities mirrors that of racial minorities living in the same surroundings.

The connection between healthy food availability and general health is just as much an international concern as it is a national concern. Canada began tracking the link between food availability, nutrition, and general health in 2007. By 2012, the Canadian government found that 13% of all Canadian families were experiencing some type of food challenges. They then linked those food challenges to overall healthcare costs and found that health care costs were higher, ranging anywhere from 23% to as high as 121% higher, when those health care costs were linked to food challenges (Tarasuk, V, Cheng, J, De Oliveira, C, Dachner, N, Gundersen, C. & Kurdyak, P. (2015).

Conceptual Framework of the Study

The conceptual framework of this study is built around the concept of community engagement as defined in 1997 by the U.S. Centers for Disease Control (CDC). The CDC defines community engagement as "the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the well-being of those people."

Study Design

One hundred and twenty-nine colleges and universities (N=129) were surveyed. This number included all of the North American land grant universities, four year state and private universities, private liberal arts colleges, community and junior colleges, and international universities listed by the Sustainable Agriculture Education Association (2016). This number also included the top 24 HBCUs with environmental programs in 2015 as well as the eighteen 1890 Historically Black Land Grant Universities of the USDA/1890 National Scholars Program (2013).

Methodology

The 129 colleges and universities were analyzed to ascertain which, if any, offered degree programs in urban agriculture and which, if any, linked urban agriculture, nutritional sciences, environmental sciences, and telehealth. The actual degree offering of these institutions was then analyzed. Lastly, the number of graduates from those HBCUs listed by the U.S. Department of Education National Center for Education Statistics (2007) was analyzed.

Results/Findings

Of the 129 colleges and universities surveyed, the degree programs were Bachelor's in Soils and Sustainable Crop Systems, Master of Agriculture in Integrated Resource Management, Interdisciplinary Program in Organic Agriculture minor, Master's and Ph.D. in Sustainable Agriculture, Plant and Soil Sciences with an Agroecology Concentration, Organic and Sustainable Agriculture and so forth. None were in urban agriculture and none linked urban agriculture, nutritional sciences, environmental sciences, and telehealth. In the State of Maryland, the U.S. Department of Education National Center for Education Statistics (2007) cites only the University of Maryland at College Park on its list of the 25 top agriculture programs for African Americans and <http://hbcu-colleges.com/environment> cites only the University of Maryland Eastern Shore (UMES) on its 2015 list of the top HBCU environmental schools. The 10 HBCUs listed by the U.S. Department of Education National Center for Education Statistics (2007) graduated an average of just under 18 students per institution in 2007.

Discussion and Conclusion

Improving the availability of healthy food choices in food deserts and urban areas may not be the best overall health option in many urban communities. In some communities around the United States, the problem of food deserts and eliminating fast food restaurants has had an opposite effect.

For example, according to Sturm, R. & Hattori, A. (2015), the City of Los Angeles passed a law banning fast food establishments in lower socioeconomic neighborhoods around the city. The intent of the law was to reduce obesity rates in those specified neighborhoods. However, between 2007 and 2012, the obesity rate increased in those neighborhoods and communities faster than in other parts of the city. Apparently, simply restricting the sale of unhealthy food and improving access to healthier food outlets does not change the attitudes, beliefs, or habits of many individuals.

Ortega, AN, Albert, SL, Chan-Goldston, AM, Langellier, BA, Glik, DC et al (2016) conducted a 2-year study of more than 1,000 individuals in East Los Angeles and found that even after assisting corner store owners in the purchase of equipment and furnishings, fresh fruits and vegetables, and even training and marketing techniques, no measurable difference in overall health was realized. There could be several possible explanations. Many individuals are not accustomed to eating healthy foods. Deckersbach, T, Das, SK, Urban, LE, Salinardi, T, Batra, P. et al (2014) suggest that individuals may need to train their brains into eating healthier foods and avoiding unhealthy foods. They suggest that individuals develop their tastes based on availability and once the habit of unhealthy eating is established, it becomes difficult to reverse.

According to Mennella, JA, Pepino, MY and Reed, DR (2005), food choices are the result of the taste receptor genes in children and adults. Harrison, K. (2005) suggests that television is sending mixed messages to children about healthy food choices. Block, JP & Subramanian, SV (2015) suggest that initiatives such as the previously mentioned \$400 million in tax incentives to businesses aimed at eliminating food deserts, and international efforts on behalf of the World Health Organization may not be very effective when it comes to improving dietary health disparities. Block & Subramanian suggest focusing more on such interventions as education, changes in the various food assistance programs, and even imposing higher taxes on those outlets that persist in marketing unhealthy food choices. Bower et al (2013) also suggest education as an intervention but only where individuals also have access to healthier food.

More colleges and universities, particularly HBCUs, can and should invest more in community engagement to help manage and even eliminate food deserts, the social determinants of health, and racial and health disparities, not just in urban areas but also in rural areas and in underserved areas around the world. Linking urban agriculture, nutritional sciences, environmental sciences (both built environment and natural environment) and telehealth is a logical first step to achieving this goal. Recruiting students from these underserved and underrepresented communities and training and educating them in these disciplines then dispatching them back into their communities as culturally competent change agents is also a logical puzzle piece. The key must also be in educating community leaders and community residents that community engagement is a reciprocal process.

References

- Baltimore City Office of Sustainability, Urban Agriculture Program. Retrieved from <http://www.baltimoresustainability.org/projects/>
- Baltimore City Master Gardener Program. Retrieved from <http://extension.umd.edu/baltimore-city-/urban-agriculture>
- Block, JP & Subramanian, SV (2015). Moving beyond 'food deserts': Reorienting United States policies to reduce disparities in diet quality. *PLoS Med.* 12 (12): e1001914 DOI: 10.1371/journal.pmed.1001914.
- Boone-Heinonen, J, Gordon-Larson, P, Kiefe, CI, Shikany, JM, Lewis, CE et al (2011). Fast food restaurants and food stores: Longitudinal associations with diet in young to middle-aged adults: The CARDIA study. *Archives of Internal Medicine*, 171 (13): 1162. DOI: 10.1001/archinternmed.2011.283.
- Bower, KM, Thorpe, RJ, Rohde, C & Gaskin, DJ (2013). The intersection of neighborhood racial segregation, poverty, and urbanicity and its impact on food store availability in the United States. *Preventive Medicine*. DOI: 10.1016/j.ypmed.2013.10.010.
- Centers for Disease Control (1997). Principles of community engagement (1st ed.). Atlanta, GA: CDC/ATSDR Committee on Community Engagement.

- Cobb, LK, Anderson, CA, Appel, L, Jones-Smith, J. et al (2015). Baltimore city stores increased the availability of healthy foods after WIC policy change. *Health Affairs*, 34 (11): 1849. DOI: 10.1377/hlthaff.2015.0632.
- Deckersbach, T, Das, SK, Urban, LE, Salinardi, T, Batra, P et al (2014). Pilot randomized trial demonstrating reversal of obesity-related abnormalities in reward system responsivity to food cues with a behavioral intervention. *Nutrition & Diabetes*, 4 (9): e129. DOI: 10.1038/nutd.2014.26.
- Farm Alliance of Baltimore (2012). Retrieved from <http://www.farmalliancebaltimore.org/the-farms/strength-to-love-ii/>
- Franco, M, Diez Roux, AV, Glass, TA, Caballero, B & Brancati, FL (2008). Neighborhood characteristics and availability of healthy foods in Baltimore. *American Journal of Prevention Medicine*, 35 (6): 561 DOI: 10.1016/j.amepre. 07.003.
- Freudenberg, N, Klitzman, S, & Saegert, S. (2009). Urban health and society: Interdisciplinary approaches to research and practice. San Francisco, CA: Jossey-Bass.
- Harrison, K. (2005). Is 'fat free' good for me? A panel study of television and children's nutritional knowledge and reasoning. *Health Communication*, 17 (2), 117-132.
- HBCU schools offering environmental programs (2015). Retrieved from <http://hbcu-colleges/environmental>
- Johns Hopkins Center for a Livable Future (2015). Retrieved from: <http://jhsphe.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/news-room/new-releases/2015/1-in-4-baltimore-residents>
- LaVeist, T, Pollack, K, Thorpe, R, Fesahazion, R & Gasken, D. (2011). Place, not race: Disparities dissipate in Southwest Baltimore when blacks and whites live under similar conditions. *Health Affairs*, 30 (10): 1880. DOI: 10.1377/hlthaff.2011.0640.
- Mennella, JA, Pepino, MY & Reed, DR (2005). Genetic and environmental determinants of bitter perception and sweet preferences. *Pediatrics*, 115 (2): e216-e222.
- Ortega, AN, Albert, SL, Chan-Goldston, AM, Langellier, BA, Glik, DC et al (2016). Substantial improvements not seen in health behaviors following corner store conversions in two Latino food swamps. *BMC Public Health*, 16 (1). DOI: 10.1186/s 12889-016-3074-1.
- Sturm, R & Hattori, A. (2015). Diet and obesity in Los Angeles county 2007-2012: Is there a measurable effect of the 2008 "fast-food ban"? *Social Science and Medicine*. DOI: 10.1016/j.socscimed.2015.03.004.
- Sustainable Agriculture Education Association (2016). Retrieved from <http://sustainableaged.org/projects/degree-programs/>
- Tarasuk, V, Cheng, J, De Oliveira, C, Dachner, C, Gundersen, C, & Kurdyak, P (2015). Association between household food insecurity and annual health care costs. *CMAJ*. DOI: 10.1503/cmaj.150234.
- Thorpe, R, Kennedy-Hendricks, A, Griffith, DM, Bruce, MA, Coa, K. et al (2015). Race, social and environmental conditions, and health behaviors in men. *Family and Community Health*, 38 (4): 297. DOI: 10.1097/FCH.0000000000000078.
- USDA (2009). Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences. United States Department of Agriculture Economic Research Service. Retrieved from http://www.ers.usda.gov/media/242675/ap036_1_.pdf
- USDA/1890 National Scholars Program (2013). Retrieved from <http://sites.ed.gov/whhbcu/2013/05/28/the-usda1890-national-schoars-program/>