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Low-income rural dwelling families are at risk for more exposure to environmental hazards due to larger percentages of substandard housing, the types of industries found in rural areas, and less access to resources for remediation and environmental education. Public health interventions designed to reduce environmental risks have taken place in the past decade, with expected outcomes of decreased risks in homes and improved health behaviors related to environmental health. Although there have been positive results for improved health conditions and decreases in hazardous exposures, there have been mixed results with health behavior change. Additionally, there has been no exploration of rural families’ health decisions that affect behavior regarding the use of environmental health information.

A qualitative study using grounded theory methodology was undertaken to explore the effects that one public health nursing intervention has had in the process of engaging environmental health information, regarding environmental risk reduction by rural low-income families with children in the Pacific Northwest. Ten participants from the intervention study were interviewed to answer the research question: How do rural low-income families with children use new environmental health information? Participants described three phases of a process in which they received new environmental health information, viewed their perceptions
about environmental health, reviewed cultural and social norms, and re-interpreted risk
messages. A core category of Re-forming the Risk Message was found to play a major role in how
rural low-income families with children perceive risk messages in order to decide on a level of
engagement with new environmental information regarding risks in their homes. Results add to
understandings of how nurses can assess and intervene to refine effective communication
regarding environmental health.
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Dedication

This dissertation is dedicated to my husband Bob, who gave me his support, time, and love in order for me to fulfill my dream.
CHAPTER ONE
INTRODUCTION

A home should be the safest place for anyone, especially from unhealthy environments. Yet, families with children living in over 6 million substandard and old housing units in the United States (US) are at risk for environmental exposures including mold, radon, lead, and carbon monoxide (Centers for Disease Control and Prevention [CDC], 2006b). Health conditions such as asthma and allergies, two of the most rapidly expanding chronic health conditions, have been directly linked to environmental hazards in a home. One notable correlate of families living in substandard housing is the sociological demographic of low income (Evans, 2004). It has been shown that families of low-income have considerably more environmental hazard exposures, and that there are more low-income families in rural areas (Evans & Marcynszyn, 2004; US Department of Health and Human Services [HHS], 2010). Low-income families are often forced to accept living in substandard homes. The rate of substandard housing for rural low-income households is twice the national rate (Housing Assistance Council [HAC], 2010b). Children are more at risk than adults for environmental hazards due to their behaviors and development stages. This increases the likelihood for children in low-income families to have detrimental health effects from environmental hazards in their homes (US Environmental Protection Agency [EPA], 2003, 2009). The additional fact that over 1.6 million substandard and old housing units are in rural areas adds to this risk. Further, low-income rural dwelling families with children living in substandard housing are particularly at risk for
environmental hazards, because they have less access to remediation services and environmental risk reduction education (Balamuragan, Rivers, Sutphin, & Campbell, 2007; HAC, 2010a; Smith, Humphreys, & Wilson, 2008; Wathen, & Harris, 2007).

**Problem Statement**

Public health interventions have been initiated to educate low-income families with children about household hazards in order to decrease health risks to children and improve health behaviors related to environmental health (Butterfield & Hill, 2007; Krieger, Takaro, Allen, Song, Weaver Chai, & Dickey, 2002; Morgan, Crain, Gruchalla, O’Connor, Kattan, Evans, et al., 2004, Postma, 2008). Such interventions have led to improved health conditions for children, increased knowledge in caregivers, various decreases to hazardous exposures, and reduced use of urgent health care services; but the exact mechanisms of action for such interventions have not yet been fully explored.

Most intervention studies regarding environmental health (EH) in the US take place in urban areas. Rather than taking a primary prevention approach to health promotion/disease prevention, many studies have a secondary prevention single disease focus and are intended to produce better health outcomes via behavior change for the particular disease (Butterfield & Hill, 2007). There have been few rural health studies, and, of those studies, most of the focus for rural interventions has been on health policy concerns such as access to health care or workforce issues (Hartley, 2004). The few rural environmental health family intervention studies in the past ten years have also used a single disease with agent approach (such as pesticide use and respiratory illness or triggers of asthma) to assess and educate rural low-income
children and caregivers about risks and health (Evans & Marcynszyn, 2004; Srinivasan, O’Fallon & Dearry, 2003). Results are similar to urban studies in which health conditions improve but health behaviors do not relate to improving physical environmental conditions, and decision making based on delivered health information is unknown.

One recent R01 intervention study (Butterfield, Hill, Postma, & Odom-Maryon, In press) utilized an upstream approach to educate rural low-income families with young children about multiple environmental risks in homes (agents included carbon monoxide, lead, well water containments, moisture for mold and mildew, radon, second hand smoke, and also included information about cleaning products). Desired outcomes included increased knowledge of risks, reduced hazards in homes by evidence of lower biomarker levels for cotinine (for second-hand smoke) and lead, and improved self-efficacy to deal with risks. However, the intervention study specifically addressed stage of action and self-efficacy; it did not examine other concepts associated with health protection such as perceived severity, perceived susceptibility, or cues to action. In addition, the Butterfield et al. study did not examine the means by which families might incorporate EH risk reduction information into their daily lives. In this context, the primary purpose of this current study was to examine the process of decision-making and action in health behaviors in low-income and rural communities.

How health risk information is delivered, how risk messages are received, and whether and how health information is used in future situations, is a compelling area of
interest because if such phenomena are understood, the pathways of decision making that become actual actions and behaviors can be brought to light. It is unknown: 1) what types of specific information are deemed valuable and usable to particular families, 2) how or if the addition of new environmental health information becomes part of the process of health decision making and resultant behavior change, and 3) the degree to which information acquisition provides motivation for families to access the public healthcare system to reduce environmental or other health risks. A knowledge gap has persisted especially for low-income families living in rural areas due to the few intervention studies existing for rural populations, as to the best type and means of delivery of health information, including environmental health information. There has been a critical need for research to explore these environmental health knowledge gaps, with the health and quality of life for rural low-income families and children at stake.

This current study obtained its sample from participants who completed the intervention study referred to above. Participants were recruited to explore the phenomenon of the process of how newly delivered health information is integrated into the lives of rural low-income families with children. Because this phenomenon is based on socially constructed perceptions, biases, and beliefs of these families about decision making, environmental health, and health priorities, a grounded theory qualitative approach was used to uncover the context, social structures, and concepts that affect the use of health information, and in particular, environmental health information.
Purpose

The purpose of this study was to explore the use of environmental health information in rural low-income families with children in order to generate a beginning substantive theory. The long-range goal for this research is to develop theory-guided effective environmental health interventions for rural families that result in better access to resources and services and a reduction in environmental health risks that lead to disease.

Research Question and Aims

The broad research question for this study was: How do rural low-income families with children use environmental health information following a nurse-delivered intervention? The aims of the study were: 1) to identify and describe the context of social conditions and structures that affect how health risk information is understood by rural low-income families, 2) to document what rural low-income families do with new environmental health information, and 3) to generate a beginning substantive theory regarding the use of healthcare information by rural low-income families and impact of health information on health behavior change.

Significance

The goal of most health interventions is to improve health and/or decrease disease. Indeed, many agencies use health promotion/disease prevention as part of a mission statement, and they are the ideals underpinning public health. Interventions designed to educate populations about health problems use many different forms of information delivery to change health behaviors so that health is enhanced. Outcomes
are measured to detect desired behavior change. Yet even when behavior change is noted, there are gaps in knowledge in regard to the mechanisms of behavior change, as noted in nursing, social science and psychology literature (Bridle, Riemsma, Pattenden, Sowden, Mather, Watt, & Walker, 2003; Johnson, Scott-Sheldon, & Carey, 2010; Whitehead, 2000). This study addressed how rural families decided to use environmental health information, in order to more thoroughly understand how behavior change happens and to add to the body of health promotion knowledge.

Public health is the venue for environmental health information and resources. Various public health agencies, such as the National Institute of Environmental Health Sciences, have been charged to assess, research, monitor, and evaluate environmental hazards. Others, including the Centers for Disease Control and Prevention (CDC), have the duty to bring this information together and, using some form of health communication, deliver it to the public. When this information is delivered in community sites or homes, public health nurses are most often the educators for populations. The American Nurses Association (ANA), American Public Health Association (APHA), American Association of Occupational Health Nurses, and the Agency for Toxic Substances and Disease Registry (ATSDR), among many other organizations, have identified the essential need for public education regarding environmental health and the unique role that nurses play in health communication of environmental issues. It is therefore essential for public health nurses to know how populations such as rural low-income families understand and use environmental
health information, in order to deliver the intervention that will best change behaviors to reduce exposures and risks.

There have been few nursing studies that have informed the development of health policy in rural communities taking into account the local values and perceptions of the population. Nurses obtain information about health issues at the “ground zero” level, in homes and communities where people must directly deal with problems that affect them. Health policy influences the types of resources and services available to resolve health problems. Often what a policy offers is not necessarily what will fit the actual problem, due to the “missing” evidence that could be best supplied by nursing. Environmental health policy affecting health programs and health access in rural areas will be improved when nursing can provide more information to researchers and policy makers about beliefs regarding health information, information delivery, and resources and services.

**Definition of Terms**

Terms defined for this study are as follows:

- **Rural**: The term “rural” was defined in the Reducing Environmental Risks to Rural Low Income Families study (NINR #R01 NR009239, PI: PG Butterfield) as rural areas in metropolitan counties (which include a county with a city with a population of 50,000 or more and the surrounding area) using the Federal Office of Management and Budget (OMB) Goldsmith Modification definition (Goldsmith, Puskin, & Stiles, 1993). Cromartie & Bucholtz (2008) note that OMB divides counties into metropolitan areas (core counties with one or more
urbanized areas and the outlying counties that are economically tied to the core county) and nonmetropolitan counties (those counties outside the boundaries of metropolitan areas). The Goldsmith Modification was developed to include those areas in metropolitan counties that have numbers of small towns of less than 10,000 or fewer people as well as scattered populations that commute long distances (over 30 minutes) to reach the urban areas. These areas are deemed rural so that they are eligible for certain funding mechanisms and because they traditionally did not share in the funding given to the urban areas of the county. Therefore the OMB Goldsmith Modification definition of rural of metropolitan counties containing areas or towns of less than 10,000 or fewer people that commute long distances to reach urban areas was used for this study.

- **Family**: Families have many forms. The traditional nuclear family of father, mother, and children, while still in existence, has given way to other types of families. Families now include same gender parents, foster and adoptive families, childless families, extended families, and single parent families among others. Therefore, a broad definition is needed for family to encompass the variety of forms and richness of diversity. The definition from Friedman, Bowden, & Jones (2003) states that family is “…two or more persons who are joined together by bonds of sharing and emotional closeness and who identify themselves as being part of the family” (p.10), was used for this study.

- **Low income**: Although there are numerous definitions of low income, most
pertain to amount of income per year per family size, and use either
means-tested formulas or, more often, the Federal Poverty guidelines (or
poverty level) set by the Department of Health and Human Services. Percentages
of these levels become eligibility criteria for various programs. The definition for
low-income for this study uses the Federal Poverty guidelines (see Table 1). For
the purpose of this study, low income was defined as \( \leq 250\% \) of the Federal Poverty
guidelines, as was also used in the Butterfield et al. study (In press).

Table 1.

2011 Federal Poverty Levels

<table>
<thead>
<tr>
<th>Persons in family</th>
<th>Poverty guideline</th>
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<tbody>
<tr>
<td>1</td>
<td>$10,890</td>
</tr>
<tr>
<td>2</td>
<td>14,710</td>
</tr>
<tr>
<td>3</td>
<td>18,530</td>
</tr>
<tr>
<td>4</td>
<td>22,350</td>
</tr>
<tr>
<td>5</td>
<td>26,170</td>
</tr>
<tr>
<td>6</td>
<td>29,990</td>
</tr>
<tr>
<td>7</td>
<td>33,810</td>
</tr>
<tr>
<td>8</td>
<td>37,630</td>
</tr>
</tbody>
</table>

For families with more than 8 persons, add $3,820 for each additional person.

Note: Source: Federal Register, Document 2011-1237 Filed 1-18-11; 4:15pm ‘The poverty guidelines
updated periodically in the Federal Register by the U.S. Department of Health and Human Services under

- Environmental health: Environmental health defined from the perspective of
nursing as “…freedom from illness or injury related to the exposure from toxic agents and other environmental conditions that are potentially detrimental to human health” (Pope, Synder, & Mood, 1995, p. 15) was used for this study. This definition includes agents due to chemical, biological, and/or psychosocial factors.

- **Risk communication**: Risk communication as defined by Lundgren and McMakin (2004) as “the interactive process of exchange of information and opinions among individuals, groups, and institutions concerning a risk or potential risk to human health or the environment.” was used for this study.

- **Access**: Access was defined for this study using the definition of the Institute of Medicine (IOM) as the “timely use of personal health services to achieve the best possible health outcomes” (Millman, 1993, p. 4), and adds the words “including all areas of the US health system”. Rather than just a narrow focus on primary care, this holistic definition is a system-based definition that includes mental health, chronic care, public health, as well as primary care. This final definition, then, for this study is: *access is the timely use of personal health services, including all areas of the US health system, to achieve the best possible health outcomes.*

- **Health promotion**: This study used the definition of health promotion as stated in the *American Journal of Health Promotion* (O’Donnell, 1989): “Health promotion is the science and art of helping people change their lifestyle to move toward a state of optimal health” (p 5).
Summary

Rural areas are correlated with higher rates of substandard housing, higher rates of low-income status, and more environmental hazards (Evans, 2004; Evans & Marcynszyn, 2004; HAC, 2010a). Substandard and old housing units contain one or more environmental health hazards to families. Children of low-income families living in rural areas are at substantial risk for developing long-term disease or chronic illness from environmental hazards exposure (EPA, 2003; 2009). Few services are available in rural areas for EH information, education, or resources (HAC, 2010b; Smith, Humphreys, & Wilson, 2008; Wathen, & Harris, 2007).

Although interventions have been designed and carried out to improve EH by decreasing environmental hazards in homes, most have taken place in urban areas and few interventions have taken a primary prevention approach to reducing EH risks. Few interventions have taken place in rural settings (Butterfield & Hill, 2007; Krieger, Takaro, Allen, Song, Weaver Chai, & Dickey, 2002; Morgan, Crain, Gruchalla, O’Connor, Kattan, Evans, et al., 2004, Postma, 2008). Although these interventions have been designed to improve health and health behavior, the mechanism of how rather than if new health information is incorporated into actions has not been explored in these studies.

A recent intervention study that used public health nurses to deliver environmental risk reduction education to low income families in rural settings in the Pacific Northwest provided an opportunity to explore the gap in knowledge about how new health information may be used. Rural dwelling residents have their own
meanings of health, including EH. A personal definition of health informs decision-
making and health behaviors (Vahabi, 2007). This personal definition includes the 
meanings, values and beliefs regarding health (including EH) and is socially 
constructed. Grounded theory is a method of scientific inquiry that uncovers the social 
processes of actions (Glaser & Strauss, 1967), including meanings of health and 
behavioral change and was chosen for this current study to investigate how rural low-
income families use EH information. It is critical to understand the process of how a 
health message regarding risks is translated into a meaning of health and what is 
deemed valuable for decision- making and behavior change. This will assist public 
health nurses, as a resource to rural families, to provide the best information to promote 
behavior change to decrease environmental risks in homes.
CHAPTER TWO
LITERATURE REVIEW AND SENSITIZING CONCEPTS

A review of literature for a grounded theory study begins with sensitizing concepts, or general concepts that shape the ideas for questions to be asked and guide the concern for the study (Charmaz, 2006). These thoroughly reviewed concepts become points of departure to further develop ideas and specific concepts during analysis. They increase the sensitivity of the researcher to the problems and issues surrounding the phenomenon of interest rather than guide the researcher to make assumptions before and during analysis (Glaser, 1978, 1992; Charmaz, 2006). A literature review conducted prior to initiating research also delineates more clearly the gaps in nursing knowledge about the phenomenon.

A nursing perspective provides the background for identification of behavioral processes, while the concepts of health promotion, environmental health, and rurality wrap around the main focus of rural dwelling families with children who are low income. These concepts provide a starting point to begin a study of these families and their use of environmental health information.

The following sections will include discussions with summary statements of (a) rurality, including definitions, characteristics, problems and strengths; (b) environment and health, including definitions, hazards, risks, and effects, substandard housing, families with children, and the public health system; and (c) health promotion, including definitions, health information and risk communication, health literacy, decision-making, and self-efficacy. A conclusory review will provide the rationale for
Rurality

Approximately 20% of Americans, or one fifth of the US population, live in rural areas in the US (Agency for Healthcare Research and Quality [AHRQ], 2005). Rural life in the US is often portrayed as idyllic and non-stressful in movies, television, and literary fiction. The image of the rural resident spending the day on the farm interacting with nature or hiking in forests or mountains on a clear sunny day has been common since this country’s beginnings. It would seem that living in a rural community ensures a healthy quality of life. However, rural residents have health concerns as do urban residents, such as lack of insurance. The fact that they live in rural areas affects the health they experience due to the effects of the rural environment. Rural residents experience health issues related to their environment in much the same way as their urban counterparts.

Defining Rurality

Rurality has been difficult to define for research purposes. Several definitions have attempted to capture its essence. Rurality can be defined as a “state or quality of being rural; rural trait or characteristic.” (Rurality, 2006). Rural is usually defined as “place”: not urban, rustic, related to country living and is used to additionally to define rurality (Rios, 1988; Rurality, 2006). Often, the two terms are interchanged and used to mean the same definition. Government agencies measure rurality by accessibility to metropolitan centers or as non-metropolitan/metropolitan due to population density (Cromartie & Bucholtz, 2008). Other measurements include the conditions of density and distance.
(Waldorf, 2006), sparse settlement and remoteness (Lee & Winters, 2006; Vanderboom & Madigan, 2007), and may include distance to emergency care (Weinert & Boik, 1995).

Governments define rural in a geographic sense as not urban, with many different classification schemes (Vanderboom & Madigan, 2007). Each state, territory, and government agency uses some form of rural-urban comparison but differ with the numbers of people and geographical locations. Rural is defined by the OMB for the US Census Bureau as areas such as territories and housing units not in urban clusters (census blocks of 2500 residents) or urban areas (50,000) (OMB, 2010). The State of Washington Department of Health (DOH), as an example, uses a four tiered classification system using various definitions from federal government agencies, commuter information, and zip code designations. It states that small towns and isolated rural areas have “towns with populations below 10,000 and their commuter sheds and other isolated rural areas” for county data (Washington State DOH, 2006).

Rural is also classified by the OMB as metro and nonmetro areas. Metro areas are defined as 1) central counties with one or more urbanized areas and 2) outlying counties that are economically tied to the core counties (measured by distance and numbers of people that commute to work). Outlying counties are included if 25 percent or more of workers commute to the core counties, or, in the reverse, if 25 percent of the employment in the county consists of workers coming from the core county. Nonmetro counties are outside the boundaries of metro areas and subdivided into two types: 1) micropolitan that have one or more core areas of urban clusters of 10,000 or more...
persons, and all remaining "noncore" counties (Ricketts, Johnson-Webb, & Taylor, 1998; Kusmin, 2009).

The varied rural definitions are used in research as a measurement factor. Each classification was developed for a different purpose and can affect research studies in the areas of sampling, analysis, or interpretation (Vanderboom & Madigan, 2007). As an example, one federal definition of rural would exclude low-density rural areas close to a large urban city, which are mostly found in the larger Western states, while another would include them (Vanderboom & Madigan). The inclusion of county for one definition and not for another also impacts the number of rural areas; basing a definition on numbers of people per square miles can split regions and states, so that regional differences are not taken into account. Since government funding may be tied to population density, the use of different definitions can also have an influence on the economic features, and the resulting impact on health, of an area. Using one of the federal definitions can make a difference in the areas chosen for study and the related outcomes. Since nursing research in rural areas influences both practice and policy, the choice of definition should be carefully made depending on the phenomenon of study (Vanderboom & Madigan). For research with low-income rural families, the use of the OMB definition suits the study, due to the choice made by the Butterfield et al. (In press) intervention study and the fact that this study is located in two large Pacific Northwestern states. These states have many areas that are sparsely populated surrounding a larger city.
Characteristics

One problem in applying one of the federal government’s definitions of rural to the present study is that such broad definitions often fail to account for regional variations in rural characteristics. It is important to understand factors of rurality in order to learn what might influence rural populations and health behaviors. It is known that rurality is associated with certain demographic features, lifestyle and values, and social features. Rural “as place” is described in terms of an area not urban or suburban, living a simple life, having homogeneity, with specialized economic bases including agriculture, forestry, mining, industry and government. Social factors include poverty, large populations of older retired persons, and variable employment trends (Rios, 1988; Kusmin, 2009). Rural residents are medically underserved, report poorer health, have more chronic illness, are less likely to receive preventative care, die more often from heart disease, and report shorter life expectancies and increased rates of disabilities, accidents, and poisonings (Eberhardt & Pamuk, 2004; Hartley & Gale, 2003; Kusmin, 2009; Wathen & Harris, 2007). Studies found that rural residents with chronic illnesses, including families with children, stay in their communities and use fewer medical services (Goins & Mitchell, 1999; Thruston & Meadows, 2003). Possible reasons noted were disinterest in formal services, lack of access to services, self-sufficiency attitudes, or avoiding the reality of giving up their livelihood.

The US Department of the Interior National Park Service has developed eleven characteristics of rural landscapes to help understand all of the factors that make up rural areas (Flint McClelland, Keller, Keller, & Melnick, 1999). These characteristics
include: 1) land use, 2) patterns of spatial organization, 3) response to the natural environment, and 4) cultural traditions. They also incorporate physical components of: 1) circulation networks (transportation), 2) boundary demarcations, 3) vegetation (related to land use), 4) buildings, objects, and structures, 5) clusters, 6) archeological sites, and 7) small-scale elements (those stand-alone features that may have historical or significant value to the local setting such as an old windmill or lighthouse). These characteristics are valuable tools to help define the context and social structures of a rural area, since all rural areas are different. Different historical uses, cultures, and industries of an area make up local culture and influence values and beliefs. Geographic location of rural areas can influence the type and numbers of populations, the amount of services available, transportation issues, and the economic base (Kusmin, 2009). As an example, a rural population that has a long history connected to dairy farming may not be aware of the problems of manure as a possible water contaminant. Another rural community that has light industry contributing to air contaminants near a cluster of homes may overlook decreased air quality due to the job security provided nearby.

Traits of rural populations include self-reliance, role diffusion, lack of anonymity, and independence (IOM, 2005; Lee & Winters, 2006). These traits can affect how rural populations view health and health services. Noting that nursing research with rural populations has uncovered unique concepts of health, Lee and Winters (2006) have developed a series of statements to explain the concepts and provide a base for rural
nursing theory. These concepts include how rural populations define health and reasons or traits of health care use. Lee and Winters found that defining health includes the ability to work or play and be productive. In order to live within this definition, a rural person may deny health concerns in order to maintain productivity. Self-reliance includes a resistance to “outsiders”, individuals or agencies from “outside” the specific rural area or culture. This includes some health care services as well as social agencies that might provide resources to resolve or remediate health concerns. Insiders or group members are trusted, as are “oldtimers”, the people that have been in the area for a long time and are valued for their knowledge. Informal networks include family and friends and are used as support and for guidance. All of these traits affect what rural populations do with health information and how they use it in defining a meaning of health for themselves.

**Rural Problems and Strengths**

Urban and rural residents share health care problems such as lack of mental health services, lack of insurance, and lack of primary care providers. It has been noted that although these health concerns are similar for both urban and rural populations, differences do exist. The Bureau of Justice Statistics (2000) reports that urban residents have higher rates of violent crime, gang problems, and property crimes. Urban populations have high population density, air pollution, increased rates of HIV, and occupational and environmental hazards that affect health (*Urban versus Rural Health*, n.d.). However, infrastructure available to urban residents may be nonexistent for rural communities, such as fire and police services, municipal drinking water systems, or
sewage disposal. Without services, rural populations are left to take care of environmental safety issues by themselves (CDC & US Department of Housing and Urban Development, 2006). With the exception of population density issues and crime, rural residents have more problems overall due to the lack of infrastructure, lower income and education levels, greater need for health safety nets, and isolation (Gamm & Hutchinson, 2004).

Rural areas have strengths in social networks, community responsibility, and social capital so that they are skilled at devising services that are needed when they aren’t available (Debertin, 1996; IOM, 2005). Rural populations often regard living in a rural area as a benefit to health (Winters, Tomlinson, O’Lynn, Lee, McDonagh, Edge, & Reimer, 2006). Although rural communities have environmental hazards and risks that impact health, the strengths of rural areas along with the preference of rural residents to live there can be used to develop and deliver specific health messages about EH risks.

Summary

Rural areas are unique both in place and in characteristics of rural populations. There are a number of definitions of rurality that affect health research and policy. To begin a study of environmental health information use by a rural population, a definition must be chosen that provides the best setting for the phenomenon of EH information use. It is important to understand the social makeup of rural areas, the geographical landscape, the historical background, and characteristics of rural populations in order to learn how risk messages are received, how a definition of EH is
formed and how health behaviors are influenced by social structures within rural communities.

**Environment and Health**

"Just as there may be a time lag between [pollution] emissions and exposure, there may also be a time lag between exposure and [human or ecological] damages."

**US EPA, Unfinished Business: A Comparative Assessment of Environmental Problems**

The three factors affecting human health according to Healthy People 2020 are those of genetic, personal behavior, and environment (HHS, 2010). Of these factors, the environment is not only a “stand alone” factor determining health but also can affect the other factors. Exposure to hazards from toxic agents and disease in the environment impact physical, mental, and emotional health, and can leave lasting genetic damage in fetuses and young children (US Environmental Protection Agency [EPA], 2003). Regional and cultural health behaviors in response to local environmental issues have been found to vary widely. Examples of such behaviors range from towns ignoring coal dust risks to the intentional use of lead oxide (aka Greta) as a stomach remedy in Mexican communities (Aguirre & Hernandez, 2003). The critical impact of the environment on human health has led to global and national efforts to study causes and effects of hazards, to determine the risks they pose to populations, and to develop interventions to prevent health problems and promote health.

A review of the environment and health literature follows, including the definition of environmental health, discussion of hazards, risks, and health effects, role of the public health system, and environmental health interventions.
Defining Environmental Health

Environment is broadly defined as both a physical condition (air, water, and soil through which exposure to chemical, biological, and physical agents may occur) and a social condition (housing, employment, transportation, urban development, land use, industry, and agriculture) (HHS, 2010). The environment affects all aspects of health and can provide a safe place that enhances health or one full of risk exposures such as work-related stress, injury, and violence. When health is impacted by an environmental factor, it becomes an environmental health issue.

The World Health Organization (WHO) states:
Environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to environment, as well as behaviour related to the social and cultural environment, and genetics (Prüss-Ostün & Corvalán, 2006, p 22).

This definition is widely used in the conduct of epidemiological research. Using an epidemiological framework, interventions are targeted towards change in natural or physical factors, and actions related to them. Epidemiological interventions do not address social or cultural factors, other than to the extent that such factors influence the exposure to one or more agents. Projects are designed to include only those factors or
behaviors that can be modified, such as use of hand washing to prevent infection or land use planning to encourage walking.

Nursing has a broad and more holistic view of environmental health. Health encompasses the total person: biological, psychological, social, and spiritual. Any or all of these factors may be affected by a health problem or condition. Causal agents for some health problems may be due to social or cultural as well as environmental conditions. In fact, physical environments may be manipulated to suit certain social or cultural ideals. In the past, American Indians burned forests or grasslands in order to harvest certain animals for food or to stimulate new plant growth. Occasionally fires got out of control, causing extreme damage to the physical environment as well as smoke inhalation and burns to the people. Similarly, grass farmers today use the same practices of burning to remove old straw after harvesting seed. This practice that remains as a cultural farming practice causes many respiratory problems such as increased asthma symptoms. To ignore the cause of the problem and only treat the symptoms does not provide complete health care and does not dignify the total human being. Therefore, environmental health, from a nursing perspective, can be defined as physical, mental, or behavioral health outcomes related to environmental conditions (Pope, Synder, & Mood, 1995). Indeed, the Agency for Toxic Substances and Disease Registry (ATSDR) notes that nursing, with its unique perspectives of health care, directly serves various groups of people from many social and cultural backgrounds,
which in turn informs nursing care. Nursing is in one of the best positions to provide environmental health information to diverse groups of people (ATSDR, 2005).

**Conceptual models.** A translational research agenda requires a holistic perspective as well, incorporating not only biological factors but also behavioral and mental factors to begin to piece together a whole view of a health risk or condition, rather than as bits and pieces that individually target only a physiologic or psychological response. Ecosocial and social epidemiologic models that are multidimensional are now used to study environmental health, such as Dixon and Dixon’s *Integrative Model of Environmental Health* (2002). Realizing that environmental health requires an upstream interdisciplinary approach (one in which problems are prevented rather than solutions sought), the model includes areas that cover not only biophysical but also other contexts of the environment. The authors noted that many studies involving environmental health only address physiologic health since much of the research involves toxicology and epidemiology. They believe that while this area is important, it should be a “starting point,” leading to an integrated and more complete understanding of all domains of health including vulnerability, personal and social knowledge, and health actions.

It is noted that one goal of Healthy People 2020 is to “promote health for all through a healthy environment” and that a healthy community is one in which both physical and social environments are created and improved (HHS, 2010, Goal statement). Since people do not live in a vacuum, but instead live in environments, all
factors that affect health within the social and physical environments can be considered. Even WHO defines health as a state of complete physical, mental, and social well being, rather than just the absence of a health problem (1948). If “complete” includes the whole person and his or her environment, then “complete well being” also includes factors of environmental health beyond the physical or natural environment.

Organizations, governmental agencies, and health disciplines have definitions and theoretical frameworks of environmental health that suit their purposes and research agendas. These definitions and frameworks are found in the literature and on web sites. It is unknown, however, what various populations use for a definition. Many research interventions are developed with a known definition, and the assumption that the population of study has, or accepts, that same definition. However, a population may have its own perceptions and beliefs about environmental health, prior to any intervention. Without an understanding of personal and socially constructed definitions, well- meaning interventions may not achieve the intended health outcome. It is critical to understand locally constructed meanings of environmental health, and how they are constructed, in order to communicate the correct message that will enact behavior change.

Hazards, Risks and Effects

A hazard is defined as a source of danger or exposure to something that can cause bodily harm or loss, a chance, or potential to cause harm. Hazardous effects are the results of exposure to a hazard. Risk is the probability or likelihood of harm or adverse outcome (Cefic, 2003; Lundgren & McMakin, 2004). Although related, a hazard does not
necessarily equate with risk (Cefic, 2003). An extremely hazardous material may not be considered high risk when used as designed and in appropriate circumstances: propane used to fuel a torch used in welding or chlorine bleach used for disinfection. On the other hand, a normally non-hazardous material, such as baby powder, may have a life-threatening risk if used incorrectly, by squeezing the container in the air so that the talc particles are inhaled into lungs, repeatedly. Not only are types of hazards and outcomes considered in risk, but also the degree of exposure of the hazard, and when considering human health, other factors such as age, gender, and health condition.

Environmental hazards include chemical, biological, and physical agents that affect human health. Exposures may come from inhalation, ingestion, or skin absorption. Although people may worry about media reports of serious environmental hazards in outside environments, much of this exposure occurs indoors. Americans spend an estimated 90% of their time indoors, at work or in homes, schools, or daycare (Davis, 2007). Environmental tobacco smoke, unpotable well water, lead, or carbon monoxide are but a few of the hazards that families may be exposed to in homes, leading to acute and/or chronic health conditions. Home environments may contain house dust, mold, and chemical residues that contribute to asthma and allergies (Butte & Heinzow, 2002; Krieger et al., 2002; Richardson, Eick, & Jones, 2005). Radon is a known carcinogenic and is found in homes in certain areas of the US (Field, Steck, Smith, Brus, Fisher, Neuberger, & Lynch, 2001). Chronic low-level exposures of many environmental hazards in homes are now thought to play a role in the increasing
numbers of diseases such as autism, cancer, and asthma (National Institute of Environmental Health Sciences [NIEHS], 2008; US EPA, 2003). However, Davis and Farland (1998) note that although there has been research showing casual effects on health from environmental hazards, much of it has been in experimental research with high doses. Results from these doses are then extrapolated to relevant lower long term dosing where humans have contact with the hazard. It is unknown exactly what doses of various hazards begin to affect health or for over what time period. This presents some uncertainty about the amount of risk for a hazard over time. Current studies are continuing to develop better risk assessment for environmental hazards and what doses over time may affect health, especially with more knowledge of genetic responses (NIEHS, 2008, US EPA, 2009). Even so, it has been shown that there is a relationship between low level chronic exposure to environmental hazards and human health, and that is best to remain conservative about risks to protect public health, especially in homes (Davis & Farland).

The health consequences of substandard housing. An estimated 4 million children in the United States are living with their families in one of over 6 million substandard and old housing units that contain tremendous environmental hazards (Bashir, 2002; CDC, 2006b). The rate of substandard housing for rural low-income households is twice the national rate, with over 1.6 million old and substandard units (CDC, 2006b; HAC, 2010a). Substandard housing is defined as either dilapidated (units that are considered unsafe and not adequate as shelter, endangering the health, safety,
or well being of a family) or declared as unfit by a government entity (International Conference of Building Officials, 1997, Chapter 10). Examples include lack of indoor plumbing, no safe source of heat, or unsafe electrical service. Old housing may be adequate as shelter but contain environmental hazards or risks from lead paint, poor water sources, or decomposing building materials. Health consequences of living in substandard or old housing are well documented, such as respiratory disease, neurobehavioral conditions, or mental health problems (Bashir, 2002; CDC, 2006a; Clarke & George, 2005; Krieger & Higgins, 2002). For example, combustible fuel sources used for heat can release toxic chemicals into indoor air (Clarke & George). Although lead poisoning rates have dropped over 77% in the past 15 years, evidence still shows that children from Black and low-income families continue to have unacceptable blood lead levels from sources such as old paint and dust in older homes and on the ground (Bashir, 2002). Lead poisoning causes decreased IQ, hyperactivity, and learning disabilities from neurological damage (Bashir; Moya, Bearer, & Etzel, 2004). Health conditions such as asthma and allergies, two of the most rapidly expanding chronic health conditions, have been directly linked to environmental hazards in a home (Krieger & Higgins, 2002; Richardson, Eick, & Jones, 2005). Evidence is mounting that living in poor housing with environmental risks not only cause disease or illness but also contribute to increased stress that affects the immune system over time (Bashir; Krieger & Higgins; Srinivasan, O'Fallon, & Dearry, 2003; Adler & Newman, 2002).
**Families with young children.** Children are especially vulnerable to long term exposure and have greater risk of exposures with greater risk of harm. Environmental hazards affect both physical and cognitive functioning due to their small size, which increases exposure to contaminated materials found in or on the ground (US Environmental Protection Agency [EPA], 2003). Since they are also undergoing brain and body development, environmental hazard exposures can cause long term or permanent damage to body systems. Children under the age of six exhibit behaviors in play and exploration that increase exposure, since they may be crawling or sitting at ground level and have more hand-to-mouth activity. Children also get the same amount of exposure as an adult but with less body mass to diffuse the effects, and have immature physiologic and metabolic pathways, so that their bodies are less able to protect against toxic exposures (Bearer, 1995, NIESH, 2008). Women who are pregnant are not only vulnerable to risk exposures but expose the fetus to the same hazards, and after delivery, can also provide an additional pathway to exposure for an infant via breast milk (US EPA, 2003). Children are also dependent on adults to make environmental health care decisions. They rely on their caregivers to have adequate information to reduce environmental risks in the home. Children’s risks increase if their caregivers are unaware of the exposures or hazards in the home environment. All of these factors combine to make environmental health a critical need for families with young children.
Within their own homes, behaviors and actions of family members affect each other and any exposure risk from one member can disrupt the other members and the family as a whole (Friedman, Bowden, & Jones, 2003). Smoking is a serious health risk to the smoker and also becomes an exposure risk as second hand smoke to the non-smoking members. A parent’s stained glass hobby may add lead particles to the environment, increasing children’s blood lead levels. While many families are aware of environmental hazards and risks of exposure in their communities, they are often unaware of environmental hazards and risks affecting their health within their own homes. For those families that are aware of home risks, they may be unsure of how to take action to reduce them or may not perceive them as a problem. However, since a family home is private property, whether rented or owned, it becomes the family’s responsibility to not only be aware of home environmental hazards and risks of exposure but also to deal with them.

**Socioeconomic status.** Socioeconomic status (SES) includes not only actual income but the “…ability to absorb losses and enhance resilience to hazard impacts.” (Cutter, Boruff, & Shirley, 2003, p 248). Lower SES has been shown to be related to poor health, unhealthy living conditions, food neglect, less access to health care, greater incidence to harmful behaviors, and increase psychosocial stresses which lead to an increased susceptibility to disease (Sapolsky, 2005). With lower SES, there are fewer economic and educational resources to access and use health information. Lower SES and race/ethnicity have been correlated to poor housing and greater risks of exposure
to environmental hazards (Adler & Newman, 2002; Taylor-Clark, Koh, & Viswanath, 2007). Homes that may be affordable are often in poorer condition. Higher rates of asthma have been reported in low SES children (Krieger et al., 2002). The AAP (2005) reports that although children’s blood lead levels have been decreasing in the past decade, approximately 25% of children in the US live in older housing with deteriorating lead based paint, with lead levels still continuing to be higher for black and poor children. Noise exposure from overcrowding in homes is linked to hypertension in adults and poor long term memory, reading deficits, and high overnight urinary catecholamine levels (Adler & Newman). After controlling for various demographic factors, Evans and Marcynyszyn (2004), in a study of rural children in upper New York, found that higher cumulative environmental risk was positively correlated with housing problems (t [214] =8.31, P<.01) and on a physiologic level with high neuro-endocrine hormone levels for children of low SES as compared to those of middle SES (t [214] =5.62, P<.01). These higher hormone levels indicate physiologic stress that can damage organs over time. It is evident from these studies that low SES plays a role in environmental health; with lower SES, one is more apt to have environmental hazards in the home and the resulting health effects that come with them.

Public Health System

Because it is so critical to health, the environment is protected by the public health system, which includes federal, state, and local agencies in the US. Indicators of a healthy environment are tracked to provide information about a community’s health.
Hazard indicators include water and air quality, toxic substances, noise, disasters, and pesticides (CDC, 2006a). Safety guidelines regarding environmental health risks have been developed to protect the public, with much of this information disseminated through the public health system. Policies and regulations designed to protect both the environment and population health are mandated from legislative bodies and federal public health agencies, and carried out by state and local public health departments (Nies & McEwen, 2010). The core functions of public health are assessment, policy development, and assurance, through which the health of the public is maintained (Nies & McEwen, 2010).

However, the US public health system is simultaneously complex and fractured, with many agencies and organizations (Shore, 2007). The Federal Department of Health and Human Services (HHS) as the primary source for protection of health in the US, oversees the agencies of the CDC, Health Resources and Service Administration, National Institutes of Health, Food and Drug Administration, and the Agency for Healthcare Research and Quality. Health policy is directed by the US Surgeon General and the CDC. The US Department of Agriculture (USDA), EPA, Department of Defense, Homeland Security, Occupational Safety and Health Administration, Indian Health Services, and Department of Veterans Affairs also have roles within the public health system. There are volunteer organizations that also assume some public health functions such as the Red Cross. States all have differing structures as well, with most of them using a combination of state, county, and/or city health departments and
health boards (Lister, 2005). As one example, Washington State has 35 different public health jurisdictions at local levels with three main agencies overseeing various functions at the state level (APHA, n.d.). Each agency and organization from federal to local levels has some stake in environmental health, but there are differences, with some at policy levels, some engaged in research, and some monitoring and delivering direct population health care. With so many agencies and levels of administration, accessing the public health system for an environmental health concern may be confusing and complicated to a member of the public.

Funding the public health system adds another issue. Only 3% of the $2.3 trillion spent on health in 2008 went to public health (California Health Care Foundation, 2010). In 2005, $54 billion was spent on public health with only 29% coming from the federal government with states and local governments making up the rest of the budget (Lister, 2005). Federal cuts to all areas of public health have continued since 2005 (Levi, J., Vinter, S., Segal, L., & Laurent, R., 2010). Across the US, state, county, and local public health departments (PHDs) have suffered budgets cuts due to loss of federal funds and economic recession, reducing both programs and staff on a local level (Rosenblatt, Casey, & Richardson, 2002; Levi, J., Vinter, S., Segal, L., & Laurent, R., 2010). This is especially critical in rural areas where environmental risks are increased and where the local PHD may be the only agency that provides health information or resources to the community.
Public health nurses. Within the public health system, public health nurses are responsible for protecting and promoting population health. (Quad Council of Public Health Nursing Organizations, 2007). They work with individuals, families, communities, and systems in a variety of situations to deliver health care and education, and evidence is accumulating of their critical roles to positive improvement of the health of the public (Corrarino, & Little, 2006; Izzo et al, 2005; Olds, et al. 2004). The APHA (2010) states that two of the strengths of public health nurses are the role in advocacy and the ability to use knowledge from health and social sciences and translate it into targeted interventions and programs.

Public health nurses are the primary educators regarding environmental health for their communities. Public health departments in rural areas use nurses to deliver needed services, with most nurses living in the same areas that they serve. Lauder, Reel, Farmer, and Griggs (2005) report nurses living in rural areas are invested in their communities and provide access to health services that might not otherwise be available. They further state that rural nurses are socially connected and vital to sustainability of a rural community. The connected social status of rural nurses make them particularly valuable in delivering health information, especially those in public health departments that work on community issues. Additionally, it has been shown in a small study in Washington that public health nurses are the only regular PHD staff members available in rural areas (Rosenblatt et al., 2002).
**Access to public health.** Most studies of health systems access discuss the primary health care system of acute care. Access theories have been developed to view access as (a) “use”, the use of services and outcomes that could be measured, or (b) “fit”, the fit between patient and system (Anderson, 1995; Ricketts & Goldsmith, 2005). Focus on indicators of access lead to assessments of service and underservice in communities of primary and acute care, along with rates of use and costs. However, most measurements of access do not include people’s beliefs about the system, how it will serve them, how much they trust it, or how much benefit they receive from use of the system because the process of how healthcare and a healthcare system is perceived by users is not known (Ricketts & Goldsmith).

Likewise, there are measurements for public health regarding frequencies and demographics of users of certain services (Perrin & Koshel, 1997). Because one core function of public health is that of assurance (IOM, 1988), local PHDs are responsible for promoting and protecting health with resources and programs, including the regulation of local environmental health hazards. There are cost figures for programs and estimates of cost effectiveness. Accessible services that are available and provided are measured. However, just as in other health systems, there are no reports regarding how access occurs for environmental health needs by populations on local levels.

It is unknown if there are barriers that prevent people from receiving the health information they need to improve their own home environments or if given this information, if there are barriers to resources within PHDs. However, based on personal
experience, it can be a daunting experience to get health information from the local PHD. Just as the larger system is fractured into many agencies and levels, local systems may be fractured into many departments that do not communicate either within the local system or with the larger regional one. When I had to get well water information about our community well system, I was given several different pieces of information ranging from “I don’t know, but it isn’t our department” to “I think you have to get that from the state.” Patience and persistence paid off with actual local and state written guidelines and regulations from the local PHD. If that experience was difficult to a health professional who understood the terms and how to navigate the system, one can only imagine what happens to people who don’t have “health language” or systems savvy.

Accessing a health system is a health behavior (Anderson, 1995). It is a goal for promoting environmental health for families to increase health behaviors that reduce or eliminate environmental risks in homes. It is important to know if families given environmental health information by public health nurses actually use that information to take action about risks in their homes and if they feel empowered to access the local PHD and get the needed information and resources. It is equally important to know what information is valued and used by populations so that public health nurses can deliver the most appropriate information.

**Public Health Environmental Interventions**

Interventions are in place to educate populations about risks and preventative measures to protect health (Tinker & Silberberg, 1997.). Media campaigns, for example,
stress the positive benefits of vaccinations and tobacco cessation. Steps to reduce allergens and dust in homes have been implemented in areas such as King County, Washington. Many of these interventions have taken place in urban settings where access to information is available through a number of methods. Few studies have been done in rural areas (Butterfield & Hill, 2007). Most studies, regardless of place, use a single agent-single disease secondary prevention focus. To more thoroughly understand the types and scopes of EH interventions in families with children in the US, a review of the literature review from a ten-year period (1998-2008) was done using the databases of CINAHL, PUBMED, ISI Web of Science, and the Cochrane Library. Search terms included “home”, “intervention”, “environmental health”, “US”, and “children”. Out of 79 articles that discussed some form of in-home intervention for environmental health risks to children, a total of 17 articles were reviewed that included some type of health education for families regarding EH risks. Much of the focus was on lead contamination, asthma and allergies and triggers, healthy homes projects, and smoking.

Two critical reviews of the literature from the Cochrane Library dealt with smoking programs for families to reduce the risk of second hand smoke to children, either in community settings or in homes for a total of 74 studies (Priest, Roseby, Waters, Polnay, Campbell, Spencer, et al., 2002; Secker-Walker, Gnich, Platt, & Lancaster, 2009). Noting that second hand smoke has long-term health consequences for children, authors for both reviews noted that only intensive clinical counseling was
effective and that moderate smokers had slightly improved quit rates over heavy smokers. Lead levels in children have been decreasing but not in poor or Black families (Jones, Homa, Meyer, Brody, Caldwell, Pirkle, et al., 2009). This has been due to policies that have reduced the types of building and home materials that contain lead, lessening exposure. Yeoh, Woolfenden, Wheeler, Alperstein, and Lanphear (2008) in a review of twelve studies noted educational or dust control interventions were not effective in reduction of blood lead levels but stated that more study was needed to discover how best to educate families.

Over ten articles dealt with projects to improve home environments. Many of these articles were also reviewed by Postma (2008). She observed, in an analysis of seven clinical trials designed to reduce environmental hazards of asthma for urban children in homes, that results that trigger behaviors to reduce environmental hazards were mostly tied to resource provision. When resources were given to decrease risks, such as mattress covers or vacuum cleaners, reports of asthma incidents lessened. In these trials however, lack of use or explanation of theoretical concepts that mediate behavior change was notable. Due to this omission, it was difficult to show exactly what factors within interventions may be the cause for success or not, including roles of health professionals. In another study, authors noted that that it may be the effect of a visit or involvement of a health care worker that is really the cause for any significant outcomes, rather than the intervention itself (Takaro, Krieger, Song, & Beaudet, 2006).
In one eastern US project to reduce asthma triggers in children, one urban site and one rural site were used to compare place differences as well as group differences (education-only groups to house interventions-with-education groups). Repeated measures designs were used. Although differences were noted in demographics and length of time for symptom improvement, both sites had similar results showing that housing improvements contributed to fewer symptom days and more effective medication use. However, the study was limited in that health care usage was difficult to determine in the urban site. Housekeeping habits did not significantly change even with knowledge of poor housekeeping contributing to poor health in either site (Stillman, 2007).

Home interventions have increased health status for many children and their families by decreasing illness and numbers of health service visits. Caregiver knowledge about aspects of EH has improved and, in several studies, homes have been modified to reduce environmental risks. There are still mixed results for improving health behaviors of risk reduction. These studies did not include the study of the mechanism of behavior change.

**Summary**

Nursing conceptualizations of EH are inherently broad and incorporate multidimensional factors. Using this nursing definition within research promotes a deeper understanding of human health that is impacted by EH risks, including risks in homes of rural dwelling populations. A large number of low-income rural families with children live in substandard and old housing that contain a number of environmental
risks. Environmental hazards in homes affect the family’s health status. Children are more at risk for long-term effects that have tremendous economic and human costs. Rural low-income families often experience substandard housing, poorer health, higher risk behaviors, and increased environmental hazards. The absence of community and economic resources prevent these families from accessing health services to deal with EH hazards. Communication of EH risks is best given by nurses, who are the primary health promotion educators for rural communities.

As noted, many interventions have had some significance with improved health outcomes. However, most have targeted an ongoing health problem rather than utilizing primary prevention to neutralize health risks before they become a problem. The purpose of the Environmental Risk Reduction through Nursing Intervention and Education (ERRNIE) interventional study (Butterfield, et al., In press) was to educate low-income families about multiple environmental risks in homes with the goal of decreasing EH conditions. Desired outcomes included increased knowledge of risks, reduced hazards in homes by evidence of lower biomarker levels, and improved self-efficacy to deal with risks. The ERRNIE study was not primarily intended to explore the phenomenon of health information use, or how information is translated into behaviors, which is best discovered through qualitative analysis designed to uncover persons’ beliefs about and associated meaning of health and health information.

This is the gap in health promotion knowledge that this study is posed to address, in order to more thoroughly understand how behavior change happens. Grounded
theory methodology was selected because of the need to document foundational
knowledge about how rural living, low income families impute meaning to new health
information and how these socially constructed meanings influence the dynamic
process of health behavior change.

Health Promotion

Defined as “…the process of enabling people to increase control over, and to
improve, their health” (WHO, 1986), health promotion (HP) incorporates factors of risk
communication, health literacy and use of health information, and decision making to
improve health. Theories have been developed to address health problems from two
approaches: 1) explanatory: in order to show why a problem exists; and 2) change: to
guide development of interventions (Rimer, Glanz, & Su, 2005). Most HP theories use a
socio-ecological perspective, in order to look at problems from the individual to a
systems level with all social and physical factors included. Rimer, Glanz, and Su (2005)
note that types of HP theories (see Table 2) include interpersonal (Social Cognitive
Theory), individual (Health Belief Model or Transtheoretical Model), and community
level (Diffusion of Innovations). The purpose of programs using HP theories is to
motivate populations to change or improve health behaviors towards better health (see
Table 2). Therefore stated goals of health promotion theories are to explain and
influence behavior (Krieger & Higgins, 2002; Rimer, Glanz, & Su, 2005; Nutbeam, 2000).
Table 2.

Health Behavior Change Theoretical Models

<table>
<thead>
<tr>
<th>Theory/Model Name</th>
<th>Level of Influence</th>
<th>Concepts Important to Model</th>
<th>Main Features</th>
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</table>
| Health Belief Model (Developed by US public health researchers - Hochbaum, 1958; Rosenstock, 1966; Becker 1974) | Intrapersonal | Characteristics that influence behavior: knowledge, attitudes, beliefs, and personality traits | 1- Perceived susceptibility  
2- Believe I am susceptible  
3- Believe the condition has serious consequences  
4- Perceived severity  
5-Perceived benefits  
6- Perceived barriers  
7-Exposed to factors that prompt action  
8-Self efficacy |
| Stages of Change (Prochaska & DicClemente, 1983). | Intrapersonal | Motivation and readiness to change | 1-Precontemplation- no intention of taking action within next six months  
2- Contemplation- intend to take action in the next six months  
3- Preparation-intend to take action within the next thirty days and has taken some behavioral steps in this direction  
4-Action-changed behavior for less than six months  
5- Maintenance-changed behavior for more than six months |
| Precaution Adoption Process Model (Weinstein & Sandman, 1992) | Intrapersonal | Unaware of issue, unengaged with issue, deciding about acting, decision to act, acting, and maintaining behavior | 1-Pass through each stage of precaution adoption without skipping any  
2-Is possible for people to move backwards from some later stages to earlier ones  
3-Once first two stages completed they do not return to them. |
### Social Cognitive Theory (Bandura, 1977)

**Interpersonal Processes**
- Primary groups: family, friends, and peers that provide social identity, support, and role definition

**Key Components**
1. Interaction of the person, behavior, and environment
2. Knowledge and skill to perform behavior
3. Anticipated outcomes of a behavior
4. Confidence in one’s ability to take action and overcome barriers
5. Behavioral acquisition that occurs by watching the actions and outcomes of others’ behavior
6. Responses to person’s behavior that increase or decrease the likelihood of reoccurrence

### Diffusion of Innovations (Rogers, E., 1962)

**Community Processes**
- Social networks, norms, or standards, among individuals, groups, and organizations, rules, regulations, policies, and informal structures, local, state, and federal policies and laws that regulate or support healthy actions or practices for disease prevention, early detection, control, and management

**Key Components**
1. How new ideas, products, social practices spread in an organization, community, or society
2. Idea, object, or practice thought to be new by an individual, organization, or community
3. How ideas are transmitted from one person to another
4. Group of individuals who adopt the innovation
5. How long it takes to adopt the innovation

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Many agencies use health promotion/disease prevention as part of a mission statement, and they are the ideals underpinning public health. Interventions designed to educate populations about health problems use many different forms of information delivery to change health behaviors so that health is enhanced. Outcomes are measured to detect desired behavior change. Yet even when behavior change is noted, it remains...
unknown how the change occurred. A review of health education interventions spanning over 50 years has shown that the one area that has not had significant or sustainable improvement is that of behavior change (Nutbeam, 2000). Interventions typically use a science-based perspective to operationalize definitions of health and health issues. It is often assumed that populations share or are aware of these definitions and also of the language and meanings used in education materials. However, populations have their own socially constructed definitions and meanings of health (Taylor-Clark, Koh, & Viswanath, 2007; Vahabi, 2007). Without an understanding of personal and socially constructed definitions, well-meaning interventions may not achieve the intended health outcome. It is critical to understand locally constructed meanings of EH, and how they are constructed, in order to communicate the correct message that will enact behavior change.

**Communicating Health Information**

Communication is the process of sharing information about thoughts ideas, or emotions and how information “...is exchanged between individuals through a common system of symbols, signs, or behavior” (Communication, n.d.). Communication can be verbal or nonverbal, intentional or non-intentional; but communication only happens in interaction between people. Communication becomes a learned skill from birth. An infant soon learns that certain sounds get a reaction from people around it and begins to use those sounds in an early attempt to communicate (Krogh & Slentz, 2001). As a child develops, the sounds, actions, and signals from other influences (such as adults laughing or dogs growling) begin to have meanings and a
language is learned to put sound and words (symbols) to the meanings, and is used to convey the meanings to others. Actions or behaviors are also learned as another means of communication. If a person runs from a raging fire, the action of running can convey the meaning of danger without language. Communication by language or action enables people to share the meanings of objects in their world.

As noted in Healthy People 2020, health communication includes not only the process of communication in the sharing of health strategies but also the study of how communication affects individuals’ and communities’ decision making about health behaviors (HHS, 2010). Health information has the ability to “…influence people’s knowledge and in turn, their ability for making an informed decision about their health care” (Vahabi, 2007, p27). Health communication is vital to the education of risks and dissemination of health messages.

A literature review covering the past 40 years from multiple sources discussed the impact of the use of health information on people’s health (Vahabi, 2007). It was found that health professionals need to be aware of social factors of health literacy, cognitive abilities, education levels, the format of risk messages, and personal values and biases when designing and delivering health information. Verbal terms and facial expressions of the health educator, for example, may have cultural meanings that influence what is interpreted about the health message. Terms that are not used or understood will not have an impact on learning. Information must be useful to the person receiving the information. Vahabi also noted that risk perception is tied to personal beliefs and
values, and without an understanding of local social perceptions, the health risk message may not be understood in the manner in which it was intended (2007). This has been found in other studies as well (Clarke & George, 2005; Taylor-Clark, Koh, & Viswanath, 2007). It is important to understand the many factors of risk communication, including social contexts, to ensure that the risk message changes behaviors so that health is improved.

**Risk communication and health education.** Risk communication is the communication about some risk that affects health or safety of populations. Much of the research about risk communication came from EH education programs (Lundgren & McMakin, 2004). Communication of health risks includes learning how at risk populations view health problems, health behaviors, and what forms of education are needed that will affect health behaviors. It requires a two-way exchange of information in order to be effective (Lundgren & McMakin). It is also noted by Tinker & Silberberg (1997) that certain factors have been found that affect perception of risk, and that the perceptions of both health professionals and the public affect the exchange of risk information.

The process of risk communication involves a series of steps (Lundgren & McMakin, 2004). Risks are assessed by health professionals and decisions made as to the benefits versus harm of informing a population about the risk. Once a decision is made to inform the public, a message is developed. The message is communicated in some fashion (media, town meetings, school programs) with a goal to motivate the receivers
to take action about the risk. Education about what can be done about the risk is also included when communicating a risk message. Most often for individual delivery, targeted interventions are designed to educate families and individuals in homes or workplaces (Taylor-Clark, Koh, & Viswanath (2007).

Factors of risk perception have been listed by many health agencies such as WHO, EPA, and ATSDR using the original work of Fischhoff, Lichtenstein, Slovic, & Keeney (1981). These factors include:

- risks perceived to be voluntary are more accepted than risks perceived to be imposed;
- risks perceived to be under an individual's control are more accepted than risks perceived to be controlled by others;
- risks perceived to have clear benefits are more accepted than risks perceived to have little or no benefit;
- risks perceived to be fairly distributed are more accepted than risks perceived to be unfairly distributed;
- risks perceived to be natural are more accepted than risks perceived to be manmade;
- risks perceived to be statistical are more accepted than risks perceived to be catastrophic;
- risks perceived to be generated by a trusted source are more accepted than risks perceived to be generated by an untrusted source;
- risks perceived to be familiar are more accepted than risks perceived to be exotic; and
- risks perceived to affect adults are more accepted than risks perceived to affect children.
These factors impact how a health risk message is received. It has been noted that the perception of risk may be high even when the chance for harm or exposure is extremely low and vice versa. Cultural and social elements also influence how populations perceive risk. Understanding how risk may be perceived is essential to exploring how a risk message may be incorporated into a meaning of health and health behavior.

Trettin & Musham (2000) found that when discussing environmental issues and hazards in one community, a community wanted information that was understandable and was objective, presented by a representative that would let the public have a voice in decisions. Distrust was found to be a common theme due to problems with risk communication from government and large companies. It was also found that rather than working on trust issues and having a figure of trust to communicate risk issues, clear understandable information is preferred so that the community members can make their own informed decisions.

How individuals view health risk information is particularly important for rural areas with few services and the need to provide self-care. Researchers investigated how rural women searched for health information and discussed health issues with others (Wathin & Harris, 2007). Concerns about the physical environment, a theme of self-reliance, lack of trust in health providers, internet information overload and lack of browsing skills, and the preferred use of social networks were found to affect the way in which 40 rural women obtained and/or used health information. Health literacy
Health information and literacy. How one incorporates information and decides if it is useful and worthwhile to make changes, within the context of his or her own situation, is described as information or health literacy and goes beyond functional and alphabetic literacy (reading and writing). Spitzer, Eisenberg, & Lowe (1998) discussed the concept of information literacy conceived in education starting in 1974, which evolved into a definition from the Final Report of the American Library Association Presidential Committee on Information Literacy: “…be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (p 20). They noted that those who become information literate also tend to access information independently and are also more socially aware.

Information literacy has also been specialized into another area concerning health: health literacy. The World Health Organization (1998) defines health literacy as the “…cognitive and social skills which determine the motivation and ability of individuals to understand and use information in ways that promote and maintain good health.” In a review of the literature to evaluate health outcomes and interventions related to health information literacy, Berkman, Sheridan, Donahue, Halpern, Viera, Crotty, et al. (2011) note that correlates of low health literacy include low education levels, certain ethnic or racial groups, elderly, low cognitive ability, female sex, incarceration, and being poor or near poor. In regard to health outcomes, mixed results were noted in the
amount of use of health services with low health literacy levels. However, there were significant findings related to increased knowledge about health with higher levels of health literacy. Risky behaviors were correlated with low literacy levels but only mixed results for correlations with adherence to medical treatment, disease conditions, or mental health issues. One question from several of these studies appears to be: is the disease condition causing a lower attention span, and therefore lower health literacy level, needed for understanding or is it the other way around? Regardless, there has been significance shown of low health literacy levels and information use related to poor health status. An overview of interventions using educational materials to improve a health outcome mostly showed improvement in knowledge and in reports of self-care (Pignone, DeWalt, Sheridan, Berkman, & Lohr, 2005). However, interventions failed for the most part to change behaviors required to change health. One exception for women with low literacy about cervical cancer noted that the type of materials used resulted in improved knowledge but that there was no follow up to learn if increased knowledge improved health. In conclusion, this report noted that the factor of low health literacy and use of information may or may not be directly related to health behaviors and may be an indicator of other factors, such as mistrust of health professionals or agencies, culture of poverty, poor self-efficacy, or poor access to health services.

Besides having fewer economic resources, low income populations are less likely to read newspapers, have less access to the internet, less likely to actively seek health
information, and find EH issues complex with difficult language (Taylor-Clark, Koh, Viswanath, 2007). Rural populations also have many of the same issues (Nielsen-Bohlman, Panzer, & Kindig, 2004; Lee & Winters, 2006). Adding the correlate of less education, rural populations are at risk for lower levels of health information literacy and consequently less health information use to improve behaviors.

**Health decision making.** Health decision making is the process of making a decision about health and includes personal health beliefs, education, and SES (Friedman, Bowden, & Jones, 2003; Evans, 2004; Vahabi, 2007). Although health decision making has not been well studied, there is evidence that culture, experience, and family play roles in how decisions are made, and what types of decisions should be made by whom (Kravitz & Melnikow, 2001). Kravitz and Melnikow discussed results from an article review of patients’ preferences regarding treatment. They noted that perception of risk can affect decisions: if there is a risk of serious harm, one may choose to act in a way to decrease the risk. One finding was that not all patients want to make their own decisions, with some choosing a collaborative approach or others referring all decision making to the health provider. Patients were also known to make decisions that didn’t correspond to the health information they received. It was noted that patients do want to be informed and to be a part of a decision making process, but in not all in the same way.

In a study of women with breast cancer making treatment decisions, it was found that those women with less education were less likely to have made a decision about
treatment and more often reported not being informed of clinical trial options; those with less income reported not being informed of treatment choices (Mason, Dwyer, Murphy, Browning, & Bernstein, 2003). It was also found that the variable of education was important to making decisions.

**Self-efficacy.** People interpret information according to prior experience, observation, persuasive arguments from others, and from psycho-social-emotional states at the time of the experience (Bandera, 1977). These four sources of information inform one’s self-efficacy beliefs. Having the ability to change behaviors requires a belief that the change can be made. Bandera (1977) discussed how self-efficacy can affect a course of action. People act according to the outcome they believe will occur. If they believe that an action will have a positive result, they will be more likely to act and persevere. Motivation, well-being, and personal accomplishment are the results of people’s beliefs of their own “…capabilities to organize and execute courses of action required to attain designated types of performances” (Bandura, 1986, p 391).

Additionally, how one acquires knowledge and skill is also dependent on one’s self-efficacy beliefs.

Environmental factors influence self-efficacy as well. Living conditions, education, socio-economic status, and political forces affect how people interpret their experiences and help set belief patterns. There are numbers of studies across health disciplines that have shown the relationship of environment and self-efficacy in a variety of situations (Garg, Serwint, Higman, Kanof, Schell, Colon, & Butz, 2007; Morris, McAuley, & Motl,
Self-efficacy can be a mediator, a cause for, or an outcome of better environment. Discovering how rural low-income families interpret environmental health information within the context of their own environment will open a window of understanding about their self-efficacy beliefs and what they need to promote behaviors that protect their families from environmental hazards.

Summary

Social context, conditions, and concepts affect how populations receive and interpret health information. Risk communication includes delivery of an EH risk message and motivation to reduce the risk. Risks have different meanings for health professionals and for populations. Decisions to decrease EH risks are based on personal and social beliefs. In order for the correct message to be received with reduction in risk, all factors of health information must be considered.

New evidence is beginning to show that social expectations and cultural perspectives play a large role in obtaining and using health information (Vahabi, 2007). These characteristics affect how low income populations perceive a health problem and their ability to obtain information and use it to resolve the problem (Srinivasan, O’Fallon, & Darry, 2003). In addition, rural low-income families have problems obtaining health information due to barriers that include geographical location, transportation, lack of health care providers or services, poverty, and lack of awareness of health issues (Hartley & Gale, 2003). Without appropriate health information,
families may make decisions regarding personal health and environment that compromise each individual’s health status. These decisions combined with low income lead to the many health disparities that affect rural populations.

**Conclusion**

Literature regarding rurality shows that while rural communities are unique, they have similar health needs as other populations in urban or suburban areas. However, rural areas have increased numbers of environmental hazards and risks, including substandard homes where significant numbers of low-income families with children live. Various definitions of rural by health and government agencies affect both outcomes of research and health policy decisions for rural areas, making it important to choose a definition that best fits the phenomenon of interest. However, these definitions typically do not include the various social structures and local rural culture that are important to understanding how rural populations understand health, and in particular environmental health. In the literature regarding research in environmental health with populations, the focus has been on the areas of 1) place (most often urban), 2) causal agents of disease, 3) health education, 4) risk reduction, and 5) improved health outcomes through increased knowledge and behavior change. Obtaining knowledge about environmental health risks and the ways in which a family can avoid or eliminate them is paramount to improving health for rural families. Communication of environmental health risks not only includes delivery of health information but also includes learning how at risk populations view environmental health and problems, what health behaviors they use, and what forms of information and resources are
needed that will affect or change health behaviors. This is particularly important for rural areas with few services and the need to provide self-care.

With goals of health promotion and disease prevention, interventions have been delivered to families to reduce environmental risks in homes. Review of the literature has shown mixed results with sustained significant behavior change. A current intervention study (Butterfield, et al., In press) sought to improve EH by risk reduction in homes but did not include the phenomenon of health information use. This intervention provided a perfect opportunity to investigate how new environmental health information delivered in an in-home intervention may have subsequently been transformed into a meaning of health that becomes the force that moves people to act to improve health. Therefore, a method designed to uncover the processes people use to make decisions and change behaviors based on personal meanings of health was needed. The next section will discuss grounded theory, which is used to discover social processes, as the method that was used to answer the question: what do low-income rural dwelling families with children do with environmental health information?
CHAPTER THREE
METHODOLOGY AND METHOD

A preliminary understanding about if and how health information was received, valued, and used evolved from research following a nurse intervention for rural low-income families regarding environmental risk reduction. Rural low-income families need to provide their own answers as to what they believe will decrease environmental risks and improve the health of their family. Therefore, a method was needed that allowed for the voices of the participants to be heard, and also offered a practical understanding of the meanings imputed to health care information.

This study is situated and specific to the context of the phenomenon. The participants all resided in rural areas. The study deals with specific environmental health information as it is used within a rural family home, as compared to how similar information would be used within an facility or agency. The focus is on behavior/action (as process) and their meanings as constructed by the participants, with data obtained from many sources (Benoliel, 1996). The purpose of a GT study is to discover and explore those processes that people use to manage situations and problems they encounter in their worlds.

Methodology

A Foundation of Symbolic Interactionism

The foundation for GT is symbolic interactionism (SI). Symbolic interactionism, birthed in pragmatism, is an interpretive perspective about the inner aspects of human behavior. As a theory of human behavior, its principal tenet is that meanings guide
behaviors. GT is an examination of process and thus lodges its inquiry in “how” questions: a) how people define reality by forming meanings for objects and events, b) how they act according to the meanings they have for objects, c) how these meanings come from interaction with others, and d) how these meanings are modified or changed through interpretive processes (Blumer, 1969, Chenitz & Swanson, 1986; Eaves, 2001).

Bowers (1989) notes that a person receives and interprets information and cues from birth within their own environments so as to “fit in” with others. To fit in, the self takes on the “role of the other” as a means to be a part of the social group (Mead, 1962). Therefore “self” becomes socially constructed through interaction with others. As more cues are interpreted due to more experiences, the self changes, or becomes reconstructed. This social interaction process is ever evolving and creative, a “…dynamic interactive process between the self and the social context” (Bowers, 1989, p. 38).

In order for self to interpret the social world, objects must have meanings. In SI, objects are more than physical entities; they are anything that self can reflect upon and act towards (Bower, 1989; Star, 2007). Objects obtain meanings from the way in which people act towards them (Chenitz & Swanson, 1986). For example, the meaning of tobacco is nothing to a person (such as an infant) without any experience with it. Its meaning is derived from how others act towards it. Cigarette smokers define tobacco much differently than do nurses who conduct a stop smoking campaign. Native Americans who use tobacco for traditional ceremonies have an altogether different
meaning than either of these other groups. However, one could be a nurse and/or Native American and be a smoker. In this scenario, one would act differently towards tobacco depending upon in what social context he/she finds “self.” Therefore, there can be multiple realities of the object. In other words, not only do objects have meanings based on how groups act towards them but the meanings are varied over time from one person to another and from one context to another. A former smoker develops a different meaning for tobacco after quitting cigarettes.

Blumer (1969) explains that one premise in SI is that as “self” observes and learns how others in his/her social world act towards an object, “self” then defines the object by acting in a similar manner. The process of socialization is one in which each person “takes the role of the other” to develop shared group meanings (Mead, 1962). Social structures are a result of the shared actions of individuals as a group, based on meanings. Tobacco as a status symbol (social structure) was once a shared group meaning in the US. Now, tobacco as a health hazard is an example of a “new reality” in development, as more and more groups are defining tobacco in a new way, as a detrimental substance to health. This change in definition also causes change (reconstruction) of actions, or social interaction.

Subjective, historical, cultural, and temporal influences and experiences affect meanings (Benoliel, 1996). Bowers (1989) states that “social interaction is a series of processes which take place in the context of the social world and among individuals who experience those social worlds as real...” (p. 40). She explains that interaction is
dependent on the process of each person understanding how others view an object and predicting actions of others toward that object, selecting an action for oneself based on that prediction, and then evaluating how that action is interpreted by the others. Groups that share certain beliefs or contexts such as socio-economic status have shared definitions of objects that reinforce uniformity in both understanding and behaviors for group members, and lead to accurate predictions of how others in the group will act. In conclusion, to interact effectively around any given object, objects must be understood as the “other” understands them, in the context within which they were created.

From an SI perspective, GT begins with the researcher entering the participants’ worlds in order to learn about their lives. It requires looking through their eyes rather than making generalized assumptions. It is important to establish rapport and respect with participants in the “role of the other” in order to understand the objects and the actions that inform their beliefs (Bowers, 1989; Charmaz, 2006).

**Historical and Philosophical Perspectives**

GT has its roots in sociology from both positivist and sociological interactionist perspectives (Glaser & Strauss, 1967). The purpose for development of GT by Glaser and Strauss as a qualitative method was to build middle range theories of social phenomena that would stand against the prevailing quantitative bias of research methodology at that time (Glaser & Strauss, 1967).

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1. It is interesting to note that the grant that allowed Glaser & Strauss to develop grounded theory in 1967 came from a Public Health Service Research Grant from the Division of Nursing, Bureau of State Services-Community Health (Glaser & Strauss, 1967, p ix).
Sociologists in the 1960s were in the process of defining sociological science and recognized that research involving people needed to include all aspects of life, including the participants’ point of view. Glaser, a quantitative researcher by training, came from Columbia University (with its generally positivist tradition) and Strauss from the Chicago School, with its generally pragmatic philosophy informed by symbolic interactionism (SI) (Charmaz, 2006). Both men ended up at the University of California at San Francisco, with Strauss recruited to teach in the nursing doctorate program (Benoliel, 1996; Morse, 2001). Glaser brought logic, middle range theory building, and specific coding procedures to the table, while Strauss added interpretation, understanding of agentic actors, and process as fundamental to the method (Charmaz, 2006). The GT method, as presented by Glaser and Strauss, brought to qualitative inquiry the understanding of actions and process, using analytical steps understood by quantitative researchers.

The original method development of Glaser and Strauss, formed during the modernism era in which “there is a reality out there”, is now considered today as “classic GT” with a critical realist ontology and a modified objectivist epistemology (Annells, 1997a; Annells, 1997b; Charmaz, 2006; Glaser, 1978; Glaser & Strauss, 1967; McCann & Clark, 2003). Research within this paradigm is guided by the belief that reality exists but can only be incompletely measured, with the researcher taking an objective view, independent from the participants. The researcher holds expert knowledge not shared by participants.
Debates arose between Glaser and Strauss as to how the method should evolve, which led to an eventual parting in the 1980s. While Glaser held onto the “classic method”, Strauss returned to his pragmatic roots and joined with Juliet Corbin, a nurse, to make GT more “user friendly” to novice researchers and to answer the ongoing debates about qualitative research at that time, such as how to define epistemology and ontology within a study, what is the role of the researcher, and the “interpretation of interpretations” (how interpretations should be done) argument (Annells, 1996; Charmaz, 2006). Strauss and Corbin (1990) introduced axial coding with a conditional matrix to GT as a means to encourage novice researchers to identify concepts and constructs within the developing GT framework. Axial coding was described as another level of coding to generate categories by providing “…intense analysis done around one category at a time…” (Strauss, 1987, p. 27), so that the category formed an axis around which coding and category building is done. Axial coding was developed as set of procedures based on action/interaction and includes categories of the phenomenon, context, conditions, consequences, and strategies (Strauss & Corbin, 1990; MacDonald & Schreiber, 2001). Although Glaser stated that this type of coding paradigm could lead to forced data resulting in description rather than theory, it did emphasize human action, social context and conditions, and gave more focus to the participants (Charmaz, 2006; Glaser, 1992; Kelle, 2007).

Strauss’ and Corbin’s use of GT is said to have become ontologically relativist with a subjectivist epistemology (Annells, 1996). Research with influence from this approach
is directed by an understanding that reality is not known but always interpreted and consists of socially constructed realities, so that there are multiple perspectives of a phenomenon. The researcher is actively involved with all aspects of the method and is aware of the interactive role as interpreter of the data in the formation of theory (Annells, 1997a).

Clarke, a student of Strauss, believed that situational grounding is needed and added situational mapping as an alternate coding step so that the situation within which a process occurs is incorporated into analysis, rather than overlooked. She sought to answer questions of how nonhuman elements such as discourse affect the situation of inquiry, and how they are constructed by the participants (Mills, Chapman, Bonner, & Francis, 2007). Subjective epistemology with constructivist ontology has taken GT to a place where co-construction of meaning between researcher and participant informs the study and allows for both micro and macro explanations of the process (Annells, 1996; Annells, 1997a; MacDonald & Schreiber, 2001).

Although some studies continue to use classic GT procedures or with the coding paradigm of Strauss and Corbin, others have used GT with an understanding that truth is constructed and reconstructed by people. Charmaz, after studying with both Strauss and Glaser, returned to SI underpinnings and classic GT but with the constructivist understanding of reality. This view assumes that reality is a social construction subject to redefinition, in which a subjective interrelationship transpires between participant and researcher (2006). Participants understand the world through their own social
constructions that are made and reinforced from interactions with others. Charmaz defines GT as a method that shows how and why people construct and reconstruct meanings and act in a certain manner, as well as one that explains where the experience is situated.

The important factor to understand about the evolution of GT is that there are now different epistemological and ontological underpinnings in the various uses of GT. These underpinnings influence the type of knowledge produced from data collection and analysis (Greckhamer & Koro-Ljungberg, 2005; Guba & Lincoln, 1994). They also affect methodology in the choice and use of a particular methods and the method as linked to outcomes (Crotty, 1998).

Objectivist views in classic GT, as noted in Glaser’s writings, include data as objective facts about the real world, that method is separate from the researcher, and a product of grounded hypotheses (Annells, 1996; Glaser, 1978; 1992). With a move of GT towards subjective orientation, Strauss and Corbin encourage the active dialectic role of the researcher to interpret the reality of socially constructed worlds, yet with a more structured approach to data collection and analysis with the use of axial coding and the conditional matrix (Annells, 1997a; McCann & Clark, 2003). Theory from this approach is verified and constructed through the interactive process of the researcher with the data. Charmaz (2006) includes the use of the classic approach but within a constructivist frame. With a priority on the phenomenon of study, researchers look for tacit meanings about beliefs and values to explain how and why “...participants
construct meanings and actions in specific situations” and seek to learn about the problem and its position embedded within other relationships, networks, and social structures (Charmaz, p. 130). The end-product addresses contextual concepts such as difference, power, or roles and shows the theoretical connections between local and larger social structures.

It is a constructivist perspective of GT, as explicated by Charmaz that guides this study of what low-income rural families do with environmental health information. Meanings of health, including environmental health, are socially constructed and become the force that moves people to act in a certain manner regarding health risks. To begin to understand the actions of health behavior, the implicit meanings about health and the social contexts and structures that affect these meanings must be uncovered. Understanding how and/or why EH information becomes valued and used needs an approach that allows an interactive process of co-construction of a theoretical framework, using the interpretations of both participants and researcher to show the multiple complexities of the phenomenon.

**Reflexivity and Situating Self**

As a nurse, I have always wondered why and how people make certain health decisions that can have lasting impacts on their health. Using GT for my thesis study, I explored the decision making process of working poor families using the emergency department (ED) for their primary care (Oneal, 2004). Although I discovered what I thought was, at the time, a basic social process of “avoiding crisis” due to a health problem within the family, upon review it was a core category of a more abstract
process of “navigating and using health systems”; in this case, the primary (acute) health care system. This led me to more study about US health systems in general, including primary (acute and chronic) care, mental health, and public health.

Entry into any one of these systems can be fraught with anxiety and frustration, as was shown by working poor families who decided that it was easier to use the ED rather than face all the barriers and jump through the administrative hoops to get to the primary care provider. Having been a nurse working in the various health systems for over twenty-eight years, I have seen both excellent and poor examples of systems in the many communities where I worked. I now have moved into community/public health nursing where I feel I can work with populations that need help accessing health systems, as well as providing health information that they can use to improve their own health status as a health promotion strategy.

With a move in the past decade towards more for-profit facilities in both acute and chronic care, and with less money and resources with which to operate for public and not-for profit systems, I have witnessed more barriers that have been erected that affect particularly low socio-economic groups in their ability to find and receive health care. Having experienced some of these barriers myself during a time in my life when I was a single mother with three children, I can feel the helplessness and hopelessness I see in families when I, in my role as a nurse, have to either enforce those barriers due to regulations or confess that I cannot find a route for them to receive care. The tension of “having been in their place” with “nurse authority” leads me to research that will allow
my expertise and experience to examine and describe the barriers to health care for low income populations, in whichever health system is being used, and explore how to provide better access.

To acknowledge theoretical sensitivity (described on page 74) for a study of rural low-income families receiving environmental health information, and to further situate myself personally, I have been and am currently a member of a rural community and have been in the low income demographic. I have lived in questionable housing and raised three children in those circumstances. I have also been a nurse for twenty-eight years and have worked in rural communities, both in and outside of nursing. People who live in rural settings have perceived group characteristics, including independence. I greatly admire, and even embrace, the value of independent living. Further, my self of “being in their place” and enjoying independence, among other rural traits, argues and conflicts with my “nurse authority” in that too much independence can be detrimental to health, when health risks and hazards are unknown or ignored.

This tension between my two selves leads me to this study. I am primarily a pragmatist, with constructivist ontological orientation, believing that people are active beings that can and do solve problems, and that meanings emerge through practical actions to solve problems (Charmaz, 2006). Groups and individuals construct reality or “know the world” from the actions and interactions they have within it. Day-to-day experiences are mostly routine, but they can be interrupted by some type of new situation/object. This causes reflection and choice of new meaning for the object and a
new action as a result (Star, 2007). When doing research with a pragmatist bent, one important idea must be remembered: to understand people, one needs to understand what they do and how they interpret the world. In my nursing world, I try to understand how a patient feels (by use of observation, experience, and/or communication) in order to give me greater empathy about the situation and let me provide greater care. By attempting to understand the perspective and role of “patient”, I can more readily advocate for them. Pragmatic tenets also include that people use what proves, by experience, useful to them and define objects according to usefulness. Pragmatism also guides my belief that research should offer new knowledge that is useful (Pursley-Crotteau, McGuire Bunting, & Draucker, 2001).

Yet, nursing comes from a mostly positivist tradition wherein “truth” is seen as evidence produced by structured studies to enhance best practice. I have operated under this “truth” as a nurse in various areas. However, nursing also incorporates a pragmatic sense and asks, what is practical? Evidence from quantitative studies may point to a certain procedure as “best practice”, but is it practical? Will that procedure be accepted and used by nurses or patients? Is it efficient or cost effective when used under “real life” conditions? Is there another way to find “evidence” that complements, changes, or modifies the positivist view of best practice so that it becomes not only better, but useful? I believe that there is and that grounded theory is the means to do so. Therefore, the conflicting experiences of my two selves inform my reality and allow me to see many perspectives of a problem in a way that is deemed “holistic” in nursing.
I understand that not only the visible but the invisible objects in peoples’ lives have meanings and therefore cause certain actions. It leads me to specific goals for inquiry with a nursing and human perspective. These are to understand how groups, such as rural low income families, experience health problems and use health information, to explore how they make health decisions, and to discover the impact of health systems on their health based on actions.

I believe that GT is a methodology that has evolved into several approaches, in order to reflect the changes in today’s world. The constructivist approach allows me as a nurse to explore “… specific contexts and situations within which human action occurs” and to focus on “what is” rather than “what ought to be” (MacDonald & Schreiber, 2001, pp. 47-48). Explanatory frameworks resulting from substantive theory obtained through GT inquiry may lead to improved health status from health promotion strategies and better practice for nursing. A grounded theory study that has action/process as a basic unit of analysis and the question of a population’s use of new health information is a perfect fit for my own epistemological and ontological orientation which leads to new or evolving substantive theory.

Use of Grounded Theory in Health Research

GT has been used as a research method in the health disciplines of sociology, medicine, psychology, and nursing to study social and behavioral phenomena, especially those that affect health outcomes. Nursing began using GT in the 1970s following Benoliel’s initial work with Glaser and Strauss (Benoliel, 1996). Benoliel brought the usefulness of GT to nursing by using it to inform her professional practice
in her investigation of palliative and hospice care of dying patients (Bryant & Charmaz, 2007). Studies using GT in all disciplines have steadily increased in the last decade (Eaves, 2001).

A brief overview of GT studies must include those conducted by Glaser & Strauss (1965, 1967). Their studies on awareness of dying and dying as a status passage initiated the grounded theory method, which was detailed in their original texts. Glaser (1978) expanded the discussion and furthered clarified GT. Carol Chenitz, a nurse, used grounded theory to understand elders’ responses and the conditions that caused them when being placed in a nursing home. Implications included finding nursing solutions to easing the transition from a private home to a nursing home (Chenitz and Swanson, 1986). Kus (1985) used sociology and nursing perspectives to investigate the “coming out” process for gay men to guide clinical practice with this population.

As GT evolved, Strauss & Corbin’s (1990) grounded theory work in chronic illness and hope lead to their development of axial coding for a different approach in using GT. Annells, a nurse researcher, following a hermeneutic study about “flatus as an incontinent condition” for ostomy patients, used axial coding with a constructivist approach to investigate interactions between clients and nurses for “relief” processes (2007). Charmaz, a sociologist, studied loss of self in the chronically ill and noted the importance of a constructivist stance in order to give voice to participants (2006).

GT moved into critical theory as Wuest (2000) expanded her evolving feminist grounded theory on women’s caring through emergent fit, comparing her own study to
previous studies and to data from the literature about helping systems, to increase the development of the theoretical processes of negotiating. Findings included the desire of women “…to be active participants in finding solutions to problems created by diverse caring demands” (p.67). Implications included that lack of suitable resources limited caring and also led to increased risks for both the women and their charges. Hamilton used GT to study the experience of predictive genetic testing for both individuals and families, as a means to understand how genomics, technology, and health care collide with ethics when an individual receives positive results and when health professionals want to disclose an individual’s positive results to family members (Hamilton, 2003; Hamilton, Bowers, & Williams, 2005). She noted that aspects of genetic health information disclosed were selectively chosen depending on family specifications and beliefs. Her study illuminated the problem of disclosure of health information with a “one size fits all” style of genetic counseling that does not prepare individuals or families for the impact of receiving results and the resulting difficulties of family dynamics and communication.

Health promotion issues have been explored more recently in nursing. Examples include how working women caring for others at home meet the demands of their own health promotion (Amirault, 2001), how cultural perspectives of Arab Muslim male immigrants impact health promotion behaviors (Yosef, 2006), how African American males access mental health services (Hines-Martin, Brown-Piper, Kim, & Malone, 2003), and how the meanings of health and illness lead to acceptance of a chronic health
condition (Wiitavaara, 2007). This study will follow along the line of health promotion research as well, to discover how low income rural families use new EH information to improve health.

**Design**

Grounded theory (GT) methodology was used for this study to explore how rural low-income families understand specific environmental health information and the conditions under which they may obtain and use it to improve health. GT explains a social process in theoretical terms using conceptual categories and properties (Glaser & Strauss, 1967). It allows a researcher to inductively generate theory about important issues in peoples’ lives (Mills, Bonner, & Francis, 2006) and is fitting for social inquiry regarding processes of health decision making, using health information, and navigating health care systems. GT is well suited to study the phenomenon of how low income rural families understand and decide to use environmental health information and systems, as this rigorous qualitative method is useful in discerning how groups operationalize meanings, and how individuals integrate these meanings into actions.

**Method**

**Review of Grounded Theory as Method**

Assumptions in GT include: 1) data collection and analysis are simultaneous, 2) inquiry is structured by discovery of social and psycho-social processes, 3) logically deducted frameworks do not shape the process or product of research, and 4) the main purpose is theory discovery, not to verify pre-existing theories (Eaves, 2001). Grounded
theories are mostly substantive; that is, they are “a theoretical interpretation or explanation of a delimited problem in a particular area” (Bryant & Charmaz, 2007, p. 610). They are not predictive but are explanatory, and evolve or are modified as new information is discovered. In all grounded theory studies, regardless of the epistemological and ontological orientation of the researcher, the same fundamental techniques include the following techniques (Annells, 1997b; Backman & Kyngas, 1999; Bowers, 1989; Charmaz, 2006; Glaser, 1978; Glaser & Strauss, 1967; Mills, Bonner, & Francis, 2006)

**Constant comparison method.** Constant comparison is the process used for coding and analysis. Data collection and analysis are simultaneous. One starts the analysis with the first data collected and completes the initial coding process before moving to the next group of data. This ensures that the categories are dense and guide theoretical sampling, as is explained later in this section. Unit coding (word-by-word or line-by-line, for example) begins the process and initial codes are assigned to organize, separate, and compile the data. Some codes may include the actual words of the participants that are called *in vivo* codes. These codes may reflect the implicit meanings and experiences of the participants.

Codes are then compared to the text as well as each other in a more focused coding. At this time, codes are condensed into short phrases and clustered into categories according to fit. Properties, or the elements of a category, are identified. As a case in point, a category of “being aware” may have the property of “self-awareness”
Categories are then compared to one another and collapsed into denser categories or linked to one another, to ensure mutual exclusiveness through theoretical coding. Theoretical coding moves the focused codes into a conceptualized analytical form to explain the relationships between categories (Charmaz, 2006). Theoretical codes can include, as examples, dimensions, context, status, or conditions. For instance, one might ask questions of a specific category: “Under what conditions does this category occur?” or “Within what context is it present?” Categories that answer these questions would then be linked to explain that specific category (Chenitz & Swanson, 1986).

Memos and field notes are added to help develop central themes of categories and processes and provide information about linkages. The core category that links to all other categories and explains the main process is developed from more comparison. As this process unfolds, sampling of the literature helps answer questions and provide more explanation, as well as to assist theoretical sampling.

Theoretical sampling. Theoretical sampling involves obtaining a sample “from the data” rather than continuing to use the same group or source of data. It is used to collect relevant data to saturate the categories and their properties (Glaser & Strauss, 1967; Charmaz, 2006). In a study to discover how rural low-income families value and use health information given to them by public health nurses, one would start “where the phenomenon is found” (Glaser, 1978) and interview family members. Theoretical sampling would then require sampling from sources that add to the emerging
categories, such as certain members of the participant group, texts such as research literature, or perhaps media reports about environmental risks in the community. Theoretical sampling is informed by the emerging data, and in turn, informs and builds the substantive theory.

**Theoretical sensitivity.** Theoretical sensitivity is the awareness of the researcher to his or her role as a participant and as a professional. In the role of participant, the researcher may increase sensitivity with the participants and raise the level of insight into the phenomenon by reviewing the literature regarding characteristics and concerns, reading historical information about the community, and spending time in the location. An initial literature review before analysis may be required to gain awareness of the participant context or of theoretical concepts important to the research area.

Knowing what the discipline understands about the phenomenon and what is not known, as well as insight as to implications for nursing, brings an awareness of self on a professional level. Theoretical sensitivity includes experiences from personal perspectives such as living in a rural area and having been a member of low-income status. In addition, theoretical sensitivity includes the ability of the researcher to explicate and reconstruct relevant meaning having been sensitized to what is “relevant’ by the participants.

**Memo writing.** Memo writing is done to provide ideas about the categories as well as an audit trail regarding the researcher’s thoughts. One converses with one’s self to
provide new insights about the data and “explicate and fill out categories” (Charmaz, 2006, p. 72). Using memos helps provide abstract analysis and provide working definitions. Memos also track those analyses not pursued, thus showing how selection of data was made and for future reference in future studies. Memos are used to “…record theoretical and selective sampling needs, and interview questions that could be used to shift or narrow the focus of analysis” (Bowers, 1989, p. 52).

Core category. Identification of the core category is a necessary requirement and the purpose of GT. However, one study may provide insight into a core category but not sufficient evidence to develop a substantive theory. The core category provides an organizing framework or heuristic for the substantive theory. Other categories and memos explain the linkages, concepts, and other areas of the theory.

Saturation. Saturation is the process of reaching “completeness”. It is the point at which no new information is obtained and data collection can cease. It refers to the fact that repetition of themes or categories are all that emerge from new sources of data.

Human Subjects Considerations

Prior to the initiation of research, Washington State University Office of Research Assurance, Institutional Review Board granted a certification of exemption for this project (Appendix A). The purpose of the study, confidentiality assurances, and all procedures were explained to participants. Participation was strictly voluntary. Written informed consent including permission to audiotape in person, via telephone, and for email interviews was obtained.
Setting

The setting for this study was in the participants’ town/area of residence (one of two rural counties in the Pacific Northwest). The preferred interview site was the home of the participant as per the participant’s choice. In-home settings allowed for observation of the home as well as family dynamics that could possibly add to analysis. Follow up interviews, as necessary for theoretical coding, were done by telephone or email.

Sample

Initially, a purposive sample is used to begin a GT study, with those participants who have experienced the problem or phenomenon. GT researchers then move to theoretical sampling, a technique that occurs simultaneously with data coding. As the coding categories develop, the sampling plan can be altered to identify new participants or materials that provide new information that ultimately results in theoretical development and saturation of core categories (Charmaz, 2006; Glaser & Strauss, 1967; Patton, 2002).

The purposive sample of 10 participants was recruited from rural low-income family adult members of the ERRNIE study. Using the ERRNIE study inclusion criteria, participants included were those who were English speaking, family income of ≤ 250% of Federal Poverty Level (FPL), over 18 years of age, on private to large well water systems, who had received services from a local public health department, who were willing and able to participate in interviews, and had children under the age of 6 years.
of age in the household at the time of the ERRNIE study. Exclusions included children, non-English speaking members, and those persons unable to complete interviews.

Recruiting of participants was done by use of a flyer sent with initial results from the ERRNIE study to former ERRNIE participants. Participants were invited to join a new qualitative study discussing their experiences, or any other potential EH study, and were given a stamped self addressed return envelope with a response as to whether they wished to be contacted, and their preferred method of contact (mail, telephone, email).

**Instruments**

The researcher is considered an instrument in grounded theory, whose function as instrument is that of data collection and analysis (Mallory, 2001). It is understood that a researcher conducts the interviews and observations as a co-participant so that the realities of the phenomenon can be understood from the view of the participant, with the researcher acting as an interpreter of the inquiry.

A semi-structured interview guide (Appendices C, D, E) was used to begin the inquiry and elicit statements and stories from the participants. Open-ended broad questions allowed for participants to share their own experiences and perceptions. Additional probes focused on detailed aspects of the discussion and to help clarify experiences and reflections.

A demographic data questionnaire (Appendix F) was used for collection of demographic information about the participants so that comparisons could be made about groups during analysis, as well as for description of the participants.
Timeline

Data collection with simultaneous analysis with participants began in October 2009 and ended in November 2010. Theoretical sampling of the literature (as discussed later in the chapter) and theoretical modeling ended in February 2011. Final results and discussion were completed March 2011.

Data Collection

Following explanation of the study and obtaining consent (Appendix H), the demographic data questionnaire was completed by participants. Semi-structured interviews were conducted using the interview guide to obtain data about participants’ beliefs and behaviors regarding environmental health and the use of health information. Initial face-to-face interview data was audio taped and transcribed verbatim, with coding and analysis initiated beginning with the first interview, in accordance with grounded theory methodology. Transcription was done by a transcriptionist educated in ethical and privacy issues in research, with guidelines to handle potential problems, such as unfamiliar terms or poor recordings (Easter, Davis, & Henderson, 2004). Data was exchanged with the transcriptionist through a password-protected web-based share site.

One concern that I had after the first set of face-to-face interviews was that the participants were seeing me as a member of the ERRNIE team, rather than as a different researcher with a different study. My instinct was that social desirability was playing a role and inhibiting responses. Social desirability is considered to be an attempt to
exhibit the “correct” or expected behavior, without revealing true feelings and is often seen in areas of research where an individual wants to present him/herself in a positive light (Rossiter, 2009). Memos I made signaled my concern that I felt as though the participants were trying to give me answers to the ERRNIE study or were waiting to be “tested”.

Public health nurses came to their homes to deliver EH risk information. I was a nurse and interviewing them in their homes. It seemed as though they saw me as an ERRNIE nurse. I was worried that I was not getting the true feelings about EH risk information and how they used it. Based on these comments and my perceptions, questions were re-ordered and the word environmental was dropped from the consent form with agreement from WSU IRB. I later amended the proposal with approval from IRB (Appendix B) to allow initial, rather than secondary, telephone and email interviews so that I could remove myself as a distracter. There was one initial telephone interview but no initial email interviews obtained for this study.

Email interviews are now commonplace and are sometimes preferred by participants, who can answer questions at a time and place more convenient to them (Hamilton & Bowers, 2006; Opdenakker, 2006). It has been found that email interviews may include information not disclosed in verbal interviews, such as socially undesirable behavior or when participants feel that they should please the interviewer with appropriate responses (McCoyd & Schwaber Kerson, 2006; Opdenakker, 2006).

Disadvantages to emailing as noted by Opdenakker (2006) include not being able to
observe social cues and respondents not answering as quickly as intended. However, in this study the social cue of the researcher-as-nurse became a hindrance to the process.

For email interviews, email was checked daily for new messages. One hard copy was made for backup and all identifying information was stripped from the email message. The original email was deleted, from both the Inbox and the Deleted Items Mailbox, in accordance with WSU IRB approval.

Secondary interviews were done, with consent from participants, via telephone using a digital recorder or by email, due to long travel distances and inclement weather. Observations using field notes were done at initial interviews as possible or in areas that were important to the context of the social situation. Field notes were coded and added to the coded transcribed data, if applicable, by the researcher.

In addition to field notes, memos, as detailed notes about tentative ideas or hunches, were kept. Thoughts recorded in memos added depth as well as helped form hypotheses, and were included in coding. Audit trails, in the forms of journals, memos, and field notes, were kept to clarify analysis and any procedures used, as well as to describe settings and conditions. Audit trails assist others to follow the process used that leads to conclusions (Glaser, 1978).

**Data storage.** All recorded tapes, email hardcopies, and notes were kept in a locked file box during any transport, and in a locked file cabinet in the researcher’s office. All participants were identified by a pseudonym to de-identify narrative data in
the dissertation. Participants who wanted to receive a summary of the study’s findings were asked to provide contact information on the consent form.

To ensure confidentiality, pseudonyms were kept on a master list in a locked cabinet separate from other materials, along with original tapes, signed consent forms, and any other identifiable data. Data stored in computer files were password protected, with only the researcher or research dissertation chair having access to the password. Data were backed up on password protected or encrypted computer disks. Dissertation committee members had access to coded data as necessary for guidance or advice.

Data Analysis

Using the constant comparative method, data were compared both within and between given interviews, labeled, and given codes that describe the substance of the data (Glaser & Strauss, 1967). Data were unitized using line-by-line coding, using notes in the margin of the transcripts. A unit of data is defined as a single word, verb, verb phrase, sentence, compound sentence, or partial or complete paragraph that conveys a single idea (Haberman, Bush, Young, & Sullivan, 1993). In vivo or emic codes (from the language of the participants) were used that reflected a characteristic of the social world (Charmaz, 2006).

For the first transcript, individual codes were put on note cards along with line numbers for reference for sorting into categories. Codes were then entered into QRS NVIVO 8 software. NVIVO 8 for this study was used as a management tool as a way to code and move data into categories, to store all transcripts and notes, and to facilitate
memo writing as well as attach memos to codes and categories (Bringer, Johnson, & Brackenridge, 2006).

Initial open coding gave analytical direction to data as they were condensed into conceptual categories. Focused coding followed, with comparison of categories to one another to find mutual exclusiveness and to reduce them into only those that are of broad scope and higher order (Charmaz, 2006; MacDonald, 2001; Stern 1985). Dimensions and subcategories were explored. Memos were used to add content to further explain the analysis, and assisted in forming hypotheses about the concepts as they developed. The core variable or central process of explanation about Re-forming the Risk Message: a grounded theory process of engaging health information emerged as categories were reduced, with hypotheses linked into an emerging conceptual framework that explained the problem. Theoretical coding moved the conceptual framework to a theoretical framework by clarifying the nature of the core variable, and specifying the relationships of the categories formed through focused coding (Charmaz, 2006). Coding was done by the researcher with oversight from Dr. Hamilton (GT mentor) and other dissertation committee members.

Theoretical sampling (TS) can be done both at the level of the participant selection and question development. Wiener (2007) states that the question asked for TS is “…what groups or subgroups of populations, events, or activities do I turn to next in order to find varying dimensions, strategies, and/or action and for what theoretical purpose?” (p. 304). Sampling at the participant level includes looking for a broad
variation from which to compare and contrast data. I chose various participants from a pool of interested people that included different ages, partnered or not, locations of homes within rural sites, gender, renters or owners, and SES. I also was fortunate to have variety of education levels. Having a wide range allowed me to note differences and similarities in patterns of events or incidents. For example, having different educational levels made the exploration of what “environmental health” meant, more in-depth.

TS also guides question development. Coding begins with the first interview from a member of the sample. Codes are used to develop analytic ideas, which are written as memos, and sorted into beginning conceptual categories. Questions asked of the categories provide direction for interviews. For example, a stay-at-home mom discussed mothering role as a factor in prioritizing her family needs. Some of the questions about mothering role included “What is meant by a mothering role?”; “Do stay-at-home moms have a different perspective than working moms?” and “Do fathers have a fathering role or do they see a difference in gender roles as parents?” To explore mothering role as a possible concept, I found a male participant and a working mom to interview with whom I could explore these types of questions.

Because a comparative sample of ERRNIE non-participants or non-completers was not available, TS of participants was restricted. Therefore, theoretical sampling of the literature was used to assist in saturation of some categories. Literature from the body of health promotion research was reviewed, particularly those related to tobacco
cessation and weight reduction interventions. These types of interventions were similar to the ERRNIE intervention in that they dealt with types of health risk information given to participants, and how participants responded to that information. Other literature from the disciplines of psychology, social psychology, and neurosciences was applied to concepts emerging from the data as categories in the areas of awareness, attention, and perception. Awareness was an early code from the first interview and was present in most of the interviews. Participants described many features of awareness, such as past awareness and present awareness. They linked awareness to paying attention and recalling past information. Sampling of the literature found that awareness has types and dimensions and also has relationships with attention and perception.

Social context and structure of rurality, family roles, prioritizing family needs, and social networks were evident in several categories. Data from nursing, sociology, and psychology literature was used to further develop theoretical linking of the categories and to show relationships and properties that eventually became one phase of the overall process. Defining health for these participants occurs in the context of rurality, as one example. Rurality also influences how participants do or don’t access health services, appreciate independent living, and recognize health risks. Rurality also influences the subcategory of family roles such as more mothers staying at home with children and taking a more proactive role in family’s health as compared to a reactive role. Although the attitude about stay-at-home moms is changing as economic demands
increase, it is still somewhat traditional in rural communities that women stay home with the children. This was mostly true for these participants. The influence of “rurality as context” is one factor that is important to how these participants “weigh” the information against what they know and do in daily lives; in other words, how they weigh the “evidence” from new EH risk information.

Selective codes from the literature reviewed were compared to those codes that were pertinent to emerging conceptual categories developed from the analysis of the interviews. Comparisons were made between and within these categories from interview texts and the literature. Memo writing as literature was reviewed helped to continue the focus for each category and eventually to the development of the core category. Comparison stopped as categories were saturated; in other words, when no new properties and dimensions of the categories emerged from data sources, either the interviews or the literature that was reviewed (Charmaz, 2006; Dey, 2007; Glaser & Strauss, 1967; Holton, 2007).

Diagramming of the framework depicted the process and assisted with explanation of the categories, relationships, and hypotheses (Stern, 1985). Input from the dissertation committee as an analysis team helped ensure a high level of abstraction and conceptualization of the framework as data analysis proceeded. Exemplars from the data were selected to illustrate each core category and subcategory, as well as to give voice to the participants, as will be shown in Chapter Four.

Challenges in Data Analysis

Interviews began in October 2009. The two sites where participants lived were at
long distances (three hundred sixty miles and three hundred ninety-nine miles respectively) from my residence. Therefore, I contacted participants to cluster three face-to-face interviews during a single trip and stayed overnight in a motel to be able obtain the interviews. This allowed me to space the interviews out over a period of 1 ½ days. These interviews were done in the homes of the participants. I made two trips to Site 1 (October 2009 and May 2010) and one trip to Site 2 (December 2009). Short secondary interviews were made via email with some of these participants as necessary. I made one initial telephone interview in January 2011.

During each trip, field notes were taken before and after each interview. Field notes contained a description of the area where the home was located, some details of the home, and any important comments or actions made before or after the interviews. Memos discussed my impressions about the interview and were done after each interview and as I listened to the tape while in the motel. Because of the distance and the fact that I had to cluster interviews, I used the memos, field notes, and the audiotape to change the order of the interview questions or the questions themselves, as a form of theoretical sampling between the interviews. Although most theoretical sampling occurs after coding and as categories are emerging, I needed a “quick” process so that I could obtain the most complete data possible at one site without having the time to transcribe and code a complete interview. I had used grounded theory as the method for my thesis, so I had an understanding of the need to let the data inform me of “where to go next.” After each set of interviews, I contacted Dr. Hamilton to review the data,
discuss problems, and to revise the interview questions.

Although there was some evidence of social desirability within some of the interviews, I worked to ensure that participants were relaxed by the middle of the interview session and focused on our discussion rather than recalling information from ERRNIE. Coding during analysis comparing the first interviews to the last set, and comparing face-to-face interviews with the telephone interview, revealed both explicit and implicit meanings and beliefs of EH risk information that relieved my anxiety about obtaining rich data and led to a beginning substantive theory.

Criteria for Evaluation/Rigor

Validity and reliability are of concern for qualitative studies in that it shows the truthfulness of findings, through stated criteria. Charmaz (2006) has stated that in order for a study to present a valuable contribution to a discipline, criteria for GT studies should incorporate originality, resonance, usefulness, and credibility. Originality is shown if the theory brings new insights to an area of research, that the significance of the findings are stated, and that the theory extends, challenges, or refines current concepts and practice. By reviewing extant literature form many disciplines, the researcher has addressed originality by adding additional insight into health behavior research. Results from this study will add to the body of knowledge in health promotion and program planning. Resonance is shown by categories that fully describe the social process, that uncover both implicit and explicit meanings, that show links between individuals and larger entities when indicated, and leads to a theory that makes sense to the participants or others who share similar circumstances. Data from
texts are used to show how the categories were saturated and the meanings that explain the process. *Usefulness* is met when the analysis can show generic processes and tacit implications, with interpretations that can used in everyday life. Usefulness also is shown by a theory that can initiate further research in other areas, and contributes to the knowledge base for a discipline. Implications will be discussed in Chapter Five as to the usefulness of this theory. *Credibility* is addressed by having sufficient data for categories from a wide range of empirical observations, drawn from systematic comparisons, with strong links between the data and analysis, audit trails, and enough evidence for the theory so that an independent reader can reach independent agreement. Credibility has been shown by the variety of participants, the use of constant comparison, detailed memos as an audit trail, and use of NVIVO as a management tool that allowed for changes to be tracked as they unfolded. These criteria will be evident in the findings and discussion in the following chapters.

**Conclusion**

Grounded theory has had a colorful history, from its origin by Glaser and Strauss (1967) to its current forms as a qualitative method. Its SI and pragmatic foundations provide the background to understanding the meanings of a group and how those meanings are incorporated into actions as process. Quantitative logic, coding techniques and procedures, as well as theory building provide structure to the method. Movement to reflexivity in research has required an awareness of the epistemological and ontological rationale by the researcher for choosing the method, as well as the research
area of interest. As more emphasis was put on the “why” of the method, different forms of the original version of GT emerged.

Although it remains important to state one’s reflexive stance, GT has common techniques that are inherent to any GT study. Using constant comparison throughout data collection and analysis, theoretical sampling and coding, acknowledging theoretical sensitivity, using memos as data, and the finding of a core category are central to GT process, and for this study, use of these techniques will be shown in the findings described in the next chapter.

Showing rigor in qualitative studies has been debated for years. It is important to state the criteria one will use and then show how the study meets those criteria. For this study the criteria of originality, resonance, usefulness, and credibility is shown and will be discussed in the following chapter.

Elements of the grounded theory of Re-forming the Risk Message, as part of larger basic social process of deciding to become engaged with health information, can be found in risk perception, risk communication, health promotion, and engagement literature. Saturation of categories with resulting development of a conceptual framework lead to the theoretical process that defines how a person moves to the crossroads of a decision regarding a level of emotional and cognitive engagement with health information. This process and the emerging theory will be discussed in Chapter Four.
CHAPTER FOUR

FINDINGS

The purpose and aims of this study were to explore and document the use of environmental health (EH) risk information by rural dwelling low-income families with children with intent to (a) identify the social context and conditions that affect the use of information and to (b) generate a beginning substantive grounded theory to explain the process individuals use to make sense of that information. This study addresses a gap in knowledge regarding the use of EH risk information in rural families and how that information might influence health decisions and health behaviors. This chapter begins with a brief description of the sample and the theoretical framework, followed by discussion to show how data was collected and analyzed during the GT process. The development of the beginning substantive grounded theory of Re-forming a Risk Message after receiving environmental health information will be described with its categories of visiting my perception, weighing the evidence, making a new meaning. The factors that impede or assist a person to move to a decision of engagement with environmental health risk information will be discussed.

Participant Demographics

A flyer was included with initial results from the ERRNIE study sent to ERRNIE participants. Twenty-nine individuals initially responded positively and indicated their interest in joining another study. Reply forms from both study sites were kept separate and put into paper bags for the purpose of choosing initial participants. Ten forms from each site were chosen at random from each paper bag at one time, by a member of my
dissertation committee. These individuals were contacted by email or telephone and an explanation was given as to the purpose and type of study.

Ten participants (9 women and 1 man) volunteered for and completed this study. Six participants were from Site 1, and four were from Site 2. Ages ranged from 30 to 52 years old. The majority owned their own homes (n=8), were partnered (n=9), and stated their race as white (n=9). Family incomes ranged from $8,000 to $95,000 per year. Numbers of children in the family varied from one to three. Most participants stated they were not the primary head-of-household (n=7) but all stated they were either the primary health decision-makers (n=9) or shared that role with a partner (n=1). Three participants had used the public health department within the previous year. Although I did not ask highest attained education level, three participants volunteered information that they had masters degrees, three stated that they had completed college, and two other participants mentioned attending college. I also did not ask the amount of time between participation in ERRNIE and participation in my study. Six individuals stated it had been at least 2 or more years. (See Appendix G).

**Development of the Theory**

From the beginning of the interviews, it became clear that many of these participants had not engaged with EH risk information received during the intervention study. Initial codes such as “staying the same” and “not meaning much” spoke to their belief that they were not changed by the intervention and that other things were going on in their lives. Yet, they all spoke of how thankful they were to have participated in the intervention and it was a good experience for them. Memos made during the first
set of interviews showed that participants spoke about awareness of and attention to EH issues but they did not use the word “knowledge”, as I would have expected. They spoke of their views about EH and of the many things that they had to prioritize in their daily lives. They did not use the word risk, using instead the words “concern”, “issue”, or “problem”. These key words became codes that developed into categories and several sub-categories of a decision-making process. A few participants acknowledged engaging with the EH information. It was that contrast of the process between those that did and those that did not engage and words that they chose to use about EH risks that prompted investigation of a new process of Re-forming the Risk Message.

**My Grounded Theory Journey**

Data collection began in October 2009 in the first site. The decision to start in this site was made due to the potential for difficult weather conditions for travel, the longer driving distance and that there were three mountain passes to cross. I wanted to get interviews done before the winter weather made it difficult to drive. I also wanted to get initial face-to-face interviews as was possible so that I could see the homes and the geographical location, to get a sense of where and how the families lived. I hoped to be able to contact participants later for selective secondary interviews by telephone as needed for saturation of conceptual categories or to clarify any questions. Three interviews were collected over 1 ½ days. Field notes were taken of my impressions of the rural setting in which the home was located, the home appearance, any family and the participant’s actions and/or expressions during the interview, and any thoughts or comments made after the tape was turned off. Memos made at that time captured any
initial thoughts about how the interview went, difficulties in the sequencing of questions or wording of the questions, and about any ideas that might lead to new questions. Memos were made after reviewing field notes and listening to the taped interviews.

Interviews were sent to the transcriptionist and received back within 2 weeks. The texts were read and then re-read for coding. Examples of the coding process for the first three interviews follow. All data in all interviews were compared, coded, and categorized. Coding of the first interview resulted in a total of 98 codes. My first impression of this interview after reading the text and looking at the codes was that I had not gotten the information I was hoping to get and that I was surprised that the participant did not describe any changed behaviors after the ERRNIE intervention. I discussed this with Dr. Hamilton who advised me to memo about this interview rather than proceed with another level of coding. We weren’t sure if this interview seemed so un-informing due to it being the first interview, that the person interviewed was a participant in this study but not really an “invested participant” (just answering the questions without any reflection), a problem with the questions, or a combination of any of these factors. We reviewed the questions and changed some of them to ease the person into the interview and reflect more about getting health information before introducing the word “environmental health”, which seemed to be a problem for the first participant. Memos reflected the difficulty of the participants with the terms of EH,
the many statements this participant made using the word “aware”, how the ERRNIE information was “tucked away”, and the repeated admission of being “unchanged” by the intervention.

The second interview was more problematic. This participant was more engaged in the interview but had the children there and there was a lot of noise in the background. More than the fact that the children were there, I wondered more about the reason they were there, especially when the point was made, twice ahead of time, that they would be gone. Memoing about this incident led me to wondering about my own presence in the home and whether or not the participants perhaps thought I was with the ERRNIE study.

Similar codes emerged as in the first interview, for a total of 35 codes: this interview was shorter and interruptions often changed the direction of the interview, so we got “off track” at times. “Being unchanged” in regards to new EH information, “children as vulnerable” due to EH risks, and “core of my parenting” (an in vivo code from the first interview that reflected parenting role and responsibility), as examples, were noted as examples. The term “awareness” was used multiple times by this participant also, although more in a past tense than I remembered from the first interview. I then compared the first level codes of the two interviews for the term “awareness”, as well as other codes. Because I was not sure that I was really getting to the underlying process and still was not sure if I had obtained the “correct” data, I continued with memoing rather than focused coding at that point. “Awareness” became
a central memo, and I noted that there were levels of awareness, dimensions of
awareness, and the act of being aware. The term environmental health was also
problematic for this participant,
and a memo noted that the terms used in EH, and the term “environmental health”
itself, was not defined as health professionals defined it.

The third interview was coded after being re-read for a total of 68 codes. I
compared these codes to the codes from the other interviews and noted similarities and
differences. It was at this time, I began focused coding, to select those codes that
indicated concepts and seemed significant in the data (Charmaz, 2006). Codes were
sorted into categories and compared to the first two interviews. Questions about the
data in categories initiated more memos and further development of the interview
guide. Initial categories included defining environment, defining EH, defining health,
avoiding jargon, defining behavior, weighing risks, attending to, being aware, learning
health, prioritizing, worrying, doing day-to-day business, having control, sharing
information, planning action, staying the same, tucking it away, core of my parenting,
recognizing children as vulnerable, being rural, and using resources.

I noted that these interviews were “sticky” or halting; it seemed the participants
were trying to think about answers as one would for a test. They were answering my
questions but in a way that led me to believe they wanted to show me that they hadn’t
forgotten the information from ERRNIE, or if they had, to confirm what they were
“supposed” to know. For example, when I asked them about their own health and
about any concerns about their own health or of that of their family, I began to get answers about lead poisoning, second-hand smoke, or cleaning products, all topics discussed in ERRNIE. These topics are risks to health but weren’t necessarily the risks that pertained to those participants. I was asking more about general personal health such as asthma, cancer, or allergies. I started a memo about “pleasing the researcher” and after a review of transcripts, I noted the phrase “you guys” in one and how an answer to one of my questions was changed due to it not being the answer “you “would want. This led to a review of literature about social desirability and what could be done about it. I looked for any type of pattern in the questions that would lead to social desirability. I had started each interview with a comment about being in the intervention and asked how it went for the participant. It seemed that starting with that comment might have been priming them about ERRNIE, and after discussion with Dr. Hamilton, it was decided to put all questions with the word environment and any others about the intervention towards the end of the interview guide. This somewhat improved the next set of interviews that took place in site 2.

Questions for site 2 included some of the original questions from the first and second versions of the interview guide, some new questions developed from the data, and the re-arranged order of questions (see Appendices C, D, E). Original questions included asking how the participant stayed healthy and what health meant to the participant and the family. New questions from data included asking about living in a rural area, asking about resources, and discussing health actions. Three face-to-face
interviews were obtained, transcribed, coded, and compared to one another, and then sorted into pertinent categories or new categories. Categories were compared and those that had similar concepts were combined. Codes that seemed to fit two or more categories were noted and used to explain relationships and properties between categories. Memos continued with the addition of sampling of the literature, so as to continue asking questions of the data while densifying and/or linking categories into a framework.

It was at this point in the study that the paradox of remaining unchanged despite exposure to new environmental health information, as verbalized by all of these participants, became apparent while several of them had actually done some type of action to reduce an EH risk. I discussed the noticeable paradox with several members of my dissertation committee who guided me towards beliefs and values of populations. Literature was reviewed about risk perception and moved to perception in general. I compared which participants stated that they were unchanged to those who did not, and who had taken action to those who had not. I also looked for any factor that might play a role in values, attitudes, and beliefs. Questions regarding health beliefs, health behaviors, and family priorities took a more prominent role in the interviews. Questions regarding what moved people to act or not act were developed. Several secondary telephone interviews added some further development to categories about a process of making priorities and health definitions.
Three more face-to-face interviews were obtained at site 1. The constant comparison process continued, with coding, sorting, memoing, and building on the framework with re-ordering of categories into a hierarchy to show main categories, subcategories, and any of their relationships or properties. Initial modeling began, with several diagrams to put a picture to some type of process, not yet defined.

I noted in the middle of these later interviews that I still seemed to be a distracter: that these participants still were associating me with ERRNIE in some way. My “aha” moment came when a person started asking me about her own health and who she needed to contact at the health department clinic that participants viewed my role as nurse researcher in their homes as identical to the public health nurses that delivered the EH information for ERRNIE. I again discussed the problem and the type of data I was obtaining with Dr. Hamilton. After one last revision on the interview guide for question re-ordering and additions, I then asked for and received approval from WSU IRB to remove the word environmental from the consent and demographic form, and to allow for initial telephone and email interviews thereby removing “myself” as the nurse from the home. I was hoping to see if the physical removal of myself would change the depth or types of data. By this time however, it was two years from the original recruitment time and only two participants answered my request to participate in the study. One preferred a telephone interview and the other stated she wanted to do an interview by email. I obtained consent from both individuals but the person who wanted to do the email interview did not respond after sending her the first question.
A telephone interview was done with the second participant and the transcript was again coded and compared to the other transcripts. It appeared that similar information was forthcoming and that although I was anxious about my presence in the home, I still obtained the type of data that participants described to tell about their process with EH information.

One highlight that came from this last interview was the discovery of urban versus rural cultural differences. I had, up to this time, been concerned that rurality was not evident within the context of the stories. Rural culture influences definitions of family roles and health, and is exemplified through some health and family behaviors. Although I noted that health and family role definitions given by participants typified the same definitions of health in rural literature, I was not sure if all of the participants I had interviewed were indeed expressing rural definitions. I was left wondering that perhaps definitions of health had changed over time in the US so that most people defined health in the same way. This last participant stated that she was a “dyed-in-the-wool urban girl” and her health and role definitions and experiences reflected a different view than I had previously obtained. Memos were reviewed and comparisons made from previous transcripts, which brought rurality from behind the scenes to the forefront for definitions of health, roles, resource use, and “self”, which were also found within rural health literature.

Theoretical sampling of the literature occurred simultaneously with the process of coding to be able to compare and contrast selected codes and emerging categories from
the literature with those from the participants and to move codes to a higher level of abstraction. Extant texts that focused on concepts regarding physiologic brain patterns of awareness and attention as evident in those categories, social cognition, health behaviors, and engagement in health information from nursing, health promotion, sociology, cognitive and social psychology, and neurosciences provided additional codes to further saturate categories. Theories relating to awareness, attention, and perception are well studied within neurosciences and cognitive psychology, and the patterns of brain function in cognitive behavior involving these constructs mimicked those described by the participants. Review of nursing’s large body of literature increased depth in categories identified in this study about needs and goals, prioritizing, health, rural nursing and rurality, health risks, family roles, and health education. Sociology and social psychology added depth to the codes of family roles, communication, rurality, values, beliefs and meanings, social networks, and perceptions. The health promotion literature that was reviewed included health behaviors, health literacy, EH risks and risk perception, risk communication, concepts within health promotion theories, and health education. Not only did using a theoretical sample from the literature increase saturation of the properties, dimensions, and relationships of the categories but it also moved the categories to a higher level of abstraction to begin to show the theoretical process of Re-forming the Risk Message.

**The Emerging Theory**

Rural low-income families with children needed to make EH risk information pertinent to their lives before they could make a decision about what do with that
information. *Visiting my perception* was the first phase in the core category of *Re-forming the Risk Message* that allowed participants to be aware and attend to the risk message in the EH information. Awareness was important to bring the risk message to a point of consciousness. More than just awareness was needed, however. They noted that as they became aware, they needed to attend to the risk message as well. Once attention was focused on the message, participants visited prior perceptions about what they knew already and compared it to the new message.

In a second phase, they began *weighing the evidence* from all of the forces in their lives as well as any acknowledged active EH risk in a dynamic interaction with their current perception. As a consequence of this interaction, they re-interpreted prior knowledge and began *making a new meaning* for the message that was informed by factors that could impede or assist them in a decision-making process. *Re-forming the Risk Message* was the core process that allowed the participants to be able to make a decision about engaging in the EH information.
Visiting My Perception

Visiting my perception, as a category, is the first phase of Re-forming the Risk Message. Two conditions, being aware and attending to, needed to be present to visit my perception. Being aware and attending to explained how perceptions were recalled and how the importance of them was determined. Perception is defined as a way of sensing: “recognition and interpretation of sensory stimuli based chiefly on memory” (Perception, n.d.). Perceptions are formed from prior experiences and knowledge and stored in the memory so they can be used to help make judgments or decisions. After being given new EH information, former perceptions about EH information as well as other health information were remembered: “I think my family is pretty aware of
environmental health just because my mom – she got breast cancer and then she kind of went on the natural route. So I think she’s kind of sucked us all into it.” [Patty, l. 619-623 ].

Darla recalled that she learned about EH and other health information from family while growing up and from media sources but also from personal experience:

“ ....When you had...your father, your grandmother who died from lung cancer...so unfortunately there’s a fatality. Or...somebody got ejected from their vehicle when it went in the ditch and got killed. And then all of a sudden there developed seatbelt wear.” [l.712-715].

Gennie’s perception of smoking was that it has become socially unacceptable. More than that however, her perception began when she was a child:

But it’s not – it’s socially unacceptable anymore.... It’s changed. So it is almost like a non-issue.... And when I think about – I grew up in the seventies. My – both my parents smoked. And they smoked in the house. And they didn’t stop. And they both quit – praise the Lord –but they didn’t quit until it began to become like more common to do so. And that was once I was out. So how did that affect my health? You know? And my brain and all… That’s sad. [l.462-468, 510-523].

Elaine remembered her grandfathers, both of whom had an impact on the way she viewed her environment:

I grew up with a gardener so we ate a lot of our own foods. We raised rabbits and had them butchered. And so I think in just the example that I was shown of healthy behaviors and health concerns. I’ll never forget – it’s pretty interesting. My grandfathers were of two different...minds as well. One was strictly an organic gardener. And as a dairymen in the valley here, he would use ladybugs for pest control and that kind of thing. And his milk was graded Grade A whereas neighbors that didn’t was a lower grade, which I love that story. And my other grandfather was a County Extension agent in (rural location). So he was all about the chemicals. And, you know, just remembering the heavy smell of chemicals in his garden shed. You know, it’s just very two different. I’ll never forget...just recently I was reading the family letters that my organic gardener grandfather was writing about and...using the leaves and grass clippings for mulch and...how you
could get by without having to...high-intensive gardening. And this is a family letter, so he was very concerned about it apparently. [Elaine, l. 119-136].

Old memories were also recalled about how the participants learned about health and/or EH information. Recalling how he’d heard about EH, Jon stated, “I went to a private school. I had my first eight years in a private school, and it was pretty tough academically. But we pretty well got that whole core.” [l. 243-246]. Colleen recalled the various sources she heard about EH and how it compared to learning other health information:

Some of it I guess is the school system – does a lot of it…television does some. A lot of it’s from just your parents too...and health professionals that tell you things. Like you should be flossing... (Laughter) Yeah. I floss. Winky-winky. [l. 89-104].

Cory remembered what was important about health then and now:

I would say I definitely learned from the role models I had, which was my parents and my – I was the youngest of four (4). So older brothers and a sister...and we were just a very active family and very into extracurricular activities and athletics. And so exercise just was always – and I saw my parents exercising, and so I knew early on that exercise was important. And just...nutrition wasn’t as much of a deal back then...but I think it is more so now. And so I see myself now with my family focusing on exercise, but also more on nutrition than when I was growing up. [l. 118-126 ].

Although the participants spoke about their past experiences in a conscious remembering, they also stated that they were aware of old EH information about EH risks on the “periphery” of their memories, but not paying attention to it. This information was just “there” if they needed it and came from prior experiences. They only visited these perceptions when they had some type of trigger or action connected to it such as filling out survey forms or interacting in a conversation, in order to match
up what they had previously perceived to what they now had in the form of new information. Jon discussed the information in the questionnaires: “In the survey stuff, nothing really jumped out at us...That’s -- pretty well all stuff that (my spouse) and I both have learned and grew up understanding from our families and so forth.”

[l. 68-74]. Patty stated she remembered EH information with a trigger:

… probably either by reading something or interacting. Like talking with someone...we go to the doctor where we’re talking about certain things, and she’ll say…“What about this in your house? Is this an issue in your house and could this be affecting your health?” So probably one-on-one talking with a health professional about it or reading something [l. 28-34].

Darla remarked about noted her past concern about mold:

My daughter and I – out of the three kids, my middle daughter has asthma and allergies just like I do so I’m always kinda looking at the environmental...always wondering where mine came from. And hers seem to be very much like mine. And so...when I think mold, I have a big concern. [l. 187-193].

There was then some type of unconscious and conscious processing going on about the EH information. First, they were aware of it and then attended to it to be able to visit their former thoughts. This had to happen before they could move on to deciding which information was the most important (what the “take-home” message was) as well as to decide what to do with the information.

Being aware. From the moment they received the EH information participants had the choice of beginning a journey towards a decision of what to do with EH information. They were made aware of various EH risks that could be found within their homes and that could affect the health of their families, in particular, the children.
They sorted out what EH information was pertinent to them. As a condition of *viewing my perception*, they became aware of what they knew in prior perceptions in order to compare it to what they were learning. Participants spoke about awareness in many ways: as having a continuum of past to future, of levels from fully (consciously) aware to unaware, of being aware, and of having self-awareness and public awareness.

Awareness on a public level was discussed as being a fully conscious effort to let others know about the issues that the participants felt were important. Having knowledge increased awareness. Awareness at this level came from their own experience with public campaigns about health issues and was included in prior perceptions. While it didn’t directly relate to self, it did affect the overall perception they had of a health risk. Several participants talked about radon mitigator campaigns and how the information kept them aware of related health risks. Gennie stated, “Well, sure...You’ve got radon mitigators on TV. Probably here more than other areas.” [l. 388-389]. Sallie explained how a media campaign worked for her, “the radon thing is a long-term thing. And I know what the repercussions of that can be.”[l. 134-135].

Because these types of campaigns worked for them to provide awareness of some EH risk in the past, they wanted to be able to provide some awareness for themselves and others in the future. They were assigning a level of importance to the new EH information so they could stay aware of it in the future. Darla discussed EH risks in the process of building her home and how public awareness could help people remember the consequences of not doing anything:
I think a public awareness that this is what it is and this is what you can do to take care of it. I feel like there’s a real lack in that area….And there’s so many people, you know, that maybe they own their home. They don’t have any clue what’s in their home because somebody else built it for them. Whether it’s asbestos or lead-based paint or the dangers that are in their home where they spend all their time. And their children’s bodies and organs are growing and developing right there. Versus like my husband and I where we built a brand new home using, you know, the latest, greatest, and all that. And how dangerous all that stuff is. So just the awareness that comes along with it. [l. 571-574, 942-950].

Because she had experience with home building and now had knowledge of EH risks associated with home building, she wanted to alert others about the risks as well as keep herself and her family aware of them.

Most often, awareness was discussed in relation to self. Participants answered the questions of: a) What was I already aware of?; b) What am I now aware of?; and c) How aware am I? Their answers reflected the past and present, their level of awareness, and of being aware.

Past awareness reflected what they already knew about EH. Many participants spoke about some type of experience with EH information. Some of them learned it in school, some got information from media sources such as television or the internet, and some from health professionals. Gennie commented about her own knowledge of EH from the past, when we were discussing about how she learned health information:

…, you know, I was quite aware of issues with environmental health. Oh, yeah. I was aware of lead-based paint. And aware of – that you could have contaminants in your water. And aware that you – you could have second-hand smoke issues with your children. Sure. I was aware of all that...,I was aware of those things. [l. 60-78].
When asked how she was aware of these risks, rather than being something she consciously thought about, she stated she just was aware, “On the periphery.” [l. 80] and later on, she reminded me, “It’s…not in the forefront.”[l. 406].

Sallie explained that she got some EH information earlier but compared it to the new EH information from ERRNIE:

I mean, there was some health classes that I took. And, even I just took a couple of child development classes. And, you know, that stuff is kind of incorporated in there. But not – I mean, it might’ve been a blip on the radar one day. It wasn’t…as extensive [l. 283-286].

Elaine commented about having some familiarity with EH from prior experience:

Oh, I’m sure I must have. Like I said, being connected with the co-op and, um, and being in – oh, gosh, in this particular community – just being very aware – more aware, it seems like, than other communities of what, you know, environmental health issues there are in the community…I’m sure I’ve heard it before this study [l. 313-318].

When nurses were in the home, there was full awareness on the part of the participants of the learning situation. Participants became aware, or more aware, of the EH information, depending on what they had previously experienced. Patty noted:

… more awareness of the things that I need to be aware of with the kids as far as, um, hazards in the home… so more – more just awareness of when I’m looking around or when I go in their bedrooms, looking at their windows and seeing they’re damp or, making sure they’re not sucking on things that have lead in them. So I’d say more awareness. [l. 9-13].

Darla explained that reinforcing the information increased awareness:

Just the awareness, I think. And it’s nice to – to reinforce things or to have things reinforced. Thinking, yeah, I was on the right track or, no, maybe you’re way off over here. So, you know, just to have that awareness. But it was very good information, and that part was great. [l. 890-897].
Cory described becoming aware with home testing for carbon monoxide:

She came in with a tool to measure that. And so we were able to identify that and get that fixed. And...just – it really brought to light a lot of things I hadn’t thought about before. I can’t say as I really...we took steps to... address the carbon monoxide....It was something we had in our house and we didn’t even know it. [l.17-20, 241-242].

Several participants spoke to being unaware even after receiving new information. It seemed that some information did not mean anything at the time it was received and therefore there was no awareness. Colleen had an incident when a carbon monoxide monitor sounded an alarm. Although she had been given information about it, she had never had one before. She described how she felt when she heard the alarm:

I probably would have had – well, I called, for one thing. So yeah. I thought, well, I don’t know what that means because although I know that the alarm is going off, I don’t know what the number means. Does that mean evacuate the house? [l. 304-308].

She also talked about getting the blood test results that showed an elevated lead level on one of her children. Although she received the results, she was unaware that anything was out of the ordinary and unaware of what the results meant, “That was alarming. Yeah. Because – because I was unaware of it” [l. 313-315]. Yet, she did acknowledge getting information about lead, “I think there was – I think there was something else about the lead, but I couldn’t tell you what it is. A list or something.” [l. 460-463].

Not being aware of what results meant affected another participant as well:

...well, I guess... just being aware that...the windows (due to condensation Leading to mold). But then again, what is a direct cause of what happens when
your windows have that? What’s a direct solution? And where can I go to get it fixed? Who do I talk to? I mean, 1-800-WINDOWS? [Patty, l. 450-456].

Not having any previous experience with certain EH information meant that prior perceptions could not give them a sense of what certain tests meant or what to do. The new information had not been committed to memory. While they may have been aware of actually receiving the information, they remained unaware as to consequences of tests or of resources which were provided in the EH information. Since these participants were not truly unaware of receiving the information, there was a lack of attending to some of the information.

**Attending to.** Attention is also present on unconscious and conscious levels. Unconsciously, attention is responsible for mental processes that guide behavior or thought towards a goal, those behaviors described as “being on autopilot” such as brushing teeth (Pally, 2007). Consciously, it is responsible for selecting those images that are important to a person so that a perception can be illuminated. One must be aware of a perception (prior or present) and also focus (attention) on it for it to consciously mean something and for any changes to be made for memory storage for future recollection (Bunting & Cowan, 2004; Dijksterhuis & Aarts, 2010; Lamme, 2003).

Conscious attention was a key to heightened awareness and in bringing focus to prior perceptions and to the new EH information for the participants, especially when discussing health risks. Darla noted that getting results along with written information made her think about EH health problems she had never considered along with one she thought might be a problem:
it passed fine, but there’s some of the things – like we had some high moisture content issues in some of our bathrooms. We had our flooring – I think the only place we had carpet was in the bedrooms. But everywhere else we either had hardwood or tile flooring. And the places where we had tile next to the sink, it seemed like where the grout lines were, there must have retained some moisture. Because it retained a high moisture…when I think mold, I have a big concern. [l.178-193].

Elaine noted that one needed to be aware first and then pay attention to a risk message: “Yeah… something to be aware of-so as to avoid risk.” [l. 263-265]. Darla discussed the environmental risks she attended to due to heightened awareness:

“Secondhand smoke, like we talked about, in the home or the office space. Maybe mold. But keeping all of those piqued awareness to first recognize what is health and what is maybe not health in that environment.” [l. 257-263].

Focused attention was required to put all information into perspective. Gennie was surprised when her children had positive levels of cotinine, indicating that they had been exposed to nicotine. Since she and her husband as well as members of her social network were non-smokers, she was totally taken aback. Her perception had been that everything would turn out normal as she reported, “And so it is remarkable to me that [they tested positive] that opened my eyes.” [l. 496-497]. Her awareness and attention were focused on her prior perception but now had to include this new development.

Darla noted that radon gas had been a concern of hers and was focused on the results: “And I think most everything came back okay, but there’s definitely some things That came to my attention as part of that study, just with…radon gas…” [l.174-176].

Jon felt that the two most important environmental factors for his family led to his
attending to one of the risks taught about in the intervention:

Well, first thing, I mean, we drink so much water, and we have really good water, I think. First. And I think the air quality. And that’s why that radon kind of came in our thoughts ‘cause those are two of the most basic things. And I feel that’s why we enjoy living where we do. [l. 90-95].

Attending to prior information did not always lead to acknowledgement of new EH information, including resources. Noting what she did and didn’t pay attention to, Darla was at a loss about where to get help if she was aware and needed it:

I don’t know. This is a very difficult one. And even with the water issue, being a (profession reference), a lot of times I will ask parents of young children, “Do you” – if they’re not on city water – if they’re on well water – “Do you know what your fluoride level content is?” And when I lived in (state reference), it was very clear to me where I could direct patients to tell them, “You can contact this…health agency and they’ll send you their little plastic vial and this chart…send it away and they’ll give you the report.” And here, I don’t even know. So, you know, I consider myself a fairly educated person. I pay attention to that kind of stuff and – so I don’t know where to go. [l. 609-620].

Participants also discussed why or why not they attended to health information. How one preferred to get information made a difference as well as if the source was trusted. The information needed to make sense to the participant. Experience with an issue in the past assisted in focusing attention on a health risk.

Personal preferences included personal conversation and the use of the internet as preferred devices for attending to information. Elaine stated her preference for personal interaction to get health information: “Yeah. I guess that…person-to-person. Okay, I’m not…I’m not a computer [geek]…getting a million hits on a Google search is not my idea of fun.” [l. 550-552]. She could attend directly to an issue when she could have a discussion. However, others stated that they paid more attention when they used the
internet. They felt they could pay attention more closely when they were focused on a particular topic:

I was contacting a guy down in (county reference) regarding pollutants inside your home and how to make sure they’re not causing health problems. I may have came across his name when I was Googling how you figure out why you’re getting condensation inside your windows...‘Cause we were dealing– have been dealing with it – a long time. [Patty [l. 226-244].

Others stated that they enjoyed having the nurses give them EH information at home to focus attention:

So I was – it was nice ‘cause then I was kind of in a passive role and...was able to have that addressed. And...it was neat to just have it be taught in an informal setting... and I was all ears and like, “Yeah, let me – sure. Let’s hear.” So – ‘cause I am concerned if I’m missing something that I should be concerned about. [Gennie, l. 162-166].

Participants attended to what was important, whether it was EH or general health information. Betty was aware of the risk of H1N1 virus and asked the nurses about it:

“It’s H1N1 virus, um, medicine came out, um, I questioned them on it....Yeah. ‘Cause I had some concerns over it.” [l. 331-336]. She was attending to the health concern that was more important to her than the EH information at the time and used the nurses as a trusted source of information.

Some participants did not attend to some of the EH information. While aware that they received information about various risks and having enjoyed the experience of the intervention, they didn’t have any prior experience with a risk, did not see the information as pertinent at the time it was received, or it was not given in a preferred learning situation. Any of these situations affected how they attended to the
information:

… generally you come away with something with it. I get impatient with people that don’t understand things. And then I stop listening when people keep having to explain something over and over and over again. I’m not a good, patient person in the classroom sometimes. It’s like get it! Come on! [Colleen, l. 439-443].

Elaine offered a possible explanation: “…the information repeated a lot, which was good. You know, the human brain needs to hear things seven times before it really clicks in.”[l. 760-761]. While repetition worked for some, it was distracting for others.

**Summary.** Without awareness, conscious perceptions were not brought into view and without attention there was neither heightened awareness nor any focus on the new information and/or prior perceptions. Both conditions together were needed to result in a participant acknowledging any previous knowledge or experience about EH and also acknowledge the risk messages in the new information. Once this occurred, the participant could then move to thinking about issues that affected the family’s daily living and weigh them against the risk messages that could possibly impact health and routines for any family member.
Figure 2. Phase Two: Weighing the Evidence

Re-forming the Risk Message—Phase Two

Weighing the Evidence

The evidence of the totality of family norms was discussed by the participants. There were many issues that the families dealt with on a daily basis. They had priorities, including time commitments, and goals. They needed to perform family roles. The social context of rurality informed their definitions of health, resource acquisition, and to some extent, individual family roles. The context of socioeconomic status (SES) defined self and how they used resources. Health risks that affected or could affect family members were weighed as to severity and importance. All of these elements, as subcategories, contributed to a different phase in which the elements were weighed against the perceptions of EH information. Taken together, these subcategories were properties of a larger category: weighing the evidence.
Acknowledging priorities. Participants told of their priorities, needs and goals. They discussed how family life was important and how they chose to keep their families healthy. Similar to Maslow’s Hierarchy of Needs (Potter & Perry, 2005) in which physiologic and safety needs must be met before other social and psychological needs can be realized, the basic needs of the family came first.

Several participants explained that food was an important first step to keeping families healthy. Betty discussed gardening as one way to provide good food: “Make sure that we have the right foods in the house... We got...corn, pumpkins, squash, potatoes, onions.” Food wasn’t the only thing priority though. She continued, ”Keeping the house as clean as you can. It’s hard with a four-year-old, but … [outside] standing water, you know, can cause problems. Mosquitoes and stuff like that. And I worry about some of the foods and stuff that we buy. [l.150-157].

Elaine explained that food from her garden was an important step to keeping the family healthy but also noted some other basic priorities such as buying organic food when food in her garden wasn’t available, exercising by walking the dog and getting proper sleep. Patty not only discussed food, liquids, and sleep as necessary to health, but also how air can affect health:

...making sure we’re one step ahead as far as taking care of your body to make it healthy as far as eating right, what you’re drinking, what you’re putting into it, and sleeping so you don’t get to a point where you’re kind of in crisis mode and you need to take care of it....you know, even necessarily the way the air is outside. We struggle with asthma and so the way it is outside, even the weather. If it’s dry, humid or not. [l.82-141].

She had children whose health was dependent on the air quality and making sure it
was at safe levels became one of her daily activities. Colleen summed it up, “We try to eat healthily. I’m fairly conscientious about germs and being cleanly. Hand-washing, you know? Because [it] kinds of does a lot of it.” [l. 75-92].

Everyday tasks had to be completed, including cleaning, shopping, taking children to school, or going to events. Darla noted that cleaning had to be done daily: “…you know, regular habits just on a daily – or however often I do it – you know, to try to do it the same time, the same way.” [l. 859-860]. Jane explained that activities were important in her family and that keeping the children active was a daily necessity: “…we go to the Y, we go swimming. I take them bowling sometimes. ‘Cause I’m on a league so sometimes I take them...We like to go to the park. My little guys, we love to listen to music and dance.” [l.372-377]. Betty described some of the chores she was responsible for and that had to be done if not daily, at least several times a week: “Weed eating. I’ve been doing that today – working on that, trying to get all the weeds around where we can’t mow... that keeps the mosquitoes down. Keeping all the grass mowed... taking care of our animals, too, and make sure that they’re healthy.” [l. 195-203]

There were other priorities as well. Children’s health was more important than that of participants. Children were seen as vulnerable and more at risk. Betty had just found out that the granddaughter living with them had a health problem. She explained that it was now more important than ever to stay healthy: “How being healthy is very important to us, you know, especially ‘cause we’ve gotta take care of her and make sure that she’s healthy, too... just recently found out that she has asthma. So – which is along with us, too. We both have it.”[l. 80-86]. Jane stated that her children’s health was much
more important than her own health:”…But I make sure that the kids get immunized and they are on time with their well child’s…” [l.128-129] She claimed that she never went to the doctor for herself. The main goal for her was to have healthy children.

Jon discussed how children are more at risk when exposed to EH hazards such as tobacco smoke:

…. like we were at a wedding the other night. And there were people smoking outside of the wedding. I’m going to hustle my kids through that window real quick. I don’t desire them to inhale at all. Especially back to that same concept. I think they’re so young and [un]developed. I think nicotine could have twenty times the effect as it would on your or I. If I breathed second-hand smoke or something. [l. 192-205].

Time played a role in what participants felt they could do in a day and for doing what they valued. Gennie claimed that she didn’t change anything due to the intervention because she concentrates her time: “…about my normal everyday concerns” [l. 28]. She added later on: “And there’re just certain things that the time it takes to be involved with or to think about… other things would be lost and that are more important. So it comes down to prioritizing. And what kind of time you have.” [l. 602-609]. She felt that by spending time on an EH risk that was not important to her at the moment, she would miss the things she valued, such as her baby learning to roll over or to smile. Her children did test positive for cotinine but since she wasn’t a smoker, she felt she could deal with that issue at some other time. She noted, “But I don’t have enough time on my hands, and I’m not somebody who’s excessively worried about those issues to have taken any proactive [action], as we said before. “ [l. 158-160].
Jane’s number one priority was her children but found she had to juggle that priority with available time for health needs, work, and activities. She stated that keeping them involved in community events was her way of staying connected with friends and also keeping the children healthy: “For my family, we go to the park. We go to community events.” and further explained that her children were very busy with sports. [l.13-14,]. However, there was little time for anything else in her life as she exclaimed, “There are just so many things to do and so little time.” [l.86] She had a child with asthma and had old heaters in her home that caused an increase in dust when they were on. She decided that between work and making the children and their activities her priorities, the heater situation could wait.

Participants explained that EH risks may or may not be a priority in their lives. When asked what she would do if she found out there was an EH risk in her home, Darla said, “You know, I guess we’d prioritize it. If we felt that it was something in – you know, real serious we would find a way to pay the medical bill or do whatever it is. But if it’s, you know not a high priority in our lives, then – [shrugs].” [l. 74-82].

For Colleen, cooking a holiday dinner on the gas stove was much more important than an EH hazard: “We have carbon monoxide detectors in our house. Currently, they’re in my garage ‘cause they would not stop going off when I was cooking the turkey.” She continued,” But I called [the manufacturer], and they said, it was twelve. One was level twelve and one was level fifteen. It’s just that they’re very sensitive detectors. So I said, okay, it’s okay for now. I’m not going to kill us all while I’m
cooking the turkey.” [l. 170-185]. She explained that she opened the kitchen window a

crack, just in case there was any possibility of carbon monoxide. Family had come from

out of town to celebrate. Getting the turkey done and having dinner with her family

outweighed the concern about having carbon monoxide detectors in the house or

worrying about alarms.

Prioritizing family needs and goals was one issue that affected how EH

perceptions were weighed. Day-to-day concerns had to be dealt with and routines

maintained. Families also lived in rural areas which affected daily life. There were

longer distances to travel to get to services. Problems had to be solved without a lot of

available resources. It was evident that there was the context of rurality at play when

families were prioritizing.

**Rurality as context.** With the exception of distance and fewer services, rural

dwelling families are becoming more similar to urban families due to increases in

technology and education. Although there is still a somewhat patriarchal structure of

the family, the typical rural “male working and woman staying at home to raise the

children” scenario has changed due to the economy and other social factors such as

more women with higher education and delay of pregnancy (Campbell, 2004). Rural

women are increasingly going to work at higher rates than urban women to help

provide for the family income and men are less likely to be the sole breadwinner (Smith,

2007). As a result, gender role differences are less apparent as they once were in

previous generations.
Yet, there are still some rural traits that influence families. It has been documented that rural dwelling persons have more resilience, prefer self-provisioning and informal work, and are more independent (Lee & Winters, 2006; Sherman, 2006). Although the family roles are changing out of necessity, these cultural norms and traits of rurality were found within the lives of the participants and affected health and family role definitions.

**Family roles.** It is known that there are differences in rural families as compared to urban families. According to Ganong, et al. (2009) urban parents value meeting new people, having close friends and also part time acquaintances, know less about their neighbors, have children with more cautious attitudes, and more closely monitor their children due to perceived risks. They noted that rural families have close relationships with kin and friends, less likely to share things with people they don’t know well, perceive their social environments as safe so children have more freedom, and are more likely to exchange resources exclusively with kin.

Participant families were close-knit and parents took their roles seriously, especially because they lived some distance from neighbors and friends and had little access to childcare. Many of the families were undergoing changes due to the economy. Several participants had lost jobs in the past few years and some women who had previously been stay-at-home moms were looking for part-time work. Several men were becoming more involved with daily childcare.

However, there was still an influence of rurality: the women in some of the
families had vegetable gardens and tended them for the family, rather than the male partner. This was learned behavior from family role models and a rural woman’s way of taking care of family. Betty, Elaine, and Colleen all had large gardens. Darla stated she, too, usually had a garden in summer but the family was getting ready to move so didn’t put one in. Although she didn’t have a garden at the moment, Darla recalled growing up on her family’s ranch: “And my grandmother had a huge garden. And she prepared all of the meals and cooked from scratch with lard and flour and sugar and beef and chickens that we raised.” [l. 139-141]. Darla prepared meals for her family in the same way. In fact, she noted that her grandmother’s example, along with distance, was a reason why she didn’t take her children out for fast food very often.

There was another example of self-provisioning as well as independence from Elaine, who had grown up with fresh milk from their family cow.

Human beings have drank raw milk for thousands of years. And – and suddenly you’re just going to outlaw it because pasteurization is – is the thing. And, of course, it has saved many people and – and preserved food stores so that we don’t starve. And, you know, it had its – its place. I mean, I understand the importance, yet the illegalness of it in… light of the fact that individuals, um, know differently, you know, in the light of contrary experience. We’d just go underground. Oh, I buy illegal milk. Wow. And it’s labeled, “For Pet Use Only.”… We do everything in terms of legal. But we’re circumventing the law in order to be healthier. [l. 381-393].

She saw her role as a parent and spouse to keep her family healthy using the same products she grew up with on the farm, even if it meant drinking milk labeled “not for human consumption”.

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Being independent was valued. As a result, participants felt more freedom and children had more room to explore. Children played in large open yards, forests, and fields nearby, as noted in field notes. Colleen said that fresh air and activity kept children healthy: “…we point to the outside. And when my kids come home today, they won’t sit down in front of the TV. It’s sunny. It’s not raining.” [l. 68-73]. Homes were rarely locked: “I mean, we don’t lock doors here. Nothing.” [Jon, l. 362]. Jon showed off the area around their home and commented that there was no traffic to worry about: “Because we have no vehicles. No motors.” [l. 97] Even though they were miles from services, they enjoyed living independently: “This is not a normal community…We’re fifty (50) miles from grocery stores.” [l. 365-368]. Participants took pride in being able to remain self-sufficient. These attitudes were identified as Darla shared:

Oh, absolutely. I’m very good at helping others, but I have a very difficult time when it’s time – if I had to ask for help, oh, that’s horrible. And if somebody offers to help, it’s about as equally painful…I think just a big part of being independent and…supporting yourself. [l. 490-504].

While valued from a resiliency perspective, rural independence could also be a factor in patriarchal domination. This was the case for one participant. Colleen noted one positive of living independently in a rural setting: “I definitely feel that being rural makes family more dependent upon one another-creates more of a family situation than a suburban setting.” [Email 1, l. 2-3]. But she also discussed one negative aspect: “…I also believe that there are a fair number of families who live this lifestyle in order to accommodate domination from a male figure as well.” [Email 1, l. 9]. Colleen had to
move with her children from an abusive situation while on a farm. Since the farm was isolated with few neighbors and only her immediate family there, independence became an undesirable feature of rurality for her as a parent.

The women made the health decisions for the children and preferred to take care of health problems at home, rather than using the health care system. This was also true for the adult family members as well. It has been noted that rural women act as family health gatekeepers (Lee & Winters, 2006). Cory made the health decisions for her family and stated it was, “…Usually me.” [l.161]. Patty followed her mom’s example in making family health decisions while also trying to involve her husband:

My dad was in the military so he wasn’t around a lot. So my mom made a lot of those decisions. So my husband is really – he’s really involved. But I think he feels like I – I had a job in the medical field and … that’s something I’m passionate about. About health…and so we talk about it, but ultimately I’m usually the one who makes those choices. [l. 530-539].

When asked about who makes health decisions in her family Colleen described her husband’s role:

…and he has never taken the kids to the doctor…if they need to take their medicine And I’m not here, he’ll make sure that they take it...he hasn’t ever made a call saying, well, they need to go to the emergency room. So very little. [l. 122-125].

Having a close knit family and friend network was vital. Cory stated having family near along with friends helps her with family roles: “I would say it was mainly family … I’d say, you know, raising small kids, I’m definitely in a – a group of friends with other families who have small kids. And so …we share information about raising family.” [l. 147-149]. Elaine thought about who she uses most often for support and
help with family matters and stated, after verbally exploring the issue, “…But I would think personal networks.” [l.227]. Elaine had an older daughter in her twenties that she shared many issues with, as well as several close friends.

Parents were held responsible to protect children from any health risk. Patty discussed having had a water problem in their community well and how other neighbors had ignored the problem. She then compared the water problem as similar to choosing to smoke. She stated:

I think – my personal opinion, I think it’s parental irresponsibility… as far as, you know, our water, I get a notice saying, “There’s E. coli in your water.” Well, I’m sure going to do the best I can do to make sure that that doesn’t come in contact with my kids.. I’m going to boil my water. I’m going to get water from outside sources.... most of the time, parents who smoke know – I mean, these days – this day and age you know how that affects you and your kids. And you’re still making the choice to do that. [l. 402-410].

Gennie explained that her role was in taking care of the children and in doing so, adults’ obligation was to protect the children from EH risks: “It really has some more to do with the adults preventing the children from being exposed. By mediating or remediating something like the radon or a well that’s not –or something.” [l. 536-542]. Betty, too, took a protective role for her granddaughter: “Her mother smokes in the house. She has another child and she wants this one here to come live with her, and we keep telling her no because the environment there is not good. “ [l. 355-359]. Cory noted that it was when she and her husband became parents that health and protecting the children from EH risks became most important:

…my husband and I have always been pretty health conscious. But once we had kids, that kind of ratcheted it up a notch…So we just kind of even went higher.
And we know that we’re a role model for them so we want to...demonstrate what is healthy and making good choices. [l. 465-472].

Cory explained that they had a carbon monoxide problem with their gas stove and not only included the children in discussing it but also had them watch as they clean the burners out on a regular basis.

Unlike most of the participants, Jane grew up in the city, lived in a rural area for a few years during the ERRNIE intervention, and moved back to a city, albeit smaller than the one she grew up in. Rather than having and appreciating space, she moved into an apartment with her family, where her home can be taken care of: “…’cause everything was pretty modern. “Cause we got new appliances. New-and when we moved in there, new carpet...the windows are great …The sliding door has like the nice seals.” [l.889-907]. She did not like living far away from services: “Absolutely...when I was pregnant with (name reference), I would be so paranoid that if something happened I wouldn’t be able to get to the emergency room because it was so far.” [l.264-268]. She noted that people in the rural area where she lived has more of a wait-and-see attitude when it came to health and accessing services. She thought that it was due to the mom “being stuck”-not having a car or perhaps not being able to drive. She wasn’t sure if it had to do with being independent or resilient.

Jane also differed in how she saw her role as a parent. Unless she could be a part of their activities, they stayed home: “So they might watch more TV than I would like.” [l. 370]. When she grew up her parents were similar, inviting their children’s friends over to their home so they could supervise and because “...we were just the one
family] that had the stable parents and the good food.” [l.120-121]. Jane also preferred to socialize with others and stated that she had a ‘Totally social house.” [l.78]. Unlike many participants, who spoke about having close social networks with whom they socialized, Jane said she and her family were “…about community and connecting.” Social activities with many people, not all of whom were close friends, were “…the center of our world”. [l.19, 93].

Air quality was important to Jane as a parent and health decision maker since her children had asthma problems. Jane complained about the smell of living in a rural area. I had noted that several participants lived in areas where animal odors were noticeable but no one previously had commented on them. Although offensive, Jane did wonder if some of the odors had a curing effect on her daughter’s asthma, whose symptoms significantly reduced while living there: “I don’t know. Because it seems ironic. Because I don’t know if you’ve ever been in (rural area), but [it] has like the worst farm odor ever all year long….And maybe it’s some good natural aroma that just cleared up those lungs and stuff. Or I don’t know.” [l.319-328]. Although appreciative of the “good natural aroma”, Jane still didn’t care for the lack of access to people, services, and community that she felt were important to raising her children. In short, rurality didn’t define family roles for her.

**Defining health.** Health is defined as the ability to work and be productive in rural culture (Lee & Winters, 2006). Participants voiced this same definition. Gennie said, “Ah, health refers to your body. And how you feel and your personal health. Ability to
function and feel good and you’re at your best…” [l. 127-134]. Colleen agreed: “…well, obviously not being sick….but having the energy or vitality of…being healthy emotionally and physically. Ability to do stuff. “ [l. 58-61.] Betty supposed, “It means being able to do the things that we want to do.” [l. 52]. Taking it further, participants also noted that health included connecting what one did personally and physically to where one lived. Cory explained that:

It means that we are…taking care of our bodies so that our bodies are healthy. And also taking care of our environment so that our bodies are healthy… Good nutrition and good exercise and…no smoking. That kind of thing. Controlling what’s in our environment and around our kids. [l. 68-74].

Defining health in a rural sense also influenced to which EH risks they paid attention. Patty described, “Mildew and mold. Big for our family….the pollen – like air quality. Mildew and mold, especially ‘cause we live in a rural farm area.” [l. 151-154]. She had earlier stated it was because of “the way the environment affects your health.” [l. 123]. Having a husband and sons who liked to play sports, her family could not do the things they wanted to do if these risks affected their health in any way. Cory discussed concerns about water quality and their family’s well:

…You know, there’s concerns about water – not in this area, but up in (county reference) a little bit. And we talk about that because of all of the raspberry farms and other farms that are up there. But supposedly we’re on a, I don’t know, some sort of a separate [water] feed from that. But that’s in the back of my mind. That I feel like we should be getting our water tested….it would make me feel more comfortable to have the water tested maybe every other year or something like that. [l. 546-562].

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Cory knew that pesticides from runoff could impact her children’s health and performance as well as the family pets that were very important to the children. She worried that those types of contaminants in the water might cause health problems, even though their well had tested negative for any type of problem. She later said she might test more often than yearly.

Elaine shed light on the fact that many older homes in her rural area had lead paint at one time, and that she lived in one. She stated, “Well, I’m far more…aware of…chipping paint and thinking about the dust blowing in from windows and, you know, the lead in the soil perhaps that might be there. I mean, I’m not going to dwell on these things, but (shrugs).” [l. 291-295]. She had mentioned lead paint because her husband visited home remodel sites as part of his job and was well aware of the problems lead caused in children.

Rural participants did not tend to use health services. They preferred to make their own health decisions and take care of things by themselves. Since health was tied to being able to function, seeing the health care provider could actual prevent one from functioning. Colleen noted, “We rarely go into the doctor. Just because, in my opinion, it’s entering into the germ kingdom. Unless you’re really, really needing to go there.” [l. 288-293]. Darla said, “I used to be really good about my annual well woman visits as well, and the last couple of years I don’t know that I have.” [l. 45-47]. Although finances were a consideration, she also revealed, “My husband and I tend to be on the ‘if you really don’t need to go to the doctor, then you don’t go’”. [l. 59-60].
Not going to a regular health care provider regularly was not just limited to the rural participants. Jane also admitted, “…that I’m very bad for health as far as I’m concerned.” [l.128]. She later explained, “And then…I have to be dyin’ for me to even call the doctor.” [l. 178-179]. However, she doesn’t like going to the doctor because she felt that they were an unreliable source of information, rather than due to her definition of health: “Usually not the doctors…they tell me like: ‘your child has this.’ Then I’ll go look it up. So I can understand-get a better understanding.” [l.401-404]. For Jane, defining health meant having insurance, having easy access to services, and staying healthy through activity: “I walk a lot when I’m at work….I will walk at least three or four times a week on my lunch break.” [l.338-342]. There was definitely a difference in health definitions between participants who had grown up or lived in rural areas and Jane who defined herself as a “city girl”.

Socioeconomic status. Poverty was new for many of the participants. Some of them had been fully employed prior to ERRNIE, and lost jobs as the economy slowed down in the areas where they lived. Others were students going to college and had left work to obtain an educational degree. They were not the “poverty-stricken” multi-generational families that have learned strategies to deal with low income. Gilbert (1998) defines middle class as having economic security, having some autonomy in employment, able to rely on their own expertise for sustainability, and having a comfortable standard of living. For the most part, participants were and still thought of themselves as middle class with fairly conservative values. Being in a lower
socioeconomic group meant that they were relearning ways to obtain health resources and also how to think about “self”.

Darla’s husband was a contractor and had been unable to sell several homes. She had previously volunteered time to schools and the local health department as a health professional, but as a stay-at-home mom. She was trying to develop a way she could work but still stay at home with the children. Loss of income meant her family could no longer use the same health resources. It also affected how she saw herself. It later affected what she felt she could do about EH risks.

And I was responsible for helping line up volunteer hygienists and dentists. And, and one of the dentists who worked at our Public Health Clinic, she would be in these meetings. And my husband was saying… he canceled his prophy [phrophylaxis teeth cleaning]– his six-month prophy because he didn’t want to spend money to go. We didn’t have the money spend. And I’m thinking this is awful… He said, “Maybe if you go there.” And my first reaction was, “No. We’re not going there. I…meet with this doctor to…help others. We’re not going there.” What a horrible thing for me to think... My stupid pride. [l. 439-454].

Her husband suggested that she make an appointment at the Public Health clinic where there was a dental clinic on a sliding fee basis with the dentist that she had worked with in the past. She was embarrassed about her financial situation and also because she was the one to give free care, not receive it. Darla later talked about finding some resources from a reception when she visited the Public Health Clinic:

And she was saying, “Well, you know, if you qualify for our program, you’d qualify for this.” And right now, our children – well, our family does not have health insurance. For financial reasons. And so just the awareness to know that if, you know, if this is where you’re at financially and you qualify…when it comes down to it, I don’t think any amount of pride if our children need… if there’s a program out there to help, then that’s wonderful. [l. 542-555].

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Yet, she still couldn’t get away from feeling like it was wrong somehow: “And... I guess part of... perceived thought that I have about this – and I don’t know if this is correct or not – but I sort of equate it to like Welfare or food stamps or things like that and think ...we shouldn’t be - we’re abusing the system.” [l. 460-463].

Jon had lost his source of income and the family was living on one third of what he used to make. He discussed how he would take his family to the public health clinic in his area if needed:

Absolutely. We would not hesitate if we financially feel burdened and we don’t feel that we can – just like I wrote down the income this year. I mean, we very well may start seeing them. (Name reference) may have to go there to get a Pap smear and do the – you know, the basic things like that right now. [l. 392-399].

Similar to Darla, Jon intellectually knew he could use the clinic for health care but still had a reservation borne of middle class values:

If I’m financially not solvent and I can’t afford, then I’m going to go to that [public health clinic]...For sure. I don’t disagree or think it’s bad. But I don’t want to burden it either if I’ve got the resources to pay for private to get it done. I’d also take that line, too. [l. 570-582].

For Darla and Jon, as well as other participants, poverty was a new experience and affected their choices of EH risks they thought she could deal with. Darla’s concern turned to cleaning products and making sure they economical and were safe to use: “I saw Clorox with bleach and this and that and the other thing, and I thought I really don’t need this stuff... And so those were things that affect my health when I use those and my family’s health when they breathe it in.” [l. 835-840]. Worried about what landfills might leach into water sources, Darla turned to recycling so that she could improve the environment while also getting a cash return. She then said that there were
moisture problems in a bathroom in their home, but since they lack finances and would have to replace tile flooring, they didn’t address that problem. Similar to Darla, Sallie also included cleaning products to make sure that there was good air quality in her home. However, she didn’t deal with a known radon problem, since mitigation systems were expensive and out of the family budget.

There were several participants who did not feel as though they had any problem with income and had not been affected by unemployment. However, there was less income due to rising costs of daily living and these concerns also affected which EH risks they dealt with. Patty fit this description: her husband had a job, they were able to pay bills, and had several children. Living in a rural area meant that there were increased transportation costs to go to work. The local market had food costs that were higher than those in the city. Wages, however, stayed stagnant. Patty described the problem in her home: ‘...the condensation inside the home ‘cause it’s not totally sealed.....we have issues with our windows with the condensation inside.’”

She wanted to have new windows put into the home but hadn’t been able to afford it.

Being new to poverty or just not keeping pace affected the participants in different ways. Regardless, the issue of income affected what participants felt were important EH risks for themselves and their families and what health resources they would use.

**Weighing risks.** Participants were aware of the various EH risks in their households and indicated that they did prioritize risks for their families. They also noted that some environmental factors such as food, air, or water were important to
protect. Certain EH concerns weighed more heavily on the family and the participants assigned a level of importance to them.

Risks were that were determined to be severe or immediate were rated as most important to take care of. Sallie stated,” Well, one, if it was an immediate risk. That would, you know, change … it would be permanent.” [l. 124-127]. She explained that some risk that could cause an immediate health problem would be the one that she would change. Darla gave clear guidelines for how she rates risks:

Well, I think the first thing I’d think of is I’d think, okay, on the priority schedule from 1 to 10, is this risk – is it something that’s going to impact me and – shorten my lifespan or my quality of life? Or is this just something that there could be a harm possibly? You might see, you might not see. So put it on that scale somewhere between 1 and 10 and figure out how much I’m willing to want to remove that. [l. 290-299].

Personal health risks competed with EH risks for priority. For some participants personal health had to be dealt with first before considering EH risks. Betty indicated that she had a health problem and was concerned about it being a risk for the rest of the family: “Well, at the – at the time and now, I’ve got one health concern. I have hepatitis C, so I have to be extremely careful.” [l. 30-31].

Some risks were associated with hobbies, requiring appropriate safety equipment. Cory noted,” … we’re very careful of the kids… we don’t even let them in the area when he’s working with those chemicals. But they are out there working…they do different woodshop projects out there. And we make ‘em wear hearing protection and safety glasses and stuff. “[l. 530-535]. However, not all participants saw risks related to hobbies in the same way. Both before and after the interview with Jon, I saw the
children playing out around and in a big workshop. Jon remarked that it was for his wife, a metal sculptor and artist. There were also chemicals and other equipment in this workshop, some of which were dangerous. There were no safety precautions that I could see in place for the children; it was not “off limits” and the children were barefoot. When asked, Jon said that they kept an eye on the children and when his wife was at work there, the children weren’t allowed to go in due to the welder and other electrical equipment in use. [Field note #2]

Other risks had to do with the types of EH problems found in the home. Although moisture was found on windows that might lead to mold, Patty indicated that certain risks were more important:

I wouldn’t think that [windows] like ours, I think, tested a little abnormally high compared to if my kid came back with greater lead levels, I’d be a little more concerned about that than the windows having condensation…I guess condensation inside the windows I don’t really see – I guess for me in my head I go, okay, I guess there could be some mildew and mold problems, which could be severe, but not as severe as something inside my child’s body that is directly affecting them right now. [l. 355-377].

Jon thought that protecting water and air were important because they were the basics of life. When asked what he thought was most important to his family’s health he stated, “Well, I put still water over tobacco. But, I mean, if you’re going to…if you’ve noticed, our country is real – I mean, we don’t smoke. We’re not into it at all.” [l. 139-141]. Betty noted that some EH risks are not always in the home: “…at one time, there was a guy that lived down the road here that used to dump transmission oil on the
ground, and I was worried about that going into the ground water.” She then admitted that one can’t control neighbors: “…that’s a hard one. You can’t, really.” [l. 207-214].

*Weighing the risks* was one more element that was included as evidence of daily living. Some risks were controllable and some were not. Some personal health risks competed with EH risks as far as a priority. It was important to the participants to review what risks they had in their homes to know just how severe they were or how soon they might feel effects.

**Summary.** *Weighing the evidence* was a phase that included prioritizing daily activities, weighing risks to the family, reviewing health definitions and family roles, and for some, adjusting to a new self-image of lower income. Once all elements of their daily lives had been reviewed in some way, the participants weighed them against the new EH information to begin to interpret the information and define a risk message within the information; one that had new meaning for them. Darla explained this best:

I guess again it’s just the awareness. First of all, people have to be aware that it’s an issue. And then they evaluate the risk of it. It’s not the ‘if I don’t do this, tomorrow I might not wake up’. You know? Whereas with carbon monoxide, that’s the case…you have carbon monoxide in your house, you get out. Because if you stay in there, you might not wake up. [l. 751-761].
Making a New Meaning

Participants reviewed their perceptions about the EH information and having weighed them against their daily lives, began to make a new meaning of how they understood the information so as to develop a risk message for themselves. This risk message was needed so that they could decide on a level of engagement with the risk.

Sallie was the participant who best exemplified how making a new meaning of an EH risk affected how she eventually engaged in the problem. My first statement to her was to tell me about the intervention. Right from the start, she informed me that they had received a very high radon reading when in the ERRNIE study. Her next comment was, “Have we yet to deal with it? No. We will…And at the time, it was just a matter of—it’s pretty expensive to get that taken care of…now we can afford to do it” [l. 11-15]. She had gone back to work the previous year to increase the family income so they could pay for a mitigation system. I asked if she knew of any resources or had looked for help
to fix the problem and she remembered: “Not that I’m aware of…I looked into it a little bit but I probably didn’t go as far as I should’ve” [l.26-27]. She later shared with me that she did know that the health department had some information that she could have used, but she chose not to.

I wondered about how much time has elapsed between finding out and doing the interview and she thought it was about 2 years. When asked how having a high radon level made her feel, she responded, “I don’t know. It was—it’s interesting and I guess you can go as nuts with it as you want, as far as how you’re going to let it scare you, I guess. And worry about it” [l.51-56].

Sallie then began discussing other EH risks in her home and how she viewed them. Having a gas fireplace required having a carbon monoxide detector. Cleaning products needed to be safe and not have toxic fumes. We moved on to a discussion about her husband’s need for a special diet due to a health problem. I asked her what would make her change something she was doing for a health concern and she noted that having a health risk, like her husband’s would require one: “Exactly. That was-had to be an immediate change.” [l. 131]. She also explained how she has worked with people in the past on dietary problems, so she was aware of how food influenced health.

She then returned to the problem with radon:

….the radon thing is a long-term thing. And I know that…I know what the repercussions of that can be. So, I mean, if it was a long…if it’s long-term, it needs to be changed…’Cause we may see the results of it some day and we may never…Who knows? …I’m not willing to take that chance and I feel I’ve been taking that chance for two years now. [l.134-147].
After moving away from this topic to discuss how she took care of her family, she returned to radon again to inform me that she has shared radon information with her family and close friends, including her own high reading. Similar to her work with helping people on diets, she warned her social network of the radon problem and how they should test their homes. So although she had not yet fixed her own problem, she made sure to be the advocate for others.

Later Sallie informed me that she realized:

…there is just a point where you can take charge of your health and what’s around you…and there are some things that you just can’t control…when you have a small child—a baby—you’re wanting to keep everything away from them…You don’t want them exposed to that stuff. But you can get as compulsive about it as you can. So I guess it educated me enough to probably not be as compulsive about some things that maybe I would’ve been as far as what they exposed to….Some things are way more important than others. [l. 417-432].

She then continued to explain how things that come out of the ground can’t be controlled but things like tobacco smoke can be, since one can choose to smoke or not or people can walk away from second-hand smoke. She then said that one solution for her family to control radon could have been to move, which was unrealistic. It was in discussing how one controls risks that I wondered if she had thought about controlling radon. Rather than suggest a mitigation system as I expected, she replied,” Watch for the warning signs I guess…The repercussions.” [527-529]. Sallie had developed a new risk message about radon. Although alarmed when she first found out about the high reading and knowing there could be health problems in family members, she focused on the words “possibility” and “long-term” as a result of getting EH information about
radon. The meaning of radon changed from being an anxiety-provoking danger which needed to be mitigated to something that could be contemplated over time without too much concern. She could intellectually state facts about radon risks and what it does and where it’s found. In fact, she shared that information with her social network. However, she did not attribute the same sense of risk to her own family. She knew she was taking a chance but she was gambling on the fact that radon health problems are slow to acquire and that one can have different doses of radon from day-to-day. Yet, as she noted, she had moved away from worrying about it and wasn’t as compulsive as she might have been.

Perhaps one factor that affected Sallie getting information and having a different message was her opinion of the public health department, which provided media messages and other information about radon in her community. Although she knew it was a valuable community safety net, she didn’t think it was something she would use: “I know they’re busy down there. And you just never know if you’re going to—what you’re going to encounter when you go there. Who might be there with what.” [l. 377-379]. She also noted, “…I know that there’s different things in the county that they monitor as far as health. But… I don’t pay a whole lot of attention.” [l.357-361].

Sallie had the intent to do something about radon, but still hadn’t done anything even after going back to work for over a year for the purpose of getting a radon mitigation system. It wasn’t finances or lack of knowledge that prevented her from fixing the problem. She saw radon, not as it had been presented in the EH information,
but as something else. In some ways, it was similar to a smoker knowing that the risks of cancer or respiratory disease exist and will eventually cause a health problem but deny that those risks will affect him or her in the present time. It is only when repercussions can be seen, that some smokers begin to think about quitting. Even with intent, it may be that, without a different message, Sallie may need to see warning signs and repercussions to be able to behaviorally engage with the radon risk.

In an opposite direction, Jon, who had no radon risk, actually put in a radon mitigation system that he could ill afford. He justified the system: “Just for our kids. ‘Cause what if? What if?” [l. 53]. In his life, clean water and air were of utmost importance. He took pride in his rural surroundings and wanted to provide the best quality of living for his family. The message he received was one of proactive health promotion: “do something before you have a problem with your air or water quality”. He not only put in the radon mitigation system without any known risk but also a carbon monoxide detector and checks his well regularly. However, Jon did seem to miss one point: he was letting his children play around his wife’s workshop that included metals, chemicals, and other environmental risks. The risk message he had developed was connected to what he deemed most important and was emotionally connected to: air and water. He had yet to connect to the possibility of other risks that might affect the family.

These are two examples of how participants actually viewed their own perceptions, weighed what was going on in their daily lives, and then compared it to
the new EH information that they had received. Out of this dynamic interaction, they began making a new meaning for it, thus Re-forming the Risk Message that the EH information was to impart.

Figure 4. The Model of Re-forming the Risk Message

**Re-forming the Risk Message**

It was the re-formed message that moved participants to a decision of engagement with a risk. The new EH information gave them messages about different risks. Through a process of evaluating the EH information and their own lives, they took a risk message from the EH information and re-formed it into one they could understand.
and use. It did not always lead to engaging in behavior that reduced or eliminated the risk in their homes. It did lead to making a decision to engage or not on some level.

**Factors.** Factors that assisted with or impeded the process of Re-forming the Risk Message and moving towards a decision of engagement included what resources were available and valued, if there were any negative consequences as a result of the risk message, if the risk was related to health or a health definition, emotional connections, how visible the risk was, and how the risk was perceived by others.

**Resources.** There were various factors such as resources that affected how participants made a new meaning. As noted above, how participants viewed resources was important. Sallie wasn’t the only one who had misgivings about the public health departments. Jon also had opinions.

… ‘Cause I – feel like… in my mind that they’re not the most qualified. I don’t like necessarily think they’re the most qualified or have the time or the energy to help based on the money they make. ‘Cause if you don’t – I mean, oftentimes they don’t reward the best doctors in, say, cardiologists. The best doctors won’t get rewarded if they stay with the healthcare system. They’re going to go in their own independent practice. So I’d want to go find whoever is the best….My perception is that public health isn’t the best. [l. 538-560].

Elaine had a similar, albeit kinder, statement when it came to a reason why the public health department wasn’t as good as private resources: “We underpay our civil servants so we don’t get the very brightest and best. You know, they go to industry. And, you know, …the government, because of budgets, cuts out research,… and so that the industries are left to do the research. [l. 352-357].

Jon noted that in rural areas anything connected to government was not trusted:
Oh, they all hate ‘em. Come on. It’s just…part of the deal. They always cause problems and making me – or making one do something that they don’t think is necessary…The average idea of how people think of Government. Especially in a place like this. This is such an anti – very conservative anti [government] type community it seems. [l. 333-343].

He also noted he’d use other resources for EH problems as well: “I mean, and the resources I have in (location reference)… friends who knew. Friends who knew. People who knew….And try to get specialists that are educated in that particular area and who has dedicated their lives to whatever the problem is. “ [l. 522-534].

The internet was used by several participants and while they said they appreciated the freedom to search and obtain information, they felt overwhelmed by it too. Patty claimed, “I Google a lot…So I’ll Google things but that’s hard too ‘cause you always have so many different opinions.” [l.209-212] Elaine said, “I think the advent of – of the computer age and internet, it’s overwhelming. You know, eggs are good. Eggs are bad…The messages. The constant barrage.” [l. 173-175]. When I asked Patty how she knew what was reliable information, she explained that she looked at all the hits that came back and when she saw the same answer in so many of them, she figured that it was the correct one. Both Elaine and Patty, along with several other participants, used the internet but really weren’t sure what information was reliable or how to find out. Yet, they used the internet to help them interpret EH information.

Nurses were considered trusted sources. For one participant, the nurse was the only trusted health professional because her mother was a nurse and the source for all health information: “Cause my mom was a nurse and I think she just knew…what would constitute an emergency visit…and what would constitute some TLC or some
rest...we believed she knew what she was saying.” [Jane, l.186-195]. Betty was to the point when asked who she would trust to give her information: “The nurses.” [l. 327]. Elaine gave an example of why she trusts nurses to give her information: “Because they sat down and gave me an information sheet of immunizations. I don’t know that I got that at my doctor’s office...and less punitive. Letting me know what’s available.” [l. 654-656].

One dimension affecting how one participant accepted information was that of age. However, Elaine, as an older mom, noted that she is less willing to just accept information no matter who it is:

I’m just not willing to take what someone says as it – which I think when you’re a younger person, you do tend to just accept. And it’s amazing, I think...I see this in younger women – younger moms...that word of mouth or information from your mothers...or friends [is] far more valid than outside sources. [l. 733-739].

**Negative consequences.** Negative consequences are a result of any untreated health risk. Knowing the consequences of a risk can sometimes lead individuals to healthier behaviors. Obese clients often join weight loss programs for this reason. While many are successful, there are just as many who drop out of the programs, often due to the goal message they began with. Huisman, Maes, De Gucht, Chatrou, & Haak (2009) found that several reasons people dropped out of weight loss programs were from high levels of goal planning and low levels of goal ownership. In other words, they had developed a goal or message that planning to lose weight was more important than actually losing it. It was the message that dictated their engagement with the program, similar to the re-formed message providing a path for engagement for the participants of this study.
One factor that affected the meaning of the information was realizing the consequences of the risk and how much risk was acceptable. Risk was defined as “danger” by a number of participants. Throughout interviews, I noticed that the word risk was missing; participants chose to describe a risk as an issue, a concern, a problem. In order to recognize a risk, one had to realize the danger involved with it.

Elaine explained that some it had to do with personality: “…in everything there’s a certain amount of danger or maybe unpredictable results is a risk…. I’m not a risk taker, I must say. That’s my personality is ‘plan it safe’…that would be to avoid danger.”

When developing a meaning for what a risk meant, risks were rated by seriousness and immediacy, as is found in risk communication literature. Cory noted:

Some are much more serious than others…. I just remember there were certain things that were much more serious than others. Like the radon...I felt like that was pretty low risk. I mean, generally houses ...aren’t contaminated with that...so that was low on my risk spectrum... drinking water would – could be potentially high. Or the carbon monoxide could be potentially high. [l. 213-239].

After the interview with Gennie was over, she said that she wanted to add something that she thought was important for clarification; unlike other health problems, environmental problems are slow and subtle. She explained that health problems are like sore throats or colds: you get something and get sick; then get over it. You know when you are sick. But environmental problems just grow slowly over time-and by the time you realize something’s going on it's a big problem. [Field Note #1]
For some participants there were no risks so there was no need to develop any new risk message: “No. I think that’s probably why we haven’t changed anything because it’s-we don’t smoke. And…I’m trying to think of what other things-there isn’t anything big that we needed to change about the home to improve our situation.” [Gennie, l. 196-199]. Elaine not only developed a risk message in order to decrease the possibility of lead dust in her home but also noted how she was able to do so: “Part of that personal element, too, that I had to get over. You know, just allowing myself to be vulnerable to learn more new information.” [l. 772-774].

Each participant saw risks differently and for those who saw danger and recognized a threat, the risk message moved them towards engagement with the risk. For those who did not, were able to temper the danger somewhat, or had no impeding risk, the risk message provided a way to postpone engagement or not to engage.

**Health risk.** How health was defined contributed to how participants saw a risk as discussed earlier in this chapter. Risks that impeded how one functioned or worked on a daily basis were deemed more serious than those that did not. This may be one reason why radon was not necessarily rated high on some participants lists, even if living in a risk area for radon.

EH jargon was another issue that participants discussed that impacted what they interpreted as a risk to health. Several participants spoke to the problem of technical language. Cory, when asked if she had ever had EH information like she received in the intervention, said:
Not– I mean, maybe back in my college days I might have had an opportunity to learn about some of that. But, I mean, it’s pretty– a lot of it is pretty kind of technical. And difficult, you know, for me to comprehend and understand and retain the definition of the terms and things that were used in the study. So it’s not everyday language. I think it – I mean...I did understand it, but it took a little bit of work. [l. 312-326].

Patty remembered:

The results were really hard to kind of understand...I mean, I got these and I was excited to get them but I’m like what do I do with these besides call my doctor...it says my kid has this much lead in their system [l.291-301]

Elaine gave an example: “Thinking of cigarette smoke. That term. The additive or the residual results of – of cigarette smoke that was very new to me. [l.462-463]. Several other participants weren’t sure about some of the individual terms or what they meant. One participant thought that radon was a chemical that might be in the foundation of a home and another mistook chloroform for coliform (bacteria in well water). Without common everyday terms, including the term risk, participants sometimes didn’t acknowledge the level of risk for an agent, which impacted the message that they re-formed.

*Emotional connections.* The message was re-formed depending on how connected emotionally participants felt to the risk. As noted previously, Jon was passionate about protecting his water and air quality and therefore put in a radon mitigation system even though his home had no level of radon. Having some control over a risk provided less anxiety and worry. Patty noted that even information about a risk gave a person some control: “And that’s okay because...sure you’re going to have some anxiety about that, but at least you have information and you know what to do with it.” [l. 333-335].
Colleen hated her image as a smoker and after learning what cotinine was and how damaging second-hand smoke could be to her children, she quit smoking. She said, “Well…it was almost scary to think…what if my kids do have like a level of nicotine. …’cause, ew, that’d make me feel really terrible.” [l. 543-545]. It was the emotional connection to the risk that helped her re-form the risk message and engage in behavior change to improve her children’s health as well as her own.

Visibility. How visible the risk was played a role in rating the seriousness of the risk. Radon and tobacco affect air quality and both are agents that cause lung cancer. Although tobacco had had a more media attention, radon is getting press time as well. Tobacco is more well-known. The main difference between the two, however, is that one can see and smell tobacco smoke and one cannot see radon. Gennie said that tobacco was more severe:

Well the other thing is, think about the exposure potentials…whereas like your water or radon-like a kid may be in another house for a moment or [two]…but that’s pretty static. But the tobacco thing is dynamic. It’s moving around because you’re moving around…and it has to do with other people. [l.801-814].

This was a factor in how some participants deemed one more important than the other, as Cory had done (noted earlier in this chapter). In much the same way, clear water was seen as clean, when in fact it could have contained bacteria and cloudy water was not clean, even without any EH risk agents. For Colleen, her cloudy water meant that a water filter was installed on the faucet. It was the visibility of an agent or a perceived agent that also assisted in Re-forming the Risk Message.
Perceived by others. Once participants got the EH information, they determined how it might be perceived by their social network. Some shared information readily with others and some did not. One reason was the technical nature of the terms, which might cause embarrassment when trying to pronounce them or if someone asked a question about them. Another reason was having to tell what risk they might have in the home. Sallie shared the radon problem readily. Gennie, who stated that she met with other moms on a regular basis, did not share any information although she had no risks, suggesting that it wasn’t a common topic of conversation and that she didn’t see the need to bring it up. Elaine said she only shared the information about tobacco rather than any other information and was rather surprised that she hadn’t shared anything else with her social network. She stated after reflection that she would just wait until someone asked. Cory said that she told family only about the carbon monoxide problem only because some of them had gas stoves. Jon shared the EH information about radon, well water, and carbon monoxide with the rest of his family members so they could make sure their homes were safe. Perception of how others might feel about the risk or how one might be seen played a role in the message that was re-formed.

Conclusion

The purpose of this study was to understand how rural dwelling low-income families with children use EH information. Re-forming the Risk Message was the core category in which they evaluated the new EH information and then made a new meaning resulting in a re-formed risk message. Participants had to recall prior perceptions of health and EH information, weigh evidence of family norms and daily
living against what they already knew and also the new EH information, then make a new meaning of the information so as to define the risk message that pertained to them. Once completed, they could decide whether to engage in the risk itself and perform any changes necessary. Although this study did not follow the trajectory of the actual process of engagement, there were three outcomes noted as a result of Re-forming the Risk Message. “Staying the same” meant that there were no changes made or planned; in other words there was no level of engagement deemed necessary by the participant. Most often, this was because there were no risks in the home, or that they were ignored (not attended to). “Tucking it away” was a term used by several participants who were planning some type of change but had not yet done anything about a risk in their home. The term meant that they had the EH information in a safe place where they could/would access it when they were ready. Darla had tucked the information away to use for cleaning products and to deal with a moisture problem in the future. “Changing my view” by being vulnerable to change reflected the participants who engaged with the risk, as the third outcome. Elaine noted that she changed her view as a result of the re-formed message she now valued. She changed from thinking that people who took their shoes when entering a home were “silly”, to requiring people coming into her home to take off shoes at the door-to prevent possible lead dust from entering the home.

To answer the aim regarding social context and conditions, it was found that SES and rurality were important to the core category of Re-forming the Risk Message. The
context of rurality informed several definitions that were vital to understanding how participants viewed EH risks: those of health and family roles. Socioeconomic status affected their perception of the resources they would use and also recognizing the importance of risks. Once risks could be perceived through the lenses of health and family, and then prioritized, they could be weighed against the new EH information.

*Re-forming the Risk Message* as a grounded theory will be discussed in Chapter Five as to how it fits in the literature, how it may lead to future studies, and implications for use in nursing practice, education, and policy.
CHAPTER FIVE

DISCUSSION AND IMPLICATIONS

Chapter Five has four sections as follows: (a) discussion of the grounded theory of Re-forming the Risk Message, (b) study limitations, (c) implications for research, practice, education, and policy, and (d) conclusion.

Discussion

Overview of the Theory

The grounded theory of *Re-forming the Risk Message* includes three phases that family decision-makers move through after receiving environmental health (EH) information, in order to develop a risk message for themselves and their families so that they may decide on a level of engagement with the message. Briefly, in *Visiting my Perception*, they recall any prior perceptions about EH or other pertinent information by being aware and attending to the new EH information, in order to compare their perceptions to the new information. Within *Weighing the Evidence*, they review all of the evidence of family and cultural norms, and weigh as evidence against their perceptions of the EH information to find a risk message that applies to them. From this interaction, they interpret the message in *Making a New Meaning*, to make a new meaning for the risk message, and in doing so, *Re-form the Risk Message* into one that they understand and can live with. It is the risk message that brings them to a decision of engagement with the risk, so that they can move on with family life.
Comparison to Literature

The question that guided this study was: “What do rural low-income families do with environmental health (EH) information?” The aims of this study were to (a) identify and describe the context of social conditions and structures that affect how risk communication is understood by low-income families, (b) to document what rural low-income families do with new environmental health information, and (c) to generate a beginning substantive theory regarding the use of healthcare information by rural low-income families and the impact of health information on health behavior change. This section will answer each aim as they pertain to theoretical and extant literature.

The context of social conditions and structures affecting risk communication. The context of social conditions and structures is found within the phase of Weighing the Evidence. Social context refers to the cultural social environment in which social structures are found and includes conditions such as physical settings (Barnett & Casper, 2001). This study took place in rural areas. Social structures are the patterns around which society is formed, and include institutions, status, groups, and roles (Mooney, Knox, & Schacht, 2011). The institution of family was a main element in this study and was made up of individual families as social groups. Multiple factors, related to cultural norms of daily living that were dictated by social conditions and structures, influenced what the families in this study perceived as risk messages through risk communication.

Risk communication involves the explanation of risks to an audience, and depends on the purpose of the communication and the type of hazard. The US Department of
Health and Human Services defines risk communication as an interactive process and noted that it “…involves multiple messages about the nature of risk…” (2002, p 4). They further define a risk message as a “written, verbal, or visual statement containing information about risk; [and] may or may not include advice about risk reduction behavior” (p10). Most commonly, information about risks to health are communicated through the public health system. Information has been delivered via media sources such as radio and television, printed sources, community meetings, and through other techniques. Warnings about natural disasters, environmental health threats, disease outbreaks, and campaigns about smoking cessation have been just a few of the types of information delivered to the public. It has been observed that effective communication involves interaction, understandable language, respect for beliefs and opinions, and clear useful information delivered to the right people at the right time (Fitzpatrick-Lewis, Yost, Ciliska, & Krishnaratne, 2010; Trettin & Musham, 2000).

There are three basic forms of risk communication: care communication about risks where danger of a risk and management of it have been determined; consensus communication to inform groups about a risk with the purpose of development of a decision for risk management; and crisis communication which involves communication of an extreme danger during and after an emergency (Lundgren & McMakin, 2004). According to Lundgren and McMakin, care communication has two subsets: that of health care risks and that of industrial risks. For these participants, the risk communication that was utilized for the ERRNIE intervention was that of heath
care risks about environmental agents in their homes, given in a face-to-face dialogue using additional written information as well as test results (see Chapter One, page 3). The EH information included a number of risks common to various agents that could pose a risk to health within homes. Some were applicable to a participant’s family home and some were not. However, the contexts of being rural and of low-income combined with the social institutions of family and public health helped determine the risk message that was heard and understood in the EH information and was then re-formed to make sense to the family.

The families in this study were rural dwelling during the ERRNIE intervention and most continued to live in rural areas at the time of this study. Several participants lived in a clustered rural development, with multiple homes within a defined area, and located in a rural part of a county. Others lived on small acreage tracts in agricultural areas or in mountain forests. One common feature for all participants was that of lengthy distance to any services, including health care. Regardless of where they lived, they shared traits and characteristics of rurality such as self-provisioning, self-reliance, and close social networks, as noted in literature (Bauer & Braun, 2002; Ganong, et al., 2009; Lee & Winters, 2006; Little & Austin, 1996; Sherman, 2006). Most of the participants stated that they had grown up in rural areas, even if not in the same area where they were currently living. They preferred living in a rural area for the safety of their children, the freedom of open areas, and the ability to be independent and
somewhat self-sustaining. Only one participant acknowledged being from a city and preferring an urban lifestyle.

When any risk communication is involved with a person or community, trust and credibility must be in place for any action, such as behavior change, to take place (Trettin & Musham, 2000). This can be difficult in rural areas where there is mistrust of outsiders including government agencies. However, most risk communication about EH takes place within the institution of public health, most of which is made up of government organizations. Public health in the US is responsible for health education, health protection, disease control and prevention, and biomedical research (Tinker, 1996). Public health was the vehicle by which the participants received EH information.

After reviewing ten cases in the North West of England, Stewart, Luria, Reid, Lyons, & Jarvis (2010), found that relationships between communities and public health authorities accounted for success or failure of the acceptance of a risk message regarding environmental health on a community level. They found “…clear and consistent findings relating to distrust of professional and regulatory bodies…” as one factor that affected risk perception, along with inappropriate or inadequate communication, lack of understanding of the health risks, and inability of professionals to deal with public anxiety and anger (p. 1167). Another study of naturally occurring asbestos in an unincorporated community in California found that there was resistance to acknowledging health concerns from state and local authorities and mistrust between government employees and community members (Culley, Zorland, & Freire, 2010). One
interesting finding was that there was also mistrust and miscommunication between the levels of public health officials as well. Local officials did not trust the information given to them by Federal officials, believing that being local made them experts in the situation. In Massachusetts, three different communities were compared as to their perceptions of environmental health and pollution from a local coal burning plant (Scammell, Senier, Darrah-Okike, Brown, & Santos, 2009). Mistrust in government agencies was found in the community with low socioeconomic status, a higher minority population, and fewer resources and people in that community trusted their own experiences. It was noted by the authors that when there is mistrust in the source of a risk message, there is less likely to be trust in the message itself.

Likewise, for the participants in this study, being in a rural area as well as having low socioeconomic status enhanced the feeling of mistrust of the public health system as an institution and organization. Although they realized there were safety nets and resources in place for their communities provided by public health, they much preferred using family or friends for help. Public health nurses were used, however to deliver EH information to the families. Participants trusted the nurses, who were members of the public health organization but also members of the community. This has been found in many other studies as well, where nurses are the preferred source of information and the most trusted source (Corrarino & Little, 2006; Lee & Winters; Pope, Snyder, & Mood, 1995). Trusting the source did allow for the participants to weigh the EH information against their cultural and structural norms.
Health definitions were defined by context in this study, that being rurality. Those participants who professed to living in rural areas most of their lives defined health as an ability to function, to work, and to do what one needed and wanted to do. These definitions match what have been found in other studies of rural settings (Lee & Winters, 2006). They are based on the perceptions and attitudes of resiliency, independence, and self-sustainability. Rural residents are known to take care of problems by themselves, using social networks rather than formal organizations. Indeed, rural residents use less health care services and seek care less often than urban residents, even when accounting for fewer medical services available (Hartley, 2004).

When defining health by ability to work and function, one tends to see EH problems in a different light. If certain EH hazards are unrecognizable, have health effects that aren’t readily seen or felt, and occur over a long period of time, one might tend to ignore the risks to health of the family since the effects aren’t interfering with daily functioning. There is also an emotional connection to a risk being unrecognizable. If one hasn’t known or seen how a risk actually affects a person’s health, and therefore how that person may not be able to work and function, it is hard to imagine that the risk might somehow affect a family member. As an example, radon and tobacco are similar: both affect air quality and both have long term effects and cause cancer. Participants were much more likely to discuss tobacco as a risk to health, rather than radon, because they perceived it to affect what one could do, and had experience with friends or family members who had some type of health effect from smoking. It was the immediate threat
to health, rather than the severity, that affected daily functioning and ability to work and was deemed more important. When functioning and ability to work define health, then the meaning made for the risk messages perceived in EH information follow, as it did for many participants.

Family is a primary group within social structures. The institution of family is socially constructed. In rural areas, it is tied to rural culture. Rural “idyll”, as a perception of rural living being peaceful, open, and tightly knit family and social groups, reveals an image of traditional conservative values and kinship ties as norms, paternalistic family networks, and mistrust of outsiders, especially government institutions (Lee & Winters, 2006; Little & Austin, 1996; Thurston & Meadows, 2003). These same perceptions were shared to a point by participants and affected relationships of family members, roles within the family, choosing family priorities, and acceptance and use of health resources.

Family roles are based on expectations of behaviors from each person and are influenced by social cultural norms. At the time of ERRNIE, all participants were partnered or married with young children in the home which was in contrast to statistics that show only 59% of rural households with two or more adults (Bauer & Braun, 2002). Some families had extended family nearby. All but three women were stay-at-home moms and their partners worked. In one family, both parents were disabled and did not work. Two women worked outside the home, much different than the reported 50% of rural women working outside the home (Bauer & Braun). The one
male participant was working fulltime. At the time of my study, several of the stay-at-home moms had returned to part-time work due to economic reasons, and their partners had been laid off. One woman was no longer partnered and worked fulltime. The male participant had also been laid off. While these changes caused some disruption in some of the expectations in childcare roles, most participants still viewed family in a traditional sense common in rural areas: parents with children, as well as any extended family (Little & Austin, 1996). Only two participants stated that they viewed both parents as equal partners and decision makers in matters concerning the family health. All others, partnered or not, saw the male figure as the head of the household and the woman as the health decision maker, which is also a traditional rural norm (Coleman, Ganong, Clark, and Madsen, 1989; Sherman, 2003). The traditional role of the male as breadwinner for the family prevailed in this group, and child rearing and health decision making as were women’s roles. Family networks, as another norm, were a source of support and childcare as an added benefit.

Women may not see EH risks in the same way as men, especially if rural culture dictates traditional family roles. Multiple studies have investigated gender differences in risk perception, although not necessarily in rural areas (Harris, Jenkins, & Glaser, 2006; Henwood, Parkhill, & Pidgeon, 2008; Pidgeon, 2007; Zelezny, Chua, & Aldrich, 2000). Harris, Jenkins, & Glaser (2006) report that women have, for the most part, reported less risk taking in most areas except social risks (for example, sharing information, disagreeing with other opinions, or disclosing results). Using a sample of
657 subjects they investigated reasons why women engage in fewer risky behaviors. In addition to women reporting less likelihood of engaging in gambling, health, and recreational risks, they also reported less enjoyment in these activities as compared to men. They also found that when there was “…no risk of severe consequences but rather a possibility of predominately positive consequences in exchange for some small fixed cost”, that women more often than men reported a “greater willingness to engage in behaviors” related to risky choices, such as buying a lottery ticket (p. 57). One suggestion given for varied behaviors included women’s roles as mothers affecting an increased perception of risk, ensuring safety for children, which may be especially reflected in rural populations with traditional beliefs of women’s roles as mothers in families. However, the authors were unsure as to why women would be more willing than men to be more risky when perceiving a positive outcome for little cost. It may be that women have traditionally had less income and less opportunity in the past, and have not yet developed resources to be able to take more chances, other than those that may provide better outcomes. This could be true for the conservative and traditional norms held by participants in this study, where parents still see women’s roles as child rearing and health decision-making, and men’s role as the breadwinner. It may also be tied to what exactly is perceived as a positive outcome.

Zelezny, Chua, and Aldrich (2000) found when reviewing literature over a ten year period (1988-1998) that women had slightly greater environmental concern as compared to men. These authors note that possible theories include females being more socialized
for caring and valuing the needs of others and having more helping behaviors. They conducted three studies to obtain additional information on the effect of gender and found that women were not passive or unconcerned about the environment and that socialization may play a role in behaviors that lead to actions about environmental concerns.

Likewise, a report on gender and risk perception (Pidgeon, 2007) and a discussion to build theoretical explanation about the effects of gender (Harwood, Parkhill, & Pidgeon, 2008) both move the conceptualization of the “difference” of gender to “effects” of gender, lending support to socialization as being an important consideration to why men and women see and react to risks in different ways. Noting that gender discourse, power, identity, and epistemology (“how one knows”) have affected how women have been successful or not in work or science domains, these two analyses bring cultural social factors influencing the meanings of parent roles to risk perception.

The participants in this study were all knowledgeable about the physical environment around them. Participants were aware of the greater impact EH hazards have on children. The two participants that were motivated to include proactive behaviors in EH risk reduction were the participants that reported equality in decision making with their respective partners. Jon added a radon mitigation system to his home even without a radon risk, and Cory began twice yearly well water testing, although her family’s well showed good water quality and no contamination. They also implemented
EH teaching for the whole family. Other participants, who reported a clear delineation between parent roles, took more reactive measures to risk reduction and had not incorporated any instruction within their families, other than to share some information with family members in social networks. Socialized rural traditional values about family roles were a factor in how the participants perceived a risk and the resulting meaning of the risk message.

Socioeconomic status was an important factor regarding using acceptable resources for health. These participants did not fit the typical rural low-income demographics of less education, substandard housing, and low skill levels (Kusmin, 2009). Participants had newer homes (less than 10 years old) for the most part. Only two participants had homes older than 10 years. One participant lived in a newer apartment. Many of the participants’ partners had worked in home sales and/or owned businesses related to home building. Only one participant reported a high school education; others volunteered information that they had some college or even college degrees. They came from middle-class families, took pride in being able to pay for resources, and, until a downturn in the economy in the mid-2000s, lived quite well. They still viewed themselves as middle-class with conservative beliefs. One example was shown by a discussion about the use of safety nets by other people. Many participants had lost health insurance. Welfare was not an acceptable option for these participants, and several participants believed that many people on welfare abused the health system. They therefore were uncomfortable using health clinics even on a sliding
fee scale. Similarly, in one ethnographic study of a small rural community in northern California that lost its main industry, it was noted that welfare was the last choice of residents and had much stigma attached to its use (Sherman, 2003). Residents preferred to move or claim disability, rather than go on government assistance. Disability status, although given by government agencies, was deemed legitimate due to the high levels of injuries received from the type of work formerly available, but most importantly because they were “obtained” from work. Social capital was related to how one coped and survived. Status in the community was higher and could bring better part time employment or leadership roles when one could be self-sufficient.

The attitude of stigma attached to welfare by participants extended to the use of other resources provided by the government as well. One factor in not wanting to use government resources was that the participants had used private resources and were familiar with them. Participants claimed that they would use resources suggested by family or friends first. Government resources were rated more poorly than private resources. The perception was that the “best and brightest” health professionals, whether for personal health or environmental health, would be found in private agencies. Perceived lack of credibility in an organization has been cited as one problem for risk communication especially when discussing EH problems and obtaining resources (Lundgren & McMakin, 2004; National Research Council, 1989). Combined with the rural attitude of mistrust of outsiders, particularly government agencies, middle class habits affected the acceptance of types of resources used and where one
would go for assistance. When a risk to a family was identified in EH information, decisions about resources and ability to pay somewhat influenced how important the risk was and how soon to deal with it.

**Summary.** Risk communication involves delivering a risk message to an audience through some communication technique for a specified purpose. Social context and structures in this study affected risk communication through risk perception. The context of living in a rural area and being socialized to rural values colored the participants’ understanding of risk messages contained in the EH information. Social structures of low socioeconomic status, family and public health institutions provided social norms of daily living. Reflecting on these norms, participants weighed the EH information, as viewed in their perceptions, against family priorities and needs and began to develop the risk message that made sense to them.

**What rural low-income families do with new environmental health information.**
The first phase of *Viewing My Perception* was the beginning step in what families did with EH information. Participants in this study discussed how they were first “aware of” and then “attending to” the EH information. Interestingly, what participants described that they were doing on a conscious level has been found to happen on an unconscious level. Attention and awareness have pathways that begin within the brain and move perceptions into a conscious focus. Participants discussed being aware consciously or unconsciously and of paying attention or not paying attention to the EH information. They could clearly describe their conscious awareness and attention but yet also noted that there were other processes going on about the information.
Understanding what is happening at an unconscious level can lead to understanding of what and how risk messages are perceived.

Attention deals with how people process information into perceptions and actions to achieve goals (Johnson & Procter, 2004; Ward, 2004). Although awareness begins in an unconscious state, most often it is defined as being in a conscious state of ‘knowing” (Paler, Voss, & Westerberg, 2009) There has been a large body of research in cognitive and social psychology, as well as neuroscience, focused on awareness and attention in order to understand how the brain processes information and how information may eventually become behavior (Bunting & Cowan, 2005; Custers, 2010; Koch & Tsuchiya, 2006; van Gaal & Fahrenfort, 2008). Lamme (2003) brings neurobiology and cognitive psychology together to discuss differences of awareness and attention. Attention is a selective process where some inputs processed differently than others to have “… a better chance of producing or influencing a behavioral response or of being memorized” (p 14). Stimuli processed more efficiently are those that have been evolutionarily chosen (such as movement over stationary or bright over dark). Processing of a stimulus leaves a trace pathway (neurons that were activated and inhibited) so that processing occurs faster at a later date. An external event (cue) requires the brain to find the meaning of the cue and relocate it to current needs/goals and use appropriate pathways (this can happen without awareness). Awareness begins with neurons sensing multiple stimuli, and as they move up towards consciousness,
certain stimuli are chosen by the attention selection pathway in order to be brought to conscious awareness.

Previously in the ERRNIE study, participants were given EH information, and, while it was similar to other health information they had received in the past, there were new concepts that were unfamiliar. Therefore they had to begin to process it at a low level to develop both attention to and awareness of the information, first at an unconscious level and then to a conscious level. Establishing pathways so that information can be easily recalled from memory required attention and awareness. When information can be easily recalled, it is more likely to be perceived.

Bargh & Morsella (2008) discuss awareness of the “unconscious mind” from a social psychology perspective. Unlike cognitive psychology that deals with unconscious stimuli, social psychology focuses on unconscious mental processes. Unconsciousness is a lack of awareness of effects of unintended behavior. This is thought to occur as an adaptive measure through natural selection. Babies absorb social conditions into which they’ve been born in order to obtain cultural knowledge. Cultural knowledge (from the general culture and social networks) guides behavior and is stored in brain. This allows for unconscious imitation so as to fit in. Contextual priming on an unconscious level results from the presence of certain events or people within cultural knowledge and automatically activates perceptions/representations of them as well as any knowledge, goals or affect connected to them. Perceptions of what participants previously knew
about EH and other health information and what they learned were viewed so as to weigh them against the goals and cultural norms they knew.

Dijksterhuis and Aarts (2010) similarly found that goals guide attention and that goals and motivation can be unconsciously primed. Goals are described as mental drinking or eating. Information that is associated with goals is attended to, such as when hungry, one’s attention is on food. One’s environment can affect which goals are unconsciously chosen: when behaviors have a positive effect, they in turn become goals in order to achieve and maintain the positive feelings. Lastly, they state that one can attend to information and not be aware: stimuli that influence psychological processes may not reach conscious awareness but some degree of attention is needed. They also state that people can be aware of stimuli without paying attention, much like the participants described. If there was no positive effect perceived from the EH information, there was no need to be aware of or attend to it for participants. One reason might have been that there were no risks identified and therefore no need to have an emotional tie or behavior attached to the information. Another reason might have been that other goals were in the way to sufficiently be aware of and/or attend to new EH information.

It is in conscious awareness with a focus of attention that perceptions about EH come into view. Paller, Voss, and Westerberg (2009) suggest that perceptions, as a mental function guiding behaviors, take place in conscious awareness. Visschers and Meertens (2008) explain that both cognitive and associative processes affect how people
perceive risks. Cognitive processes involve deliberate conscious evaluation. Associative processes are intuitive, quick, and are described as “gut feelings”. The authors state that although both may occur for the same risk, one process will be dominant. If a threat is imminent, associative processes are more likely to be employed. These studies about risk perception showed that a) when confronted with new information about a risk, people associate new risks with known risks (even if there is only one characteristic in common and all others are dissimilar), b) that people associate risks that they have experienced and that others have experienced, c) that there was no difference between passive and active delivery of risk information, d) that perceived riskiness of a known risk is an indicator of perceived riskiness of a new risk, and e) that it was “…difficult to influence the way people evaluate risks by means of risk messages” (Visschers & Meertens, 2008, p. 6). Noting that society and culture influences are factors in perception, they postulate that it may take more than a single message and/or a very vivid powerful one to establish a perception of risk.

These results seem to parallel the participants’ actions when Viewing My Perception. After an unconscious processing to bring what was known to a cognitive state, participants could then compare old information with new EH information.

Glaser and Strauss (1965) noted that conscious awareness may not mean full awareness; one might be aware of some aspects of a risk or problem and be unaware of other aspects. In the same way, one may be aware intellectually, and yet, unaware emotionally. To be aware of a risk requires a visible physical cue (either external or
internal to a person) and also a temporal cue (the progression expectation). They stated that physical and temporal cues may actually cancel each other out: if the temporal cue is a slow progression, the physical cue may be negated and the actual problem will be missed. As an example relevant to the current study, if one is aware of a physical cue such as a high radon level and intellectually knows what can happen to a family member’s health, but knows that there is a slow progression of risk, one can, while aware, remove emotion from the risk, not attend to, and, in fact, ignore the actual radon problem.

Once participants had recalled old EH and health information and examined the new EH information, the participants then moved to the phase of *Weighing the Evidence* (as has been described above for the first aim). Reviewing the norms, expectations, experience, and priorities for their family was a necessary step to be able compare the evidence from these elements to their perceptions. Unconscious and conscious goals related to keeping the family stable and healthy were important. As noted previously, goals and motivation are the foundations for most behaviors (Dijksterhuis & Aarts, 2010). Goals drove the behaviors in making family priorities and to keep norms intact. Any risk message for participants contained in the EH information needed to make sense with the goals in order to decide on any engagement with it.

*Making a New Meaning* was the phase in which participants chose a risk message in the EH information and made a meaning for the risk message. This meaning fell in line with their perceptions of health and the social and cultural evidence of their lives. The
process of making a meaning for a risk or another facet affecting daily life has been seen in other studies. As an example, Viscusi and Zeckhauser (1996) found that after a bad experience with a certain product, consumers will alter risk beliefs for that product and other similar products. Changing the meaning of a product from “safe” to “harmful” changed purchasing behaviors.

Burningham, Fielding, and Thrush (2008) investigated populations in England and Wales who were vulnerable to flooding, as to why there was a lack of awareness about flooding risks, after severe floods occurred in 1998 and 2000. They found that certain areas were more likely to have residents that were aware of flood risk, which might indicate that social context may be important. There was less awareness with renters as compared to owners of homes. Having experience with flooding and time lived in a vulnerable area were other factors that predicted flood awareness. However, the fact that one had experience or owned a home did not explain area differences. Social class proved to be very significant as a predictor for all areas. The authors also interviewed a number of residents and discovered that prior to flooding, most had not been aware of any risk, believed their homes to be invulnerable, and perceived their local area as risk-free. Findings included lack of information, lack of official information, or information that was difficult to understand, the invisibility of flood risk, lack of experience, time factors (“the last one was a hundred years ago”), and denial or a lack of concern even with knowledge, in which the authors noted that “…they seemed to put that knowledge to one side.” (p 230). Some residents flatly rejected at-risk status. One conclusion from
their study was that even “…having experience and knowledge of local flood risk does not necessarily prepare people for flooding of their own property” (p 233) The message that the authors heard throughout their study was the message that residents had re-formed even with flood risk knowledge: “It’ll never happen to me” (p 216).

Optimistic bias has been indicated as a factor that accounts for people claiming that they are less likely to be affected by risks than their peer groups, as shown in a study of physicians’ perceptions of developing diabetes by Walker, Kalten, Mertz, and Flynn (2003). Although having a medical understanding of diabetes and also having experience treating patients with diabetes, 50% of physicians that were rated as higher risk for developing diabetes reported that they were less likely to develop the disease. This score also matched the score on a previous pilot study by the authors, of overweight lay persons expressing the same optimistic bias. It was also stated that the higher risk physician group seemed to “…be making independent evaluations of their diabetes risk” (p 2546). This led the authors to conclude that when people assign different meanings to the word ‘risk’ that then affects their perceptions of risks or hazards.

Whether needs, goals, attitudes, cultural norms, or perhaps optimistic bias were at play, participants needed to be able to understand the risk message contained in the new EH information that they believed was important and could possibly affect their families. To do so, they assigned a new meaning to that risk that reflected their perceptions, the social context, and social structures within which their world operated.
Summary. Participants moved through three phases of a process that explained what they did with environmental health information. Visiting My Perception included being aware and attending to new and old perceptions of EH and other health information from unconscious and conscious domains. Reviewing the important elements of social context and structures allowed them to compare perceived EH information risk messages to their daily lives in Weighing the Evidence. Once completed, a risk message stood out that was one that they felt was important to their families. They then needed to interpret it into one that had meaning for themselves. Making a New Meaning gave participants a way to understand the risk message within their day-to-day lives.

The theory of Re-forming the Risk Message. The grounded theory of Re-forming the Risk Message describes a process that people use to understand environmental health information about a risk so that they can decide on a level of behavioral engagement with that information. Re-forming the Risk Message adds to the body of literature regarding health promotion and risk communication.

Health promotion theories are used for many public health interventions intending to change behaviors or lower risks to populations. Theories are chosen according to the problem, the intended outcome, and the unit of change and also to individual, interpersonal, and community levels. Explanatory theories intend to describe a problem and factors that are associated with it (Rimer, Glanz, & Su, 2005). Two types of theories are generally used: continuum theories that identify variables that influence
action (e.g. health belief model or theory of reasoned action) and stage theories that specify a certain “…set of categories into which people could be classified and…[one could] identify factors that can induce movement from one category to the next” (Weinstein, Rothman, & Sutton, 1998). Examples of stage theories include Stages of Change Model (SCM) developed by Prochaska and DiClemente (1983), and the Precaution Adoption Process Model (PAPM) developed by Weinstein and Sandman (1992).

Within the stage models are assumptions of behavioral steps that range from unawareness of a health issue (PAPM) or precontemplation or no intention to change (SCM), to action and maintenance as final steps (both theories). Incorporated within both theories is an assumption that people who are aware but not engaged with the issue then move to a decision-making process for the issue prompted by increased knowledge and self-efficacy, also called engagement with the issue. Weinstein, Rothman, & Sutton (1998) state that in PAPM there are two outcomes for the decision-making process: people decide not to act or they decide to act. Once aware but unengaged, the next step is engagement and decision-making. The outcomes presume that a person is engaged with the issue itself for this decision to take place; in other words, that the person is behaviorally engaged. It also presumes a level of engagement: full or none.

Re-forming the Risk Message adds another perspective to the decision-making process. Participants in the ERRNIE study were not initially behaviorally engaged with
the EH information. They were making a decision, but it was a decision whether to become behaviorally engaged or not with the risk message in the EH information. Action was taking place but not at a behavior level. It was a cognitive action, rather than a behavioral one. The risk message that was re-formed allowed the decision to be made about a level of engagement that the participants wanted to take. Unlike the SCM where there is a time dimension associated with a plan of action, or PAPM where a full level of behavioral engagement is needed for decision-making, the theory of Re-forming the Risk Message offers an explanation of an intermediate process that varies in action between awareness or contemplation and deciding to act or preparation. Re-formation of the risk message is an action, but not an action towards positive behavior change as intended by the stage theories. It suggests that a partial step towards behavioral engagement or preparation is needed, and allows that there needs to be a decision about a level to engage behaviorally or of preparation, before any decision can be made to act.

Re-forming the Risk message challenges some assumptions of non-compliance with health information. It has been assumed that people are non-compliant due to a number of reasons including physiological, behavioral, and treatment factors and can also include patient-provider interactions (USHHS, 1990). It has been difficult to determine just why people are non-compliant although it has been determined when or about what people are noncompliant. While some factors are straightforward (financial difficulty, transportation, loss of vision or hearing), others lead health professionals to believe that there may be resistance of some type. Milder, Williams, Ritchie, Lipworth,
& Day (2010) explored the use of non-steroidal anti-inflammatory drugs in an older population. There was concern that patients were taking medication differently than prescribed. What was discovered was that many patients viewed themselves as low risk to side effects, transferred responsibility about risks to their provider, or believed that since they had prolonged use without any harm, they wouldn’t have any harm in the future. The authors described these patients as avoiding engagement with the health information. However, for some of these patients it was clear that they had changed the message of risk that they had originally received. *Re-forming the Risk Message* may answer some of the questions of non-compliance when the risk message that patients use is changed by them.

Health behavior intervention research hypothesizes that some type of intervention regarding a health risk will bring about a behavioral change, but through a cognitive focus only. *Re-forming the Risk Message* suggests adding a different perspective to this prevailing model. It may be argued that most intervention studies are based on a theoretical framework that has implicit understanding of certain psychological and physiological concepts. However, they are demonstrated as cognitive behaviors without a connection to what might be happening on an unconscious physiological level. Pally (2007) notes that the brain actually constructs our perception of the world. External sensory cues as stimuli are incorporated with other internal cues, emotions, and memory to form a perception. The brain also “…expects that current situation will resemble past situations…” and sends information back to memory sensors to begin
activity related to that type of situation (p. 866). This allows a perception to be recalled faster and is based in survival mechanisms of behavior. If one has an experience with something dangerous, one will run faster away from it, or something similar, at the next encounter. Perhaps it may be the opposite: if not dangerous, one may learn to ignore it. While that may be helpful in some situations, it may lead to errors of judgment in others and require "unlearning".

Some participants alluded to being aware only of or not paying attention to some of the EH information. This fact leads to various questions. How did either of these factors affect perception of the new EH information? What areas of the brain, for instance, are active when a person actually perceives a risk? What areas modify that reaction or enhance it? Can we establish alternate attention selection pathways that bypass already established pathways for goals that motivate and cause behaviors? How might we prime the unconscious mind towards healthy behaviors? It is important to understand how risk messages are perceived from physiologic to cognitive levels to be able to influence healthy behaviors from a conscious level and, more importantly, from an unconscious level. If a goal for nursing intervention research is to provide evidence for practice, then adding physiologic knowledge of the unconscious mind to such factors as conscious knowledge, culture, values, and beliefs can provide a more complete picture of how a person develops meanings and behaviors. Understanding which goals influence and drive behavior, and why, may lead to nursing strategies that influence behavior change at both unconscious and conscious levels.
**Risk communication.** Risk communication is affected by various social contexts and structures as is noted previously in this chapter. Clear and understandable information is necessary for people to be able to perceive a risk and make choices regarding health risks in their lives. Even with easy-to-understand information provided by trusted sources such as nurses and given in a variety of ways, the perceived risk message is not always the one that was intended. In this study, participants had to make a risk message for themselves that allowed them to continue with norms and priorities of life. For some it was the message that was delivered; for others it was a different message.

The language of EH was instrumental in risk communication for participants. The only time any of the participants volunteered the work “risk” was once in discussion of a personal health problem of a partner. Noting the avoidance of the word, participants were asked what it meant. The definition most often given was “danger”. For some participants the risk message was developed to decrease the “danger” element.

The word environment was problematic. Participants described in terms of ecology such as air, water, ground. Health meant personal health (as in ability to do something). When asked to define environmental health, they could not, although some were able to state that when the features of ecology were “good”, health would be “good”. They simply did not see the term environmental health as a normal everyday concept that they could understand. Given that this group had a higher level of
education than is normally found in low-income rural dwellers, this was surprising, especially when the materials that they received had EH printed on them.

Health behavior meant a habit, which could be good or bad. For some, it meant personal behavior such as depression when not taking a medication. Others correctly identified it as being a behavior that affected health.

All of these terms are commonly used in environmental health and environmental risk reduction. However, two participants told me directly that it was language they didn’t understand and didn’t use while others suggested difficulty with a specific term, most often "environmental health". One participant, who stated she had a masters degree in science, stated that if she had difficulty with the terms used, she could not imagine what people who spoke English as a second language would understand.

Perhaps an unintended finding of Re-forming the Risk Message is that of how difficult terms can be for the public although they are familiar to health professionals. It is known that many scientific terms or jargon can prevent understanding of EH and other health information. In order for risks to be perceived, understood, and acted on, the language chosen must be the day-to-day language of the intended audience.

**Study Limitations**

This study was limited to the participants who were low income and had families with children living in rural areas close to an urban center and results are only applicable to them. Other rural residents in other types of rural communities may have different experiences and perceptions regarding environmental health information. Other limitations included the number of participants (n=10) and minimal ethnic and
gender diversity of participants. One man and nine women participated. There were 
ine participants who described themselves as Caucasian and one who described 
herself as African American. It is unknown if similar results would be found in 
populations that had a more diverse population, in less diverse populations with 
different racial or ethnic compositions, or in a study that included predominately men 
or equal numbers of men and women. Social structures and context are different for 
various populations accounting for differences in beliefs and values. While different 
groups may re-form a risk message, there may be cultural overlays that would be 
necessary to uncover and understand as the risk message moves these groups to a level 
of engagement.

This study dealt with environmental health information only. Although there 
seems to be a re-formation of risk messages in other areas of health information with 
regard to risk perception, this study did not compare how messages are formed or re-
formed with other types of health information.

Distance between study sites and lack of travel time affected data collection and 
analysis. As discussed in Chapter Three, I was unable to follow the grounded theory 
process of immediate analysis with data collection. It is unknown if analysis done at the 
same time as data collection would have provided some other theoretical samples than 
emerged from data analysis in this study.
Implications

Implications for use of the grounded theory of Re-forming the Risk Message in the areas of nursing research, education, practice, and policy will be discussed in the following section.

Future Research

Future research should include studies regarding re-forming risk messages with other populations who have been given risk messages, with other types of health information, and in other areas of healthcare in order to better understand how people receive health information and how they make a meaning for it that fits into their lives but that also affects their health. Further testing of the theory concepts could produce a psychometric instrument that could be used to assist nurses in assessments of risk perception. Specifically, studies should test conditions of awareness and attention in relation to getting information to note perceptions and readiness, test elements in daily living that seem to influence decision-making of engagement levels, and test for the types of self-messages people have after being giving health information. More research is needed to find out the language most used by the public to develop teaching tools. As Re-forming the Risk Message was a core category of a larger process of engagement, an exploration of the process of engagement is needed to understand the levels of engagement that people choose to follow. Lastly, future research should be conducted to develop interventions that change self-messages into healthy behaviors.
Practice

This study has the potential to inform nurses about the process that people use when receiving health information, perceiving a risk, and the risk message developed as an outcome. Knowing this process will allow nurses to develop clear messages that incorporate social norms and family priorities. Understanding how a message is re-formed may allow nurses to explore the re-formed message with clients to correct or enhance the message itself, as well as impact nurses applying the label “noncompliant prematurely. This study brings to light the problematic EH jargon that is not used in day-to-day language. Nursing is a trusted source of information and is also the best “translator” of technical or medical language into more common terminology. Knowing what terms are most difficult will allow nurses to find alternate terms to better describe environmental health and other terms connected to it.

Education

This study may assist nursing education by providing an explanation for certain behaviors that may be seen in clinical situations regarding environmental risks. It provides an exemplar for an understanding of rural families and how social context can play a role in development of risk messages. It also allows students to see how the process of Re-forming a Risk Message moves nursing to a health promotion focus. When one can understand how a person re-forms a message about a health concern, it is easier to see where interventions can be implemented to promote healthy behaviors that prevent health problems.
Policy

This study shows once again, that nurses were rated as the most reliable source of information. The key fact of this outcome is that the nurses that delivered the intervention to the participants were public health nurses. Although there is a lack of trust with the public health system due to its governmental affiliations, the nurses are not connected to this perception. It is time that policy makers realize that if health promotion is to play a role in decreasing the costs of health care, nurses are the professionals that will carry the public trust to do so. Findings from this study in this regard, and also in the area of risk communication, may influence policy makers to review how necessary nurses are to the public health workforce and increase public health financing for this purpose. Development and implementation of programs, without taking into account the risk perceptions of the public, waste time and money.

Findings also show a lack of public understanding about the functions and resources provides by public health. Although public health clinics are wonderful safety nets for personal health, public health departments can also assist with problems in environmental health and in areas of health promotion. Inaccessible information, lack of public awareness, and lack of funding at all levels contribute to this problem. Most information provided by public health is in the form of media messages rather than in face-to-face presentations. Brochures or fact sheets are handed to people over a counter or are in display racks. Websites have facts listed in text and may provide downloadable forms. While these types of products can assist people, there may also need to be some sort of personal communication to put a “face” to public health.
Perhaps this study will provide enough information to elicit a change in public health management for a more personable outreach instead of media messages in order to build trust and credibility along with awareness.

**Conclusion**

The grounded theory of *Re-forming the Risk Message* answers the question of what one group of rural low-income families do with environmental health information. This study informs understanding of the process that precedes behavioral engagement. It found that when a risk is perceived, there is a process that is undertaken to re-form the risk message into one that is useable, has meaning, and can fit into the daily life of a family. Future study of re-forming risk messages will provide a more complete understanding in the process of behavior change.
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doi:10.1002/14651858.CD001746.pub2


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http://cancercontrol.cancer.gov/constructs


the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100).


APPENDIX A

WSU IRB EXEMPTION OF PROJECT

MEMORANDUM

TO: PHYLLIS EIDE and Gail Oneal,

FROM: Patrick Conner, Office of Research Assurances (3005)

DATE: 7/24/2009

SUBJECT: Certification of Exemption, IRB Number 10956

Based on the Exemption Determination Application submitted for the study titled "Rural Low-Income Families and Their Use of Environmental Health Information," and assigned IRB # 10956, the WSU Institutional Review Board has determined that the study satisfies the criteria for Exempt Research at 45 CFR 46.101(b)(2) and 45 CFR 46.101(b)(4).

This study may be conducted according to the protocol described in the Application without further review by the IRB.

It is important to note that certification of exemption is NOT approval by the IRB. You may not include the statement that the WSU IRB has reviewed and approved the study for human subject participation. Remove all statements of IRB Approval and IRB contact information from study materials that will be disseminated to participants.

This certification is valid only for the study protocol as it was submitted to the IRB. Studies certified as Exempt are not subject to continuing review (this Certification does not expire). If any changes are made to the study protocol, you must submit the changes to the IRB for determination that the study remains Exempt before implementing the changes (The Request for Amendment form is available online at http://www.irb.wsu.edu/documents/forms/rtf/Amendment_Request.rtf).

Exempt certification does NOT relieve the investigator from the responsibility of providing continuing attention to protection of human subjects participating in the study and adherence to ethical standards for research involving human participants.

In accordance with WSU Business Policies and Procedures Manual (BPPM), this Certification of Exemption, a copy of the Exemption Determination Application identified by this certification and all materials related to data collection, analysis or reporting must be retained by the Principal Investigator
for THREE (3) years following completion of the project (BPPM 90.01). Audio/video/photo recordings that are intended solely for transcription should, however, be destroyed after the transcription is complete and verified.

Washington State University is covered under Human Subjects Assurance Number FWA00002946 which is on file with the Office for Human Research Protections (OHRP).

Review Type: New
Review Category: Exempt
Date Received: 6/30/2009
Exemption Category: 45 CFR 46.101(b)(2) and 45 CFR 46.101(b)(4)
OGRD No.: N/A
Funding Agency: N/A

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APPENDIX B

WSU IRB AMENDMENT

MEMORANDUM

TO: Phyllis Eide and Gail Oneal

FROM: Patrick Conner, Office of Research Assurances (3005)

DATE: 12/17/2010

The IRB staff have evaluated the proposed amendment to the Exempt study, "Rural Low-Income Families and Their Use of Environmental Health Information" IRB #10956) and have determined that the amended study procedures remain exempt from IRB review under 45 CFR 46.101 (b)(2) and 45 CFR 46.101 (b)(4).

The study procedures have been amended to include:
* E-mail Interviews

You may conduct the study, as amended above, without further IRB oversight. Your department shall maintain oversight of the project.

Further changes will require that a new Request for Amendment form be completed and submitted to the IRB.

If you have questions, please contact the Institutional Review Board at (509) 335-3668. Any revised materials can be mailed to Office of Research Assurances (Campus Zip 3005), faxed to (509) 335-6410, or in some cases by electronic mail, to irb@wsu.edu.

Review Type: Amendment
Review Category: Exempt
Date Received: 12/15/2010
OGRD No.: N/A
Agency: N/A

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APPENDIX C

Rural Low Income families and Their Use of Environmental Health Information

Semi-structured Interview Guide-Version 1

Gail Oneal, MN, APRN, BC
Graduate Research Assistant
Washington State University College of Nursing

(509) 324-7263 or (509) 953-7983

1. You just received a nurse intervention about environmental health risks Tell me about the intervention (visits) you received.
2. What is health to you? What does it mean to you and your family?
3. How would you describe a health behavior?
4. How is a health behavior “learned” in your family?
5. To you, what does the word environmental mean?
6. And what does environmental health mean to you?
7. What is an environmental risk or hazard? Are they different/the same?
8. When you think of environmental risks, what comes to mind?
9. What environmental risks are you most concerned about for your family’s health?
10. Which environmental risks pose the most risk to your children, your family as a whole?
11. Describe how the environmental health information provided by the nurses influenced any health decisions you made.
12. What health behaviors, if any, did you change as the result of this information?
13. Which health behavior changes have you stuck with and maintained…not maintained?
14. What factors influenced you sticking with and maintaining the health behaviors…not sticking with the health behaviors?
15. Was this experience (learning new environmental health information) similar to any other health experience you’ve had? Tell me more about it.
16. Describe your experiences with the local health department.
17. How do you feel about getting resources and help for environmental issues?
18. What do you think other people know about environmental health? How are you the same…different?
19. What about the term “public health”?
20. What might you use the public health department for and what not? What do you expect from the PHD?

*Some describe being proactive vs reactive to their health concerns

Additional probes such as “Tell me more about that” will be used to provide for greater dimensions and explanations of their experiences and behaviors.
APPENDIX D

Rural Low Income families and Their Use of Environmental Health Information

Semi-structured Interview Guide-Version 2

Gail Oneal, MN, APRN, BC
Graduate Research Assistant
Washington State University College of Nursing
(509) 324-7263 or (509) 953-7983

1. I know you received an intervention about (environmental?) health risks in your home. Please tell me about how you came to be in it and what happened. (Possible probes here-why did they sign up for the project; what types of family health or home concerns they had/have now)
2. What does “health” mean to you and your family?
3. What do you do to take care of yourself and family?
4. How would you describe a health “behavior”? What is a healthy behavior for you?
5. How did you learn about important health issues and healthy behaviors in the past?
6. To you, what does the word environmental mean?
7. When you think of environmental risks, what comes to mind?
8. Do you see yourself doing anything to change the environment in or around your home for health concerns?
9. Before this intervention, did you ever hear the term “environmental health”? Were there other terms or language in the intervention that struck you as new or different? How so?)
10. How do you feel about getting resources and help to make changes in your home?
11. Who would go to for help?
12. Have you ever thought about using your local public health department? What might you use it for/what not? (Kind of a stand-alone question but asking this because public health nurses did the intervention, and are the nurses that deliver EH information/education now.)

Additional probes:

Can you tell me if this experience (learning new environmental health information) was similar to any other health experience you’ve had? How or why not?

What about the term “public health”? Question about tobacco as a risk-different than other risks??
APPENDIX E

Rural Low Income families and Their Use of Health Information

Semi-structured Interview Guide-Version 3

Gail Oneal, MN, APRN, BC
Graduate Research Assistant
Washington State University College of Nursing

(509) 324-7263 or (509) 953-7983

1. What do you do to take care of yourself and family?
2. If you had to list priorities to take care of your family, what would they be?
3. What does “health” mean to you and your family?
4. Some people say they got most of their health information from different places, such as their doctor or family. How did you learn about important health issues? How do you now?
5. What health concerns are important to you? What health concerns do you talk about with other people? Who do you talk to? (Who wouldn’t you share with?)
6. Can you describe some things you regularly do that you think are good for your health? Things that aren’t so good for your health?
7. How about good for your family’s health? Anything you can think of that is not good for your family?
8. Tell me what’s it’s like to live in a rural area.
9. Do you think living in a rural area affect your health or the health of your family in any way?
10. Do you see yourself doing anything to change anything in or around your home for health concerns?
11. How do you feel about getting resources and help to make changes for any health concern? (or in your home)
12. Who would you go to for help?
13. Have you ever thought about using your local public health department? What might you use it for/what not? (Kind of a stand-alone question but asking this because public health nurses did the intervention, and are the nurses that deliver health information/education now.)
14. I know you received an intervention about (environmental) health risks in your home. Please tell me about how you came to be in it and what happened.

(Possible probes here-Why did they sign up for the project; What did they expect from the intervention; When you think of environmental risks, what comes to mind?; Before this intervention, did you ever hear the term “environmental health”? Were there other terms or language in the intervention that struck you as new or different or uncomfortable? How so?)
APPENDIX F

Rural Low Income Families and Their Use of Environmental Health Information

Demographic Information Form

Gail Oneal, MN, APRN, BC

Graduate Research Assistant

Washington State University College of Nursing

(509) 324-7263 or (509) 953-7983

Please fill out information below:

Age__________ Gender_________________

Partnered (Circle one) Yes No

Occupation___________________________________________________________________

Average yearly income_____________________

Do you (circle one) Rent Own your home?

Number of family members in your household______________

Number of adults______________

Number of children______________

Ethnic origin/Race/Cultural identity___________________________________________

Are you the primary head of household? (Circle one) Yes No

Partner to primary head of household? (Circle one) Yes No

Primary decision maker for health concerns? (Circle one) Yes No

How many times have you used the public health department in the past year?_____________________

For what?_________________________________________________________________________
# APPENDIX G

## Demographics

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</tr>
</tbody>
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Research Study Consent Form

Study Title: Rural Families and Their Use of Health Information

Researchers:
Dr. Phyllis Eide, Assoc Professor, College of Nursing, 509-324-7246, PI (advisor)
Gail Oneal MN, Research Assistant, College of Nursing, 509-324-7263 or 509-953-7983 (Co-PI)

You are being asked to take part in a research study carried out by Phyllis Eide and Gail Oneal. This form explains the research study and your part in it if you decide to join the study. Please read the form carefully, taking as much time as you need. Ask the researcher to explain anything you don’t understand. You can decide not to join the study. If you join the study, you can change your mind later or quit at any time. There will be no penalty or loss of services or benefits if you decide to not take part in the study or quit later. This study has been approved for human subject participation by the Washington State University Institutional Review Board.

What is this study about?

This research study is being done to understand what rural families do with environmental health information and how that information changes or doesn’t change the health of family members. The purpose of this study is to find common behaviors and actions that rural families use to maintain or improve health, including environmental health, so that health professionals can provide more meaningful and useable information and resources to rural populations.

You are being asked to take part because you are interested in environmental health for you and your family and may or may not have been part of a study about in-home environmental risks and hazards. Taking part in the study will take about 1 to 2 hours for interviews.

You cannot take part in this study if you are under eighteen years old, unable to speak or understand English, or unable to participate in an interview for one or more hours for any reason. You will be removed from the study if the researcher feels that it would be in your best interest.
What will I be asked to do if I am in this study?

If you take part in the study, you will be first be asked to choose a time and place for an interview. At the time of the interview, you will be asked to fill out a short form that includes some questions about you and your family such as age, gender, occupation, partner status, number of family members, and use of public health services. This form takes about 5 minutes to complete. You are free not to answer any question that you do not want to answer. You may ask questions about the form or any question before answering.

If face-to-face interviews are done, you will be interviewed using a digital voice recorder. You will complete an interview that may last from 1 to 2 hours. Most often, it will only be about 1 hour. Questions will ask about your knowledge of environmental health information and how you make health decisions with that information. Sample questions may include: “Tell me about the environmental information you received” “What does environmental health mean to you?” “When you think of environmental risks, what comes to mind?”

You may answer or not answer any question you choose. You may ask questions about the interview or the interview questions. You may stop the interview at any time.

You may be asked to do a second interview later to help clarify any questions or information.

An interview may be necessary at a time of year that the weather makes it difficult or dangerous to travel, so the researcher may need to do a telephone interview using a landline for confidentiality. This call will be taped using the digital recorder and you will be informed of this verbally over the telephone before proceeding with the interview. Any long distance call will be made by Gail O'Neal (researcher) at her cost. In addition, you may be contacted to give feedback about the findings at some point in the study.

All of the interviews will be taped and will only be heard by the transcriptionist who is trained in confidential and privacy issues and the researchers.

Previously collected and de-identified information from the Environmental Risk Reduction through Nursing Interventions and Education (ERRNIE) may be used for this study. If you participated in ERRNIE, a consent was signed by you allowing for other use of the study results. All identifying information has been removed so that only generalized results will be available. No personal information about you or your family will be available from these results.

You may be asked to show your home to the researcher to observe any environmental problems or issues. You may choose not to show your home to the researcher.

You have the right to read and review your own transcript. If you wish to waive this right, you need to check a box at the end of the consent form. If you would like to
receive results at the end of the study, you will need to provide mailing information on this consent form.

It is anticipated that the total time to you for the first interview filling out forms, and any home observation will be between 1 and 2 ½ hours. You will receive a gift card for your time.

**Are there any benefits to me if I am in this study?**

The potential benefits to you for taking part in this study are: 1) You may benefit by talking about your health and the health of your family related to environmental issues; 2) You may feel better and gain more understanding about your own actions and decisions about environmental risks and hazards in your home and elsewhere; and 3) You may increase your own use of public health services regarding environmental health. The information that you provide for this study will help nurses and other health professionals understand how rural families use environmental health information and how that information affects health actions and behaviors. This information will be used to develop more useable and meaningful education materials and interventions about health and the environment. It will also be used to inform policy makers about the resources that are accessible and available from public health departments.

**Are there any risks to me if I am in this study?**

The potential risks from taking part in this study are: 1) You may uncomfortable, embarrassed, or upset discussing your own or your family’s health or home environment; 2) You may be at risk for loss of confidentiality; 3) You may feel pressured to continue the study or answer questions in order to receive the gift card; or 4) Because this study may involve a home observation, you may feel that this study is an invasion of privacy. In addition, I (Gail Oneal) am obligated by law to report to legal authorities certain activities including child abuse, domestic abuse, illegal use of substances, elder abuse, intent to harm either yourself or others, or unsafe living or disease conditions. You will be at risk for legal and/or medical action if any of these situations are found.

All measures will be taken to ensure your confidentiality and privacy. You have the right to not answer any question that is upsetting or uncomfortable, or to end the interview or observation at any time without any problems or loss of gift card. You will be given the name of a local mental health resource or referral to an urgent care facility for counseling or follow up health care, if needed or requested. If you chose to use any referral, it will be at your own financial responsibility.

**Will my information be kept private?**

The data for this study will be kept confidential to the extent allowed by federal and state law. No published results will identify you, and your name will not be associated with the findings. Under certain circumstances, information that identifies you may be released for internal and external reviews of this project.
Only the researchers, research team, and the Washington State University Institutional Review Board (IRB) will have access to materials including voice recordings, written transcripts, notes, and observation logs.

Your name will be given a code for purposes of identifying each piece of information about you, and a master list with all names and codes along with original voice recordings from the interviews will be kept in a locked file box within a locked file cabinet and in a separate place from all other materials in Gail Oneal’s (researcher) office. In addition, all other materials will be kept in a locked file cabinet in the office. All study information stored on Gail Oneal’s computer will be password protected or encrypted for security and confidentiality.

This study requires voice audio recordings of interviews. All interviews will be private and done in a place and time of your choosing. You will have the choice to include any other individuals to attend the interview. No other participant will have access to or be informed of your participation.

Because this study looks at what environmental health means to you, there will be some actual quotations of your interview in the final report. You will be given a false name for any written report using quotations to protect your identity.

You confidentiality will not be protected in the case of illegal or harmful activities. Because Washington and Montana State laws, require reporting by health professionals of a dangerous or illegal activity, Gail Oneal will call the appropriate authority to report the incident.

The results of this study may be published or presented at professional meetings, but the identities of all research participants will remain anonymous.

The data for this study will be kept for 10 years. Information from this study may be used for other studies in the future.

Are there any costs or payments for being in this study?

There will be no costs to you for taking part in this study. Any long distance telephone calls will be made by Gail Oneal at her cost.

You will receive a $10 gift card to Walmart or Target for taking part in this study at the time of the interview. If you decide to quit the study during the interview, you still will receive the gift card.

Who can I talk to if I have questions?

If you have questions about this study or the information in this form, please contact the researcher: Gail Oneal, Washington State University, College of Nursing, Suite 422C, PO Box 1495, Spokane, WA 99210-1495. (509-324-7263 or 509-953-7983.) If you have
questions about your rights as a research participant, or would like to report a concern or complaint about this study, please contact the Washington State University Institutional Review Board at (509) 335-3668, or e-mail irb@wsu.edu, or regular mail at: Albrook 205, PO Box 643005, Pullman, WA 99164-3005.

**What are my rights as a research study volunteer?**

Your participation in this research study is completely voluntary. You may choose not to be a part of this study. There will be no penalty to you if you choose not to take part. You may choose not to answer specific questions or to stop participating at any time.

**What does my signature on this consent form mean?**

Your signature on this form means that:

- You understand the information given to you in this form
- You have been able to ask the researcher questions and state any concerns
- The researcher has responded to your questions and concerns
- You believe you understand the research study and the potential benefits and risks that are involved.

---

**Statement of Consent**

I give my voluntary consent to take part in this study. I will be given a copy of this consent document for my records.

☐ I waive my right to receive a copy of my interview transcripts for review.

☐ I understand that voice recordings via tape are required for this study and agree to be voice recorded.

__________________________________  ______ _______________
Signature of Participant     Date

__________________________________
Printed Name of Participant

__________________________________                  ___________________________
Signature of witness if unable to sign                           Date
Printed Name of witness

If you wish to receive a copy of the results in the future, please list a mailing address:

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect.

I certify that when this person signs this form, to the best of my knowledge, he or she understands the purpose, procedures, potential benefits, and potential risks of participation.

I also certify that he or she:

• Speaks the language used to explain this research
• Reads well enough to understand this form or, if not, this person is able to hear and understand when the form is read to him or her
• Does not have any problems that could make it hard to understand what it means to take part in this research.

Signature of Person Obtaining Consent

Date

Printed Name of Person Obtaining Consent

Role in the Research Study