2015 University of the District of Columbia Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The University of the District of Columbia (UDC) is a historically relevant and uniquely progressive, urban land-grant institution located in the heart of our nation's capital. UDC is committed to a broad mission of education, research and community service. The University offers associate, baccalaureate, graduate and professional degree programs, as well as community education and certificate programs to learners of all ages. The College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES) embodies the landgrant tradition of UDC. In addition to offering innovative academic programs in urban architecture and community development, urban sustainability, health education, nursing, and nutrition and dietetics, we also offer a wide range of community education programs through our five landgrant centers (1) The Center for Urban Agriculture & Gardening Education; (2) The Center for Sustainable Development which includes the Water Resources Research Institute; (3) The Center for Nutrition, Diet & Health which includes the Institute of Gerontology; (4) The Center for 4-H & Youth Development; and (5) The Architectural Research Institute.

Key to our success has been the integration of our academic and landgrant programs and the integration of AES and CES responsibilities into one landgrant mission. Landgrant universities have always sought to be relevant to the needs of their communities by focusing on research that makes a difference in the lives of local people and organizations; and by offering education both on their campuses and in local neighborhoods. Consistent with the priorities of the USDA, and the needs of District agencies and local residents, our goals address important issues like improving food security, food safety, water management and water safety, mitigating climate change, alternative energy, and combating childhood obesity and other food related health problems.

Finding solutions to real-life challenges requires collaboration across academic disciplines, hands on work, and perseverance. For CAUSES, it means that we work together across many fields to find solutions to the aforementioned challenges, and given our location, our focus is exclusively urban. After all, our community urban, so our unique focus sets us apart from all the other landgrant universities in the United States. We also create unusual alliances like urban agriculture and urban sustainability. Central our ability to find solutions is the University's Firebird Farm, which tests innovative food production methods and is fast becoming a go-to place for anyone who wants to learn how to make agriculture a viable profession in an urban setting. Some urban producers are initially motivated by the goal of improving their own health, quality of life and economic opportunity; some are motivated by the goal of making their neighborhoods safer and creating opportunities for their neighbors and extended family. Yet research in the tradition of the Landgrant University is not enough when urban populations are the focus. We must work with coalitions across the city to link Urban Agriculture to Health, and Urban Sustainability. We have accomplished this through our Urban Food Hubs concept that was pioneered by Dr. Sabine O'Hara, Dean of CAUSES and Director of Landgrant Programs (O'Hara, Food Security: The Urban Food Hubs Solution. Solutions, March 2015). The Urban Food Hubs concept offers a comprehensive approach to urban food security through four integrated components: (1) food production, (2) food preparation, (3) food distribution, and (4) closing the loop through waste and water management.

In addition to providing non-credit bearing learning and capacity building programs in the tradition of the cooperative extension service, the five landgrant centers of CAUSES and the Urban Food Hubs work they support also strengthen UDC's academic programs. The centers offer both learning and leadership

opportunities by providing students with hands-on, practical service learning experiences, internships and research opportunities that (a) foster relevant experiential learning, and (b) facilitate employability and skills development.

Given our three-pronged approach of teaching, research and community outreach, we seek to make a measurable, positive difference in the lives of people right where they live and work. Our vision is to be a world leader in designing and implementing top quality, research-based academic and community outreach programs that measurably improve the quality of life and economic prosperity of people and communities in the District of Columbia, the nation, and the world.

This report documents our accomplishments and results of our research and cooperative extension efforts in support of our mission and vision for Fiscal Year 2015. The joint research and extension report includes six program areas that are aligned with the goals of NIFA: (1) Mitigating Climate Change; (2) Improving Global Food Security; (3) Preventing Childhood Obesity and Other Food Related Illness; (4) Urban Families, Youth and Communities; (5) Sustainable Energy; and (6) Food and Water Safety.

1. **Climate Change**

Research

Establishment of Computational Infrastructure at UDC to Conduct Climate Change Research for the District of Columbia

To understand and adapt the climate change related issues, a number of federal, state and local government agencies have launched several evaluations of vulnerability of their critical infrastructure to the possible effects of climate change. Climate change has the potential to increase the variability in extreme weather events. Washington DC is very important because the city houses a significant number of federal agencies, several national monuments, international embassies and serves a s major economic center for the Washington Metropolitan area.

The increase in temperature can result in extreme precipitation events which can have significant impacts on the critical infrastructures of the District of Columbia, life and property of residents and on the overall economy of the Metropolitan DC area. There is a need to study the climatic parameter such as precipitation and its trend which would be useful for planners, engineers and water resource professionals in making informed decisions about climate change in planning, designing, operating, and maintaining the water resources systems. In this research, the key inputs, temperature and rainfall, are treated as key natural variables which have significant influence in climate change. Understanding these natural variables will benefit our decision-making in adaptability of climate change.

During the reporting period, the project team was able to commission computer server systems and set up for the development of the software system. Hourly precipitation data was downloaded from NOAA websites, the database system was designed, and a stored procedure analytical tool was developed to store the data for easy retrieval and use. Faculty researchers have introduced climate change research in their course works. The team has researched and designed the preliminary layout for the website development which will serve all stakeholders to include: engineers, water resources professionals, agricultural professionals and health professionals.

The preliminary results from this research were presented in a Poster at the National Capital Region Water resources Symposium held on April 10, 2015. The title of the research was "Development of a Storm Event Analysis Software Tool for Water Resources Engineering." We have not reached the point where the results can be disseminated to the community.

During the next reporting period, we plan to procure the remaining computational systems and accessories required; develop the website; download additional precipitation data; and develop a software system to analyze the long-term precipitation record to conduct storm event analysis.

Analysis of Watering Devices for the Planting and Survival of Young Urban Canopy Trees

Urban forestry is the art, science and technology of managing trees, forests and natural systems in and around cities, suburbs, and towns for the health and well-being of all people. It is care and management of urban forests, i.e., tree populations in urban settings for the purpose of improving the urban environment. Grey and Deneke describe urban forestry that it is the management of trees for their contributions to the physiological, sociological, and economic well-being of the urban society. It was further stated that urban forestry deals with woodlands, groups of trees, individual trees and where people live. Currently underway

by the Director for the Center for Urban Agriculture and Gardening Education is research to analyze watering devices for the planting and survival of young urban canopy trees. Specifically, the project compares various watering methods and their ability to encourage deep taproot growth. The watering methods tested include the Grouses Waterbucks, Gator Bags, and manual watering with a water hose. We are focused on the tree-planting community in the greater Washington Metropolitan area including non-profit environmental groups and for-profit commercial tree-planters.

According to the Natural Environment Research Council (Centre for Ecology and Hydrology), "Establishment of trees in the built (i.e. urban) environment cannot be regarded as a routinely successful enterprise. The overall picture is that there are many dangers for a newly planted tree and in some cases the chances of survival are as little 1 in 2." (Tree Roots in the Built Environment - Ch. 5, Establishment of Young Trees. 2013.)

The traditional method of planting urban trees is using a 5-7 year old nursery tree in a B&B (Bag and Burlap) root ball or in some cases, a large nursery pot. This method has been successful but comes with some drawbacks: high cost and long-term watering and maintenance. A new innovation, the Waterbox (and its bio-degradable version, the Greenbox, is being used successfully around the world to establish younger (1-2 year old) trees; and with this comes a large advantage of cost savings (up to 90%), very little maintenance, and improved early taproot establishment.

Along with several related questions, this research focuses on determining whether such a device would be effective in DC's urban conditions and soils. In addition to known lowering of costs and maintenance, this research will determine if the Waterbox can create better and deeper tree root systems despite DC's typical urban and compacted soils, which would improve survival rates and even perhaps lessen the risk of trees blowing over in windstorms.

As an additional experimental comparison, we will plant the same trees using the Gator Bag/Gator Ring (currently used by DDOT (DC Dept. of Transportation)), and as a control, bare ground (i.e. with no watering except normal rainfall).

To represent a mix of hardwood trees commonly planted in the Greater Washington, DC area, we selected White Oak, Swamp White Oak, Sweet Gum and Hackberry.

Overall, the primary goals of our experimental process went reasonably as planned. In this 2nd year, we still encountered problems setting up a watering system as this plot was not on the main grid at Firebird Farm. However, we have found that the site for this planting is the heaviest soil at Firebird and stays waterlogged for extended periods of time. (Note: See more detailed discussion below.) Moreover, the site is at the far end of the farm and is subject to significant run-off and inflow of water from the adjacent forest. Thus, additional watering which is the intended protocol of the research can hinder rather than support root development and tree growth.

The trees, in general, have recovered from the difficult Year 1 establishment shock caused by poor planting conditions. In last year's report, we noted these planting conditions and did, in fact, think that this Year 2 would see this rebound in tree establishment and growth.

We have essentially written off Plot 2 which contains the bio-degradable devices. As we stated in last year's report:

"We found that the bio-degradable tree-planting devices in Plot 2 did not endure as we had hoped or expected, the heavy rains and high winds that Muirkirk (now Firebird Farm) experienced in 2014. Keeping the tree flange (where the trunk meets the first primary root) at or slightly above soil level, required that we keep the tree-planters on the surface. Note: tree flanges planted below the surface encourage adventitious roots which spin around and strangle ("girdle") the tree.

To improve structural stability, we added a consistent amount of mulch (5 gallons/ tree) throughout the plots. This was an unanticipated budget item (i.e. time and materials) that Muirkirk picked up. However, the bio-degradable tree-planters were still "above ground" (unlike other test plots around the world - e.g. desert conditions where sandy soil structure does not require the exact planting techniques that our heavier clay soils demand). Thus, there was much wind-damage to them and no funds budgeted for their replacement. "

The key core research, however, remains intact; Plot 1 with young trees in the equivalent non-biodegradable plastic tree-planters, continues to work very well; and their results vs Plots 3-6 remain the

focus of the research. We still believe that our preliminarily hypothesis - that consistent passive drip irrigation and protection of young trees does in fact promote better and more efficient tree-growth. As we predicted in last year's report, Year 2 did provide a more robust set of data to further elucidate this point. We anticipate that Year 3 will provide the final and even more robust data to further test this hypothesis about urban tree-planting techniques. We have not disseminated this information or given official tours. Based on the more complete discussion above, we anticipate Year 3 being better for meaningful dissemination and sharing with communities of interest.

2. Global Food Security

CAUSES recognizes Global Food Security and Hunger as one of the most important themes in urban sustainability and urban agriculture. Without securing a steady and dependable supply of highly nutritious food, urban communities cannot claim to attain sustainability. With more than half of the world's population, and over 80 percent of the U.S. population now living in urban communities, food travels over longer distances resulting in declining nutrient density, high energy demand associated with a transport intensive food system, increasing vulnerability of urban food supplies, and growing health disparities due to unequal access to fresh food.

Using the pioneering work of Dr. Sabine O'Hara, CAUSES has begun implementing the concept of Urban Food Systems Hubs that operationalize her work on Sustaining Production (O'Hara 1996, 1998, 2004, 2012, 2013). Sustaining Production expands the traditional success measures of production such as profit maximization and productivity, and gives simultaneous consideration to increasing productivity, reducing emissions (negative externalities) and improving sink capacities. The Urban Food Systems Hubs consist of the following components:

1. Food production through highly efficient small scale aquaponics systems
2. Food preparation through commercial kitchens that serve as business incubators
3. Food distribution through networked farmers markets, grocery stores and restaurants
4. Waste management and recycling through food waste processing, composting, energy generation, and water management.

All four components of the Urban Food Systems Hubs offer business opportunities. To capitalize on these opportunities, the Hubs serve not only as sustainable production facilities, but also as training sites especially in the food desert areas of Wards 7 and 8 where unemployment is high and food related public health problems including diabetes, hypertension and obesity are prevalent.

Among the eight wards in the District of Columbia, Ward 8 is the most underserved and is located in the southeastern quadrant of Washington, D.C., south of the Anacostia River. The average household income in Ward 8 is $48,000 and unemployment is 24 percent. This compares to an average household income of $99,500 across all eight of the DC Wards and to an average $162,000 per household in Ward 3, which is home to the highest household incomes in the District of Columbia. 20 percent of the population in Ward 8 is under the age of 18; and 91 percent are African American, 1.5 percent are Hispanic, slightly more than 4 percent are Caucasian, and less than 1 percent are Asian. The percentage of college graduates in Ward 8 is 7.6 percent compared to an average 22.5 percent across all eight Wards.

Research

Promoting Sustainability: Growing Nutrient Dense Rice Using Drip Fertigation and Biodegradable Mulch

Rice is a staple crop of many cultures around the world. Traditional methods of growing rice have proven unsustainable in the face of growing water scarcity, environmental degradation, and shifting ecosystems. Flooded rice paddies are a major source of methane from anaerobic organisms. The average size of a rice farm in America is over 450 acres and growing. According to a study by the Lower Colorado River Authority (LCRM), rice growers in Texas used three times the amount of water as the entire city of Austin in 2012 (Henry, Terrence 2012). This research proposal designs an experiment to test sustainable models of rice production involving reduced water usage while promoting small-scale intensive practices that reduce environmental impacts. Developing methods that make growing rice an economically viable option for farmers and consumers is an important component of sustainability. Various drip irrigation and fertigation methods with biodegradable mulch to control weeds will be tested to increase rice nutrient density and profitability while maintaining the environment.

Our goal is to contribute to the momentum of small-scale rice production by increasing viable options for

farmers. As small scale processing equipment becomes more accessible, the capability of growing rice and other small grains, which have been the base of humanity's food security, should be in the hands of small farmers to insure a sustainable future. Our future depends on creating models of adaptability. Putting grain production into the hands of the small farmer is a step in the right direction.
We are focused on the small farmers and food producers in the Washington Metropolitan area interested in rice production in urban agriculture. We intend to present preliminary findings to local small farm conferences and workshops.
The primary goals of this research was achieved.The second year of rice production proceeded without incident. The crop was rotated to a different .8 acre plot according to the farms crop rotation plan.Rice can have allopathic qualities which may affect yield potential.
The plot is on a newly felled area with heavy clay Russett-Christiana Complex soil and poor nutrient availability. Two tons per acre of high calcium limestone was applied to the plot based on previous years soil analysis.The field was amended with leaf compost and dry fertilizer before planting based on the results of soil analysis.Foliar nutrients were applied and later adjusted based on plant sap analysis and plant growth stage. Nic Ellis, crop consultant, advised on a nutrient program.
The amendments were incorporated into the top 10 inches of soil using an Imants spader. A Rain-Flo 2600 plastic layer with drip layer was used to create 5" high, 30" wide beds on a 60" center. The area was divided into 4 plots of (6) 180' rows. Plots 1 and 3 had 6" drip and 2 and 4 had 1" drip tape with 12" drip spacing with .45gpm/ 100' output. In row plant spacing was reduced from 10" to 5" to observe effects of spacing and tillering on yield potential. A Rain-Flo water wheel transplanter was used for transplanting 21 - 28 day old rice plugs at the 4 leaf stage. Earlier plant dates were achieved this year. Abundant rainfall in June allowed for a vigorous growth stage. Low soil nitrogen and heavy rains... The Duborskian variety reached ripening stage with minimal watering through drip irrigation. And in general, water used was greatly reduced with a more abundant rainfall season. Koshihikari variety was grown this year with .95 acre/ft of water which is 25% of average water use in paddy rice systems.
Pests this year included the rice stink bug, Japanese beetles, cucumber beetle, and starling birds. A different approach was used effectively on the rice stink bug and Japanese beetles. Diatemacous earth was observed to be a very effective mechanical control of stink bug. With the starlings, various types of audible bird deterrents failed and only row cover was effective in controlling bird damage.It is estimated a 10% loss on the Duborskian and 10 - 20% loss to bird damage on the Koshihikari.
Disease encountered this year was minimal.Sheath blight was observed in a section of the 1" plot of Koshihikari. University of MD confirmed sheath blight due to Rhizoctonia.
Average yields in paddy systems are approximately 8000 lbs/acre. Aerobic systems such as upland and dry-land systems are expected to produce half that amount. Paddy systems are anaerobic and produce reduction reactions which increase nutrient availability. Those same anaerobic conditions also contribute to heavy metal uptake plaguing paddy rice production. Koshihikari harvest was 4333 lbs/acre. Duborskian harvest was 3452 lbs/acre. While Koshihikari has a higher yield, it appears more susceptible to disease such as sheath blight. And while Duborskian produces lower yields, its early harvest date provides many advantages. Both varieties have excellent flavor. While labor intensive, growing rice with these methods as a specialty crop has great potential in the local sustainable artisanal grain movement.
We were able to successfully increase our outreach over the past growing season. Last February, we presented a workshop on growing rice at the PASA winter conference and at Rooting DC. A field day at the farm was held in junction with Future Harvest CASA about growing dry-land rice. There were 25 people in attendance, including 7 beginner farmers. More than one attendee has confirmed that they are going to experiment with growing rice this upcoming season. Presentations were also given at CFSA conference in North Carolina, NOFA-NY, and VABF. The workshops have been well received and many have voiced interest in moving into small scale grain production.
The Ethnic and Specialty Crop Development Program
Our farm uses sustainable growing methods to produce a range of fresh herbs and vegetables that are rare in area supermarkets. Many of them are so-called ethnic crops that do not originate on the American continent, but can be grown locally. As defined by the USDA, specialty crops are fruits and vegetables,

tree nuts, dried fruits, horticulture, and nursery crops that are cultivated or managed and used by people for food, medicinal purposes, and/or aesthetic gratification to be considered specialty crops. Firebird Farm is the home for many herbs and spices from Ethiopia and several species of vegetables from West Africa. Located just north and east of the District, the farm enjoys a humid subtropical climate that allows us to grow ethnic crops. Our crops include, but are not limited to, Collards, Hybrid Kale, Hybrid Pac Choi, Hybrid Patty Pan Squash, Hybrid Smooth Leaf Spinach, Specialty Salad Greens, Swiss Chard, Mustard Greens, Bunching Onions, Red Russian Kale, Baby Peppers and Long Beans.

The UDC Ethnic Crops program was established to meet the needs of the rapidly changing ethnic makeup of the region's consumers. Our Ethnic and Specialty Crop Programs will continue to address the needs of the rapidly changing ethnic make-up the region's consumers. We will look to expand upon our Ethnic Crop Program by experimenting with a few of ethnic crops to determine their ability to grow in Washington, DC. Ethnic and specialty crops are in high demand in a diverse metropolitan area like Washington, DC. This is, in part, why CAUSES entered into ethnic crop production. In making these products accessible and affordable, we are helping to connect most consumers to new types of food. We are also giving native born and local immigrant populations a taste of home, right here in the Mid-Atlantic.

In his position as ethnic crop development specialist, Yao Afantchao works closely with local community gardeners and advises residents how to grow and cook a variety of flavorful international menu options. This program also introduces commercial growers to expanding ethnic produce marketing opportunities. According to BBC News, the Washington, DC area has the largest population of Ethiopians in the U.S. - about 250,000 people - and is the second largest metropolitan population of Ethiopians in the world (coming second only Ethiopia's capital of Addis Ababa). There is, therefore, a sizable market for Ethiopian food products in Greater Washington. Growing Ethiopian herbs and spices on the farm helps us to further expand our reach into this market. Ethnic produce presents a significant opportunity for Mid-Atlantic farmers as high-value alternative crops and excellent sources of income. Ethnic food products in North America account for more than 12 percent of all retail food sales, and are projected to sustain five percent annual growth. Some of the ethnic crops grown at Firebird Farm include: Nug (Ethiopian Seed), Netch Azmud (Ethiopian Caraway), Tikur (Black Cumin), Tena Adam (Rue), Besobila (Sacred Basil), Gboma (African Eggplant), Sawa Sawa (edible flower), Jamma Jamma (Huckleberry), Chinese Asian, East Indian, Mexican and Puerto Rican crops.

Tinashe Kuimba writes, "... Yao's mentorship is integral to this vision. Since I've known him Yao has offered a variety of experiences from workshops, field trips, and workdays on the farm to interactions with various experts in the Ag sector. The workshops have provided a forum for an exchange of ideas between mentors, mentees, educators, experts and the general public on a variety of topics from pest control, nutrition, and urban farming legislation..."

Christopoher Mapondera writes, "...The program involved hands on experience with production of ethnic crops. The ethnic crops production, harvesting and processing program was a very beneficial program eliminating food deserts among the immigrants in the DC metropolitan area. The program has implications that will affect the world. The developing countries will benefit from knowhow on promoting indigenous food crops..."

Aquaponics System and Crop Production at Firebird Farm

Urban agriculture has been defined as the cultivation of crops and rearing of animals, including aquaponics, aquaculture and urban forestry, within and surrounding the boundaries of cities. The Center for Urban Agriculture and Gardening Education (CUAGE) focuses on a multifunctional approach to food production activities, as well as herbs, medicinal and ornamental plants for home consumption and for the market. CUAGE contributes to fresh food availability of urban dwellers, as well as to the greening of the nation's capital and teaches the productive reuse of urban waste. CUAGE will seek global relationships in urban and peri-urban agriculture. In developing countries, urban agriculture is recognized for the provision of local food, as well as recreational, educational and social services. An important aspect of urban and peri-urban agriculture is that it provides income and employment and contributes to local economic development, poverty alleviation and the social inclusion of the urban poor and women. CUAGE describes this system as urban agroecology.

An aquaponics system is a process of growing fish in a tank. Aquaculture is known as fish or shellfish fish

farming that refers to breeding, rearing and harvesting of plants and animals in all types of water environment including ponds, rivers, lakes and ocean. Aquaculture includes the production of seafood from hatchery fish to shellfish which are grown to market size in tanks, ponds, cages and raceways. It also includes productions of ornamental fish for the Aquarian trade and growing plant species used in range of food, and pharmaceutical, nutritional, and biotechnology products. If you connect the fish tank water (fish waste) to water a hydroponics system, plants get an automatic food supply of almost everything they need to grow from the fish water and in turn the plants filter the water for the fish. The fish waste from the tank helps to grow different vegetables and/or crops organically. Plants grow fast because they get rich alive nutrients.

We have implemented aquaponics systems in two greenhouse facilities at the Firebird Research Farm. There are two 500 gallon water tanks in each greenhouse. The farm grows Tilapia species. Demonstration activities were conducted with stakeholders to include a crop harvest festival day at the farm. We will continue investigations and experiments on crop production infrastructure and maintenance on this sustainable method of food production for the District of Columbia and other urban areas.

Crop Production in Aquaponics System

Raised beds and pots with rocks/pebbles were prepared in the Aquaponics system in one of our hoop houses. Different crops were planted in raised beds and in pots filled with rocks for demonstration. Fish waste was used to water and grow the crops. Vegetable seedlings planted in the raised bed (soil) performed much better than the vegetables planted in the pots filled with small rock/pebbles. Tomatoes, peppers, huckleberries, and water leaf were planted during the summer season and Mustard Greens, Tatsoi, and Collard Greens were planted in Fall season.

Extension

From consuming produce that is tastier and higher in nutritional value to decreasing CO2 emissions by harvesting as locally as your backyard, District residents are all "a buzz" about the many benefits of local food production. Urban agriculture has caught on, and unlike large-scale intensive agriculture operations, urban agriculture utilizes comparatively smaller spaces while focusing on diversified, edible crops. Many residents already subsidize what they buy at the grocery store through community garden plots and by growing in their backyards, yet are in need of technical assistance with issues ranging from cultivar selection and planting dates to fertilizing, soil contamination, and integrated pest management. Alternately, other District residents don't have access to grocery stores, let alone yard space or a nearby community garden in which they can grow their own food.

Urban Gardening

The Cooperative Extension Service works with District residents on both ends of the spectrum. We provide technical assistance to the established gardeners, and also help the up and coming gardeners start their own gardens by providing free consultation, connecting them with available resources, and providing technical assistance. Some of the activities for fiscal year 2015 include offering workshops; demonstrations; site visits; presentations and providing technical assistance to District residents through phone, email, and in-person consultations.

DC Master Gardener Program

The Master Gardener Program is active in all 50 states and Canada. The DC Master Gardeners Program was established to assist Cooperative Extension in reaching the consumer horticulture audience. Master Gardeners, revitalized in 2002, is a volunteer program affiliated with land-grant universities through the Cooperative Extension Service. DC's Cooperative Extension - our community education programs - is housed under CAUSES. Washington, DC and Baltimore City host the only metropolitan, inner city MGPs on the east coast of the U.S. Volunteers use research-based information to educate the public on best practices in horticulture and environmental stewardship.

The DC Master Gardener Program is designed to train volunteer horticultural educators for the University of the District of Columbia Extension, the principal outreach education unit of the University of the District of Columbia. Participants receive 50 hours of basic horticulture training and then agree to work in their communities to teach District of Columbia Residents how to cultivate garden spaces and manage landscapes sustainably using research-based information. This population horticulture approach reduces fertilizer and pesticide use resulting in improved soil and water quality. There are several program benefits

for communities to include:
• Creating a healthier environment by reducing fertilizer runoff into our watersheds and the Bay
• Saving money and reducing health risks by minimizing use of toxic pesticides
• Improving soils and saving landfill space by composting yard waste
• Reducing water use through horticultural practices
• Creating beautiful and ecologically sound landscapes for local conditions
• Learning ways to provide habitat for native wildlife and beneficial insects
• Teaching the benefits of home food production and developing skills and knowledge in growing food, managing community gardens, or contributing to food banks or kitchens

The UDC Extension Agent /Horticulturalist, Sandy Farber, is the Master and Junior Master Gardener Coordinator. The program has 226 active Master Gardeners in D.C., and Ms. Farber trains participants to go out in the field and teach plant clinics. The program also has beautification projects in all eight Wards of DC including schools, places of worship, nursing homes and parks. The Master Gardeners give back 9,000 hours back to the city annually. The program provides interested individuals with extensive training in topics such as plant pathology, entomology, urban soils, plant propagation, and pruning clinics. In return, participants dedicate volunteer time to teach horticultural information, answer questions, speak at public events and participate in community gardening programs.
In FY 15, 276 (which includes 42 trainees) Master Gardeners and Trainees provided 9,000 hours of horticultural expertise to the District of Columbia. The value of volunteer time is $39.86 per hour according to www.independentsector.org with a total value of $358,740 in savings to the District of Columbia. In addition, 41,194 direct contacts were served by the Master Gardener Coordinator/Extension Agent. Forty-two (42) Master Gardener Trainees completed 50 hours of basic horticulture training, a final exam and 50 hours of volunteer hours. Various Master Gardener projects throughout all eight wards have been established which includes the Ward 3 food hubs (the UDC green roof/greenhouse), schools, parks, beautification projects, landscape design, youth gardens, local and national botanical gardens, and partnerships with non-profit organizations. Several new projects were initiated and here are the highlights and success stories:

• Master Gardeners volunteered 600 hours to the success of the Ward 3 Food Hub (green roof/greenhouse) in its' inaugural year. The value of their volunteer time is $21,641 in savings to the university. Their duties included propagation of vegetables and companion plants, planting, maintenance, and harvesting. 4,225 lbs were harvested and donated to the following: food banks (3,000 lbs.), UDC Center for Nutrition, Diet, and Health (200 lbs), Community Supported Agriculture (300 lbs), and volunteers (725 lbs).

Pollinator Education
Pollinators such as bees, wasps, flies, butterflies, moths, beetles, birds and bats support terrestrial wildlife, provide healthy watershed and more. Honeybees play an important part in our agricultural ecosystem. According to the USDA, one-third of our daily diet comes from honeybee-pollinated crops. Pollen is transported by honeybees, allowing plants to produce fruits, vegetables and seeds. Despite their critical role, these pollinators are being increasingly threatened by extreme weather, parasites, disease, chemicals, and reductions in forage areas. Honeybees thrive in pollinator patches, which offer bees blooming opportunities and a variety of flowers to support different bee species, increasing pollinator diversity. In partnership with The SEED School, the University of the District of Columbia MGP celebrated planting a pollinator garden as part of the Bayer Bee Care Program. Pollinator forage is essential to the health of honey bees. CUAGE is delighted to partner with Bayer Crop Science and come together with students and industry stakeholders to design and plant a garden to support pollinator health. Beekeeping was legalized in DC under the Urban Agriculture Apiculture Act of 2012 and is regulated by the District Department of the Environment. UDC offers beekeeping courses in partnership in with The DC Beekeepers Alliance and the Northern Virginia Beekeeping Education Consortium.
The farm was pleased to welcome officials from the Aruba Agricultural Department. CUAGE looks forward to assisting the enhancement of Aruba's food and nutrition security strategy. CUAGE can assist by improving the food situation of the country and its people, especially for populations facing any level of

food insecurity. Aruba, being a net importer of food, faces some extreme elements of food and nutrition insecurity, which includes limited availability, accessibility and nutritional quality of food. In Aruba, the food security challenge involves creating income-earning opportunities and making enough safe and nutritious food available for all residents. Rising food prices, increased weather variability and the global economic crisis have, in recent years, made the goal of enhancing food security in Aruba even more challenging. The overall goal should be to improve the health and well-being of all persons living in Aruba through enhanced food and nutrition security. In Aruba's quest for increased food production, CUAGE has identified some important ways we can assist in increased food production.
We partner with local organizations such as Bread for the City to promote local food and nutritional security. Bread for the City tends and manages the City Orchard on UDC's Firebird Farm . All of the fruit is donated to feed their constituents--the vulnerable residents of DC who rarely have access to fresh fruit. The farm also donates produce to groups that feed underserved populations like DC Central Kitchen. Partner organizations bring volunteers to Firebird Farm and regularly pick-up produce from the farm.
Urban agriculture is a global and growing pursuit that can contribute to economic development, job creation, food security, and community building. It can, however, be limited by competition for space with other forms of urban development, a lack of formalized land use rights, and health hazards related to food contamination. The use of green roof technology in urban agriculture has the potential to alleviate some of these problems, without adversely affecting the benefits provided by urban agriculture. It would not only enable the use of land for development and agriculture, but may facilitate the formation of formal space and water use agreements and enable redistribution of ground level resources among urban farmers. This could decrease the use of contaminated land and water at ground level and alleviate health concerns.
Farm Improvements
During the reporting period, we have worked diligently and purposely to continue to build capacity for expanded research in aquaponics, sustainable agriculture, ethnic crops and specialty crops at our research farm in Beltsville, MD. At Firebird Farm, our goal is to research and test techniques in sustainable and organic agriculture and apply them to an urban agricultural setting in the Asian and Latino communities.

3. Preventing Childhood Obesity and Other Food Related Illness

Research

Changing the Health Trajectory for Older Adults through Effective Diet and Activity
Midlife and other adults comprise the fastest growing population segment in the U.S. Baby boomers, who make up much of this population shift, have higher rates of obesity, chronic disease and disabilities than previous generations. Older adults are at higher risk of developing arthritis, sarcopenia, diabetes, hypertension, hypercholestrolemia, age-related muscular degeneration, and cardiovascular disease than younger adults. These conditions that are associated with disabilities, compromise physical capacity and loss of independence but are preventable by diet and/or physical activity, providing the basis for the proposed work of this transdisciplinary team project. Adults make daily choices without being aware of how that seemingly inconsequential decisions may impact their health. Numerous biological, environmental and behavioral risk factors influence an individual's daily health choices. To better understand the factors influencing age-related diseases and health-promotion in midlife and older adults, this multistate research project will examine: (1) environmental factors influencing the adoption of health-promoting lifestyle changes and (2) evaluation of lifestyle interventions that lead to measurable outcomes.
During the reporting period, original recipes and memoirs were collected from the seniors. The recipes were analyzed and a healthier version of the recipes was created and compiled into a recipe book with original and modified recipes, nutrient facts and historical perspective for each. Additionally, a survey instrument was designed to gather data on identifying the barriers for good nutrition. The recipe book was distributed to all centers during the Annual Meeting in Rhode Island. Recipe books were also distributed to all the congregare sites that participated in the research.
Two student presentations were made at a regional research meeting in June 2015. One was a demographic analysis of the target audiences; the other provided a detailed nutritional analysis of selected African vegetables as an alternative food choice for members of the target population.
A survey instrument has been developed that will collect quantitative and qualitative data that will identify

and explain personal (family and cultural) characteristics, attitudes, and beliefs, that influence the purchase, preparation, and consumption of fruits, vegetables, and whole grains among the target population; and will determine if any of these characteristics are barriers to healthy food choices. This instrument has been sent to the University IRB for approval.
Potential barriers to healthy food choices in the target population have been identified as cultural/attitudinal, physical, or political. These categories informed the construction of the survey instrument.
Sampling sources and plans that will provide target population subjects have been identified: congregate meal sites; churches and recreation centers; and private homes.
Collaboration with UDC Gerontology Institute has been established to recruit seniors for conducting the pilot testing by using the survey instrument. The survey instrument has been loaded to survey-monkey to enable students to conduct survey and gather data.
After approval by the IRB, the survey instrument will be pilot tested and validated. At least 150 subjects will be interviewed by four research assistants using the validated instrument. Focus groups will be designed in the event that additional data on food choice barriers is required.

Extension

Over the past 30 years, obesity rates among children and adolescents have almost tripled throughout the United States. An estimated 17% of children and adolescents aged 2-19 years are obese. The Healthy People 2010 goal of 5% obesity among children was not met. Obesity in children is defined as a BMI greater than or equal to the age-and sex-specific 95th percentiles of the 2000 CDC Growth charts. Childhood obesity is associated with an increased risk for developing type 2 diabetes, high blood pressure, sleep apnea, and high blood cholesterol www.cdc.gov/nchs/data. Children who are obese are also more likely to become obese adults, further increasing their risk for obesity related diseases, including heart disease and certain cancers. Obesity rates have affected low-income children at a disproportionate rate. Data published from the 2009 Pediatric Nutrition Surveillance System study showed that almost one third of the 3.7 million low-income children aged two to four years old were obese or overweight. Obesity in low-income children ages two to four years old has increased in the District of Columbia, from 10.9% in 1998 to 13.3% in 2008 (Center for Disease Control, Morbidity and Mortality weekly report, http://www.cdc.gov/mmwr with more boys being obese as compared to girls.
The Center for Nutrition, Diet and Health programs and activities addresses three of the five priority areas of the National Institute of Food and Agriculture (NIFA) of the United States Department of Agriculture (USDA) as follows:
1. Global Food Security & Hunger - Farmers Market Nutrition Education Program
2. Childhood Obesity - Shopping for Healthy Food - Grocery Store Tours; Nutrition Education for Preschoolers; Nutrition Education for Youth; Fruit and Vegetable Prescription/WeCan Program; SMART Nutrition for Seniors; and A Taste of African Heritage Diet
3. Food Safety - Professional Food Managers Certification Program

The Supplemental Nutrition Assistance Program-Education (SNAP-Ed) was reported o the United States Department of Agriculture, Food and Nutrition Services, and the Expanded Food and Nutrition Education (EFNEP) are being reported on to NIFA through the WEBNEERS website. The following programs are reported on during this reporting cycle:

1. Farmers' Market Nutrition Education Program
2. Shopping for Healthy Food - Grocery Store Tours
3. Nutrition Education with Preschoolers
4. Nutrition Education for Youth
5. Fruit and Vegetable Prescription/WeCan Program
6. SMART Nutrition for Seniors
7. A Taste of African Heritage Diet
8. Professional Food Managers Certification Program

Nutrition Education for Preschoolers

According to the National Health and Nutrition Examination Survey (NHANES), one in two adults and one

in three children are considered overweight or obese. When examining just the 2-5 year olds, about 11% of children ages 2-5 years of age are considered overweight or obese. These numbers reflect the obesity epidemic which affects millions of Americans on a daily basis. In an effort to curb the rise in obesity, the nutrition Education for Preschoolers was developed. The Cooperative Extension Service uses this educational program as a tool to teach residents how to manage their weight and address health related problems associated with a poor diet and lack of physical activity. By utilizing qualified registered dietitians and nutritionists, the District of Columbia Cooperative Extension Service, Center for Nutrition, Diet and Health is effective in providing ongoing nutrition education to the residents of the District of Columbia.
The Nutrition Education for Preschoolers Program educates individuals to adopt healthier lifestyles in accordance with the "Dietary Guidelines for Americans" and "MyPlate". Public school, daycare center, and Head Start program teachers are trained to implement the Color Me Healthy curriculum and the 48-lesson curriculum in nutrition and food safety among children and their families, improving their ability to select healthy foods, safely handle food, and properly prepare and store foods. Children in participating preschool/prekindergarten classes receive nutrition education lessons that incorporate hands-on experience with fresh fruits and vegetables. Parents are offered nutrition educational sessions covering topics related to their child and to their personal health. Five basic concepts are taught within the preschool/prekindergarten classrooms. These include: 1) Food safety/hand washing, 2) Vegetables, 3) Fruits; 4) Whole grains, Dairy and protein, and 5) Physical activity. We believe getting individuals to make positive changes around these topics will lead to healthier lifestyles and a reduction in obesity and overweight among the target groups.
These topics are followed in order by the nutrition educator. One topic is taught each month, and the teachers continue the nutrition education during the remaining weeks of the month. Once all five concepts have been taught, the nutrition educator will cycle through them again using different approaches in order for the individuals to review and broaden their knowledge on each topic. In addition to the nutrition lessons in the classroom, parent workshops are held in order to address nutrition related questions and concerns.
The program is implemented by nutrition educators and graduate nutrition students. A nutrition educator/graduate nutrition student is assigned a number of D.C. public and chartered schools, daycare centers, and Head Start centers located throughout the District that serve low-income children ages two to five years old. The nutrition educator trains the teachers at each site on how to use research and evidence-based curriculum to incorporate nutrition, food safety, and physical activity education into lesson plans. The nutrition educator also works with the students in each classroom, as well as provides parent workshops on various health related topics. The nutrition educator partners and collaborates with the site's parent coordinator in order to set a date, time, and recruit parents accordingly for each meeting or workshop. The topics are taught in a variety of ways.
An example of an activity used to teach food safety/hand washing: Food safety/Hand Washing - a stuffed Elmo comes with the nutrition educator to the lesson to enforce the idea that "germs are bad." A story is told about Elmo going to school and forgetting to wash his hands before he eats, after using the restroom, and how his friends coughed and sneezed on him. Glitters, or "germs," are sprinkled on Elmo after each incident to show how the germs are spread. We then lay Elmo down to sleep, because he is sick. We then review how to cough, sneeze, and wash our hands correctly. Each student goes through the steps of washing their hands, using soap and warm water, to get rid of the germs.
Kids Cooking Classes/Kids Cooking in the Classroom provides children aged 2-5 years with hands-on cooking experiences. The foods include vegetables, fruits, whole grains, dairy, and protein. Research has shown that the more exposure preschool aged children have with healthy foods, the more likely they will be to engage in healthier lifestyles choices later in life.

Nutrition Education for Youth

The program provides nutrition education conducted by nutrition educators youth on the following topics: nutritional needs and cultural heritage of audience; nutrition knowledge, skills, and attitudes necessary to improve diets; planning for daily food needs; knowledge and practice in food selection and preparation; knowledge of financial management relating to family food budget, uneven incomes, and local food resources; use and care of equipment used for food preparation, storage, and utilization; food safety, health, and sanitation practices; gardening and food production techniques; food preservation practices;

food intake and health and fitness. The direct education provides a series of classes in groups of 15-20 students in classrooms and community settings. Youth completing the series of classes receive a certificate of completion.

Unity Healthcare We Can

Unity Healthcare (3924 Minnesota Avenue NE), in Ward 7, is responsible for the healthcare of District community members. Since FY14, UDC SNAP-Ed participated in Unity Healthcare's We Can Program. We Can is a family-centered obesity prevention program that provides exercise and nutrition programs for adults middle-aged and senior adults seeking to change their weight status. Helen Naylor and Teresa L. Turner provide nutrition education and healthy food demonstrations for the participants on Wednesdays. In FY14, SNAP-Ed educators provided services for one afternoon class. Because the program was so successful, Unity Healthcare requested and invited UDC SNAP-Ed to provide services to an additional evening class. Our visits increased from biweekly in FY14 to weekly in FY15. In FY14, Unity's We Can direct contacts equaled 53. In FY2015, their direct contacts equaled 311. There was a significant increase of 487% participation. Indirect contacts for FY15 totaled 1423. Partnerships included Wholesome Waves and DC Greens.

Farmers' Market Nutrition Education Program

According to USDA Agricultural Marketing Service, farmers markets are becoming fresh food mainstays for people across all socioeconomic, political and ethnic classifications. They serve as community anchors, promoting the regional economy and local farm businesses, increased access to fresh, nutritious food, and stronger social networks that help keep communities healthy. In addition to providing easier access to fresh food, studies show establishing a farmers' market can revitalize a neighborhood, enhance social interaction and provide a supplemental source of farm income for many growers, according to the Center for Sustainable Development's Farmers Market Manual. Moreover, because farmers markets increase the availability of fresh fruits and vegetables for consumers, they play an important role in the government's mission to combat childhood obesity. People also love supporting locally grown and produced foods. The Farmers Markets are usually open from May-November.

CNDH partners with local farmers markets around the District of Columbia in effort to make a comprehensive approach towards affecting policy, system and environmental change. The Farmers Market Nutrition Education Program provides nutrition education at point-of-purchase for market goers. The program also provides on-site food demonstrations using fresh produce from the market, recipes and nutrition data for foods sold at markets. Nutrition educators and chefs also attend local farmers markets and conduct fresh food demonstrations including fruit and vegetable carvings to get children interested in eating healthier foods. In addition, they inform farmers market customers that buying fruits and vegetables in season is cheaper and gives them information about how to preserve the produce out of the current season.

Food demonstrations provide interactive instruction on healthy cooking techniques, modifying favorite recipes to include healthier ingredients. And of course, who doesn't love a free sample? You can always find a CNDH chef at the UDC Farmers' Market on Saturdays from 8:00 a.m. - 2:00 p.m. One of the unique concepts behind our market food demonstrations is that he uses ingredients and produce from the market's vendors. Hence, a shopper is more likely to purchase the same ingredients directly from the market after tasting a sample. They also provide food safety education and health tips, and offers nutrition information and cooking tips to market shoppers.

The UDC Farmers' Market is a great venue for teaching people how to use and enjoy fresh produce. At one occasion, Chef Holden cooked an agusi stew using fresh avuvo from the UDC Firebird Farm and shared it with 85 direct contacts that day. Another day, he prepared grilled vegetables and melons. Chef Holden met a group of young soccer players and carved melons into critters for them to take home. Not all food demonstrations have to involve cooking. Some can involve simple preparation and a combination of unexpected ingredients, like the watermelon and feta salad that Chef Holden prepared for people at the UDC Farmers' Market. Chef Holden's presentation showed people a different way of using summer fruit, in a savory dish. People were happy to take the recipe home to try with their families. There were 75 direct contacts at this time.

CNDH was a partner and presenter at the Get Fresh Festival at the RFK Stadium Farmers Market, (2400

East Capitol St NE), which promotes using benefits like WIC, SNAP, and the FMNP (Get Fresh!) checks. Chef Holden conducted a live cooking demonstration using fresh vegetables available at the farmer's market for 150 direct contacts. Participants were able to see how to prepare these ingredients and had the opportunity to ask the Chef questions. Many of the participants were seen shopping for the vegetables Chef Holden used so that they could make the dish at home. Partnerships included: SNAP-ED, WIC, Vegetarian Nutrition Practice Group, Cooking Squad, Our Food Rocks the Plate, Lia's rainbow, Roots Activity Learning Center, Montessori School of Chevy Chase, DC Department of Health, Mount Calvary Holy Church, and DC Central kitchen. Chef Holden did a food demonstration at the Get Fresh Festival near the White House, using fresh fruits and vegetables from the farmer's market. Chef Holden particularly enjoys showing participants how to make multiple healthy dishes using the same few ingredients. This gives them options even after they have purchased their ingredients. There were 200 direct contacts and 500 indirect contacts for this event. Partnerships included: WIC, DOH, SNAP-ED, DC Fire Department, US Postal service, DCPD, and local farmers in Maryland, Delaware, and Virginia, and UDC Farmer's Market.

Shopping for Healthy Food (Grocery Store Tours)

"Cooking Matters at the Store" is another nutrition education program carried out through the partnership between UDC, healthcare clinics, food retailers and District residents receiving or eligible for SNAP benefits. Project (Nutrition) specialist coordinates the program, conducting outreach in all eight Wards of the District, teaching different age groups how to better understand what they are eating and make smarter decisions. Sapna leads "grocery store tours," teaching participants how to shop healthy on a budget. These tours are conducted in various grocery stores around the District, with an average of 5-10 participants per class. At the end of each tour, everyone receives a $10 food shopping gift card (gift cards funded by Share Our Strengths) to be used towards the purchase of healthy foods. During these weekly, interactive grocery store classes she teaches participants how to read food labels, identify acceptable levels of salt and sugar in food, and understand if food is really as nutritious as advertised. The participants for this particular July class are part of a diabetes management group where learning how to eat healthy foods is vital for managing their disease. These classes are held in the typical grocery stores where participants would regularly shop for food. Sapna focuses on helping participants to make small life changes that will more likely be sustained rather than a total change in diet that will be more difficult to maintain in the future.

As they make their way through the grocery stores, Sapna asks the participants to select a canned good, box of cereal etc. and read the nutrition labels before discussing why a particular product should or should not be purchased. She also includes tips to limit the effects of commonly purchased items. For example, she explained to the participants that if they choose to purchase canned goods, they should wash them off with water before use and it will reduce the sodium by about 40 percent. When asked what her favorite part of teaching the class is, the nutrition educator quickly responded, "the participants."

"We are only in the middle of this multi-week course, but I can already see the progress made by the participants," explained Sorelle N. J. Cooper, MSN, FNP-BC, Family Nurse Practitioner at Parkside Health Center part of Unity Health Care, Inc. "This is the type of knowledge they keep with them for the rest of their lives."

"I really like coming to these classes," commented one of the participants. "They are educational but also fun. And I like learning about food!"

"Cooking Matters at the Store" is funded by a grant from the Share Our Strength program, a national nonprofit that aims to end hunger in America by connecting people with the nutritious food they need to lead healthy, active lives. Through the $2,500 grant, the Center for Nutrition, Diet and Health is in the process of conducting grocery store tours for 250 individuals. Program participants are organized through CNDH partners: Unity Clinics, DCPS community and parent outreach groups, Transition Housing Corporation, DC libraries, DCPS New Heights program and senior centers.

A Taste of African Heritage Diet

The ancestors of African Americans brought many wonderful food traditions to parts of the Caribbean, South America, and the Southern states of the U.S. Over the generations, many of these food traditions have been lost, with the influences of modern, American eating habits. Health has sufferd because of this loss. The American Heritage Diet is a way of eating based on the healthy food traditions of people with

African roots. The diseases we know today, like diabetes, heart disease, cancer and obesity were much less common with traditional diets in earlier times. The African Heritage diet is primarily plant-based. A Taste of African Heritage is a program established by Oldways, a nonprofit food and nutrition education organization. The program introduces a six-week curriculum that focuses on nutrition education, traditional African heritage foods and cultural history.

The Center for Nutrition, Diet and Health (CNDH) piloted the nutrition curriculum specifically designed for African-Americans and descendants of Africans across the diasporaThe purpose of the program is to reduce health disparities by reconnecting African-Americans to the history, culture and food traditions of their African ancestors. Moreover, the program's foundation lies in the extensive research conducted by physicians, dietitians, and historians and evidence-based eating model - the African Heritage Pyramid - an evidence-based eating model that serves as a guide to teach healthy cooking using traditional foods that are familiar to African-Americans.

CNDH piloted the A Taste of African Heritage curriculum in partnership with Unity Healthcare's Parkside WeCan! Initiative in the District's Ward 7 and several other sites in D.C. Many of whom were diagnosed with Type II diabetes, obesity, and high cholesterol, enrolled in the CNDH pilot and attended six nutrition classes. They completed the A Taste of African Heritage classes over the course of three months. The participants learned about the history of traditional African heritage cuisines while being reintroduced to natural foods formerly enjoyed by their ancestors. They also learned about the negative impacts of increased sodium and sugar consumption and how to prepare delicious plant-based meals using whole grains, vegetables, fruits and spices that derived from Africa, South America, and the Caribbean. The participants observed cooking demonstrations and eventually began to prepare the recipes on their own. The classes encouraged them to explore their family histories, prepare more meals at home, and share the program materials with their family members and friends.

SMART Nutrition Support Group for Seniors

The SMART Nutrition Support Group for Seniors is a new program in the Center for Nutrition, Diet and Health in the pilot stages. The program emphasizes healthy eating on a fixed income, interactive nutrition education and food demonstrations and cooking classes.

UDC's Farmers' Market

Run by Center for Sustainable Development (CSD), College of Agriculture, Urban Sustainability and Environmental Sciences (CAUSES), on every Saturday at the Van Ness Campus from May to late November since 2013, the UDC Farmers' Market brings local, fresh, and sustainable produce to Ward 3 residents and beyond. The economic impact of the farmers' market goes far beyond the sales value because the local spending causes a larger multiplier effect throughout the economy that will stay local, compared to the spending that happens at grocery stores. Using the Sticky Economy Evaluation Device (SEED) methodology, it is estimated that UDC Farmers' Market in 2015 market season (mid-May to late-November) has an annual combined economic impact of $432,717 in the District of Columbia's economy. Operating 26 days per year, the UDC Farmers' Market is estimated to enjoy gross annual receipts of $140,600. The CSD evaluation team also learned through its survey that the UDC Farmers' Market attracts approximately 300 shoppers per market day, which results in an estimated annual attendance of 7,500 shoppers.

The impact of this public market comes in three major perspectives: a) vendors, b) nearby businesses, and c) a region's economy through local and state taxes contribution. In addition, core market statistics such as shopper frequency, geography and important demographic details, as well as suggestions for improvement are captured in our survey.

The UDC Farmers' Market locates on the west side of the Connecticut Street in front of UDC Law School at 4340 Connecticut Avenue NW, 20008. It manages 1,600 sq. ft. of space with eight vendors. The vendors pay an annual fee of $150 to the CAUSES and their produce comes from farmers in 100 miles radius from the market. The main objectives of UDC Farmers' Market is to provide convenient access to fresh produce, to enhance social engagement, to enrich the community with useful knowledge that they can incorporate in everyday living and to improve the local economy by providing a useful source of income for many local farmers.

Our roles and responsibilities include overseeing the market and making sure it runs smoothly enough to

seem as though it naturally occurred. We are also responsible for making sure that every vendor is in compliance with the Markets rules and guidelines as well as the regulations of the United States Department of Agriculture (USDA). As part of the mission of the Land-Grant University, we are also responsible for providing access to the market to low-income areas as well as educating the local community.

We total the economic benefit to vendors, nearby businesses, and the local community and multiplies the total by a number (called a Regional Input-Output Modeling System II multiplier, or RIMS II multiplier) calculated by the Bureau of Economic Analysis (BEA) or estimated in light of comparable BEA multipliers. This multiplier captures the impact of an initial round of spending plus successive rounds of re-spending the initial dollars within the District of Columbia and the Washington DC Metropolitan Area. The greater the interaction each dollar has with the local economy, the larger the multipliers are (and the "stickier" the economy is).

in 2015, UDC Farmers' Market is estimated to have brought the District a total economic benefit of $432,717 (Projected gross annual receipts at businesses near the market ($140,600) + Projected gross annual receipts at businesses near the market ($170,760)) * DC multipliers, $44,220 personal income and one and half full-time equivalent job across all sectors. UDC Farmers' Market is estimated to have brought the Metropolitan Area a total economic benefit of $546,707, $167,557 personal income and six full-time equivalent job across all sectors.

The benefits that a farmers' market brings to the economy and community goes beyond monetary impacts. Socially, the UDC Farmers' Market provides a new common ground where people easily interact, alive with social activity and increases the sense of community. Nutrition information about food sold at the market and cooking instructions are distributed and cooking demonstrations are provided by UDC land-grant program staff at the UDC Farmers' Market. There was also art demonstration and display, as well as live music played by local artists and musicians. According to our survey, 55 percent of respondents either strongly agreed or agreed that their family's weekly consumption of fruits and vegetables increased due to shopping at farmers markets.

Environmentally, farmers' market promotes local transactions which minimize the food mileages and carbon footprint, and maximize the nutrition contents of the produce. According to our interviews with the vendors, produce sold at UDC Farmers' Market come within 103 miles radius, compared with nearby Giant's produce coming from 1100 miles radius. Serving as the food distribution platform, UDC Farmers' Market is an essential component for the CAUSES Urban Food Hub system and promotes healthy diet and lifestyle. Its social, environmental and educational benefits will be our next steps in the evaluation work.

Independent farmers and vendors need a venue to sell fresh, healthy foods. Additionally, consumers need convenient locations to have access to fresh and healthy foods. To address these needs, the University of the District of Columbia, through grant funding from USDA, established and operated two Farmers' Markets in the District of Columbia. The markets operated for 24 Saturdays from May-November, provided vending space for 10 independent entrepreneurs and welcomed over 6,000 visitors who purchased produce, supported community marketing initiatives and participated in cooking and sampling demonstrations. Six volunteers from two DC universities also received community nutrition experience and entrepreneurship skills. Each week over 300 people purchase fresh, healthy foods from independent vendors. Patrons can also sample foods and participate in community demonstrations and events at the market. The market employs three students and offers weekly spaces to farmers and other independent entrepreneurs.

We will not be reporting on breast cancer research as the project has been completed. All outputs and outcomes have been reported in previous annual reports.

4. Urban Families, Youth and Communities

Research

The Five Pillars of Economic Development

Many underserved urban neighborhoods have been excluded from economic development success even in times of economic expansion. Economic development challenges are typically exacerbated in times of economic stagnation. Washington DC is especially challenging in this regard. It is a tale of two cities.

Wards 2 and 3 in the NW of the District have household incomes of $110,000 per year, low unemployment rates of 4% or less and less than 10% of the population are African American; neighborhoods in Wards 7 and 8 east of the river have household incomes of $35,000 per year, unemployment is close to 20% and over 80% of the population are African American. This bi-furcation distorts economic development success as averages within the District are not sufficiently descriptive of the realities of the most city's underserved neighborhoods.

Yet economic development success is possible. The key lies in identifying viable economic development strategies that strengthen the individual and community based assets of underserved communities and meet local needs. Using the pioneering work of Dr. Sabine O'Hara (O'Hara and Vazquez. 2007. The Five Pillars of Economic Development) as its starting point, this alternative approach to economic development provides a bottom-up approach that enables local residents to define and shape their own future.

The research seeks to generate information about local needs and individual and community based assets in two Washington DC neighborhoods, Deanwood and Congress Heights.

To date the research project has developed a sizable data base of indicators that provide information by Ward about a range of data indicative of health, education, social and cultural amenities, environmental quality and access to information and transportation - the five pillars of economic development. In addition to these quantitative indicators, the research uses an innovative story writing process in the Deanwood and Congress Heights neighborhoods that represent the different histories, economic conditions, and demographics within the most underserved Wards, Ward 7 and 8 of Washington DC. The base research for the two story writing workshops was conducted in October and November 2015 in the form of two facilitated conversational focus groups that were structured around the five-pillar areas. Based on the focus group results a first story draft was developed that records the collective vision of success and prosperity 25 years into the future. This community based vision of economic development success will yield invaluable information about the aspirations and needs of local residents, demographic sub-groups, and key stakeholders including the business community, service providers, the public sector and other relevant groups.

The descriptive details that emerge from the story writing workshops identify further assessment needs and planning details that can close persistent information gaps and address coordination needs. While it is pre-mature to identify specific follow up needs, future research efforts may include a neighborhood based skills and needs survey and the selection of suitable quality of life indicators that can serve as success measures to track progress toward the expressed vision of economic development success in the two neighborhoods as well as other areas within the District of Columbia.

During the reporting period, a three months full-time project coordinator was hired who is a recent UDC graduate and resident of one of the neighborhoods where the two focus group meetings were held. Fourteen UDC students were trained to engage in the various aspects of the research including as focus group facilitators and recorders, and as research assistants to collect data. More than 200 DC residents and CAUSES faculty and staff members were educated on the persistent health disparities and economic development disparities in Washington DC and were introduced to the community based approach to economic development offered by the Five Pillars Development model. The project's PI. Dr. Sabine O'Hara, designed the focus group process and content and held two training sessions for facilitators and recorders prior to conducting the focus groups.

To provide appropriate background information for the focus group participants, the project PI and project coordinators prepared and disseminated appropriate quantitative data about key quality of life indicators in the two selected neighborhoods. The project PI briefed all participants on the major findings of the quality of life comparisons between the eight Wards in the District of Columbia. In addition, flyers were available during the focus group meetings to summarize the data collection process.

Next steps include the following:

1. Prepare a first draft of the collective economic development story of the two neighborhoods
2. Solicit feedback on the narrative constructed by the PI and other UDC project collaborators based on the qualitative data collected during the two focus group meetings.
3. To solicit feedback on the overall report structure for the Five Pillars report which will consist of a

quantitative data analysis section and a qualitative data analysis section.

4. To discuss strategies for disseminating and using the report after its expected completion in the fall of 2016 to drive changes that will improve the quality of life and economic development opportunities in the two selected neighborhoods.

In addition, the PI intends to submit an edited version of the Five Pillars Report to a peer-reviewed journal as well as present at a conference. We also anticipate to disseminate the report through the Landgrant system to provide an analytical example of stakeholder engagement in cooperative extension and research.

Extension

4H and Youth Development

4-H Clubs engage young people, ages five through eighteen, in developing knowledge, skills and attitudes that will enable them to become self-directing, responsible, productive citizens, and contributing members of society. The 4-H program educates youth in arts and sciences, health and fitness, science, technology, environmental science, math, sewing and fashion design, cooking and healthy eating and a host of other subject areas while encouraging fellowship and service opportunities. 4-H continues to develop new projects for its members to study beyond agriculture and animal husbandry, including photography, conservation, cooking, public speaking, various sports, history, art, and other pursuits. During this program year the number of youth we serve took a plunge due to the reduction in staff and lack of external funding. While high quality programs continue to be offered the lack of finding certainly affected our ability to reach our target numbers. Summer camp was set aside to allow the 4-H team to plan a new strategic plan.

Programs for FY 2015 include:

LifeSmarts Program

LifeSmarts, a unique consumer knowledge game show competition is designed for teenagers in grades 9 - 12. LifeSmarts concentrates on several crucial areas of real life: Personal Finance; Health and Safety; Environment; Technology; and Consumer Rights and Responsibilities. This consumer education program for youth also fits into the category of Adult and children's literacy, by preparing the youth to be smart and savvy consumers. It prepares youth to ask the right questions, understand the way certain systems work and save money. The state competition was conducted on the UDC campus with 45 youth representing nine teams. The winning team was from the United Planning Organization Power Program 4-H Club. They traveled to Seattle, Washington, where they competed in the national LifeSmarts competition. The teens wrote impact statements on the firsthand knowledge that they gained from participating in the LifeSmarts program. The youth from the winning team also made a video which was displayed on YouTube that had over 500 views.

4-H Embryology Program

Educators within public and charter schools in the District of Columbia have expressed a continuous need for an educational opportunity regarding the life cycle of chickens or quails. Teachers often request this embryology program to demonstrate the life cycle and expose youth to agriculture at an early age. This is especially important for 5th-7th grade students, as it aligns with one of the District of Columbia science standards.

The 4-H Embryology Program was implemented in public schools in the District of Columbia. This program offers youth a hands-on learning approach to science where they are able to learn basic knowledge about the development from egg to chick. The students are asked to take direct care of the eggs within the incubator, ensuring the appropriate humidity and temperature. With the assistance of the classroom teacher, the students are also expected to take care of the chicks once they have hatched by offering food and water regularly. Embryology activities and lessons where taught by using the 4-H Embryology curriculum.

4-H Health Rocks Program

According to a report by the Trust for America's Health (TFAH), prescription drug abuse has quickly become a top public health concern, as prescription drug related deaths now outnumber those from heroin and cocaine combined, and drug overdose deaths exceed motor vehicle-related deaths in 29 states and Washington, D.C. Misuse and abuse of prescription painkillers alone costs the country an estimated $53.4 billion a year in lost productivity, medical costs and criminal justice costs. The report also notes that,

currently, only one in 10 Americans with a substance abuse disorder receives treatment.
"Prescription drugs can be a miracle for many, but misuse can have dire consequences. The rapid rise of abuse requires nothing short of a full-scale response - starting with prevention and education all the way through to expanding and modernizing treatment," said Jeffrey Levi, PhD, executive director of TFAH. "There are many promising signs that we can turn this around - but it requires urgent action."
Youth in the 4-H LIFE Program have parents that are incarcerated. The majority of the youth in the program live in high risk communities where they are surrounded by high crime rates, and rampant drug use. Children see drug deals as they happen and often see drugs in their homes. Studies show that education about drug and alcohol abuse can reduce drug use among children. Youth all over the city are familiar with the drug culture and many children see firsthand drug use in their homes.
Our 4-H Health Rocks program aims to:

- Reduce youth smoking and tobacco use.
- Help youth build life skills that lead to healthy lifestyle choices with special emphasis on youth smoking and tobacco use prevention.
- Help youth understand influences and health consequences of tobacco, drug, and alcohol use to make healthy choices.
- Engage youth and adults in partnership to develop and implement community strategies that promote healthy lifestyle choices.
- Build positive, enduring relationships with youth involved as full partners through widely varying "communities of interest" to address youth risk behaviors.

UDC 4-H received funding to implement the 4-H Health Rocks program. A team of volunteers and high school students provided experiential Health Rocks Drug Alcohol and tobacco prevention education and experiential programming. The program was provided to 637 youth each with 10 hours of programming. Some site locations include Malcolm X Education Campus, Calvary Christian Academy, DC National Guard, DC Preparatory Public Charter School, US Dream Academy, Omega Freedom School, Caesar Chavez Public Policy Education Campus, GW University's Upward bound Program, 4H Summer Camp at the Ward 7 Riverside Center and LaSalle Elementary School. The First Tee of DC, Anthony Bowen YMCA, and Communities in Schools requested additional programming.
4-H Riverside Bicycle Corps
In the nation's capital, ridership jumped 80 percent from 2007 to 2010. The District opened the country's first automated bike-share system, constructed separated bike lanes on key downtown corridors--including the stretch of Pennsylvania Avenue linking the White House and Capitol Hill--and installed more than 1,600 bike racks. According to the Bureau of Labor Statistics, bicycle repair jobs will increase by 37.6 percent between 2010 and 2020, making it one of the top 30 occupations with the fastest projected employment growth. This is yet another reason why bicycling is good for business. With the projected job growth of bicycle repairers and the city being ranked 4th in the nation there is a need to train the future employees and business owners. The program will begin to the sow the seed in youth participants as bicycle mechanic as a career path and trained them to learn some of the ins and outs of running a business. Currently there are no bike repair shops in ward 7 or ward 8 of the city which these areas are considered "bike deserts".
The 4-H Riverside Center Bike Corps club partnered with Washington Parks and People, Metropolitan Police Department, Gearing-Up Bicycles, and Phoenix Bikes and various community members to assist with the program. There were a total of 15 youth from ward 7 who participated in the Bike Corp Program. The club received a donation of 25 bicycles from MPD to ensure that youth would be able to select a bike to repair and take home. If youth participant already had a bike, they were encouraged to trade it in for a new one or make repairs to the current one. Phoenix Bikes also donated 8 bikes to assists with the development of the program. Gearing Up Bicycles led workshops on bicycle maintenance because of their expertise in the field. The youth spent 4 hours of the day learning the parts of the bicycle and how to make various repairs then went riding to different locations in ward to explore and learn safe riding techniques. Some of the local trips included harvesting food from Marvin Gaye mini farm, Kenilworth aquatic gardens, biking on National Night Out and visits to local parks and swimming pools.

Operation Military Kids

Operation Military Kids (OMK) is the US Army's collaborative effort with America's communities to support children and youth of National Guard, Army Reserve and active duty families impacted by the global war on terrorism. State 4-H Military Liaisons lead OMK State Teams in 34 states in partnership with the Army National Guard, Army Reserve, the Military Child Education Coalition, Boys & Girls Clubs of America, the American Legion and schools. These and other community organizations are joining Army Child & Youth Services to support "Suddenly Military" youth before, during and after the deployment of a parent or loved one. The mission of OMK is to support the children of deployed National Guard, Army Reserve and active duty soldiers living in communities across the country by:

- Creating networks of people, organizations and other resources to support "suddenly military" children and youth where they live.
- Delivering a wide range of recreational, social and educational programs for military youth living in civilian communities.
- Acknowledging the strengths and sacrifices of military kids as an everyday home front
- Supporting military kids coping with the stress of knowing their deployed parents may be in harm's way.
- Educating the public on the impact of the deployment cycle on soldiers, families, kids and the community as a whole.

419 youth with parents connected to the military were provided 4-H programming and Operation Military Kids programming that included helping them understand the deployment cycle. A group of 35 traveled to New York City during their spring break from school to learn about the events that took place on September 11, 2001. They also participated in monthly 4-H club activities that included learning about cultures where their parents might travel, tasting the food, learning about the government and family practices. 200 youth participated in the technology training provided by the Microsoft Company held monthly at their Virginia store location. They received advanced computing classes from Microsoft educators. Homeschool military youth at Joint Base Anacostia attended the four night Samsung Summit at the National 4-H Council where they learned more advance technology. They also participated in weekly education about using film and cameras. Monthly programming was provided to the military youth with parents attending their required military drill programs. As parents attended drill, 4-H staff provide programming, monthly.

The UDC Growing 4-H Science STEM Leaders Program

The UDC Growing 4-H Science STEM Leaders Program introduces middle school youth to activities and careers in the STEM disciplines. The program is designed to engage participants in working with community volunteers and college students from the UDC College STEM program in investigating STEM practices, learning the scientific method, understanding that science can be fun and that they are capable of being successful in the STEM disciplines. Youth work in groups of five preparing to become STEM leaders. Collectively the volunteers will provide an overview of STEM projects, and career options for the middle school youth to consider in their teams. The middle school youth will then select a project from the STEM disciplines and work collaboratively twice weekly to complete the projects under the guidance of their assigned STEM mentors. After completing their projects they will compete for prizes, make presentations to their parents, teachers and communities and selected youth will work to educate the next group of UDC Growing 4-H Science STEM Leaders.

The Program goal is to:

· Increase awareness, interest and mastery of skills in STEM related discipline for middle school aged participants;

· Promote initiative, strategies and activities that improves student performance, and confidence in their abilities related to careers in STEM disciplines;

· Provide college students with the opportunity to impact the lives of younger students through service learning; and

· Introduce the middle school student to the world of college through their positive interactions with college students and visits to the university.

4-H's approach is comprehensive and holistic--from agriculture to climate change to alternative energy--youth are learning about highly relevant complex systems and issues that will ensure their contributions to their communities today and their success as global leaders tomorrow.

5. Sustainable Energy

Research

Solar Wells as Alternative Source of Water Supply for Sustainable Food Production

As the global population is increasing and climate change is threatening our environment as well as our economy, sufficient food production is the challenge of mankind in the 21st Century. The traditional fossil fuel based agriculture does not address climate change nor is sufficient to feed the future generation. In this project, we are assessing the application of a solar system to access groundwater for food production uses, including irrigation, aquaponics, and hydroponic systems at the Firebird Agriculture Research Farm the University of the District of Columbia. An Integrated Distributive Utilities Network (IDUN) is currently being installed at the Research Farm. The project involves combining renewable energy sources (solar) to produce power (electricity), extract groundwater and store into a cistern reservoir at above ground for further uses. The reservoir will be connected to "smart" irrigation systems that will be powered by solar energy. The effectiveness of the proposed technology to the sustainable urban agriculture research programs of the University of DC at the Firebird Farm will be assessed. Current sustainable agriculture projects include hydroponic, aquaponics, specialty and ethnic vegetables and fruits production and urban forestry. Data will be collected for feasibility study of the IDUN that will support the design and installation of similar Solar Well Systems (SWS) as alternative source of Water Supply for irrigation and other purposes, including drinking water during emergency in the event of a catastrophic contamination of the current sources of surface water for potable supply.

The year two of the project was devoted to expand the system built during the first year of the project with an additional a solar powered micro-inverter and battery operated hybrid electrical energy system. The goal of this expansion is to provide round the clock electricity for maintaining specified temperature in a series of green houses as well as supply irrigation water to a variety of crop systems including sustainable agriculture projects comprising hydroponic, aquaponics, specialty and ethnic vegetables and fruits production and urban forestry hydroponic crop systems at the Farm. The system is proposed to be a model for a self-powered, standalone small scale hybrid system, ideal for semi-rural and rural farming.

A paper titled, **Hybrid, Micro-inverter and Battery based Standalone System for Rural and Urban Water Delivery** , summarizing the major achievements of the project was presented at the **31st European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC 2015),** in Hamburg, Germany in September 2015.

More than 1,350 research and industry contributions were submitted for presentation at this conference, whose scientific committee selecting the presentations was composed of 200 leading experts from the global PV community.

The proposed **hybrid micro inverter and battery based system** was found to be a good potential as a viable and cost effective alternative to a single battery/inverter based solar generated power delivery system. The system uses a novel AC coupling scheme, which may be impractical for remote rural areas where grid access is limited. The rotary inverter approach is well suited for semi-rural applications where a single phase grid line is available.

The main goal of the project was to provide a solar powered **micro-inverter and battery operated hybrid electrical energy system** in order to provide round the clock electricity for maintaining specified temperature in a series of green houses.

The proposed hybrid system consists of the following components:

- Four SW 285W solar modules;
- Four EnPhase 250 micro-inverters;
- A MAGNUM 2.8KW inverter;
- A bank of six, 8G8D gel batteries;
- An optional communications gateway; and
- A rotary inverter.

The final assembly of the system was completed in late summer 2015. As in the first year of the project, many visitors have come to the Firebird Farm in Beltsville, MD where the research project was established. These visitors ranged from DC Public School students and teachers to college students and faculty from the University of the District of Columbia and other universities in the Metro Area. They all saw the use of renewable energy (solar) as a source to access ground water for food production through aquaponics, hydroponics and field crops irrigation. Small farmers and food producers in the Washington Metro Area, as well as foreign dignitaries from embassies, also visited the site.
We will not be reporting on the fuzzy-logic based controller system or the digester system projects. Both research projects have been completed and results were reported in previous annual reports.

6. Food and Water Safety

Research

Soil Analysis for Trace Elements and Urban Gardening in the District of Columbia: Food Safety
As food security and global warming induces local food movement, urban gardening becomes popular in the densely populated cities like the District of Columbia. More neighborhoods start integrating urban gardens into their communities as well as their home yards. The available space for gardening in the urban set includes vacant lot and abandoned properties, which are potentially contaminated. As urban gardening become popular, the concern of food safety is also raised. Growing edible crops in a contaminated growing medium or soil with a high level of heavy metals such as Pb and Cd may pose risks to human health.
The goal of this study is to identify and quantify trace elements (Pb, As, Cd, Cr, Cu, Ni, Se and Zn) in the soil and products of home and community gardens, to include idle places that can potentially be used for urban gardening in the District. The objectives of this work are five-folds: (1) a background study for soil contamination and urban gardening in DC, (2) testing trace elements in the soil of home and community gardens, (3) geocoding soil test results, (4) assessment of potential accumulation of trace elements in different products that might grow on the contaminated sites, and (5) development of guidelines for best practices that reduce human exposure to high levels of metals. Objectives 1 through 4 are being completed.
The major accomplishments and project output of the trace metal analysis project in the gardens of the District of Columbia ranges from training future water and soil scientists through providing laboratory testing service to DC residents. During the reporting period, we trained graduate and undergraduate students, provided free soil quality testing to the DC residents, presented and published conference papers. The free soil testing service not only helped the gardeners make informed decision in planning and implementing various gardening techniques to avoid soil contamination with toxic metals, but also saved them significant lab fees. Most residents in the "food desert" region in DC are low income families, who often live in or near older Pb painted houses or gardens on vacant lands with high levels of Pb and other toxic metals. In addition to living in a Pb painted house, people may get exposed to food that is grown in contaminated soil. Providing free soil testing service and educating the urban gardeners to reduce multiple exposures to contaminated soil was part of the major accomplishment of this research project.
The main output of the reporting period was provided free soil testing service to about 160 DC residents, which otherwise cost thousands of lab fee to the residents. The type of analysis included all trace metals and minerals. GIS map of Arsenic contamination. Most important parts of the findings were presented at the national conference.
The soil quality testing results were sent to about 160 participants who received proper guidelines about what to do next with the lab results. About 170 soil samples were tested for all trace metals and minerals for the community service. The results and concerns of high contamination were communicated with each gardener through telephone and e-mail. Furthermore, we conducted plant uptake study of the environmental concentration of arsenic and lead in the green house. The samples are being processed in the laboratory. The community based study showed high level of arsenic and lead in both home and community gardens. Appropriate recommendations were provided for the contaminated soils and possible ways for soil amendment.
During this reporting period, the major goals accomplished include soil sample collection and analysis throughout the city; free soil quality testing service for about 600 DC urban gardeners; training students

and researchers on advanced analytical techniques and Geo-coding; provide soil quality consultation to DC gardeners, and publications.
During the reporting period, about 340 DC residents were contacted. About 160 gardeners received test results and guidelines. In addition, the findings of the project were presented at the national and regional conferences.
During the next reporting period, we plan to:
1. Assess the potential accumulation of trace elements in different producers when they grow on the contaminated soil;
2. Identify best practices to grow vegetables contaminated soils;
3. Publish guidelines about methods of reducing food contamination through soil and dust in urban gardens as part of the final reporting period.

Extension

Certified Professional Food Manager Program (CPFMP)
Food-borne illness costs $77 billion in economic burden in the United States annually (Bottemiller, 2012). With 48 million cases of food-borne illness estimated by the Center for Disease Control each year (CDC, 2014) and 4,700 food establishments in the District of Columbia alone, the need for licensed food managers is at an all-time high. Not to mention, with only 17 sanitarians, two supervisors, a program manager, and a food technologist the District of Columbia needs quality educated food handlers to ensure food safety at a local level; thus, the Certified Professional Food Manager (CPFM) Course taught at the University of the District of Columbia is necessary.
Taught by Mr. Paul Brown Jr., the CPFM course has served the District of Columbia in a multitude of ways. The course allows students to learn and take an exam to earn a nationally recognized certification to handle food safely. They can then, take that certification to their state health department, to give them a safe food handling certificate for that state. The CPFM Course has reached all wards of the District, but most specifically the 5th, 7th, and 8th wards. A vast majority of workshop participants have come from the African American community, with a large percentage of women. Participants can use this certification to help gain employment, as all establishments that serve food to the public must have a licensed food handler on premises. They have also used the certification as a step in acquiring a personal mobile food facility (food truck) or personal catering business, or for promotion within their current job or organization. Students come from different agencies around the District and surrounding areas, such as Homes for Hope; which is taught at the Hughes Memorial United Methodist Church in Northeast DC, Chartwells/Thompson Dining Services, Emerge Inc., Rockson Community Development Corporation Inc., Greater Washington Urban League, Fannie Mae, Census Bureau, public and chartered schools and faith-based organizations. This course is vital because District residents, visitors, and people worldwide need and deserve their food be prepared and served with the utmost care and quality. It is beneficial to District residents who take the course, because it allows them upward mobility at their current place of employment or a greater chance at employment, or the ability to be one certification closer to their dream of entrepreneurship in owning a food truck or catering business.
From fiscal year 2014 to fiscal year 2015 there has been a marked change in the scores. 79 students were certified in 2015, and 113 certified in 2014, a 30% decrease. In fiscal year 2014 the average Pre-Test score was 59. In fiscal year 2015, the average score was 62, a 5% increase. The average Post-Test score for fiscal year 2014 was 79, in fiscal year 2015 the average was 89, a 13% increase. Finally, the average National Exam score in fiscal year 2014 was 79, while in fiscal year 2015 that average score was 91, a 15% increase. This is due to more attention being paid to learning the material and greater emphasis on independent, at home, studying and learning.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	54.0	0.0	10.0	0.0
Actual	22.8	0.0	19.3	0.0

II. Merit Review Process

1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External University Panel
- External Non-University Panel
- Expert Peer Review

2. Brief Explanation

We have established a Merit Review Process for research/extension in Land Grant Programs that continues to work well at ensuring that research proposals are judged fairly and on their merit. For Hatch and Mini-grants offered through the Station, the process includes: the Development of a RFP; Solicitation of RFP; Receipt of Proposals; Review of Proposal Packets for Completion of Requirements; Peer Review; Director's Review; Completion of Required Forms for submission to USDA; Electronic Submission to USDA for expert panel review; USDA Approval; and Issuance of Award. The Peer Review panel includes representatives from various departments/schools across the University. Research projects are often joint ventures, conducted by faculty as well as qualified research and extension staff.
The Peer Review Committee assesses our program's proposed research/extension projects and activities based on the following criteria:
• Knowledge base of the research
• Adequacy of procedures and experiment to meet the objectives
• Feasibility of accomplishing the objectives
• Scientific merit of the proposed research
• Familiarity with work of others related to the proposal
• Outcomes and Impacts
• Appropriate budget for proposed research
• Budget Justification
All research/extension projects are monitored by the Director and Associate Director to ensure that objectives and timelines are being met. An annual progress report is required and is reviewed by the Station Director prior to electronic submission to USDA. All projects must include student learning experiences.
Findings are published in refereed journals, posters are developed and presented at conferences, and fact sheets or Information Documents are prepared and distributed to stakeholders. Students participate in conference presentations as well as research seminars.
CAUSES has an Advisory Board comprised of community stakeholders from various industry and public sector areas including environmental science, business/finance, public administration, counseling, water resources management, marine science, engineering, and computer science.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Other (distribution lists; website)

Brief explanation.

CAUSES regularly seeks stakeholder input through its partnerships with non-profit organizations, DC agencies, and residents through neighborhood organizations and the ANCs, a network of neighborhood representatives that are active in every Ward of the District of Columbia. IN addition, we collect program feedback from participants, community partners, and faith-based organizations. Particularly important is our work with individuals and organizations in the most underserved Wards of the District, Wards 5, 7 and 8. These are largely low income communities, characterized by extensive food desserts, high unemployment, high school dropout rates and other significant challenges. We have reached out to seniors, youth, single mothers, ministers, community advocates, working class and middle class residents. Three of our Urban Food Hubs, which are currently in various stages of implementation, are also located in Wards 5, 7 and 8. Additionally, stakeholder input is sought at both research and extension activities such as the Farmers' Market, workshops, seminars, and demonstrations throughout the eight Wards of the District of Columbia. We let our stakeholders know that their input is essential to the research conducted and outreach services provided to benefit them, their families, and communities within the District of Columbia. We encourage their input via stakeholder surveys, interviews, and one on one dialogue, and two major stakeholder events held annually.

2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them

1. Method to identify individuals and groups

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Use Surveys
- Other (workshops, seminars, Quality of Life Day Event)

Brief explanation.

Our objective is to meet with residents and organizations across the eight Wards of the District. Currently, our focus is on the underserved population of the city, residents residing in Wards 5, 7 and 8. A large segment of this population are low income residents and many households in the District's most underserved Wards are led by a single parent or, in some cases, a grandparent(s). Research and Extension, separately as well as jointly, host a number of activities during the year

including workshops, seminars, demonstrations, training sessions, a Farmer's Market on the University's main campus, and support for several other farmers markets across the District. At these events, stakeholder surveys are administered to willing participants and collected for assessment. In 2015 we also hosted an open house event at the Firebird Farm Agricultural Experiment Station and we hosted a stakeholder appreciation luncheon on our main campus at Van Ness in May 2015. Since both events were vey successful we anticipate repeating them in 2016.

2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them

1. Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with invited selected individuals from the general public

Brief explanation.

Our objective is to meet with residents and organizations across the eight Wards of the District. Currently, our focus is on the underserved population of the city, residing in Wards 5, 7 and 8. A large segment of this population is low income residents with many households lead by a single parent or, in some cases, a grandparent(s). Research and Extension, separately as well as jointly, host a number of activities during the year including workshops, seminars, demonstrations, training sessions, and an annual Farmer's Market on the University's main campus. In addition, the CAUSES Landgrant center directors as well as the Dean and Associate Dean of Landgrant programs have met with DC agencies and non-profit organizations to solicit information about priority needs for the District of Columbia. An important tool in structuring these informational meetings is the so-called Sustainable DC plane developed by former DC major Vincent Gray. The plan outlines the ambitious goals of making Washington DC the greenest, healthiest and most livable city in the United States by 2030. Moreover the Sustainable DC Plan sets sustainable development targets that provide a roadmap for CAUSES to focus its activities in support of the Sustainable DC goals. The Directors of the five CAUSES Centers have now begun to convene networking meetings several times per year that bring together organizations and DC agencies in their respective areas of responsibility -- Urban Agriculture; Sustainable Development; Nutrition Diet and Health; Youth Development; and Housing and Community Planning.

3. A statement of how the input will be considered

- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- To Set Priorities

Brief explanation.

The assessment work of CAUSES is supported by a full-time administrative specialist for assessment and date management, who is assisted by two full time positions focused on data management and volunteer coordination. This three members staff works closely with the five landgrant center directors and the five academic program directors in CAUSES to ensure that input received from stakeholders is reviewed, assessed and processed to improve on our applied research and community outreach activities. The result of this assessment and analysis

work indicates that we are addressing many of the issues and concerns identified by our stakeholders. However, there are areas that offer opportunities for expansion and improvement of our work. Our ability to realize these opportunities depends largely on budget and personnel allocations, yet operational improvements will also be necessary to fully realize the potential of expanded and new research and community outreach opportunities. Especially critical are operational areas in human resources and procurement. The new President of the University of the District of Columbia has made operational and processing one of his priorities and has established a new organizational structure that includes a Chief Operating Officer with responsibility for HR, IT, procurement, and facilities. As the University's landgrant college, CAUSES and its leadership is keenly aware of the responsibility to build capacity that improves the social, economic and environmental conditions of the District and its diverse stakeholders through relevant research and community education programs. In its monthly management meetings, the CAUSES center directors, academic program directors and operations staff are carefully reviewing and updating our Plan of Work to expand our effectiveness and reach.

Brief Explanation of what you learned from your Stakeholders

Stakeholders concerns have remained relatively consistent. In line with the Sustainable DC plan and its targets, concerns of the broad range of DC stakeholders include improving health and especially preventive measures that improve health conditions before treatment becomes necessary; improved access to locally grown, high quality food; water quality including the goal to make the rivers within the District fishable and swimmable; improved infrastructure; more access to parks and outdoor recreation; better sustainability literacy. In addition, we have observed a growing interest in Urban Agriculture. In 2015 we launched an Urban Agriculture Certificate program and enrollment has continued to increase. Issues and topics of concern include the following:

- Safety of Foods: Growth, storage, and preparation of foods
- Economic Development: Jobs, training, sustainable neighborhoods
- Obesity: Healthy children and adults; Prevention of Chronic Illnesses; Healthy Eating; Activities for Children
- Urban Gardening: Growing their own food; exposure to different types of food, including ethnic crops and organic foods
- Healthy Food Choices: Eating better for better health and longevity
- Healthy Lifestyles: youth activities related to physical fitness and proper nutritio
- Sustainable energy: continued availability of resources for themselves, their children and generations to come
- Urban Agriculture
- Aquaponics and Hydroponics

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1188760	0	902595	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	1207070	0	772624	0
Actual Matching	976913	0	697921	0
Actual All Other	244901	0	546467	0
Total Actual Expended	2428884	0	2017012	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	106600	0	122389	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Climate Change

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%		50%	
124	Urban Forestry	100%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.0	0.0
Actual Paid	2.7	0.0	5.5	0.0
Actual Volunteer	56.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
147890	0	190804	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
173398	0	179840	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
10125	0	3375	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Conducted research: 1) establishing a computational infrastructure at UDC to initiate climate change research for the Disrict of Columbia and 2) tree planting technology. For the climate change

research, computational infrastructure was procured and implemnented for the project which includes computer systems and accessories. Computer servers were installed and issues with hardware and software were rectified. The database system design was completed for precipitation and an analytical tool was completed to store the data. For the tree planting technology project, activities continued to set up the water system, determine best growth conditions, i.e. soil level, mulching, and other requirements;

2. Maintained soil, air, and water quality monitoring programs and testing lab;

3.Trained and certified DC Public School Teachers as Environmental educators;

4. Developed and distributed informational materials such as fact sheets and brochures regarding changes in natural resources and environmental issues in the District;

5. Provided workshops, demonstrations and technical assistance on the effect of environmental degradation as it relates to the quality of life for District residents; and

6. Involved youth in environmental awareness education via education workshops at DC Public and Charter Schools, community events, the Landgrant Programs Urban Agroecology Fair at Firebird Farm.

2. Brief description of the target audience

1) District of Columbia residents
2) DC Public School Teachers
3) Youth, Grades K-12
4) Urban gardeners
5) Storm and waste water operators
6) Landscapers
7) Nursery Owners

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2929	37006	48	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total

Actual	0	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of articles published

Year	Actual
2015	0

Output #2

Output Measure

- Number of fact sheets published

Year	Actual
2015	0

Output #3

Output Measure

- Number of newsletter published

Year	Actual
2015	1

Output #4

Output Measure

- Number of workshops, demonstrations and technical assistance implemented.

Year	Actual
2015	33

Output #5

Output Measure

- Number of research projects completed

Year	Actual
2015	1

Output #6

Output Measure

- Number of soil, air and water samples test results

Year	Actual
2015	0

Output #7

Output Measure

- Number of informational materials distributed

Year	Actual
2015	19225

Output #8

Output Measure

- Number of conference presentations

Year	Actual
2015	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of program participants that will become more environmentally aware due to new knowledge from informational materials provided and workshop presentations
2	Percent of program participants that will implement new environmental skills to improve natural resources and the environment
3	Percent of soil, air, and water samples meeting EPA standards after implementation of research project.

Outcome #1

1. **Outcome Measures**

Percent of program participants that will become more environmentally aware due to new knowledge from informational materials provided and workshop presentations

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Percent of program participants that will implement new environmental skills to improve natural resources and the environment

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Percent of soil, air, and water samples meeting EPA standards after implementation of research project.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	50%		50%	
205	Plant Management Systems	50%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	0.0	2.0	0.0
Actual Paid	4.2	0.0	2.2	0.0
Actual Volunteer	2869.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
262079	0	125453	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
173398	0	109277	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
229762	0	543092	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1) Conduct field experiments in the use of composted waste as a soil amendment for growing vegetables in urban gardens; their impact on the environment will be conducted at Muirkirk Research Farm

in Beltsville, MD;

2) Facilitate workshops, training sessions, demonstrations, field activities, and farm tours for program participants to teach and update knowledge of sustainable agricultural techniques to establish, maintain, and protect both vegetable and flower gardens;

3) Develop and distribute informational fact sheets, brochures, and newsletters related to production and protection of urban gardens;

4) Participate in local, National, and international conferences and meetings on sustainable agriculture and urban gardening;

5) Provide pesticide safety education and certification for monitoring insect and disease infestations and recommendations for control while preventing environmental degradation;

6) Maintain Master Gardening certification; trained gardeners will participate in beautifying the city through volunteer hours; and

7) Strengthen Ethnic and Specialty Crop Program.

2. Brief description of the target audience

1) District of Columbia residents
2) DC Public School Teachers
3) Youth - Grades 3-8
4) Urban comunity gardeners
5) Small rural farmers
6) Landscapers
7) Nursery owners

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	34920	16868	1354	96

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total

Actual	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of articles published

Year	Actual
2015	4

Output #2

Output Measure

- Number of fact sheets published

Year	Actual
2015	19

Output #3

Output Measure

- Number of Newsletters published

Year	Actual
2015	40

Output #4

Output Measure

- Number of workshops, demonstrations and technical assistance implemented.

Year	Actual
2015	205

Output #5

Output Measure

- Number of research projects completed

Year	Actual
2015	2

Output #6

Output Measure

- Number of soil, plant and water samples test results

Year	Actual
2015	20

Output #7

Output Measure

- Number of informational materials distributed

Year	Actual
2015	13166

Output #8

Output Measure

- Number of conference presentations

Year	Actual
2015	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percent of program participants that will adopt urban gardening techniques learned from informational materials provided and workshop presentations
2	Percent increase in urban gardens using some compost material as a soil amendment
3	Percent of soil, plant and water sample results within acceptable crop production range
4	Percent increase in the growth of a variety of ethnic crops in home, school, and community gardens in the District of Columia.

Outcome #1

1. Outcome Measures

Percent of program participants that will adopt urban gardening techniques learned from informational materials provided and workshop presentations

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	42

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is a public demand for unbiased horticultural and IPM education for sustainable landscapes and gardens and conservation of natural resources.

What has been done
The DC Master Gardener Program was started as a means of extending the horticultural and pest management expertise of University of the District of Columbia Extension to the general public. The program is designed to train volunteer horticultural educators for the University of the District of Columbia Extension- the principal outreach education unit of the University of the District of Columbia. Participants receive 45-50 hours of basic horticulture training and then agree to work in their communities to teach District of Columbia Residents how to cultivate garden spaces and manage landscapes sustainably using research-based information. This environmental horticulture approach reduces fertilizer and pesticide use resulting in improved soil and water quality.

Results
In FY 15, 276 (which includes 42 trainees) Master Gardeners and Trainees provided 9,000 hours of horticultural expertise to the District of Columbia. The value of volunteer time is $39.86 per hour according to www.independentsector.org with a total value of $358,740 in savings to the District of Columbia. In addition, 41,194 direct contacts were served by the Master Gardener Coordinator/Extension Agent. Forty-two (42) Master Gardener Trainees completed 50 hours of basic horticulture training, a final exam and 50 hours of volunteer hours. Various Master Gardener projects throughout all eight wards have been established which includes the Ward 3

food hubs (the UDC green roof/greenhouse), schools, parks, beautification projects, landscape design, youth gardens, local and national botanical gardens, and partnerships with non-profit organizations. Master Gardeners volunteered 600 hours to the success of the Ward 3 Food Hub (green roof/greenhouse) in its inaugural year. The value of their volunteer time is $21,641 in savings to the university. Their duties included propagation of vegetables and companion plants, planting, maintenance, and harvesting. 4,225 lbs were harvested and donated to the following: food banks (3,000 lbs.), UDC Center for Nutrition, Diet, and Health (200 lbs), Community Supported Agriculture (300 lbs), and volunteers (725 lbs).

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #2

1. Outcome Measures

Percent increase in urban gardens using some compost material as a soil amendment

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #3

1. Outcome Measures

Percent of soil, plant and water sample results within acceptable crop production range

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

Outcome #4

1. Outcome Measures

Percent increase in the growth of a variety of ethnic crops in home, school, and community gardens in the District of Columia.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	212

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Washington DC Metropolitan area has experienced rapid expansion, where the current population is about 5.7 million people and more than a quarter of this population is represented by Black or African Americans (United States Census Bureau, 2013). Moreover, with more than 161,100 African-born residents, the Washington DC Metropolitan area has the second highest percentage of metropolitan statistical areas with the largest foreign-born populations from Africa (Gambino, et al. 2014 (Appendix 1). Unfortunately, the growing niche of African-born residents is not associated with the number of food producers. There is currently a small number of vegetable producers growing West African Ethnic Crops in the DC Metropolitan area.

What has been done
Through the Ethnic and Specialty Crops Program, ethnic varieties have been grown at Firebird Farm. Workshops, food demonstrations and consultations have been provided to residents, small farmers, and those having general interest. Five West-African food tastings and presentations were offered in the District of Columbia. Free food samples were provided and prepared by chefs from CAUSES Center for Nutrition, Diet and Health. Consumer feedback sureveys were distributed and data collected. Focus groups of consumers and distributors in the Washington DC Metropolitan area to assess their demand for nine varieties of African vegetables were conducted.

Results
87% of 462 people surveyed on the different series of West-African food tasting and presentations, indicated intereset in knowing where to purchase ethnic cropos, how to prepare them, and learning about nutritional value. 46% indicated that they would consider growing a garden with them.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

87% of 462 people surveyed on the different series of West-African food tasting and presentations indicated that they were interested in knowing where to purchase them, how to prepare them, and learning about their nutritional value. 46% would consider growing a garden with them. Out of nine sample crops, Avuvo, Sawa Sawa, Gboma, Jamma Jamma and Garden Eggs, all were well received by customers. African Americans defintely have a better knowledge in African ethnic crops and are more interested in purchasing, nutritional information, growing these crops, and how to cook them. Women and customers living in high-income wards show more interest in eating these crops at a restaurant. This is a surprising finding, and may suggest that the potential market of African ethnic crops should be expanded to non-African American communities in the metropolitan area.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Health, Nutrition and Childhood Obesity Prevention

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	50%		50%	
724	Healthy Lifestyle	50%		50%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	3.0	0.0
Actual Paid	2.5	0.0	3.7	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
142153	0	160004	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
173398	0	160004	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Changing the Health Trajectory for Older Adults through Effective Diet and Activity

Modifications:

1) Investigate and compare priorities of high fruit and vegetable consumers with the low fruit and vegetable consumers;
2) Design new and innovative activities through which nutrition education can be effectively rendered; and
3) Collect and modify traditional recipes to improve the nutrition density and to increase the vegetable content and publish the recipe book.

Nutrition Education:

1. Farmers' Market Nutrition Education Program
2. Shopping for Healthy Food-Grocery Store Tours
3. Nutrition education with preschoolers
4. Nutrition Education for Youth
5. Fruit and Vegetable Prescription/WeCan Program
6. SMART Nutrition for Seniors
7. A Taste of African Heritage Diet
8. Professional Food Managers Certification Program

2. Brief description of the target audience

1) Adult men and women over the age of 65 who live in Metropolitan Washington, DC
2) DC Public School teachers
3) Students, grades Pre-K through 9
4) Children 2 -5 years of age
5) Pre-School/Headstart and Daycare teacher volunteers
6) Overweight individuals and non overweight individuals from the same environment
7) Obese individuals and non obese individuals from the same environment
8) Low income residents living in multi-family housing
9) Researchers/Biologists
10) Low-income adults who are responsible for planning and preparing the family's food with emphasis on households with young children
11) Low-income youth

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	186	182	186	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Curriculum developed for various workshops, fact sheets for nutrition education for teachers.

Year	Actual
2015	40

Output #2

Output Measure

- Train the Trainer Food Stamp Educational Workshops: 2 hours a week by teacher volunteers; FFNews; Creative Curriculum; Color Me Healthy; Tickle Your Appetite; 5 A Day; DCPS Nutrition Curriculums; and Development of Food Safety and Dietary Quality Lessons
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Assess four day food diary data for the number of portions of fruits and vegetables for registered participants
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Establish intervention/focus groups for registered participants consuming less than 5 servings of fruits and vegetables per day and identify the determinants of low consumption of fruits and vegetables.

Year	Actual
2015	0

Output #5

Output Measure

- Design and implement educational classes to assist registered participants with improving consumption of fruits and vegetables

Year	Actual
2015	60

Output #6

Output Measure

- Youth and adults will receive direct basic nutrition and food safety education

Year	Actual
2015	20000

Output #7

Output Measure

- Youth and adults will receive direct education on health issues and direct education and demonstration on physical activity
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Development of a manuscript for the publication of data on the mechanisms of action of g-T3 on MCF-7 breast cancer cells.
  Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Employ microarray experiments and a range of cellular and molecular biological techniques to determine the molecular basis of the action of y-T3.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage of parent participants who make better food choices (fruits/vegetables).
2	Percentage of participants who improved eating habits.
3	Development of broad applications for the inhibition of breast cancer cell proliferation and possibly cell transformation
4	Number of participants who increased physical activity and experienced weightloss
5	Number of participants who improved their dietary intake, including an increase in fruits and vegetables
6	Number of participants who improved food resource management practices such as menu planning and food shopping
7	Percentage of participants, who through information and interactive approaches, have adopted better eating habits thereby increasing their daily intake of fresh fruit and vegetables.
8	Percentage of increase in vegetable intake for consumers participating in UDC's Farmers Market

Outcome #1

1. Outcome Measures

Percentage of parent participants who make better food choices (fruits/vegetables).

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A Taste of African Heritage Diet
The ancestors of African Americans brought many wonderful food traditions to parts of the Caribbean, South America, and the Southern states of the U.S. Over the generations, many of these food traditions have been lost, with the influences of modern, American eating habits. Health has sufferd because of this loss. The American Heritage Diet is a way of eating based on the healthy food traditions of people with African roots. The diseases we know today, like diabetes, heart disease, cancer and obesity wrer much less common with traditional diets in earlier times. The African Heritage diet is primarily plant-based. A Taste of African Heritage is a program established by Oldways, a nonprofit food and nutrition education organization. The program introduces a six-week curriculum that focuses on nutrition education, traditional African heritage foods and cultural history.

What has been done
The Center for Nutrition, Diet and Health (CNDH) piloted the nutrition curriculum specifically designed for African-Americans and descendants of Africans across the diaspora. The purpose of the program is to reduce health disparities by reconnecting African-Americans to the history, culture and foodways of their African ancestors. Moreover, the program foundation lies in the extensive research conducted by physicians, dietitians, and historians and evidence-based eating model. The African Heritage Pyramid - an evidence-based eating model that serves as a guide to teach healthy cooking using traditional foods that are familiar to African-Americans.
CNDH piloted the A Taste of African Heritage curriculum in partnership with Unity Healthcare Parkside WeCan! Initiative in District Ward 7 and several other sites in D.C. Many of whom were diagnosed with Type II diabetes, obesity, and high cholesterol, enrolled in the CNDH pilot and attended six nutrition classes. They completed the A Taste of African Heritage classes over the course of three months. The participants learned about the history of traditional African heritage

cuisines while being reintroduced to natural foods formerly enjoyed by their ancestors. They also learned about the negative impacts of increased sodium and sugar consumption and how to prepare delicious plant-based meals using whole grains, vegetables, fruits and spices that derived from Africa, South America, and the Caribbean. The participants observed cooking demonstrations and eventually began to prepare the recipes on their own. The classes encouraged them to explore their family histories, prepare more meals at home, and share the program materials with their family members and friends.

Results
Participants improved their eating habits and started to eat more fresh fruits and vegetables. Participants experienced weight loss and lowering of blood pressure. 100% of the participants will recommend the program to their friends.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #2

1. Outcome Measures

Percentage of participants who improved eating habits.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Development of broad applications for the inhibition of breast cancer cell proliferation and possibly cell transformation

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of participants who increased physical activity and experienced weightloss

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of participants who improved their dietary intake, including an increase in fruits and vegetables

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	2500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
According to the National Health and Nutrition Examination Survey (NHANES), one in two adults and one in three children are considered overweight or obese. When examining just the 2-5 year olds, about 11% of children ages 2-5 years of age are considered overweight or obese. These numbers reflect the obesity epidemic which affects millions of Americans on a daily basis. In an effort to curb the rise in obesity, the nutrition Education for Preschoolers was developed. The Cooperative Extension Service uses this educational program as a tool to teach residents how to manage their weight and address health related problems associated with a poor diet and lack of physical activity.

What has been done
The Nutrition Education for Preschoolers Program educates individuals to adopt healthier lifestyles in accordance with the Dietary Guidelines for Americans and MyPlate. Public school, daycare center, and Head Start program teachers are trained to implement the Color Me Healthy curriculum and the 48-lesson curriculum in nutrition and food safety among children and their families, improving their ability to select healthy foods, safely handle food, and properly prepare and store foods. Children in participating preschool/prekindergarten classes receive nutrition education lessons that incorporate hands-on experience with fresh fruits and vegetables. Parents are offered nutrition educational sessions covering topics related to their child and to their personal health. Five basic concepts are taught within the preschool/prekindergarten classrooms. These include: 1) Food safety/hand washing, 2) Vegetables, 3) Fruits; 4) Whole grains, Dairy and protein, and 5) Physical activity. We believe getting individuals to make positive changes around these topics will lead to healthier lifestyles and a reduction in obesity and overweight among the target groups. These topics are followed in order by the nutrition educator. One topic is taught each month, and the teachers continue the nutrition education during the remaining weeks of the month. Once all five concepts have been taught, the nutrition educator will cycle through them again using different approaches in order for the individuals to review and broaden their

knowledge on each topic. In addition to the nutrition lessons in the classroom, parent workshops are held in order to address nutrition related questions and concerns. The program is implemented by nutrition educators and graduate nutrition students. A nutrition educator/ graduate nutrition student is assigned a number of D.C. public and chartered schools, daycare centers, and Head Start centers located throughout the District that serve low-income children ages two to five years old. The nutrition educator trains the teachers at each site on how to use research and evidence-based curriculum to incorporate nutrition, food safety, and physical activity education into lesson plans. The nutrition educator also works with the students in each classroom, as well as provides parent workshops on various health related topics. The nutrition educator partners and collaborates with the site parent coordinator in order to set a date, time, and recruit parents accordingly for each meeting or workshop. The topics are taught in a variety of ways.

An example of an activity used to teach food safety/hand washing: Food safety/Hand Washing - a stuffed Elmo comes with the nutrition educator to the lesson to enforce the idea that germs are bad. A story is told about Elmo going to school and forgetting to wash his hands before he eats, after using the restroom, and how his friends coughed and sneezed on him. Glitters, or germs, are sprinkled on Elmo after each incident to show how the germs are spread. We then lay Elmo down to sleep, because he is sick. We then review how to cough, sneeze, and wash our hands correctly. Each student goes through the steps of washing their hands, using soap and warm water, to get rid of the germs.

Kids Cooking Classes/Kids Cooking in the Classroom provides children aged 2-5 years with hands-on cooking experiences. The foods include vegetables, fruits, whole grains, dairy, and protein. Research has shown that the more exposure preschool aged children have with healthy foods, the more likely they will be to engage in healthier lifestyles choices later in life.

Results

In FY15 the retrospective survey was completed by 145 teachers at 43 schools. The number of schools and teachers, respectively, per ward were the following: Ward 2 included 1 school and 1 teacher; Ward 4 included 3 schools and 11 teachers; Ward 5 included 8 schools and 24 teachers; Ward 6 included 2 schools and 10 teachers; Ward 7 included 10 schools and 31 teachers; and Ward 8 included 19 schools and 68 teachers. The largest number of school and teachers were from Ward 8 followed by Wards 7 and 5. These wards have the largest number of individuals and families living at or below the poverty level and challenged with the highest level of health disparities.

The findings showed the children that consumed the recommended servings of vegetables and fruit daily in FY15 were 92.4 % and an increase of 2.5% when compared with 89.9% for FY14. Children that consumed the recommended servings of low fat, fat free and milk products daily in FY15 were 92.4%, a slight decrease of 0.3% when compared with 92.7% in FY14. The number of children consuming the recommended amount of grains and meeting the recommendation of making half their grains whole grains daily in FY15 were 83.4%, a decrease of 3.2% when compared with 86.6% for FY14. The children were more physically active daily in FY15 at 91%, a decrease in 0.4% when compared to 91.4% for FY14. Children that consistently washed hands prior to handling food were 95.9% in FY15, and 2% when compared to 93.9% in FY14. The percentage of children that were able to identify healthy food choices was 91% in FY15, an increase of 0.5% when compared to 90.5% for FY14. Finally, 96.5% of children tried new foods (foods unfamiliar to them) in FY15, an increase of 1.4% when compared to 95.1% for FY14. The data shows a slight decrease for the consumption of low fat milk and milk products and

grains as well as a decrease in daily physical activity for FY15. However, the data shows significant achievement exhibited by the percentage increases for consistent handwashing, ability to identify health food choices and trying new foods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #6

1. Outcome Measures

Number of participants who improved food resource management practices such as menu planning and food shopping

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Shopping for Healthy Food (Grocery Store Tours)
Cooking Matters at the Store is another nutrition education program carried out through the partnership between UDC, healthcare clinics, food retailers and District residents receiving or eligible for SNAP benefits. Project (Nutrition) specialist coordinates the program, conducting outreach in all eight Wards of the District, teaching different age groups how to better understand what they are eating and make smarter decisions. Grocery store tours are conducted, teaching participants how to shop healthy on a budget.

What has been done
These tours are conducted in various grocery stores around the District, with an average of 5-10 participants per class. At the end of each tour, everyone receives a $10 food shopping gift card (gift cards funded by Share Our Strengths) to be used towards the purchase of healthy foods. During these weekly, interactive grocery store classes she teaches participants how to read food labels, identify acceptable levels of salt and sugar in food, and understand if food is really as nutritious as advertised. The participants for this particular July class are part of a diabetes

management group where learning how to eat healthy foods is vital for managing their disease. These classes are held in the typical grocery stores where participants would regularly shop for food. We focus on helping participants to make small life changes that will more likely be sustained rather than a total change in diet that will be more difficult to maintain in the future. As they make their way through the grocery stores, the participants are asked to select a canned good, box of cereal etc. and read the nutrition labels before discussing why a particular product should or should not be purchased. Tips to limit the effects of commonly purchased items are given. For example, we explain to the participants that if they choose to purchase canned goods, they should wash them off with water before use and it will reduce the sodium by about 40 percent. When asked what her favorite part of teaching the class is, the nutrition educator quickly responded that it was the participants.

Results

We are only in the middle of this multi-week course, but I can already see the progress made by the participants, explained Sorelle N. J. Cooper, MSN, FNP-BC, Family Nurse Practitioner at Parkside Health Center part of Unity Health Care, Inc. She further indicated that this is the type of knowledge they keep with them for the rest of their lives.

"I really like coming to these classes," commented one of the participants. "They are educational but also fun. And I like learning about food!"

"Cooking Matters at the Store" is funded by a grant from the Share Our Strength program, a national nonprofit that aims to end hunger in America by connecting people with the nutritious food they need to lead healthy, active lives. Through the $2,500 grant, the Center for Nutrition, Diet and Health is in the process of conducting grocery store tours for 250 individuals. Program participants are organized through CNDH partners: Unity Clinics, DCPS community and parent outreach groups, Transition Housing Corporation, DC libraries, DCPS New Heights program and senior centers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

Percentage of participants, who through information and interactive approaches, have adopted better eating habits thereby increasing their daily intake of fresh fruit and vegetables.

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Percentage of increase in vegetable intake for consumers participating in UDC's Farmers Market

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	55

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Independent farmers and vendors need a venue to sell fresh, healthy foods. Additionally, consumers need convenient locations to have access to fresh and healthy foods.

What has been done
The University of the District of Columbia, through grant funding from USDA, established and operated two Farmers' Markets in the District of Columbia. The markets operated for 24 Saturdays from May-November, provided vending space for 10 independent entrepreneurs and welcomed over 6,000 visitors who purchased produce, supported community marketing initiatives and participated in cooking and sampling demonstrations. Six volunteers from two DC universities also received community nutrition experience and entrepreneurship skills. Each week over 300 people purchase fresh, healthy foods from independent vendors. Patrons can also sample foods and participate in community demonstrations and events at the market. The market employs three students and offers weekly spaces to farmers and other independent entrepreneurs.

Results
The impact of this public market comes in three major perspectives: a) vendors, b) nearby businesses, and c) a region's economy through local and state taxes contribution. We total the economic benefit to vendors, nearby businesses, and the local community and multiply the total by a number (called a Regional Input-Output Modeling System II multiplier, or RIMS II multiplier) calculated by the Bureau of Economic Analysis (BEA) or estimated in light of comparable BEA multipliers. This multiplier captures the impact of an initial round of spending plus successive rounds of re-spending the initial dollars within the District of Columbia and the Washington DC Metropolitan Area. The greater the interaction each dollar has with the local economy, the larger the multipliers are (and the stickier the economy is). UDC Farmers' Market is estimated to have brought the District a total economic benefit of $432,717, $44,220 personal income and one and half full-time equivalent job across all sectors. UDC Farmers' Market is estimated to have brought

the Metropolitan Area a total economic benefit of $546,707, $167,557 personal income and six full-time equivalent job across all sectors. The benefits that a farmers' market brings to the economy and community goes beyond monetary impacts. Socially, the UDC Farmers' Market provides a new common ground where people easily interact, alive with social activity and increases the sense of community. Nutrition information about food sold at the market and cooking instructions are distributed and cooking demonstrations are provided by UDC land-grant program staff at the UDC Farmers' Market. There was also art demonstration and display, as well as live music played by local artists and musicians. According to our survey, 55 percent of respondents either strongly agreed or agreed that their family's weekly consumption of fruits and vegetables increased due to shopping at farmers markets. Environmentally, the farmers' market promotes local transactions which minimize the food mileages and carbon footprint, and maximize the nutrition contents of the produce. According to our interviews with the vendors, produce sold at UDC Farmers' Market come within 103 miles radius, compared with nearby Giant Food produce coming from 1100 miles radius. Serving as the food distribution platform, UDC Farmers' Market is an essential component for the CAUSES Urban Food Hub system and promotes healthy diet and lifestyle. Its social, environmental and educational benefits will be our next steps in the evaluation work.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Family and Social Support)

Brief Explanation

The limited number of grocery stores within low-income communities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Follow-up surveys will be conducted to determine how useful the information was and if participants are consuming more vegetables and fruits and reading food labels.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Urban Families, Youth, and Communities

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	0%		50%	
801	Individual and Family Resource Management	0%		50%	
802	Human Development and Family Well-Being	20%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%		0%	
806	Youth Development	70%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	16.0	0.0	2.0	0.0
Actual Paid	7.8	0.0	2.5	0.0
Actual Volunteer	953.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
409515	0	98491	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
173398	0	78495	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1) Contests
2) Gardening Projects
3) Computer Labs
4) Health Awareness
5) Water Quality and GIS Technology
6) Curriculum Development
7) Fact Sheets
8) Newsletters
9) Workshops
10) Presentations
11) Focus Groups

2. Brief description of the target audience

1) Youth
2) Adults
3) Seniors
4) Military Personnel
5) DC residents
6) College students
7) Ex-offenders
8) Low to moderate income residents

3. How was eXtension used?

eXtension was not widely used during this reporting period. Survey for programs were researched and webinars were researched for volunteers. One agent used th eprogram for webinars.

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	10039	10145	5704	6000

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2015

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Curriculum developed for various parenting workshops, seminars, support groups, fact sheets, and newsletters.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of participants in parenting workshops.

Year	Actual
2015	200

Output #3

Output Measure

- Number of parenting support groups formed.

Year	Actual
2015	5

Output #4

Output Measure

- Conduct a minimum of 50 sessions in the area of financial literacy.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Conduct 15 sessions per year for junior and senior high schools in the District of Columbia on financial planning.
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Develop newsletter and/or fact sheets for District residents so they can perform basic/advanced repairs in and around their home.
  Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Conduct hands-on workshops for District residents in basic and advanced home repair.
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- Percent increase in the number of 4-H clubs throughout the city.

Year	Actual
2015	10

Output #9

Output Measure

- Youth will receive training in the areas of sewing, computer technology, and geospatial technology.

Year	Actual
2015	2000

Output #10

Output Measure

- Youth will receive leadership development training through conferences and special programs.

Year	Actual
2015	600

Output #11

Output Measure

- Number of community focus groups held in an underseved ward of the District of Columbia pertaining to economic development.

Year	Actual
2015	2

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of children who have increased their knowledge of the essential elements of team work through participation in 4-H club actitivies.
2	Number of children who demonstrate responsibility as a result of participation in 4-H Program activities. participation.
3	Number of parenting workshop participants who have used their knowledge of support services available to apply for assistance in an effort to meet some of their parenting needs.
4	Number of Youth demonstrating an immediate and long-term commitment to civic engagement.
5	Percentage of youth with first time, first hand exposure to an animal science project/activity.

Outcome #1

1. Outcome Measures

Number of children who have increased their knowledge of the essential elements of team work through participation in 4-H club actitivies.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
LifeSmarts, a unique consumer knowledge game show competition is designed for teenagers in grades 9 through 12. LifeSmarts concentrates on several crucial areas of real life: Personal Finance; Health and Safety; Environment; Technology; and Consumer Rights and Responsibilities. Youth in the District of Columbia need to learn more information about teams work and they need information about consumer issues that can help them break the patterns of poverty.

What has been done
Coaches worked with DC youth in teams of five. 15 teams began the competition stage of the program learning about the Environment. Technology information was gained through interactions with information secured from Microsoft, Legal Rights and responsibilities and Health and Safety. Nine teams qualified to participate in the state competition and competed to represent the District of Columbia at the National Competition in Seattle, Washington.

Results
The state competition was conducted on the UDC campus with forty-five youth representing nine teams. The winning team was from the United Planning Organization Power Program 4-H Club. They traveled to Seattle, Washington where they competed in the national LifeSmarts competition. The teens wrote impact statements on the firsthand knowledge that they gained from participating in the LifeSmarts program. The youth from the winning team also made a video which was displayed on YouTube that had over 500 views. Participants were surveyed and asked to agree/disagree with various statements about the program:
82% agree: I have made more positive decisions for myself because of things I learned in LifeSmarts.
93% agree: LifeSmarts has made me a smarter, more responsible consumer.

80% agree: LifeSmarts has taught me valuable lessons about my rights as an employee.
75% agree: I have shared the information I gained through LifeSmarts with my friends and family.
95% agree: I would recommend LifeSmarts to High School students.
82% agree: I gained valuable experience working as a team, and interacting with adults through LifeSmarts.
92% agree: LifeSmarts has had a moderate to great effect on me.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

Number of children who demonstrate responsibility as a result of participation in 4-H Program activities. participation.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	9000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth in the District of Columbia need positive relationships with adults to help them progress and reach their fullest potential. Working with volunteer leaders that set and example for positive behaviors and provide encouragement has resulted in marked progress of all of the youth in the 4-H program.

What has been done
9000 Youth particpated in the 4-H program in clubs and specialized activities. They worked as leaders and represented us in a variety of programs. 150 youth participated in an agriculture food production program for five months to learn about food production, distribution and preparation at the UDC Firebird Farm. Members of the 4-H teen council represented the District of Columbia at the White House making presentations about Agricultural Science and ways of engaging more youth in agricultural Science.

Results

Items in which 80% of participants responded they somewhat agree or strongy agree:
I understand why producing food in urban areas is important. (88.1%)
Items in which 70% of participants responded they somewhat agree or strongly agree:
I understand which types of soil hold onto water and nutrients are best. (79.4%)
I am more likely going to select fresh fruits and vegetables over canned fruits/veggies. (76.5%)
I am more likely to eat fruits and vegetables. (73.5%)
Items in which 60% of participants responded they somewhat agree or strong agree:
I understand how to test for clay in my soil. (67.7%)
I understand how an aquaponics system works. (64.7%)
I understand how long it takes to make compost. (64.2%)
Items in which less than 60% of participants responded they somewhat agree or strong agree:
I am more likely to eat fresh greens raw to get the most nutrients out of them. (55.9%)
I am more likely to grow my own plants or produce herbs at home. (44.1%)
I can distinguish a tomato plant from other plants. (32.4%)

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Number of parenting workshop participants who have used their knowledge of support services available to apply for assistance in an effort to meet some of their parenting needs.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	214

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Families in the 4-H LIFE program are primarily from Wards 5, 7, and 8. 4-H LIFE is a family strengthening program for children with incarcerated parents. These families are led primarily by single parent households with lower levels of education and they need support in managing the parenting responsibilities with their children before and after incarceration. Children need to reconnect with parents and understand what happened that led to the incarceration. Children need to understand that their parents still care about them and want them to succeed and that their parents' circumstances do not dictate their futures.

What has been done
Parenting education programs were provided to the parents both male and female. UDC nursing students provided health education classes and counseling students provided support via support groups and counseling.
4-H Agent, Shaquita Simpkins, provided hair and beauty consultations and classes to qualify women to take the certification classes to braid hair for a profit in the District of Columbia.

Results
98% of youth report gaining improved relationships with their parents.
70% of youth would refer others to the program.
91% report feeling loved, supported and cared about by their parents.
98% of parents report a improved relationship with their children.
91% of participants report that they would refer someone else to the program.
78 % of parents report knowing that they will change how they discipline their children.
82% report they will change how they communicate with their children.
96% of youth report knowing that they will not go to prison because their parents went.

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #4

1. Outcome Measures

Number of Youth demonstrating an immediate and long-term commitment to civic engagement.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	400

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth in the District of Columbia are exposed to images of drug and alcohol abuse in their communities and on television. They become familiar with drug terminology and paraphernalia. Education about the dangers of using drugs and alcohol is not readily available. Drug pushers in

the city have begun to package dangerous drug in containers that appeal to younger children and give them names like Scooby Snacks. Children need tools to understand the dangers of drug abuse and smoking, and the tools to use to tell aggressive persons "No" about trying drugs. Prescription drugs are also on the rise in the District of Columbia.

What has been done
The Health Rocks program was presented to District of Columbia Youth. The program uses experiential tools such as goggles that simulate intoxication, lungs that appear damaged by smoking being compared to healthy lungs, and activities that emphasize the dangers of trying drugs for the first time.

Results
Evaluations show that the Health Rocks! program was highly successful in educating youth about drugs, alcohol and tobacco.
96% of youth participants gained increased knowledge of the risks and consequences associated with tobacco usage.
93% of youth participants gained increased knowledge about other risky behaviors.
95% of youth participants learned social personal, social and/or resistance skills.
96% of youth participants said that they personally disapprove of tobacco products.
98% of participants indicate it is wrong to use illegal drugs, alcohol or tobacco products.
72% of the participants indicated they understood that personal values and spending habits and health are related.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Percentage of youth with first time, first hand exposure to an animal science project/activity.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Educators within public and charter schools in the District of Columbia have expressed a continuous need for an educational opportunity regarding the life cycle of chickens or quails. Teachers often request this embryology program to demonstrate the life cycle and expose youth to agriculture at an early age. This is especially important for 5th-7th grade students, as it aligns with one of the District of Columbia science standards.

What has been done

The 4-H Embryology Program was implemented in public schools in the District of Columbia. This program offers youth a hands-on learning approach to science where they are able to learn basic knowledge about the development from egg to chick. The students are asked to take direct care of the eggs within the incubator, ensuring the appropriate humidity and temperature. With the assistance of the classroom teacher, the students are also expected to take care of the chicks once they have hatched by offering food and water regularly. Embryology activities and lessons where taught by using the 4-H Embryology curriculum.

Results

Findings: When asked about careers in animal science, 100% reported knowing nothing prior to 4-H program. 87% reported knowing a lot after 4-H program.
When asked about how a chicken grows, 100% reported knowing nothing prior to 4-H program. 87% reported knowing a lot after 4-H program.
When asked about how to make ethical decisions, 100% reported knowing nothing prior to 4-H program. 87% reported knowing a lot after 4-H program.
When asked about how to compare and contrast, 100% reported knowing nothing prior to 4-H program. 87% reported knowing a lot after 4-H program.
When questined about setting goals and a plan, 100% reported almost never or not usually prior to 4-H program. 75% reported usually after 4-H program.
When queried about observing and keeping records, 100% reported almost never or not usually prior to 4-H program. 75% reported usually after 4-H program.
When asked about working well with others, 100% reported almost never or not usually prior to 4-H program. 75% reported usually after 4-H program.
Lastly, when asked about using the right tools for incubation, 100% reported almost never or not usually prior to 4-H program. 75% reported usually after 4-H program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Community Support)

Brief Explanation

This year the reduction in grant funding and staff greatly affected our ability to reach the number of youth we were able to reach in previous years. It also impacted the number of youth we could serve during summer camp programs. Agents would like a petty cash budget to purchase unforseen materials for 4-H club and activiities.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Surveys have indicated that youth are receptive to new learning experiences and have positive learning experiences as a result. 4-H activities have imparted positive influences on participants, strengthening their leadership, communication, and interaction with peers and instructors/team leaders. Youth indicate a change in knowledge and attitude. Most indicate that they want to do what is considered healthy and appropriate and at this early age, indicate disapproval of bad behaviors or negative activities.

More than 200 residents and CAUSES faculty and staff were educated on the community based approach to economic development offered by te Five Pillars Development model. The results of the community focus groups are been assessed. Further feedback from the community will be sought as we prepare strategies to drive changes that will improve the quality of life and economic development opportunities in the two selected neighborhoods.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
403	Waste Disposal, Recycling, and Reuse	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	2.0	0.0
Actual Paid	2.5	0.0	1.7	0.0
Actual Volunteer	19.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
135510	0	65848	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
173398	0	58318	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The proposed hybrid micro inverter and battery based system was found to be a good potential as a viable and cost effecive alternative to a single gattery/inverter based solar generated power delivery system. A paper titled, Hybrid, Mirco-inverter and Battery based Standalone System for Rural and Urban

Water Delivery, summarizing the major achievements of the project was presented at the 31st European Photovoltaic Solar Energy Conference and Exhibition in Hamburg, Germany.

2. Brief description of the target audience

DCDepartment of the Environment
DC Department of Transportation
DC Department of Public Works
Researchers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1442	24245	26	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Design of a fuzzy-logic based controller system to optimize the operation of the anaerobic digestion System in terms of operational cost, the produce energy, and the quality of the residual organic matter.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Creation of a set of fuzzy rules to control the input flow rate and to control the concentration of VFA, the concentration of chemical oxygen demand (COD), and digester operating temperatures.
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Design, development, and expansion of a hybrid micro inverter and battery based system.

Year	Actual
2015	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Development of better designs for digestion reactor and its data acquisition sensors
2	Control of the concentration of VFA in the digester system through the manipulation of the input flow rate.

Outcome #1

1. Outcome Measures

Development of better designs for digestion reactor and its data acquisition sensors

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

Outcome #2

1. Outcome Measures

Control of the concentration of VFA in the digester system through the manipulation of the input flow rate.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
{No Data}	null

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)
- Other ()

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The proposed hybrid micro inverter and battery based system was found to be a good potential as a viable and cost effecive alternative to a single battery/inverter based solar generated power delivery system. The systems uses a novel AC coupling scheme, which may be impractical for remote rural areas where grid access is limited. The rotary inverter approach is well suited for semi-rural applications where a single phase grid line is available.

Key Items of Evaluation

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	1.0	0.0
Actual Paid	2.7	0.0	3.7	0.0
Actual Volunteer	956.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
109923	0	132024	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
109923	0	111987	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
5014	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research is being conducted to identify and quantify trace elements in the soil of home and community

gardens, to include idle places that can potentially be used for urban gardening in the District. Free soil testing service to about 160 DC residents was provided. The type of analyts included all trace metals and minerals.

Food Handler Certification will include:

1) Pretest
2) Post Test
3) National Examination
4) DC Code Examination
5) Ability of agencies to pass DC inspections
6) Measure of knowledge acquired from food handler certification messages include in the national examination
7) Data Collection
8) Data Analysis
9) Reporting

2. Brief description of the target audience

- Non-commercial agency staff members
- Ongoing participating food handlers
- Non-profits

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	11826	5804	50	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2015
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2015	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Classroom instruction/workshops on Food Handler Certification Regulations to include DC Code Examination or Serve Safe National Examination, and Practice Examinations

Year	Actual
2015	14

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Percentage decrease in the risk of factors of foodborne illness.
2	Number of participants gaining awareness, knowledge and skills in Food Handling techniques.
3	Number of participants scoring a required minimum of 70% on post test and national examination.

Outcome #1

1. Outcome Measures

Percentage decrease in the risk of factors of foodborne illness.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of participants gaining awareness, knowledge and skills in Food Handling techniques.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of participants scoring a required minimum of 70% on post test and national examination.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2015	79

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Foodborne illness costs $77 billion in economic burden in the United States annually (Bottemiller, 2012). With 48 million cases of foodborne illness estimated by the Center for Disease Control each year (CDC, 2014) and 4,700 food establishments in the District of Columbia alone, the need for licensed food managers is at an all-time high. Not to mention, with only 17 sanitarians, two supervisors, a program manager, and a food technologist the District of Columbia needs quality educated food handlers to ensure food safety at a local level; thus, the Certified Professional Food Manager (CPFM) Course taught at the University of the District of Columbia is necessary.

What has been done

Taught by Mr. Paul Brown Jr., the CPFM course has served the District of Columbia in a multitude of ways. The course allows students to learn and take an exam to earn a nationally recognized certification to handle food safely. Then, they can take that certification to their state health department, to give them a safe food handling certificate for that state. The CPFM Course has reached all wards of the District, but most specifically the 5th, 7th, and 8th wards. A vast majority of workshop participants have come from the African American community, with a large percentage of women. Participants can use this certification to help gain employment, as all establishments that serve food to the public must have a licensed food handler on premises. They have also used the certification as a step in acquiring a personal mobile food facility (food truck) or personal catering business, or for promotion within their current job or organization. Students come from different agencies around the District and surrounding areas, such as Homes for Hope; which is taught at the Hughes Memorial United Methodist Church in Northeast DC, Chartwells/Thompson Dining Services, Emerge Inc., Rockson Community Development Corporation Inc., Greater Washington Urban League, Fannie Mae, Census Bureau, public and chartered schools and faith-based organizations. This course is vital because District residents, visitors, and people worldwide need and deserve their food be prepared and served with the utmost care and quality. It is beneficial to District residents who take the course, because it allows them upward mobility at their current place of employment or a greater chance at employment, or the ability to be one certification closer to their dream of entrepreneurship in owning a food truck or catering business.

Results

From fiscal year 2014 to fiscal year 2015 there has been a marked change in the scores. 79 students were certified in 2015, and 113 certified in 2014, a 30% decrease. In fiscal year 2014 the average Pre-Test score was 59. In fiscal year 2015, the average score was 62, a 5% increase. The average Post-Test score for fiscal year 2014 was 79, in fiscal year 2015 the average was 89, a 13% increase. Finally the average National Exam score in fiscal year 2014 was 79, while in fiscal year 2015 that average score was 91, a 15% increase. This is due to more attention being paid to learning the material and greater emphasis on independent, at home, studying and learning.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Government Regulations

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

From fiscal year 2014 to fiscal year 2015 there has been a marked change in the scores in food safety certifications. 79 students were certified in 2015, compared to 113 certified in 2014, a 30% decrease. This is laregly due to the fact that in previous years some of the food safety certification classes were offered by the UDC Community Colleeg which received work force development funding through the District of Columbia. In fiscal year 2015 all food sfaety certifications were moved to CAUSES which does not currently have the funding in place to waive all course fees. In 2014 the average Pre-Test score was 59. In fiscal year 2015, the average score was 62, a 5% improvement in test scores. The average Post-Test score for fiscal year 2014 was 79, in fiscal year 2015 the average was 89, a 13% increase. Finally the average National Exam score in fiscal year 2014 was 79, while in fiscal year 2015 that average score was 91, a 15% increase. This is due to more in depth information being provided to course participants and increased attention to providing support for independent learning and studying outside of the classroom.

Key Items of Evaluation

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
0	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.