Hunger, Poverty And Health: Community-Academic Partnerships That Improve Food And Nutrition Security In Rural Appalachia

By: **Melissa Gutschall**, Amanda Hege, **Alisha Farris**, Elizabeth Young, Maegan Furman, and Robin Fox

Abstract

Background/Purpose: Malnutrition, present as both overnutrition and undernutrition, is the largest single contributor to disease in the world. This article will describe the relationship between hunger, poverty and health, from the global to local level, with a focus on the relationship between hunger and obesity in the United States. The socio-ecological model will be used to present a community-academic partnership for addressing food insecurity and improving health in rural Appalachia. Partners: Hunger and Health Coalition, Appalachian State University Department of Nutrition and Healthcare Management, and the Appalachian Regional Healthcare System collaborated to address the hunger-obesity paradox in Appalachia. Target population: Individuals in Watauga County, which has the third highest poverty rate in North Carolina. The population of 51, 079 residents is 94.5% White, 1.7% African American, and 3.4% Hispanic or Latino and 59% are recipients of food assistance. Methods: Describe community, organizational and policy-level initiatives implemented by the partnership, including community forums, nutrition education, sustainable food systems, healthcare-based food security screenings and resource referrals. Discuss facilitators and barriers over time, and the interface among academic and local partner responsibilities, resources, and goals. Outcomes: Action steps focus on growing the community-clinical partnership, influencing policy, systems and environmental change, and ultimately fostering a clinical shift toward sustainable health. Improved food security and health status of the target population, nutrition professionals prepared for non-profit work, and a partnership model that can be replicated or scaled nationwide. Conclusions Social, economic, and environmental factors have a profound impact on nutrition-related health outcomes and call for integrated, system-based approaches. Community-academic partnerships offer a unique opportunity to address food insecurity as a social determinant of health.

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Partners Hunger and Health Coalition, Appalachian State University Department of Nutrition and Healthcare Management, and the Appalachian Regional Healthcare System collaborated to address the hunger-obesity paradox in Appalachia.

Target population Individuals in Watauga County, which has the third highest poverty rate in North Carolina. The population of 51, 079 residents is 94.5% White, 1.7% African American, and 3.4% Hispanic or Latino and 59% are recipients of food assistance.

Methods Describe community, organizational and policy-level initiatives implemented by the partnership, including community forums, nutrition education, sustainable food systems, healthcare-based food security screenings and resource referrals. Discuss facilitators and barriers over time, and the interface among academic and local partner responsibilities, resources, and goals.

Outcomes Action steps focus on growing the community-clinical partnership, influencing policy, systems and environmental change, and ultimately fostering a clinical shift toward sustainable health. Improved food security and health status of the target population, nutrition professionals prepared for non-profit work, and a partnership model that can be replicated or scaled nationwide.

Conclusions Social, economic, and environmental factors have a profound impact on nutrition-related health outcomes and call for integrated, system-based approaches. Community-academic partnerships offer a unique opportunity to address food insecurity as a social determinant of health.

Introduction

Hunger is on the rise, affecting the health and development of millions of individuals across the globe. Malnutrition, the lack of proper nutrients to meet daily needs, is the single largest contributor to disease in the world. Present as both overnutrition and undernutrition, "malnutrition in all forms" is a global problem with consequences including chronic disease, early mortality, reduced child development, and lack of economic productivity. [1]

Undernutrition results from insufficient intake of energy and nutrients to meet an individual's needs. Beyond adequate calorie intake, micronutrient availability is a critical component of proper nutrition. Inadequate micronutrient intake of mothers and infants has long-term impacts on the growth and development of the child, which most specifically

occurs during the child's first 1,000 days from conception to their second birthday. [2] Overnutrition, due to an overconsumption of certain nutrients such as proteins, carbohydrates, and fat, contributes to the development of chronic diseases including obesity, heart disease, diabetes, stroke, and certain types of cancer. It is possible to be overweight or obese from excessive calorie consumption but still not get enough vitamins and minerals to promote health.[3]

Overnutrition disproportionately impacts low-resource individuals and families living in developed nations.[4] In the United States (U.S.), many Americans struggle to put healthful food on the table. According to Feeding America, the largest anti-hunger agency in the U.S., approximately 41 million Americans and 1 in 5 U.S. children experience food insecurity – the lack of consistent access to enough food for an active, healthy life – putting them at a greater risk of various forms of malnutrition and poor health.[5]

Preventing malnutrition in all forms is achievable through ensuring everyone has access to safe and healthful food, recognized as a high intake of fruits and vegetables.[6] Many in the international community believe that eradicating malnutrition and hunger is possible within the next generation.[7] The second Sustainable Development Goal set forth by the United Nations identifies that the right to proper nutrition is a fundamental right under international law.[8] This Sustainable Development Goal to "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" pinpoints the inter-relationship between agriculture, poverty, food security, and health. This section will focus on how this inter-relationship, incorporating the four pillars of food availability, access, utilization, and stability, can be used in assessing and developing strategies that accelerate progress toward optimal health.

Measuring Food Security Status in the United States

The US Food Security Survey Module developed by the USDA Economic Research Service (ERS) utilizes a tiered approach to measure food security status of American households.[9] Food secure households are shown to have no or minimal anxiety about accessing adequate food and no changes to the quality, variety, or quantity of food utilized. Low food secure/ food insecure households have reduced quality, variety, and desirability of diets; but the quantity of food intake and normal eating patterns are not substantially disrupted. Households experiencing very low food security, also known as hunger, are shown to have disrupted eating patterns and a severe decline in both the quality and quantity of food intake at multiple points throughout the year.

Food security status is determined by a household's economic ability to afford food. The US Food Security Survey asks if, in the last 12-months, the household cut the size of meals, skipped meals, ate less than they should, or went hungry because there was not enough money for food [9]. The risk for food insecurity increases when money to buy food is limited or not available, and the most prevalent risk factor for food insecurity is poverty.[10]

Hunger-Obesity Paradox

An integral component of the multi-dimensional nature of food security is its implications on nutritional status. Food insecurity can lead to malnutrition and poor health due to decreased eating of healthful foods. All too often, overnutrition (overweight or obesity) and hunger exist within the same household, commonly referred to as the hunger-obesity paradox.[11]

Causes associated with the hunger-obesity paradox are the result of households that are low-resource facing unique challenges to adopting and maintaining healthful behaviors. For example, households with limited finances are forced to make trade-offs between food and other basic necessities such as housing, utilities, medicine, and transportation. Postponing medical care, cost-related medication underuse, and forgoing foods needed for special medical diets (i.e. diabetic diets) are common coping strategies that lead to poor health. Energy-dense, convenience foods that are filled with added sugars, fats, and refined grains are more popular with lower resource households due to lower cost. Food insecure households reportedly choose cheaper food, even though they know they are not the healthiest.[12]

In addition to the decrease in the accessibility of affordable healthful foods, low-resource communities have a higher density of fast-food restaurants[13], which predominantly offer a variety of energy-dense, nutrient-poor foods at relatively low prices. Research shows a diet rich in these foods is associated with weight gain and diet-related

diseases.[14,15] The financial and emotional pressures of food insecurity, coupled with low wage work, limited health care, inadequate transportation, poor housing, and neighborhood violence contributes to extremely high levels of stress and poor mental health for these households. Research has linked stress and poor mental health to weight gain and obesity through stress-induced hormonal and metabolic changes.[16]
The rates of food insecurity are significantly higher among historically disadvantaged communities. The high incidence is largely attributed to obesogenic food environments that include surroundings, opportunities, or conditions that promote obesity of a population.[17] Easy access to fast food restaurants and processed foods are common for predominantly black or Hispanic neighborhoods, where they are shown to have fewer full-service supermarkets and more fast food restaurants than their white counterparts.[18]

Achieving Nutrition Security

To achieve food and nutrition security, food must be (1) available, (2) accessible, (3) utilized, and (4) stable.[19] Defined by the World Food Programme, "Food availability is the amount of food that is present in a country or area through all forms of domestic production, imports, food stocks and food aid".[20] There is sufficient agricultural capacity across the globe to feed the world's population and the United States produces enough nutrient-dense food for all Americans.

Food access includes the physical, economic, and social means of obtaining food.[19] Lack of physical access is illustrated by a scenario in which food is being produced, but not distributed appropriately, due to inefficiency or lack of infrastructure. Specifically, urban, peri-urban, or rural low-resource communities have limited physical access to food due to a lack market channels to access fruits and vegetables due to fewer full-service supermarkets or grocery stores.[21]

Mitigating food waste is another contributing factor to food access. Nearly 40% of food in the United States goes uneaten and this preventable loss has profound effects on food security, the environment, and economy.[22] Food waste is estimated to cost $218 billion annually, approximately $1,800 for a four-person American household every year.[23] Recovering and repurposing pre-consumer waste from farms, restaurants, and other food distribution sites are shown to effectively reduce waste and promote healthful food access.

Understanding healthy food selection, preparation, storage, and sanitation are needed to ensure adequate utilization of food. Based on the World Food Summit, utilization includes having "safe, nutritious foods that meet dietary needs of all individuals".[24] It is both the way in which the body makes use of the nutrients and the household's food safety and preparation practices. Effective interventions to promote food utilization focus on empowering individuals and households with the knowledge, skills, and confidence to shop for and prepare healthy meals.[24]

The consistent stability of food availability, access, and utilization "at all times" is necessary to achieve nutrition security.[19] Scenarios that can disrupt stability include poverty, unemployment, increased food costs, adverse changes in climate, public safety, and political conditions.

Food Insecurity as a Social Determinant of Health

Factors in which individuals and communities live, work, and play are shown to influence health status, and health is determined in part by our social and physical environments.[25] Social determinants of health include access to healthful food (food and nutrition security); safe and affordable housing, access to educational, economic, and job opportunities; transportation; residential segregation; language and literacy; and availability of community-based resources in support of community living and opportunities for recreation. Physical determinants of health include the natural environment including green space; weather and climate; built environment--including sidewalks, bike lanes, and roads; exposure to toxic substances; and aesthetics such as good lighting.[25]

The U.S. Office of Disease Prevention and Health Promotion approaches the social determinants of health with a focus on five key areas:

- Economic stability – including employment opportunities, food and nutrition security, affordable housing, and poverty
- Education – including early childhood education and development, enrollment in higher education, high school graduation, and language and literacy
- Social and community context – including civic

participation, discrimination, incarceration, and social cohesion
- Health and health care – including access to health care, access to primary care, and health literacy
- Neighborhood and built environment – including access to foods that support healthy eating patterns (fruits and vegetables), crime or violence, environmental conditions and climate, and the quality of housing.[25]

The social-ecological model is a recognized framework for altering the five focus areas to promote healthy individuals, communities, and environments. The three core levels within the social-ecological model include macro (national legal system), meso (organization, communities, and ethnic groups), and micro (families, relationships, and individuals). The four-part food insecurity multi-dimensional index can be applied to all levels of the social-ecological model. **Figure 1** is a reproduction of the framework that was used to address food and nutrition security in rural Appalachia.[26]

The Social-Ecological Model (left side) and Corresponding Food Insecurity Multidimensional Index (right side)

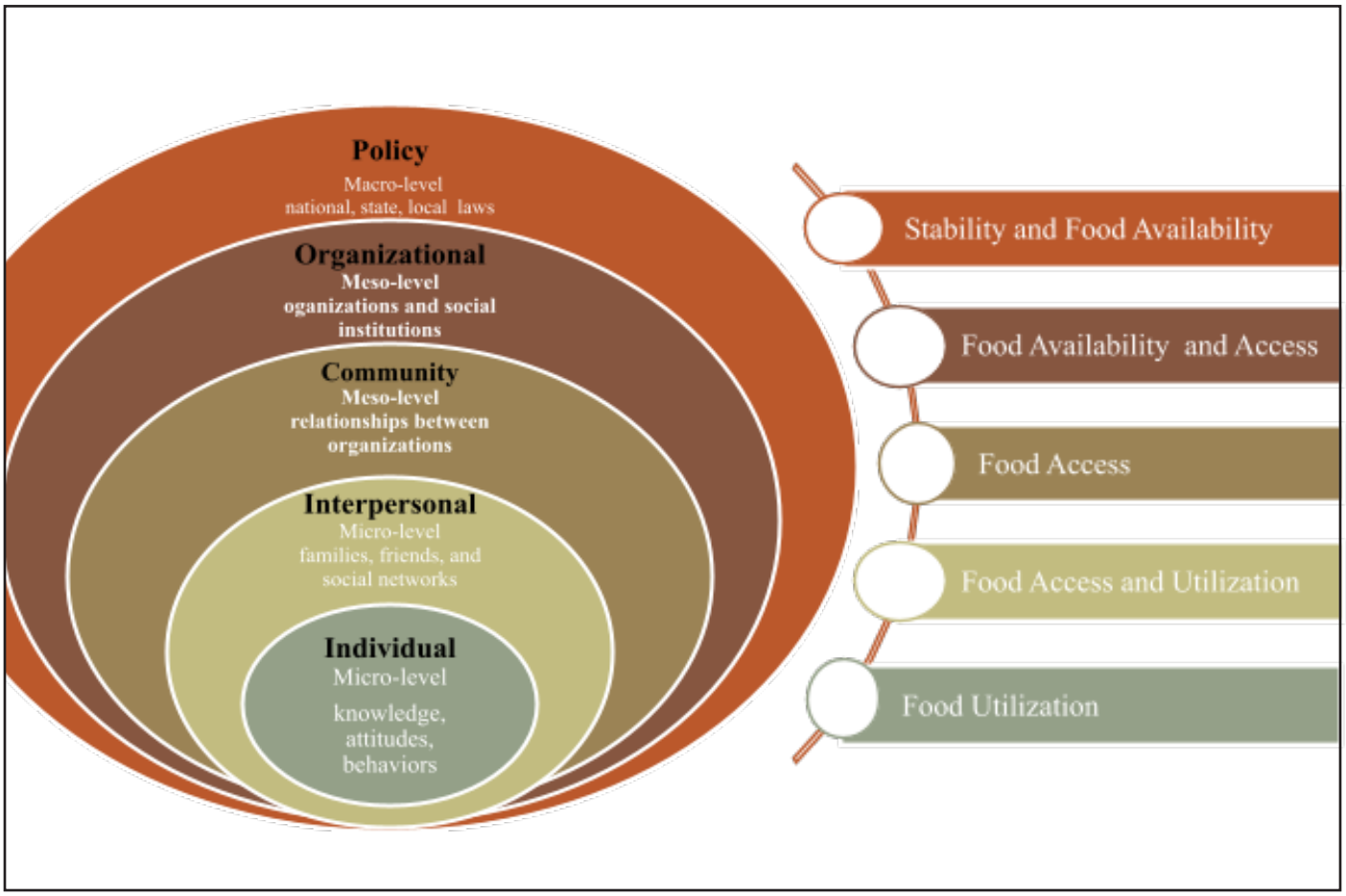

Figure 1. The authors received permission to reproduce this figure. The original source of the framework shown is from Hege, AS, Oo, K., Cummings, J. (2019). Current Nutrition-related Health Issues and Challenges, In Barth, M. (2019). Public Health Nutrition (ed), Springer Publishing. .

Connecting Policy and Food Availability

The United States Agriculture Improvement Act (commonly known as the 'Farm Bill') is the primary agricultural and food policy tool of the federal government.[27] Policies within the Farm Bill include factors that influence the type of food available within the country by offering subsidies that artificially decrease the cost of commodities (corn, wheat, and soybeans). Some argue that sustainable, regenerative agriculture practices that support small-scale farms, diversify production to include more fruits and vegetables, and strengthen resiliency (climate variability, natural disasters, or economic shocks) will contribute to improving dietary quality and overall health.[28]

Connecting Policy and Food Access

The Farm Bill also includes government safety-net programs that ensure adequate access to food for low-resource populations:

- Supplemental Nutrition Assistance Program (SNAP, formerly known as food stamps) – provide temporary benefits to low-income Americans to buy groceries on an electronic benefits transfer (EBT) card that works similar to a debit card at authorized retailers
- The Emergency Food Assistance Program (TEFAP) – provides USDA commodities to families in need of short-term hunger relief through emergency food providers like Feeding America Food Banks
- Commodity Supplemental Food Program (CSFP) – provides food assistance for low-income seniors through a monthly package of USDA commodities
- Child and Adult Care Food Program (CACFP) – provides prepared meals and snacks to children and adults in designated child and adult care centers
- National School Lunch Program (NSLP) – provides prepared lunch to qualified children during the school year
- School Breakfast Program (SBP) – provides prepared breakfast to qualified children during the school year
- Summer Food Service Program (SFSP) – provides prepared meals and snacks on-site to qualified children during the summer
- Women, Infants, and Children (WIC) – a prescriptive, non-entitlement program that supplies nutritious food for proper growth and development for pregnant and lactating women and children under the age of five

The following are additional safety net programs that can be implemented during a pandemic:

- Pandemic Electronic Benefit Transfer (P-EBT) Program – provides extra financial support to buy groceries for families of children who normally receive free and reduced lunch at school when schools are closed due to a pandemic
- Coronavirus Food Assistance Program (CFAP) – provides immediate financial assistance to farmers and ranchers impacted by COVID-19 by partnering with regional and local food distributers to purchase food from farms and distribute boxes of fruits and vegetables within the community

Connecting Organizations and Food Access

At the organizational level, Feeding America is the largest anti-hunger organization in the United States that works to ensure healthy food access for all.[29] The Feeding America national network includes 200 food banks and 60,000 food pantry and meal programs that provide food and services. Food Banks are non-profit organizations that collect and distribute food to direct hunger-relief programs. They act as food storage and distribution centers for smaller front-line agencies and usually do not give food directly to individuals and families struggling with hunger. The front-line agencies include food pantries, community meal sites, soup kitchens, mobile food distributions, and shelters. A food pantry receives food from a Food Bank and functions as the arms that reach out to the community directly.[29]

Connecting Individuals and Food Utilization

Nutrition education programs rooted in behavior change theory and human-centered design (a process that begins with the people in order to develop solutions that are tailored to their needs) are shown to be effective in addressing household and individual-level utilization food practices.[30] The USDA continues to explore programs that effectively encourage the consumption of healthy foods, such as SNAP-Ed that

offers strong nutrition education to change food behavior and improve health, specifically improving fruit and vegetable consumption for children and older adults, and providing shopping strategies and meal planning advice to help families serve more healthful meals.[31]

Applying the Framework in Appalachia: A Community-Academic Case Study

Communities in rural Appalachia experience higher rates of diet-related health disparities compared to other southern regions.[29] Appalachia includes a 205,000-square-mile region that follows the spine of the Appalachian Mountains including West Virginia; the eastern counties in Ohio, Kentucky, and Tennessee; the western counties in North Carolina; and the northern counties in South Carolina, Georgia, Alabama and Mississippi. The Appalachian Region's economy, once highly dependent on mining, forestry, and coal, has been continuously declining over the past decade. Residents of rural Appalachia have limited access to health care and high rates of food insecurity.[29] They are also less likely to report chronic disease.[32] and almost twice as likely to report their health as "poor or fair" than individuals not living in Appalachian, whether or not they have a current health condition or chronic disease.[33]

Despite this region's status as an agricultural community, many families still reside in areas with limited access to affordable, healthy food.[29] A large portion of the individuals and families in this region rely heavily on emergency food providers, such as food pantries, to supply their basic food needs. Nearly 90% of food pantries in western North Carolina were found to purchase inexpensive, higher fat and unhealthy food due to cost. Yet more than half of the food assistance recipients at these same pantries listed fresh fruits and vegetables as the category of food items they most desired.[34]

Purpose

Comprehensive strategies focused on reducing client dependency on services and shifting how the community connects food and health are shown to effectively address health disparities.[35] The purpose of this section is to describe the development of a community-academic partnership focused on innovative solutions to address food access and utilization in Appalachia. The partnership vision is to "have a deeply engaged community that has extensive resources and a culture of strength". The overall scope is to address the community's barriers to healthy food access, healthcare, and socio-cultural restrictions, in order to empower individuals, families, groups and leaders to enact policy and systems-based change.

Developing a Community-Academic Partnership

The National Institute on Minority Health and Health Disparities promotes the implementation of individual and micro-level strategies that include community-based, education approaches designed to reduce diet-related disparities in underserved populations.[35] Community-based participatory research has proven to be effective for collaborations between community and academic organizations resulting in positive outcomes. As such, forming community and academic partnerships is a way to address the public health disparities in Appalachia.[36] Concurrently, health-related professions, including programs with a focus on nutrition and dietetics, have a lack of professional practice sites for students limited in part by the geographic region, number of healthcare facilities, and willingness of clinical preceptors to mentor students.[37] The partnership described provides a creative solution to this challenge with a training opportunity that has local to global implications, including entrepreneurship and advocacy in non-profit work as a prospective career. Hands-on experience with evidence-formed solutions builds graduate student research repertoire, enhances the ability to provide culturally competent and sensitive care to a diverse population, and fosters the development of a passion for civic engagement. The fruits of all these endeavors have tremendous potential to reach the rural population on a new level of disease prevention, support innovation and self-sustainability of collaboration across the food system and empower community members.

The core partners include the following agencies based in Boone, NC:

- Hunger and Health Coalition (HHC) – established in 1982, HHC is a food pantry that addresses and alleviates the effects of poverty in Watauga County, NC. Eligibility for all services is based

on the USDA requirements for federal food assistance recipients—clients must be at or below 200% of the Federal Poverty Level. According to a 2014 study by Feeding America, 72% of Watauga County meets this criterion for assistance. Nearly 30,000 people received assistance through the their "food box pantry" program each year, a third of whom are children.

- Department of Nutrition and Health Care Management at Appalachian State University (ASU) - ASU is a mid-sized master's granting institution with more than 18,000 students, about 1700 of those being graduate students. The nutrition and health care management department is housed within the Beaver College of Health Sciences. The undergraduate and graduate programs predominantly prepare graduates for careers in food, nutrition, and dietetics with an emphasis on those aspiring to achieve the Registered Dietitian Nutritionist (RDN) credential.
- Appalachian Regional Healthcare System (ARHS) – the leader for healthcare in the High Country, committed to promoting health. The hospital system includes two hospitals that offer 117 beds at the primary hospital in addition to thirteen medical practices across the area.

HHC has long sought to make data-driven decisions regarding the needs of clients, going beyond a reliance on traditional means of assistance through things like prepared boxes of food and selected prepared meals. Thus, HHC turned to two critical partners in its search for solutions: the Department of Nutrition and Health Care Management at Appalachian State University (ASU) and the Appalachian Regional Healthcare System (AHRS). The data-driven experiences that each partner provided, based in part on feedback from clients and the community, hastened and informed a desire to combat health disparities.

Beginning in 2015, graduate students in nutrition spoke with clients at the HHC to collect information about how the clients felt services could be improved and expanded. Responses indicated an overwhelming desire for healthier food options and nutrition education services, as well as improved decision-making regarding meal planning. Nearly all clients expressed awareness that they need to make healthier food choices, both for themselves and for their families, but added that they lack the knowledge needed to improve food choices.

Simultaneously, ARHS began to track the correlation between food insecurity and in-patient hospitalizations and emergency department visits for acute and chronic disease. This trend was confirmed by registered nurses and social workers who began completing food insecurity questionnaires with their patients in conjunction with guidance from the HHC. The link between food insecurity and a general lack of awareness about which foods are appropriate for managing chronic illnesses became increasingly apparent.

As a result, HHC began partnering with ARHS in August 2017 to create a program that provides emergency food for patients screened as food insecure in an effort to develop solutions for providing healthier foods to the community's low-resource populations and to provide family-based nutrition education that creates lasting behavior changes in food preparation and consumption, impacting generations to come. The first step in accomplishing this goal was to establish a relationship with these new clients, done primarily through the provision of healthy foods during the first contact.

Community Centered Health Initiative

In 2014, BlueCross Blue Shield (BCBS) began Community Centered Health, an initiative that supports collaborations between clinical and community organizations to form a better understanding of, and act on, non-medical drivers of health outcomes. Community Centered Health is a way for BCBS to support North Carolina and develop ways to combat the root causes of health disparities while acknowledging that health is more than what occurs in a doctor's office and can stem from many outside determinants.[38]

Members of the partnership commit to identify any relevant information or data in relation to individual or organizational work that would support the Community Centered Health program. The partners have agreed to be advocates for the Community-Centered Health Project and will share information about the program and Community Centered Health model with their respective organizations, clients/patients, and the broader community. Committed to influencing the entire social-ecological model, the successes can be leveraged within clinical and organizational partnering agencies

in order to support policies and influence formidable change. The commitment includes identifying and addressing inequities that have been identified in the community by engaging and supporting community members most impacted by these inequities.

Target Population

The partnership took place in Boone, NC within Watauga County. This area has historically been a traditional Appalachian farming community. The two largest employers are Appalachian State University and Appalachian Regional Healthcare System.

According to the 2010 Census data [39], the current population make-up of Watauga county's 51, 079 residents is 94.5% White, 1.7% African American, and 3.4% Hispanic or Latino. Watauga county holds the 3rd highest poverty rate in North Carolina, paired with a high cost of living related to an economy based on tourism and its home to a mid-sized state University. Food insecurity rates overall and among children are greater than state averages. Thirty-two percent of residents have no health insurance and 59% are food assistance recipients. The local food bank reports an upward trend to 36 new families seeking assistance each month. Several nonmedical drivers, or social determinants, of health (SDOH) including poverty, transportation, housing and education are related to rates of food insecurity, obesity and chronic disease. Access to healthy foods, choices for healthy eating, and disease prevention and management are priority areas identified by community needs assessments. The Community Health Assessment of Watauga County reports that The Hunger and Health Coalition and the Community Care Clinic of Boone, NC, have a significant client base with biochemical indicators associated with obesity, metabolic syndrome, and chronic disease (23% with diabetes, 43% with hypertension, 32% with high cholesterol, and 16% with both diabetes and hypertension).[34] When someone experiences one disparity, a number of other pressures perpetuate this cycle creating additional health, wellness, and emotional concerns. Poor food choices and the economic realities that lead to them are connected in significant ways to individuals' health. As the home to Appalachian State University (ASU), the county also suffers from food insecurity among its student population. In fact, the rate of food insecurity at ASU has been documented to be as high as 46%.[40]

Identifying the Need through Community Forums

Engagement with the community is essential to hear what community members feel is necessary to make a shift in food insecurity and poor health outcomes. During the planning period, the team engaged and partnered with community members through a number of activities. Data from hospital partners identified specific micro-communities in Watauga County as high utilizers of the emergency room for poorly managed chronic diseases (e.g., diabetes). This initial hospital data and the ongoing food security screenings facilitated intentional relationship building with members of these communities.

A series of community cookouts were held in the identified micro-community to learn about community members' concerns. The cookouts were hosted in partnership with trusted and well-known community members, without any agenda but building relationships and trust with neighbors.

In response to feedback gleaned at the cookouts, the partnership continued to explore barriers within the low-resource community by coordinating community forums. A series of 4, 2-hour forums were held with 24 families. The forums were conducted over a four-week period. During the third week, participants were invited to a local catering kitchen and participated in a healthy cooking demonstration. Each household went home with enough supplies to recreate the meal with their family. Almost half (44%) of the participants were Spanish speaking. Each session included a community meal for participants and their families, childcare during the focus group portion of the evening, and a 30-pound box of produce provided to each family. Participants provided valuable insight into what the residents of these communities need in order to feed themselves and their families healthful meals and break the chain of ongoing food and nutrition insecurity. This diverse group helped inform the top challenges of those who experience food insecurity in Watauga County.

The community forums provided information regarding where participants have been shopping, transportation methods, how they make their budgets stretch, and additional benefits or services they are using in order to provide food for their families. Results showed that community members prefer fresh over canned produce and would like to see more culturally appropriate food items available in their food boxes (100%). Almost half (46%) of the

participants explain that they did not buy unfamiliar produce because they do not know how to prepare it. Families find it particularly difficult to meet food needs during the winter due to transportation, seasonal work that limits financial resources, and a desire for special foods on holidays. Individuals were very clear in sharing concerns about their overall health and nutrition. The majority (90%) of the participants were interested in nutrition counseling offered at HHC and more than half of those preferred group counseling over individual sessions.

Improving Healthy Food Access

Findings from the community forums led the team to consider additional ways to support clients and community members through promoting healthy food access and improving utilization through nutrition education. HHC has made efforts to shift donation requests to include more nutrient-dense, disease-friendly options, fresh produce, and cultural foods. Aside from strong relationships with local farmers, they have worked to procure additional sources of regionally located produce. Shifts in budget priorities have also reflected the purchase of fresh and culturally appropriate foods.

A **Simple Gesture** is a nutrition-focused food donation program that engages the entire community. The program is designed to make food pantry donations simple by organizing volunteer drivers to pick up the donated items right from the doorsteps of community residents. Donors are given a reusable bag that contains a list of requested healthy items to donate. Pick up days occur every eight weeks. Food bags are brought back to HHC where volunteers begin the sorting process to redistribute food to its clients. This program has raised nearly 10,000 pounds of food at each pick-up day and offers the opportunity to target donations to meet client preferences.

The coordination of Quantity Food Production experiences for students in the Nutrition Program at ASU led to a greater number and variety of **healthy take-out meals** available for clients. For students, this experience involves creating a protocol for developing menus, sourcing ingredients, cooking, storing and distributing a variety of freshly prepared 'grab and go' refrigerated and frozen entrees, and donated food ingredients as well as analysis and development of workflow in the food production area. Cooking demonstrations and samples of healthy recipes on a budget have also been offered in conjunction with the nutrition education initiatives. Preliminary results among students support benefits to rich experiences in personal interaction and engagement in the nonprofit setting compared to other food production learning sites on-campus.

The food distribution area of HHC was renovated in 2018 with the goal of implementing a **client-choice food distribution system**, where clients self-select food box items, much like a grocery store, within established allocation guidelines for family size. The renovation included a new layout that would make client shopping possible, and new shelving with specific shelves designated for disease-friendly foods such as low-sodium, and gluten-free options. Barriers such as staff resistance, space limitations, hours of operation, and food supply precluded full implementation of this distribution method.[41] A transitional system with a pantry order form was used in the meantime so clients could still have some choice and a more dignified experience when obtaining food assistance. Because of the encountered barriers, full implementation and evaluation of outcomes related to client satisfaction and self-efficacy were not achieved. Follow-up research regarding the benefits and barriers to client-choice operations was conducted to identify potential next steps in bringing this system to full realization and to benefit others who may desire this transition. The findings indicated that various pantry-specific factors including hours of operation, number of staff and volunteers, and facility layout all influence the way a client-choice pantry can be operated and that the ordering system may, in fact, be a best option for some facilities.[42] Staff buy-in and training was also a significant factor in moving forward in this direction.

Renovation of the food pantry to include a **Fresh Market** space included merchandising, marketing, and inventory management strategies to enhance the overall quality and presentation of healthy food. Nutritional "nudging" has been shown to encourage clients to select more nutrient dense foods such as produce and legumes.[43] This was incorporated through the provision of bilingual nutritional value signage, sample recipes, a "personal shopper" to assist families in making improved food selections, and repositioning of sweets and baked goods so that they were not at the front and center of client view. Interestingly, formative research on the Fresh Market shows that the clients utilizing it were

more food insecure than clients not participating. Additionally, clients participating in more services offered by HHC reported lower self-efficacy, demonstrating that the services are truly reaching those in most need.[44] Clients also rated self-efficacy lower for planning ahead and higher for making decisions in the moment, signaling a need for future interventions to focus on meal planning for the near and far future as well as evaluating self-efficacy over a longer period of time.[44]

To improve healthy food access for individuals accessing healthcare through the emergency department at the hospital, ARHS incorporated a 2-question food security screening to their emergency room patient screening protocol in 2017. The hospital committed to this change at a system-wide level by incorporating the screening into their Electronic Medical Records (EMR) as well as educating physicians and staff on the prevalence of food insecurity and its adverse effect on health. If a patient is identified as food insecure, the hospital provides an emergency medically-tailored food box and the health care provider refers them to HHC. The health care providers also "prescribe" certain foods that individuals can receive at HHC to address obesity and diet-related chronic diseases. Students have collaborated in the development of recipes for food box items and the development of counseling and screening materials to be used with clients.

Improving Food Utilization

Efforts were aimed at branding a nutrition team at HHC to improve food utilization by offering **nutrition education** at HHC. This has taken several forms over the years, including the following methods:

- A 6-week waiting-room education series where brief targeted lessons were provided as clients waited in line for pharmacy services. Preliminary results supported increases in knowledge and self-efficacy for clients, but there were barriers regarding time for clients to fully engage.[45]
- Nutrition interns offered tours to food pantry clients at the HHC facility and provided assistance with food choices.
- A registered dietitian and graduate students were available for regular office hours to provide nutrition education and counseling for clients with diet-related diseases.
- The Cooking Matters Program (Share our Strength) is also being delivered in collaboration with Second Harvest Food Bank of Northwest North Carolina. In 1993, the Cooking Matters campaign began teaching parents and caregivers to shop for and cook healthy meals on a budget. Food skills education is practical education that teaches individuals to prepare food that meets their nutrition, budget, and personal needs. Cooking Matters works to help end childhood hunger through empowering families to make healthy and affordable food choices.[46]
- Nutrition education has also taken the form of written materials, SNAP meal plans, recipes to accompany food boxes, and video demonstrations.

Preliminary Outcomes

Partnerships with ASU and ARHS have helped HHC to engage people throughout Watauga County who were unaware that they were eligible for services or may not have known to ask for assistance. Combined efforts have created a broader safety net for those in need and have, at the same time, engaged key stakeholders who are examining the issues related to food insecurity from a broader perspective. Preliminary results support positive benefits for client nutrition knowledge and self-efficacy as well as positive perceptions of initiatives indicated by clients, staff, and students. The work helped identify specific barriers in moving forward to full implementation and success. Making nutrition convenient, tasty, and relevant through internal policies and procedures was shown to increase access and interest in the produce for HHC clients.

Advantages and Challenges to the Partnership

The partnership enhances collaborative effort rather than individual entities engaging in similar work, as well as synergy from the collective energy and passion for serving the most vulnerable in our community. Advantages of this partnership include the potential for continued funding based on the strong partnership that has been developed. The relationship building toward a common goal builds capacity for greater advocacy and leverage for wide-spread policy change.

Challenges have included the uncertainty of

onboarding potential new team members given the success of the core team. One strategy for moving forward to grow partnership potential has been the development of a rules of engagement document and memorandums of agreement between each entity in the partnership. Another potential challenge in any partnership is clear communication regarding the roles and responsibilities of each partner such that no partner is carrying an overly burdensome level of responsibility. Clearly outlining expectations can help mitigate the risk of a misunderstanding, as can regular communication among the core team about partner directions and efforts toward reaching common goals.

There are potential challenges to this work as the partnership moves toward mobilization of the community, including its members and leaders. Since it is a primary election year, there is the potential that leadership will change at all levels. Continuing to engage local leaders, candidates, current policy makers and community members on what it means to live and work in Watauga county, including currently available opportunities as well as barriers to accessing those opportunities and services, will be increasingly important. The partnership aims to offer multiple opportunities for public discussion and education. These discussions and forums represent the voice of the individuals experiencing low socioeconomic status and elected leaders who are shaping the policies.

Future Opportunities: Moving toward Stability in Healthy Food Access

Moving forward, major performance indicators include 1) awareness, identification of, and connection with local resources for food insecurity, evidenced by a decreased rate and severity of food insecurity in Watauga County; 2) improvement in intake of healthier food options for preventing and managing chronic disease, evidenced by improved health indicators, and 3) policy changes that increase sustainable housing options as a social determinant of health. Table 1 illustrates how these indicators will be targeted and measured.

Additional Resources

https://www.hsph.harvard.edu/nutritionsource/sustainability/

https://www.paho.org/salud-en-las-americas-2017/?p=67

https://www.un.org/sustainabledevelopment/

https://www.ted.com/talks/michael_green_the_global_goals_we_ve_made_progress_on_and_the_ones_we_haven_t

https://www.youtube.com/watch?v=a5xR4QB1ADw

https://www.ted.com/talks/jude_wood_building_a_resilient_community

https://www.who.int/initiatives/decade-of-healthy-ageing

https://www.jeffsachs.org/

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Table 1. Theory of Change Table Guiding Partnership Work

Inputs	Activities	Outputs	Outcomes	Impacts
Nutrition Education	• Nutrition education and cooking classes • Counseling • Personal shopping assistance	• Number of clients attending education events and receiving consultations	• Percentage of participants with increased nutrition knowledge, food preparation skills, self-efficacy, and eating behaviors.	• Improved food security, eating behaviors, and management of chronic disease
Food Security Screening	• Screenings in all ARHS offices • Rx for Food Box and fresh produce	• Number of patients referred and connecting with local food resources	• Improved food security and disease management	• Reduced number of hospital admissions and readmissions
Food Sourcing	• Review and revise pantry business model and policy to increase variety of cultural and disease appropriate food items • Increase connections with local businesses, farmers, Second Harvest Food Bank	• Organizational policy and fiscal resources dedicated to increasing % of fresh produce • Number of cultural and disease appropriate food items.	• Adoption of pantry policy to increase % fresh produce, and cultural and disease appropriate food items • Dedicated space and fiscal resources to supply expanded food variety • Client satisfaction	• Internal and external policy shift to improve pantry food environment
Housing	• Research and development of policy recommendations for equitable housing solutions • Plan and host forum to educate policy makers	• Stakeholder discussions to identify equitable housing solutions • Percentage of housing sector stakeholders in attendance at forum events and educated about policy proposals • Finalized equitable housing solutions policy white paper and recommendations for housing sector	• Change in housing sector knowledge regarding equitable housing solutions number of new housing sector policies aimed and adopted for achieving equitable housing standards • Increase in affordable housing in the community	• Improved housing regulations and affordable, equitable housing options

Over the short and long-term, the partnership action steps will focus on growing the community-clinical partnership, influencing policy, systems and environmental change, and ultimately leading to a clinical shift. Tables 2-4 present action plans at the community, organizational and policy level with a timeline for each goal. The partnership aims to host a community education summit entitled "Refocus Watauga 2020" to disseminate the information from community forums, with the goal of shaping policy supports and recommendations for town and County policy makers.

Table 2. Action Plan: Individual and Community-Level (Food Access and Utilization)

Action	Anticipated Outcomes	Timeframe
Expand food security screening to all ARHS offices and 10 non-ARHS offices	Increased: • Number of offices implementing screening and referral system • Number of patients screened and referred monthly • Number of patients connecting with local food resources upon referral • Reduced number of hospital admissions and re- admissions	12-18 months
Increase awareness of food insecurity and other barriers to wellness in the clinical community	• Increased awareness in the medical community about the connection between food insecurity and how that impacts overall health	12-18 months ongoing
Expand community nutrition education opportunities	• Increased number of clients attending consultations and education events • Improved nutrition knowledge, food preparation skills, self-efficacy, eating behaviors, and chronic disease management	Ongoing

Table 3. Action Plan: Organizational Level
(Food Availability and Access)

Action	Anticipated Outcome	Timeframe
1. Incorporate SDOH screening in the ARHS Electronic Medical Records	• System wide integration of SDOH screening in the Electronic Medical Record • Increased tracking of barriers for patients and trust between patients and physicians • Decrease in unmanaged chronic disease with earlier detection of disease	18 months – ongoing
2. Implement physician referrals for fresh produce through prescriptions	• Physicians identifying access to healthy food as instrumental to habit and health change • Provision of prescriptions for nutrient dense food through HHC • Increase in positive patient interactions and trust with physicians and outside safety net services • Increased positive outcomes for diet related management of disease	18 months- ongoing
3. Inform research, creation, and implementation of policy at the local, regional and state level	• Informed policy approach internally at ARHS regarding SDOH and understanding of the impacts of these policies on clinical well being • Members of the ASU and ARHS systems actively participating in data gathering to inform the research, creation and implementation of policy at the local, regional and state level	2-4+ years
4. Develop policy surrounding nutrition counseling referrals through HHC pharmacy.	• Policies for identifying clients with chronic disease that would benefit from increased nutrition education and increased access to fresh food for diet related management of disease	6 month-ongoing
5. Shift HHC policy regarding partners and purchasing of local produce and culturally appropriate offerings.	• Incorporation of diversified food procurement in order to address the nutrition and cultural appropriateness of food being distributed through the HHC	6 month-ongoing

Table 4. Action Plan: Policy-Level (Stability and Food Availability)

Action	Anticipated Outcome	Timeframe
1. Lobby Second Harvest Food Bank to change procurement and distribution system	• Diversified purchasing and offerings for the Second Harvest network serving Central to Western NC	12 months
2. Host Refocus Watauga 2020, "State of Watauga" education and information session for candidates, policy makers, educators, local leaders and community members	• Increase in community and policy maker awareness, policy maker advocacy for increased access to services for community members, willingness to receive policy suggestions	6 months, ongoing - annually
3. Create policy suggestion document for local and regional leaders, specific to SDOH and barriers identified through community engagemen	• Community informed policy suggestions that increase equitable access to food, housing, transportation, education and health care for all residents	1 year - ongoing

The community-academic partnership model could be expanded to public-private partnerships regionally and nationwide, and data gathered will be very valuable in demonstrating the efficacy of this program model to improve health care for diet-related conditions among low-resource, uninsured populations.

Practice Applications

- Malnutrition, food insecurity, and hunger all too often occur within the same communities and households.
- Largely attributed to a lack of financial resources, food insecure communities experience social and physical challenges to living a healthy life.
- Achieving optimal nutritional status is possible through food 1) availability, 2) accessibility, 3) utilization, and 4) stability.
- The greatest opportunity for creating change is building on established community partnerships to reach all individuals and families in need.
- Strategic academic-community partnerships have the potential to bridge the gap between food insecurity and chronic disease in rural Appalachia.

Conclusion

Social, economic, and environmental factors have a profound impact on nutrition-related health outcomes and call for integrated, system-based approaches.[25] Community-academic partnerships offer a unique opportunity to address food insecurity as a social determinant of health. Community partners are trusted organizations by individuals and families in need and provide a breadth and depth of experience and understanding of the health-related challenges experienced by members of the community. Academic institutions offer expertise in research and program evaluation in addition to providing skill-based reliable interns and volunteers. Health care facilities and hospitals are at the forefront in addressing common health inequities. Adequate food for health is not merely a promise to be met through charity; it is one to be fulfilled through appropriate actions by governments and non-state agencies. By connecting the dots between academia, non-profits, and hospitals, communities can develop sustainable approaches that decrease chronic disease and promote health for all, now and in the future.

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Melissa Gutschall* PhD, RD, LDN Associate Professor and Director, Graduate Programs in Nutrition, Department of Nutrition and Healthcare Management, Appalachian State University;

Amanda Hege* MPH, RDN, LDN Nutrition Educator, Second Harvest Food Bank of Northwest North Carolina

Alisha Farris PhD, RDN Assistant Professor, Department of Nutrition and Healthcare Management, Appalachian State University

Elizabeth Young Executive Director, Hunger and Health Coalition of Boone; NC

Maegan Furman Outreach Coordinator, Hunger and Health Coalition of Boone, NC

Robin Fox System Director of Care Management, Appalachian Regional Healthcare System.

These two authors contributed equally.

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