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Unintentional Home Injury Risks Among the Elderly in Southern Nevada

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UNINTENTIONAL HOME INJURY RISKS AMONG THE ELDERLY IN SOUTHERN NEVADA

by

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ABSTRACT

Unintentional Home Injury Risks Among the Elderly in Southern Nevada

By

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The elderly population (65 years of age and older) is one of the fastest growing populations in the US. A major public health concern involving the elderly population is unintentional injuries in the home. Since elderly adults typically spend the majority of their time in the home, minimizing unintentional home injury hazards is crucial for this population. The Nevada Healthy Homes Partnership (NHHP) program is a grant funded effort that helps to improve the quality and availability of safe and healthy homes in Nevada. Therefore, the purpose of this study is to determine the effectiveness of the NHHP program interventions in reducing home injury hazards among the elderly living in Southern Nevada and to compare visual observations with elderly perceptions of hazard reduction. A total of 23 participants that completed pre- and post-intervention home visits were included in this study. Wilcoxon signed rank test and McNemar's test were utilized to compare pre- and post-intervention visual observations and elderly perceptions of home injury hazards. Specificity, sensitivity, positive predictive value, negative predictive value, and the phi coefficient (F) were obtained to determine the consistency between visual observations and elderly perceptions. There was a statistically significant change in fire hazards less than 1m ($p=0.030$) as measured by visual observations, and trip or fall hazards ($p=0.039$), smoke detector ($p=0.003$), fire extinguisher ($p=0.002$), and carbon monoxide detector ($p<0.001$) as measured by questionnaire responses. Overall, the NHHP program is a vital program that reduces unintentional home injury hazard risks among the elderly living in Southern Nevada.

Keywords: Home injury hazard risks; Healthy Homes; Elderly Perceptions

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INTRODUCTION

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1) How effective are the NHHP interventions at reducing home injury hazards among the elderly living in Southern Nevada after evaluating visual observations and elderly perceptions of hazard reduction?

2) Is there a significant correlation between the visual observations of home injury hazards and elderly perceptions of home injury hazards as measured by questionnaire responses?

Significance of Study

In 2009, the U.S. Surgeon General published a document known as "Call to Action" (CTA), which contained guidelines for promoting Healthy Homes nationwide. The document also describes how people play an integral part in preventing disease, disability and injury that may originate from health hazards in the home. Public health

professionals were given the opportunity to develop a comprehensive and coordinated approach for addressing home hazards that affect the health and well-being of people living in the US. Due to the US Surgeon General's nationwide agenda being of great importance, the Centers for Disease Control and Prevention (CDC) shifted its focus towards a Healthy Homes initiative (Surgeon General, 2009). In 2011, the Department of Environmental and Occupational Health at the University of Nevada, Las Vegas began the process of evaluating and developing a healthy homes initiative for Southern Nevada.

This study was designed to determine the effectiveness of the NHHP interventions in reducing home injury hazards among the elderly living in Southern Nevada and to compare visual observations with elderly perceptions of hazard reduction.

CHAPTER 2

BACKGROUND & SIGNIFICANCE

Injury

Injury is a major public health concern that threatens the health and safety of people all over the world. In 1998, there were about 5.8 million injury-related deaths worldwide. The leading causes of injury-related deaths worldwide were road traffic injuries and self-inflicted injuries. While the leading cause of injury-related deaths among youth (ages 5 to 15) was road traffic injuries, self-inflicted injuries were the leading cause of injury-related deaths among individuals 45 years of age and older (Krug et al., 2000).

Every day in the United States (US), there are about 400 injury-related deaths, 7,500 injury-related hospitalizations, and 150,000 individuals who suffer from an injury causing limitations in one's ability to perform typical daily activities and seek medical assistance (Chino et al., 2010). While most deaths, hospitalizations, and disabling events are caused by motor vehicle crashes, there is still a large portion of people who are affected by injuries such as violence, falls, drowning, and poisonings (Chino et al., 2010). The leading cause of death and disability in the US for individuals between the ages of 1 to 34 years of age are injuries (Healthy People, 2010). Similarly, injury in Nevada is the leading cause of death among children, teens, and young adults. These populations are at greatest risk due to the high rates of motor vehicle crash rates, high suicide rates, and rates of injury in the workplace (Chino et al., 2010).

Two important concepts that provide a deeper understanding of injury are the injury epidemiology model and the injury pyramid. In Figure 1, the injury epidemiology model focuses on the host, the energy, the agent, and the environment and how each component

relates to the other components. The host is the individual who is injured, the energy can be chemical, electrical, mechanical, or thermal, the agent is the product or vector involved, and the environment can be either the social or physical environment. The injury epidemiology model is very helpful in finding causes and solutions that prevent injuries (ElderSafety, 2011). In Figure 2, the injury pyramid is a useful indicator for injury. For every death that was caused by an injury, millions of people are hospitalized and treated for their injury. The top of the injury pyramid consists of injury-related deaths, which are few in number but more noticeable to people. Below injury-related deaths are less severe injuries that result in hospitalizations. Below injuries that result in hospitalizations are less severe injuries that result in emergency treatment. Below injuries requiring emergency treatment are less severe injuries resulting in primary care treatment, which are injuries treated in basic health facilities, such as the doctor's office or clinics. Lastly, the base of the pyramid consists of injuries that do not receive attention in a health institution, and are probably treated at home or not treated at all. Injuries at the base of the pyramid are the most abundant and are not receiving the medical attention that they may need (Indian Health Services, 2005).

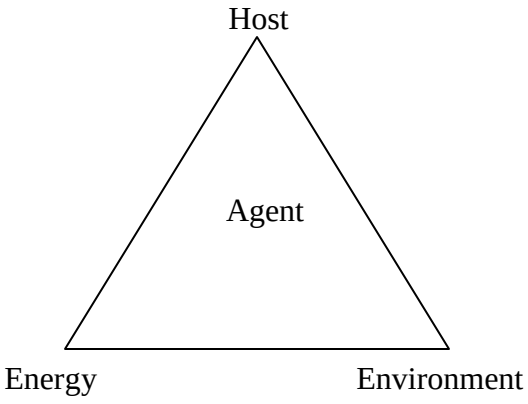


Figure 1. Injury Epidemiology Model

Figure 2. Injury Pyramid

Intentional vs. Unintentional Injury

Injury is defined as either unintentional or intentional damage to the body from the absence of essentials such as heat or oxygen or from the acute exposure to chemical, electrical, mechanical, or thermal energy (Healthy People, 2010). The two different types of injury are intentional and unintentional injury. Intentional injury is a type of injury that is deliberately inflicted on another person or oneself. Some examples of intentional injuries are self-inflicted injuries, interpersonal violence (homicide and violence), and war injuries (Krug et al., 2000). Unintentional injury is a type of injury that occurs without the intention to harm another person or oneself (Chino et al., 2010). Some examples of unintentional injuries are road traffic injuries, poisoning, falls, fires, choking and suffocation, and drowning (Krug et al., 2000).

In Nevada, there has been an increase in the rates of unintentional injury while the rates of intentional injury remained relatively stable. With an increase in the rates of unintentional injury in Nevada between 1999 and 2006, future efforts should be made towards reducing the rates of unintentional injury statewide (Chino et al., 2010).

Cost of Unintentional Injuries

Unintentional injuries are one of the major financial burdens to society. In 1998, the cost of fatal unintentional injuries, nonfatal unintentional injuries, and medical costs were $34 billion, $183 billion, and $22 billion, respectively (Zaloshnja et al., 2005). Even though nonfatal unintentional injury costs are greater than fatal unintentional injuries and medical costs, collectively these unintentional injury costs are very expensive and more attention should be dedicated in minimizing these costs through preventative methods. In addition, the financial burden, reduced quality of life, and social and emotional distress of living with a disability resulting from an injury are serious public health problem (Chino et al., 2010).

Injury and the Elderly Population

The elderly population (65 years of age and older) is one of the fastest growing populations in the US. By 2050, the elderly population is projected to reach approximately 86 million individuals or account for 20% of the entire US population (He et al., 2005). With the rapid growth of the elderly population and their high vulnerability to illness, disease, and injury, more attention and efforts are needed to enable this population to have a better quality of life.

One of the growing public health concerns involving the elderly population are unintentional injuries in the home. In the United States, unintentional injuries are the fifth leading cause of death in elderly adults (Centers for Disease Control and Prevention [CDC], 2012) and the home is the second most common location for unintentional deaths to occur (Runyan et al., 2005). Since elderly adults typically spend majority of their time in their home, minimizing their potential of having an unintentional home injury, such as

falls, fire and burns, carbon monoxide poisoning, and excessive heat-cold exposures, is crucial (CDC, 2012; Home Safety Council, 2011).

With the majority of the elderly living in private residences and being responsible for their own fire safety, fire deaths rates have been extremely high among this population. One of the possibilities for such high fire deaths rates could be the current smoke alarm features being poorly designed for the elderly. Current smoke alarms use a high frequency tone that is very difficult for the elderly to hear when sleeping or in a room without a smoke alarm. Therefore, suggestions have been made to lower the frequency of smoke alarms so that the elderly, as well as younger ages, can hear them in the event of an emergency (Huey et al., 1996).

Two additional sensory disabilities that affect the elderly are associated with their ability to see and their sense of smell. One disability that affects elderly adults daily activities are their challenges with seeing. Elderly that are visually impaired will have a difficult time seeing warning signs for potential fires. Like their reduced vision, elderly adults can have a reduced ability to smell. Therefore, in the event that there is a fire, they are incapable of smelling it and escaping (Huey et al., 1996). In addition to the elderly having sensory disabilities, they also have physical disabilities, such as mobility impairment, that make it difficult for them to escape independently in the event of an emergency (Huey et al., 1996).

Falls

Falls are consistently the highest ranked unintentional injury affecting the elderly population nationally (CDC, 2012). Falls account for 53.7% of all unintentional home injury deaths, more than 36% of all nonfatal home injuries, and about 4 million

emergency room visits every year (Runyan et al., 2005). More than one third of individuals 65 years of age and older fall every year. Nonfatal falls have devastating consequences associated with them, such as fractures, head trauma, social withdrawal, loss of independence and confidence, admission to a long-term care facility, depression, and anxiety (Alexander et al., 1992; Kannus et al., 2005; Sterling et al., 2001).

Falls are the most common cause of injury death among the elderly in the US (Alexander et al., 1992; CDC, 2012). About 60% of people who die from falls are 65 years of age or older (Rivara et al., 1997). The major risk factors for falls and fall-related injuries among the elderly are cognitive impairment, chronic illness, balance and gait impairment, a low body mass index, a history of one or more falls, use of diuretics, use of psychotropic drugs, and hazards in the home (Ray et al., 1989; Speechley & Tinetti, 1991; Thapa et al., 1995; Tinetti et al., 1995). In 2008, more than 19,700 older adults died from unintentional injuries (CDC, 2012).

In 2000, the CDC concluded that fatal and nonfatal fall-related injuries among older adults resulted in $19.5 billion in direct medical care costs: $179 million in medical costs for fatal falls and $19.3 billion in medical costs for nonfatal injuries. While 63% of the $19.3 billion was for injuries requiring hospitalizations, 21% was for injuries related to emergency room visits, and 16% was for injuries treated in outpatient settings (Stevens, 2005).

Fire & Burns

In 2007, there were about 2,865 deaths and 140,000 injuries that were caused by household fire burns, smoke, or toxic gases (Hall, 2001). While some individuals died from burns, the majority of people died from smoke or toxic gases that were byproducts

of the household fire. Older adults are one of the populations that have a high risk of death due to fire or heightened difficulty in benefiting from smoke detectors (Fire Safety Council, 2006; Istre et al., 2001; Warda et al., 1999; US Fire Administration, 2006). Residences with annual household incomes below the poverty level ($10,210 for first person in family; additional $3,480 for each additional person in family), with low educational attainment, or with no children or older children were less likely than their counterparts to have a smoke alarm in their home (Ballesteros & Kresnow, 2007).

A major risk factor for household fire deaths and injuries is nonfunctioning or absent smoke detectors (Ahrens, 2004; Istre et al., 2001). Various studies have shown that 90% of all US homes have a smoke detector. Of those homes that have a smoke detector, three quarters of the smoke detectors are functioning (Ahrens, 2004; Smith, 1993). Homes that have a functioning smoke detector have a 40% to 50% decreased risk in having a household fire (Ahrens, 2004).

Other risk factors for household fire deaths and injuries are associated with cooking equipment, heating equipment, intentional fires, electrical distribution and lighting equipment, smoking material, and candles (Diekman 2011).

Carbon Monoxide Poisoning

Carbon monoxide (CO) is an odorless gas that can be produced by stoves, lanterns, burning charcoal and wood, gas ranges, and heating systems when they combust. From 2007 to 2008, more than 400 Americans die from unintentional CO poisoning, more than 4,000 are hospitalized, and more than 20,000 visit the emergency room (CDC, 2007; CDC, 2008). The population that has the highest risk of death due to CO poisoning is adults 65 years of age or older (Mack & Liller, 2010). Like smoke detectors, CO

detectors use high frequency alarms that are very difficult for older adults to hear, especially when they are sleeping or in a room without a CO detector.

Excessive Heat-Cold Exposures

Extreme temperature changes between heat and cold are the leading cause of home injury death among the elderly (Home Safety Council, 2006). While excessive heat exposure could lead to heat cramps, heat exhaustion, heat syncope, heatstroke, and hyperthermia, excessive cold could lead to central nervous system depression, arrhythmias, and renal failure (Mack & Liller, 2010). Every year there are about 420 deaths due to heat-cold exposures in homes. Among all heat exposure deaths, 40% of deaths were among individuals 65 years of age and older (CDC, 2006). Among all the cold exposure deaths, 49% of deaths were among individuals 65 years of age and older (CDC, 2006).

Nevada is a unique state that experiences extreme temperature changes throughout the year. While the winter season can be very cold and windy, the summer season can be very hot. Therefore, if individuals 65 years of age and older do not have a working central heating or cooling unit, they can be at risk for excessive heat-cold exposures, especially during the winter and summer seasons.

Preventative Strategies

Since injuries were traditionally viewed as accidents or random events, public health efforts were not directed towards injury prevention. However, since it is now known that injuries are preventable by changing the environment, products, social norms, individual behavior, legislation, and governmental and institutional policy, public health officials

have utilized the four key steps of an epidemiologic approach to injury (Healthy People, 2010; Krug et al., 2000).

The first step is to determine the magnitude, scope and characteristics of injury. The second step is to identify the risk factors for injury or disability in order to determine whether or not certain factors are modifiable. The third step is to utilize the information from the second step to design, pilot test, and evaluate interventions in order to prevent injuries. The last step is implementing interventions on a broad scale (Krug et al., 2000).

The three Es of injury prevention are three types of injury interventions- education, enforcement, and environment. Education can make people aware of potential injury hazards and risks, and persuade people to adopt safer behaviors. Although education does not always cause people to change their behaviors, there is still the possibility that people will be more receptive to injury prevention strategies. For example, if the elderly adults spends a lot of time alone, they should be taught what to do in the event that they fall and cannot get up. They should also be taught that they should have some type of personal emergency-response system or telephone that is accessible from the floor in the event that they do fall in order to call for help (Tinetti, 2003). Enforcement through legislation can reduce dangerous behaviors made by individuals, manufacturers, and local governments, and thus play a crucial role in injury prevention. One example of enforcement through legislation that can help reduce trip or fall hazards in the home is requiring construction companies to install handrails for stairways, and to ensure that the household carpet, tile, or hardwood flooring is leveled. Environmental interventions are changes made to the environment or product design to automatically protect people from injuries. Some of the best preventative strategies for addressing injuries, especially unintentional injuries in the

home, are changing the environment and products within the home and changing individual behaviors. By changing the household environment, unintentional injuries can be prevented. For example, reducing clutter, having handrails on stairs, grab bars and non-slip surfaces in the bathroom, reducing trip and slip hazards, having adequate lighting in the home, and reducing exposed electrical and telephone cords in walkways can help minimize older adults risk of falling (Carter et al., 1997). Changing household products can also prevent unintentional household injuries. For example, installing functional smoke alarms and CO detectors can help minimize older adults risk of being burned or being exposed to smoke or toxic gas (Mack & Liller, 2010). All in all, the most effective injury prevention strategies are those that incorporate all of the three Es of injury prevention (ElderSafety, 2011).

Unintentional household injuries are an enormous burden to individuals, society, and the US healthcare system (Stevens et al., 2001). Elderly adults are more vulnerable than the rest of the population and are at greater risk of being involved in unintentional household injuries because of their limited mobility, chances of being mentally or physically disabled, and their greater use of medications (Diekman et al., 2011). As the US population continues to age, unintentional household injuries will also increase unless action is taken to prevent them in the future (Stevens et al., 2001).

One program that strives to reduce unintentional household injuries for elderly adults is the NHHP program. One of the main objectives for the NHHP program is to reduce unintentional household injuries for elderly living in Southern Nevada through educational and environmental modifications. Depending on the elderly residents needs, the NHHP program will provide them with either a basic, facilitated, or intensive level

intervention. The basic level intervention provides the elderly resident with a personalized report stating what home injury hazards were found in the home and an educational booklet that educates the elderly residents about the various home injury hazards that may be found in a home. The facilitated level intervention provides the elderly resident with all the basic level intervention components as well as free devices and/or supplies, such as a CO detector, smoke detector, fire extinguisher, or non-slip grip tape. The intensive level intervention provides the elderly with all the facilitated level intervention components along with rehabilitation services, such as heating, ventilation, and air conditioning repairs, from either of the NHHP program's partnering agencies: Rebuilding Together and HELP of Southern Nevada.

CHAPTER 3

METHODS

Purpose of Study

The purpose of this study is to determine the effectiveness of the NHHP program interventions in reducing home injury hazards among the elderly living in Southern Nevada and to compare visual observations with elderly perceptions of hazard reduction.

Research Question

1. How effective are the NHHP interventions at reducing home injury hazards among the elderly living in Southern Nevada after evaluating visual observations and elderly perceptions of hazard reduction?
2. Is a significant correlation between home injury hazard visual observations and elderly perceptions as measured by questionnaire responses?

Hypotheses

Hypothesis 1

H_0: Pre-intervention visual observations are equal to post-intervention visual observations of home injury hazards among the elderly in Southern Nevada.

H_A: Pre-intervention visual observations are not equal to post-intervention visual observations of home injury hazards among the elderly in Southern Nevada.

H_{A1}: Home injury hazards among the elderly in Southern Nevada would reduce from pre- to post-intervention, as measured by visual observations.

If NHHP interventions are effective at reducing home injury hazards among the elderly living in Southern Nevada, Healthy Homes Specialists should see a visual reduction in home injury hazards from pre- to post-intervention home visits.

Hypothesis 2

H_0: Pre-intervention elderly perceptions are equal to post-intervention elderly perceptions of home injury hazard reduction among the elderly living in Southern Nevada.

H_A: Pre-intervention elderly perceptions are not equal to post-intervention elderly perceptions of home injury hazard reduction among the elderly living in Southern Nevada.

H_{A2}: The perceived reduction in home injury hazards among the elderly in Southern Nevada would increase from pre- to post-intervention, as measured by questionnaire responses.

If NHHP program interventions are effective at reducing home injury hazards among the elderly living in Southern Nevada, the elderly homeowners will perceive there to be a reduction in home injury hazards from pre- to post-intervention home visits.

Hypothesis 3

H_0: There is no significant correlation between visual observations and elderly perceptions of pre- and post-intervention home injury hazards among the elderly in Southern Nevada.

H_A: There is a significant correlation between visual observations and elderly perceptions of pre- and post-intervention home injury hazards among the elderly in Southern Nevada.

It is theorized that there will be a significant correlation between visual observations and elderly perceptions of pre- and post-intervention home injury hazards among the

elderly in Southern Nevada since the same types of home injury hazards are being measured in this study by the elderly homeowner and Healthy Homes Specialists.

Treatment of Data

In 2009, the US Surgeon General published a document known as the "Call to Action," which contained guidelines for promoting Healthy Homes nationwide and described how people play an integral part in preventing disease, disability, and injury that may originate from health hazards in the home.

In 2011, the Department of Environmental and Occupational Health (DEOH) at the University of Nevada, Las Vegas (UNLV) conducted a pilot study (*n=56*) for the NHHP program after receiving IRB approval on October 1, 2010 (Appendix 1). The overall goal for the NHHP program was to create an effective and sustainable program to identify, assess, and remediate multiple health and housing-related hazards; and to connect residents to community resources in an organized, consistent, and systematic manner.

All NHHP program research team members were certified Healthy Homes Specialists and completed the Collaborative Institutional Training Initiative (CITI) Human Research Curriculum prior to conducting any research with the NHHP program.

The purpose of this pre-experimental study was to determine the effectiveness of the NHHP program interventions in reducing home injury hazards among the elderly living in Southern Nevada and to compare visual observations with the elderly's perceptions of hazard reduction.

Target Population

The target population for this study was elderly residents living in Southern Nevada who were 65 years of age and older. While the NHHP program was primarily intended to target individuals living in older, low income, and high-risk communities in Southern Nevada, NHHP opened its program to any elderly residents in Southern Nevada who were interested in participating in the program.

Recruitment

Participants were recruited through referrals obtained by community partners and community outreach events (Appendix 2). Community partners, such as Rebuilding Together and HELP of Southern Nevada, needed confirmation that homes were lead-safe before doing any type of repairs inside and outside of a home. Team members from the NHHP program who were certified Lead Risk Assessors through the Environmental Protection Agency (EPA) conducted the lead inspections for community partners and offered the NHHP program to the elderly homeowner before or at the time of the lead inspection. Community outreach events at hospitals and fire department events enabled the NHHP program to find elderly people who were interested in participating in the program.

Potential participants were contacted in order to determine if they were still interested in participating in the study. Once a potential elderly participant had expressed an interest in the program over the telephone, a site visit was scheduled at the elderly participant's convenience.

Selection Criteria

Inclusion Criteria

Elderly living in Southern Nevada who are 65 years of age and older that completed pre- and post-intervention home visits were included in this study. In total, 23 elderly homeowners participants of the 56 total NHHP program participants fit the inclusion criteria, so the data for the 23 elderly participants were used for this study.

Exclusion Criteria

Elderly who did not complete pre- and post-intervention home visits were excluded in this study. In total, 33 of the 56 homes visited during the NHHP program pilot study in 2011 fit the exclusion criteria.

NHHP Intervention

Table 1 shows the timeline, the type of documentation, and the type of intervention that was completed at each of the three home visits.

During the pre-intervention home visit, while a certified Healthy Homes Specialist conducted a room-to-room inspection for home injury hazards using a visual assessment form (Appendix 3), another Healthy Homes Specialist assisted the elderly participants complete a consent form (Appendix 4), legal release form (Appendix 5), resident questionnaire (Appendix 6), injury questionnaire (Appendix 7), and health questionnaire (Appendix 8).

The visual assessment form contained visual observations of home injury hazards, such as clutter, the absence or nonfunctioning smoke or CO detector, indoor air

temperature, hot water temperature, fire hazards, and identified trip or fall hazards (eg. loose rugs, electric cords).

Table 1. Timeline, Documentation, and Intervention Completed at NHHP Program Home Visits

Home Visits	**Timeline**	**Documentation/Intervention**
Pre-Intervention Home Visit		Consent, Legal Release, Resident, Injury, Health, Visual Assessment
Intervention Home Visit -Level based on homeowners needs	2-5 weeks after pre-intervention home visit	Basic level intervention -Personalized report, educational booklet[1]
		Facilitated level intervention -Personalized report, educational booklet[1], needed devices/supplies[2]
		Intensive level intervention -Personalized report, educational booklet[1], needed devices/supplies[2], rehabilitation services[3]
Post-Intervention Home Visit	6-12 months after pre-intervention home visit	Resident, Injury, Health, Visual Assessment $50 gift card to Walmart

[1]Educational booklet explains the seven principles of the NHHP program (Keep it Dry, Keep it Clean, Keep it Pest-Free, Keep it Safe, Keep it Contaminant-Free, Keep it Ventilated, and Keep it Maintained)
[2]Devices/supplies- CO detector, smoke detector, fire extinguisher, non-slip grip tape
[3]Rehabilitation services, such as heating, ventilation, and air conditioning repairs, provided to elderly participants by Rebuilding Together or HELP of Southern Nevada

Various components of the visual assessment and questionnaires were obtained from the HOME Injury Survey (Phelan, 2009). Even though the entire NHHP program visual assessment and questionnaires were not validated, the components from the HOME Injury Survey had been validated for their program.

Two to five weeks after the pre-intervention home visit, a Healthy Homes Specialist scheduled an intervention home visit with the participants. At the intervention home visit, participants received one of three interventions: basic, facilitated, or intensive interventions. Levels of intervention were determined by participants' needs, but all participants were given all the components of the basic level intervention. Regardless of the level of intervention that participants were given, all participants had an equal opportunity to reduce home injury hazards (see Table 1).

The basic level intervention consisted of a personalized Healthy Homes report and an educational booklet explaining the Seven Principles of Healthy Homes: Keep it Dry, Keep it Clean, Keep it Pest-Free, Keep it Safe, Keep it Contaminant-Free, Keep it Ventilated, and Keep it Maintained. The facilitated level intervention consisted of a personalized Healthy Homes report, an educational booklet, and devices/supplies like CO detectors, smoke alarms, fire extinguishers, and non-slip tape. Participants were given devices/supplies if they did not have them already. The intensive level intervention is the most comprehensive intervention of the three. Not only did this intervention level comprise of the basic and facilitated level interventions, it also consisted of rehabilitation services provided by community partners such as Rebuilding Together and HELP of Southern Nevada (see Table 1).

Six to twelve months after the pre-intervention home visit, a Healthy Homes Specialist scheduled a post-intervention home visit with the participants. Like the pre-intervention home visit, a Healthy Homes Specialist identified home injury hazards by doing a visual inspection of the home and participants completed a series of questionnaires pertaining to demographics and information on home injury hazards during the post-intervention home visit. Once the post-intervention home visit was complete, the participant was given a $50 Walmart gift card to purchase home maintenance and cleaning supplies (see Table 1).

Observational Data

Demographic Information

Demographic information (such as age, gender, income, zip code, disability status, type of health insurance, origin of referral, type of intervention, and needed safety devices) was obtained during the pre-intervention home visit and updated during the post-intervention home visit. Frequency distributions were calculated for all demographic information in this study.

Reporting of Injury

In the injury supplement, participants were asked, "In the past year, have you suffered an injury in the home that caused you to seek medical care?" The type of injury, the number of instances, and the room that it occurred in gave insight on how common or uncommon the elderly residents experienced injuries in the home.

Data Collection

Data collected for the NHHP program were kept in secure research files and computerized databases. Each home was assigned a unique ID in order to accurately distinguish between documentation. Data were accessible only to Healthy Homes Specialists. After entering data into a Microsoft Excel spreadsheet, data were transferred into SPSS software. A data dictionary was developed to code and decode all of the collected data.

Analyses for Hypothesis 1

The types of home injury hazards that were evaluated in this study were trip or fall hazards, fire and burn hazards, CO poisoning hazards, and excessive heat-cold

exposure hazards (see Table 2). Since this study consists of a small sample size, a Wilcoxon signed rank test and a McNemar's test were used to compare pre- and post-intervention home injury hazards among the elderly in Southern Nevada as measured by visual observations.

Table 2. Visual Observations of Home Injury Hazards

Type of home injury hazard	**Visual Observation (visual assessment checklist)**
Trip or fall	Identification of trip or fall hazards in home
	Clutter
Fire and burn	Smoke detector (working, not working, don't know
	Fire hazards <1m (matches, candles, incense)
CO poisoning	Carbon monoxide detector (working, not working, don't know)
Excessive heat-cold exposures	Air temperature (outside, inside)
	Hot water temperature

Since the identification of trip or fall hazards in the home, clutter, and fire hazards less than 1m (matches, candles, incense) have continuous dependent variables, the mean was calculated for each of the pre- and post-intervention home injury hazards as measured by visual observations in order to perform a Wilcoxon signed rank test. Both identification of trip or fall hazards in the home and fire hazards less than 1m (matches, candles, incense) were home injury hazards that were counted and could potentially have a maximum of 10 trip or fall hazards or 10 fire hazards in any given room or location.

Once smoke detectors and CO detectors were coded as being present or absent, indoor air temperature was recoded as being safe (between 68°F and 80°F) or unsafe (<68°F or >80°F), and hot water temperature was recoded as being safe (<120°F) or unsafe (>120°F), a McNemar's test was conducted. In this study, it was theorized that there would be a reduction of home injury hazards from pre- to post-intervention as measured by visual observations. If the NHHP program interventions were effective,

Healthy Homes Specialists would visibly see a reduction of home injury hazards by the time of the post-intervention home visit.

Analyses for Hypothesis 2

Similar to the analyses for hypothesis 1, the types of home injury hazards that were evaluated in this study were trip or fall hazards, fire and burn hazards, CO poisoning hazards, and excessive heat-cold exposure hazards (see Table 3). A McNemar's test was used to compare pre- and post-intervention perceptions of home injury hazard reduction among the elderly in Southern Nevada as measured by questionnaire response.

Table 3. Elderly's Perception of Home Injury Hazards
As Measured By Questionnaire Responses

Type of home injury hazard	**Elderly Perception (Questionnaire response)**	**Assessment Tool**
Trip or fall	Is there secure, non-slip treading in the bathtub/shower?	Injury
Fire and burn	If you have a smoke detector, do you test the batteries monthly?	Resident
	Is there a fire extinguisher present in the home?	Resident
CO poisoning	If you have a carbon monoxide detector, do you test the batteries monthly?	Resident
Excessive heat-cold exposures	What is the average temperature setting of your thermostat in the summer and in the winter?	Resident

In this study, it was theorized that there would be an increase in the perception of home injury hazards from pre- to post-intervention as measured by questionnaire responses. Assuming that the elderly in Southern Nevada believed that their homes contained injury hazards and if the NHHP program interventions were effective, the elderly homeowners would take the initiative to reduce the home injury hazards in their homes by the post-intervention home visit.

Analyses for Hypothesis 3

Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and the phi coefficient were calculated in order to determine the significance of

the correlation of home injury hazards between visual observations and the elderly's perception of home injury hazards.

Sensitivity represents the proportion of elderly resident homes observed to have no injury hazards that also reported to have no injury hazards on the questionnaire response. Specificity represents the proportion of elderly resident homes observed to have injury hazards that also reported to have injury hazards on the questionnaire response. PPV represents the proportion of elderly resident homes reporting no injury hazards that were observed to have no injury hazards. NPV represents the proportion of elderly resident homes reporting injury hazards that were observed to have injury hazards. Phi coefficient measures the association between visual observations and the homeowner's perception of home injury hazards.

The independent variable (dichotomous) is the elderly homeowner's perception of home injury hazard reduction and the dependent variable is the visual observation of home injury hazard. In this study, it was theorized that there would a correlation between visual observations and perceived home injury hazards from pre- to post-intervention home visits. In order to assess this correlation, trips or falls, fire and burns, CO poisoning, and excessive heat-cold exposure were compared between visual observations and elderly's perception as measured by questionnaire responses (Table 4).

Table 4. Home Injury Hazards Between Visual Observations and Elderly's Perception as Measured by Questionnaire Responses

Type of home injury hazard	**Visual Observation**	**Elderly Perception (Questionnaire Response)**
Trip or falls	Identification of trip or fall hazards (bathroom only)	Is there secure, non-slip treading in the bath-tub/shower
Fire and burn	Smoke detector (working, not working, don't know)	If you have a smoke detector, do you test the batteries monthly?
CO poisoning	Carbon monoxide detector (working, not working, don't know)	If you have a carbon monoxide detector, do you test the batteries monthly?
Excessive heat-cold exposure	Air temperature inside and outside of home	What is the average temperature setting of your thermostat in the summer and in the winter?

CHAPTER 4

RESULTS

Several data points were obtained for this study. Firstly, demographic information (age, gender, zip code, disability status, type of health insurance, origin of referral, type of intervention, and safety devices given to the elderly participants in this study) were obtained in order to gain a better understanding of the participants in this study. Secondly, pre- and post-intervention home injury hazards as measured by visual observations were calculated using a Wilcoxon signed rank test and McNemar's test. Thirdly, the elderly participant's perceptions of pre- and post-intervention home injury reduction as measured by questionnaire responses were calculated using a McNemar's test. Lastly, sensitivity, specificity, PPV, NPV, and phi coefficient were obtained to determine if there was a significant correlation between visual observations and the elderly's perception of home injury hazard reduction during pre- and post-intervention.

Demographic Information

The NHHP program pilot study began on January 1, 2011 and ended on December 31, 2011. In 2011, the NHHP program had 56 families that participated in the study. Of the 56 families that participated in the 2011 NHHP program pilot study, 23 homes had at least one elderly resident (65 years of age and older) living in the home.

As seen in Table 5, the participants that were 66 years old (17.4%), identified themselves as White (47.9%), were female (60.9%), had some college education (39.1%), had Medicare (69.7%), and had an annual income between $10,000 and $14,999 (47.9%) represented the majority of the participants in this study. In addition, the majority of the

participants were referred to the NHHP program by HELP of Southern Nevada (34.8%), and did not require a referral from NHHP program (65.2%). For all other trends, such as disability status and report of injury please see Table 5 for more information.

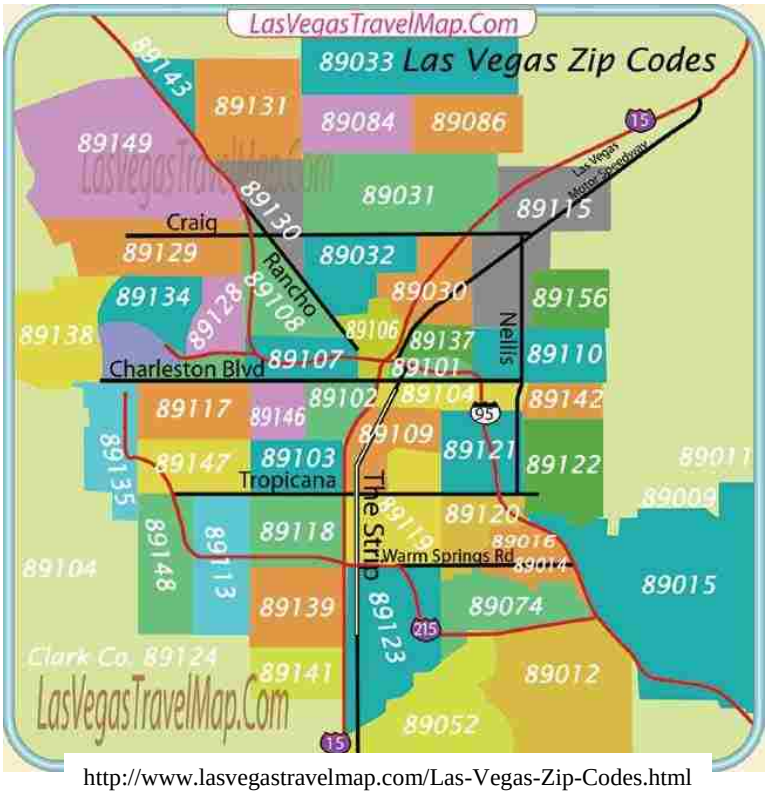
Participants in this study received either a basic, facilitated, or intensive intervention. Table 5 shows that they majority of participants in this study received the facilitated intervention (60.9%, n=14). Nevertheless, 8 participants (34.8%) received the intensive intervention, and 1 participant (4.3%) received the basic intervention. Participants that received the facilitated intervention were given various safety devices. A total of 19 participants (82.6%) received a CO detector, 15 participants (65.2%) received a smoke detector, 14 participants (60.9%) received a first aid kit, and 13 participants (56.5%) received a fire extinguisher. Participants that received the intensive intervention obtained services from either Rebuilding Together (75.0%, n=6) or HELP of Southern Nevada (25.0%, n=2).

Table 5. Demographic Information (Age, Gender, Highest Level of Education, Annual Income, Disability Status, Race/Ethnicity, Origin of Referral, Level of Intervention, Given Safety Devices, Referral, Type of Health Insurance, and Report of Injury) Among the Elderly Participants in the NHHP Program (n=23)

VARIABLE	NO. (%)
Age	
65 years old	2 (8.7%)
66 years old	4 (17.4%)
69 years old	1 (4.3%)
70 years old	3 (13.1%)
71 years old	2 (8.7%)
72 years old	1 (4.3%)
74 years old	2 (8.7%)
76 years old	2 (8.7%)
77 years old	1 (4.3%)
81 years old	1 (4.3%)
83 years old	1 (4.3%)
89 years old	1 (4.3%)
91 years old	1 (4.3%)
95 years old	1 (4.3%)
Gender	
Male	9 (39.1%)
Female	14 (60.9%)
Highest Level of Education	
Less than High School	1 (4.3%)
Some High School	1 (4.3%)
High School Graduate	6 (26.2%)
Some College	9 (39.1%)
College Graduate	5 (21.8%)
Trade School	1 (4.3%)
Annual Income	
Did not work	3 (13.1%)
Less than $5,000	----------
$5,000-$9,999	----------
$10,000-$14,999	11 (47.9%)
$15,000-$24,999	5 (21.8%)
$25,000-$34,999	1 (4.3%)
$35,000-$49,999	----------
$50,000-$74,999	----------
$75,000-$99,999	1 (4.3%)
Over $100,000	----------
I don't know	2 (8.7%)
Disability Status	
Disabled	9 (39.1%)
Not disabled	14 (60.9%)

VARIABLE	NO. (%)
Race/Ethnicity	
White	11 (47.9%)
Black/African American	9 (39.1%)
American Indian/Alaskan Native	2 (8.7%)
Samoan	1 (4.3%)
Origin of Referral	
HELP of Southern Nevada	8 (34.8%)
Rebuilding Together	7 (30.4%)
Radon Program	3 (13.1%)
Channel 3	2 (8.7%)
Las Vegas 7	1 (4.3%)
Aging and Disability	1 (4.3%)
Child Protective Services	1 (4.3%)
Level of Intervention	
Basic	1 (4.3%)
Facilitated	14 (60.9%)
Intensive	8 (34.8%)
Given Safety Devices	
Carbon Monoxide Detector	19 (82.6%)
Smoke Detector	15 (65.2%)
First Aid Kit	14 (60.9%)
Fire Extinguisher	13 (56.5%)
Not given any safety devices	4 (17.4%)
Referral	
HELP of Southern Nevada	6 (26.2%)
Rebuilding Together	2 (8.7%)
No referral	15 (65.2%)
Type of Health Insurance	
Medicare	16 (69.7%)
Medicaid	1 (4.3%)
Private	1 (4.3%)
Medicare and Private	3 (13.1%)
Medicare and Medicaid	1 (4.3%)
Did not answer	1 (4.3%)
Report of Injury	
No Injury	20 (87.0%)
Trip or Fall	2 (8.7%)
Burn	1 (4.3%)

While majority of the participants (73.9%) lived in the City of Las Vegas or unincorporated Clark County (zip codes: 89101, 89103, 89104, 89106, 89107, 89110, 89115, 89120, 89142, 89146, and 89156), 17.4% lived in North Las Vegas (zip codes: 89030, 89032), and 8.7% lived in Henderson (zip codes: 89052, 89074). Zip codes 89104 and 89106 had the highest representation of participants with three participants from each zip code. Zip codes 89030, 89032, 89101, and 89107 had the second highest representation of participants with 2 participants from each zip code. Zip codes 89052, 89074, 89103, 89110, 89115, 89120, 89142, 89146, and 89156 had to lowest representation of participants with 1 participant from each zip code (see Figure 3).



http://www.lasvegastravelmap.com/Las-Vegas-Zip-Codes.html

Figure 3. Zip Codes in Las Vegas

Out of the 23 elderly residents that participated in this study, only 3 participants reported suffering an injury in the home that caused them to miss work or seek medical

care. Two of the three participants had suffered a trip or fall in the home and one of the three participants had been burned in the home.

Statistical Analysis of Research Questions

Hypothesis 1: *Home injury hazards among the elderly in Southern Nevada would reduce from pre- to post-intervention, as measured by visual observations.*

Wilcoxon signed rank test was used to analyze the identification of trip or fall hazards in the home, clutter, and fire hazards less than 1m (matches, candles, incense) during the pre- and post-intervention home visit as measured by visual observations.

In Table 6, a total 22 of the 23 participants in this study had pre- and post-intervention data on the identification of trip or fall hazards in the home. While 12 participants had more trip or fall hazards pre-intervention, 8 had more trip or fall hazards post-intervention, and 2 had an equal amount of trip or fall hazards pre- and post-intervention ($Z=-0.318$, $p=0.751$,$\alpha=0.05$).

Of all the 23 participants in this study that had pre- and post-intervention data on clutter, 11 participants had more clutter pre-intervention, 7 participants had more clutter post-intervention, and 5 participants had an equal amount of clutter pre- and post-intervention ($Z=-1.438$, $p=0.151$,$\alpha=0.05$) (see Table 6).

In Table 6, of all the 23 participants in this study that had pre- and post-intervention data on fire hazards less than 1m (matches, candles, incense), 9 participants had more fire hazards pre-intervention, 1 participant had more fire hazards post-intervention, and 13 participants had an equal amount of fire hazards pre- and post-intervention ($Z=-2.172$, two-tailed $p=0.030$,$\alpha=0.05$).

Table 6. Visual Observations of Trips or Falls, and Fires and Burns Pre- & Post-Intervention

Type of Home Injury Hazard		N	Mean Rank	Sum of Ranks	Z (2-tailed)	p-value (α=0.05)
Trips or Falls	**Identification of trip or fall hazards in the home**					
	Negative Ranks	12	9.46	113.50	-0.318	0.751
	Positive Ranks	8	12.06	96.50		
	Ties	2				
	Total	**22**				
	Clutter					
	Negative Ranks	11	10.73	118.00	1.438	0.151
	Positive Ranks	7	7.57	53.00		
	Ties	5				
	Total	**23**				
Fires and Burns	**Fire hazards <1m (matches, candles, incense)**					
	Negative Ranks	9	5.39	48.50	-2.172	0.030
	Positive Ranks	1	6.50	6.50		
	Ties	13				
	Total	**23**				

Negative Ranks mean that there were more home injury hazards pre-intervention than post-intervention. Positive Ranks mean that there were more home injury hazards post-intervention than pre-intervention. Ties mean that there were an equal amount of home injury hazards pre- and post-intervention.

McNemar's test was used to analyze the presence or absence of a working smoke detector and CO detector, and the indoor air temperature and hot water temperature being safe or unsafe during the pre- and post-intervention home visit. Table 7 shows the two-by-two contingency table that was used for the McNemar's test to illustrate visual observations of the home injury hazards mentioned above during the pre- and post-intervention.

Table 7. A 2 x 2 Contingency Table for Visual Observations of Home Injury Hazards During the Pre- & Post-Intervention

		Post-Intervention (% of total)		
		No injury hazard	**Injury hazard**	**Total**
Pre-Intervention (% of total)	**No injury hazard**	a	b	a + b
	Injury hazard	c	d	c + d
	Total	a + c	b + d	a + b + c + d

The box with an "a" represents the total number of elderly participants with no visual observations of home injury hazards during the pre- and post-intervention home visit. The box with a "b" represents the total number of elderly participants with no visual observations of home injury hazards during the pre-intervention home visit, but had visual observations of home injury hazards during the post-intervention home visit. The box with a "c" represents the total number of elderly participants with visual observations of home injury hazards during the post-intervention home visit, but had no visual observations of home injury hazards during the pre-intervention home visit. The box with a "d" represents the total number of elderly participants with visual observations of home injury hazards during the pre- and post-intervention home visit. The box with an "a + b" represents the total number of elderly participants with no visual observations of home injury hazards during the pre-intervention home visit. The box with a "c + d" represents the total number of elderly participants with visual observations of home injury hazards during the pre-intervention home visit. The box with an "a + c" represents the total number of elderly participants with no visual observations of home injury hazards during the post-intervention home visit. The box with a "b + d" represents the total number of elderly participants with visual observations of home injury hazards during the post-intervention home visit. The box with an "a + b + c + d" presents the total number of participants in this study that had pre- and post-intervention data on visual observations of home injury hazards.

In Table 8, of the 23 participants in this study that had pre- and post-intervention data on working smoke detectors, 10 participants (43.5%) had a working smoke detector pre- and post-intervention ($p=1.00$, $\alpha=0.05$). Of the 23 participants that had pre- and post-intervention data on a working CO detector, 3 participants (13.0%) had a working CO detector pre- intervention, and 11 participants (47.8%) had a working CO detector post-intervention ($p=0.008$, $\alpha=0.05$). Of the 21 out of 23 participants in this study that had pre- and post-intervention data for indoor air temperature (safe indoor air temperature being between 68°F and 80°F), 7 participants (33.3%) had a safe indoor air temperature pre-intervention, and 10 participants (47.6%) had a safe indoor air temperature post-intervention ($p=0.581$, $\alpha=0.05$). Of the 17 out of 23 participants in this study that had pre- and post-intervention data for hot water temperature (safe hot water temperature being below 120°F), 15 participants (88.2%) had a safe hot water temperature pre-intervention, and 12 participants (70.6%) had a safe hot water temperature post-

intervention (p=0.453, α=0.05). For all other trends pertaining to visual observations of smoke detectors, CO detectors, indoor air temperature, and hot water temperature, please see Table 8 below.

Table 8. Visual Observations of Smoke Detectors, CO Detectors, Indoor Air Temperature, and Hot Water Temperature Pre- and Post-Intervention

	N	a (%)	b (%)	c (%)	d (%)	a+b (%)	c+d (%)	a+c (%)	b+d (%)	p-value
Smoke Detectors	23	6 (26.1%)	4 (17.4%)	4 (17.4%)	9 (39.1%)	10 (43.5%)	13 (56.5%)	10 (43.5%)	13 (56.5%)	1.000
CO Detectors	23	3 (13.0%)	0 (0.0%)	8 (34.8%)	12 (52.2%)	3 (13.0%)	20 (87.0%)	11 (47.8%)	12 (52.2%)	0.008
Indoor Air Temp.	21	2 (9.5%)	5 (23.8%)	8 (38.1%)	6 (28.6%)	7 (33.3%)	14 (66.7%)	10 (47.6%)	11 (52.4%)	0.581
Hot Water Temp.	17	10 (58.8%)	5 (29.4%)	2 (11.8%)	0 (0.0%)	15 (88.2%)	2 (11.8%)	12 (70.6%)	5 (29.4%)	0.453

Column "a" represents the total number of elderly participants with no visual observations of home injury hazards during the pre- and post-intervention home visit. Column "b" represents the total number of elderly participants with no visual observations of home injury hazards during the pre-intervention home visit, but had visual observations of home injury hazards during the post-intervention home visit. Column "c" represents the total number of elderly participants with visual observations of home injury hazards during the post-intervention home visit, but had no visual observations of home injury hazards during the pre-intervention home visit. Column "d" represents the total number of elderly participants with visual observations of home injury hazards during the pre- and post-intervention home visit. Column "a + b" represents the total number of elderly participants with no visual observations of home injury hazards during the pre-intervention home visit. Column "c + d" represents the total number of elderly participants with visual observations of home injury hazards during the pre-intervention home visit. Column "a + c" represents the total number of elderly participants with no visual observations of home injury hazards during the post-intervention home visit. Column "b + d" represents the total number of elderly participants with visual observations of home injury hazards during the post-intervention home visit (α=0.05).

Hypothesis 2: *The perception of home injury hazards among the elderly in Southern Nevada would increase from pre- to post-intervention, as measured by questionnaire response.*

McNemar's test was used to analyze the elderly's perception of home injury hazards based on the elderly's questionnaire response to there being a secure, non-slip treading in the bathtub or shower, having a smoke detector and testing the batteries monthly, having a fire extinguisher in the home, having a CO detector and testing the batteries monthly, and setting the thermostat in the home to a safe temperature during the summer and winter. Table 9 is the two-by-two contingency table that was used for the McNemar's test to illustrate the elderly's perception of the home injury hazards mentioned above during the pre- and post-intervention.

Table 9. A 2 x 2 Contingency Table for the Elderly's Perception of Home Injury Hazards During the Pre- & Post-Intervention

		Post-Intervention (% of total)		
		No injury hazard	**Injury hazard**	**Total**
Pre-Intervention (% of total)	**No injury hazard**	a	b	a + b
	Injury hazard	c	d	c + d
	Total	a + c	b + d	a + b + c + d

The box with an "a" represents the total number of elderly participants with the perception that there were no injury hazards in their home during the pre- and post-intervention home visit. The box with a "b" represents the total number of elderly participants with the perception that there were no injury hazards in their home during the pre-intervention home visit, but perceived that there were injury hazards in their home during the post-intervention home visit. The box with a "c" represents the total number of elderly participants with the perception that there were injury hazards in their home during the pre-intervention home visit, but perceived that there were no injury hazards in their home during the post-intervention home visit. The box with a "d" represents the total number of elderly participants with the perception that there were injury hazards in their home during the pre- and post-intervention home visit. The box with an "a + b" represents the total number of elderly participants with the perception that there were no injury hazards in their home during the pre-intervention home visit. The box with a "c + d" represents the total number of elderly participants with the perception that there were injury hazards in their home during the pre-intervention home visit. The box with an "a + c" represents the total number of elderly participants with the perception that there were no injury hazards in their home during the post-intervention home visit. The box with a "b + d" represents the total number of elderly participants with the perception that there were home injury hazards in their home during the post-intervention home visit. The box with an "a + b + c + d" presents the total number of participants in this study that had pre- and post-intervention perception data on home injury hazards.

In Table 10, of the 19 out of 23 participants in this study that had pre- and post-intervention data for the presence or absence of secure, non-slip treading in the bathtub or shower, 6 participants (31.6%) reported having secure, non-slip treading pre-intervention, and 13 participants (68.4%) reported having secure, non-slip treading post-intervention ($p=0.39$, $\alpha=0.05$). Of the 19 out of 23 participants in this study that had pre- and post-intervention data for the presence of a smoke detector and testing the batteries monthly, 5 participants (26.3%) reported having a smoke detector pre-intervention, and 16 participants (84.2%) reported having a smoke detector post-intervention ($p=0.003$, $\alpha=0.05$). Of the 22 out of 23 participants in this study that had pre- and post-intervention data for the presence or absence of a fire extinguisher in the home, 9 participants (40.9%) reported having a fire extinguisher in the home pre-intervention, and 21 participants (95.5%) reported having a fire extinguisher in the home post-intervention ($p=0.002$, $\alpha=0.05$). Of the 14 out of 23 participants in this study that had pre- and post-intervention data for the presence of a CO detector and testing the batteries monthly, all 14 participants reported not having a CO detector pre-intervention, and 11 participants (78.6%) reported having a CO detector post-intervention, ($p=0.001$, $\alpha=0.05$). Of the 17 out of 23 participants that had pre- and post-intervention data for the average temperature setting of the household thermostat during the summer and winter (safe thermostat setting being between 68°F and 80°F), a total of 15 participants (88.2%) reported having a safe thermostat setting pre- and post-intervention ($p=1.00$, $\alpha=0.05$). For all other trends pertaining to the elderly participant's perception of smoke detectors, CO detectors, indoor air temperature, and hot water temperature, please see Table 10.

Table 10. Elderly Perception of Trip or Fall Hazards (secure, non-slip treading in the bathtub or shower), Smoke Detector, Fire Extinguisher, CO Detector, and Indoor Air Temperature (average temperature setting of household thermostat) Pre- and Post-Intervention

	N	a (%)	b (%)	c (%)	d (%)	a+b (%)	c+d (%)	a+c (%)	b+d (%)	p-value
Secure, non-slip treading in bathtub/shower	19	5 (26.3%)	1 (5.3%)	8 (42.1%)	5 (26.3%)	6 (31.6%)	13 (68.4%)	13 (68.4%)	6 (31.6%)	0.390
Smoke Detector	19	4 (21.1%)	1 (5.3%)	12 (63.2%)	2 (10.5%)	5 (26.3%)	14 (73.7%)	16 (84.2%)	3 (15.8%)	0.003
Fire Extinguisher	22	8 (36.4%)	1 (4.5%)	13 (59.1%)	0 (0.0%)	9 (40.9%)	13 (59.1%)	21 (95.5%)	1 (4.5%)	0.002
CO Detector	14	0 (0.0%)	0 (0.0%)	11 (78.6%)	3 (21.4%)	0 (0.0%)	14 (100%)	11 (78.6%)	3 (21.4%)	0.001
Indoor Air Temp.	17	14 (82.4%)	1 (5.9%)	1 (5.9%)	1 (5.9%)	15 (88.2%)	2 (11.8%)	15 (88.2%)	2 (11.8%)	1.000

Column “a” represents the total number of elderly participants with the perception that there were no injury hazards in their home during the pre- and post-intervention home visit. Column “b” represents the total number of elderly participants with the perception that there were no injury hazards in their home during the pre-intervention home visit, but perceived that there were injury hazards in their home during the post-intervention home visit. Column “c” represents the total number of elderly participants with the perception that there were injury hazards in their home during the pre-intervention home visit, but perceived that there were no injury hazards in their home during the post-intervention home visit. Column “d” represents the total number of elderly participants with the perception that there were injury hazards in their home during the pre- and post-intervention home visit. Column “a + b” represents the total number of elderly participants with the perception that there were no injury hazards in their home during the pre-

intervention home visit. Column "c + d" represents the total number of elderly participants with the perception that there were injury hazards in their home during the pre-intervention home visit. Column "a + c" represents the total number of elderly participants with the perception that there were no injury hazards in their home during the post-intervention home visit. Column "b + d" represents the total number of elderly participants with the perception that there were home injury hazards in their home during the post-intervention home visit (α=0.05).

Hypothesis 3: *There is a significant correlation between visual observations and the elderly's perceptions of pre- and post-intervention home injury hazards among the elderly in Southern Nevada.*

Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and the phi coefficient were obtained in order to make a comparison between visual observations and the elderly's perception of trips or falls, fire and burns, CO poisoning, and excessive heat-cold exposure. Table 11 is the two-by-two contingency table that illustrates the consistency between visual observations and the elderly's perception of the home injury hazards mentioned above during the pre- and post-intervention home visits.

Table 11. A 2 x 2 Contingency Table for the Comparison Between Visual Observations and Elderly's Perception of Home Injury Hazards During the Pre- & Post-Intervention

Pre- & Post-Intervention		**Visual Observation (% of total)**		
		No injury hazard	**Injury hazard**	**Total**
Homeowner Perception (% of total)	**No injury hazard**	a	b	a + b
	Injury hazard	c	d	c + d
	Total	a + c	b + d	a + b + c + d

The box with an "a" represents the total number of elderly participants with no injury hazards reported by visual observations or perceived by the elderly participants during the pre- and post-intervention home visits. The box with a "b" represents the total number of elderly participants with the perception that there were no injury hazards in their home, but had visual observations of home injury hazards during the pre- and post-intervention home visits. The box with a "c" represents the total number of elderly participants with the perception that there were injury hazards in their home, but no visual observations of home injury hazards during the pre- and post-intervention home visits. The box with a "d" represents the total number of elderly participants with injury hazards reported by visual observations or perceived by the elderly participants during the pre- and post-intervention home visits. The box with an "a + b" represents the total number of elderly participants with no injury hazards perceived by the elderly participants during the pre- and post-intervention home visits. The box with a "c + d" represents the total number of elderly participants with injury hazards perceived by the elderly participants during the pre- and post-intervention home visits. The box with an "a + c" represents the total number of elderly participants with no injury hazards reported by visual observations during the pre- and post-intervention home visits. The box with a "b + d" represents the total number of elderly participants with injury hazards reported by visual observations during the pre- and post-intervention home visits. The box with an "a + b + c + d" represents the total number of participants with pre- and post-intervention data on the elderly's perception of home injury hazards and visual observations.

As seen in Table 12, of the 23 participants that had complete pre-intervention visual observation and elderly perceptions trip or fall data located in household bathrooms, 7 participants (30.4%) had trip or fall hazards reported by the elderly participants during pre-intervention, and 10 participants (43.5%) had no trip or fall hazards identified by visual observations pre-intervention. Of the 23 participants that had complete post-intervention visual observation and elderly perceptions trip or fall data located in household bathrooms, 17 participants (73.9%) had trip or fall hazards reported by the elderly participants post-intervention, and 7 participants (30.4%) had no trip or fall hazards identified by visual observations post-intervention. For more pre- and post-intervention visual observation and elderly perceptions of trip or falls in household bathrooms, please see Table 12.

In Table 12, of the 21 participants that had complete pre-intervention visual observation and elderly perception smoke detector data, 7 participants (33.3%) had a smoke detector reported by the elderly participants pre-intervention, and 10 participants (47.6%) had a smoke detector reported by visual observations pre-intervention. Of the 21 participants that had complete post-intervention visual observation and elderly perception smoke detector data, 18 participants (85.7%) had a smoke detector reported by the elderly participants post-intervention, and 10 participants (47.6%) had a smoke detector reported by visual observations post-intervention. For more pre- and post-intervention visual observation and elderly perceptions of a working smoke detector in the home, please see Table 12.

As seen in Table 12, of the 14 participants that had complete pre-intervention visual observation and elderly perception CO detector data, all 14 participants (100.0%) did not

have a CO detector reported by elderly participants pre-intervention, and 2 participants (14.3%) had a CO detector identified by visual observations pre-intervention. Of the 14 participants that had complete post-intervention visual observation and homeowner perception CO detector data, 11 participants (78.6%) had a CO detector reported by the elderly participants post-intervention, and 7 participants (50.0%) had a CO detector reported by visual observations post-intervention. For more pre- and post-intervention visual observation and elderly perceptions of a working CO detector in the home, please see Table 12.

In Table 12, of the 16 participants that had complete pre-intervention visual observation and elderly perception excessive heat-cold exposure data,14 participants (87.5%) reported having a safe indoor air temperature pre-intervention, and 4 participants (25.0%) had a safe indoor air temperature identified by visual observations pre-intervention. Of the 16 participants that had complete post-intervention visual observation and elderly perception excessive heat-cold exposure data, 14 participants (87.5%) reported having a safe indoor air temperature post-intervention, and 9 participants (56.3%) had a safe indoor air temperature identified by visual observations post-intervention. For more pre- and post-intervention visual observation and elderly perceptions of a safe indoor air temperature in the home, please see Table 12.

Table 12. Pre- & Post-Intervention of Trips or Falls, Working Smoke Detector, Working CO Detector, and Safe Indoor Air Temperature Consistency Between Visual Observations and Elderly Perceptions

		N	a (%)	b (%)	c (%)	d (%)	a + b (%)	c + d (%)	a + c (%)	b + d (%)
Trips or Falls	**Pre-**	23	5 (21.7%)	2 (8.7%)	5 (21.7%)	11 (47.8%)	7 (30.4%)	16 (69.6%)	10 (43.5%)	13 (56.5%)
	Post-	23	7 (30.4%)	10 (43.5%)	0 (0.0%)	6 (26.1%)	17 (73.9%)	6 (26.1%)	7 (30.4%)	16 (69.6%)
Smoke Detector	**Pre-**	21	5 (23.8%)	2 (9.5%)	5 (23.8%)	9 (42.9%)	7 (33.3%)	14 (66.7%)	10 (47.6%)	11 (52.4%)
	Post-	21	9 (42.9%)	9 (42.9%)	1 (4.8%)	2 (9.5%)	18 (85.7%)	3 (14.3%)	10 (47.6%)	11 (52.4%)
CO Detector	**Pre-**	14	0 (0.0%)	0 (0.0%)	2 (14.3%)	12 (85.7%)	0 (0.0%)	14 (100%)	2 (14.3%)	12 (85.7%)
	Post-	14	6 (42.9%)	5 (35.7%)	1 (7.1%)	2 (14.3%)	11 (78.6%)	3 (21.4%)	7 (50.0%)	7 (50.0%)
Indoor Air Temp	**Pre-**	16	4 (25.0%)	10 (62.5%)	0 (0.0%)	2 (12.5%)	14 (87.5%)	2 (12.5%)	4 (25.0%)	12 (75.0%)
	Post-	16	8 (50.0%)	6 (37.5%)	1 (6.3%)	1 (6.3%)	14 (87.5%)	2 (12.5%)	9 (56.3%)	7 (43.8%)

Column “a” represents the total number of elderly participants with no injury hazards reported by visual observations or perceived by the elderly participants during the pre- and post-intervention home visits. Column “b” represents the total number of elderly participants with the perception that there were no injury hazards in their home, but had visual observations of home injury hazards during the pre- and post-intervention home visits. Column “c” represents the total number of elderly participants with the perception that there were injury hazards in their home, but no visual observations of home injury hazards during the pre- and post-intervention home visits. Column “d” represents the total number of elderly participants with injury hazards reported by visual observations or perceived by the elderly participants during the pre- and post-intervention home visits. Column “a + b” represents the total number of elderly participants with no injury hazards perceived by the elderly participants during the pre- and post-intervention home visits. Column “c + d” represents the total number of elderly participants with injury hazards perceived by the elderly participants during the pre- and post-intervention home visits. Column “a + c” represents the total number of elderly participants with no injury hazards reported by visual observations during the pre- and post-intervention home visits.

Column "b + d" represents the total number of elderly participants with injury hazards reported by visual observations during the pre- and post-intervention home visits (α=0.05).

Table 13 shows the sensitivity, specificity, PPV, NPV, phi coefficient and p-values for pre- and post-intervention consistency between visual observations and elderly perceptions of trip and fall hazards in household bathrooms, working smoke detectors and CO detectors in the home, and a safe indoor air temperature.

Trip and fall hazards in household bathrooms among the participants in this study had a sensitivity of 50% and 100% during pre- and post-intervention, respectively; specificity was 84.6% and 37.5% during pre- and post-intervention, respectively; PPV was 71.4% and 41.2% during pre- and post-intervention, respectively; NPV was 68.8% and 100% during pre- and post-intervention, respectively; phi coefficient was 37.3% and 39.3% during pre- and post-intervention, respectively; and p-values of 0.074 and 0.059 during pre- and post-intervention, respectively (α=0.05) (see Table 13).

Working smoke detectors in the homes of the participants in this study had a sensitivity of 50% and 90% during pre- and post-intervention, respectively; specificity of 81.8% and 18.2% during pre- and post-intervention, respectively; PPV of 71.4% and 50% during pre- and post-intervention, respectively; NPV of 64.3% and 66.7% during pre- and post-intervention, respectively; phi coefficient of 33.7% and 11.7% during pre- and post-intervention, respectively; and p-values of 0.122 and 0.593 during pre- and post-intervention, respectively (α=0.05) (see Table 13).

Working CO detectors in the homes of the participants in this study had a sensitivity of 0% and 85.7% during pre- and post-intervention, respectively; specificity of 100% and 28.6% during pre- and post-intervention, respectively; PPV of 54.6% during post-intervention; NPV of 85.7% and 66.7% during pre- and post-intervention, respectively;

phi coefficient of 17.4% during post-intervention; and a p-value of 0.515 during post-intervention (α=0.05) (see Table 13).

Safe indoor air temperature in the homes of the participants in this study had a sensitivity of 100% and 88.9% during pre- and post-intervention, respectively; specificity of 16.7% and 14.3% during pre- and post-intervention, respectively; PPV of 28.6% and 57.1% during pre- and post-intervention, respectively; NPV of 100% and 50% during pre- and post-intervention, respectively; phi coefficient of 21.8% and 4.8% during pre- and post-intervention, respectively; and p-values of 0.383 and 0.849 during pre- and post-intervention, respectively (α=0.05) (see Table 13).

Table 13. Sensitivity, Specificity, PPV, NPV, Phi Coefficient, and p-values for Pre- and Post-Intervention Consistency Between Visual Observations and Elderly Perceptions

	Sensitivity		**Specificity**		**PPV**		**NPV**		**Phi Coefficient (F)**		**p-value (α=0.05)**	
	Pre-	**Post-**	**Pre-**	**Post-**	**Pre-**	**Post-**	**Pre**	**Post-**	**Pre-**	**Post-**	**Pre-**	**Post-**
Trip/fall hazards (bathroom)	0.500	1.000	0.846	0.375	0.714	0.412	0.688	1.000	0.373	0.393	0.074	0.059
Smoke detector (working)	0.500	0.900	0.818	0.182	0.714	0.500	0.643	0.667	0.337	0.117	0.122	0.593
CO detector (working)	0.000	0.857	1.000	0.286	*	0.546	0.857	0.667	*	0.174	*	0.515
Indoor air temp (safe)	1.000	0.889	0.167	0.143	0.286	0.571	1.000	0.500	0.218	0.048	0.383	0.849

*unable to be determined

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion of Results

Hypothesis 1 Results

Hypothesis 1: *Home injury hazards among the elderly in Southern Nevada would reduce from pre- to post-intervention, as measured by visual observations.*

After performing a Wilcoxon signed rank test and a McNemar's test, Hypothesis 1 was only partially supported. The Wilcoxon signed rank test revealed that there was a statistically significant reduction in fire hazards less than 1 meter, but no statistically significant reduction in trip or fall hazards and clutter. These results suggest that elderly residents were more likely to reduce fire hazards less than 1 meter (matches, candles, incense) in their homes as opposed to reducing trip or fall hazards and clutter. Nevertheless, physical disability and lack of knowledge may play a role in this outcome.

It is possible that elderly residents have an easier time at reducing or minimizing fire hazard products as opposed to reducing trip or fall hazards and clutter. In this study, trip or fall hazards ranged from loose rugs to uneven flooring, which may be very difficult for elderly residents to fix if they have mobility impairments. Like trip or fall hazards, dealing with clutter can be a challenge for elderly residents who have difficulty performing moderate to vigorous activity. Fire hazard products less than 1 meter (such as candles, incense, and matches) are much easier to deal with than trip or fall hazards or clutter because it does not require a lot of effort on the elderly residents part to make changes. For example, elderly residents can simply reduce fire hazards by disposing fire hazard products (such as candles, incense, and matches), however, reducing trip or fall

hazards or clutter may be a more difficult task, especially if they have mobility impairments.

Currently, the NHHP program interventions that address trip or fall hazards and clutter are the personalized report stating what issues pertain to these home injury hazards and non-slip tape to place under a loose rug. Several ways that NHHP program can reduce trip or fall hazards is to not only educate the elderly residents about the importance and benefits of reducing trip or fall hazards and clutter in the home, but also to educate their family or caretakers about trip or fall hazards in the elderly residents home. In addition, Healthy Homes Specialists can show the elderly residents where and what types of home injury hazards were found in their homes.

The McNemar's test revealed there was a statistically significant reduction in CO poisoning hazards, but there were no statistically significant changes in smoke detectors, safe indoor air temperature, and safe hot water temperature pre- and post-intervention as measured by visual observations. These results suggest that elderly residents reduced CO poisoning hazards by installing a CO detector in their homes, but did not reduce fires and burns by installing a smoke detector, or reduce excessive heat-cold exposure by having a safe indoor air temperature or safe hot water temperature.

One explanation for the lack of change for this outcome is the amount of effort that is required to fix certain types of home injury hazards. For example, it takes very little effort to reduce CO poisoning hazards in a home. If an elderly resident does not have a CO detector, the NHHP program will provide the device free of charge to the elderly resident and plug it into a working outlet. Therefore, there is a reduction in the risk of CO poisoning hazards with the installation of a CO detector in an elderly resident's home.

Unlike the CO detector that can be easily plugged into an outlet and instantly reduce the risk of CO poisoning, the smoke detector that is provided to the elderly resident free of charge must be hardwired. Therefore, if the elderly resident is unable to find someone to hardwire the smoke detector, the device is never installed.

Like reducing the risk of injury form fires and burns through the installation of a smoke detector, reducing excessive heat-cold exposure by having a safe indoor air temperature or safe hot water temperature may be difficult for the elderly resident living in Southern Nevada to achieve. One of the challenges that elderly residents are faced with in Southern Nevada is the drastic climate change between the summer and winter seasons. In order to have a safe air temperature during the summer and winter seasons, elderly residents in Southern Nevada need to have a working central cooling/heating unit and proper sealant around the doors and windows in their homes. Reducing excessive heat-cold exposure by having a safe hot water temperature may not be a concern for elderly residents unless a child lives or visits the home frequently.

Currently, the NHHP program addresses fires and burns, and excessive heat-cold exposure are the personalized report stating what issues pertain to these home injury hazards, a free smoke detector that must be hardwired, and a referral to Rebuilding Together or HELP of Southern Nevada to fix the elderly residents heating, ventilation, and air conditioning (HVAC) system. One way that the NHHP program can be more effective in reducing fires and burns is providing elderly residents with a plug-in smoke detector rather than a smoke detector that needs to be hardwired. Even though current smoke alarms exhibit high frequency that is very difficult for older adults to hear, it is still safer to have a smoke detector in the home than not to have one at all (Huey et al.,

1996). One way that the NHHP program can be more effective in reducing excessive heat-cold exposure among the elderly living in Southern Nevada is to better educate them about the importance of having a working HVAC system in their home and a safe hot water temperature. Healthy Homes Specialist should contact Rebuilding Together or HELP of Southern Nevada for the elderly residents in order to obtain HVAC services. In addition to this, the NHHP program can easily assist the elderly in Southern Nevada to have a safe hot water temperature by changing their heater to a temperature that is at or below 120°F.

Hypothesis 2 Results

Hypothesis 2: *The perception of home injury hazards among the elderly in Southern Nevada would increase from pre- to post-intervention, as measured by questionnaire responses.*

After performing a McNemar's test, Hypothesis 2 was only partially supported. The McNemar's test revealed that there was a statistically significant increase in the elderly's perception about the importance to reduce trip or fall hazards (secure, non-slip treading in the bathtub or shower), and the importance of having a smoke detector, a fire extinguisher, and a CO detector in the home, but there was no statistically significant change in the elderly's perception about the importance to have a safe indoor temperature during the winter and summer to reduce excessive heat-cold exposures during pre- and post-intervention as measured by questionnaire responses.

The elderly residents perceive trip or fall hazards (secure, non-slip treading in the bathtub or shower), the absence of a smoke detector, a fire extinguisher, and a CO

detector to be hazards, regardless of whether or not the elderly resident actually reduced the home injury hazard. Therefore, the elderly residents in this study understood the importance and safety of having secure, non-slip treading in the bathtub or shower, a smoke detector, a fire extinguisher, and a CO detector in the home.

On the other hand, the elderly residents in this study did not perceive safe indoor temperature to reduce excessive heat-cold exposures. Currently, the NHHP program interventions address excessive heat-cold exposures among the elderly living in Southern Nevada by contacting Rebuilding Together or HELP of Southern Nevada to fix the elderly residents HVAC system. However, the NHHP program could better educate the elderly about the importance in reducing excessive heat-cold exposures through having a safe indoor temperature in the home.

Hypothesis 3 Results

Hypothesis 3: *There is a significant correlation between visual observations and elderly perceptions of pre- and post-intervention home injury hazards among the elderly in Southern Nevada.*

Unfortunately, Hypothesis 3 was not supported in this study. Since the correlation between the visual observations and elderly's perception was not statistically significant ($p>0.05$) for all types of home injury hazards in Hypothesis 3, the phi coefficient (F) demonstrated a lack of significant association between visual observations and elderly's perception. In other words, there is no significant association between actual home injury hazards as reported by Healthy Homes Specialists on visual observations and perceived home injury hazards as reported by the elderly residents on the questionnaires. Therefore,

visual observations and elderly perceptions must be evaluated separately since they each provide useful information in their own way.

Nevertheless, there is very useful information when comparing pre- and post-intervention home injury hazards results from the sensitivity, specificity, PPV, and NPV tests. Trip or fall hazards in the bathroom and the presence of a smoke detector and CO detector had a higher sensitivity rate during post-intervention than pre-intervention. This means that post-intervention is a better indicator of reporting the proportion of elderly resident homes observed to have no trip or fall hazards in the bathroom and no fire and burn hazards that reported to have no trip or fall hazards in the bathroom and no fire and burn hazards on the questionnaire responses.

All home injury hazards evaluated in this study (trip or fall hazards in the bathroom, the presence of the smoke and CO detectors, and a safe indoor air temperature) had a higher specificity rate during pre-intervention than post-intervention. This means that pre-intervention is a better indicator of the proportion of elderly resident homes observed to have trip or fall hazards in the bathroom, no smoke detector and CO detector, and an unsafe indoor air temperature that reported to have these injury hazards on the questionnaire responses.

With regards to PPV and NPV rates for the home injury hazards in this study, trip or fall hazards in the bathroom and the presence of a smoke detector had a high PPV pre-intervention and a high NPV post-intervention rate. This means that pre-intervention is a better indicator of the proportion of elderly resident homes reporting no trip or fall hazards and having a smoke detector that were observed to have no injury hazards. In addition, the post-intervention is a better indicator of the proportion of elderly resident

homes reporting trip or fall hazards and no smoke detector that were observed to have injury hazards. Unlike trip or fall hazards in the bathroom and the presence of a smoke detector, a safe indoor temperature had a high PPV post-intervention and a high pre-intervention NPV intervention rate. This means that post-intervention is a better indicator of the proportion of elderly resident homes reporting a safe indoor air temperature that were observed to have no injury hazards. In addition, the pre-intervention is a better indicator of the proportion of elderly resident homes reporting an unsafe indoor air temperature that were observed to have no injury hazards.

The presence of a CO detector in the home could not be evaluated for a PPV and NPV pre- and post-intervention comparison due to the lack of information for the pre-intervention PPV rates.

In regards to the consistency between visual observations and elderly's perception of trip or fall hazards in the bathroom, the elderly identified more trip or fall hazards in the bathroom pre-intervention than post-intervention. In other words, the elderly's reported a reduction in trip or fall hazards in their bathrooms. Surprisingly, Healthy Homes Specialists found slightly more trip or fall hazards in the bathrooms during the post-intervention home visit than pre-intervention home visit. This suggests that the elderly perceive trip or fall hazards in the bathrooms differently from Healthy Homes Specialists.

The elderly reported not having a smoke detector during the pre-intervention home visit, but reported having one and testing the batteries monthly during the post-intervention home visit. Healthy Homes Specialist saw no changes in the number of working smoke detectors pre- and post-intervention. Therefore, this suggests that the elderly may not be reporting smoke detector information honestly and the NHHP

program is not effectively reducing fire and burn hazards by simply providing the elderly resident with a smoke detector. It may be more beneficial for the elderly resident to have a plug-in smoke detector rather than a hardwired smoke detector.

The elderly reported not having a CO detector during the pre-intervention home visit, but reported having one and testing the batteries monthly during the post-intervention home visit. Healthy Homes Specialist identified more elderly residence to have a CO detector post-intervention than pre-intervention. This suggests that the NHHP program is effective in reducing CO poisonings for elderly residents in Southern Nevada.

The elderly reported no changes in the indoor air temperature pre- and post-intervention, but Healthy Homes Specialists reported safer indoor air temperatures post-intervention than pre-intervention. This suggests that the NHHP program has worked effectively with partnering agencies, such as HELP of Southern Nevada and Rebuilding Together to provide HVAC services to the elderly residents in this study. The way that the NHHP program refers elderly to Rebuilding Together and HELP of Southern Nevada is by including the partnering agencies contact information in the personalized report that is given to the elderly residents. However, the NHHP program can better serve the elderly residents in Southern Nevada by contacting the partnering agencies for them. In doing so, the NHHP program is more effective at reducing excessive heat-cold exposures for the elderly in Southern Nevada.

Based on the findings of this study, more effort must be invested into home injury hazard prevention because there is a lack of knowledge about prevention of fires and burns, excessive heat-cold exposures, and trip or fall hazards among the elderly population in Southern Nevada. Not only should we educate the elderly population in

Southern Nevada about the importance of home injury hazard reductions, we should also educate the elderly populations family and the Southern Nevada community that deals with this population.

Conclusions

Since elderly adults typically spend majority of their time in their home, minimizing their potential of having an unintentional home injury, such as trips or falls, fires and burns, CO poisoning, and excessive heat-cold exposure, is crucial (CDC, 2012; Home Safety Council, 2011). To my knowledge, this study is one of the first studies to assess the perception of elderly with regards to home injury hazards and to evaluate the effectiveness of the NHHP program interventions in reducing home injury hazards among the elderly in Southern Nevada.

Overall, there are three components to this study that provides invaluable information about home injury hazards among the elderly in Southern Nevada: 1) The NHHP program successfully reduced CO poisoning hazards by using 2 of the 3 E's of Injury Prevention (education and environment), 2) Pre- and post-intervention data provide differing yet useful information about trips or falls, fires and burns, CO poisoning, and excessive heat-cold exposures, and 3) Visual observations and the elderly's perception of home injury hazards must be evaluated separately.

First, the NHHP program successfully reduced CO poisoning hazards by using 2 of the 3 E's of Injury Prevention (education and environment). The NHHP program educated the elderly participants about the importance of having a CO detector to reduce their risk of CO poisoning. Since CO is an odorless gas that can be produced by stoves, lanterns, burning charcoal and wood, gas ranges, and heating systems when they

combust, the elderly participants perceived CO poisoning as a home injury hazard and wanted to reduce their risk of CO poisoning (CDC, 2007; CDC, 2008). With the help of the NHHP program, the elderly participants were provided with free, plug-in CO detectors to install in their homes. With the installation of this free, plug-in CO detector, elderly participants got the opportunity to reduce their risk of being poisoned by CO.

Second, pre- and post-intervention data provide differing yet useful information about trips or falls, fires and burns, CO poisoning, and excessive heat-cold exposures. Pre-intervention data are effective at identifying the proportion of elderly resident homes:

1) Observed to have injury hazards that reported to have injury hazards on the questionnaire response,
2) Reporting no trip or fall hazards and a working smoke detector that were observed to have no injury hazards, and
3) Reporting no CO detector and an unsafe indoor air temperature that were observed to have injury hazards.

Post-intervention data are effective at identifying the proportion of elderly resident homes:

1) Observed to have no injury hazards that reported to have no injury hazards on the questionnaire response,
2) Reporting no trip or fall hazards and no smoke detector that were observed to have injury hazards on the questionnaire response, and
3) Reporting a safe indoor air temperature that reported to have no injury hazards on the questionnaire response.

Lastly, visual observations and the elderly's perception of home injury hazards must be evaluated separately. Visual observations give the NHHP program a better understanding of what types of home injury hazards are in the home and what the staff members of the NHHP program need to do in order to better serve the elderly community in Southern Nevada. Visual observations show what changes were (and were not) made by the elderly resident in order to reduce injury hazards in their home. By knowing what changes were made shows the NHHP program what home injury hazards the elderly residents need help reducing. The elderly's perceptions of home injury hazards can show what they believe are home injury hazards. For example, in this study, the elderly perceived fires and burns and CO poisoning to be injury hazards in their homes. However, the elderly participants did not perceive trips or falls and excessive heat-cold exposure to be injury hazards in their homes. With this information, the NHHP program should invest more time in educating the elderly residents about the dangers and harmful effects that trips or falls and excessive heat-cold exposures are, in fact, injury hazards that were particularly found in their homes.

Study Limitations

Unfortunately, the sample size for this pilot study was relatively small (n=23). However, with the results from this study, there is useful information on how to make the NHHP program more effective in serving more elderly residents in Southern Nevada.

Another limitation to this study were differing Healthy Home Specialists conducting visual observations pre- and post-intervention home visits. Therefore, there is the possibility that the way that one Healthy Homes Specialist classified or counted home injury hazards is different from the way another Healthy Homes Specialist conducted the

visual observations in the elderly resident's home (inter-rater reliability). In order for pre- and post-intervention home injury hazard data to be consistent and reliable, the NHHP program should use the same Healthy Homes Specialists during the pre- and post-intervention home visits and standardize the procedure of classifying and counting home injury hazards.

Recommendations

There are several ways that the NHHP program can help elderly residents reduce trip or fall hazards, fires and burns, and excessive heat-cold exposure. Although it is inevitable for homes to possess trip or fall hazards, it is helpful to educate the elderly residents about certain areas that are considered trip or fall hazards and how to minimize their chances of tripping or falling. Therefore, making elderly residents aware of the various trip or fall hazards in their home and what safety measures to take in the event that they trip or fall may be helpful for them to better protect themselves. In addition to this, Healthy Homes Specialist can educate elderly residents about the importance of reducing clutter in their homes. Since the elderly residents may have limited physical mobility, it may be helpful to speak to the elderly resident's family about the importance of reducing clutter in the home.

In addition, the NHHP program may create and incorporate a checklist of ways that elderly residents in Southern Nevada can reduce home injury hazards in the home. A personalized checklist for each elderly resident can potentially reduce injury hazards since they are told what changes must be made and how they can make the changes.

Like trip or fall hazards, more attention must be contributed to reducing fires and burns in elderly residences. Providing elderly residents with plug-in smoke detectors rather than hardwired smoke detectors would be easier to install and test every month.

The most difficult home injury hazard to address in this study was excessive heat-cold exposure because the NHHP program is unable to provide services to reduce this type of home injury hazard. Therefore, it is in the NHHP program's interest to continue a strong relationship with HELP of Southern Nevada and Rebuilding Together. Thanks to these partnering agencies, elderly residents in Southern Nevada are capable of living in a home that has a safe indoor air temperature. In addition to this, Healthy Homes Specialist should educate the elderly residents about the importance of having a safe hot water temperature in the home regardless of their being a child in the home.

Overall, the NHHP program is a vital program that reduces unintentional home injury hazards among the elderly residents in Southern Nevada. With continued funding and resources to support the NHHP program's mission to reduce unintentional home injury hazards for elderly residents in Southern Nevada can give them the opportunity to live healthy and safely in their homes.

Nevertheless, since this study is one of the first studies to assess the perception of elderly with regards to home injury hazards and to evaluate the effectiveness of the NHHP program interventions in reducing home injury hazards among the elderly in Southern Nevada, more research is needed to find more effective methods in reducing hazards among the elderly in Southern Nevada and potentially on a statewide, national, and global scale. Even though the elderly residents in this study recognized the importance of reducing home injury hazards, they are not making all the necessary

changes in their homes to reduce these hazards. While home injury hazards cannot be completely eliminated in the homes of elderly residents, knowing what home injuries are present in the home and what changes need to be made is only the beginning. Therefore, determining the elderly resident's cues to action in reducing home injury hazards can provide a clearer understanding to the effectiveness in reducing home injury hazards among the elderly population.

APPENDIX 1

Institutional Review Board Approval Form

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

Biomedical IRB – Expedited Review
Approval Notice

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: January 5, 2011

TO: **Dr. Shawn Gerstenberger**, Environmental and Occupational Health

FROM: Office of Research Integrity - Human Subjects

RE: Notification of IRB Action by /John Mercer/ Dr. John Mercer, Chair and /Charles Rasmussen/ Dr. Charles Rasmussen, Co-Chair
Protocol Title: **Healthy Homes Building Strategic Alliance**
Protocol #: 1008-3565
Expiration Date: January 4, 2012

This memorandum is notification that the project referenced above has been reviewed and approved by the UNLV Biomedical Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45 CFR 46 and UNLV Human Research Policies and Procedures.

The protocol is approved for a period of one year and expires January 4, 2012. If the above-referenced project has not been completed by this date you must request renewal by submitting a Continuing Review Request form 30 days before the expiration date.

PLEASE NOTE:
Upon approval, the research team is responsible for conducting the research as stated in the protocol most recently reviewed and approved by the IRB, which shall include using the most recently submitted Informed Consent/Assent forms and recruitment materials. The official versions of these forms are indicated by footer which contains approval and expiration dates.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through ORI - Human Subjects. No changes may be made to the existing protocol until

modifications have been approved by the IRB. Modified versions of protocol materials must be used upon review and approval. Unanticipated problems, deviations to protocols, and adverse events must be reported to the ORI – HS within 10 days of occurrence.

If you have questions or require any assistance, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 895-2794.

APPENDIX 2

Nevada Healthy Homes Partnership Referral Form

Date:

Referring Agency	☐ Emergency Referral	Comments:
Name of Agency:		
Referring Individual:		
Telephone Number:	( ) - EXT.	
E-mail:	@	
Family/Home Referred		
Name:		
Address:		
Contact Number:	( ) - ☐ Home ☐ Cell ☐ Work ☐ Other _____	
Language Preference:	☐ English ☐ Spanish ☐ Other _____	Occupancy: ☐ Owner occupied ☐ Tenant occupied Landlord Name:
Reason for Referral: *(check all that apply)*	☐ Asthma triggers/attacks ☐ Poisoning ☐ Injury ☐ Structural Problems ☐ Other: _____	

All Healthy Homes home assessors should present a valid picture I.D. upon entrance to a home.

Please fax to (702) 895-5573 or (702) 895-5184 – Attention to: Nevada Healthy Homes Partnership (NVHHP)
Contact number: (702) 895-5449 E-mail: healthyhomesnevada@unlv.edu

To be completed by Healthy Homes staff

Pre-Qualification Contact date:	

Status:	Comments:
☐ Site visit scheduled _____ ☐ Left message _____ ☐ Incorrect number ☐ Not interested	

APPENDIX 3

Visual Assessment Form

Visual Assessment Checklist - Page 1

Date of Assessment: ______ Pre - ☐ Post - ☐ Case Number: ______ Name of Assessor: ______

	Observation		Front yard/Entrance	Backyard	Interior Entryway	Living Room	Dining Room	Kitchen	Laundry	Garage	Bedroom 1	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Bathroom 3	Hallway	Staircase				Notes/Actions	See Additional Notes
	Indicate the 3 most used rooms in the home:																							☐
Indoor Air Quality	Unvented gas appliance (broken, inaccessible, unknown)																							☐
	Mold or Mildew (W=Walls, F=Floor, C=Ceiling)	Obvious source of moisture																						☐
		No obvious source of moisture																						☐
	Bathroom fans inoperable/ineffective or inoperable window																							☐
	Evidence of tobacco smoke or other usage																							☐
	Evidence of unusual odors																							☐
Pb Prevention	Bare soil (without grass, mulch, rocks, etc.)																							☐
	Deteriorated Paint	Surfaces (W=Walls, F=Floor, C=Ceiling)																						☐
		Windows, doors, or trim																						☐
		Visible chips on ground																						☐

	Observation	Front yard/Entrance	Backyard	Interior Entryway	Living Room	Dining Room	Kitchen	Laundry	Garage	Bedroom 1	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Bathroom 3	Hallway	Staircase				Notes/Actions	See Additional Notes
Cleanliness	Cleanliness (C=Clean, S=Some Clean, N=Not Clean)																						☐
	Clutter (L=Low, M=Medium, H=High)																						☐
Structural Elements	Broken/inoperable light fixtures or no electricity																					Number of CFLs needed:	☐
	Broken/missing/code violations of components																						☐
	Plumbing problem (including leaks, unsealed toilets)																						☐
	Water damage (W=Walls, F=Floor, C=Ceiling)																						☐
	Broken windows																						☐
	Cracks (W=Walls, F=Floor, C=Ceiling)																						☐
	Roof damage (sagging, leaking, missing materials)																						☐

Visual Assessment Checklist - Page 2

	Observation	Front yard/Entrance	Backyard	Interior Entryway	Living Room	Dining Room	Kitchen	Laundry	Garage	Bedroom 1	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Bathroom 3	Hallway	Staircase				Notes/Actions	See Additional Notes
Pests	Improperly screened windows																						☐
	Improperly stored foods or pet foods																						☐
	Improperly stored garbage																						☐
	Evidence of pests (C=Cockroaches, R=Rodents, B=Bed bugs, M=Multi, PC=Pest Control products)																						☐
																							☐
Energy Efficiency/Sustainability	No running water																						☐
	Inadequate ventilation (<2 in.) around refrigerator/dirty coils																						☐
	Inadequate seals around refrigerator/freezer doors																						☐
	Inadequate/missing stripping (D=Doors, W=Windows, B=Both)																						☐
	Evidence of condensation on windows																						☐
	Absence of faucet aerators (faucet flow >2.5gpm)																					Number needed:	☐
	Absence of low-flow shower heads (shower flow >2.5 gpm)																					Number needed:	☐

	Observation	Front yard/Entrance	Backyard	Interior Entryway	Living Room	Dining Room	Kitchen	Laundry	Garage	Bedroom 1	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Bathroom 3	Hallway	Staircase				Notes/Actions	See Additional Notes
Detectors	Smoke detector (1=Works, 0=Not works, ?=DK)																					Number needed: (1 each floor and 1 in each sleeping area)	☐
	CO detector(1=Works, 0=Not works, ?=DK)																					Number needed: (1 each floor)	☐

Readings	Air temperature	Outside:	Floor 1 (Living Room):			Floor 2 (Hallway):	
	Relative humidity	Outside:	Floor 1 (Living Room):			Floor 2 (Hallway):	
	Carbon monoxide reading		Floor 1 (Living Room):			Floor 2 (Hallway):	
	Hot water temperature (Recommend: <120°F)		Faucet:			Water heater setting: ☐ Inaccessible	
	Refrigerator/freezer temperature (Recommend: 35-38°F/ 0°F)		Refrigerator:			Freezer:	
	Refrigerator/freezer specifications		Make:		Model:		
	Staircase 1 specifications	Uneven: Yes / No	Rise:	Run:	Railing space:	☐ Not applicable	
	Staircase 2 specifications	Uneven: Yes / No	Rise:	Run:	Railing space:	☐ Not applicable	
	Air filter 1 specifications	Dimensions:	Brand:	Reuseable: Yes / No		☐ Inaccessible	
	Air filter 2 specifications	Dimensions:	Brand:	Reuseable: Yes / No		☐ Inaccessible	
	Attic insulation depth		Inches:			☐ Inaccessible	

Visual Assessment Checklist - Page 3

	Observation	Front yard/Entrance	Backyard	Interior Entryway	Living Room	Dining Room	Kitchen	Laundry	Garage	Bedroom 1	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Bathroom 3	Hallway	Staircase				Notes/Actions	See Additional Notes
Injury Prevention (adults >65)	Fire hazards <1m (matches, lighters, candles, incense)																						☐
	Identified trip or fall hazards (COUNT)																						☐
	Missing hand rails for stairs with >3 steps																						☐
Injury Prevention (children <6)	Accessible sharp objects < 1m (COUNT)																						☐
	Sharp edges on furniture/cabinets <1m																						☐
	Glass surfaces on furniture / cabinets <1 m																						☐
	Improperly stored chemicals < 1m (COUNT)																						☐
	Unsecured tipping hazard < 1m (COUNT)																						☐
	Unsecured second story windows (unlocked, no guard)																						☐
	Dangerous cords/other strangulation hazard <1m																						☐
	Choking hazards (ping pong ball or smaller) <1m																						☐
	Uncovered outlets, power cords misused <1m (COUNT)																						☐
	Unsecured pool/spa																						☐
	Other unsecured drowning hazard (buckets, toilets)																						☐
	Unsafe outdoor playground equipment																						☐

Additional Notes

APPENDIX 4

Consent Form

Healthy Homes Consent Form

TITLE OF STUDY: Healthy Homes Building Strategic Alliance

INVESTIGATOR(S): Shawn L. Gerstenberger, PhD (702-895-5420), Sheniz Moonie, PhD (702-671-2231), Michelle Chino PhD (702-895-2649), Erika Marquez MPH, Jennifer Berger MPH, Mackenzie Burns MPH, Sabrina Bartholomew (La Monica) BS, Michelle Ching BS, Tara Dickinson BS (702-895-5449).

SPONSOR: Centers for Disease Control and Prevention

Name of Participant: _____

Case Number: _____

Purpose

The Department of Environmental and Occupational Health (DEOH) at University of Nevada Las Vegas (UNLV) is doing a research study to identify and reduce health hazards in the home. UNLV team members will assess the overall condition and safety of the home by identifying hazards in the home related to asthma, injury, poisoning, and structural problems. Identifying these areas through a home assessment will allow us to provide you with information on improving the safety of your home and health.

Procedures

You are being asked to participate in the study because you were refferred by one of our community partners. If you or your family choose to participate, this study should take about 12 hours of your time, over a period of 6-12 months. UNLV team members, each specially trained and certified, will visit your home on three or more separate occasions. An overview of the process is provided to you.

A UNLV Healthy Homes assessment may include the following services at *no cost*:

Initial visit: During the first visit, you will complete forms necesssary for enrollment. The forms include this consent form, a legal release waiver, and questionnaires about your health and home. These forms need to be completed by each participating family member. After all the forms are complete your home will be checked for saftey and health hazards through a Healthy Homes and Lead Risk Assessment. A list of some of the activities at your first visit include:

- Checking for carbon monoxide
- Checking for lead-based paint
- Checking for moisture or other structural problems
- Checking for pests, and
- Checking for any other safety hazards

Follow-up visit(s): At the next visit, scheduled at a time best for you, UNLV team members will provide you with an educational tool kit designed to address hazards in your home. Depending on available resources some homes will be provided with devices such as a smoke alarm or fire estinguisher, and/or remediation of one or all of the hazards found in your home. A list of some of the activities at your next visit include:

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Educational/Device Intervention:

- Educational tool will be provided to each household. Tailored specifically to address hazards found in the home.
- If applicable, provide household with a mop, broom, bucket, trash can, smoke alarm, CO-detector, fire extinguisher, and a trash can with a lid.
- A UNLV team member will discuss recommendations for reducing or eliminating hazards in the home.

Remediation Intervention:

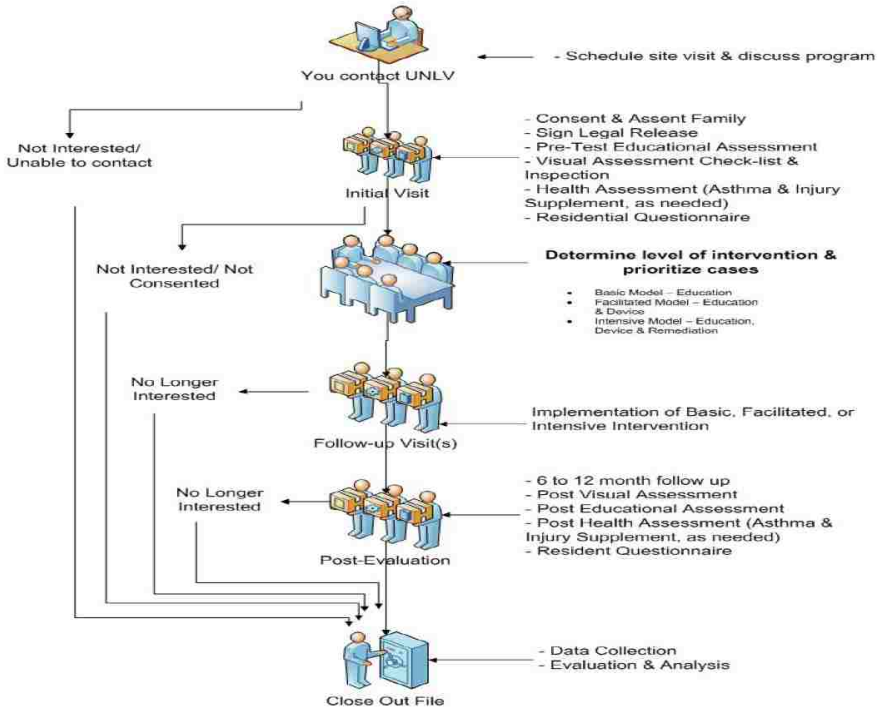
- If household meets financial qualification criteria, set by community partners, hazards in the home requiring remediation may be fixed.

Last visit: During the last visit, about 6-12 months after your first visit, UNLV team members will re-evaluate your home for saftey and health hazards. At this time, you will also complete the last set of questionnaires about your health and home

What the UNLV Healthy Homes program will not include:

- The healthy homes program will not assess the property for asbestos containing material.
- The healthy homes program will not assess the property for radon.

Once the intervention is provided and all questionnaires and follow up visits take place, the study is complete. At this time, each participating household will receive a $25 gift card to Walmart, limit one per household. This gift card can be used to purchase home maintenance and cleaning supplies.



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Benefits & Risks
The benefits for participating in this study include personalized educational materials that can help you make your home a safer and healthier place. In addition, you may qualify to receive free devices and/or supplies related to creating and maintaining a healthy home.

Risks of participating in this study are minimal. There may be some level of discomfort that may come with home visits and answering questions about your home and health. If you are uncomfortable answering any of the questions in this study, you are free to skip those questions or discontinue participation. Participation is voluntary and you can withdraw at anytime. There is no penalty or loss of benefits from this study for those who choose not to participate.

Other important things to know:
All information gathered in this study will be kept completely confidential. Data will be evaluated using case numbers instead of personal names, therefore no reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for five years after completion of the study or until publication. After the storage time the information gathered will be destroyed. Only researchers from UNLV will have access to the study data. You can ask questions about this study at anytime.

Questions
If you do have questions about the research, your rights as a participant, or would like more information please contact principle investigater Dr. Shawn Gerstenberger at (702) 895-5420 or shawn.gerstenberger@unlv.edu. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-2794 or toll free at 877-895-2794 or via email at IRB@unlv.edu.**

Please inital one box below. Signing your name below indicates that you agree to be in this study.

_____ The initial indicates that I have read the above consent.

or

_____ The initial indicates that the above consent was read to me by the research team member

Signature of participant or parent of a minor child	**Date**
Printed name of participant or parent of a minor child	**Date**
Signature of person obtaining consent	**Date**
Printed name of person obtaining consent	**Date**

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APPENDIX 5

Legal Release Form

CONSENT TO PARTICIPATE IN "HEALTHY HOMES" PROGRAM AND GENERAL RELEASE OF LIABILITY

This *Consent to Participate in "Healthy Homes" Program and General Release of Liability* ("Release") is made by _____ ("Participant") in favor of the Board of Regents of the Nevada System of Higher Education, on behalf of the University of Nevada, Las Vegas ("UNLV"), and is based on the following:

Description of Program

1. UNLV's School of Community Health Sciences has obtained a grant (the "Grant") from the Centers for Disease Control and Prevention, an agency of the United States Department of Health and Human Services (the "CDC") to identify, and in some instances correct, health hazards in private homes.

2. In accordance with the Grant, and in cooperation with the Southern Nevada Health District ("SNHD"), an agency of the State of Nevada, UNLV has established a "Healthy Homes" program in which UNLV students and faculty members ("UNLV Team Members") perform in-home inspections to identify hazards related to asthma, injury, poisoning, and structural problems. The Healthy Homes program is offered without cost to the Participant.

3. The Healthy Homes program involves three or more visits to a Participant's home over a period of 6 to 12 months. Each visit will last between 2 and 4 hours.

4. During their initial visit, UNLV team members will ask the Participant to complete an enrollment form and answer a questionnaire regarding the Participant's personal health and the condition of his or her home. Afterwards, UNLV Team Members will perform a series of inspections and tests that include the following:

- Detection of volatile organic compounds, such as, carbon monoxide.
- Detection of Lead-based paint using an X-ray Fluorescence handheld device.
- Identification of moisture problems in the home using a moisture detector.
- Identification of safety hazards that can lead to injury.
- Identification of pests through a visual assessment.

5. In one or more subsequent visits, UNLV Team Members will provide the Participant with an educational "tool kit" to assist the Participant in identifying safety hazards in the home. UNLV Team Members will meet with the Participant

to discuss the results of their inspection and to advise the Participant on ways to reduce risks in the home.

6. Depending on available resources and funding, UNLV may assist the Participant in the correction of certain hazards found in the home, including the following:

    - Providing cleaning materials such as a mop, broom, bucket, and/or trash can with a lid.
    - Providing safety equipment such as a smoke alarm, carbon monoxide-detector, and/or fire extinguisher.

7. If the Participant meets certain financial qualification criteria, UNLV may arrange for the remediation of certain structural safety hazards in the home.

8. UNLV Team Members will conduct a final home visit in which the Participant will be asked to complete a final set of questionnaires about his or her personal health and home. UNLV Team Members will also re-evaluate the Participant's home for safety and health hazards and perform one or more of the following inspections:

    - Detection of volatile organic compounds, such as, carbon monoxide.
    - Detection of Lead-based paint using an X-ray Fluorescence handheld device.
    - Identification of moisture problems in the home using a moisture detector.
    - Identification of safety hazards that can lead to injury.
    - Identification of pests through a visual assessment.

9. The Healthy Homes program will *not* include tests to determine the presence of asbestos or radon gas.

10. Upon completion of the final visit, the household will receive a $25 gift card to Wal-mart to purchase cleaning supplies.

Agreement and Release

Based on the foregoing, the Participant agrees as follows:

A. **Consent to Participate in the Healthy Homes Program**. Participant agrees to participate in the Healthy Homes program and consents to the use of all information and data, including photographs, video, film and other images, obtained by UNLV Team Members for analysis and publication. Participants agree to allow UNLV, CDC and/or SNHD to use survey responses and other data for research on housing and health. UNLV will remove all identifying information such as names, addresses and telephone numbers prior to using data for research or publication. Each Participant will be assigned a unique identifying

number, which shall be kept confidential. All information will be entered into a password protected computer and any physical data files will be secured. No personal information will be used in any reports or publications that may result from this program. UNLV will retain information acquired during this program for as long as required by State and/or Federal law and regulation.

B. **Acknowledgment of Risks of Program Participation**. The Participant acknowledges that there may be some level of discomfort that may come with home visits and answering questions about his or her home and health. If the Participant is uncomfortable answering any of the questions in this study, he or she is free to skip those questions or discontinue participation in the program. Participation is voluntary and the Participant can withdraw at any time, although only those persons who complete the program will be eligible to receive a $25 Wal-mart gift card. The Participant also acknowledges that there may be risks associated with any corrective action taken in his or her home, including the removal and replacement of building materials, the use of tools and other construction equipment. The Participant will comply with all reasonable requests made by any contractor performing work on his or her property to ensure the safety of the Participant, UNLV Team Members and others.

C. **Release of UNLV, CDC and SNHD**. Participant acknowledges that the inspection of his or home is not comprehensive and that additional risks may exist beyond those (if any) identified by UNLV. Participant agrees that UNLV's inspection is for research purposes only and may not be relied upon by the Participant for any reason. Participant acknowledges that risks may be identified by UNLV that do not in fact exist (a "false positive") and that UNLV may fail to observe risks that do in fact exist (a "false negative"). UNLV does not warrant the accuracy of any tests and advises the Participant to obtain independent verification of the condition of his or home by appropriately licensed professionals. If any corrective actions are proposed, work will be performed by a third party contractor. The Participant agrees that any claims arising from such work will be solely the responsibility of the third party contractor and not UNLV, the CDC and/or SNHD. Participant releases UNLV, CDC and SNHD, together with their employees, agents and other representatives, from all claims, arising out of his or her participation in the Healthy Homes program.

I have read, understand and agree to all terms and provisions of this Release.

Signature of participant: _____ Date: _____

Printed name: _____ Date: _____

Signature of person obtaining consent: _____ Date: _____

Printed name of person obtaining consent: _____ Date: _____

APPENDIX 6

Resident Questionnaire

Resident Questionnaire

Case #: _____ Personal ID #: _____

Date of Assessment: _____ ☐ Pre- ☐ Post-

Name of Assessor: _____

1. Owner/Renter Name: _____

2. Street Address: _____

3. City: _____ 4. Zip Code: _____

5. Phone Number: _____ 6. Primary Language: _____

7. Total number of occupants in the home: _____

8. For ALL occupants, complete: ⇨

	Age	Gender	Highest Grade Level	Relationship to Respondent
8.1				
8.2				
8.3				
8.4				
8.5				
8.6				
8.7				
8.8				
8.9				
8.10				

*** If there is a child under age 6 or an adult over age 65, complete the Injury Prevention Supplement**

9. Type of home:
   - ☐ Single family
   - ☐ Duplex or townhouse
   - ☐ Apartment or condo
   - ☐ Manufactured home
   - ☐ Other _____

10. Do you own or rent the home?
   - ☐ Own
   - ☐ Rent

11. How many years have you lived in the home? _____

NVHHP complete: Construction year from the Clark County Assessor Record: _____

Square footage of the home/unit: _____

12. What was the household's total income **LAST YEAR**? (Have resident select one from list).

☐ Did not work at all last year	☐ Less than $5,000	☐ $5,000 to $9,999
☐ $10,000 to $14,999	☐ $15,000 to $24,999	☐ $25,000 to $34,999
☐ $35,000 to $49,999	☐ $50,000 to $74,999	☐ $75,000 to $99,999
☐ Over $100,000	☐ I don't know	

13. In the last **2 YEARS**, have you or anyone in your household received benefits or used the services of any of the following social programs? (Have resident check all that apply from list).

☐ Temporary Assistance for Needy Families (TANF)		☐ Food stamps
☐ Disability insurance	☐ Unemployment insurance	☐ Social Security
☐ Veteran's pay	☐ General assistance/Welfare	☐ Medicaid
☐ Low income housing	☐ Public health clinic	☐ WIC
☐ Disaster relief	☐ Legal services	☐ I don't know
☐ Pell grants	☐ Other: _____	

15. Is any member of the household disabled? ☐ No ☐ Yes

If No, skip to Question 16

15.1. If yes, please list household member age, gender, and describe their disability: _____

_____

_____

_____

16. Has any member of the household been diagnosed with asthma? ☐ No ☐ Yes

If No, skip to Question 17

16.1. If yes, please list household member age, gender, and their relation to you: _____

_____

_____

_____

17. Has a radon test ever been performed in the home? □ No □ Yes □ I don't know

If No, skip to Question 18

17.1. What were the results of the radon test? _____

□ I don't know

18. Has a lead assessment ever been performed in the home? □ No □ Yes □ I don't know

If No, skip to Indoor Air Quality

18.1. What were the results of the lead assessment? _____

□ I don't know

*** If a Pre-1978 home, complete full Lead Risk Assessment; if a Post-1978 home, complete abbreviated Lead Risk Assessment**

Indoor Air Quality----------

1. Does the home have a working central heating/air conditioning unit? (Select one).

□ Yes, there is a working unit □ Yes, but the unit is not working □ No, there is no unit

If No, skip to Question 2

1.1. Are the air filters replaced at least every 3 months? □ No □ Yes

1.2. Does the unit have a thermostat? □ No □ Yes

If No, skip to Question 1.4

1.2.1. Do you know how to work your thermostat? □ No □ Yes

1.2.2. What is the average temperature setting of your thermostat in the summer (July/Aug.)?

□ Not applicable □ I don't know _____ºF

1.2.3. What is the average temperature setting of your thermostat in the winter (Dec./Jan.)?

□ Not applicable □ I don't know _____ºF

2. Besides a central heating/air conditioning unit, do you use any of the following to heat or cool your home? (Check all that apply).

□ Space heater □ Stove/Oven □ Swamp cooler □ Electric Fans □ Other _____

3. What is the average cost of your cooling (gas or electric) bill in the summer (July/Aug.)?

□ Not applicable □ I don't know $_____/month

4. What is the average cost of your heating (gas or electric) bill in the winter (Dec./Jan.)?

□ Not applicable □ I don't know $_____/month

5. Are humidifiers ever used in the home? □ No □ Yes

If No, skip to Question 6

5.1. If yes, do you clean the humidifier parts before or after every use? □ No □ Yes

6. Can mold or mildew be seen or smelled in the home? □ No □ Yes

If No, skip to Question 7

6.1.If yes, where in the home can mold or mildew be seen or smelled? (Check all that apply).

□ Front yard	□ Backyard	□ Entryway
□ Living room	□ Dining room	□ Kitchen
□ Adult's bedroom #_____	□ Child's bedroom #_____	□ Bathroom
□ Laundry room	□ Hallway	□ Staircase
□ Garage	□ Other _____	

7. If there is a fireplace in the home, do you use it? □ No □ Yes □ No fireplace

If No or No fireplace, skip to Question 8

7.1. If yes, do you use the vent/damper? □ No □ Yes □ I don't know

8. Are the following appliances vented to the outside of the home?

8.1. Fireplace	□ No	□ Yes	□ I don't know	□ No fireplace
8.2. Stove/Oven	□ No	□ Yes	□ I don't know	□ No stove/oven
8.3. Clothes dryer	□ No	□ Yes	□ I don't know	□ No clothes dryer
8.4. Water heater	□ No	□ Yes	□ I don't know	□ No water heater

9. Does anyone smoke cigarettes, cigars, or tobacco pipes inside the home? □ No □ Yes

If No, skip to Question 10

10. Are there pets inside the home? (Check all that apply).

□ Cat(s) #_____ □ Dog(s) #_____ □ Other:_____ #_____ □ No

If No, skip to Poisoning Prevention

10.1. If yes, are the pets allowed in the bedrooms? □ No □ Yes

Poisoning Prevention ----------

1. Are any of the following products used in the home?

   1.1. Bleach, ammonia, cleaners, or detergents ☐ No ☐ Yes ☐ I don't know

   1.2. Paints, stains, paint thinners, adhesives, or glues ☐ No ☐ Yes ☐ I don't know

   1.3. Air fresheners, air purifiers, or candles ☐ No ☐ Yes ☐ I don't know

2. How do you usually clean your home? (Check all that apply).

   ☐ Sweeping or dry mopping ☐ Damp mopping ☐ Dusting ☐ Vacuuming

3. Does the home have a vacuum? ☐ No ☐ Yes

   If No, skip to Injury Prevention

   3.1. If yes, does the vacuum have a(n):

   ☐ Ultra-filtration bag ☐ HEPA-like bag ☐ HEPA-like filter
   ☐ Other filter or bag ☐ HEPA filter ☐ I don't know

Injury Prevention ----------

1. On a scale of 1 to 10 (with 1 being the worst and 10 being the best, how would you rate the overall safety of your home? (Circle the number).

   1----------2----------3----------4----------5----------6----------7----------8----------9----------10
   Unsafe Average Safe

2. If you have a smoke detector, do you test the batteries monthly? ☐ No ☐ Yes ☐ N/A

3. Is there a fire extinguisher present in the home? ☐ No ☐ Yes

   If No, skip to Question 4

   3.1. If yes, where is the fire extinguisher located? (Check all that apply).

   ☐ Kitchen ☐ Bathroom ☐ Outside storage
   ☐ Garage ☐ Other _____

4. If you have a carbon dioxide detector, do you test the batteries monthly?
   ☐ No ☐ Yes ☐ N/A

Structural Elements of the Home ----------

1. On a scale of 1 to 10 (with 1 being worst and 10 being best), how would you rate your overall satisfaction with your home? (Circle the number).

   1----------2----------3----------4----------5----------6----------7----------8----------9----------10
   Unsatisfied Average Satisfied

2. On a scale of 1 to 10 (with 1 being the worst and 10 being the best), please rank your opinion of your home as it compares to other homes: (Circle the number).

   1----------2----------3----------4----------5----------6----------7----------8----------9----------10
   Worse than others Average Better than others

3. Are there **currently** any problems with the plumbing in the home? ☐ No ☐ Yes
   If No, skip to Question 4

   3.1. If yes, what exactly are the problems? _____

   _____

   _____

   _____

   3.2. What rooms have the plumbing problems? (Check all that apply).

☐ Living room	☐ Dining room	☐ Kitchen
☐ Adult's bedroom #_____	☐ Child's bedroom #_____	☐ Bathroom
☐ Laundry room	☐ Hallway	☐ Staircase
☐ Garage	☐ Other _____	

4. Are any of the windows in the home **not** able to be opened? ☐ No ☐ Yes
   If No, skip to Question 5

   4.1. If yes, what are the locations of the inoperable windows? (Check all that apply).

☐ Living room	☐ Dining room	☐ Kitchen
☐ Adult's bedroom #_____	☐ Child's bedroom #_____	☐ Bathroom
☐ Laundry room	☐ Hallway	☐ Staircase
☐ Garage	☐ Other _____	

5. Is there any water damage present in the home? ☐ No ☐ Yes
   If No, skip to Question 6

5.1. If yes, what rooms have the water damage? (Check all that apply).

□ Living room	□ Dining room	□ Kitchen
□ Adult's bedroom #_____	□ Child's bedroom #_____	□ Bathroom
□ Laundry room	□ Hallway	□ Staircase
□ Garage	□ Other _____	

6. Does the home have properly working rain gutters and downspouts?
□ No □ Yes □ I don't know

7. Is there any damage to the roof, such as leaks, sagging, or missing roofing materials?
□ No □ Yes □ I don't know
If No or I don't know, skip to Pests

7.1. If yes, describe the type of roof damage: _____

_____

_____

Pests ----------

1. Is all food stored in airtight containers? □ No □ Yes
2. Is pet food stored in airtight containers and/or off the floor? □ No □ Yes □ N/A
3. Is food ever eaten outside of the kitchen or dining area? □ No □ Yes
4. Is garbage contained in a sealable indoor trash can? □ No □ Yes
5. Have cockroaches, other insects, or rodents been seen in the home? □ No □ Yes
6. Have insect or rodent feces been seen in the home? □ No □ Yes
7. Have bed bugs been seen in the home? □ No □ Yes
8. Has anyone in the home experienced bed bug bites? □ No □ Yes □ I don't know
9. Has anyone in the home used pesticides to control pests (sprays, foggers, etc.)?
□ No □ Yes
If No, skip to Question 10

9.1. If yes, when was the last time the pesticides were used? _____

10. Have any professional pest control workers done work inside your home? □ No □ Yes

If No, skip to Question 11

10.1. If yes, what was the reason for their visit and what did they do? _____

_____

_____

10.2. When was the last time the pest professionals visited the home? _____

11. On average, how often do you wash bed sheets? (Select one).

□ Once a week □ Every 2 weeks □ Once a month □ Less often than once a month

11.1. When you wash the sheets, do you use hot water? □ No □ Yes

12. Do your sleeping pillows have dust-proof covers? □ No □ Yes

APPENDIX 7

Injury Questionnaire

Injury Supplement

Case #: _____

Personal ID: _____

☐ Pre- ☐ Post-

For: Children under age 6 and/or Adults over age 65

1. In the **past YEAR**, have you/ the child suffered an injury **in the home** that caused you/ the child to miss work or school, or to seek medical care? ☐ No ☐ Yes

   1.1. If yes, how were you/ the child hurt?

   ☐ Burned ☐ Choked ☐ Cut/Stabbed
   ☐ Poisoned ☐ Suffocated ☐ Tripped/Fell
   ☐ Drowned
   ☐ Other: _____
   ☐ Other: _____
   ☐ Other: _____

   1.2. If yes, in the **past YEAR**, how many of these injuries occurred? _____ injuries

   1.3. Where did the injury occur?

   ☐ Front yard ☐ Backyard ☐ Entryway
   ☐ Living room ☐ Dining room ☐ Kitchen
   ☐ Adult's bedroom ☐ Child's bedroom ☐ Bathroom
   ☐ Laundry room ☐ Hallway ☐ Staircase
   ☐ Garage ☐ Other _____

Poisoning Prevention ----------

1. Does the home have a working telephone? ☐ No ☐ Yes
2. Is emergency contact information present in the home? ☐ No ☐ Yes

   2.1. If yes, does the info. include a number to a poison control center? ☐ No ☐ Yes

First AID/CPR ----------

1. Are first aid supplies present in the home? ☐ No ☐ Yes

2. Is anyone in the home trained in CPR? ☐ No ☐ Yes

3. Is anyone in the home trained in First Aid? ☐ No ☐ Yes

Fire Prevention ----------

1. Are the smoke detector batteries tested monthly? ☐ No ☐ Yes

2. Is there a fire extinguisher in the home? ☐ No ☐ Yes

3. If yes, where is the fire extinguisher located? (Check all that apply)

☐ Master bedroom	☐ Child's bedroom	☐ Kitchen
☐ Living room	☐ Dining room	☐ Hallway
☐ Other bedroom	☐ Other bedroom	☐ Bathroom
☐ Other bathroom	☐ Other _____	

Child Safety ----------

(Skip Child Safety if resident >65 years)

1. If there are baby walkers present in the home, are the wheels removed?

☐ Yes, Wheels Removed ☐ Yes, Wheels Not Removed ☐ No Baby Walker

2. If there is a crib present in the home are the slates >6cm apart?

☐ Yes, Slats >6cm ☐ Yes, Slats <6cm ☐ No Crib

3. Is the stove top located <1 meter from the floor? ☐ No ☐ Yes

4. At what temperature is the hot water? (MEASURE WITH THERMOMETER)

Kitchen_____ degrees F Bathroom_____ degrees F

Pool Safety ----------

1. If there are children less than 3 years old in the home, do all bathroom doors remain closed at all times?

☐ No ☐ Yes ☐ No children under 3

1.1. If no, are there safety latches on all toilet seats? ☐ No ☐ Yes

2. Do you ever leave your children alone in the bathtub? □ No □ Yes □ N/A

3. Does the home have a pool or spa? □ No □ Yes
If No, skip to Fall Safety

3.1. If yes, what type of pool/spa is present?

□ In-ground □ Above-ground □ Inflatable

3.2. Are the pool and/or spa completely surrounded by a property perimeter fence that is at least 5 feet high? (The house may be part of the barrier.) □ No □ Yes

3.3. Are the pool and/or spa completely surrounded by a 4-sided fence isolation fence that is at least 4 feet high? □ No □ Yes
If No, skip to Question 3.4

3.3.1. If yes, does the fence have a self-latching gate? □ No □ Yes
If No, skip to Question 3.4

3.3.1.1. If yes, is the latch out of the reach of children? □ No □ Yes

3.3.1.2. Does the gate door self-close? □ No □ Yes

3.4. Are any of the following present around the pool/spa:

3.4.1. Working alarms on all doors, pet doors, and windows with direct access to the pool/spa area? □ No □ Yes

3.4.2. An automatic power pool cover? □ No □ Yes

3.4.3. A laser, light-beam, or infra-red sensor electronic alarm system around pool/spa? □ No □ Yes

3.5. Is there pool safety equipment present near the pool/spa? □ No □ Yes

3.6. Are there any pool toys or other climbable objects near the fence? □ No □ Yes

Fall Safety ----------

1. Is there secure, non-slip treading in the bathtub/shower? □ No □ Yes

2. If the home has stairs, are safety gates used at the top and bottom?
□ Yes, Safety Gates Used □ Yes, Safety Gates Not Used □ No Stairs

3. Do the steps in the stairway have consistent height? □ No □ Yes

MEASURE STAIRS

STAIRWAY 1: RISE_____ RUN_____ #of steps_____

STAIRWAY 2: RISE_____ RUN_____ #of steps_____

Firearms ----------

4. Is there a firearm in the home? □ No □ Yes

5. Number of firearms in the home? #_____

6. Are firearms kept separate from ammunition? □Yes-All □ Yes- Some □ No

7. Are firearms in a locked box or cabinet? □Yes-All □ Yes- Some □ No

8. If yes, where is the fire extinguisher located? (Check all that apply)

□ Master bedroom	□ Child's bedroom	□ Kitchen
□ Living room	□ Dining room	□ Hallway
□ Other bedroom	□ Other bedroom	□ Bathroom
□ Other bathroom	□ Other _____	

APPENDIX 8

Health Questionnaire

Health Questionnaire

Case #: _____

Personal ID: _____

Date of Assessment: _____ □ Pre-

Demographic Data ----------

1. Your (or the child's) name: _____ 2. Age: _____

3. What is your (or the child's) race? (Check all that apply.)

□ White
□ Black/African American
□ American Indian/Alaskan Native
□ Asian Indian
□ Japanese
□ Native Hawaiian
□ Hispanic/Latino/Spanish
□ Guamanian/Chamorro
□ Filipino
□ Vietnamese
□ Chinese
□ Korean
□ Samoan
□ Other: _____

4. If you (or the child) are of Hispanic, Latino, or Spanish origin, what is your ethnicity?

□ Mexican/Mexican American/Chicano
□ Cuban
□ Puerto Rican
□ Other: _____
□ Not of Hispanic, Latino, or Spanish origin

Health Care ----------

1. Do you (or the child) currently have health (medical) insurance? □ No □ Yes
If No, skip to Question 2

1.1. What type of health insurance do you (or the child) have? (Select one).

□ Medicaid □ Medicare □ Private/Other

1.2. Who pays for the health insurance? (Select one).

□ I pay
□ My employer
□ Government
□ My spouse
□ My spouse's employer
□ Other: _____
□ My parent
□ My parent's employer
□ I don't know

2. In the **past YEAR**, have you (or the child) used any type of health care services from doctors, nurses, clinics, or hospitals? ☐ No ☐ Yes

If No, skip to Question 3

2.1. The **last time** you (or the child) used a health care service, where did you (or the child) go? (Select one).

☐ Hospital ☐ Emergency Room ☐ Private Doctor's Office ☐ Quick Care
☐ Chiropractor ☐ Healer/"Curandero" ☐ Other: _____

3. Do you (or the child) see a dentist at least **one time per YEAR**? ☐ No ☐ Yes

4. What trouble (if any) do you have getting health care for yourself (or the child)? (Check all that apply).

☐ I have never needed health care
☐ I have no transportation/ Too far away
☐ Services are not open when needed
☐ They don't speak my language
☐ I don't feel welcomed
☐ I'll lose my job
☐ Other: _____
☐ I don't know
☐ I don't know where services are available
☐ They don't provide services I need
☐ They don't treat me with respect
☐ They don't understand my problems
☐ It's too expensive/ I don't have insurance
☐ No difficulties or problems getting health care

General Health ----------

1. On a scale of 1 to 10 (with 1 being the worst and 10 being the best, how would you rate your (or the child's) overall health? (Circle the number).

1----------2----------3----------4----------5----------6----------7----------8----------9----------10
Poor Average Excellent

2. Does your (or the child's) health currently limit your (or their) ability to perform vigorous physical activities such as: running, lifting heavy objects, and strenuous sports? (Select one).

☐ No, not limited at all ☐ Yes, limited a little ☐ Yes, limited a lot

3. Does your (or the child's) health currently limit your (or their) ability to perform moderate physical activities such as: pushing a vacuum, climbing 1 flight of stairs, or playing golf? (Select one).

☐ No, not limited at all ☐ Yes, limited a little ☐ Yes, limited a lot

4. On a scale of 1 to 10 (with 1 being the worst and 10 being the best), how would you rate the healthiness of your (or the child's) diet? (Circle the number).

1----------2----------3----------4----------5----------6----------7----------8----------9----------10
Unhealthy Average Healthy

5. How many fruits and vegetables do you (or the child) usually eat **per DAY**? _____ items

6. How many times **per WEEK** do you (or the child) usually eat fast food? _____ times

7. How many times **per WEEK** do you (or the child) usually exercise? _____ times
If zero, skip to Question 8

7.1. When you (or the child) do exercise, how many minutes are spent? _____ minutes

8. How many hours **per DAY** do you (or the child) usually spend watching television, playing video games, on a cell phone, or on a computer? _____ hours

9. Have you (or the child) **ever** smoked cigarettes, cigars, or used other tobacco products?
☐ No ☐ Yes
If No, skip to Preventative Care

9.1. Do you (or the child) **currently** smoke or use tobacco products? ☐ No ☐ Yes
If Yes, skip to Preventative Care

9.2. If no, when did you (or the child) quit? _____

Preventative Care ----------

1. Have you (or the child) ever been tested for exposure to lead, by a blood test?
☐ No ☐ Yes
If No, skip to Question 3

1.1. If yes, where did you (or the child) receive the blood lead test? (Select one).

☐ Health District ☐ Doctor's Office ☐ Laboratory ☐ Other: _____

1.2. If yes, was the blood sample collected by blood draw or the stick of a finger? (Select one).

☐ Blood draw (in a vein) ☐ Stick of finger (capillary)

1.3. What was the resulting blood lead level? ☐ I don't know _____ µg/dL

Quality of Life ----------

1. **For <u>self</u>-report only (Do not answer for the child):** Do you agree or disagree with each of the following statements?

   1.1. You seem to get sick a little easier than other people. (Select one).

   □ Strongly agree □ Agree □ Neither
   □ Disagree □ Strongly disagree

   1.2. You are as healthy as anybody you know. (Select one).

   □ Strongly agree □ Agree □ Neither
   □ Disagree □ Strongly disagree

   1.3. You expect your health to get worse. (Select one).

   □ Strongly agree □ Agree □ Neither
   □ Disagree □ Strongly disagree

Asthma Diagnosis ----------

1. Have you (or the child) ever been diagnosed with asthma, by a healthcare professional?

   □ No □ Yes
   *** If Yes, complete the Asthma Supplement**
   *** If No, complete question 2**

2. Do you (or the child) think you have asthma? □ No □ Yes

   In the past for weeks, did you or your child:
   Have wheezing or difficulty breathing when exercising? □ No □ Yes □ Unsure
   Have wheezing during the day when not exercising? □ No □ Yes □ Unsure
   Wake up at night with wheezing or difficulty breathing? □ No □ Yes □ Unsure
   Miss days of school because of his/her asthma? □ No □ Yes □ Unsure
   Miss daily activities (such as, playing, going to a friend's house, or any family activity) because of asthma? □ No □ Yes □ Unsure

   *** If any of the above are answered Yes, complete the Asthma Supplement**

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