



Summary Report

UNC Center for Environmental Health and Susceptibility

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On our honor, we have neither given nor received unauthorized aid on this assignment.

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Abstract

Background: Environmental exposures have been linked to increased risks of numerous health conditions, including asthma, cancer, obesity, and lead poisoning. The Community Outreach and Engagement Core (COEC) at the University of North Carolina Center for Environmental Health and Susceptibility (CEHS) received a three-year grant from the Centers for Disease Control and Prevention (CDC) to implement Healthy Homes programming across North Carolina in 2011. The Capstone team was tasked with assessing the home health-related educational needs of Durham and Lenoir County residents to help inform this programming. **Methods:** The Capstone team conducted demographic and epidemiological information reviews, qualitative formative research, community visits, assessments of the COEC's existing educational materials, and examination of existing Healthy Homes policies and current literature on effective environmental health outreach interventions and strategies. The Capstone team performed 14 key informant interviews with community leaders in Durham and Lenoir Counties, as well as three focus groups with community members in Lenoir County. **Results:** Data showed that poverty, unemployment, and safety were over-arching issues in both counties. In Durham, the most commonly mentioned environmental health issues were indoor air quality and mold. Lead was also indicated often and has historically been a problem in the county. Lenoir County's top environmental health issues were water quality, housing issues, outdoor air quality, and lead. Access to environmental health education and costs are frequent barriers to acting on environmental health risks. Organizations in the two areas vary in both their focus on environmental health issues and capacity to provide education and outreach. **Discussion:** The Capstone team's recommended improvements to the COEC's Healthy Homes-focused outreach and education strategies are organized into three areas: engagement, adult learning methods, and education. The COEC's engagement efforts could be improved by increasing their presence in Lenoir County. Healthy Homes trainings could be improved by increasing the use of participatory teaching methods. The education could be strengthened and tailored to the audience's needs by integrating cost-saving tips and conducting more evaluation of the trainings with participants.

Major Deliverables:

- Deliverable 1: Community Profile Reports for Durham and Lenoir Counties: Demographics, History, and Statistics
- Deliverable 2: Annotated Bibliography on Effective Environmental Health Education Methods for Low-income Populations
- Deliverable 3: Home Exposures Education Needs Assessment
- Deliverable 4: Environmental Health Education and Outreach Recommendations

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List of Key Acronyms

ADHD: Attention Deficit Hyperactivity Disorder

CBPR: Community Based Participatory Research

CDC: Centers for Disease Control and Prevention

CEHS: UNC Center for Environmental Health and Susceptibility

CHW: Community Health Workers

CLPPP: Childhood Lead Poisoning Prevention Program

COEC: CEHS's Community Outreach and Engagement Core

DHHS: Department of Health and Human Services

EBLL: Elevated Blood Lead Level

EPA: United States' Environmental Protection Agency

HBHE: Health Behavior and Health Education

HHLPPP: Healthy Homes and Lead Poisoning Prevention Program

IPM: Integrated Pest Management

MPH: Master's of Public Health

NCDENR: North Carolina Department of Environment and Natural Resources

NGO: Non-Governmental Organization

NIEHS: National Institute of Environmental Health Sciences

UNC: University of North Carolina

Introduction

Capstone and the UNC Center for Environmental Health and Susceptibility

Capstone is a group-based, mentored, evaluated, service-learning opportunity designed to improve student skills while aiding the work of local partner organizations and improving public health. This year-long project is a required part of the Health Behavior and Health Education (HBHE) Master's of Public Health (MPH) curriculum at The University of North Carolina at Chapel Hill Gillings School of Global Public Health. Five MPH candidate students in this department formed the student team responsible for this Capstone project. The Capstone community partners (i.e., supervisors and mentors) for this project were Neasha Graves, MPA, Kathleen Gray, MSPH, and Amy MacDonald, MS, who are staff members of the Community Outreach and Engagement Core (COEC) at the UNC Center for Environmental Health and Susceptibility (CEHS). The CEHS's research employs an interdisciplinary approach aimed at reducing the burden of environmentally related diseases (CEHS, 2011). The COEC's work "translates Center research into knowledge that can be used to improve public health and educates the public about how individual and group susceptibilities interact with environmental factors to cause disease" (CEHS, 2011). The COEC implements programming in counties across North Carolina, specifically with vulnerable populations who are particularly susceptible to environmental health hazards.

Healthy Homes Initiative

For many years, the COEC focused on the Centers for Disease Control and Prevention's (CDC) Childhood Lead Poisoning Prevention Program (CLPPP) to reduce elevated blood lead levels (EBLL) in children throughout the state. As a result of state- and nation-wide declines in blood lead levels in children, as well as other health risks becoming more salient, the COEC has expanded their work to target housing-related health hazards. In collaboration with the North Carolina Department of Environment and Natural Resources (NCDENR) and the North Carolina Department of Health and Human Services (DHHS), the COEC received a three-year grant from CDC in 2011 to develop and implement a statewide

Healthy Homes Initiative that addresses health risks associated with unsafe housing, which include structural issues, as well as individual behaviors related to cleaning, pest management, and home safety.

Specific aims of this grant-based initiative include: 1) Developing a state-wide Healthy Homes Initiative strategic plan; 2) Conducting outreach and education activities pertaining to Healthy Homes; 3) Conducting Healthy Homes assessments for 1,000 homes; and 4) Identifying and working to address policy gaps related to the home environment. For the first aim, the COEC is working with stakeholders and local partners, such as housing code enforcement officers, home assessors, environmental health officials, school nurses, and members of local non-profit organizations, throughout North Carolina to create a strategic plan. These stakeholders and local partners were chosen due to their capacity to raise awareness of Healthy Homes issues in 13 different counties, strategically chosen to take part in the grant in order to assess a cross-section of vulnerable populations located within North Carolina's three geographic regions, i.e. the coastal plain, the piedmont, and the mountains.¹

With respect to the second aim, the COEC and its partners seek to increase the knowledge and capacity of environmental, health, and housing professionals through a Healthy Homes training curriculum. They are accomplishing this by conducting outreach and educational sessions with professionals and community leaders in a "train the trainer" format. The ultimate intention is for the community leaders and professionals to conduct Healthy Homes trainings in their own spheres of influence, thereby expanding the reach of Healthy Homes education and increasing the capacity of local partners to address local Healthy Homes concerns.

For their third aim, the COEC and its partners are performing at least 1,000 Healthy Homes assessments during the three-year funding cycle by making home visits within targeted communities. This activity specifically targets children who live in unsafe housing in North Carolina, as they are disproportionately affected by health hazards in the home (Chaudhuri, 2004). Using a previously designed geo-spatial Lead Risk Model which identifies neighborhoods that are at the greatest risk for lead

¹ In the Coastal Plain: Craven, Jones, Lenoir and Pamlico counties, in the Piedmont: Durham, Forsyth, Guilford and Union counties, and in the mountains: Buncombe, Henderson, Mitchell, Yancey, and Avery counties

exposure, the project will target the poorest quality housing (housing at high risk of containing health hazards) across 13 counties (CEHS, 2011) and will offer Healthy Homes assessments to families living in these areas, as well as those in federally subsidized housing or with children 18 years old or younger with asthma or EBLs.

For the final aim, the COEC and its partners are identifying and working to address environmental health policy gaps in order to increase compliance with Healthy Homes related policies and to meet the state-mandated *Healthy People 2020* goals (U.S. Department of Health and Human Services, 2011).

Goals of the Capstone Project

The Capstone project was designed to contribute to the aims of the Healthy Homes Initiative, focusing specifically within two of the selected counties: Durham and Lenoir. The activities were intended to inform the Healthy Homes trainings used by the COEC in Durham and Lenoir Counties to address the unique needs of these communities including environmental health policy gaps. Insights from this project also aided the development of outreach and educational materials to be used across the state. There were three overarching goals for the project.

Table 1: Capstone Project Goals

Goal 1:	Document the most salient and pressing environmental health hazards in the home in Durham and Lenoir Counties within each County’s context by researching the history, social and economic conditions, major health concerns, and resources available in each county.
Goal 2:	Identify Healthy Homes policies at national, state, and local levels, and explore perceptions of local policymakers in Durham and Lenoir Counties.
Goal 3:	Position the COEC to tailor effective educational outreach on environmental health hazards in the home to residents in Durham and Lenoir Counties and to incorporate the Capstone project’s findings into the work occurring in the other eleven counties of the Healthy Homes Initiative.

Overview of the Capstone Summary Report

This Summary Report describes and serves as a record of the UNC CEHS's Capstone team's project. It includes a literature review of the available published information on various environmental health hazards in the home, the populations who are most vulnerable to such hazards in Durham and Lenoir Counties in North Carolina, and the methods used to gather this information. The report also includes a logic model that illustrates the resources and activities associated with the Capstone project, as well as the intended outcomes and impacts of the project. Embedded in the Methods, Results, and Discussion sections is information on program sustainability and community engagement and assessment, as these topics are essential to the processes of planning, implementation, and evaluation of effective public health programs. Thus, reflections on program sustainability and community engagement and assessment are included throughout the report to highlight the relevance of the Capstone activities for the communities involved in this project. Acknowledging the effects of research and interventions on a community is in line with the principles of Community Based Participatory Research (CBPR), a research framework in which researchers and community members work in partnership to learn about and find solutions to local, salient health issues (Ross, Loup, Nelson, Botkin, Kost, Smith Jr., & Gehlert, 2010).

Background

Homes Affect Health

Environmental exposures have been linked to increased risks of a range of health conditions including asthma (Leaderer, 2002), breast cancer (Perera, 1997), skin cancer (Gloster & Brodland, 1996), obesity (Reidpath, Burns, Garrard, Mahoney, & Townsend, 2001), and lead poisoning (Landrigan, Schechter, Lipton, Fahs, & Schwartz, 2002). Environmental exposures specific to the home are of particular concern, as research indicates that one's home has a great effect on a person's health (Istre, McCoy, Osborn, Barnard, & Bolton, 2001; Akinbami & Schoendorf, 2002; CDC, 2005; Ahrens, 2007; Mudarri & Fisk, 2007). Though homes are commonly regarded to be safe spaces, they often contain

many health hazards, including lead contamination, poor indoor air quality, unintentional injury risks, and asthma and allergy triggers (Khan, 2011).

Lead Poisoning Programming

The negative health effects of lead exposure are well-established. Immediate outcomes from exposure to lead include abdominal pain, headaches, renal failure, and, at extremely high levels of exposure, death (Koller, Brown, Spurgeon, & Levy, 2004). Over the long-term, lead exposure has been linked to higher rates of inattention and impulsivity (Braun, Kahn, Froehlich, Auinger, & Lanphear, 2006), slowed cognitive development, and impaired physical growth (Jacobs, Clickner, Zhou, Viet, Marker, Rogers, & Friedman, 2002). Living in dilapidated or old housing greatly increases the likelihood of lead exposure (Staudinger & Roth, 1998; Jacobs et al., 2002; Selevan et al., 2003; Wu, Buck, & Mendow, 2003; CDC, 2005; Onuegbu, Olisekodiaka, Nwaba, Adeyeye, & Akinola, 2011). In 2002, an estimated 38 million housing units in the U.S. had interior lead-based paint, a sharp decline from the 64 million estimated in 1990. Of these, 63% (24 million units) were found to have significant lead-based paint hazards (Jacobs et al., 2002).

Those most at risk of suffering from the ill effects of lead exposure include young children and pregnant women and their fetuses. Children under five are especially susceptible to lead toxicity, as they are at a particularly vulnerable phase of physiological development and are more likely than older individuals to ingest lead particles by eating lead paint chips or from household dust. Nationally, approximately 250,000 children aged 1-5 years have blood lead levels greater than 10 micrograms of lead per deciliter ($\mu\text{g}/\text{dL}$) of blood, the level at which CDC recommends public health actions be initiated (CDC, 2011). Although this is the CDC's "action level," studies have found that there is no safe blood lead level in children, as detrimental health effects have been documented at levels lower than 10 $\mu\text{g}/\text{dL}$ (Canfield et al., 2003; Koller et al., 2004; Lanphear et al., 2005; Braun et al., 2006; Cho et al., 2010).

Transition from Lead to Healthy Homes

Since 1991, the CDC has made it a top national priority to address lead exposure in the home. A key national program to combat lead exposure was CDC's CLPPP, which utilized education, testing, and policy-focused approaches to reduce the number of households in the U.S. containing lead risks by 50% (CDC, 2009). However, recent research has shown that, in addition to lead, numerous aspects of the home environment can adversely affect health, such as poor indoor air quality, hazards that can cause unintentional injury, and asthma and allergy triggers (Khan, 2011). Thus, the CDC incorporated CLPPP into a broader initiative on health in the home environment in 2009, now titled the Healthy Homes and Lead Poisoning Prevention Program (HHLPPP) (Jacobs et al., 2002; CDC, 2009).

The program addresses various hazards within the home that can lead to injury, illness, or death and emphasizes the *Healthy People 2020* goals of environmental health, public health infrastructure, and education and community-based programs (U.S. Department of Health and Human Services, 2011). This comprehensive initiative is a move away from the fragmented, categorical methods of addressing specific home-based health and safety risks from the past (Khan, 2011). The Healthy Homes Initiative encompasses various intervention approaches, such as capacity-building among environmental, public health, and housing professionals to coordinate Healthy Homes programming, improve Healthy Homes-related data collection and monitoring, develop federal, state, and local Healthy Homes guidelines to identify and alleviate health and safety risks, and enact resource- and setting-appropriate methods to reduce home-based risks (CDC, 2010).

The U.S. Department of Health and Human Services defines a Healthy Home as one that “is sited, designed, built, renovated, and maintained in ways that support the health of residents” (U.S. DHHS, 2009). This broad definition of Healthy Homes is fitting, as people spend approximately 90% of their lives indoors and, thus, are exposed to an array of indoor environmental elements (Jie, Ismail, Jie, & Isa, 2011). Public health officials assert that this holistic assessment can prevent illnesses and injuries that result from housing-related hazards and deficiencies (Gard, Keith, Neltner, & Millette, 2007).

Because previous home-based environmental health programs focused solely on lead, the transition to Healthy Homes programming required a retooling of program implementation. Recent studies have detailed the most effective ways for a program to transition from a focus on lead to general home health, citing useful changes to programs, policies, and partnerships (Maring, Singer, & Shenassa, 2010).

Examples of program changes include: streamlined training opportunities for staff; restructuring of home visits to include a broad array of educational materials; and establishment of key partnerships such as with the fire department, the housing department, and child protection services (Maring et al., 2010).

In determining whether a home is healthy, a variety of factors, including lead exposure, indoor air quality, unintentional injury threats, and poisonous materials, are considered (Mainzer & Moffett, 2011). Unfortunately, comprehensive scientific evaluations on interventions designed to affect all of these factors within the home environment are scant in the literature, though they have been investigated extensively as separate factors (Jacobs, Kelly, & Sobolewski, 2007). The next section is a review of the literature on indoor air quality, home safety, and pesticides and integrated pest management, which are key components of Healthy Homes programming.

Indoor Air Quality

Many pollutants, including radon, tobacco smoke, carbon monoxide, and household dust, can affect indoor air quality as they combine to form indoor air pollution and subsequently aggravate allergy sensitivities and respiratory function (Francisco, 2011). Environmental tobacco exposure has been linked to a two- to four-fold increase in risk of attention deficit hyperactivity disorder (ADHD) (Braun et al., 2006). Unintentional exposure to carbon monoxide, from sources such as furnaces, gas stoves, and kerosene heaters, has led to approximately 20,000 emergency department visits and 450 deaths annually in the U.S. (King & Damon, 2011). Carbon monoxide is especially harmful to pregnant women and fetuses (CDC, 2009). Household dust, which can contain a mixture of mold spores, mite corpses and feces, animal dander, and toxic particles, can cause asthma, allergies, and other respiratory illnesses, with children being especially vulnerable (Lu, Yoshino, Takaki, & Kurihara, 2011).

Mold growth can have a great impact on indoor air quality and particularly affects individuals who suffer from asthma or other respiratory illnesses. Certain conditions within the home can be conducive to mold growth, as it thrives in warm, moist environments and in the presence of dust and building materials that are found in houses (Brandt et al., 2006). Of the 21.8 million people with asthma in the U.S., approximately 4.6 million cases are attributable to mold exposure in the home, with an economic impact of approximately \$3.5 billion annually (Mudarri & Fisk, 2007).

Home Safety

Unintentional injuries in the home, a focus area of Healthy Homes, are widespread and costly (Anonymous, 2005; DiGuseppi, Jacobs, Phelan, Mickalide, & Ormandy, 2010). They include falls, fire-related injuries, scald-related injuries, and drowning. Those most at risk for becoming injured at home include the youngest and oldest age groups. For adults aged 65 and older, injuries in the home result in 7,000 deaths and 1.7 million emergency room visits per year (DiGuseppi et al., 2010). Injuries in the home result in more than 4 million emergency room visits and 74,000 hospitalizations each year for children younger than 19 (DiGuseppi et al., 2010). Researchers have found that for children under the age of five, the majority of unintentional injuries occur in the home (Smithson, Garside, & Pearson, 2011). House fires are also a considerable cause of death and injury in the U.S., leading to more than 3,000 deaths and 17,000 injuries each year (Istre et al., 2001). Furthermore, household cleaners can be dangerous if not stored away from children, with the American Association of Poison Control Centers asserting that approximately 1.2 million young children ingested poison in the U.S. in 2001 (Bull et al., 2003).

Pesticides and Integrated Pest Management

According to the U.S. Environmental Protection Agency (EPA), pests include insects, rodents, weeds, fungi, and microorganisms such as viruses and bacteria. In addition to the nuisance of home pest infestation, these pests can harbor disease and threaten human health (EPA, 2011). In order to control the

spread of pests inside of the home, homeowners can utilize integrated pest management (IPM), defined as an approach entailing an assessment of the pest situation, weighing the different options for addressing it, and implementing actions to manage it (EPA, 2012). IPM discourages the sole use of common household products containing pesticides, such as sprays, repellants, and poisons, when seeking to address infestations (EPA, 2011), because pesticides are associated with detrimental effects to one's nervous system and can accumulate in the body over time (Chanda & Pope, 1996; Rice & Barone, 2000; Whyatt et al., 2002; Bradman et al., 2005; Eskenazi et al., 2007, Eskenazi et al., 2008). In 2000, 80% of exposure to pesticides occurred indoors (Kiely, Donaldson, & Grube, 2004). For these reasons, IPM practices seek to increase the use of other tactics when dealing with infestations in the home (EPA, 2011).

Home-related Environmental Policy

Federal, state and local policies pertaining to indoor environmental health have the potential to make great impacts on health. However, when necessary policies are lacking or not enforced, the public can face health risks. Indoor air policies are one realm that suffers from such gaps. The Clean Air Act of 1970 authorized regulatory standards and systems in regards to outdoor air quality, but did not stipulate directives or give clear authority with respect to indoor air quality. Although laws have been established regarding toxins in the home, surveillance and regulation of indoor air quality are often limited to voluntary public programs because of the ambiguous nature of ownership and responsibility (Jacobs et al., 2007).

While national health-focused agencies have transitioned from lead and asthma programming to a more comprehensive Healthy Homes approach, scientific research and policy are lagging behind (Jacobs et al., 2007). Many federal and state legislative policies cover lead and asthma risks without addressing other household environmental health risks. Furthermore, they do not specify authority or responsibility over indoor environments. Hesitancy in taking a more holistic policy approach may stem from political tensions between affordability, and housing issues, or concern over citizens' privacy (Jacobs et al., 2007).

Healthy Homes as a Public Health Intervention

Among the general U.S. population, there is a lack of concern or understanding of the health risks associated with indoor environments, particularly with respect to indoor air quality (Rosenthal, 2011). Public health officials and community health workers (CHWs) are increasingly turning to home-based interventions and trainings to combat these knowledge gaps and misconceptions regarding environmental health risks in the home (Parker, Israel, Robins, Mentz, Lin, Brakefield-Cladwell, & Ramirez, 2008). Through these awareness-raising activities, public health professionals strive to increase individuals' ability to reduce those risks and improve health, as predicted by many well-established behavior models, such as the Theory of Planned Behavior, that link knowledge and behavioral intentions. These models illustrate that increasing knowledge is an essential component of risk avoidance behavior in individuals (Rosenthal, 2011).

The Healthy Homes Initiative is an example of a comprehensive home-based education program that has demonstrated positive impacts on residents (Polivka, Chaudry, Crawford, Bouton, & Sweet, 2011). In one Healthy Homes program located in Columbus, Ohio, Polivka et al. (2011) conducted a community intervention on home-based asthma triggers that included participant education, personalized action plans to reduce exposures in the home, and demonstrations of trigger-reduction techniques. They found that knowledge of, self-efficacy to avoid, and skills to manage asthma triggers all improved after this Healthy Homes intervention. In another study in Seattle, Washington, Krieger, Takaro, Song, and Weaver (2005) implemented a high intensity intervention, consisting of multiple home visits by CHWs, personalized Healthy Homes action plans, participant education on home health risks and reduction methods, strengthening of social support to improve home environments, and the distribution of resources to reduce exposure risk. Post intervention, they reported that quality of life for asthma caregivers improved and urgent care visits decreased (Krieger et al., 2005).

These studies provide evidence that integrating education into a comprehensive home-based intervention has demonstrated positive health outcomes for asthma sufferers. While the impact of the

Healthy Homes initiative on other health outcomes beyond asthma has yet to be evaluated, current research substantiates the CDC Healthy Homes Initiative as an appropriate method of building public awareness and education of household health risks, and, in turn, reducing their negative health impacts (Rosenthal, 2011).

Healthy Homes in North Carolina

Many home environmental risks are prevalent in North Carolina, where housing stock is frequently inadequate and aging. Nineteen percent of North Carolina's housing stock was built before 1950, 45% was built before 1979, and mobile homes make up 17% of all North Carolina housing (U.S. Census Bureau, 2011). The North Carolina Housing Coalition reports that 31% of North Carolina's households suffer from at least one housing problem, such as issues with continuity of electricity, heating and plumbing services (North Carolina Housing Coalition, 2012). Thus, there is a demonstrated need to address home environmental risk factors among North Carolina's population.

Since 1997, the number of children in North Carolina who have been tested for lead exposure has steadily increased, while the percentage of confirmed cases of EBLLs of 10ug/dl or more has drastically decreased, from 1.3% in 1997 to 0.3% in 2007 (CDC, 2010). Though these data are encouraging, several counties in the state still have disproportionately high rates, including Durham, where 0.42% of children tested had EBLLs, and Lenoir, where 0.80% of children tested had EBLLs (CDC, 2010). Furthermore, other housing-related hazards, such as indoor air quality, injuries, and pest management, remain largely unaddressed. Implementing a Healthy Homes program in North Carolina is an effective way to address the documented risks to health from living in inadequate housing.

Methods

The evidence supporting Healthy Homes initiatives gives credence to the three goals of the Capstone team to effectively position the COEC to tailor successful educational outreach on environmental health hazards in the home to residents in Durham and Lenoir Counties. The methods and

details of all Capstone activities completed in fulfillment of these goals are discussed in the following section.

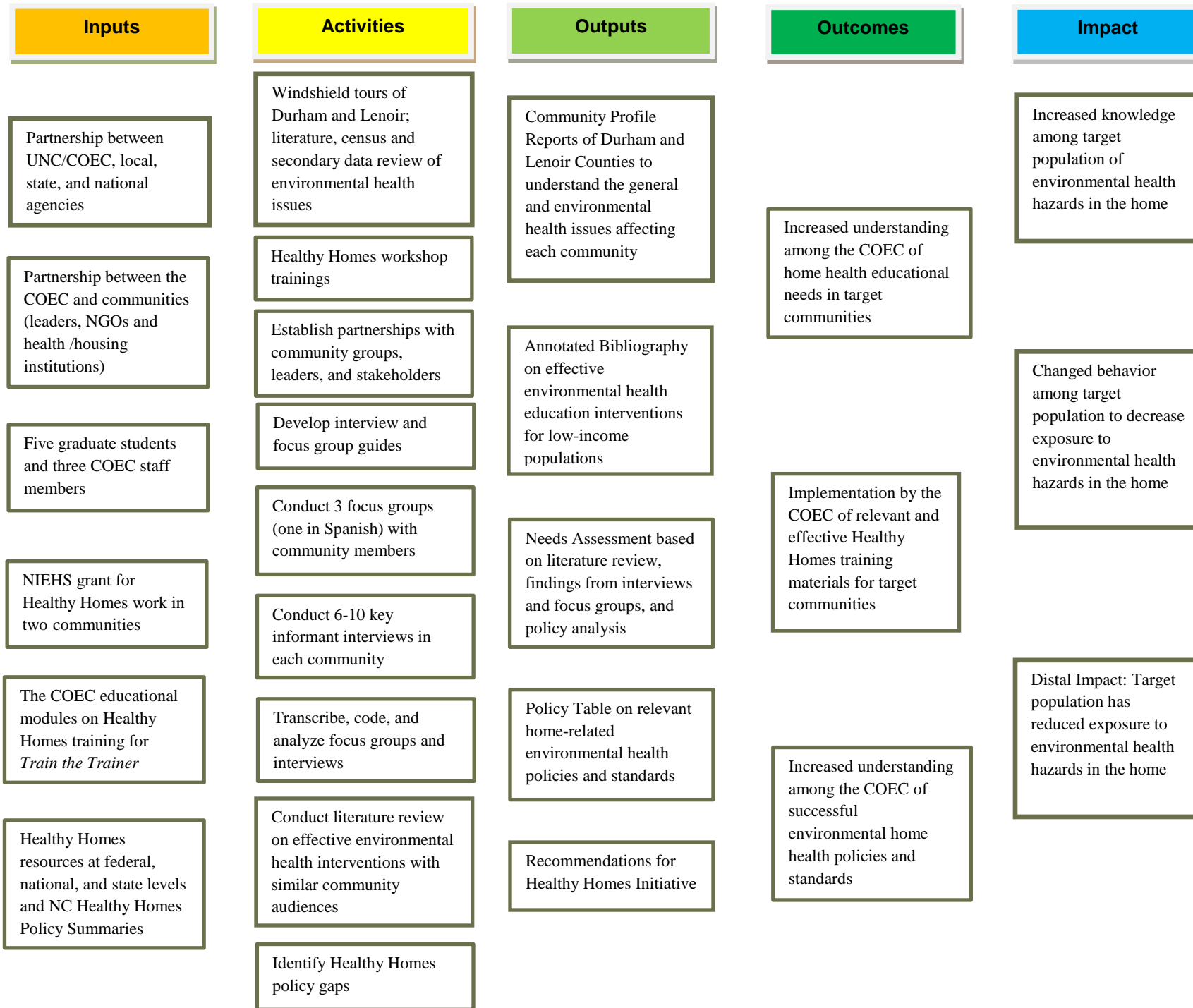
Logic Model

Figure One shows the logic model that informed the Capstone project design and implementation, leading to the intended outcomes and impacts. A logic model is a graphic representation of the relationships between the resources, activities, and intended results of an intervention. If the intervention is implemented as planned, then the listed outcomes and impacts should ensue. A logic model theoretically details the change that is predicted to result from an intervention's implementation and its key elements. Additionally, it offers a basis for both process and outcome evaluation measures for the program (W.K. Kellogg Foundation, 2004). This logic model outlines the inputs, activities, outputs, and expected short- and long-term outcomes, called outcomes and impact respectfully, of this Capstone project.

The inputs in the logic model represent relationships between the COEC and organizations that work with the target populations and leaders within Durham and Lenoir Counties, as well as previously developed resources, such as educational modules. Inputs also include the Capstone team's time, knowledge, and expertise devoted to the project and the resources associated with the Healthy Homes Initiative. The activities undertaken were primarily qualitative, encompassing the conducting and analyzing of focus groups and interviews, along with completing semi-structured observations that occurred during community visits (windshield tours). Additional activities included relationship building within the target communities, participating in the COEC workshops and meetings, and conducting secondary research on relevant policy and educational topics. These activities informed the following outputs: reports on the primary environmental health needs residents of Durham and Lenoir Counties face in their homes, relevant policy approaches to address these issues, and recommended suggestions for the Healthy Homes educational trainings.

Four of the outputs in the logic model are also the Capstone project's main deliverables. These reports and recommendations are intended to increase the COEC's understanding of specific home environmental health education needs in these communities, with the goal that the COEC will implement relevant and effective educational modules for community members. Additionally, the Policy Table will assist the COEC in becoming aware of policy gaps related to Healthy Homes, and the variance between policies at the county, state, and national levels. The intended impacts of these tailored modules and the COEC's enhanced understanding are increased knowledge and behavior change that will decrease the target population's exposure to environmental health threats in the home.

Figure 1: Healthy Homes Capstone Project Logic Model



Planning for Sustainability

Before working on the activities and outputs, it was important to evaluate the sustainability of the Capstone project. Sustainability was a major focus throughout the planning and implementation phases of the project. The definition of sustainability most befitting of this Capstone project and its goals is: “The capacity of a project to continue to deliver its intended benefits over a long period of time (Bamberger et al., 1990).” As Shediak-Rizkallah and Bone (1998) point out, consideration of program sustainability is critical for three main reasons. First, terminating a program is counterproductive if the problem the intervention was created to address is ongoing. Second, failure to sustain a program may keep it from achieving its full potential or impact, despite large investment into the program and significant start-up costs. Finally, a program that is not sustained may have negative repercussions for future programs. Community members may expect new projects will also end prematurely and therefore not buy into them (Shediak-Rizkallah and Bone, 1998). In evaluating the project’s plan for sustainability, the Capstone team considered three categories of factors: project design and implementation factors, factors within the organizational setting, and factors within the community environment (Shediak-Rizkallah, 1998). These factors are discussed in greater detail in the Results section.

The Capstone project aimed to position the COEC to tailor their outreach methods to more effectively train community leaders and professionals in Durham and Lenoir Counties on environmental health threats in the home, ultimately build community capacity to identify and address these threats. The Capstone project deliverables intended to help tailor and sustain the educational and outreach activities of the COEC by documenting the evidence base for effective programming and providing a relevant context for the target populations and settings. Outcomes of the Capstone project support the COEC’s mission to build capacity in communities in North Carolina around environment health issues. By supporting its mission, this Capstone project strengthened the sustainability of the COEC’s activities to ultimately improve the lives of individuals in North Carolina who are affected by environmental health hazards, particularly those within the home.

Engagement and Assessment Activities

In addition to sustainability, the engagement of the target communities in Durham and Lenoir Counties was purposefully considered in the project design. When conducting a public health intervention, it is essential to engage with the community that is the intended beneficiary of the project. The published peer-reviewed literature increasingly recognizes that involvement and engagement with the community in all parts of program planning, implementation, and evaluation leads to more successful and appropriate interventions (Ahmed & Palermo, 2010). Community engagement is defined by the CDC as “the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the well-being of those people” (CDC, 1997). Researchers assert that involving the affected individuals of a health program in the decision-making process can increase the likelihood that the program impacts community-level social norms, thus making widespread behavioral change more likely to occur (Jewkes & Murcott, 1998; Shediac-Rizkallah & Bone, 1998). Furthermore, engagement increases a community’s capacity to address its health issues, as well as deepens researchers’ understanding of community priorities (Ahmed & Palermo, 2010).

Community members can become engaged with public health programs in many ways, such as participating in formative research, serving on an advisory board, or being involved with focus groups to pilot test program materials (Ahmed & Palermo, 2010). Assessment activities focus on gaining a better understanding of the issues faced by the target communities. Since there is significant overlap between the Capstone team’s engagement and assessment activities, they are described together.

The intended beneficiaries of the project include local community leaders who are involved, in some way, with environmental and healthy homes issues, as well as community members who are affected by these issues. The first phase of the Capstone team’s engagement with and assessment of the intended beneficiaries began in the fall semester of 2011 with three main activities: community visits, researching and writing the Community Profile Reports on the demographics, history, and various

statistical information of Durham and Lenoir Counties, and attending the North Carolina Environmental Justice Summit.

Community visits to both Durham and Lenoir Counties occurred in fall of 2011, with all members of the Capstone team participating. In Lenoir County, three members of the team attended the “Living the Good Life Expo and Food Tasting,” centered around local healthy food options and physical activity resources in Kinston, NC on September 27, 2011. The event was marketed as a way for the public to learn about local services and restaurants. During the event, local non-profit organizations and businesses, chefs, and the Chamber of Commerce’s Young Professionals set up booths advertising their organizations’ programs and services, as well as providing healthy food samples. During the event, team members spoke with residents, as well as observed who attended and what activities occurred. A driving tour of Kinston for the Capstone team members was guided by a native of the town. In Durham County, team members attended the “Bull City Open Streets” event that took place on Sunday October 9, 2011 in the City of Durham. The event’s goal was to promote physical activity and cohesiveness among neighbors by closing some streets to traffic and encouraging people to participate in physical activities, like hula hooping and bike riding. After the event, team members conducted a driving tour in under-resourced neighborhoods located in the City of Durham’s southeast corner, as well as visiting a local flea market located in the same area.

Researching and writing the Community Profile Reports for Durham and Lenoir Counties involved accessing multiple online resources and data sets on health, housing, and the environment, as well as contacting community leaders in both areas involved in health and housing issues. Some of the sources included local news media outlets, peer-reviewed literature databases, U.S. Census data, and the North Carolina State Center for Health Statistics. This information was synthesized and organized into two separate reports, one for each county, according to environmental health risks.

At the North Carolina Environmental Justice Summit, a two-day event in October 2011 organized by the North Carolina Environmental Justice Network, the Capstone team attended presentations and discussions on factory farming and livestock, industrial chemical production, hydraulic fracturing,

concentrated animal feeding operations' waste, and energy production injustices, all of which are pertinent environmental health issues in North Carolina. The Capstone team also assisted the COEC's Neasha Graves with educational programming for children attending the Summit by helping guide 25 grade school children through activities about nutritious food and physical activity.

The second phase of the Capstone team's engagement with and assessment of the community occurred in the spring of 2012 and included conducting interviews, building relationships, and recruiting for and conducting focus group discussions. These activities employed CBPR principles of respectfully entering and engaging with a community, as well as qualitative research methods such as collecting, analyzing, and presenting data. The Capstone team interviewed six community leaders (key informants) in Durham County and eight in Lenoir County who were identified by the COEC, with questions focusing on three main areas of environmental health: key issues within the target communities, accessing and sharing environmental health information, and perceptions of local, state, and federal policies and policymakers. The interviews typically lasted fifty to seventy minutes, and took place over the phone and in-person. The interviews were recorded, transcribed, and analyzed using Atlas.ti software.

The COEC staff introduced the Capstone team to most of the community leaders who were interviewed, as they had working relationships with several organizations in both communities prior to the Capstone project's commencement. Three of the Lenoir County interviewees were identified by the COEC as being able to assist in the recruitment and hosting of focus group discussions. For that reason, contact was maintained for several weeks with these interviewees following the original interview to gain assistance with focus group planning and recruitment.

Recruitment for focus group discussions occurred through these community leaders and the placement of flyers in public places. Community leaders publicized focus group days and times in their networks and acted as liaisons between the Capstone team and Lenoir County residents. In keeping with the principles of CBPR, the team sought an equal partnership with the recipient communities and to develop strong working relationships with community leaders and members. In addition one Capstone team member attended a Zumba fitness class, at the invitation of a community leader, and recruited the

majority of the participants for the English speaking focus group discussion. Following recruitment, the Capstone team conducted three focus groups in Lenoir County in February 2012, two in English with African-American residents and one in Spanish with Latino residents. The focus group discussions lasted approximately an hour and a half each, and were recorded, transcribed, and analyzed by reviewing the transcripts.

The purpose of these interviews and focus group discussions was to learn about community needs directly from local professionals and residents. During the interviews and focus groups, the Capstone team members used openly framed questions to solicit a range of community leader and member feedback, reducing the likelihood that the outputs were the result of researcher bias, and, thus capturing the real Healthy Homes education needs of Lenoir and Durham Counties. Prior to their use, all interview and focus group guides were reviewed and edited by a qualitative research expert at the Odum Institute at UNC-CH. In addition to the formative research described above, Capstone team members attended two Healthy Homes trainings put on by the COEC staff for community members to better understand the COEC's Healthy Homes education program and materials.

Work Plan Deliverables

The collective purpose of the work plan deliverables was to reach the three primary outcomes of the Capstone project: 1) Increased understanding among the COEC of home health educational needs in target communities; 2) Implementation by the COEC of relevant and effective Healthy Homes training materials for target communities; and 3) Increased understanding among the COEC of successful environmental home health policies and standards. These short-term outcomes will have a compound effect and eventually change the knowledge and behavior of residents in Lenoir and Durham counties thereby reducing their exposure to environmental health hazards in the home.

Results

Sustainability Findings

There were many implications from the Capstone project's plans for sustainability, the conduct of community engagement and assessment activities, and completion of four main deliverables. In regards to evaluating the project's sustainability, the Capstone team concluded that the interplay of various factors influenced its overall sustainability. These factors can be divided into three primary categories: project design and implementation factors, factors within the organizational setting, and factors within the community (Shediac-Rizkallah, 1998).

Project Design and Implementation Factors

Though the COEC staff had several key professional contacts within both Durham and Lenoir Counties at the onset of the Capstone project, many of the relationships were newly initiated as part of the project design and implementation. This was beneficial to the long-term sustainability of the project as it helped to increase awareness of the COEC's work and developed entrée for the COEC into Lenoir County.

The ultimate sustainability of the Capstone project is best measured through the operational lens of building capacity within the intended communities. Currently, capacity building in the intended communities occurs through educating community leaders and future trainers on Healthy Homes topics through the COEC's existing training modules and materials. The Capstone project's activities and research informed the COEC's trainings to ensure that they were relevant and engaging for the intended audiences, as well as effectively building their capacity to address environmental health hazards in the home within Durham and Lenoir Counties.

Additional design and implementation factors that impacted the sustainability of the project included the focus on the COEC's existing Healthy Home trainings, insufficient direct contact with community members and limited the COEC staff time. Overall, the Capstone project was designed to focus on the COEC's Healthy Homes trainings, which are directed towards educating local community

leaders who then train others within their communities. However, it was unclear to the Capstone team how much control these community trainers possess over the program's dissemination in their communities and to what extent ownership of the program activities is transferred to local community members over the long-term.

In terms of contact with community members, the Capstone team felt they did not engage with residents in either Durham or Lenoir Counties sufficiently, which may have led to reduced participation by community members in the project, affecting its long-term sustainability. Additional engagement activities could have improved the Capstone team's entrée into the communities and increased buy-in of the Capstone project's activities.

Factors within the Organizational Setting

Factors within the COEC's organizational setting helped to contribute to the long-term sustainability of the Capstone project. The COEC is the outreach arm of the CEHS and has been in existence for ten years. As a result of this affiliation with UNC and its ongoing work in North Carolina's communities, the COEC's work is highly valued by other organizations, community members, and UNC, which helps facilitate increased sustainability of its programs. The COEC's presence in the CEHS is a requirement of the National Institute of Environmental Health Sciences (NIEHS), the CEHS's main funder. Thus, the COEC's existence is guaranteed as long as the CEHS continues to receive NIEHS funding. The COEC, now in its third grant cycle, has been working on lead research and outreach for six years and began focusing on Healthy Homes in 2009 after acquiring new funding from the CDC. The grant-funded Healthy Homes Initiative that occurs in the state will run for the next three years, and the COEC intends to continue this work over the long-term.

The COEC's pre-existing relationships with community leaders have also played a strong role in the project's sustainability. A year ago, the COEC began working in Lenoir County on Healthy Homes projects and trainings. Though they forged strong relationships with the Kinston Community Health Center, as well as the local health department and several non-governmental organizations (NGOs),

expanding into this new setting has presented some challenges as they have found it difficult to make connections within the faith community. While Healthy Homes work in Durham County is newer, the COEC has strong, pre-existing relationships in this community, including with the local health department, NGOs, and the faith community. Many relationships in Durham were initiated four years ago, thus there is strong stability in these partnerships.

The amount of staff time devoted exclusively for the COEC's Healthy Homes Initiative is limited, as the COEC's three part-time staff members' combined effort for all of the Core's activities equals that of approximately one full-time employee. Each staff member is involved in other projects at the CEHS that are outside of the COEC's focus, and therefore their time is not solely devoted to the Healthy Homes Initiative. Despite these time limitations, the staff members of the COEC who served as the Capstone project's community partners provided constant feedback based on their extensive experience with environmental health issues, which helped to guide the main deliverables towards achieving long-term results.

Factors within the Broader Community Environment

In Durham and Lenoir Counties, many factors within the broader community affected the sustainability of the Capstone project's activities, including the socioeconomic and political environments in each locale. Social divisions are present within the communities along both economic and racial lines. Neighborhoods most affected by environmental health hazards and Healthy Homes issues in the two counties are primarily comprised of individuals who are from minority groups and those of low socioeconomic status. Additionally, these communities face a multitude of other challenges that affect the general health and well-being of residents. In 2010, Durham County's violent crime rate was 639.4 and Lenoir County's was 623.1 per 100,000 people, as compared to the statewide rate of 374.4 (North Carolina Department of Justice State Bureau of Investigation, 2011). Similarly, unemployment is an issue in both counties, at 8.4% in Durham and 10.9% in Lenoir, compared to the statewide rate of 10.4% (Employment Security Commission of North Carolina, 2011). In each community, these circumstances

may act as barriers to carrying out Healthy Homes-related activities if involvement from the COEC were to cease, as crime and unemployment may be higher priorities for community members than creating and maintaining a healthy home. However, with the support of key stakeholders and local leaders, community buy-in to support and continue the Initiative can be achieved, which in turn may increase the likelihood of its sustainability.

Engagement and Assessment Findings

The Capstone project's community engagement and assessment activities yielded important background knowledge that was incorporated throughout the Capstone activities and deliverables. The insight gained from conducting windshield tours of Durham and Lenoir Counties was a crucial first step in the process of community engagement, particularly for Lenoir County as no Capstone team member had spent time in the community prior to this project. Driving through various parts of Durham and Lenoir Counties as part of the windshield tours allowed Capstone team members to see the social and economic landscapes of the counties and the deep economic divisions that exist in different parts of the counties' largest cities. In Lenoir County, a woman from Kinston guided the driving tour, and her commentary on recent violent crimes, drug activity, and food access issues helped to contextualize many of the significant issues community members face.

In the same way that the windshield tours provided this vital context, attending the North Carolina Environmental Justice Summit early in the Capstone project gave team members background information on environmental justice issues and the history of environmental health concerns in the state. This event also helped Capstone team members hear from and network with a variety of environmental justice champions across the southeast region of the U.S. Furthermore, the windshield tours and additional community visits helped in planning the interviews and focus group discussions, particularly in determining which sub-populations to target for focus group recruitment and what issues were most likely to be relevant to them. Strategic meetings with community leaders in Lenoir County and participating in

community activities like the Zumba fitness class also significantly helped the Capstone team in recruiting participants for the three focus groups discussions.

To complete the Community Profile Reports, several key contacts in both communities were approached for information, and were subsequently considered as potential interviewees. These reports also provided the COEC and the Capstone team with background information on each community, from relevant history and demographics to salient environmental health threats. The research demonstrated that the history of environmental health issues in both counties is lengthy, specifically regarding lead contamination and extensive home damage from natural disasters, showing that these issues have been present in both communities for decades. Not only did the Community Profile Reports highlight many of the structural challenges both counties face in terms of poverty, job loss and crime, but also provided an overview of the strong community capacity that exists in both counties regarding work being done by community groups, local non-profits and governmental organizations. Observing the Healthy Homes trainings twice during the project allowed the Capstone team to understand more details about the educational activities currently offered by the COEC. Additionally, it helped to contribute to the Capstone team's recommendations for the COEC's current work.

By conducting interviews and focus groups, the Capstone team attempted to move from engaging generally with community members during the community visits to engaging specifically with the intended beneficiaries, as well as key stakeholders and leaders in the community who work on environmental health issues. From this qualitative research, the Capstone team gained knowledge on the most pressing home-related health hazards for low-income families, the extent to which these families are or are not accessing available resources, and how much control they feel over changing their home environment.

All engagement and assessment activities, including conducting windshield tours and community visits, participating in the North Carolina Environmental Justice Summit, observing the COEC-led trainings, and conducting interviews and focus group discussions with key informants and community members informed and significantly strengthened the Needs Assessment report on the Healthy Homes

issues affecting Durham and Lenoir Counties (Deliverable 3). These activities also directly contributed to the Capstone team's Recommendations (Deliverable 4) for future outreach strategy development and policy initiatives that could help remediate the most pressing home-related health issues.

Overall, engaging with key stakeholders and beneficiaries provided the Capstone team with information on the strengths of these communities, including the resources available, community members' perceptions of local policies and policymakers and the ability of the key stakeholders and intended beneficiaries to organize and advocate for change around Healthy Homes issues. In conjunction, the Capstone team learned about limitations to achieving optimal environmental health outcomes in the communities, including lack of resources and interest or ability to advocate for Healthy Homes policy changes.

Summary of Deliverables

This section outlines the Capstone project's deliverables and provides details on each deliverable's purpose, timeline, methods and key findings (Tables 2, 3, 4, and 5).

Table 2: Capstone Project Deliverable 1 Description

Deliverable 1: Community Profile Reports for Durham and Lenoir Counties: Demographics, History, and Statistics	
<p><i>Purpose:</i> The Community Profile Reports of Durham and Lenoir Counties are intended to provide the COEC with background information on each county, including demographics, history, and environmental health statistics, and inform subsequent Capstone team research activities.</p>	
<p><i>Timeline:</i> September 2011 – January 2012</p>	
Methods	Key Findings
<ul style="list-style-type: none"> • Review of scientific literature via PubMed and Google Scholar • Online searches of city and county governmental reports, U.S. Census data, HBHE student-conducted AOCD reports, Durham’s <i>The Herald Sun</i> and <i>Independent Weekly</i> archives, and electronic databases 	<p>Durham County has higher per capita incomes than Lenoir County, though both counties have more people living in poverty than the state average. Lenoir County is ranked as the 83rd “healthiest” county out of 100 counties in the state (meaning only 17 counties are more unhealthy than Lenoir), while Durham is 9th. There are high rates of hospitalization for asthma in Lenoir County. Mold is considered to be an issue in both counties. Water quality is a critical issue in Lenoir County and carbon monoxide emissions is a major issue in Durham County.</p>

The Community Profile Reports met the needs of both the community partner and the Capstone team in providing a comprehensive overview of the counties, as the research and documentation helped to orient the team to both regions. A firm background of this information helped the team better understand the communities’ circumstances and priorities and, thus, make appropriate recommendations for the COEC’s environmental health education and outreach activities. The COEC benefited from the reports by having an informative resource to distribute to local partners in both counties and by gaining access to new resources of general and environmental health information.

Table 3: Capstone Project Deliverable 2 Description

Deliverable 2: Annotated Bibliography on Effective Environmental Health Education Interventions for Low-income Populations	
<i>Purpose:</i> The Annotated Bibliography listed effective educational interventions on environmental health and housing for low-income populations from peer-reviewed scientific literature.	
<i>Timeline:</i> January – February 2012	
Methods	Key Findings
<ul style="list-style-type: none"> • Literature review of current research • <i>Database and online searches for existing education strategies on specific Healthy Homes topics</i> 	<p>Effective home-based asthma interventions: target more than one trigger, employ multiple approaches, conduct multiple home visits, and use CBPR methods and CHWs. Combining home safety education with distribution of equipment is more effective than education alone. Actively engaging target community members increases efficacy of home lead interventions. Integrated Pest Management (IPM) is the most effective and safest way to control pests in the home. Adults learn best through dialogue and experiential education methods.</p>

The Annotated Bibliography provided the COEC with recent notable peer-reviewed published literature regarding Healthy Homes-based education and outreach efforts across the country. It addressed the research question: What are the most effective educational interventions on environmental health and housing for low-income populations? The structure of this document followed the COEC’s five main Healthy Homes Initiative outreach areas: Lead, Indoor Air Quality and Mold, Safety, and Pest Management/Pesticides. It also included effective teaching methods and innovative curricula and interventions on these topics.

Table 4: Capstone Project Deliverable 3 Description

Deliverable 3: Home Exposures Education Needs Assessment	
<p><i>Purpose:</i> The Needs Assessment compiled findings from key informant interviews and focus groups with Lenoir County community members to present the COEC with a comprehensive summary of target community environmental health needs and perceptions of local policymakers.</p>	
<p><i>Timeline:</i> January 2012 – April 2012</p>	
Methods	Key Findings
<ul style="list-style-type: none"> • Key informant interviews in Durham and Lenoir Counties • Focus groups (Spanish and English) in Lenoir County 	<p>Interviews in Durham County revealed the following: many of those working on issues of health and housing were interested in networking with each other to share information through forums such as the newly formed Healthy Homes Coalition; and low-income tenants in rental units, landlords and people making renovations to older homes should be targeted with information on home-related health risks. In Lenoir County, there was a need for environmental health education on a variety of topics. Key informants discussed significant structural challenges, including high poverty, low education, and lack of jobs. Both communities were interested in low-cost or free solutions to reduce home health hazards.</p>

The Needs Assessment informed the COEC on the pertinent environmental health and Healthy Homes related issues and policies in the two counties. It addressed Goal One (Table 1) of the Capstone project. Qualitative data gathered through the key informant interviews and focus groups was analyzed in-depth and the findings reported in the Needs Assessment. This information fed directly into the Recommendations of the COEC’s continued outreach and networking activities as part of the Healthy Homes Initiative and other health topics.

Table 5: Capstone Project Deliverable 4 Description

Deliverable 4: Environmental Health Education and Outreach Recommendations	
<p><i>Purpose:</i> Informed from the previous deliverables, the Capstone team offered recommendations, and resources to assist the COEC’s work in Durham and Lenoir Counties in the following areas: engagement, adult learning methods, and education.</p>	
<p><i>Timeline:</i> March – April 2012</p>	
Methods	Key Findings
<ul style="list-style-type: none"> • Review of findings from the Needs Assessment and Policy Table, Annotated Bibliography, and Community Profile Reports • Discussion of methods to address community needs within the Capstone team and with the COEC staff • Draft and review of possible recommendations 	<p>Recommendations included:</p> <ul style="list-style-type: none"> • Increasing Community Engagement in Lenoir County • Increasing the use of participatory and applied learning methods in trainings • Integrating cost saving tips into the Healthy Homes Curriculum

The Recommendations were a culmination of all of the Capstone team’s activities. Given the information that was compiled in the Community Profile Reports, the concerns and needs revealed through the qualitative research conducted in each county, and the effective educational strategies identified in the literature, the Capstone team provided a list of recommended activities and methods that the COEC can consider for its Healthy Homes education and outreach efforts. The report included targeted recommendations for each of the following three main areas: engagement, adult learning methods, and education. The Recommendations enabled the Capstone team to fulfill Goal Three (Table 1) to position the COEC to tailor effective educational outreach on environmental health hazards in the home with residents of Durham and Lenoir Counties.

Finally, as a part of the CDC grant requirements, the COEC was charged with understanding the current condition of home exposure-related environmental health policies in the state. One of the Capstone team’s activities was to assist in gathering this information. This task was an additional activity

that was completed as a part of the Capstone project. In the format of an Excel table, the Capstone team presented information about existing federal, state, and local policies and standards in a structured and user-friendly way. The Policy Table summarized current home exposure-related policies and standards and highlighted progressive and comprehensive versions in place across the state and country. It also detailed possible policy areas where the COEC could build capacity among community members to advocate for better protection, and addressed Goal 2 of the Capstone project (Table 1).

Discussion

Strengths and Limitations of Engagement and Assessment Activities

As previously described, the Capstone team was purposeful in applying sound community engagement and assessment methods in all activities conducted during the project. As the COEC had limited networks in Lenoir County, the team worked to develop new relationships there by meeting with community leaders who could provide entrée into the Latino and faith-based communities, both of which containing members' of the project's target audience. Additionally, Capstone team members worked closely with the COEC to obtain feedback and guidance on all deliverables in order to ensure the project's relevancy and long-term use. Despite these strengths, there were ways in which the Capstone team could have done more to achieve greater community engagement. Additionally, some circumstances were beyond the control of the Capstone team that limited the extent to which such methods could be used in all aspects of the project.

The Capstone team attempted to engage with the communities from the onset of the project by participating in local events and conducting windshield tours of the counties in September and October 2011. However, the Capstone team did not engage with each community in an equal partnership due to limited interaction with the intended beneficiaries. This was primarily due to the fact that Capstone team visited the communities only one time prior to interview and focus group recruitment in January 2012. Specific constraints to greater interaction with the communities included distance to the communities

from the university and a Human Subjects Review Board process that led to delays in the interviews and focus group discussions. Despite these constraints, more efforts could have been taken by the Capstone team to engage with the communities by holding informal informational interviews with relevant stakeholders, networking with community leaders, and participating in additional community events. These further discussions with community members and more frequent community visits would have helped to sustain the project's impacts and ensure that it was owned by the community. Additionally, more frequent community visits could have helped to develop and strengthen lines of communication between key informants and leaders in the target communities and the Capstone team members.

Some factors beyond the control of the Capstone team further limited the extent to which community engagement and assessment methods could be used comprehensively throughout the project. For example, the overarching approaches and goals of the project were not discussed with residents of the recipient communities prior to the initiation of the Capstone project, and thus these groups were not included in its planning and implementation. This is a limitation to the sustainability of the project as engaging with communities can improve the relevancy of research aims, thus increasing the potential benefits of the work. Additionally, the overall quality of the research can be enhanced when community members contribute their expertise and guidance to the study (Ahmed & Palermo, 2010). Furthermore, it is important to note that the products of this Capstone project were part of a grant with pre-identified goals and objectives; thus the COEC staff members were required to guide the Capstone project's activities, as opposed to it being guided by input from the targeted communities.

Lastly, while created with the best intentions of teaching professionals and community members about the hazards to health inside the home, the training materials developed by the COEC were not created in partnership with the intended audiences. Thus, they primarily focus on informing and consulting with community members, as opposed to partnering with them (Arnstein, 1969). Involvement by the intended audiences, particularly with key stakeholders who can provide valuable input and act as gatekeepers to facilitate entrée into target communities, would have helped to sustain the COEC's Healthy Homes work.

Additional limitations of the community engagement activities included: 1) a dearth of published community-level data on environmental health issues; 2) a research strategy that primarily utilized qualitative methods, and thus may lack representative data on the entire community; and 3) interviewing community representatives and leaders instead of those who will be ultimately impacted by intervention activities, community members.

Potential Impacts and Benefits

This year-long project produced several benefits to the Capstone partner organization, the target communities and stakeholders, and the Capstone student team. Since the primary goals of the Capstone project were aimed at supplying the COEC with information and research to be used in the implementation of the Healthy Homes Initiative, much of the impact and benefits were seen at the partner organization level. However, the Capstone team also gained significant insight and experience. Detailed below are the impacts and benefits at the partner organization level, community and stakeholder level, and Capstone student team level.

Partner Organization

The first benefit to the partner organization, the COEC, stemmed directly from the deliverables of this Capstone project. The Community Profile Reports provided background on the economic and social situations in Durham and Lenoir Counties that both demonstrated a need for Healthy Homes interventions. Additionally, the Annotated Bibliography compiled effective environmental health education intervention strategies and methods into one document. The COEC can use this information in training future employees, drafting program grants, or producing reports for program donors. Most importantly, the activities and deliverables gave the COEC a solid understanding of the key household environmental health issues affecting Durham and Lenoir Counties, which can be used to develop and implement more effective Healthy Homes trainings.

Conducting formative research in Durham and Lenoir Counties expanded the COEC's network and built relationships within the communities, which may help the organization gain entrée when

implementing Healthy Homes activities. The COEC has the opportunity to take advantage of these new connections and fill the current gaps in providing education on how housing affects health to local organizations. The findings from the interviews, summarized in the Needs Assessment Report, raised the COEC’s awareness of the capacity in each community and provided a synthesis of the issues that are most relevant to community leaders and members. Lastly, the Environmental Health Policy Table provided information on relevant policies and standards in place, as well as areas for potential action for the COEC and its partners. If these policy opportunities are explored further, the COEC can advocate for lasting policy change to improve housing standards and the health of people living in Durham and Lenoir Counties.

Table 6: Benefits for Capstone Partner Organization

Deliverable	Benefits to the COEC
Community Profile Reports	<ul style="list-style-type: none"> • Comprehensive background information regarding history and health issues in each county • Helpful resource to provide to local partners when building Healthy Homes coalitions in both areas • Identification of major health and housing issues in Durham and Lenoir • Identification of local potential community partners
Annotated Bibliography	<ul style="list-style-type: none"> • Easy-to-use resource highlighting recent notable environmental health and Healthy Homes-related community interventions • Creative and evidence-based ideas the COEC can adapt for its targeted populations and settings • Description of adult learning principles and styles to employ in the COEC’s training modules
Needs Assessment	<ul style="list-style-type: none"> • First-hand accounts from community leaders and members in each county on perceived environmental health issues and environmental health education information needs • List of Healthy Homes policies and standards to inform the COEC’s advocacy work in North Carolina
Recommendations	<ul style="list-style-type: none"> • Targeted list of actions the COEC can take to enhance their work on Healthy Homes and other environmental health education and outreach in North Carolina

Communities and Stakeholders

The impact on and benefit for Lenoir and Durham Counties relate to the future actions of the COEC that may be informed by the Capstone project's findings, as well as to the participation of community leaders and members in the formative research conducted in both areas. Specifically, community leaders and members may now receive Healthy Homes trainings tailored to their specific needs due to the COEC's increased understanding of the two communities. Additionally, the Capstone team's activities in the communities heightened community leaders' and members' knowledge and awareness of the COEC and its activities.

Capstone Team

The Capstone team members gained knowledge of environmental health issues, both generally and specific to these communities, and experience in applying research and program design skills that will be useful in future endeavors. The Capstone project offered team members the opportunity to work directly with the COEC staff and community members to inform the design of tailored Healthy Homes educational programs for Durham and Lenoir County professionals. Also, the Capstone team honed its qualitative research skills by conducting background literature searches and one-on-one interviews, leading focus group discussions and interview, and analyzing and summarizing findings.

Lessons Learned and Challenges

The biggest lesson learned for Capstone team members related to the subject matter of Healthy Homes. Prior to this project, the student team had little knowledge of home-related health hazards. This project offered a unique opportunity to learn more about indoor air quality, pest management, and home safety and generally about the significant impact of the home on one's health. The student team also was able to learn about the need of flexibility when applying HBHE skills in a real world setting, particularly with respects to community engagement and assessment. At the same time, the Capstone team learned of the importance of building rapport with partners and the intended beneficiaries of the project, as well as sharing project ownership across multiple stakeholders.

The primary challenge in this Capstone project was the recruitment for key informant interviewees and focus group participants. Soliciting interest and participation from several key informants was difficult. Additional community visits to build rapport with key stakeholders, more extensive recruitment efforts and a larger pool of potential interviewees could have alleviated this challenge. Recruitment for focus group discussions proved difficult as well, due to the Capstone's team limited networking and recruitment efforts, the COEC's new presence in the community and a lack of rapport with multiple community leaders who may have facilitated entrée. For example, two focus groups discussions were postponed because of a lack of participants, which delayed the project timeline. As a result of these challenges, the majority of English-language focus group participants were older African American women, whereas it may have been beneficial to have a more diverse segment of Lenoir's population and opinions represented in the focus group discussions. Additional reasons accounted for these delays, including a short timeframe for recruitment and limited buy-in by community leaders, as they may have been unfamiliar with the COEC's work. Overall, these challenges led to fewer completed interviews and low turnout at focus group discussions, which then resulted in a small sample size. A small sample size weakened the interpretation of the results and the generalizability of findings to other settings and populations.

Considerations for Sustainability

As the Capstone project was primarily focused on formative research, some of the project activities do not need to be sustained since they are complete, such as gathering information on the current environmental health education needs in Durham and Lenoir Counties, although ongoing assessment of community needs may be necessary. Many aspects and outcomes of the Capstone project should continue beyond its tenure, including community engagement and capacity building, exploring Healthy Homes policy gaps in North Carolina, and researching existing opportunities for action on these policies. The most effective way to sustain these activities is for the COEC to institutionalize them by completing them regularly. However, due to limited resources, building community capacity is not a

main focus of COEC's work at this time. Nevertheless, prioritizing capacity building will greatly help to ensure the future impact of their work.

Conclusion and Recommended Next Steps

The products of the Capstone project have fulfilled the goals set forth by the Capstone team and the COEC. As next steps, the COEC will decide how to integrate the Capstone team's recommendations in the Healthy Homes trainings, particularly utilizing engagement activities and adult learning methods. The findings from the Needs Assessment Report about the unique challenges to addressing Healthy Home issues that urban and rural populations face can be further explored and applied in the COEC's projects across North Carolina. It may also be beneficial for the COEC to document the process of creating a Healthy Homes Coalition in Durham County, with the possibility to disseminate and replicate this process elsewhere in the state. In conclusion, while the Capstone team faced some challenges, particularly in terms of building rapport with target communities, the end result is a collection of reports that may be used to tailor Healthy Homes educational trainings to the needs of Durham and Lenoir County professionals and residents, as well as a hands-on experience that will serve Capstone team members in their future careers.

Appendix

Final Work Plan

A. Capstone Team Members

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B. Working Title

Please provide a working title that describes the population, setting, health topic(s), and major deliverable(s) you will be working on. E.g., Evaluation and Adaptation of a Reproductive Health Peer Education Curriculum for NC Latino Youth.

“Improving Understanding of Environmental Health Education and Policy Needs Focused on Exposures in the Home, in Lenoir and Durham Counties in North Carolina, and Identifying Opportunities for Environmental Health Outreach.”

C. Capstone Project Description

*In narrative format, please describe the significance of the **health problem(s)** the Capstone project aims to address. Describe the **population** that will benefit from the Capstone project work. Describe the **setting** that will be impacted by the Capstone project work. Describe the **methods** that the Capstone team will use to address the health problems. (1-2 paragraphs)*

Environmental exposures have been linked to increased risks of acquiring an array of health conditions including asthma (Sporek et al., 1990), breast cancer (Perera, 1997), skin cancer (Gloster et al., 1996), obesity (Reidpath et al., 2001), and lead poisoning (Landrigan et al., 2002). Additionally, according to the Environmental Protection Agency (EPA), racial minority and low-income populations are more likely to experience higher than average exposures to some air pollutants, hazardous waste facilities, contaminated fish, and agricultural pesticides (US EPA, 1992). For these reasons, it is especially necessary to address environmental risk factors in North Carolina’s vulnerable communities.

This HBHE Capstone project will entail conducting an environmental health education needs assessment with community leaders and members in the target communities of Lenoir County and Durham County in North Carolina, using a mixed methods approach. Information will be gathered on relevant environmental health issues and health policies, appropriate environmental health education topics and methods, and community needs, resources, capacity, and capital for each community. The Capstone team will work with the Community Outreach and Engagement Core (COEC) staff to assess community interests on environmental health concerns and develop a Needs Assessment on locally relevant environmental health education and outreach needs. Additionally, Capstone students will become familiar with the healthy homes training in the COEC environmental health toolbox. Capstone students will observe and participate in trainings that utilize the materials and, based on the information learned from the needs assessment, develop recommendations for environmental health education and outreach. These recommendations will be particularly helpful in positioning COEC to conduct effective outreach activities in Lenoir and Durham County aimed at improving understanding of health hazards in homes.

D. Deliverables & Activities

Please list all Capstone deliverables and their purposes; the activities necessary to complete them; and the timeline for completing them.

Deliverable I: Assessment Instruments & IRB Application

Purpose: Seek IRB approval of the project in order to conduct qualitative research in Durham and Lenoir Counties, including key informant interviews and focus group discussions. IRB application will include interview guides, focus group guides, recruitment fliers for focus groups and all consent forms. Key informant interviews will be conducted with community leaders working on environmental health issues in Durham and Lenoir County and will be identified by the COEC. Focus group discussions will be held with community members, including two English-speaking groups and one Spanish-speaking group. English speaking focus group participants will be recruited through previously established contacts by the COEC as well as those newly established by the Capstone team. Spanish speaking focus group participants will be recruited through a previously established contact by the COEC.

ACTIVITIES	DUE DATES
1.0 Complete preliminary literature review and review of public databases, media sources, and other resources to summarize key environmental health concerns and resources in each community to inform IRB application and needs assessment instruments	9/16/11 – COMPLETED
1.1 Draft IRB application, including interview guides, focus group guides and recruitment materials to send to COEC	9/29/11 - COMPLETED
1.2 Initial submission of application to IRB, including interview guides, focus group guides and recruitment materials.	11/10/11 - COMPLETED
1.3 Submit modification of IRB application that includes Spanish versions of key documents	12/9/2011 - COMPLETED

Deliverable II: Home Exposures Education Needs Assessment

Purpose: The needs assessment will compile findings from key informant interviews and focus group discussions with Lenoir County community members to present the COEC with a comprehensive summary of target community environmental health needs and perceptions of Healthy Homes policy. Qualitative data will be gathered through the key informant interviews and focus groups to be analyzed in-depth with findings reported in the Needs Assessment. This information will be used in the development of recommendations to the COEC regarding outreach and engagement activities as part of

the Healthy Homes Initiative. In the format of an Excel table, the Capstone team will present information about existing federal, state, and local policies and standards in a structured and user-friendly way. The Policy Table will summarize current home exposure-related policies and standards and highlight progressive and comprehensive approaches in locations across the state and country. It will also detail possible policy areas where the COEC could build capacity among community members to advocate for better protection.

ACTIVITIES	DUE DATES
2.0 Read Toxic Free NC Capstone report to review environmental health issues and community engagement and outreach strategies	8/31/11 -COMPLETED
2.1 In consultation with COEC, identify relevant state housing policies that affect health and compare them to policies in other states with more progressive housing policies	3/16/12 - COMPLETED
2.2 Complete community profile drafts on key environmental health issues and resources using public databases, media sources, and other resources in each community	10/14/11 - COMPLETED
2.3 Complete interviews with 6-10 key informants/community leaders in each community	2/1/12 - COMPLETED
2.4 Revise Capstone work plan, as needed	12/7/11- COMPLETED
2.5 End of semester check-in to present and discuss preliminary findings from environmental health education needs assessment to COEC, including: 1) literature review; 2) relevant health policies, and 3) coding and analysis plan	12/2/11- COMPLETED
2.6 Complete 2-3 focus groups with community members in Lenoir County, NC	2/25/12 - COMPLETED
2.7 Complete informal analysis of transcribed interviews and focus groups	3/2/12 - COMPLETED
2.8 Submit draft of home exposures education needs assessment report to COEC	3/23/12 - COMPLETED
2.9 Finalize home exposures education needs assessment report, including community needs, resources, capacity, capital and interest in advocating for policy change	4/25/12 - COMPLETED

Deliverable III: Environmental Health Outreach and Engagement Recommendation Report

Purpose: The recommendations will enable the Capstone team to position the COEC to conduct effective educational outreach on environmental health hazards in the home with residents of Durham and Lenoir Counties. Given the information that will be compiled in the Community Profile Reports, the concerns and educational needs which will be revealed through the qualitative research, and the effective educational strategies that will be identified, the Capstone team will provide a list of recommended activities and methods that the COEC could consider for its Healthy Homes education and outreach efforts. The report will include

recommendations for each of the following three main areas: engagement, adult learning methods, and education.

ACTIVITIES	DUE DATES
3.0 Participate in NC Environmental Justice Summit and observe/assist with COEC outreach activities	10/14/11 – 10/15/11 - COMPLETED
3.1 Conduct a literature review on effective environmental health education and outreach strategies in the home and present findings as an annotated bibliography	2/8/12 - COMPLETED
3.2 Join COEC staff in at least three outreach activities	3/15/12 - COMPLETED
3.3 Submit recommendations report on outreach and education materials specifically for Healthy Homes, including suggestions and/or revisions to techniques, materials and topics	4/25/12 - COMPLETED
3.4 Provide presentation on environmental health needs assessment results and recommendations to COEC's Community Advisory Committee and staff	5/3/12

E. Important HBHE Principles

a. Theory-Grounded

Please explain how the Capstone project work will be grounded in theory.

We intend to use health behavior change theories that specifically apply to the nature of Capstone activities. For example, activities will be based on Social Cognitive Theory, specifically the concept of reciprocal determinism, which demonstrates the triadic influence between personal behavior and environmental factors. Additionally, we will utilize the Social Ecological Framework (SEF) as a basis for all activities, ensuring that we target multiple levels of the SEF, namely individuals, communities, and policies, to increase program impact on environmental health issues among the intended beneficiaries.

b. Evidence-Based

Please explain how the Capstone project efforts will be evidence-based.

Initial steps will involve a thorough literature review of the health issues, particularly environmental health risks in the home, affecting the communities in which Capstone activities will take place. Detailed community profiles consisting of this information as well as recently published scientific research will be created and inform our interview and focus group guides. Furthermore, a review of effective environmental health outreach strategies that have been used in similar settings/challenges will form the basis, along with the needs assessment, of program recommendations in the third deliverable. Specific attention will be paid to previously documented evidence based interventions (EBIs) and “best practices” that focus on the topics relevant to the health needs of these communities and COEC’s stated goals.

c. Participatory

Please explain how the Capstone project efforts will involve the intended audience.

We will use principles of community engagement and empowerment to foster positive relationships between the Capstone team/community partner and the intended audience of Capstone activities. Engaging and educating community members will enable them to be active in making decisions that affect the health outcomes of their families and communities. Recruitment and data collection activities will build on existing relationships between the community partner and communities. The outcomes of all Capstone activities will be taken back to those with whom activities occurred to ensure that all findings are rooted in the community context and participatory in nature. Given that the intended beneficiaries will be well-defined and identified groups, it will be feasible for us to gather relevant and necessary input from members of these beneficiaries that represents the needs of all group members.

d. Public Health-Oriented

Please explain how the Capstone project work will impact public health.

By thoroughly evaluating the specific environmental hazards in the home that impact health in these communities, making recommendations to trainings that target these hazards, and having the long-term goals of educating and empowering community members to address the most important environmental health issues through educational and policy change, this Capstone project will directly and indirectly improve the public's health.

e. Attention to the Potential for Sustainability and Dissemination

Which project outputs should be sustained after the Capstone project ends, how, and by whom? How will you share outcomes with stakeholders, relevant institutions, organizations, and individuals?

Sustainability is a key aspect of this Capstone project. Many of this project's activities involve assessment of environmental health issues and threats within target communities that must be sustained long-term to ensure that community needs are being addressed. Process and outcome evaluation of COEC's education modules must be continually implemented to ensure that COEC's activities are being carried out properly and that they are meeting goals. Many key players will be involved in long-term project efforts. COEC will be responsible for maintaining, monitoring and directing these activities. Because COEC has multi-year funding for Healthy Homes training and expresses a firm commitment to successful implementation of these trainings in the target communities, their leadership of the project is paramount to long-term sustainability. If the Capstone program selects this program in the coming years, future Capstone teams will be charged with implementing and evaluating educational activities based off the suggestions made by this Capstone team, and expanding on the policy research that will be conducted this year to generate specific policy solutions to environmental health problems in the home in these communities. Finally, community leaders and members must be involved in each step of this process, both through input as well as active participation in program activities. Working with and disseminating relevant information to established community groups increases the likelihood that

Capstone activities can be maintained beyond the team’s tenure. The results of the needs assessment and suggestions for future program activities will be shared with COEC staff, local community leaders and members, and Capstone teaching staff as well as future Capstone team members through printed reports and presentations.

F. IRB Implications

Will you be conducting secondary data analysis or primary data collection? Do you plan to pursue additional activities with the same information for dissemination (e.g., conference paper, article)? Please refer to the IRB Guidance for Student Research and Class Projects document to determine whether or not you will need to do an IRB.

Both primary and secondary data will be used. Students will submit an IRB application to gain approval for the in-depth interviews and surveys to be conducted with community leaders and members. Students are interested in use of the gathered data for drafting articles and/or manuscripts for submission for publication, though a final decision will be made at a later date. Procedures for such dissemination will be outlined in the IRB application and be contingent on COEC and IRB approval.

On December 9th 2011, the IRB has been signed by all appropriate persons, modifications had been submitted and final approval was confirmed.

G. Resources

a. Capstone Site Resources

The HBHE department will reimburse up to \$100 of expenses relating to the direct activities necessary to carry out the established deliverables of the Capstone team.

What materials/resources will the Capstone partner supply to support this Capstone project (e.g., work space; transportation costs; long distance phone and faxes; data sources; data processing; printing; postage; clerical support; supplies for focus groups/meetings; etc.)? Does this Capstone team have all of the resources (e.g., money, space, technology, etc.) necessary to produce the deliverables outlined in the work plan? If no, explain how the resources will be obtained.

COEC will provide:

- Reimbursement for travel related expenses (mileage, overnight stay at a hotel if necessary), provided they are approved in advance by COEC.
- Administrative supplies (including copying, printing, postage)
- Two recorders for interviews
- Possible computer workspace in Carolyn Crump’s office in SPH (2nd fl. Rosenau)

b. Capstone Partner Key Personnel

Please use the table below to identify key personnel (besides the community partner) at the Capstone organization/agency who will interact with the Capstone team.

Name, Degree(s)	Title	Relationship to Capstone Team	Communication Plan
Kathleen Gray, MSPH	Director,	Final say over all	When necessary or

	Environmental Resource Program	deliverables	included by Neasha; if her input is needed to proceed
Amy MacDonald	Environmental Health Educator, Environmental Resource Program	Logistical help on use of modules	When necessary or included by Neasha

c. **Consultants on Call**

Do you require any special expertise beyond what will be provided by your community partner, faculty, adviser, and the teaching team? If so, please use the table below to identify any faculty, adjunct faculty, alumni, PhD students, or other public health professionals who might be able to lend their expertise to the project.

Name, Degree(s)	Title	Area(s) of Expertise
Beth Moracco, PhD	Research Associate Professor, HBHE	Process & outcome evaluation, planning
J. Michael Bowling, PhD	Research Associate Professor, HBHE	Biostatistics, SAS
Karl Umble, PhD	Program Planner and Evaluator, NCIPH	Program Evaluation
Paul Mihas	Coordinator of Education and Qualitative Research Consultant, Odum Institute	Qualitative Survey Research Design and Analysis

H. Logistical Considerations

a. **Timing**

Are there any timing considerations that will be important for the student team to be aware of when working on this project and its deliverables?

- Students and faculty may be traveling during fall break (October 20-23, 2011), Thanksgiving (November 23-27, 2011), winter break (December 17, 2011 to January 8, 2012), and spring break (March 5-11, 2011)
- Students will be taking comprehensive exams on August 16, 2011
- COEC staff has work travel and other conflicts the week of October 10-14, 2011 and response time to students may lag
- Community Partner will be unavailable September 7-13, 2011

b. **Travel**

What special travel considerations exist for the student team? If travel is required, who is covering that expense?

- Though some travel is required, COEC will be mindful of students' demands outside of the Capstone project and students will inform COEC of time and scheduling limitations related to travel to Lenoir County, NC and the second community.
- Only some of the students have cars. Carpooling will be essential when traveling.
- Traveling expenses, including gas, hotels and per diem expenses, will be covered by COEC, provided they are approved in advance.

c. **Other**

Are there any other important issues that the Capstone team (students, faculty adviser, and community partner) or teaching team should know about this Capstone project and/or the deliverables?

I. Permissible Uses of Information

a. **Ownership of the Deliverables**

The Capstone partner owns the final deliverables. However, HBHE reserves the right to publicly list the organization as a Capstone partner, to keep copies of all Capstone teams' final deliverables for review by the HBHE community, and to include a brief project description in Capstone promotional materials. Please explain the degree to which students will be allowed to use the work produced in pursuit of their educational or professional careers (e.g., thesis, dissertation, manuscript). Describe the procedures for obtaining approval to disseminate the Capstone project deliverables. If there are certain data or products that cannot be disseminated, please list them here.

Students will be allowed limited use of the work produced in pursuit of their educational and professional careers. Namely, they will be allowed to use the data to write manuscripts or articles submitted for publication. Dissemination in any form (including a publication or abstract) will require approval by the Community Partner.

b. **Authorship**

What are your plans for authorship if you produce publishable materials?

If published, the lead Capstone student team member assigned to the specific deliverable will be included as author, if his/her work is of suitable quality. Other Capstone student team members could potentially receive co-authorship for a publication that they did not lead, if their contribution warrants authorship.

c. **Use of Recorded Materials**

Who (e.g., Capstone partner, HBHE, students) can use the photographs, recordings, interviews, or auditory recording created by HBHE MPH Students during their Capstone projects?

In accordance with IRB requirements, IRB-approved staff will have access to these materials for project purposes only. COEC will have ownership over any recorded and transcribed materials generated from Capstone project work. UNC-HBHE cannot use recordings or interview transcripts.

J. Agreement


I reviewed this updated work plan and read through the updated *Roles and Responsibilities* document (Appendix A). I agree to my responsibilities as team member and as an individual within this timeline. This contract may be amended with the consent of all parties named below.

Neasha Graves, MPA Community Partner

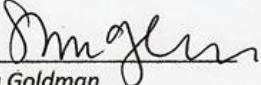
Carolyn Crump, PhD Faculty Adviser




Rachel Berthiaume
Rachel Berthiaume
Student



Anna Child
Anna Child
Student



Shira Goldman
Shira Goldman
Student



Emily McMahon
Emily McMahon
Student



Michael Zelek
Michael Zelek
Student

Approved by: _____
Teaching Team Member

Date: _____

Roles & Responsibilities

Individual students are responsible for:

- Indicating how (s)he will contribute to the work plan deliverables
- Contributing equitably to team activities and deliverables
- Providing professional, constructive feedback to teammates, community partner(s), faculty adviser, and teaching team as needed
- Being familiar with department policies and procedures as they relate to Capstone
- Attending Capstone Celebration Day

The **student team** is responsible for:

- Assisting in the development of mutually agreed upon specific, tangible, substantive, timely, and feasible activities and deliverables activities be achieved during the Capstone
- Drafting the initial team work plan and updating the document throughout the Capstone process
- Obtaining approval from the community partner for team work plan
- Become oriented to political, cultural, and social norms that relate to the community partner and Capstone experience
- Exhibiting professional and ethical behavior and seeking mentorship from community partner
- Maintaining confidentiality of all Capstone information and deliverables
- Implementing the team work plan in a way that equitably involves each student in each major deliverable
- Facilitating team development (e.g., establishing team ground rules, providing constructive feedback, division of labor, etc.) and decision-making
- Meeting regularly as a team to decide on activities and tasks to be completed as part of the Capstone process
- Participating in progress meetings with the faculty adviser(s), teaching team, and community partner three times in the fall semester and three times in the spring semester (roughly once per month)
- Participating in a feedback session with the faculty adviser(s), all community partners, and the Capstone teaching team at least once a semester
- Determining whether or not an IRB is necessary and if so, managing the IRB process
- Ensuring that applicable practice and research ethics guide group conduct
- Providing professional, constructive feedback to the community partner(s), the faculty adviser, and teaching team as needed
- Producing team deliverables that advance the mission of the Capstone partner
- Obtaining approval of deliverables as they are produced from the lead community partner and faculty adviser
- Renegotiating and revising the project activities and deliverables as necessary
- Identifying a *mentor (community partner/faculty adviser) liaison* who is responsible for:
 - communicating with the community partner AND faculty adviser
 - making requests to the community partner and faculty adviser when guidance is needed

- fielding needs/questions from the community partner and faculty adviser
- soliciting feedback on Capstone activities and deliverables from the community partner and faculty adviser
- ensuring that both the community partner and faculty adviser approve all deliverables
- Identifying a *teaching team liaison* who is responsible for:
 - communicating with members of the teaching team on behalf of his/her Capstone team
 - providing weekly updates summarizing the team's progress on the Capstone project work (community partners and faculty advisers should be copied on these emails)
 - maintaining group records on Blackboard/Sakai
 - updating the teaching team if contact information for the community partner or faculty adviser changes
 - turning in group coursework assignments
- Identifying a *department liaison* who is responsible for:
 - Serving as a liaison between the front office and members of their Capstone team
 - Serving as their team's resident expert on all Capstone policies and procedures
 - Contacting the TAs and/or HBHE staff with questions about policies and procedures
 - Submitting all receipts and the necessary paperwork (reimbursement forms, agenda and participant list for food purchases) to the TAs
 - Coordinating resources needed to complete the project(s) (e.g. , work space, equipment, access to data, etc.)
 - Attending all department liaison meetings

The **community partner** is responsible for:

- Mentoring and facilitating the work of the student team
- Developing mutually agreed upon specific, tangible, substantive, timely, and feasible activities and deliverables activities to achieve during Capstone
- Approving the team work plan
- Orienting students to the Capstone partner's people, projects, and resources
- Orienting students to political, cultural, and social norms that relate to the Capstone team experience
- Modeling professional, ethical behavior
- Respecting the student team's obligation to uphold Federal and University guidelines on conducting research
- Providing resources needed to complete the project(s) as needed (e.g. work space, equipment, access to data, etc.)
- Meeting with the student team in person or by conference call and maintaining regular communication with students outside of scheduled meetings
- Participating in progress meetings with the faculty adviser and student team at least three times in the fall semester and at least three times in the spring semester (roughly once per month)
- Participating in a feedback session with other community partners, the faculty advisers, and the Capstone teaching team at least once a semester
- Providing timely, specific, and constructive feedback to the student team as needed

- Renegotiating and revising the project activities and deliverables as necessary
- Reviewing Capstone deliverables as they are produced
- Completing an evaluation form for the student team at the end of each semester
- Attending Capstone Celebration Day
- Identifying a suitable replacement to serve in the role of community partner if unable to continue as a community partner or unable to fulfill any of these specific responsibilities

The **faculty adviser** is responsible for:

- Reviewing and approving team work plans
- Providing advice to students on the team work plan (e.g., tasks, timelines, scope of work, adjustments)
- Providing intellectual and technical expertise and experience to the Capstone team
- Directing students to TAs, teaching team, Consultants on Call, or other resources as appropriate
- Supporting the Capstone partner and student team, as necessary, to ensure that the deliverables are moving forward to a successful conclusion
- Reviewing Capstone deliverables as they are produced
- Participating in progress meetings with the student team and community partner at least three times in the fall semester and at least three times in the spring semester
- Participating in a feedback session with other faculty advisers, all community partners, and the Capstone teaching team at least once a semester
- Providing useful feedback during and at the end of the project in addition to a final grade
- Attending Capstone Celebration Day and helping to evaluate teams

The **teaching team** is responsible for:

- Reviewing and approving team work plans
- Conducting feedback sessions with community partners and faculty advisers at least once a semester and as needed to provide updates on course activities, discuss issues of relevance to the Capstone experience, and provide support for challenges encountered during the Capstone experience
- Advising student teams via e-mail and meetings as requested by students
- Maintaining regular communication with community partners, faculty advisers, and students related to Capstone activities, particularly with feedback on what is working and what is not working
- Facilitating the resolution of conflicts that may arise between community partners and students or within the student team regarding Capstone activities and materials
- Coordinating feedback sessions with community partners and faculty advisers
- Assessing the performance of individual students and student teams as a whole

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