The Role of Forensic Nurses in Communities Experiencing Environmental Contamination

Wendy Robinson

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THE ROLE OF FORENSIC NURSES IN COMMUNITIES EXPERIENCING ENVIRONMENTAL CONTAMINATION

A Dissertation

Submitted to the School of Nursing

Duquesne University

In partial fulfillment of the requirements for
the degree of Doctor of Philosophy

By

Wendy Robinson

May 2012
THE ROLE OF FORENSIC NURSES IN COMMUNITIES EXPERIENCING ENVIRONMENTAL CONTAMINATION

By

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Approved January 17, 2012

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THE ROLE OF FORENSIC NURSES IN COMMUNITIES EXPERIENCING ENVIRONMENTAL CONTAMINATION

By

Wendy Robinson

May 2012

Dissertation supervised by Associate Professor L. Kathleen Sekula, PhD, APRN, FAAN

Purpose

The purpose of this study was to provide an understanding of the self-perceived physiological and psychosocial needs of persons living in communities which have been exposed to environmental contamination, and to provide an understanding of how forensic nurses can be utilized in these communities.

Background

This study was conducted to provide an opportunity for forensic nurses to advance their profession by finding ways that they can move beyond their traditional
roles. Dixon and Dixon’s Integrative Environmental Health Model was the theoretical framework.

Research Design

This cross-sectional triangulated study used quantitative and qualitative methods. The Community Environmental Health and Rights Assessment Tool (CEHRAT) was used to elicit quantifiable responses. One-on-one qualitative interviews were then conducted.

Participants and Data Collection and Analysis

Questionnaires were completed by 198 participants (109 from Ellenville, New York, and 89 from South Plainfield, New Jersey). For the qualitative phase, six residents were interviewed.

All persons who completed the questionnaire received a $5 gift card and an environmental resource pamphlet. The quantitative data was analyzed using SPSS. The qualitative data was managed with Weft QDA.

Results

The majority of participants in each community were ‘Somewhat satisfied’ with the environmental information they receive (32.4% for Ellenville and 53.5% for South Plainfield). Two-thirds of the respondents in both communities said they know little or nothing about environmental contamination in their community. Over ninety-six percent of respondents indicated that they would trust nurses to provide environmental information if the nurses were experienced in such matters. Over ninety-eight percent of respondents stated they would trust forensic nurses. Eighty-five percent of respondents wanted educational information so they could protect themselves from contamination.
The qualitative data revealed themes that buttressed the quantitative results: a lack of knowledge; the negative impact of politics, economics, and personal finances on remediating contamination; the need for outside help; and the belief that nurses can help affected communities by providing education, treatment, and investigation.

Conclusions

Forensic nurses can benefit communities that have been environmentally contaminated. In addition to advancing their profession, forensic nurses can be catalysts for change.
ACKNOWLEDGEMENTS

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<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong> ........................................................................................................ iv</td>
</tr>
<tr>
<td><strong>Acknowledgements</strong> ........................................................................................ vii</td>
</tr>
<tr>
<td><strong>List of Tables</strong> .................................................................................................. xii</td>
</tr>
<tr>
<td><strong>List of Appendices</strong> ........................................................................................... xiii</td>
</tr>
<tr>
<td><strong>Chapter 1</strong> ......................................................................................................... 1</td>
</tr>
<tr>
<td><strong>Introduction</strong> ..................................................................................................... 1</td>
</tr>
<tr>
<td>1.1 Background of the Study .............................................................................. 1</td>
</tr>
<tr>
<td>1.2 Purpose ........................................................................................................... 5</td>
</tr>
<tr>
<td>1.3 Research Questions ....................................................................................... 6</td>
</tr>
<tr>
<td>1.4 Operational Definitions ................................................................................ 6</td>
</tr>
<tr>
<td>1.5 Assumptions .................................................................................................... 9</td>
</tr>
<tr>
<td>1.6 Significance of the Study ............................................................................. 10</td>
</tr>
<tr>
<td>1.7 Summary ......................................................................................................... 12</td>
</tr>
<tr>
<td><strong>Chapter 2</strong> ......................................................................................................... 14</td>
</tr>
<tr>
<td><strong>Review of the Literature</strong> .................................................................................. 14</td>
</tr>
<tr>
<td>2.1 Theoretical Framework ............................................................................... 15</td>
</tr>
<tr>
<td>2.2 Brief History of Environmental Contamination in the United States .......... 17</td>
</tr>
<tr>
<td>2.3 Individual and Community Characteristics ............................................... 41</td>
</tr>
<tr>
<td>2.4 Political/Legal Concerns ............................................................................... 53</td>
</tr>
<tr>
<td>2.5 Nurses and Environmental Health .............................................................. 62</td>
</tr>
<tr>
<td>2.6 Forensic Nurses .............................................................................................. 65</td>
</tr>
</tbody>
</table>
4.12 Environmental Rights…………………………………………………………117
4.13 Sources of Environmental Information……………………………………118
4.14 Information Needed……………………………………………………………120
4.15 Most Trustworthy Sources for Environmental Health Information……122
4.16 Least Trustworthy Sources for Environmental Health Information……123
4.17 Most Trustworthy Sources for Environmental Laws and Rights………124
4.18 Least Trustworthy Sources for Environmental Laws and Rights………125
4.19 Nurses…………………………………………………………………………127
4.20 Introduction to Qualitative Results…………………………………………130
4.21 Findings and Themes…………………………………………………………132
  4.21a A Lack of Knowledge…………………………………………………132
  4.21b Politics………………………………………………………………………135
  4.21c The Economy and Personal Finances……………………………135
  4.21d Needing Help……………………………………………………………136
  4.21e Nurses Can Help…………………………………………………………138
Chapter 5………………………………………………………………………………139
Discussion of the Findings, and Implications for Nursing………………….139
  5.1 Discussion of the Findings………………………………………………….139
  5.2 Implications for Nursing………………………………………………….143
  5.3 Limitations of the Study………………………………………………….145
  5.4 Relevance of Study…………………………………………………………147
  5.5 Dissemination of Results and Community Follow-up………………..151
  5.6 Conclusion……………………………………………………………………152
References
Appendices
LIST OF TABLES

Table 1 Age Distributions ................................................................. 103
Table 2 Demographic Characteristics............................................. 105
Table 3 Respondents’ Annual Household Incomes............................ 106
Table 4 Health Characteristics ......................................................... 107
Table 5 Number of Medicines Taken Daily ..................................... 108
Table 6 Incidence of Specific Illnesses .......................................... 109
Table 7 How Health Care is Paid For .............................................. 110
Table 8 Community Health and Safety .......................................... 112
Table 9 Health Care Information ..................................................... 113
Table 10 Environment Problems .................................................... 114
Table 11 Environmental Contamination Knowledge ....................... 116
Table 12 Environmental Information .............................................. 117
Table 13 Knowledge about Environmental Rights ............................ 118
Table 14 Sources of Environmental Information ............................. 119
Table 15 Information Needed ......................................................... 121
Table 16 Most Trustworthy Sources of Environmental Health Information .... 123
Table 17 Least Trustworthy Sources for Environmental Health Information ........ 124
Table 18 Trusted the Most for Environmental Rights ....................... 125
Table 19 Trusted the Least for Environmental Rights ....................... 127
Table 20 Trust in Nurses ................................................................. 128
Table 21 Areas in Which Forensic Nurses Would be Most Helpful .......... 129
# LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Community Environmental Health and Rights Assessment Tool</td>
<td>182</td>
</tr>
<tr>
<td>B</td>
<td>Guide for the Researcher to Locate Key Informants</td>
<td>190</td>
</tr>
<tr>
<td>C</td>
<td>Qualitative Interview Guide and Prompts</td>
<td>192</td>
</tr>
<tr>
<td>D</td>
<td>Institutional Review Board Approval</td>
<td>193</td>
</tr>
<tr>
<td>E</td>
<td>Ellenville Postcard Handout</td>
<td>195</td>
</tr>
<tr>
<td>F</td>
<td>Ellenville Flyer</td>
<td>196</td>
</tr>
<tr>
<td>G</td>
<td>Online Posting for Ellenville Survey</td>
<td>197</td>
</tr>
<tr>
<td>H</td>
<td>South Plainfield Flyer</td>
<td>198</td>
</tr>
<tr>
<td>I</td>
<td>Online Posting for South Plainfield Survey</td>
<td>197</td>
</tr>
<tr>
<td>J</td>
<td>Online Posting for South Plainfield Survey</td>
<td>198</td>
</tr>
<tr>
<td>K</td>
<td>Online Posting for South Plainfield Survey</td>
<td>199</td>
</tr>
<tr>
<td>L</td>
<td>Sample Request Letter</td>
<td>200</td>
</tr>
<tr>
<td>M</td>
<td>Sample Response Letter</td>
<td>201</td>
</tr>
<tr>
<td>N</td>
<td>Letter to the Editor</td>
<td>202</td>
</tr>
<tr>
<td>O</td>
<td>Consent to Participate in a Research Study</td>
<td>203</td>
</tr>
<tr>
<td>P</td>
<td>Information Pamphlet for Woodbrook Road Dump</td>
<td>205</td>
</tr>
<tr>
<td>Q</td>
<td>NIH Certificate of Completion for Wendy Robinson</td>
<td>207</td>
</tr>
<tr>
<td>R</td>
<td>NIH Certificate of Completion for Dr. Kathleen Sekula</td>
<td>208</td>
</tr>
</tbody>
</table>
Chapter 1

1.1 Background of the Study

Environmental health concerns all aspects of human health that are determined by physical, chemical, and biological factors that are external to a person. It also includes behaviors related to the social and cultural environment, as well as the assessment and control of environmental factors that can potentially affect health (World Health Organization, 2011a). Through both manmade and natural occurrences, the above-mentioned factors can alter the health processes of individuals, families, and communities. Environmental health is directed toward disease prevention and creating environments that foster optimum health. For some communities, environmental health has been jeopardized by volatile organic compounds (VOCs), pesticides, radioactive waste, heavy metals, and other potentially toxic substances that have infiltrated the soil, sediment (mud), air, surface waters, and ground waters from manufacturing processes, or through the storage or disposal of toxic materials. Although the contamination may have occurred decades ago, when humans come in contact with these chemicals their health may be affected.

The effects of hazardous chemicals on humans have been well documented. Research conducted by the federally created Agency for Toxic Substances and Disease Registry (ATSDR), and by non-governmental researchers has shown that scores of chemicals pose health risks to humans. The ATSDR has profiled substances that have already affected Americans or could eventually affect them (ATSDR, 2009a). Some substances may cause relatively minor effects, while others may cause more serious harm. Biennially the Environmental Protection Agency (EPA), in conjunction with the
ATSDR publishes a list of substances most commonly found at federally recognized contaminated sites. Due to their known or suspected toxicity and potential for human exposure these substances pose the most significant potential threat to human health (ATSDR, 2009b). Of the 275 chemicals currently on the list, the top three are arsenic, lead, and mercury.

Independent researchers have also documented adverse consequences resulting from exposure to chemicals in our environment. Even low concentrations of arsenic in Michigan groundwater have been found to impact at least 23 different health outcomes including cardiovascular disease, diabetes mellitus, chronic liver disease, hypertension, and respiratory disease (Meliker, Wahl, Cameron, & Nriagu, 2007). A significant correlation has been found between hospital admissions related to respiratory and cardiovascular diseases (including asthma, influenza, pneumonia, chronic obstructive pulmonary disease, cerebrovascular disease, heart failure, and ischemic heart disease), and the atmospheric presence of nitrogen dioxide, sulfur dioxide, ozone, and particulate matter less than 10 microns; major components of polluted air (Wong et al., 1999). Exposure to respirable particulate matter has also been associated with decreased peak flow values, increased symptoms of respiratory irritation, increased use of asthma medications, and increased hospitalization for asthma (Schwartz, Slater, Larson, Pierson, & Koenig, 1993). Increased vascular endothelial dysfunction, a harbinger of cardiovascular morbidity, has also been documented (Rundell, Steigerwald, & Fisk, 2010). Long-term exposure to industrial emissions may be a risk factor for systemic lupus (Kardestuncer & Frumkin, 1997).
With increased understanding of the potential effects of environmental chemicals on humans, and with a greater desire to prevent rather than merely manage hazardous situations, environmental organizations and government agencies recognize the need for more environmental health care providers who can help protect and educate the public (Mood, 2002). As nurses are the largest group of health care providers in the United States (United States Bureau of Labor Statistics, 2010), and because they are in direct contact with individuals, families, and communities, their presence presents an opportunity for more of them to enter this field (ATSDR, 2010; Institute of Medicine, 1995). Nurses are the ideal professionals to assist individuals in environmentally affected communities, and to educate the public about the environment because they understand growth and stages of development, and are taught to be educators, communicators, and assessors (Powell & Stewart, 2001; Wakefield, 2001). In addition, nurses can gain access to communities that may be less receptive to other investigators because nurses garner great trust and respect, and because nurses are considered to be the most honest and ethical professionals in the country (Saad, 2008).

Increased attention is also being paid to the criminal and legal aspects of environmental contamination (Suggs et al., 2002). Researchers are recognizing the connection between public health and criminal justice, especially for populations that are marginalized, have specific health problems (like asthma), or otherwise are noted for being especially vulnerable (Payne-Sturges & Gee, 2006; Akers & Lanier, 2009). Companies that accidentally or purposely release hazardous substances into the environment, or cause injury to living organisms, may face civil or criminal charges.
The intersection between health care and legal proceedings presents a prime opportunity for forensic nurses to broaden their scope of practice (knowledge of public or legal proceedings, and the application of health care in the investigation of trauma and/or death) beyond their traditional roles, and to elucidate how the identified environmental needs correlate with the definition of forensic nursing and the boundaries of forensic nursing roles and practices as identified by forensic experts such as Virginia Lynch and the International Association of Forensic Nurses (IAFN). The IAFN is currently defining emerging roles for forensic nurses.

This study was intended to assist in role delineation as it relates to environmental health. The study had two purposes: to provide an understanding of the self-perceived physiological and psychosocial needs of persons living in communities which have been exposed to environmental contamination, and to understand how forensic nurses can be utilized in communities where people have been exposed to environmental contamination.

The research questions focused on identifying the needs of people who live in communities that have been exposed to environmental contaminants, and to understand the potential role of forensic nurses in communities where there is environmental contamination. Although research has been conducted on individual victims and communities experiencing natural disasters such as hurricanes and earthquakes, few studies have focused on healthcare needs of individuals and communities experiencing environmental contamination, and in particular, how forensic nurses can help address these needs.
The dependent variables were the self-identified needs of individuals in the communities, and the role of the forensic nurse. The independent variables were the environmental problems that have been identified in the communities, and individual factors that affect vulnerability such as age, gender, pre-existing health conditions, income, and level of education, level of health knowledge, level of health care, and the amount of prior environmental knowledge. These variables are indicators of the health of the community, and will help researchers to understand the needs of the communities. Other socio-demographic and environmental resource data for the communities were obtained from public records.

Data for this cross-sectional triangulated study were gathered and analyzed using quantitative and qualitative methods. Quantitative data was gathered using the Community Environmental Health and Rights Assessment Tool (CEHRAT) in Appendix A. Qualitative data was gathered using the hermeneutical phenomenology approach, as espoused by Heidegger, Ricoeur, and van Manen (van Manen, 2002; Wilson & Hutchinson, 1991). This approach was selected because it focuses on uncovering verbal details that provide meaning and context for the environment in which the person is living.

1.2 Purpose

The aim of the study was to discover and understand the needs of people who live in communities that have been exposed to environmental contaminants, and to understand the possible role of the forensic nurse in these communities. Information obtained from the study can potentially expand the role of forensic nurses, while providing better health care and health promotion to individuals and communities throughout the United States.
1.3 Research Questions

The research questions were:

1. What are the self-identified needs of people who live in communities that have been exposed to environmental contaminants?

2. What is the potential role of forensic nurses in communities where there is environmental contamination?

1.4 Operational Definitions

This section defines the operational definitions; environmental health, environmental contamination, risk, community, and forensic nursing.

Environmental Health

Environmental health involves all the physical, chemical, and biological factors, that occur externally, but that can impact behaviors, human health, and disease (WHO, 2011a). This definition reflects an understanding of both the direct and indirect effects of chemical, physical, and biological agents external to the human, and the agents’ effects on health and well being. For that reason, health can be defined as not just an absence of illness, but as a state of physical, mental, and social well-being. Environmental health also includes quality of life, and the social and psychosocial factors in the environment. It relates to assessment of the individual and the presumed external factors, with the goal of disease prevention and the creation of a better environment for healthy living (Agius, 2007). An understanding of environmental health also includes understanding the relationship between people and their environment because assessing and controlling factors in the environment can potentially affect health.
Environmental health is often considered a branch of public health, but it need not be within the exclusive domain of any one group of health care providers. Rather, environmental health is broad enough and challenging enough to be addressed by providers from multiple disciplines.

Environmental Contamination

Environmental contamination is defined as the introduction of microorganisms, chemicals, toxic substances, or wastes into water, air, or soil to the extent that the medium is unfit for its subsequent intended use, and poses a hazard to living organisms (Cornell University Cooperative Extension, 2011). This definition also applies to surfaces of objects, buildings, and various household and agricultural use products. Remediation is advisable when the contamination can potentially affect the health and quality of life for people living and working near the contaminated area.

Some environmentalists also consider social elements such as violence, stress, and poverty, as environmental hazards (IOM, 2003). The social effects of contamination often accompany environmental disruptions because the disruptions may wrench families and communities apart, at times forcing families to permanently leave their homes, lose their jobs, and change their socioeconomic status. Thus, social changes can become fundamental when considering environment and health.

Risk

Although the effects of environmental contamination are not always corroborated by scientific evidence, the Precautionary Principle has become a widely accepted approach for intervention. The Precautionary Principle, which was first promulgated in Europe in the early 1970s, posits that when there is insufficient, preliminary, or
inconclusive scientific evidence to indicate reasonable grounds for concern about a potentially hazardous effect on the environment or humans, interventions should be taken to prevent harm (World Commission on the Ethics of Scientific Knowledge and Technology, 2005). Interventions should be chosen that are proportionate to the seriousness of the potential harm, taking into account the positive and negative consequences, and an understanding of the moral implications of taking action or doing nothing. The Precautionary Principle has been widely accepted with some variations in approach and terminology by countries in the European Union, some cities in the United States (e.g. San Francisco), international treaty organizations, and environmental organizations globally (Science & Environmental Health Network, 2011).

Community

A community can be defined as a group of individuals who share a given area of space, live within that area’s borders for a long duration, frequently socially interact with each other, and share a culture (Curtis & Aguirre, 1973; Quarantelli, 1978). Community members share values, norms, needs, resources, problems, and risks, and exhibit some awareness of their identity as a group (Robinson, 2008). Community is vital to understanding social life and is recognized as being an important predictor of quality of life (Chekki, 1990). Although each individual can be assessed for his or her own state of environmental health, the concept is also appropriately applied to groups. Community can be described in relation to environmental contamination, and the people who live and work near a hazardous waste site (ATSDR, 2008). When studying the psychological responses to hazardous substances, the ATSDR found that group culture plays a large part in shaping responses to situations (1995). Groups provide alternatives, different strengths,
as well as resilience and capacities to respond.

Forensic Nursing

Forensic nursing is defined as the application of the nursing process to public or legal proceedings, and the application of health care in the scientific investigation of trauma and/or death related to abuse, violence, criminal activity, liability, and accidents (Lynch, 2006). First recognized as a specialty by the American Nurses Association in 1995, forensic nurses investigate and treat both victims and perpetrators of crimes, and assist individuals, families, communities, and the legal system (IAFN, 2006) by combining biomedical knowledge and critical thinking skills with an understanding of the law. This nursing specialty encompasses not only the deceased, but living patients as well. Sexual assault, accident examination and reconstruction, and legal nurse consulting are major foci for forensic nurses, with attention to physiological and psychosocial factors for persons living in the community as well as in institutional settings. Forensic nurses collaborate with law enforcement agencies, and can testify as expert witnesses in court. Developing public policy is also within the domain of forensic nurses. Although the IAFN lists environmental hazards as an area of concern for forensic nurses, few actually work in this field. This study presented an opportunity to bring more forensic nursing expertise to the area of environmental contamination.

1.5 Assumptions

The following assumptions were made:

1. In an interview setting participants would truthfully reveal their experiences and feelings about environmental contamination and the role of nurses.
2. Through a written survey participants would be able to express their opinions about environmental contamination and nurses.

1.6 Significance of the Study

This section discusses four major reasons why this research was significant: the level of national public concern regarding environmental contamination; a lack of public trust concerning environmental information; an anticipated shortage of public health nurses; and the opportunity to expand the role of forensic nurses.

Public Concern

Environmental surveys have consistently shown that environmental contamination is an important concern for Americans. The 2009 Gallup Environmental Survey (Saad, 2009) showed that over 80% of the respondents to the telephone interview (land-line and cell phone users) worried a ‘great deal’ or a ‘fair amount’ about pollution of drinking water, pollution of rivers, lakes, and reservoirs, contamination of soil and water by toxic waste, and maintaining a fresh water supply. Seventy-six percent (76%) worried a ‘great deal’ or a ‘fair amount’ about air pollution. Pollution of drinking water caused the greatest concern. Although the level of substantial concern about most of the issues has declined since 2000, concern about maintaining a fresh water supply has increased significantly. It is reasonable to assume that if a general survey of Americans revealed such worries; individuals living in communities that have been contaminated also have substantial environmental health concerns.

Lack of Government Trust

Americans have indicated a lack of trust in government agencies which are charged with protecting the environment. When asked who they would trust to protect the
quality of the environment in this country in a 2005 Gallup survey (Carlson, 2005), the pollsters found that only 22 percent of the respondents put a ‘great deal’ of trust in the EPA and only 16 percent put a ‘great deal’ of trust in state environmental agencies. Compared to results for the same questions in 2000, the level of trust has eroded for the EPA and state agencies. This broadly points to the possibility of addressing environmental health concerns through organizations which are not affiliated with governmental agencies. Other researchers have documented significant levels of distrust in environmental health information produced by government sources, and the possible role of nurses as advocates for residents (Clark, Barton, & Brown, 2002). This public skepticism may be ameliorated with nurses helping to monitor and enforce compliance with regulations. The public may be receptive to forensic nurses as their environmental health care providers.

Shortage of Public Health Care Providers

It is widely presumed that environmental health issues mainly lie within the domain of public health workers. Of almost 200,000 identified public health workers, nurses make up the “largest identified professional group” (Gebbie, Merrill, & Tilson, 2002). However the Association of State and Territorial Health Officials (ASTHO) stated that 30 out of 37 states have reported public health nursing as the field that will be most affected by workforce shortages in the future (2004); the number of public health nurses decreased from 39 percent of the public health workforce in 1980 to 17.6 percent in 2000. In addition, aging and retirement trends for registered nurses will have a drastic effect on the public’s health. The average age of the public health workforce is 46.6 years, and retirement rates are forecast to reach 45 percent of the workforce by 2011 (ASTHO,
Moreover, in 2008, and again in 2010 the Association of Schools of Public Health forecasted that by 2020 the United States will experience a shortage of more than 250,000 public health professionals. This shortage of public health experts will make it more difficult to monitor and track disease and environmentally induced problems. It also highlights the need for more environmental health care professionals. The shortage could be ameliorated by forensic nurses, resulting in an increased number of nurses capable of providing health care to communities that need it.

Expanded Role for Forensic Nurses

This study provided an opportunity for expansion of forensic nurses’ roles, and advancing the forensic nurse profession, by exploring the needs of exposed individuals and communities, and asking participants how forensic nurses can help address these needs. The study was also important because it provided specific ways that forensic nurses can move beyond their traditional roles as sexual assault examiners and legal nurse consultants. Information gained from this study can provide further understanding of how health care providers can intervene during instances of environmental contamination, in ways that have not been previously understood. Nurses can also use the information from this study to act as advocates for communities in need. Results of this study can serve as a springboard for future community research.

1.7 Summary

The researcher collected quantitative and qualitative data as part of a cross-sectional triangulated study to investigate the self-identified needs of people who live in communities that have been exposed to environmental contaminants. The researcher also wanted to identify potential roles for forensic nurses in affected communities. This study
was significant because it addressed public concerns about contamination, corroborated prior studies which identified poor trust of government agencies by the public, provided an opportunity for forensic nurses to advance their profession, and addressed the anticipated healthcare shortage of health care providers who work in the community. Information gained from this study may also lead to further understanding of how health care providers can intervene during instances of environmental contamination, and is a springboard for future community research.
Chapter 2

Review of the Literature

The literature review for this study focused on environmental health, forensic nursing, and environmental contamination. Combinations of the words, ‘environment’, ‘contamination’, ‘community’, 'epidemiology', 'forensics', 'justice', ‘health’, 'nursing', ‘pollution’, ‘poverty’, 'race’, survey', and ‘assessment’ were used to search Medscape, PubMed, Google Scholar, Health and Psychosocial Instruments (HAPI), and CINAHL for relevant information. Environmental health websites including PubHub, EnviRN, e-commons, the Right-to-Know Network, the Environmental Justice Resource Center, Health Care Without Harm, and the National Environmental Health Organization (NEHO) were also investigated. No searches yielded results for the combination of 'environmental forensics' and 'nursing', or 'epidemiology' and 'nursing'.

Websites for organizations sponsored by the federal government such as the Agency for Toxic Substances and Disease Registry (ATSDR), the National Institute of Health (NIH), the Environmental Protection Agency (EPA), the National Institute of Environmental Health Sciences (NIEHS), the Centers for Disease Control and Prevention (CDC), the Institute of Medicine (IOM), and the National Academies Press (NAP) were investigated as well. The ATSDR, an agency within the HHS, conducts public health assessments of waste sites, performs health consultations concerning specific hazardous substances, responds to emergency releases of hazardous substances, conducts applied research in support of public health assessments, develops and disseminates information, and provides education and training concerning hazardous substances. The NIH conducts and supports medical research. The EPA provides research and education. The NIEHS,
an agency of the HHS and NIH, conducts research which is used to understand how environment influences the development and progression of disease in humans. The IOM is an independent not-for-profit organization that functions as an arm of the National Academies, and provides independent advice on public health issues. The National Academies Press publishes reports issued by the IOM and other scientific organizations that are under Congressional charter and which are authorized to give independent advice to the federal government.

2.1 Theoretical Framework

Dixon and Dixon’s Integrative Environmental Health Model (2002) was the conceptual framework for this study. The model uses a deductive approach, and interrelates four broad domains of environmental concerns; the physiological domain, vulnerability domain, epistemological domain, and health protection domain.

The physiological domain concerns processes through which environmental agents affect individuals. The major elements of this domain are the agent, exposure, incorporation, and health effects. Agent refers to the potential cause of disease. Exposure refers to the intensity and amount of time that an individual is in contact with the agent. Incorporation refers to the accumulation of foreign substances in the body. Health effects are the results of the first three physiological elements on the body.

The vulnerability domain relates to individual and community characteristics that can cause changes in the individual after exposure to environmental agents. Individual characteristics include gender, race, age, pregnancy status, and nutritional status. Community characteristics include demographic data, cultural characteristics, location of residence, and even public policies. The human effects of environmental contaminants
vary depending upon several factors including the duration of exposure, the route of exposure, and the vulnerability of the individual (including age, gender, and prior health condition).

The epistemological domain focuses on how individuals and communities come to know about the effects of environmental agents on health. This domain involves both personal thought and social knowledge. Personal thought may be intuitive or it may involve a pursuit of knowledge such as reading about the topic or asking experts. Social knowledge incorporates shared assumptions of the problem; a mutual understanding about what is true, and a mutual belief about who is responsible. Although personal thought and social knowledge may actually be contrary to what scientific evidence has demonstrated to be true, the individual may remain unconvinced, and retain his or her own beliefs, thus leading to contentious relations between the community, scientific experts, and government agencies.

The health protection domain which focuses on what people do about the environmental exposure is comprised of three elements: concerns about environmental health, a belief that something can be done to address the issue, and actions that can be taken individually or collaboratively to protect the individual and community.

The Integrative Environmental Health Model dovetails with this study's areas of interest. Harnish, Butterfield, and Hill (2006) have successfully used the model in their qualitative study of rural parents’ perceptions of environmental risks. In a telephone conversation with Dr. Jane Dixon, she fully supported this researcher's use of the model for this proposed research, and stated that the model is an appropriate fit (Robinson, personal communication, November 18, 2008).
2.2 Brief History of Environmental Contamination in the United States

Environmental contamination in this part of the world has been documented as early as the 1700s. This section gives a brief history of contamination in this country. Although contamination cuts across many fields of interest including occupational health, public health, and conservation, this section will primarily focus on the social, political, and legal aspects of environmental contamination as it has affected communities.

1739 – 1769. Benjamin Franklin demanded greater sanitation in the colonies. Franklin was very concerned about the need for clean drinking water, especially in Philadelphia. He also viewed the issue in the larger context of public rights versus private rights; the rights of the citizens versus the rights of private enterprises. Franklin and his neighbors petitioned the Pennsylvania Assembly to ban waste dumping, and to remove tanneries from Philadelphia's commercial district, claiming that dumping and tanneries produced foul smells, lowered property values, caused disease, and interfered with fire fighting efforts. The polluters complained that their rights are being violated, but Franklin argued for "public rights” (Tri-County Health Department, 2011).

1832 - 1849. First cholera epidemic in New York. This outbreak bolstered support for using the Croton Aqueduct system to bring clean upstate water to New York City (City University of New York, 2011). This project, completed in 1842, led to the phasing out of private and neighborhood wells that were often polluted with human and animal waste. In June 1849 cholera again struck New York City,
killing 5,071 out of a population of 500,000. The disease hit hardest in the poorest neighborhoods, particularly the slum known as Five Points, where African-Americans and poor immigrant Irish Catholics lived in overcrowded, unsanitary conditions. Politicians and citizens called for environmental reform. There was also increased recognition that there should be sewers, and that pigs and other livestock should be banished from city streets. One roundup moved over 20,000 pigs north to the upper wards. Still, with over 200 slaughterhouses and more than 375,000 animals slaughtered per year, sanitation remained inadequate. By 1854 John Snow, a British physician, linked cholera with contaminated water (Snow, 1854/1936). In 1883 the bacterium, *Vibrio cholera*, was discovered to be the agent that caused the gastrointestinal disease (Wilford, 2008).

1864. Sanitary conditions in New York improve. A group of New York City physicians began to survey the sanitary conditions in the city. Their efforts inspired a voluntary group of wealthy New Yorkers concerned with city governance to create a Council of Hygiene and Public Health and to underwrite a full survey of the city. In 1865 the Council produced a report that remains a landmark in the history of public health for its systematic approach towards studying the urban environment, and for its motivating principle that a city's moral and economic prosperity was intimately tied to its residents’ physical well-being (City University of New York, 2011). The report surveyed sanitary conditions ward by ward, and produced over three hundred pages of descriptions describing the poor conditions in which New Yorkers lived. The report solidified the link between sanitation and public health, and concluded that nothing short of
a major overhaul of the city’s sanitary policies would avert recurrent crises. The Metropolitan Board of Health grew in responsibility in the late-nineteenth century and continued advising on all sanitary matters in the city. Ultimately, sanitation became a progressive idea in the city.

1851. United States Congress enacted the Shipowner's Limitation of Liability Act to limit liability in the event of accidents such as oil spills. The purpose of this statute was to allow a shipper to limit his liability to the 'post-accident' value of a vessel and its freight. This act encouraged the growth of the shipping industry, because when accidents occurred liability would not exceed the value of the shipper’s investment; the value of the vessel (Limitation of Shipowners Liability Act, 1851).

1869. Ellen Swallow Richards, the first woman to study at MIT, began collecting thousands of water and food samples for the new Massachusetts State Board of Health. In 1887 she began looking for contamination in Massachusetts’ inland bodies of water. The waters were contaminated from industrial and municipal waste. Richards’ work led to the first water quality initiative in the United States, and the nation’s first modern municipal water treatment plant was built in Lowell, Massachusetts. Richards' research led to Massachusetts factory and food inspection laws; the first in the nation. She was also involved in the development of sanitary sewer treatment systems (Bowden, 1997).

1871- 1920. Chicago’s waste disposal issues were revealed and addressed. Chicago’s unusual method of wastewater disposal resulted from the city’s
location at the juncture of Lake Michigan and the Chicago River. Since the city’s inception the lake had supplied water for the city. Beginning in the 1850s on an informal basis, and in 1871 on a formal basis, Chicago flushed its wastewater into the Mississippi River drainage system by reversing the flow of the Chicago River. After the Great Fire of 1871, much of the debris from the fire was dumped into Lake Michigan as landfill, forming the underpinnings for what are now Grant Park, Millennium Park and the Art Institute of Chicago. With continued growth, sewage treatment became necessary to conserve the lake water quality. As a result, the typhoid death rate fell by almost 80 percent, and there were similar decreases for other waterborne diseases. Within 10 years, however, it was clear that the waterways were too small to handle the growing volume of domestic and industrial wastes. During the 1920s, the city began to construct a major treatment works that became the foundation of its wastewater strategy. The U.S. Supreme Court limited the annual average net diversion from Lake Michigan to successively lower levels over an eight-year period. This decision reinforced the district's shift from a strategy based on open sewers to one based on wastewater treatment. The Calumet sewage treatment works began operations in 1922, followed by the North Side works (1928), the West Side works (1931), and the Southwest works (1939). By 1970 Chicago had the world’s largest system of wastewater treatment facilities in the world (Cain, 1991).
1907-1915. Air pollution lawsuits filed the state of Georgia against the Tennessee Copper Company in the United States Supreme Court caused limitations to be placed on the amount of sulfur and other chemicals that emerged from Copper Basin smelters in Tennessee. The fumes were destroying forests and orchards, and sickened Georgians who lived just over the border. The state of Tennessee refused to act against the copper companies and disputed Georgia’s right to interfere. Georgia sued in 1907 and won in 1915 (Georgia v. Tennessee Copper Co. and Ducktown Sulphur, Copper & Iron Company, 1907).

1914 -1960. The Army Corps of Engineers began pollution surveys of streams and harbors. Reports showed an accumulation of heavy damage from oil dumping, mine runoff, untreated sewage, and industrial waste. The Corps extensively investigated acid mine run-off in the Ohio River. Some 250 public officials and industry executives were consulted about their water use and the remedies for acid deposition from functional or abandoned mines. One of the problems with increasing stream acidity was the great additional expense in filtering drinking water, and the corrosion and scaling of city water pipes, which were expensive for cities and industry to maintain. In 1921 the Corps began an investigation of oil pollution in harbors. By the late 1960s, the Corps had become a leading environmental preservation and restoration agency. It now carries out natural and cultural resource management programs, and regulates wetlands activities. In addition, the Corps assists the military services in environmental management and the restoration at former and current military installations (U.S. Army Corps of Engineers, 2007).
1921. The U.S. Supreme Court allowed New Jersey to dump sewage into New York Harbor. New York brought suit against New Jersey and the Passaic Valley Sewerage Commissioners to stop the execution of a project which intended to send sewage from the Passaic Valley through a sewer system, and discharge it into New York Harbor. New York claimed that currents and tides would carry the sewage into the Hudson and East Rivers and ultimately contaminate New York’s wharves and docks to the extent that its waters would be harmful for bathing, recreation, and commerce. In addition, the sewage would poison fish and oysters making them inedible. The federal government originally opposed New Jersey’s plan, but withdrew its opposition when the New Jersey Legislature agreed to allow the federal government to inspect the sewer system, and also agreed to comply with specifications concerning the sewer’s construction, maintenance and operation. The Supreme Court decided that New York had not provided sufficient evidence to show that given the modifications, the proposed addition of sewage would cause harm to New York citizens, commerce, or fish. (New York v. New Jersey, 1921).

1924 -1990. First U.S. Oil Pollution Act (43 Stat. 604) passed in Congress. The act prohibited discharge of oil from any vessel within three miles of U.S. coastal waters, except by accident. The Oil Pollution Act of 1961 (P.L. 87-167) extended the regulation of the 1924 act by forbidding the discharge of oil in any waters within 50 miles of the U.S. coastline. In 1980 the Oil Pollution Act of 1961 was superseded by the Act to Prevent Pollution from Ships of 1980 (P.L. 96-478), which forced ships in U.S. waters, or U.S. ships anywhere, to follow the pollution
prevention guidelines established by the International Convention for the
Prevention of Pollution from Ships of 1973. The Oil Pollution Act of 1990 (OPA)
(P.L. 101-380 104 Stat. 484) established liabilities for polluters and recovery
methods for areas affected by oil spills. The purpose of the OPA was to "amend
[section] 311 of the Clean Water Act to clarify federal response authority for oil
spills, increase penalties for spills, require tank vessel and facility response plans,
and provide for contingency planning in designated areas." The new legislation
was enacted soon after the Exxon Valdez, a giant oil tanker, struck Bligh Reef in
Prince William Sound of Alaska in March of 1989, spilling over eleven million
gallons of crude oil. The spill threatened birds, fish, whales, the shoreline, and the
livelihoods of commercial fishermen and Native Americans who depended on the
Sound for earning their incomes (EPA, 2011a). Although Congress was in favor
of the legislation, opposition came from the oil industry executives who were
concerned about the costs of implementing the OPA's stricter requirements. The
act enabled the Environmental Protection Agency to better regulate, prevent, and
respond to devastating oil spills.

1926. The Bureau of Fisheries in the United States Department of Commerce
reported on the effects of water pollution and its relation to the fisheries. The
discussion between state and federal officials and industry representatives
included concerns about the effects of oil waste, industrial waste and sewage on
migratory fish.
1932. First lawsuits filed by workers and families affected by Gauley River/Hawks Nest mine disaster in West Virginia. In 1927 Union Carbide hired a contractor to divert the New River through a 3-mile tunnel under the Gauley Mountain in order to generate electricity for a plant downstream. When silica was found underground, the contractors instructed some of the 5,000 workers to mine the mineral. Most of the men were African-American migrants. They were not given any masks or breathing equipment to use while mining, resulting in their exposure to silica dust (Cherniack, 1986). As a result of the exposure many of the men developed silicosis; a lung disease characterized by inflammation and scarring. An estimated 476 men died and 2,000 were sickened. Most of the bodies were buried without identification, and relatives were not notified. In compensation, families of workers who had developed lung disease received $600. After newspaper writers reported the story, and it was nationally publicized, state and federal legislators were determined to pay more attention to occupational hazards. By the end of 1937, 46 states had enacted laws covering workers afflicted with silicosis (Suburban Emergency Management Project, 2007).

1937. Smog in St. Louis, Missouri. By 1937 St. Louis doctors realized the harmful effects of the smog that had plagued the city for years. They recognized the relationship between the smog and the high incidence of nose and throat ailments in that city. YMCA workers also campaigned for smoke abatement, because among other reasons, their laundry bills were higher than the laundry bills of YMCA workers in Philadelphia and Boston (Time Magazine, 1937).
Property owners refused to paint their buildings or paper walls because the smoke dirtied the walls so quickly. Merchants had to keep their store windows lighted, and motorists used their headlights until noon on winter days. The doctors insisted that Mayor Dickmann sign an ordinance in the interest of public health, which would require all users of soft coal in St. Louis to install more efficient furnaces. Coal dealers would have to "wash" small-sized coal and hand-pick chunks to prevent sulfuric acid and other products of burnt sulfur from escaping into the atmosphere. Locomotives would only be permitted to belch smoke in St. Louis for six minutes in any hour while getting up steam in a roundhouse, and for only one minute while on open tracks. Although the mayor signed the ordinance, Henry Horner, the governor of Illinois did not approve of the legislation. He wrote to Mayor Dickmann:

Before you take final action on the ordinance before you, may I ask you fully consider the unnecessarily drastic effect which its enforcement will have on the coal industry in 15 southern Illinois counties, adjacent to St. Louis, employing 29,000 wage earners, and sending 4,000,000 tons of coal annually to your city, which is the natural market place for these counties (Time Magazine, 1937).

1948. Donora, Pennsylvania smog incident in October, 1948. The smog emergency in Donora was an example of the effect of environmental toxins on human health. Due to a massive temperature inversion, fluoride gasses emitted from the town’s steel mills, coke and zinc furnaces, were trapped over the Monongahela Valley. Cold air from the surrounding hilltops prevented the gasses from rising, causing an impenetrable fog over the town. Although it was virtually
impossible to see ten feet away due to the thick, black fog, residents continued to go to work, school children continued to play outdoors, and the mills and factories continued to spew out more fumes. Five days later, the fog began to subside, but only after the mills had been shut down. By that time 20 people had died of respiratory ailments, and 6,000 others (half the town’s population) had become ill. Although studies did not definitively document the long-term effects on the survivors, there are indications that many suffered respiratory and cardiac problems over their lifetimes (Davis, 2002).

1948. The Water Pollution Control Act of 1948 (Ch. 758; P.L. 845) was the first major United States law to address water pollution. The Act intended to eliminate or reduce the pollution of interstate waters and tributaries, and to improve the sanitary condition of surface and underground waters. The purpose was to make the waters safe for drinking, propagation of fish and aquatic life, recreational purposes, and agricultural and industrial uses. As public awareness concerning the necessity for clean water grew, the law became known as the Clean Water Act and was frequently amended. The 1977 amendment (P.L. 95-217) authorized the EPA to implement pollution control programs for industries; made it unlawful for anyone to discharge any pollutant from a point source into navigable waters without a permit; and funded the construction of sewage treatment plants.

1955 -1967. The Air Pollution Control Act of 1955 (P.L. 84-159, ch. 360, 69 Stat. 322) was the first federal legislation involving air pollution. This Act provided funds for federal research in air pollution. The Clean Air Act of 1963
(P.L. 88-206) was the first federal legislation regarding air pollution control. It established a federal program within the United States Public Health Service and authorized research into techniques for monitoring and controlling air pollution. In 1967, the Air Quality Act (PL 90-148) was enacted in order to expand federal government activities. In accordance with this law, enforcement proceedings were initiated in areas subject to interstate air pollution transport. As part of these proceedings, for the first time the federal government conducted extensive ambient monitoring studies and stationary source inspections. The Air Quality Act of 1967 also authorized expanded studies of air pollutant emission inventories, and air control techniques. The Clean Air Act of 1990 (P.L. 101-549) amended the prior Clean Air act and allowed states to establish deadlines for each contamination source depending upon the severity of its pollution. The Act also raised automobile emissions standards and set a definite timetable for reductions. Through this legislation the government encouraged the use of low-sulfur fuels as well as alternative fuels as a means of reducing sulfur dioxide (the main component of acid precipitation). The government also tried to prevent ozone depletion by calling for a reduction in the amount of chlorofluorocarbons (CFCs).

1959. California became the first state to impose automotive emissions standards. Automakers fought mandatory use of emission control devices, and already had a long history of avoiding emissions and gasoline restrictions. In 1924 five refinery workers died at Standard Oil (Exxon) refinery while they were making tetraethyl lead gasoline additive (Kovarik, 1994). It was also reported that seven other workers had died previously at General Motors and DuPont plants. New York and
other cities and states banned leaded gasoline, but this was overturned. In 1970 the president of General Motors, Edward Cole, promised "pollution free" cars by 1980 and urged the elimination of lead additives from gasoline in order to allow the use of catalytic converters (General Motors, 2011). In February 1972 the EPA announced that all gasoline stations had to sell "nonleaded" gasoline, but did not set standards until 1973. The first EPA clean fuel program established standards in 1973 that gradually reduced the amount of lead in gasoline. The lower lead content reduced health risks in two ways: first by reducing direct lead emissions from gasoline-fueled vehicles; and second by enabling use of advanced after-treatment technologies such as catalytic converters that control other kinds of pollutants in vehicle exhaust. By June 1979, nearly half of all U.S. gasoline was unleaded. The Clean Air Act Amendments of 1990 and EPA regulations banned lead in gasoline after 1995 (EPA, 2011b). The lead in human blood had declined by 78 percent from 1978 to 1991 during the leaded gasoline phase-out (CDC, 1997; Pirkle et al., 1994). An American Academy of Pediatrics (2005) study showed a direct relationship between lead exposure and IQ deficits in children. In February 2007 the EPA (2007) reduced the level of benzene allowed in gasoline to 1.3 percent. The agency anticipated that this would result in an 80 percent decrease in 1999 toxic emissions levels by the year by 2030.

1962. *Silent Spring* was written by Rachel Carson (1962). This widely read book documented the harmful effects of pesticides on the environment, particularly on birds. Carson accused the chemical industry of spreading disinformation, and public officials of accepting industry claims uncritically. The book caused
widespread public concerns about pesticides and pollution of the environment, and facilitated the ban of the pesticide DDT in 1972 in the United States. The book is often seen as turning point in the public’s desire to protect the environment.

1969. The Cuyahoga River in Ohio burst into flames. The Cuyahoga River stretches for about 100 miles through northeast Ohio. At one time it was one of the most polluted rivers in the United States, because it had become a dumping ground for companies that operated along its shores (U.S. Dept. of the Interior, 2011). The river died; in some areas the oxygen concentration was so low that it was virtually impossible for any animal or plant life, except for algae, to live. There was so much gasoline, oil, paint, and metals in the river that it was devoid of fish from Akron to Cleveland. In addition, there were no laws or rules concerning what could be dumped in the river. Akron and Cleveland dumped sewage in it, and steel and automobile industries caused the river to become one of the worst rivers in Ohio's history. There have been at least thirteen fires on the Cuyahoga River, the first occurring in 1868. A large river fire in 1952 caused over $1 million in damage to boats and a riverfront office building. Fires erupted on the river several more times before a river fire in 1969 helped spur attention to water pollution control activities. This resulted in the Clean Water Act, Great Lakes Water Quality Agreement, and shortly thereafter, the creation of the federal EPA and the Ohio Environmental Protection Agency (EPA, 2011c).
1969. Santa Barbara oil well blowout. The oil well blowout off the Santa Barbara coast of California on January 28th, spilled 235,000 gallons of oil, and covered 30 miles of beach with tar by the tenth day. Oil, pushed by currents in many directions, eventually covered hundreds of square miles of Santa Barbara Channel waters. Ultimately forty miles of mainland coastline were impacted by the spill. Oil also washed up onto the shores of Anacapa, Santa Cruz, Santa Rosa, and San Miguel Islands and remained in some locations for months following the spill. A class-action lawsuit awarded nearly $6.5 million to owners of beachfront homes, apartments, hotels, and motels. Commercial and recreational boat owners and nautical suppliers were awarded $1.3 million for property damage and loss of revenue. Commercial fishers temporarily lost access to some fisheries. Union Oil also settled a lawsuit filed by the State of California, County of Santa Barbara, and the Cities of Santa Barbara and Carpinteria for $9.5 million for loss of property. Many mammals, birds, fish, and other sea life in the area were impacted by the spill. The California Department of Fish and Game reported that at least 3,600 birds died. The accident spurred legislation to regulate all future oil and gas leasing. Also after the blowout, leasing in California waters required a formalized environmental public review process under the newly enacted National Environmental Policy Act and the California Environmental Quality Act (County of Santa Barbara Planning And Development Energy Division, 1969).

1969. National Environmental Policy Act passed in Congress. The purpose of the Act (P.L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970) was to
encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

The Council on Environmental Quality gave the President advice on environmental issues and reviewed environmental impact statements. These statements are now required of all federal agencies planning projects with major environmental ramifications. The National Environmental Policy Act was amended in 1975 (P. L. 94-52, July 3, 1975), and 1982 (P. L. 97-258, § 4(b), Sept. 13, 1982).

1970. The first nationwide Earth Day celebration was held on April 22nd. The day was organized by Gaylord Nelson, a Democratic senator from Wisconsin. For years Senator Nelson had tried to interest his Washington colleagues in focusing on environmental concerns. By 1970 he decided that with increasing public interest in conservation, instead of expecting legislators to take the lead, a movement could be led at the grass roots level by mobilizing individuals and groups in their own communities. It is estimated that 1 in 10 Americans participated in the first Earth Day, drawing extensive attention from the media (Nelson Institute for Environmental Studies, 2011).

1970. The EPA was established under President Nixon’s administration. The EPA brought together 15 key federal programs including the Health Education and Welfare National Air Pollution Control Administration and the Department of Interior's Water Quality Administration (Wiseman, 1985).
1972. Flooding along the 17-mile Buffalo Creek in West Virginia killed 125 people and left 4,000 homeless (West Virginia State Archives, 2011). The flooding resulted from careless and unethical strip mining practices that resulted in a buildup of water that broke through dams. The Pittston Coal Company was successfully sued by the State of West Virginia, and survivors of the flood.

1974. Congress passed the Safe Drinking Water Act (42 U.S.C. §300f et seq.). This act authorized the EPA to set minimum standards for actual or potential drinking (tap) water that is above ground or underground. In 1986 the act was amended (P.L. 99-359; 100 Stat. 642) to set standards for 83 contaminants. It also banned the use of lead pipes and solder in new drinking water systems. Another amendment in 1996 (P.L. 104-182, 110 Stat. 1613) mandated that communities be informed via annual reports about what is in their drinking water, and how the water is treated. Citizens also have the right to know the level of microbial contaminants in their water, and the possible health effects.

1976. Congress passed the Toxic Substances Control Act (15 U.S.C. §2601) which required testing for health and environmental effects prior to a chemical’s manufacture or distribution. The law also allowed EPA enforcement through civil proceedings.

1978. Love Canal Homeowners Association was formed by Lois Gibbs. Love Canal, a ditch that initially was supposed to connect the Niagara River to Lake Ontario, ran through a middle class community in Niagara Falls, New York. In 1978 it was discovered that since 1920 the Canal had been the site of toxic waste
dumping by chemical companies, the City of Niagara Falls, and the United States Army. By itself, the Hooker Chemical Company was responsible for burying thousands of tons of chemicals in the canal. Over 82 different compounds were detected; 11 of them were known carcinogens (Beck, 1979). The New York State Health Department and Environmental Protection Agency ultimately acknowledged that these chemicals had seeped into homes, schools, playgrounds, and other community sites, and that the community was unsafe for habitation. Residents showed increased incidences of asthma, stillbirths, miscarriages, birth defects, burns, rashes, kidney disease, headaches, and central nervous system disorders (EPA, 2009a). Lois Gibbs, the founder of the Love Canal Homeowners Association, fought to have the residents’ illnesses acknowledged by the state and federal governments and ultimately to have families relocated at government expense (Gibbs, 1998). According to Gibbs, some of the barriers initially faced by the community were a lack of medical information, lack of access to health professionals who could help them interpret complex medical reports, inexperience in conducting health surveys, and a lack of knowledge about the formation of public policy and the legal system. The residents were also unprepared for the physical and emotional toll it took on their families. As a result of relocating the families, and demolishing contaminated homes, the community of Love Canal was destroyed. However Gibbs’ efforts led to the creation of the U.S. Environmental Protection Agency's "Superfund," which was used to locate and clean up toxic sites throughout the United States.
1979. Three Mile Island nuclear power plant lost coolant and partially melted down. Due to human error, component failure, and design errors, there was a meltdown of one of the cores on March 28, 1979 (United States Nuclear Regulatory Commission, 2011). Although very little radiation escaped from the facility, and there were no documented injuries or fatalities, the accident was a setback for the nuclear power industry which was already under fire for safety problems in other plants, construction cost overruns and lack of planning for radioactive waste disposal. The event also galvanized the anti-nuclear movement in the United States, and led to more regulations concerning planning and procedures at nuclear facilities. There was also increased urgency about preparing communities for emergency evacuations. It took 13 years (from 1980 until 1993) and over a billion dollars to defuel the faulty reactor, and to decontaminate the radioactive water.

1979. Bean v. Southwestern Waste Management, Inc. (1979). This lawsuit was one of the first environmental justice cases in the United States. The lawsuit was filed on behalf of Houston’s Northeast Community Action Group, an African-American organization in Warren County, North Carolina. The group was requesting an injunction against a waste facility that had been granted a permit to operate in their neighborhood. The plaintiffs said that the siting was discriminatory. The judge in denying the injunction ruled that although the action group had shown that irreparable harm would occur from the facility, the group had not proven that the siting was discriminatory. His ruling provoked widespread protests and arrests, and led to studies by the federal government and civil rights
organizations to document widespread discriminatory practices in waste management (Bullard, 2011). The Warren County protests provided the impetus for an U.S. General Accounting Office study that revealed that although African-Americans made up only 20 percent of the region's population, three out of four of the off-site, commercial hazardous waste landfills in the South were located in predominantly African-American communities. In 1982 it was determined that the Warren County site had been used to dump toxic organic pollutants such as polychlorinated biphenyls (PCBs). In protesting the PCB-laden landfill, environmental justice activist Dr. Benjamin Chavis coined the term “environmental racism”. By 1990, North Carolina had spent over $25 million to cleanup and detoxify the landfill (Ferruccio, 2010).

1980. Congress created the ATSDR to investigate hazards and exposures; conduct research to identify hazardous substances; and to protect the public from exposure to environmental hazards (ATSDR, 2009a). The ATSDR has profiled over 150 substances that have affected Americans or could eventually affect them. Some substances may cause relatively minor effects, while others may cause more serious harm. Biennially the Environmental Protection Agency (EPA), in conjunction with the ATSDR publishes a list (in order of priority) of substances most commonly found at federally recognized contaminated sites, that pose the most significant potential threat to human health due to their known or suspected toxicity and potential for human exposure.
1980. The Comprehensive Environmental Response, Compensation, and Liability Act (1980), also known as CERCLA or Superfund was created in response to the contaminations at Love Canal. CERCLA provided money to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through CERCLA, EPA was given power to seek out those parties responsible for any release and assure their cooperation in the cleanup. EPA cleans up orphan sites when potentially responsible parties cannot be identified or located, or when they fail to act. CERCLA has created a National Priorities List (NPL) which identifies over 1,200 hazardous waste sites in the United States and its territories, which are eligible for long-term remedial action due to releases or threatened releases of hazardous substances (EPA, 2011d). These waste sites have high Hazard Ranking scores based on the migration of contaminants through a combination of ground water, surface water, soil exposure, and air migrations. To be eligible for inclusion on the NPL not all pathways of contaminant migration need exist.

Through various enforcement tools, EPA obtains private party cleanup through orders, consent decrees, and other small party settlements. EPA also recovers costs from financially viable individuals and companies once a response action has been completed. By law, the Superfund was initially designed to spend $1.6 billion over five years and was funded through new taxes on the chemical industry. In 1986, the Superfund budget was expanded to $9 billion. A 1992 report found that only 84 of the 1,245 sites designated by the EPA as the most
polluted had been successfully cleaned up. There are currently over 1,287 active
Superfund sites, and 66 proposed sites (EPA, 2011d).

1982. EPA confirmed contamination of Times Beach, Missouri. Times Beach
was a one square mile town in Missouri. An EPA study confirmed that dangerous
levels of dioxin had threatened the health of residents. Dioxin is a manufacturing
byproduct that has been linked to cancer, birth defects and liver damage (WHO,
2011b). Very high exposure occurred when dioxin was deliberately mixed with
waste oil and sprayed on Times Beach's unpaved roads to control dust; the small
town had 16 miles of dusty roads. The contamination problem was exacerbated by
the town’s location in a flood plain along the Meramec River (EPA, 2010a).
Between 1983 and 1985, the federal government spent $33 million to buy the
homes and properties of 2,400 people in Times Beach. After months of
uncertainty and fear about their health and whether they would be able to receive
adequate compensation for their homes, the residents were relocated, the town
was demolished, the dioxin-laced soil was thermally cleaned of contaminants, and
a state park was built on the land (Leistner, 1985).

1983. Black residents in Triana, Alabama settled a $25 million lawsuit against
the EPA, the Department of Defense, and Olin Chemical Company concerning
DDT from Redstone Arsenal Army base (EPA, 1983). The army base was
supposed to be monitored by the Tennessee Valley Authority (TVA). The TVA is
a federally owned corporation created by congressional charter in May 1933, to
provide navigation, flood control, electricity generation, fertilizer manufacturing,
and economic development in the Tennessee Valley. In 1979 the agency released a report showing extensive DDT pollution in the Huntsville Spring Branch near the small town of Triana, Alabama. The TVA study showed that fish taken from the Spring Branch had DDT amounts as high as 200 parts per million; 40 times the federal limit. The presence of DDT in the water was linked to the Redstone Arsenal, located in nearby Huntsville, Alabama. The Redstone Arsenal was owned by the Army Corps of Engineers, but leased to the Olin Corporation from 1947 until it was closed in 1970. Olin, which manufactured and sold DDT to the Army and other companies for use as a pesticide, had been discharging their DDT-contaminated wastewater into the Huntsville Spring Branch. The DDT accumulated in the sediment along the Huntsville Spring Branch, and the water flowed through the mostly poor and predominately black town of Triana. Not only did the residents rely on fish for protein, but many of the residents sold the fish to earn a living. The fishermen’s blood showed highly elevated levels of DDT. Olin was required to clean up the DDT at its own cost. To oversee the cleanup of the Huntsville Spring Branch, a group consisting of EPA, TVA, U.S. Fish and Wildlife Service, the Department of the Army, and the State of Alabama, was established. Over the next ten years, they worked with Olin to clean up the areas surrounding the Redstone Arsenal. There was also a requirement that within ten years DDT levels in fishes from those waters would be reduced to normal levels.

1985. Beginning July 4, 1,350 cases of poisoning were reported from aldicarb pesticide in California watermelons. There were another 692 cases reported in
eight other states and Canada (CDC, 1986). This was the worst US outbreak of pesticide poisoning in history. In 2010 the EPA banned aldicarb (EPA, 2010b).

2000. Martin County, Kentucky sludge spill. On October 11, over 300 million gallons of thick, black coal slurry sludge was released when a Massey Energy Company impoundment dam collapsed in Martin County, Kentucky (U.S. Department of Labor, 2003). The sludge from coal mining flowed into the Big Sandy River’s Tug Fork and its tributaries. In some places the sludge was over five feet deep. The spill destroyed 100 miles of streams and killed millions of fish. It also contaminated the water supply for over 27,000 residents. This was one of the country’s worst environmental contaminations. Massey spent about $77.9 million on cleanup, and paid $3.25 million in fines to the state of Kentucky. There were also fines for violating the Clean Water Act.

2001. The Environmental Working Group (EWG) reported that sources of drinking water for more than seven million Californians and millions of others were contaminated with perchlorate, a chemical that in elevated levels can damage the thyroid gland, and which controls growth, development and metabolism. Fetuses, infants and children with thyroid damage may suffer mental retardation, loss of hearing and speech, or deficits in motor skills. At higher levels of exposure, perchlorate is known to cause cancer. Perchlorate, the main ingredient of missile and rocket fuel, had been detected in 58 California public water systems and in water or soil in 17 other states. Neither California nor the EPA had established any safety standards for perchlorate in drinking water. The
EWG proposed a maximum of 4.3 parts per billion, which was about 7.5 times more stringent than the EPA's proposed standard, and about four times more stringent than California's advisory level at that time. The EWG calculated that even at the EPA's proposed standard, formula-fed infants would have been exposed to between 7.5 and 2,000 times the safe level of perchlorate in drinking water (EWG, 2001).

2008. Coal ash flood at the Kingston Fossil Plant, near Knoxville, Tennessee on December 22. The plant is owned by the TVA. At the end of 2008 over five and a half million cubic yards of fly ash (a by-product of coal-burning) broke through an earthen dam, engulfed homes, and spilled into nearby rivers. This spill is now considered to be the largest environmental disaster of its kind in the United States (Dewan, 2008). Fly ash is known to contain toxic substances such as arsenic, lead, selenium, and thallium (Evangelou, 1996), which can cause birth defects and nervous system disorders (National Library of Medicine, 2008). Preliminary air testing by the Environmental Protection Agency found highly elevated levels of arsenic in the area (EPA, 2010c). Within days, homeowners, and environmental groups such as Greenpeace, Earthjustice, and the Southern Alliance for Clean Energy filed suit against the TVA accusing it of negligence and failing to protect the public and the water against harmful products. Although most of the 300 acres of sludge belonged to the TVA, nearby reservoirs and shorelines were impacted, and the agency bought 156 nearby properties that were already affected, or could potentially be affected. Cleanup continues at the site with sludge being dredged from surrounding rivers and transported to Alabama for storage. The lawsuits
continue, with displaced residents claiming that the TVA’s negligence in designing, building, and maintaining the plant caused them physical and emotional distress. They are also claiming that plant management violated state and federal regulations. The TVA maintains that it is immune from lawsuits because it was providing a public service. A federal judge has concurred (United States District Court Eastern District of Tennessee, 2011), and has allowed TVA’s request for a summary judgment. Punitive damages against TVA have been disallowed.

2.3 Individual and Community Characteristics

Prior to exploring the role of forensic nurses in environmental issues, it is important to understand the defining characteristics of individuals and communities that are exposed to environmental contaminants. This section reviews research related to characteristics that generally coexist with environmental contamination. Only studies of populations living within the United States who were exposed to contaminants existing in soil, water, and air were included. Although substances such as radon, cockroach debris, paint chips, or pet dander can affect human health, they and other residential contaminants were excluded from the literature review. The literature review focused on hazardous waste produced outside of homes, and which were not naturally-occurring (i.e. radon).

When considering the mode of transmission of the environmental hazards, many of the studies concerned air emissions, or respiratory disorders. One of the studies investigated water borne contaminants (mercury in fish), and two of the articles concerned lead contamination: one by ingestion of fish, the other by soil contamination.
Four of the articles were specifically concerned with facilities that treated, stored, or disposed of waste.

Geographically, six of the studies were concerned with data collected nationally, while others focused on a specific state or geographic area. Several of the researchers used census data albeit at varying population groupings. Some used county boundaries, while others analyzed data according to census tracts, census blocks, or zip codes.

The majority of the studies measured race/ethnicity and some measure of income as independent variables. The age of the research subjects varied according to the focus of the article. Several studies focused on children, others specifically focused on adults, and some did not specify their sample population by age. Many of the articles pertained to respiratory conditions such as asthma, or reduced lung volume. All of these asthma studies included children in the sample populations. Some studies investigated non-respiratory disorders such as cancer, systemic lupus erythematosus, birth defects, or pre-term births.

Extensive documentation confirms that there is a correlation between socioeconomic factors and the location of hazardous waste facilities. The approach toward considering the effects of the environment on humans, termed ‘environmental justice’ in 1994 (EPA, 2011e), refers to the concept that people should be treated equitably in regards to the development and enforcement of environmental laws and policies. No one group or community should bear a disproportionate share of any environmental impact, and race, income, social class or other discriminators should not determine who is exposed to environmental hazards.
According to the ATSDR (2011), the probability of living near a hazardous waste site is greater for individuals who live in mid-to-low income neighborhoods that have a higher proportion of minority residents. As a result, people in these communities are at higher risk for developing adverse health outcomes associated with exposure to potentially hazardous substances. For this reason social inequities such as poverty and racism are considered to be antecedents of environmental health. For example, non-white cancer research participants living in southern California households with annual incomes from $5,000 to over $100,000 were found to have increased risk despite their level of affluence (Morello-Frosch, Pastor, Porras, & Sadd, 2002).

Boer, Pastor, Sadd, and Snyder (1997) examined the relationship between race, income, and proximity to hazardous waste facilities. By studying socioeconomic data from 1990 national census data for 1,640 census tracts in Los Angeles County, they determined that working-class communities of color located near industrial areas are most affected by hazardous waste facilities. Downey (1998) studied race and income to understand which variable is a better predictor of toxic emissions distribution in Michigan. Using census data from 1990, the researcher determined that when comparing non-Hispanic whites and African-Americans, as household income increased, toxic emissions decreased. Also as the white/black ratio increased for a community, toxic emissions decreased. Faber and Krieg (2002) analyzed the impact of social and geographic distribution of contaminants that are potentially harmful to humans. They studied 1990 census data from 368 Massachusetts communities, and DEP and EPA data from hazardous facilities in and around those communities. They concluded that hazardous sites (i.e. landfills and transfer stations), and industrial facilities were
disproportionately located in communities with higher percentages of non-whites, and in working class communities that have relatively lower median household incomes.

Burger, Gaines, and Gochfield (2001) concluded that race was a predictor of environmental contamination. They interviewed 258 men and women who fished along the Savannah River, which flows through South Carolina and Georgia. Due to the amount of fish they ingested, black anglers of either gender were more likely to ingest mercury compared to white anglers. Two methods of examining risk were considered; hazard index, and estimates of how much and how often people of different body mass consume different species of fish. Hazard index is a measure of the risk to a pollutant. A hazard index of one indicates potential adverse effects from exposure (EPA, 2002). Blacks consumed more fish and had higher hazard indices than whites. Even at the median consumption, the hazard index for blacks exceeded that of whites regardless of gender. Almost half of the black fishermen ate enough Savannah River fish to exceed a hazard index of one.

Stretsky and Hogan (1998) also concluded that there was a strong positive relationship between race/ethnicity and proximity to contaminated sites. Using the 1990 census data for Florida, and EPA Superfund data, they found that blacks and Hispanics were more likely to live near Superfund sites. They also concluded however, that income and poverty were not predictors of Superfund site locations, but that the more affluent are more likely to live near Superfund sites in Florida.

American Indians and Alaska Natives were also found to be vulnerable to environmental exposure. Orr, Bove, Kaye, and Stone (2002) studied the relationship between major structural birth defects in racial/minority infants (n = 13,938 with birth
defects, control = 14,463 without birth defects) between 1983 and 1988, and the potential exposure of their mothers to contaminants in hazardous waste sites in California. In the case-control study infants were categorized into four racial/ethnic groups; black/African American, Hispanic/Latino, American Indian/Alaska Native, and Asian/Pacific Islander. Where mothers had been potentially exposed to hazardous waste, their infants were at a slightly higher risk for neural tube defects (OR=1.85, CI=95%). Of the four racial/ethnic groupings, American Indian/Alaska Native infants showed the strongest association between birth defects and potential exposure to hazardous materials (OR=1.19, CI=95%).

Davidson and Anderton (2000) examined the national distribution of hazardous waste sites in relation to income and race. They mapped 2,299 waste facilities governed by the Resource Conservation and Recovery Act (RCRA), and overlaid their locations with 61,258 census tracts across the United States according to 1990 census data. They determined that RCRA facilities were likely to be located in working-class neighborhoods that had lower percentages of minority residents, but were close to neighborhoods with a higher percentage of minority residents. Thus, although race was a factor, income and other socioeconomic indicators were greater factors.

A retrospective analysis of 1990 national census data investigated 15,083 industrial facilities that used at least one of 140 flammable or toxic substances, and the 2,333 counties that surrounded these facilities (Elliott, Wang, Lowe, & Kleindorfer, 2004). The analysis determined that between 1994 to 2000 counties with greater proportions of African-Americans tended to have slightly higher average incomes, and educational levels. These counties also had significantly greater incidences of poverty. In essence, these counties had higher degrees of income inequality. For counties where there
were heavily populated African-American communities, there are larger and more chemical intensive facilities, and a greater risk of accidents, such as spills, deaths, or injuries at those facilities (adjusted relative risk of accident = 1.9, 95% CI = 1.5 to 2.4).

Apelberg, Buckley, and White (2005) reached similar conclusions when they evaluated the differences in estimated cancer risk from exposure to air toxins in Maryland. Looking at data from the year 2000 for 1,210 census tracts, in relation to the EPA’s 1996 toxic air assessment, they found that reduced income and lower levels or education were greater predictors of the risk of cancer than race. Aligne, Auinger, Byrd, and Weitzman (2000) analyzed whether urban residence is an independent risk factor for childhood asthma, by retrospectively analyzing data from the 1988 National Health Review Survey for 17,110 children under the age of 17. They determined that poverty and urban residence were greater risk factors for asthma than race, and that race was not an independent predictor.

The lessened effect of race was also found in Gwynn and Thurston’s research (2001). They wanted to understand the effects of race and socioeconomic status in relation to the effects of air pollution. Through time-series regression analyses of data from 1,096 New York City hospital admissions for people complaining of respiratory problems (i.e. bronchitis/bronchiolitis, pneumonia, chronic obstructive pulmonary disease, or asthma), they concluded that although the data appeared to indicate that non-whites and Hispanics had higher relative risks for respiratory-based hospital admissions, when viewed by income, the poor/working poor (no insurance or Medicaid) had a higher relative risk, than higher income people (payment using private insurance or Medicare),
regardless of race or ethnicity. They also concluded that socioeconomic factors combined with being a racial minority tended to increase the risk of being affected by air pollution.

Hird and Reese (1998) found a positive correlation between being non-white or Hispanic and disproportionately high pollution levels. Applying multivariate analyses to 1998 national census data at the county level, they also found a strong positive relationship between population density, manufacturing activity, and pollution, and a strong negative relationship between political activity (as measured by voter registration), and pollution levels. Surprisingly, they also concluded that higher levels of pollution are found where the income is higher. They were unable to account for this relationship. However recognizing that the data was obtained at the county level, it is possible that analysis of the data for communities within counties would have shown different results.

Maantay (2007) used 2000 national census data at the block level, and EPA data concerning hazardous facilities to determine whether there was a geographic relationship between the locations that contribute to poor air quality and the residences of people hospitalized for asthma in the Bronx, New York. She concluded that for the years 1995 through 1999, adults and children living near business areas with high concentrations of toxic land use facilities were up to 66 percent more likely to be hospitalized for asthma, 30 percent more likely to be poor, and 13 percent more likely to be a minority. These results were statistically significant at 95% confidence intervals.

Ponce, Hoggatt, Wilhelm, and Ritz (2005) studied the relationship between pre-term births, variations in traffic-related pollution exposure, and socioeconomic status using 1990 Los Angeles census data for 37,347 pre-term babies born between 1994 and 1996. The findings demonstrated that low socioeconomic neighborhoods had the highest
percentage of preterm births, and the highest levels of traffic-related air pollution. Those who lived in the 80th percentile or higher for traffic-related pollution in a low socioeconomic neighborhood had a 30 percent higher risk of a preterm delivery compared to those who lived in an area that have less traffic pollution (20th percentile or less). In contrast, there was no equivalent increase in pre-term deliveries based on traffic pollution in high socioeconomic areas.

Residents in rural areas are also vulnerable to environmental contamination. Researchers surveyed seventh and eighth grade students at 226 public schools in North Carolina to understand the extent to which they may be exposed to airborne pollutants (i.e. methane, hydrogen sulfide, ammonia, bacteria, and residues of veterinary antibiotics) from swine feeding facilities, and the relationship between school demographics and exposure to swine facilities (Mirabelli, Wing, Marshall, & Wilcosky, 2006). They determined that more livestock sites were closest to schools where the socioeconomic indicators such as household income were low, and that schools with a higher proportion of lower socioeconomic children had the greatest prevalence of livestock odor. In addition, areas which had a low percentage of white children, and low socioeconomic status had the greatest prevalence of sites.

The 1987 United Church of Christ Commission for Racial Justice study, ‘Toxic Wastes and Race” is often cited as a mobilizing influence in the early stages of the environmental justice movement. Two cross-sectional studies explored the relationship between demographic patterns and hazardous waste facilities, and demographic patterns and uncontrolled toxic waste sites. In the first study, 415 commercial facilities that processed, stored, or disposed of hazardous materials were identified around the United
States. The demographics of their surrounding communities were then determined using factors such as minority percentage of the population, mean household income, mean value of homes, and number of toxic waste sites in the community per 1,000 residents. The 415 waste facilities were divided into four groups based upon several factors, such as the size of the facility, and whether it had a landfill. The second study was more descriptive in nature. It sought to document the presence of toxic waste sites in 36,000 United States zip codes, and relate their incidence to racial and ethnic presence in the surrounding communities. The Commission found that toxic dumps were often located near minority communities rather than just near economically deprived communities. When the Commission updated its report in 2007, it found that there was an even higher likelihood that racial minorities comprise the majority of individuals living in neighborhoods within 1.8 miles of hazardous waste sites. The report demonstrated that race continues to be an independent predictor of where hazardous wastes are located. The Committee found that race is a stronger predictor than income, education, and other socioeconomic indicators. African-Americans, Hispanic/Latinos, Asian-Americans/Pacific Islanders are disproportionately exposed to hazardous wastes in this country.

In summary, most of the researchers found that certain individuals and communities bear a disproportionate share of any environmental hazards. Most of the disparities are based upon socioeconomic discriminants such as income, or education, but race, gender, and age may also contribute to the inequities.

There were several limitations in analyzing the research articles. One major limitation was that the research papers rarely investigated the same variables, or had the
same purpose. Therefore, head-to-head comparisons of the data were difficult. For example, Burger et al. (2001) studied race (specifically African-Americans and whites), while others compared race and income, income but not race, or income, race, and other variables. Another concern pertains to the definition of race. Some studies (Downey, 1998), specifically mentioned African-Americans as a variable, while other studies used the word ‘Black’. This may be a significant difference because not all people who are classified as Black consider themselves to be African-Americans. They may originate from the Caribbean, or Africa.

Another limitation was that some of the studies (such as Aligne et al., 2000) focused on national data, while others restricted their observations to regional areas such as the Savannah River (Burger et al., 2001), or one state (Downey, 1998). There were also variations among the studies concerning how key information such as race or income was obtained. For example, some research groups used census data, while others used telephone surveys. In addition, although many researchers used census data, some used the 1990 U.S. Census, while others used the 2000 U.S. Census. Even among groups that used the same census data, different levels of analysis were used. This can lead to confusion because delineations by county, tract, zip code, and block are not comparable in size, purpose, or origin. The average county population is 100,000, the average zip code population is 30,000, the average tract population is 4,000, and the average block population is 1,000 (Krieger et al., 2002). State and local governments determine county boundaries, while the U.S. Census Bureau defines tracts and blocks. Zip codes are defined by the U.S. Postal Service, and can cross county, tract and block lines. There has been ongoing debate concerning the correct way to measure health in communities; by
census tract, block, or zip code (Elreedy et al., 1999; Fiscella & Franks, 2001). It has been argued that when census tracts are used, income often becomes a more significant variable than race. When zip codes are used, the opposite becomes true; race becomes a more significant variable, and the relative weight of race often becomes the greater explanatory variable. The end result may be that depending upon the unit of measurement, the effect of race or other socioeconomic indicators may be underestimated (Bryant, 1996; Krieger et al, 2002).

The recency of the data was another concern. Although most the research articles were written within the last 10 years, some of the data was collected prior to that time. For example, Aligne et al. (2000) used data from the 1988 National Health Interview Survey, and at least eight research groups used census data collected prior to 1997. Comparing results using data for two different census years can be misleading because some zip codes may have been added over the years, and demographics for an area can change dramatically due to the mobility or the population (Krieger et al, 2002). Also, the Superfund Act of 1980 and its reauthorization in 1986 provided funds for the cleanup of many hazardous waste sites around the country. Therefore, data collected prior to 1980 or 1986 may not be comparable to data collected after mass cleanups; as the result of the Superfund Acts many areas have become less toxic (EPA, 2011f).

One glaring gap in the information concerned age as a risk factor. Although the geriatric population are less physiologically capable of processing toxins, and therefore over their lifetimes accumulate more toxins, none of the studies specifically studied seniors as a separate variable. Recent evidence indicates that some disparities in the exposure to environmental toxins are due to racial and socioeconomic factors, and that
certain populations, such as the elderly, women, and children, face greater potential
disease and ill effects from toxic exposures (Committee on Environmental Justice, 1999;,
Hird & Reese, 1998; Maantay, 2007; Payne-Sturges & Gee, 2006). Research has shown
an increased incidence of respiratory illness from air pollution in some African-American
communities, especially if individuals in those groups have predisposing factors such as
chronic obstructive pulmonary disease, asthma, hypertension, or elevated cholesterol
(American Lung Association, 2001). Other researchers have found a correlation between
low-income communities of color and an increased risk of lead poisoning (Morello-
Frosch & Lopez, 2006).

Although there were several limitations to the research data, the literature review
provided an understanding of intersection between socioeconomic and racial/ethnic
elements and exposure to environmental toxins in soil, air, and water. It is likely that no
single variable is a predictor of environmental risk, but rather, race/ethnicity, income
level, proximity to the waste site, are all possible risk factors. Indeed, Payne-Sturges and
Gee’s (2006) framework for understanding racial and ethnic disparities in environmental
health incorporates a variety of elements, including residential location, societal elements
such as community stressors and resources, sources of pollution, actual exposure to the
pollution, and individual vulnerability due to variations in body burden and the amount of
dosing. Gold and Wright (2005) have suggested that there is a constant interaction
between community and individual elements that relate to pollution and asthma.
Community stressors such as poor housing can influence factors on an individual level,
such as an overcrowded household, and exacerbate or trigger asthmatic episodes.
Communities as well as individuals are impacted by contamination. When studying the psychological responses to hazardous substances, the ATSDR found in part that group culture plays a large part in shaping responses to situations (1995). Groups provide alternatives, different strengths, as well as resilience and capacities to respond. These responses as well as other coping mechanisms have been well documented for natural disasters, but there have been few studies on coping mechanisms related to relocation due to environmental contamination. These coping mechanisms can be vital for a community. When studying the effects of the 1972 West Virginia Buffalo Creek flood on the community, Erikson (1976) found that for individuals who were dependent upon the community prior to the disaster, the flood not only destroyed the physical community, but damaged their social networks and community identity as well.

2.4 Political/Legal Concerns

After 32,000 cubic yards of PCB-contaminated (polychlorinated biphenyls) soil was buried in predominantly African-American communities in Warren County, North Carolina in 1982, environmental activists, civil rights activists, and social organizations understood the necessity of demanding increased government supervision over toxic waste disposal and storage (Bullard, 1990). In 1990, the Congressional Black Caucus, a coalition of educators and political activists met with EPA officials, and showed data supporting their conclusion that minorities and the poor were at greater risk of environmental exposure. In response, the EPA created the Environmental Equity Workgroup in July 1990 to address the allegation that "racial minority and low-income populations bear a higher environmental risk burden than the general population." (EPA, 2009b). The Workgroup produced a two-volume final report "Reducing Risk in All
Communities" in June 1992, which supported the allegation and made ten recommendations for addressing the problem. One of the recommendations was to create an office to address these inequities. The Office of Environmental Equity was established November 6, 1992. The name was changed to Office of Environmental Justice in 1994.

Another recommendation was to seek remedies through legislation. Several bills relating to environmental justice were introduced in Congress between 1992 and 2008, but few were signed into law. The Environmental Justice Act of 1993 (S. 1161) directed the EPA to publish a list in rank order, of the total weight of toxic chemicals released in each county in the country, and also required that potential health effects be identified and that remedies be legislated. This bill died in committee. The Environmental Equal Rights Act of 1993 (H.R. 1924) intended to give citizens the right to petition against the placement of polluting facilities, when those facilities are to be placed in environmentally disadvantaged communities. This bill also died in committee. The Environmental Health Equity Act of 1994 (H.R. 1925) proposed that the EPA collect data on race, gender, income, ethnic origin, and education levels of residents living in communities adjacent to toxic sites. This bill died in committee as well. The Environmental Justice Act of 2002 (H.R. 5637) proposed that each Federal agency incorporate environmental justice goals in their missions. This bill was not enacted in 2002. Nor was it enacted three years later (H.R. 427).

Due to political opposition in Congress, President William Clinton relied mainly on his powers as chief executive to pursue his environmental agenda; he realized he could not muster enough votes to enact change legislatively. Therefore he used his powers of appointment, budgeting, reorganization, and regulatory oversight to provide greater
protection from environmental exposures (Vig & Kraft, 2006). The last major environmental directive issued by the Federal government was Executive Order 12898 (EO 12898), issued by Clinton in 1994. EO 12898, formally titled, ‘Federal Actions To Address Environmental Justice In Minority Populations and Low-Income Populations’, required that each federal agency “make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions.” Concurrent with EO 12898 Clinton also released a memorandum that requires all federal agencies to ensure that all programs or activities that receive federal financial assistance not discriminate on the basis of race, color, or national origin, and that these agencies analyze the environmental and health effects on minority and low-income communities whenever an Environmental Impact Statement is required. The order also is meant to insure that minority and low-income communities have adequate access to public information regarding human health, environmental planning, and environmental regulations, and enforcement (Clinton, 1994).

As a result of EO 12898, the EPA now has an environmental justice steering committee which is responsible for strategic planning, an environmental justice policy committee, an Office of Civil Rights, and environmental justice coordinators at each regional office. The coordinators are responsible for implementing environmental justice policies. The EPA has also sought to advance its agenda by invoking Sections 601 and 602 of Title VI of the 1964 Civil Rights Act (United States Department of Justice, 2003). Section 601 prohibits the use of federal funds in programs that have discriminatory
effects. Section 602 requires federal agencies to implement regulations to protect the rights of people who have been discriminated against. However it may not be possible to use Title VI against environmental polluters because in the case of *Alexander v. Sandoval* (2001), the Supreme Court disallowed the use of Title VI when there is unintentional discrimination that adversely affects racial groups or other protected classes. One must now demonstrate intentional discrimination.

Environmental activists were unable to pass legislation concerning environmental justice in the later 1990s, mainly due to party politics. Since Republicans comprised the Congressional majority at that time, there was no significant movement to eradicate environmental disparities due to race or economics. Due to this lack of success, coalitions sought remediation through the existing framework of the EPA.

After EO 12898 was issued, several government officials criticized its implementation (Library of Congress, 2008). In 2004, the EPA’s Inspector General found that the EPA had not fully implemented the Executive Order, that environmental justice was not fully integrated into day-to-day operations, and that inconsistent EPA strategies and actions were causing inconsistent results. In 2005 the U. S. Government Accountability Office (USGAO) reported that the EPA did not devote enough time to environmental justice, especially as it related to gasoline and diesel fuels, and clean air standards (USGAO, 2005).

Although EPA officials reaffirmed their commitment to EO 12898, in 2005 EPA Administrator Stephen Johnson wrote that environmental justice is ‘justice for all people, regardless of race, color, national origin, or income’. He also wrote that the EPA was intent upon providing environmental justice for everyone, not just members of minority
groups (Johnson, 2005). These subtle revisions and reinterpretations of Clinton’s Executive Order signaled that there was no guarantee that the original intentions of the order would be maintained unless it was codified. Because an executive order is not binding, it can be reversed or diluted by subsequent presidents. Although President Clinton's successor, George W. Bush did not reverse EO 12898, interpretations of the Executive Order by EPA officials posed its potential nullification. The Environmental Justice Act of 2008 sought to codify EO 12898 so that it could not be nullified in the future. Also, if enacted, the 2008 Act would have been the first time that any federal law defined ‘environmental justice’.

The Environmental Justice Act of 2008 (S.642) was introduced in the Senate in February 2007 by Senator Richard Durbin, a Democrat from Illinois. The bill’s co-sponsors were Democratic Senators Robert Menendez of New Jersey, Barbara Boxer of California, John Kerry of Massachusetts, and Hillary Clinton of New York (Library of Congress, 2008). When introduced, Senator Durbin stated that the purpose of the bill was to help protect the well-being of minority and low-income communities. The bill’s intent was to codify Executive Order 12898, and contained reporting requirements to ensure that EO12898 was fully implemented. An identical bill was introduced in the House of Representatives in February 2007 by Democratic Hilda Solis and 54 Democratic co-sponsors. This House bill was referred to the Committee on Energy and Commerce, and to the Committee on Natural Resources, but did not come out of those committees.

Section 2 of S.642 specifically codified EO 12898, stated its definitions of ‘environmental justice’ and ‘fair treatment’, and removed any judicial review of EO12898. Section 3 mandated that the Administrator of the EPA carry out specific
recommendations of the Inspector General of the agency; namely to identify which programs, policies, and activities require environmental justice reviews, to require relevant offices establish a plan to complete the necessary reviews, to mandate that each EPA office and program develop specific guidelines for conducting reviews, and that review results be compiled and actions taken when they are recommended. The bill also mandated the EPA Administrator enhance the ability of EPA workgroups to identify potential environmental justice issues by providing training and guidance to coordinators of workgroups. Modeling techniques should also be used to understand the financial impact of potential environmental justice issues. EPA officers and spokespeople were also directed to respond fully to public comments on environmental justice. The bill also mandated that the EPA Administrator clearly define the mission of the Office of Environmental Justice. Specific time frames for developing goals and measurements were also included. If the bill had been enacted the EPA Administrator would have had six months to submit an initial report to Congress regarding his/her strategy for implementing the measures, with semi-annual progress reports thereafter.

In July 2008 the bill advanced to the Committee on Environment and Public Works. Republican committee members were not in favor of the bill for several reasons. They believed that the terms ‘environmental justice’ and ‘fair treatment’ were not clearly defined, thus making the law subject to various interpretations. They stated that this could lead to a proliferation of lawsuits based upon environmental justice discrimination in communities. Republican proposals to modify the bill’s definition of ‘fair treatment’ were narrowly defeated 10-9. Republicans refused to vote in favor of the bill because they believed that communities should have the right to do what was in their own best interest,
while being mindful of the health and safety of its residents, as guaranteed by Title VI of the Civil Right Act. They wrote that environmental justice activists should not be allowed to file a federal civil rights claim every time an environmental or public health problem impacts minorities. They further maintained that the act did not differentiate between instances when hazardous facilities are placed in minority and low-income communities, and instances when minorities and low-income persons move to areas that already have these facilities. In the latter situations, it is untrue that the hazards have been imposed on its residents; the residents have willingly moved there. Republican committee members also rejected evidence purportedly showing the uniformly negative impact of environmental hazards. They claimed that sometimes facilities that use environmental toxins are good for communities because these facilities bring jobs, a larger tax base, higher real estate prices, and a better socioeconomic climate. They also rejected the position that health problems for minorities living near hazardous facilities can be ascribed solely to the toxins. Other factors such as poor nutrition, substance abuse, poverty, family dysfunction, and a lack of participation in health care prevention may also be contributors. Thus businesses are being blamed for problems that society has not addressed and rectified.

Republican support came from the U.S. Chamber of Commerce, which represents over three million businesses and organizations. The Chamber of Commerce wrote that since EO 12898 was signed environmental justice activists had delayed or stopped many projects and facilities that could have benefited minority and low-income communities by claiming discrimination. In addition, businesses had been driven from the very communities that needed the revitalization that more jobs could bring. If the bill were
passed, new energy facilities, nuclear power plants, oil refineries, and coal-fired power plants would be subject to endless litigation.

To demonstrate that the EPA had been complying with EO 12898 Republicans detailed many goals that the EPA had set after the order was signed: identifying priorities such as clean and safe water; reducing exposure to air toxins; reducing the number of asthma attacks; revitalizing brown fields and other contaminated areas; and collaboratively problem-solving to address environmental justice issues. The Republicans did not clarify which, if any, of the goals had been achieved.

In August 2008 the Congressional Budget Office created an estimated budget for the bill. The office determined that many of the activities required under the bill were already underway. However, fully implementing the legislation would increase EPA costs by less than $500,000 annually between 2009 and 2013. There would be no costs to state, local, or tribal governments (Library of Congress, 2008).

Politics became an important reason why S. 642 did not advance. Since he had taken office, George W. Bush was considered anti-environmental due to his denial of climate change, rejection of the Kyoto Protocol (an international treaty to reduce pollution due to climate change), and a failure to acknowledge the effects of pollution on the poor people of the world (Center for Media & Democracy, 2008). Environment became a political issue, with Democrats espousing environmental awareness, and Bush Republicans in denial. S. 642 died in committee, and did not come before the full Senate for a vote.

Environmental justice has not been fully realized in this country, due in part to politics. Although the Environment Protection Agency under the Obama administration
has expressed a desire to move forward with the equitable distribution of environmental resources and facilities, codification of Executive Order 12898 has yet to occur. In addition, environmentalists have recently experienced setbacks in their efforts to safeguard the environment. In August 2011 the State Department announced that it is allowing a 1,700 mile oil pipeline to be built that would stretch from Alberta, Canada to Texas (Eilperin, 2011). The proposed Keystone XL Pipeline would bring a half million barrels of crude oil each day from Alberta to refineries in the Gulf Coast.

Environmentalists have objected to the potential environmental impact of the pipeline on humans, wildlife, and natural resources such as drinking water. After a two and a half year study (United States Department of State, 2011), the State Department concluded that there would be some impact on the environment from leaks and spills during and after construction, but the pipeline would bring economic benefits to the counties where the construction workers would live, eat, and otherwise spend their dollars. Also, the pipeline would bring new jobs (albeit temporary jobs) to these areas. When considering EO 12898, the conclusion was that census block groups that had higher percentages of minorities and low income populations would potentially be impacted more than census block groups that had lower percentages of minorities and persons of low income. The impacts would include exposure to construction dust and noise, disruptions to traffic patterns, and increased competition for social services in underserved areas where the construction workers did not have health care workers in their construction camps, and needed to use local facilities. Although the report stated that disruptions would be minimal, and only last 20 to 30 working days, the perception appeared that
environmental disruptions would again disproportionately impact minorities and low income people.

Another retreat from pushing forward on environmental reform has been President Obama’s rejection of the EPA’s proposal to tighten ozone pollution levels, and his declaration to remain with the current standards (Broder, 2011). The proposal would have lowered the ozone standard from 75 parts per billion to 60 to 70 parts per billion. Obama stated that he was abandoning the new proposal because it would severely burden industry and local governments. This change would have put many companies out of compliance of the Clean Air Act. The companies would have had to spend money on new emissions controls, at a time when the country is trying to come out of a recession. State and local governments would also have needed to spend money on enforcing the new standards, at the same time that they are struggling to balance their budgets.

Environmentalists are concerned that these retreats from environmental concerns are merely capitulations to Republican pressure (Kaufman, 2011), and do not bode well for any other environmental and environmental justice initiatives.

2.5 Nurses and Environmental Health

There are over 2.6 million nurses in the United States; forming the largest number of health care professionals in the country (ANA Nursing World, 2011). As we gain a greater understanding of the risks to humans, environmental health takes on increased importance for nurses (IOM, 1995). Although nurses have been associated with environmental health since Florence Nightingale first collected quantitative data during the Crimean War (O’Fallon, 2006), environmental health is still considered to be a novel area for some nurses (Duval, 2008).
On a theoretical level nurses have begun to analyze the concept of contamination (Green & Polk, 2009). The North American Nursing Diagnosis Association (NANDA) added two nursing diagnoses, Contamination, and Risk for Contamination to international nursing diagnoses for 2009-2011 under the domain of safety/protection (Herdman, 2009). NANDA defines contamination as exposure to “environmental contaminants in doses sufficient to cause adverse health effects” (p. 334). Pesticides, biological agents, pollution, waste, and radiation are recognized as possible causative agents for organic and systemic (respiratory, gastrointestinal, neurological, renal, immunological, and integumentary) responses, and may cause genetic and oncological changes. With this definition, exposure to polluted air, soil, waste, and water, from noise, radioactive materials, heavy metals, and other chemicals are now recognized by nurses as being precipitants for illness. Risk factors for contamination include exposure to causative agents, as well as socioeconomic factors such as living in poverty because it increases the potential for multiple exposures, and increases the likelihood of lack of access to health care, and of poor nutrition.

On a practice level environmental health nursing is most often addressed by public health and community based nurses (O’Fallon, 2006). Public health nurses generally work for government agencies (federal, state or local) and integrate an understanding of the health conditions of individuals and families within a community, with an understanding of how individual cases relate to health and wellness of the entire community (American Public Health Association, 2010). Public health nursing, which also may be called community health nursing, focuses on populations and how to promote their health and prevent disease. Community based nurses can be found in either
governmental or non-governmental agencies. They too work in the community, and seek to promote health, and prevent disease, but they primarily focus on individuals and families, rather than the community as a whole (Zotti, Brown, & Stotts, 1996).

Throughout the country nurses are addressing environmental issues by implementing safer exposure practices in hospitals and communities, conducting environmental nursing research, teaching environmental health to nursing students, and educating their peers about the connection between health and the environment. The Luminary Project (www.theluminaryproject.org) profiles over 120 nurses nationally who have distinguished themselves as environmentalists.

Several organizations promote nurses’ involvement in environmental issues. The American Nurses Association has become a strong advocate by developing initiatives to decrease the exposure of nurses and the public to environmental contaminants in the hospital and in the community (ANA Nursing World, 2012). One of the newest organizations is the Alliance of Nurses for Healthy Environments (2012). Founded in 2008, this group is developing strategies to integrate environmental health into nursing education, practice, research, and advocacy. Health Care Without Harm, an international coalition of health care institutions, community groups, health care professionals, and environmental organizations, has become a prominent advocate for the utilization of health care practices that are safe for humans and do not pollute the environment (Health Care Without Harm, 2012). Although not exclusive to nurses, the organization's co-Executive Director Anna Gilmore Hall is a registered nurse, as is the co-founder, Charlotte Brody. EnviRN, a portal created by environmental and community health nurses (www.envrn.umaryland.edu), and hosted by the University of Maryland’s School
of Nursing, provides environmental resources for nurses. The site continues to be an important link to government websites, provides strategies and tools for increasing nursing involvement in environmental health care, and produces monthly email newsletters. Some of the suggested nurse-related interventions include collecting client history on the exposure to potential toxins; investigating the possible risks; identifying patterns of illness; educating individuals, community members, and other nurses about health risks, policies, and regulations; and advocating for changes in the conditions, and in policies that allowed the exposures to occur (EnviRN, 2011).

Although environmental nursing research remains limited (Green & Polk, 2009), nurses are responding to the environmental health issues. Recent nursing research concerning environmental contamination has included an investigation of what ‘environmental risk’ means to residents of two communities adjacent to two different Superfund sites by analyzing government reports, selected newspaper articles, and interviews with residents, using the critical theory method (Clark et al., 2002). Other recent research includes the relationship of health, culture, and environment for one Hispanic community in New Mexico using critical ethnography (Bent, 2003), what ‘empowerment’ means, and how it should be used in communities where environmental health issues are a concern (Postma, 2008), and a Home Environmental Health and Safety Assessment Tool (Del Bene Davis, 2007).

2.6 Forensic Nurses

Despite increased attention to environmental issues by the general public, government agencies, and non-government organizations, nurses have not become fully integrated into the circle of environmental health professionals. This is especially true for
areas related to forensic nursing and the environment. Two possible terms, 'environmental forensics' and 'forensic epidemiology' might be considered relevant to nursing health care, but a literature search of those words revealed no reference to the term 'nurse', except 'nursing home deaths' in a text by Loue (2010). ‘Environmental forensics’ does not incorporate nursing; it focuses on scientific investigations of chemicals in the environment that are subject to legal proceedings. These investigations include analytical analyses of soil, water, and air, and are within the domain of the physical sciences, not health care (Hester, 2008; International Society of Environmental Forensics, 2002). ‘Forensic epidemiology’ refers to investigations of health problems where there is the possibility of criminal involvement (Alibek & Handelman, 1999). It can also refer to the societal context of diseases from the perspective of community involvement and advocacy (Loue, 1999). Although forensic epidemiology closely relates to public health, nurses are rarely mentioned in the literature, or discussed except when mentioned as the target of criminal investigations resulting from health crises such as clusters of unexplained deaths of nursing home patients, epidemic increases in cardiac arrests on intensive care units (ICU), or administering overdoses of digoxin to patients who died (Goodman, Munson, Dammers, Lazzarini, & Barkley, 2003). Clearly, nurses need to be able to share their expertise with other forensic environmental specialists.

There are two important aspects to the incorporation of forensic nurses into environmental health concerns: the skills and abilities needed as determined by professionals in the field of environmental health, and what communities say they need from health care providers. This study attempted to determine whether the needs expressed by communities fit the skills and abilities that forensic nurses already possess,
or can achieve. To assist in solving environmental problems, and to help evaluate solutions to problems, environmental health professionals must understand community involvement, public-health ethics, community-based health education, screening and treatment, and health policies.

Bent (2003) identified several ways that nurses can be influential in promoting community-based and community-focused health in environmentally affected communities: conducting health assessments; helping community members to express their concerns in ways that can be appreciated by government agencies and private organizations that can influence change; helping communities to find their voices and means for expressing their need for change; and finally by helping communities and agencies to develop policies and strategies that can benefit affected communities.

Choi, Afzal, and Sattler (2006) identified possible roles for nurses in environmental health. The roles included conducting physical assessments for symptoms that occur in communities affected by hazardous substances; providing health education about risks and perceptions of risks; and evaluating the effectiveness of health education programs that are already in operation.

A consortium of national public health officials identified ten services that are essential to the public health well-being. These services include monitoring health status to identify community health problems; investigating and diagnosing community problems; informing and educating the public about health issues; developing policies and plans to support community efforts; enforcing policies and regulations related to community health; evaluating the effectiveness of programs that have been implemented; and conducting research to find new ways to foster community health (CDC, 2010).
These actions require professionals who are critical thinkers and problem solvers. They must have strong communication skills, and be able to observe, analyze, and evaluate situations (Morrone, 2005). Although this information is useful for understanding what public officials believe are necessary criteria for entry into environmental health professions, Morrone’s research did not ask community members what they think are important qualifications for health professionals who intend to serve their communities. Nor did the research address what the participants think they need to improve their health and living conditions. Questions regarding these areas have been included in the current research tool, CEHRAT.

The active inclusion of nurses in community health activities may be vital to the success of environmental health care initiatives. Health care disparities and environmental health injustices based upon race, economics, and socio-cultural factors have led some minority groups to distrust government efforts, or medical doctors (Musa, Schulz, Harris, Silverman, & Thomas, 2009). Minorities also express ambivalence or cynicism about government efforts to clean up environmental contamination (Clark, Barton, & Brown, 2002). To reduce the level of distrust, nurses may need to become more active in monitoring cleanup efforts, and to collaborate with communities to minimize their health risks (Clark et al., 2002).

Despite nurses’ strong influence on health care they are usually not mentioned in environmental health research. A recent survey concerning trust in the health care system and the use of preventive services between black and white adults omitted mention of trust in nurses, and focused on trust in information from government health agencies, doctors, and non-health care sources such as religious leaders, family, and friends (Musa
et al., 2009). Nurses are mentioned, albeit briefly in the Behavioral Risk Factor Surveillance System (BRFSS) questionnaires produced by the Center of Disease Control’s National Center for Chronic Disease Prevention and Health Promotion (CDC, 2008). These questionnaires are used by state agencies to collect information on health risk behaviors, preventive health practices, and health care access primarily related to chronic disease and injury. The questionnaires include questions such as, “Have you ever been told by a doctor, nurse, or other health professional that you have asthma?” Therefore the questions mention nurses, but do not isolate their roles from those of other health professionals.

2.7 Summary

Environmental contamination has occurred in the United States since before its inception as a country. The competing interests of politics, government, industry, and the public have been an ongoing struggle. The conflicts and subsequent advancements have often been intertwined with cultural, socioeconomic, and racial disparities. Legislative actions have addressed some of the more blatant environmental assaults that have contaminated our air, water, and soil, and which posed risks, or caused actual harm to humans, their communities, and their social and economic circumstances. Progress, however, has slowed in recent years due to partisan disagreements in government, and the weighing of costs versus benefits. During tough economic times, the costs in dollars may be seen to be more important than human well-being.

Nurses have continually attempted to address environmental contamination. Currently, nurses have formed new and exciting organizations to pool their knowledge. Forensic nurses are currently not major players in environmental nursing, but their
inclusion is feasible. The next chapter will provide the methodology for investigating the possible inclusion of nurses into this field.
Chapter 3
Methodology

3.1 Design

This was a cross-sectional triangulated study that used quantitative and qualitative methods to gather information about the self-identified needs of people who live in communities that have been exposed to environmental contaminants, and to understand the potential role of the forensic nurse from the perspective of participants in communities where there is environmental contamination. The Community Environmental Health and Rights Assessment Tool (CEHRAT) was used to gather the quantitative data (Appendix A), and a semi-structured interview was used to gather the qualitative information (Appendix C). In addition, census data from the years 2000 and 2010 was used to better understand the communities involved in the study.

Triangulation is a research method that combines research strategies to allow a multidimensional understanding of a situation (Foster, 1997) using measurements from at least two known points to locate a third unknown point (Begley, 1996; Shih, 1998). Researchers use triangulation to overcome weaknesses and biases that may result from single-method, single-observer studies. It is also used to bring a richer context to, and greater understanding of the topic. Triangulation strategies include using two or more investigators to analyze data, using different hypotheses to test a theory or to generate a new theory, using two or more research methods, or using two or more types of analysis on the same data set. Triangulation using both qualitative and quantitative methods can enhance the reliability and validity of findings. When this strategy is used it is recommended that each method of data collection and analysis be conducted according to
the guidelines of its specific paradigm (Risjord, Dunbar, & Moloney, 2002). In most instances participants should be common for each method used. Once data analysis for each concept under consideration is completed in the two research methods, results should be analyzed for convergent and/or divergent outcomes with the purpose of blending the results to clarify the phenomenon.

Prior to collecting data from participants, the researcher explored her own thoughts and feelings about environmental contamination, relocation, race, socioeconomics, and community. The researcher tape recorded, and then transcribed her impressions. Exploring her own feelings allowed the researcher to enter the data collection phase with recognition of predetermined ideas versus reflections obtained from participants.

A two-stage process was used in this study. A quantitative tool was administered before conducting the one-on-one qualitative interviews. In an effort to prevent the quantitative data from influencing the qualitative data collection, the research assistant entered the quantitative data into a software program (SPSS) as soon as it was collected, but it was not analyzed by the researcher until the qualitative data had been collected and analyzed.

The quantitative phase addressed the physiological, vulnerability, and health protection domains, by using a 28 question closed-end tool to survey the communities. The survey asked participants what environmental issues were of most concern (physiological domain) in their community, what actions they wanted to occur to remedy the situations, and the possible ways that forensic nurses could assist them and their
communities (health protection domain). Demographic data (age, gender, and socioeconomic data) contributed to understanding the vulnerability domain.

The qualitative data was collected using the hermeneutical phenomenology approach, as espoused by Heidegger, Ricoeur, and van Manen. This method was selected because it addresses the interpretation of human experiences, and focuses on revealing details and aspects of living with a goal of creating meaning and achieving a sense of understanding though language and culture (van Manen, 2002; Wilson & Hutchinson, 1991). The researcher believed that personal stories would provide more context to the quantitative data.

The qualitative phase in this study elicited information in the health protection and epistemological domains, by asking community members how they personally came to know about contamination in the community (the epistemological domain), what they had done, what they want to do (individually or collectively as a community), or what they want others to do to reduce environmental hazards (the health protection domain).

After collecting the results from both phases, the researcher consulted with a statistical expert, and then blended the quantitative and qualitative responses.

3.2 Settings

After receiving permission from Duquesne University’s Institutional Review Board (Appendix D), the researcher solicited persons over the age of 18. Participants were selected from two communities which had been identified by local, state, or national agencies as having been exposed to contamination, and which had been placed on the National Priorities List (NPL) as a Superfund site. The communities, Ellenville, New York, and South Plainfield, New Jersey, were selected because they were recent
inclusions on the NPL list (after 2000), they have a substantial number of people potentially affected by the contamination (at least 1,000), major clean-up activities had not been completed by the start of data collection, and exposure to humans had yet to be brought under control. In addition, although the researcher initially considered several sites in the northeast United States that fit the same criteria, she ultimately felt that it was more practical to select communities that were within two hours driving distance from her home in Westchester County, New York. She realized that she would need to make several visits to each community, and did not want her study to be impaired by constraints of distance and travel time.

Ellenville, New York

Ellenville is a village in the Town of Wawarsing, in Ulster County, New York. The village lies in a flood plain in the Rondout Valley, with the Catskill Mountains to its north, and Shawangunk Ridge to its east. In addition to Ellenville, the Town of Wawarsing (population, 13,157) includes six other principal communities including Kerhonkson, and Napanoch (U.S. Census, 2010).

A community since 1798, Ellenville began to flourish after the D&H Canal was constructed through the Rondout Valley in the 1820s. The canal, which connected the Delaware and Hudson Rivers, brought more manufacturing and commerce to the area. Major manufacturers at that time included a water bottling plant, and New York Knife. The beginning of the 1900s saw the extension of railroad service into Ellenville, and less reliance on the canal for commerce.

Prior to the 1960s the Ellenville community was an active thoroughfare for vacationers. Many large resorts, bungalow colonies, boarding houses, and inns attracted
visitors who enjoyed fresh air, mountain trails, and resort entertainment. As air travel became less expensive, and vacationers sought out more glamorous experiences, traditional “borscht belt” Catskill tourism declined drastically. Most of the old resorts closed due to financial constraints, or were demolished due to fires and poor structural integrity. The remaining resorts frequently change ownership, but have not recaptured the clientele or ambience of the past.

According to the 2010 United States census data, the village measures 8.7 square miles, and has 4,135 residents (51.5% female, 48.5% male), and 1,578 households. The median age is 35.9. Sixty-eight per cent of the residents are white, 27.9% Hispanic or Latino of any race, 14% black, 2.4% Asian, and 1.3% Native American. Although the 2010 employment data is not yet available, the 2000 census data showed unemployment at 51.3% for residents over the age of 16 years, with the majority of the workers in sales, service, or manufacturing jobs. The median household income in 1999 was $34,198.

Ellenville has a post office, library, large supermarket, and several banks. The Town of Wawarsing’s government building is also located in Ellenville. The town airport, the Joseph Y. Resnick Airport, is located one mile northeast of Ellenville. The Town of Wawarsing has an Environmental Conservation Commission which is charged with protecting and promoting the town’s natural environment, and advising the local governments and the public on environmental issues (Town of Wawarsing Environmental Conservation Commission, 2012). Although residents have access to daily newspapers, many read the Shawangunk Journal, a weekly newspaper that focuses on local news and issues. There are no prominent environmental groups in Ellenville at this time. While there are several restaurants, stores, and a theatre company with playhouse in Ellenville,
unemployment remains a major concern. Vacant storefronts outnumber stores that are open for business. The main employers are the Ellenville Regional Hospital, and four nearby medium and maximum correctional facilities (the Eastern New York, Ulster, Woodbourne, and Sullivan Correctional Facilities). Nearby Native American tribes have developed casinos, which village officials hope will once again attract visitors to the region. This Spring Wal-Mart’s plans for opening a store in the Town of Wawarsing were approved. Some Ellenville residents have fought against a big box store believing it will undercut the prices of struggling shop owners while only bringing 200 low-paying jobs to the area. Other residents believe that a Wal-Mart store will bring more shoppers to the valley, and will increase the tax base.

The major contaminated site in Ellenville is the Ellenville Scrap Iron and Metal Superfund Site. This is a 24-acre, inactive facility located at 34 Cape Road (EPA, 2011g). The site which borders the Beer Kill Creek to the south and west, and residential homes to the east, is divided into upper and lower portions by a 40-foot high landfill. The landfill is composed of construction and demolition debris, including scrap brick, concrete, wood, and metal. Operated from 1950 to 1998, the site was used to recycle scrap metal and automotive waste including car batteries, waste oils, car parts, oil burners, tires, and electronic circuit boards. After complaints from residents, state and local officials removed approximately 3,000 tires from the site. In 2000, the U.S. EPA investigated the site at the request of the New York State Department of Environmental Protection. Samples from site soils, groundwater, on-site surface water, Beer Kill sediments, Beer Kill surface water, and soils from nearby homes showed elevated levels of polychlorinated biphenyls (PCBs), volatile and semi-volatile organic compounds, and
heavy metals. The organic compounds which included acetone and benzene, can damage vision, impair the respiratory system, and can cause liver toxicity. The heavy metals included lead, mercury, arsenic, copper, and zinc. These metals have been found to be toxic to the nervous system, and can affect brain function. Carcinogenic pesticides such as DDT, DDD, and DDE were also found at the site. It was determined that the contaminants at the site were a hazard, and a cancer risk to nearby adult and children residents, recreational users of the Beer Creek Kill, adult and children site trespassers, construction and utility workers who worked nearby, and the two Beer Creek Kill fisheries. Approximately 4,000 people who rely on public and private drinking water live near the site.

The former property owners were directed to clean up the site, but very little progress was made. The owners blamed each other for the pollution, and were not financially capable of remediating the site. Ultimately they abandoned their responsibilities. In September 2002, the site was listed as a Superfund site, with the first EPA cleanup action beginning in November 2004. During 2004 and 2005, EPA demolished all of the buildings at the site, and disposed of waste oil tanks and approximately 20 drums containing hazardous materials. In addition, soil contaminated with lead was removed and disposed of off-site. A final plan to clean up the site was proposed in July 2010. Some of the contaminated soil is currently being moved to the landfill on the property. The landfill will then be capped to prevent contaminants from leaching out of the landfill into the ground water. Any of the excavated soil or materials that are considered to be especially hazardous will be shipped off-site for disposal. The EPA will work in partnership with the U.S. Army Corps of Engineers and the New York
State Department of Environmental Conservation (NYSDEC). The cleanup, which is expected to cost about $8 million, is being paid for by EPA, with NYSDEC contributing 10 percent of the funding. Cleanup work at the site is expected to be completed in the Fall of 2011.

In addition to the Superfund site, Ellenville has a site which is being monitored by the NYSDEC; the former Channel Master manufacturing site, owned by Avnet, Inc. (NYSDEC, 2011a). Television antennae, transmission cables, and related accessories were manufactured at the site from the 1940s until 1984. In 1984 the main plant property was sold to the Imperial Shrade Company, but Channel Master agreed to be responsible for any corrective actions needed due to their operations (EPA, 1993). In the 1980s the United States EPA found slightly elevated levels of arsenic and lead in wells downgrade of the site, as the land slopes toward Sandburg Creek to the east, and Fantine Kill Creek to the south. Ground water contamination from several chemicals including benzene, chloroform, toluene, and various chlorobenzene compounds, were also found beneath the main plant building in an area where waste waters were believed to have been released from the plant sewer system. The EPA determined that the impact on human health and the environment was minimal because the public water supply, withdrawal wells, and reservoirs are upgrade from the contaminated site. However the contaminants could flow into the Sandburg Creek. A plan was developed to remove volatile organic compounds (VOCs) from the ground water, and then discharge the treated ground water into the Sandburg Creek. The NYDEC continues to monitor the ground water for evidence of contaminants.
Also, in the Town of Wawarsing, the Napanoch Paper Mill (NYSDEC, 2011b) was the site of recent clean-up activity, and is still being monitored. The paper mill was operated on 19 acres from the late 1940s until it was destroyed by fire in 1977. Beginning in 1986 the New York State DEC investigated the site leading to its classification as an inactive hazardous waste disposal site that posed a significant threat to the public health. Remediation was required. Although the mill operated under several owners, New York State sued the final owners, Longboat, Inc. and James Barry (Longboat’s President) for the cost of disposing hazardous substances at the site (New York v. Longboat, Inc., 2001). The major contaminants were PCBs, used in the manufacturing operations that were discharged along with wastewater into the lagoons on the site. The overflow from the lagoons ran into Rondout Creek. The DEC removed approximately 6,750 tons of PCB-contaminated paper sludge and soil. Further investigations found arsenic, chromium, mercury, and more PCBs in the soil, paper rolls, and sediment in Rondout Creek. The cost of removing the contamination from the creek and soil was over $20 million. The defendants claimed that they did not actually operate the paper mill, but merely bought it with the intent of constructing houses on the land. They also denied responsibility for the contamination stating that it was probably committed by several prior owners. New York State countered that CERCLA does not require that the State sue all potentially responsible parties in order to recover costs. If the defendants believed other parties were responsible, the defendants could commence a separate action against them. The site remains fenced and vacant, with some ruins of the paper mill buildings still evident. The DEC periodically monitors the soil, groundwater, and sediment for
evidence of contamination (Rubin, 2010). The owners were not able to compensate the State for the cost of remediation, and there have been no viable plans for development.

South Plainfield, New Jersey

South Plainfield is a borough in Middlesex County, New Jersey. It was incorporated in 1926, but was settled by Europeans over 200 years earlier, when the Unami Indians sold the land to settlers. Evolving from a farming community, businesses such as grist mill, flax factory, and sawmill developed around the borough’s lakes and ponds. In 1913 the Spicer Manufacturing Company constructed a factory near the railroad station. Hadley Airport, the site of the first transatlantic flight, was built in the 1920s. By the time the borough incorporated, the Lehigh Valley Railroad had expanded into the area, and industry really began to flourish. Over the years large industries have made South Plainfield their home, including steel factories and pharmaceutical companies. As a result of these industries, South Plainfield began its transformation from a sleepy farming town into a suburban industrial community.

South Plainfield’s prosperity began in 1936 when Cornell-Dubilier moved into the Spicer Building. Cornell-Dubilier, which manufactured condensers for the burgeoning radio industry, employed more than half of South Plainfield’s families. South Plainfield was still mostly a farming town with a population of 5,300 in 1940. Harris Structural Steel became one of the largest steel manufacturers in the country during World War II. South Plainfield’s suburban character was established after World War II when the Geary Farm on Plainfield Avenue was developed into what became known as Geary Park. Shortly thereafter various housing developments sprang up throughout the north side of
the borough increasing South Plainfield’s population from 8,000 in 1959, to 18,000 in 1960, and 23,385 in 2010 (U.S. Census, 2010).

Some New Jersey residents remember the Nike missile base that was constructed in South Plainfield during the 1960s (Bender, 1999). The launch site operated next to Hadley Airport from 1955 until 1971, with the radar-guided missiles arriving in 1961. The Nike missiles were intended to intercept and destroy any Soviet fighter planes that attempted to attack New York City. First manned by the U.S. Army, the base was later occupied by the New Jersey National Guard. The missile site was eventually dismantled. It is unclear how ordinance and other potentially toxic metals were removed. After 44 years of operation, Hadley Airport closed in 1968 due to the need for costly upgrades. The land was sold, and a shopping center, industrial park, and hotel were built on the site. The nearby land which contained the missile site became part of the shopping complex, and is now the site of Kohl’s Department Store.

According to the latest United States census data, the borough measures 8.8 square miles. Its residents are 51.0% female and 49.0% male. There are 7,876 households. The median age is 37.9. Sixty-seven per cent of the residents are white, 14.7% Asian, 13.2% Hispanic or Latino of any race, 10% black, and 0.4% Native American. Although the 2010 employment data is not yet available, the 2000 census data showed unemployment at 33.1% for residents over the age of 16 years, with the majority of the workers in manufacturing jobs. The median household income in 1999 was $67,487.

South Plainfield is a busy community of single family houses, several business districts, small and mid-sized low-rise, outdoor shopping malls, and several indoor and
outdoor recreational facilities. There is a large supermarket, a post office, public library, and government buildings. South Plainfield has a large number of civic, social, and religious organizations. The borough also has an environmental commission with a wide-ranging agenda, including reviewing proposals from the governing bodies and town boards regarding environmentally sound land use; administering environmental programs; and maintaining the Highland Avenue Nature Preserve. There is also a Health Advisory Board. This group reviews health-related programs and inspections, reviews animal reporting requirements as mandated by the State and reviews all property maintenance health-related issues. South Plainfield also has a Recycling Commission. Residents have access to several regional daily newspapers, but also rely on the *South Plainfield Observer*, a weekly newspaper, for local news. The Edison Wetlands Association (EWA) is a non-profit grassroots environmental organization that has advocated for South Plainfield, the neighboring community of Edison, New Jersey, and other nearby communities for over 21 years. Robert Speigel, Executive Director of the EWA suggested the Woodbrook Road Superfund site as a possible focus of the researcher’s investigation, because the site fit the researcher’s project criteria.

South Plainfield has two Superfund sites; the Woodbrook Road Dump, and the Cornell Dubilier Electronics Inc.. The Woodbrook Road Dump is a 70-acre inactive site in the southeast corner of South Plainfield, north of Woodbrook Road, and within the wetlands of the Dismal Swamp. The 1,250-acre Dismal Swamp is the largest natural wildlife refuge in the northern Middlesex, New Jersey area. The Woodbrook site operated as a private dump during the 1940s and 1950s, with the owners at that time accepting household and industrial wastes. In September 1999 members of the Edison Wetlands
Association discovered that there were leaking capacitors in the Dismal Swamp wetlands. The following month the U.S. EPA conducted an investigation, culminating with the Woodbrook site’s Superfund listing in 2003. The site was found to have high levels of PCBs, pesticides such as DDT, and heavy metals such as arsenic chromium, mercury, and lead (EPA, 2011h). Surface water runoff caused the contaminants to migrate through the Dismal Swamp and the Bound Brook. The first EPA cleanup began in October 2003. The area is still contaminated with 55-gallon drums of capacitors. A New Jersey DEP fish consumption advisory remains in effect for Bound Brook, New Market Pond, and Spring Lake. Fish caught from these waters should not be eaten, because elevated levels of PCBs and dioxins have been detected in the fish.

The second Superfund site in South Plainfield is the Cornell Dubilier Electronics Inc. site, also called the Hamilton Industrial Park. This is a 25-acre facility located at 333 Hamilton Boulevard, in the center of South Plainfield. A Bound Brook tributary crosses through a corner of the site. Operated from 1936 to 1962, electronic parts and capacitors were manufactured at the 18 buildings on the site (EPA, 2011i). Transformer oils were tested on the site. The EPA found high levels of polychlorinated biphenyls, volatile organic compounds, and semi-volatile organic compounds, such as trichloroethylene (TCE) and tetrachloroethylene (PCE). In addition, high levels of arsenic, chromium, mercury, and lead were found in the soil and runoff. The first EPA cleanup began in 2004. All 18 buildings on the site have been demolished, and the homes and yards of nearby residents have been decontaminated. Some contaminated soil at the site has been removed, while some is being treated on-site by low temperature thermal desorption. The
current owners are developing plans to pave the site and bring in some small businesses, like a gas station.

In addition to the Superfund sites, South Plainfield has other contaminated areas. According to the New Jersey Department of Environmental Protection (NJDEP), as of July 2011 there were 61 other active sites with confirmed contamination (NJDEP, 2011a), and 5 sites with confirmed contamination, which are slated to be listed on New Jersey DEP rosters (NJDEP, 2011b). A classic example of non-Superfund contamination in South Plainfield is owned by the American Smelting and Refining Company (ASARCO). ASARCO was a leading producer of copper; one of the largest metal producers in the United States (Office of the Attorney General of New Jersey, 2009). ASARCO had several large fuel spills on their property at 901 Oak Tree Road, in South Plainfield, where they processed minerals and stored wastes. The fuels formed underground plumes, contaminating over 80 acres of ground water. It is estimated that it will take 5 years for the ground water to self-remediate, and 50 years for the underlying bedrock to be clear of TCE, PCE, arsenic, chloroform, carbon tetrachloride, and other contaminants (Office of the Attorney General of New Jersey, 2005). When the South Plainfield contamination, as well as other ASARCO contamination was discovered, ASARCO filed for Chapter 11 bankruptcy protection. This resulted in the largest environmental bankruptcy filing in United States history, on claims of $1.8 billion for environmental cleanup and restoration in 19 states. The Office of the New Jersey Attorney General petitioned for claims of $1.5 million for the Oak Tree site. Other New Jersey municipalities filed separate claims. South Plainfield was awarded more than $1 million for damage to its natural resources, to be paid to New Jersey’s DEP for
remediation. The settlement did not consider the financial, physical, or emotional impact of the contamination on nearby residents.

3.3 Participants and Sample Size

The researcher began by investigating communities of interest on the NPL website (http://www.epa.gov/superfund/sites/npl/status.htm). This website provides details concerning each site location, its demographics, names of the EPA and community contact persons, the currently known risk to humans and the environment, the best approach to address the risk, the cleanup progress to date, and community activities related to the contamination. The researcher used this website to investigate each community, and then used the Internet, telephone directories, and visits to the communities to understand community formal and informal structures and organizations, available resources, and community and interpersonal dynamics. In this way the researcher was able to collect organization contact information (including names, telephone numbers, email addresses, physical addresses, community meeting dates and times). On the initial visit to each community the researcher also photographed the community and its contaminated areas.

Community leaders identified on the NPL website for each community were called to request their assistance in identifying other key community persons and organizations. The script for speaking to key informants is in Appendix B. Potential key community members included local officials such as the mayor, council members, police and fire chiefs, civic leaders including Chamber of Commerce officers, school principals, clergy, and the presidents of social and service organizations. Some of these leaders were willing to direct the researcher to other key community contacts. The researcher also
telephoned, wrote, or emailed representatives of public interest groups, and engaged persons who attended community events, or who responded to solicitations through community agencies, at church and community meetings, and through notices posted in visible locations such as store windows, newspapers, community bulletin boards and websites (Appendices E-K). The researcher asked contact persons for permission to meet with their groups, and gave them her telephone number and email address. Upon obtaining permission, the researcher and contact persons arranged mutually agreed upon times and places for administering the survey.

Ellenville was the first community the researcher studied. She encountered some obstacles when trying to encourage residents to participate. Realizing that in many small communities churches are focal points, she reached out to church leaders via email, letters, and phone calls. Many did not respond. The few who did, either said that they wanted to see the questionnaires ahead of time (this was not a problem), or that they wanted to administer the questionnaires themselves (this was a problem). In general most of the church leaders were negative about allowing their congregants to participate without the leaders’ direct intercession. Fortunately one leader was very receptive, and also suggested that the researcher contact a social service agency; Family of Ellenville (FOE). The director at FOE was very welcoming, and arranged a day for the researcher to meet with the clients. The FOE director posted notices in advance, and encouraged her staff to participate as well. Another very helpful organization was the Knights of Columbus (KOC); a Catholic fraternal men’s organization. The head of the local chapter stated that he responded to the research request because it was being sponsored by a Catholic university, and participation would be a form of community service. The
chairwoman of the local chapter of the National Association for the Advancement of Colored People (NAACP) was also receptive (Appendices L-M). She invited the researcher to distribute the survey as part of a community health fair, and asked her to give a presentation as well. Despite the researcher’s initial trepidation at asking store owners to post signs of upcoming questionnaire sessions, the owners were very receptive and helpful. As more notices appeared in the village, the researcher was more warmly received by community members, including Seventh Day Adventists who initially had not responded to her requests. In the Spring of 2011, the Adventists held a large parade and health fair in the village and drew community residents, and residents from nearby villages. This became an excellent opportunity for the researcher to meet residents, and to learn of environmental issues in the community.

Throughout the data collection process, the researcher became more astute in how to encourage participation. She always brought a folding card table and at least four chairs to encourage sitting, and decorated the table with an attractive tablecloth, a small vase with a fresh flower, and a small bowl of hard candies. Lacking the resources to have a silk screen banner, she created a colorful sign so passersby could immediately understand what was going on at the table. She also laid out environmental information sheets and pamphlets in different colors, to create an attractive display. Seeing people filling out the questionnaire encouraged other people to stop by. None of the respondents were given the environmental information until they had completed the questionnaire. Although the questionnaire could usually be completed in 20 minutes, people became so interested in making new acquaintances and discussing environmental issues in their neighborhoods that the sessions took on an unanticipated, yet wonderful atmosphere of
information sharing by participants and the researcher. Although none of the venue owners requested payment for using their spaces, the researcher did provide a raffle prize for the health fair at Pleasant Stone Farm as each vendor/presenter was requested to provide a small prize.

After she completed data collection in Ellenville, the researcher had a better understanding of how and where to promote sessions in South Plainfield. She had a broader understanding of how to successfully encourage participation; namely advertising through Internet forums like Topix, and placing advertisements in weekly newspapers. When she posted a notice online to the South Plainfield Observer, the editor quickly responded by email, requesting more information about the research. After receiving the information, the editor wrote that the information would best be presented as a letter to the editor (Appendix N). This was more than the researcher would have hoped for, and gave much-needed publicity. Recognizing that publicity is synergistic, she also sent emails to all elected officials, as well as to all members of the Chamber of Commerce, and community leaders. Five minutes after emailing one councilman, the researcher received a telephone call from him. He asked one or two questions about the research, and then stated that he was going to contact the Mayor. Not knowing whether she had committed a faux pas, the researcher hung up the phone, feeling a bit intimidated. Five minutes later, Mayor Matthew Anesh called to discuss the research. He suggested that the original questionnaire dates remain, but invited the researcher to participate in a children’s health day that was going to be held in three days. He provided contact names for filing an application, but when the researcher called the Mayor’s secretary the next day, the arrangements had already been completed. On the day of the event, the Mayor
and several of the councilmen completed questionnaires. The health day presented a prime opportunity because it was in the front parking lot of the Senior Citizen Center. The Center which is located on a busy intersection across from a busy park was a very visible location. Other activities at the event, such as face painting, balloon sculptures, arts and crafts, health assessments from a local hospital, and a clown waving to passersby, brought in more participants than the researcher would have attracted on her own. Also, the researcher had flyers available for the next questionnaire session. Several questionnaire respondents offered to post the flyers in their apartment buildings, thus helping to attract participants for subsequent promotions. None of the South Plainfield venue owners requested payment for using their spaces, and agreed to post advance notice of the event.

Although the researcher was able to garner interest from the South Plainfield community, some obstacles remained. After being placed on their agenda, she attended a meeting of the Environmental Commission. She explained her project and requested a one-on-one interview with a member of the Commission. None of the members volunteered. Only after prodding by the other members, did one gentleman agree. When the researcher called him the next day to set up a meeting date and time, he said he could not arrange a date, and that she needed to call him back the following week. After several further attempts to contact him, she abandoned the effort.

3.4 Data Collection Instruments

Quantitative Phase

A questionnaire was used in the quantitative phase of the study. The tool was comprised of 28 closed-ended questions (Appendix A) adapted from tools created from
the Mobilizing for Action through Planning and Partnerships (MAPP) and Protocol for Assessing Community Excellence in Environmental Health (PACE EH). These tools were created to assess individual or community-based knowledge and need, and were intended to be adapted to individual communities, which is what occurred in this study. Both the MAPP and PACE EH methods were created through efforts of the National Association of County and City Health Officials (NACCHO), an organization which represents 1,300 cities, county, town, and tribal health departments.

For the PACE EH, the NACCHO collaborated with the National Center for Environmental Health (NCEH) at the CDC. PACE EH enables communities and local governments to identify local health issues, rank environmental health concerns, and to prioritize strategies. PACE EH consists of 13 steps to engage the community in environmental health planning and assessment activities (NECH, 1998; NCEH, 2011). The steps include: determining whether the community has the capacity to support an assessment; defining the socioeconomic, political, geographic, and environmental elements in the community; setting goals and objectives; identifying and analyzing the priority environmental health issues; identifying standards by which to judge the health status of the community; reviewing available data; developing an action plan; and evaluating the success of the project. Each community is encouraged to adapt the process and the tools to fit their community, and to share their tools on the NACCHO website (www.naccho.org).

MAPP was developed between 1997 and 2000 by the NACCHO in cooperation with the Public Health Practice Office and the CDC. The intent was to help communities make strategic plans concerning health and quality-of-life issues by identifying individual
physiological and psychosocial health issues, community resources, limitations, and needs (NACCHO, 2007). MAPP uses seven phases, which are similar to PACE EH's 13 tasks. The phases are: organizing; developing a vision; assessing community resources; identifying strategic issues; identifying goals and strategies; taking action; followed by evaluating the action.

MAPP and PACE EH have several similarities. Both incorporate the belief that community change should involve community members. Actions should not be dictated by agencies, but should stem from the needs and expressed vision of the residents. Also both processes recognize that every community has unique characteristics that cannot be confined by unalterable assessment tools. For these reasons, there is a high degree of flexibility which allows each community to adapt the tools to fit their needs. Although this flexibility encourages local participation, the tools are often created and used without the rigor of reliability or validity testing. Despite the overlap between the two methods, PACE EH is the preferred method for environmental health planning, or conducting a community-based assessment, while MAPP is better for developing a comprehensive public health strategic plan for the community. PACE EH focuses on tactical issues, while MAPP focuses on strategic issues. Both approaches are reflected in Dixon and Dixon’s Integrative Environmental Health Model which looks at the entirety of personal and community understanding and experiences to understand how environmental issues impact a community.

The MAPP and PACE EH tools provided the researcher with appropriate questions for this research tool, but no existing community surveys could be used in their entirety because none addressed the role of nurses or forensic nurses to the researcher’s
satisfaction. Therefore the researcher created a new tool, the Community Environmental Health and Rights Assessment Tool (CEHRAT) that could not only address community environmental problems, and the health care and environmental rights issues that concern residents, but that also addressed the possible roles of forensic nurses as environmental health care providers.

In addition to appropriate questions culled from PACE EH community surveys, the researcher developed additional survey questions as a result of attending four community meetings in 2008 as an intern for the New York-based organization, West Harlem Environmental Action for Environmental Justice (WE-ACT). At these meetings community residents discussed their environmental needs and concerns. Anecdotally, the recurrent theme was that residents lacked environmental health and resource information. They stated that they lacked access to information, and did not know who to ask about their needs. Hence, several of the questions in CEHRAT reflect comments from those community meetings.

Prior to administering the survey to large numbers of participants, it was important to identify the amount of time it took to administer CEHRAT, whether any parts of the tool were difficult to understand, whether the sequence of questions were reasonable, and whether all of the questions yielded useful data (Polit & Beck, 2008). The survey was completed by 10 people. As a result of this preliminary work, several questions and their order in the tool were revised. The questions were then assessed for readability. The researcher wanted to ensure that the tool avoided unduly complicated sentence structures, or too many polysyllabic words. The questions scored an 8.2 reading level using the Flesch-Kincaid test, an 8.1 reading level on the SMOG (Simple Measure O


of Gobbledygook) test, and a reading ease of 59.8 indicating that it was easily readable by a 13 to 15 year old.

Due to the complexity of the tool it was important that there were sufficient responses in each community to allow the detection of differences among responses within each question, and to perform meaningful statistical tests, assuming the largest possible proportional response to a dichotomous variable: i.e. a response of 50% Yes, 50% No to any one question, and a margin of error of 5% at a 95% confidence level. Therefore the researcher anticipated that she would need to interview at least 100 residents from several communities to ensure that there were a sufficient number of useable replies.

**Qualitative Phase**

The interview guide (Appendix C) for the qualitative phase began by asking the participant to tell the interviewer about himself/herself. The next question asked the participant what it is like to live in his/her community. The third question asked participants how they first found out about environmental contamination in the community, and their initial reactions. The next question asked participants to tell about their personal experiences living with contamination.

3.5 Procedure for Data Collection

Participants were recruited according to procedures discussed earlier in this chapter. Adults over the age of 18 years were enlisted through snowball and purposive sampling without regard to race, gender, socioeconomic status, or age. The Environmental Protection Agency, the Centers for Disease Control and Prevention, and other research experts have identified snowball and purposive sampling as being the most
successful for community testing (NACCHO, 2007; Payne-Sturges, Schwab, & Buckley, 2004).

Quantitative Phase

For the quantitative data collection phase, times were arranged with community organizers for persons to complete the tool individually, or in small groups. In Ellenville, data collection occurred between February and June 2011 at several venues including Pleasant Stone Farm (a health food store), the Ellenville Public Library, a Knights of Columbus monthly meeting, a health fair sponsored by the Pathfinders of the Seventh-day Adventist Church, and Family of Ellenville (a social service agency). In South Plainfield, data collection occurred between May and July 2011 at a community health fair, at a local diner, and during several sessions at the Police Athletic Building.

Prior to receiving the tool, participants were asked to sign a consent agreement (Appendix O). Upon signing the agreement they were given the questionnaire. Having the researcher available during data collection provided an opportunity for participants to receive clarification if they had questions. One participant who expressed difficulty reading the questions had the questions read to him. At the end of the questionnaire Question 28 asked the participant whether she/he was willing to have a longer, individual interview. Some of the responders who so indicated were selected for participation in the qualitative portion of the study. Participants were also asked whether they would like to see the results of the study, and if so, how they would like to receive the information – in a follow-up group presentation, by letter, or by another method. The goal of presenting the research findings to the community is to provide resources that can support the community’s needs for information and improvement.
Upon completion, each survey was assigned a unique identification number. As an incentive for participating, Ellenville participants who completed the survey received a $5 gift card for Shoprite, the local supermarket. South Plainfield participants received a $5 gift card for an A&P supermarket. Participants also received environmental resource pamphlets that were unique for each community. The pamphlets contained relevant information concerning environmental contamination in their community, and private and government-funded environmental organizations that could provide additional information (Appendix P).

**Qualitative Phase**

The purpose of the qualitative phase was to elicit information in the epistemological and health protection domains of Dixon and Dixon’s Integrative Environmental Health Model (2002). That is, to understand how a respondent personally came to know about contamination in his/her community (the epistemological domain), and what they have done, what they want to do (individually or collectively as a community), or what they want others to do to reduce environmental hazards in their community (the health protection domain). Lastly, the researcher believed that personal stories would add more context to the background information and to the quantitative data that had already been collected. She wanted to understand what it meant for the residents to live in a community whose natural environment had been contaminated.

After CEHRAT responses were collected, the researcher called or emailed persons who had completed the survey and had indicated that they were interested in having an individual face-to-face interview. One interviewee had not been able to attend any of the CEHRAT sessions in South Plainfield, but after having read about the sessions
in the newspapers, she called the researcher. She was eager to discuss her personal
environmental contamination experiences.

The researcher attempted to select individuals who as a group comprised a diverse community profile. In a phenomenological study, it is important to select participants in a purposive manner so that a richer understanding of the research under investigation is developed (Creswell, 1998; Miles & Huberman, 1994; Seidman, 1998). Purposive sampling in this study was necessary to ensure that all participants from a range of backgrounds met the specific criteria outlined for study participation. The strategy for purposive sampling is to capture and describe the central themes that cut across variation (Patton, 2002). Therefore, a maximum variation sampling strategy was desirable because “any common patterns that emerge from great variation are of particular interest and value in capturing the core experiences and central, shared dimensions of a setting or phenomenon” (Patton, 2002, p. 235). The researcher used an interview guide (see Appendix C) to collect the data for this phenomenological portion of the study. Participants gave permission to be audio-taped. The data collection and analysis closely followed data collection strategies described by Richards and Morse (2007).

To ensure that the interviews were as meaningful as possible, they were held in locations that were both agreeable to the participants, and that provided privacy and comfort. Locations included the back of a quiet cafe in Ellenville, and a private office in the Police Athletic Building in South Plainfield. Since the researcher had already collected demographic data, she proceeded to an open-ended question such as, “What does it mean to live in this community?” The questions were designed to be open enough, yet precise enough to give the person the opportunity to develop his/her own
ideas. The researcher was mindful to avoid judgmental responses. Most of the interviews lasted 30 to 40 minutes. As small thank you gift for their time, Ellenville participants received a $5 gift card for Shoprite, the local supermarket, and South Plainfield participants received a $5 gift card for their local A&P supermarket. If the interview was held at a café, the researcher bought coffee or tea for the participant.

3.6 Procedures for Data Analysis

Upon completion, each survey was assigned a unique identification number. The research assistant examined the responses immediately after collection to find any missing or incomplete data. However no data analysis was performed until the qualitative phase was complete.

Qualitative Phase

The researcher followed accepted qualitative analysis strategies (Dimico, 2005; Richards & Morse 2007), using an iterative process of constructing and deconstructing the data in order to obtain the meaning of the experiences while being mindful of the person who was interviewed, and of the cultural, social and historical context of that person's situation. The researcher began the process by transcribing the interviews. She read, rewrote, observed, and reflected on the data to understand the lived experiences. She then entered the interviews into Weft QDA qualitative software, in order to manage and analyze the data. The data was coded by selecting key words, phrases, sentences, or expressions that were relevant to the research questions. The researcher then reviewed the transcriptions and drafted a summary of their contents in an effort to adhere to the phenomenological framework of the study and to gather the essences of the data. Key items were clustered and labeled, and meanings formulated for each descriptive
statement. By grouping the meanings, themes emerged. The researcher was mindful of the goal of this phase; to explore meaning of the lived experiences of the people, and to let their experiences reveal the themes relevant to their communities. She was looking for the meaning behind the words, to try to understand how their lives were shaped by their experiences. In order to clarify some of the interview information the researcher made follow-up phone calls, lasting less than 10 minutes each, to two participants. This second mini-interview also gave the researcher the opportunity to clarify or expand on issues raised in the initial interview.

Quantitative Phase

Prior to any analysis, the researcher examined all data for errors and inconsistencies. Microsoft Access was used to input the data into the computer and to organize it. SPSS, a statistical software program, was used to analyze the data. Some computations were also done by hand to verify the computer generated results. A statistician was consulted throughout the data analysis process.

Interpretation of scores for CEHRAT is norm-referenced because the scores allow the researcher to see how a respondent’s scores compare to those of other participants. Depending upon the CEHRAT question, it was scored as Yes=1, No=0, or if it was Likert-style format, it was scored from 1 to 5, with 1 being the most negative response, and 5 being the most positive. For Yes/No questions, missing data was scored as a ‘No’. For Likert-style questions, missing or blank data was given a score of ‘0’.

Because data was collected from more than one community, variables for each community were analyzed separately. When the results did not vary significantly between communities, the results were combined. Some data was transformed, and some variables
were cross-tabbed for ease of analysis, or to increase understanding of the results. Statistical analyses included frequency distributions, mean, median, mode, standard deviation, $z$-tests, $F$ tests, $t$-tests, and Spearman’s rank correlation tests.

After the results of the quantitative and qualitative phases were analyzed, the researcher looked to see where the results corroborated or enhanced each other, and how each phase added to answering the research questions.

3.7 Procedure for Protection of Human Subjects

Duquesne University’s Institutional Review Board approved this study prior to its implementation (Appendix D). Throughout the study the researcher protected participants from harm or discomfort, and their rights were not abused. Prior to receiving the survey each participant read and signed the consent form (Appendix O). The form explained the purpose of the study, its risks and benefits, methods of ensuring confidentiality, and the participant’s right to withdraw from the study at any time for any reason. The consent form also explained that participation in the study would involve no known risks beyond those of everyday life. Participants were also informed that they could receive psychological counseling if the survey or interview elicited any emotional disturbances. No participants requested psychological support.

Confidentiality was maintained at all times. No participants were identified by name in the final report, and no information that specifically identified a participant or anyone that the participant discussed has been included in any published documents. Computers, voice recorders, software, and flash drives that contain the research data are password protected. All hard copies of the quantitative and qualitative data will be maintained in a locked file cabinet in the researcher’s home for five years after
completion of the study and dissemination of the findings. At that time all paper responses will be destroyed by shredding, and the contents of the voice recorder, flash drive, and other hardware will be erased.
Chapter 4

Results

4.1 Introduction to Quantitative Results

Two communities were surveyed; Ellenville (population 4,135), a village in Ulster County, New York, and South Plainfield, a borough (population 20,000) in Middlesex County, New Jersey. In total, 198 persons returned surveys; 109 persons living or working in Ellenville, and 89 persons from South Plainfield. These communities were selected because they were recent inclusions on the NPL list (after 2000), they have at least 1,000 humans potentially affected by the contamination, major clean-up activities had not been completed by the start of data collection, and exposure to humans had yet to be brought under control.

The data analysis was designed to identify similarities and differences in the responses from the two communities while responding to the research questions. When statistically possible, results from the two locations were combined. Four basic statistical methods were employed as appropriate: the two-proportion z-test to evaluate observed differences between percentages; Spearman’s Rank Correlation test to compare how survey responders ranked sources of health, environmental problems and environmental information, and for data such as age, income and the number of medications used, the $F$ test to evaluate the observed ratio of variances, and where homoscedacity was identified, the $t$-test to compare means.

4.2 Demographics of Participants

Demographics for the respondents from both communities appear in Tables 1-4. There are statistically significant differences between the communities for each of these
demographics. For this reason a degree of caution is required when combining the information from the two localities. Conversely, agreement between how respondents from the two communities relate to environmental and health questions is strengthened by the diversity of the demographic backgrounds.

4.3 Age

The average age of the two sets of responders (Table 1) shows a statistically significant difference, and this difference appears to be a function of how the questionnaires were conducted in the two communities. So far as variability is concerned the two age samples could well have come from the same population (variance ratio = 1.24 < the 0.05 \( F \) table value of 1.4), and the two distributions can accordingly be considered to share a common standard deviation (to be homoscedastic). There is however a meaningful difference in the two mean ages, with Ellenville respondents (54.3 years) being on average older than those from South Plainfield (50.5 years); with 192 degrees of freedom, the \( t \)-value of 1.733 falls between table values for \( p = 0.05 \) (1.653) and \( p = 0.01 \) (1.972). The South Plainfield residents may have been younger due to the location of a meaningful part of the data collection. Several of the sessions in South Plainfield were held in the PAL building, where most of the visitors are there to use the exercise room, or participate in other recreational activities. By contrast, a large number of the Ellenville respondents were senior citizens, with many interviewed at a Knights of Columbus meeting. This difference in age in turn explains much of the difference in the observed employment status between the two communities with a large proportion of the Ellenville responders classifying themselves as retired (Table 2).
Survey responders were on average older than the general populations of their respective communities.

Table 1

*Age Distributions for Respondents from Ellenville (n=109) and South Plainfield (n=89)*

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Percent**</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>18 - 25</td>
<td>10</td>
<td>4</td>
<td>1.39</td>
</tr>
<tr>
<td>26 - 29</td>
<td>2</td>
<td>5</td>
<td>1.33</td>
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<tr>
<td>30 - 39</td>
<td>6</td>
<td>12</td>
<td>1.82*</td>
</tr>
<tr>
<td>40 - 49</td>
<td>13</td>
<td>20</td>
<td>1.85*</td>
</tr>
<tr>
<td>50 - 59</td>
<td>32</td>
<td>24</td>
<td>0.54</td>
</tr>
<tr>
<td>60 - 69</td>
<td>25</td>
<td>18</td>
<td>0.60</td>
</tr>
<tr>
<td>70 - 79</td>
<td>16</td>
<td>5</td>
<td>2.25*</td>
</tr>
<tr>
<td>80 and older</td>
<td>1</td>
<td>1</td>
<td>0.12</td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Mean</td>
<td>54.3</td>
<td>50.5</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>54.5</td>
<td>50.5</td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td>15.802</td>
<td>14.205</td>
<td></td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
** The base for each of the responders’ percents excludes Missing.

4.4 Gender, Race/Ethnicity, and Education

Results for gender, race/ethnicity, and education, are shown in Table 2. There was a greater proportion of male respondents from Ellenville (46.3% male) compared to South Plainfield (33.7%). The difference is significant at the 5% level.

Caucasians represented the largest number of respondents in each community (66.3% for Ellenville, and 67.4% for South Plainfield). African-Americans/Black were 13.5% of the Ellenville participants, and 20.2% of the South Plainfield participants. There
are no meaningful differences in the make-up of the two survey samples for these two dominant groups. The significant differences between the two samples occur due to the relatively high number of Hispanics in Ellenville, and the high number of Asians in South Plainfield. Persons who identified themselves as ‘Other’ or ‘Don’t Know’ represented more than one race or ethnicity.

Educational levels were higher in South Plainfield than in Ellenville. The majority of Ellenville respondents were high school graduates/GED holders (25.0%). Most of the South Plainfield respondents had some college education; only 7.9% had a high school diploma or GED as their highest degree. This difference between the two localities is extremely significant—it could have occurred by chance in less than 1 in 1,000 similar comparisons.

There was a significantly higher employment rate in South Plainfield (65%) than in Ellenville (50%). To a large extent this is due to the significantly greater proportion of retired persons included in the Ellenville survey, and this in turn relates to the Knights of Columbus session from which many of the Ellenville responders were obtained (see earlier comments). Two variance $F$ test = 1.10 (97 & 89 degrees of freedom respectively). This calculated value is less than the $F$-distribution value of 1.4 for $p = 0.05$. The two distributions can accordingly be considered to have a common standard deviation (homoscedastic).
Table 2

**Demographic Characteristics for Ellenville and South Plainfield Participants**

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Ellenville Frequency</th>
<th>South Plainfield Frequency</th>
<th>z-test *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
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</tr>
<tr>
<td>Male</td>
<td>50</td>
<td>30</td>
<td>1.81</td>
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<td>Female</td>
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</tr>
<tr>
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<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian/White</td>
<td>69</td>
<td>60</td>
<td>0.16</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>15</td>
<td>1</td>
<td>3.67</td>
</tr>
<tr>
<td>African-American/Black</td>
<td>14</td>
<td>18</td>
<td>1.25</td>
</tr>
<tr>
<td>Asian, Pacific Islander</td>
<td>0</td>
<td>8</td>
<td>2.96</td>
</tr>
<tr>
<td>Other or Not Known</td>
<td>6</td>
<td>2</td>
<td>1.27</td>
</tr>
<tr>
<td>Missing</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 1 – 8</td>
<td>4</td>
<td>0</td>
<td>2.04</td>
</tr>
<tr>
<td>Grades 9 – 11</td>
<td>19</td>
<td>15</td>
<td>0.26</td>
</tr>
<tr>
<td>Grade 12 or GED</td>
<td>26</td>
<td>7</td>
<td>3.35</td>
</tr>
<tr>
<td>College 1 - 3 years</td>
<td>22</td>
<td>26</td>
<td>1.45</td>
</tr>
<tr>
<td>College 4+ years</td>
<td>22</td>
<td>33</td>
<td>2.45</td>
</tr>
<tr>
<td>Masters degree or Higher</td>
<td>12</td>
<td>8</td>
<td>0.58</td>
</tr>
<tr>
<td>Missing</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>52</td>
<td>57</td>
<td>2.09</td>
</tr>
<tr>
<td>Not Employed**</td>
<td>23</td>
<td>17</td>
<td>0.48</td>
</tr>
<tr>
<td>Retired</td>
<td>29</td>
<td>14</td>
<td>2.04</td>
</tr>
<tr>
<td>Missing</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

**4.5 Income**

Although the $46,573 mean household income in South Plainfield was higher than the average of $42,629 for Ellenville, it is not significantly so (t-test = 1.44). Using 184 degrees of freedom, this value is between 1.286 for p = 0.01 and 1.653 for p = 0.05.
Despite this lack of statistical difference in the two average incomes there are noticeable
differences between the two localities in two of the components that combine to create
these averages (Table 3). Ellenville responders had a significant greater presence in the
$40,000 income class, while in South Plainfield there was a significantly greater
proportion of responders in the highest group ($60,000 or more).

Table 3

Respondents' Annual Household Incomes

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Ellenville</th>
<th></th>
<th></th>
<th>South Plainfield</th>
<th></th>
<th></th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent**</td>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under $20,000</td>
<td>17</td>
<td>17.5</td>
<td></td>
<td>13</td>
<td>14.6</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>$20,000 - $29,999</td>
<td>13</td>
<td>13.4</td>
<td></td>
<td>10</td>
<td>11.2</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>$30,000 - $39,999</td>
<td>10</td>
<td>10.3</td>
<td></td>
<td>12</td>
<td>13.5</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>$40,000 - $49,999</td>
<td>18</td>
<td>18.6</td>
<td></td>
<td>6</td>
<td>6.7</td>
<td>2.48*</td>
<td></td>
</tr>
<tr>
<td>$50,000 - $59,999</td>
<td>14</td>
<td>14.4</td>
<td></td>
<td>11</td>
<td>12.4</td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td>$60,000 or more</td>
<td>25</td>
<td>25.8</td>
<td></td>
<td>37</td>
<td>41.6</td>
<td>2.30*</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>12</td>
<td>11.0</td>
<td></td>
<td>0</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Mean: $42,628.87 (Ellenville) $46,573.03 (South Plainfield)
Standard deviation: $18,263.43 (Ellenville) $19,132.82 (South Plainfield)

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
** The base for each of the responders’ income percents excludes Missing.

4.6 Health

When asked to rate their health (Question 3), only 11.8% of all respondents (5.6%
for Ellenville, 17.9% for South Plainfield) considered themselves to be unhealthy (Table
4). The majority of respondents in the two communities consider themselves ‘Healthy’
(46.8% for Ellenville, and 43.8% for South Plainfield), with 88.2% of all respondents
(94.4% for Ellenville, 82.1% for South Plainfield) considering themselves to be more
healthy than not. The difference between the two communities is statistically significant
with the survey responders from Ellenville in general considering themselves healthier.
than do those from South Plainfield. Considering the higher average income of the South Plainfield responders (Table 3) and the greater incidence of smoking in Ellenville, this healthy self rating may be surprising. The respondents are overwhelmingly non-smokers (81.0% for Ellenville, and 90.9% for South Plainfield). This difference is statistically significant ($p < 0.05$).

Table 4

*Health Characteristics of Participants in Ellenville and South Plainfield*

<table>
<thead>
<tr>
<th>Health Characteristics</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very unhealthy</td>
<td>3</td>
<td>10</td>
<td>2.30*</td>
</tr>
<tr>
<td>Unhealthy</td>
<td>3</td>
<td>6</td>
<td>1.29</td>
</tr>
<tr>
<td>Somewhat Healthy</td>
<td>31</td>
<td>25</td>
<td>0.05</td>
</tr>
<tr>
<td>Healthy</td>
<td>51</td>
<td>39</td>
<td>0.42</td>
</tr>
<tr>
<td>Very Healthy</td>
<td>21</td>
<td>9</td>
<td>1.85*</td>
</tr>
<tr>
<td>Smoker</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>20</td>
<td>8</td>
<td>2.03*</td>
</tr>
<tr>
<td>No</td>
<td>85</td>
<td>90</td>
<td>2.03*</td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

* $z$-test $>1.64$ indicates a significant difference (probability $< 0.05$) between the data from the two communities

** The base for each of the responders’ percents excludes Missing

This state of good health is also seen in the number of medications that the respondents take each day (Table 5). Although the number of different medications ranged from 0 to 10 (combined mean = 1.62), over 44% of all respondents take no medications (47.7% for Ellenville, and 40.4% for South Plainfield). As there are no significant differences between the two communities in terms of their arithmetic means,
standard deviations or the percent of responders taking each of the different number of medications, the percentages have been combined. In Table 5, the calculated $F$ test $= 1.17$. With degrees of freedom of 105 and 89, the 0.05 value for the $F$ distribution is 1.4. As the calculated 1.17 is less than 1.4, the variance ratio is not significant. The calculated value for the $t$-test $= 0.88$, which is less than the table value of 1.04 for a probability of 0.15. The observed difference between the mean number of daily medicines is not significant.

Table 5

*Number of Medicines Taken Daily*

<table>
<thead>
<tr>
<th>Number of Daily Medicines</th>
<th>Ellenville Frequency</th>
<th>Ellenville Percent**</th>
<th>South Plainfield Frequency</th>
<th>South Plainfield Percent</th>
<th>Combined $z$-test*</th>
<th>Combined Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>51</td>
<td>47.7</td>
<td>36</td>
<td>40.4</td>
<td>1.02</td>
<td>44.0</td>
</tr>
<tr>
<td>1</td>
<td>17</td>
<td>15.9</td>
<td>14</td>
<td>15.7</td>
<td>0.03</td>
<td>15.8</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>11.2</td>
<td>13</td>
<td>14.6</td>
<td>0.70</td>
<td>12.9</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>7.5</td>
<td>9</td>
<td>10.1</td>
<td>0.65</td>
<td>8.8</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>7.5</td>
<td>7</td>
<td>7.9</td>
<td>0.10</td>
<td>7.7</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>3.7</td>
<td>4</td>
<td>4.5</td>
<td>0.26</td>
<td>4.1</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>3.7</td>
<td>2</td>
<td>2.2</td>
<td>0.62</td>
<td>3.0</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>0.9</td>
<td>2</td>
<td>2.2</td>
<td>0.72</td>
<td>1.5</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>1.9</td>
<td>0</td>
<td>0.0</td>
<td>1.43</td>
<td>0.9</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.1</td>
<td>1.01</td>
<td>0.5</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.1</td>
<td>1.01</td>
<td>0.5</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>1.8</td>
<td>0</td>
<td>0.0</td>
<td>1.43</td>
<td>0.9</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.53</td>
<td>1.80</td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.02</td>
<td>2.18</td>
</tr>
</tbody>
</table>

* $z$-test $>1.64$ indicates a significant difference (probability $< 0.05$) between the data from the two communities

* *The base for each of the responders’ percents excludes Missing.*
Respondents were asked about specific illnesses they or other immediate family members have had (Question 5). They could select as many choices as they wished. Responders from South Plainfield have had a significantly greater incidence of people with high blood pressure, cancer and/or diabetes (Table 6). Ellenville’s incidence of hearing and vision loss and/or alcohol dependency is significantly greater than South Plainfield’s. Because of the observed differences the data from the two localities cannot be combined. Write-in responses from Ellenville were ‘allergies’, ‘ADHD’, ‘dementia’, ‘spinal meningitis’, ‘a-fib’.

Table 6

<table>
<thead>
<tr>
<th>Illness</th>
<th>Ellenville</th>
<th>South Plainfield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol or drug Dependency</td>
<td>28 25.7</td>
<td>12 13.5</td>
</tr>
<tr>
<td>Arthritis</td>
<td>47 43.1</td>
<td>32 36.0</td>
</tr>
<tr>
<td>Cancer</td>
<td>44 40.4</td>
<td>52 58.4</td>
</tr>
<tr>
<td>Depression or anxiety</td>
<td>40 36.7</td>
<td>32 36.0</td>
</tr>
<tr>
<td>Diabetes</td>
<td>37 33.9</td>
<td>44 49.4</td>
</tr>
<tr>
<td>Hearing or vision loss</td>
<td>35 32.1</td>
<td>9 10.1</td>
</tr>
<tr>
<td>Heart disease</td>
<td>29 26.6</td>
<td>32 36.0</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>6 5.5</td>
<td>4 4.5</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>45 41.3</td>
<td>62 69.7</td>
</tr>
<tr>
<td>Lung disease/asthma</td>
<td>33 30.3</td>
<td>32 36.0</td>
</tr>
<tr>
<td>Other</td>
<td>7 6.4</td>
<td>3 3.4</td>
</tr>
</tbody>
</table>

*z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

**The base for each of the responders’ percents excludes Missing.
When asked how they paid for their health care (Question 6), Medicare/Medicaid and VA are significantly more popular methods of payment in Ellenville than they are in South Plainfield (Table 7). In South Plainfield there are a relatively higher percentage of cash payers than in Ellenville.

The one write-in response from Ellenville was ‘well care’.

Table 7

<table>
<thead>
<tr>
<th>Payment method</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent**</td>
<td>Frequency</td>
</tr>
<tr>
<td>Health insurance</td>
<td>74</td>
<td>67.9</td>
<td>53</td>
</tr>
<tr>
<td>Medicare/Medicaid</td>
<td>47</td>
<td>43.1</td>
<td>23</td>
</tr>
<tr>
<td>No insurance (pays cash)</td>
<td>9</td>
<td>8.3</td>
<td>17</td>
</tr>
<tr>
<td>Veterans Administration</td>
<td>8</td>
<td>7.3</td>
<td>0</td>
</tr>
<tr>
<td>Medicare Supplemental</td>
<td>8</td>
<td>7.3</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>2.8</td>
<td>1</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
* *The base for each of the responders’ percents excludes Missing.

4.7 Community Health and Safety

When asked how they would rate their community as a place to grow up, or to raise children (Question 4), responders from Ellenville suggested that their community was significantly less safe than did South Plainfield responders concerning their community; 10% ‘Unsafe’ versus 3% (Table 8). Similar proportions of responders agreed
that their communities were ‘Safe’, (43.0% in Ellenville, 44.9% in South Plainfield). The difference between the two communities arose with the ‘Very safe’ category, which was just 9.3% for Ellenville but 21.3% for South Plainfield. This difference is statistically significant.

Compared to community safety, a smaller percentage considered their communities to be healthy (Question 2). The majority of respondents from both communities (47.2%) rated their community as only ‘Somewhat healthy’ (45.0% for Ellenville, and 50.0% for South Plainfield). Only 29.4% of all respondents rated their communities as ‘Healthy’ or ‘Very healthy’ (30.3% for Ellenville, and 28.4% for South Plainfield). Significantly, none of the South Plainfield respondents rated their community as being ‘Very healthy’.
Table 8

Community Health and Safety for Ellenville and South Plainfield Participants

<table>
<thead>
<tr>
<th>Community Ratings</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent**</td>
<td>Frequency</td>
</tr>
<tr>
<td>Safety:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very unsafe</td>
<td>3</td>
<td>2.8%</td>
<td>2</td>
</tr>
<tr>
<td>Unsafe</td>
<td>11</td>
<td>10.3</td>
<td>3</td>
</tr>
<tr>
<td>Somewhat safe</td>
<td>37</td>
<td>34.6</td>
<td>25</td>
</tr>
<tr>
<td>Safe</td>
<td>46</td>
<td>43.0</td>
<td>40</td>
</tr>
<tr>
<td>Very Safe</td>
<td>10</td>
<td>9.3</td>
<td>19</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>1.8</td>
<td>0</td>
</tr>
<tr>
<td>Health:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very unhealthy</td>
<td>3</td>
<td>2.8</td>
<td>11</td>
</tr>
<tr>
<td>Unhealthy</td>
<td>24</td>
<td>22.0</td>
<td>8</td>
</tr>
<tr>
<td>Somewhat healthy</td>
<td>49</td>
<td>45.0</td>
<td>44</td>
</tr>
<tr>
<td>Healthy</td>
<td>28</td>
<td>25.7</td>
<td>25</td>
</tr>
<tr>
<td>Very healthy</td>
<td>5</td>
<td>4.6</td>
<td>0</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
** The base for each of the responders’ demographic percents excludes Missing

4.8 Health Care Information

Respondents were asked their level of satisfaction with the health care information they receive (Question 7). While the majority of respondents from both communities stated that they were satisfied with the health care information they received (44.0% for Ellenville, and 46.6% for South Plainfield), there were significantly more dissatisfied respondents from Ellenville (20.2%) compared to South Plainfield (9.1%) (Table 9).
Table 9

Health Care Information for Ellenville and South Plainfield Participants

<table>
<thead>
<tr>
<th>Level of Satisfaction</th>
<th>Ellenville Frequency</th>
<th>Percent**</th>
<th>South Plainfield Frequency</th>
<th>Percent</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very dissatisfied</td>
<td>6</td>
<td>5.5</td>
<td>0</td>
<td>-</td>
<td>2.52*</td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>16</td>
<td>14.7</td>
<td>8</td>
<td>9.1</td>
<td>1.22</td>
</tr>
<tr>
<td>Somewhat satisfied</td>
<td>26</td>
<td>23.9</td>
<td>25</td>
<td>28.4</td>
<td>0.72</td>
</tr>
<tr>
<td>Satisfied</td>
<td>48</td>
<td>44.0</td>
<td>41</td>
<td>46.6</td>
<td>0.36</td>
</tr>
<tr>
<td>Very satisfied</td>
<td>13</td>
<td>11.9</td>
<td>14</td>
<td>15.9</td>
<td>0.80</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>-</td>
<td>1</td>
<td>1.1</td>
<td>-</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
** The base for each of the stated percents excludes Missing

4.9 Environmental Problems

When asked what they felt were the most important environmental problems in their communities, respondents could select as many environmental problems as they wished (Question 1). The major environmental problems as perceived by the respondents differed significantly between the communities (Table 10): the square of the rank differences adjusted by the number of tied rankings = 540, which is greater than the test value of 423 (Spearman’s Correlation Test). Ellenville respondents considered garbage disposal and drinking water to be the major issues (61.5% for each), while South Plainfield respondents considered contaminated soil (79.8%), and then chemical pollutants (71.9%) to be their major concerns, with garbage disposal (9.0%) of much lesser importance. A write-in response from South Plainfield for the category ‘Other’ was ‘illegal dumping’.
Table 10

*Environmental Problems for Ellenville and South Plainfield Participants*

<table>
<thead>
<tr>
<th>Environmental Problem</th>
<th>Ellenville</th>
<th></th>
<th></th>
<th>South Plainfield</th>
<th></th>
<th></th>
<th></th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>Percent</td>
<td>Rank</td>
<td>Freq</td>
<td>Percent</td>
<td>Rank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage disposal</td>
<td>67</td>
<td>61.5</td>
<td>½</td>
<td>8</td>
<td>9.0</td>
<td>15</td>
<td>14½</td>
<td></td>
</tr>
<tr>
<td>Drinking water</td>
<td>67</td>
<td>61.5</td>
<td>½</td>
<td>53</td>
<td>59.6</td>
<td>4</td>
<td>3 ½</td>
<td></td>
</tr>
<tr>
<td>Tobacco smoke</td>
<td>53</td>
<td>48.6</td>
<td>3</td>
<td>26</td>
<td>29.2</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Chemical pollutants</td>
<td>51</td>
<td>46.8</td>
<td>4</td>
<td>64</td>
<td>71.9</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Polluted streams/rivers</td>
<td>47</td>
<td>43.1</td>
<td>5</td>
<td>60</td>
<td>67.4</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sewage disposal</td>
<td>43</td>
<td>39.4</td>
<td>6</td>
<td>11</td>
<td>12.4</td>
<td>14</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Pesticides</td>
<td>39</td>
<td>35.8</td>
<td>7</td>
<td>17</td>
<td>19.1</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Animal droppings</td>
<td>37</td>
<td>33.9</td>
<td>8</td>
<td>14</td>
<td>15.7</td>
<td>12</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Contaminated soil</td>
<td>36</td>
<td>33.0</td>
<td>9</td>
<td>71</td>
<td>79.8</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Food safety</td>
<td>33</td>
<td>30.3</td>
<td>10</td>
<td>19</td>
<td>21.3</td>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>31</td>
<td>28.4</td>
<td>11</td>
<td>52</td>
<td>58.4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Pests/rodents</td>
<td>29</td>
<td>26.6</td>
<td>12</td>
<td>13</td>
<td>14.6</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hazardous material</td>
<td>28</td>
<td>25.7</td>
<td>13</td>
<td>38</td>
<td>42.7</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Mold</td>
<td>26</td>
<td>23.9</td>
<td>14</td>
<td>6</td>
<td>6.7</td>
<td>16</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>20</td>
<td>18.3</td>
<td>15</td>
<td>15</td>
<td>16.9</td>
<td>10 ½</td>
<td>4 ½</td>
<td></td>
</tr>
<tr>
<td>Smells</td>
<td>15</td>
<td>13.9</td>
<td>16</td>
<td>15</td>
<td>16.9</td>
<td>10 ½</td>
<td>5 ½</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.9</td>
<td>17</td>
<td>3</td>
<td>3.4</td>
<td>17</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
** The base for each of the stated percents excludes Missing
4.10 Environmental Knowledge

By this point in the questionnaire responses, the perceptions of respondents appeared to change. Their responses became more negative. In response to the question concerning how much they know about the environmental contamination in their community (Question 8a), relatively few, less than a fifth of the respondents from both communities, considered themselves to be at least ‘Knowledgeable’ (Table 11). Only 8.5% were ‘Very knowledgeable’ (4.7% for Ellenville, and 12.4% for South Plainfield). For this category the South Plainfield percent was significantly greater than that of Ellenville.

In response to Question 8b, over two-thirds of the respondents (68.8%) have questions about the environmental contamination in their communities (63.3% for Ellenville, and 74.2% for South Plainfield). The difference between the two communities is significant at the 0.05 probability level.
### Table 11

*Environmental Contamination Knowledge in Ellenville and South Plainfield*

<table>
<thead>
<tr>
<th>Amount of Knowledge</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>No knowledge at all</td>
<td>12</td>
<td>5</td>
<td>1.43</td>
</tr>
<tr>
<td>Know a little</td>
<td>44</td>
<td>32</td>
<td>0.74</td>
</tr>
<tr>
<td>Somewhat knowledgeable</td>
<td>35</td>
<td>32</td>
<td>0.48</td>
</tr>
<tr>
<td>Knowledgeable</td>
<td>11</td>
<td>9</td>
<td>0.04</td>
</tr>
<tr>
<td>Very knowledgeable</td>
<td>5</td>
<td>11</td>
<td>1.90*</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

Has questions:

<table>
<thead>
<tr>
<th></th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>69</td>
<td>66</td>
<td>1.66*</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>23</td>
<td>1.66*</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

#### 4.11 Environmental Information

When asked about their level of satisfaction with the environmental information they receive about contamination in their community (Question 9), the majority of respondents in South Plainfield were ‘Somewhat satisfied’ (53.5%). In Ellenville only 32.4% respondents were ‘Somewhat satisfied’ (Table 12). Overall, South Plainfield respondents showed higher satisfaction levels than Ellenville respondents, with significantly more ‘Dissatisfied’ respondents ($p < 0.025$) in Ellenville, and significantly more ‘Somewhat satisfied’ respondents ($p < 0.025$) in South Plainfield. There are three significant differences between the two communities, each with $p < 0.025$ (for the categories ‘Very satisfied’, ‘Somewhat satisfied’, and ‘Dissatisfied’. These significant differences indicate that responders in Ellenville are much less satisfied than are those in
South Plainfield with the information received about environmental issues in their community.

Table 12

**Environment Information for Ellenville and South Plainfield Participants**

<table>
<thead>
<tr>
<th>Level of Satisfaction</th>
<th>Ellenville</th>
<th>South Plainfield</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent**</td>
</tr>
<tr>
<td>Very dissatisfied</td>
<td>9</td>
<td>8.3</td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>44</td>
<td>40.7</td>
</tr>
<tr>
<td>Somewhat satisfied</td>
<td>35</td>
<td>32.4</td>
</tr>
<tr>
<td>Satisfied</td>
<td>20</td>
<td>18.5</td>
</tr>
<tr>
<td>Very satisfied</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
** The base for each of the stated percents excludes Missing.

4.12 Environmental Rights

When asked how much they know about their environmental rights and the laws that protect their rights (Question 12a), two-thirds of the responders in both communities said they know little or nothing. The majority of respondents in both communities only ‘Know a little’ (Table 13). A significant number of Ellenville respondents confess to having ‘No knowledge at all’. This represents 29.0% of the Ellenville respondents, and 16.1% of the respondents from South Plainfield. Less than 10% of the respondents in both communities considered themselves at least ‘Knowledgeable’ about their environmental rights and laws, with only 1.2% being ‘Very knowledgeable’. Over 70% of all respondents have questions about their environmental rights and laws (68.8% for Ellenville, and 75.3% for South Plainfield).
### Table 13

*Knowledge about Environmental Rights in Ellenville and South Plainfield*

<table>
<thead>
<tr>
<th>Amount of Knowledge</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>Combined Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent**</td>
<td>Frequency</td>
</tr>
<tr>
<td>No knowledge at all</td>
<td>31</td>
<td>29.0</td>
<td>14</td>
</tr>
<tr>
<td>Know a little</td>
<td>43</td>
<td>40.2</td>
<td>43</td>
</tr>
<tr>
<td>Somewhat knowledgeable</td>
<td>24</td>
<td>22.4</td>
<td>21</td>
</tr>
<tr>
<td>Knowledgeable</td>
<td>9</td>
<td>8.4</td>
<td>7</td>
</tr>
<tr>
<td>Very knowledgeable</td>
<td>0</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>1.8</td>
<td>2</td>
</tr>
</tbody>
</table>

Has questions:

<table>
<thead>
<tr>
<th></th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>Combined Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>75</td>
<td>68.8</td>
<td>67</td>
</tr>
<tr>
<td>No</td>
<td>34</td>
<td>31.2</td>
<td>22</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities  
** The base for each of the stated percents excludes Missing.

### 4.13 Sources of Environmental Information

Respondents were asked from whom they received their environmental health information (Question 10). They could select as many sources as they wished.

Newspapers and magazines were the primary sources of environmental health information for both communities (Table 14) followed by the Internet, radio, and environmental organizations. The difference in ranking for the different sources was not statistically significant between the two communities. Licensed health care professionals (doctors, nurses, pharmacists) were all ranked poorly as sources of environmental health information. In both communities government agencies were ranked below environmental organizations as sources of environmental health information. TV/Radio ranked higher in Ellenville (third) than in South Plainfield (sixth), and Environmental
Organizations ranked higher in South Plainfield (second) than in Ellenville (fourth). The
difference in percents between the two communities for these two sources was
statistically significant.

Write-in responses from Ellenville for the category ‘Other’ were: ‘own research’,
and ‘what we hear after the fact’.

Table 14

Sources of Environmental Information in Ellenville and South Plainfield

<table>
<thead>
<tr>
<th>Sources of Information</th>
<th>Ellenville</th>
<th>South Plainfield</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>Percent**</td>
</tr>
<tr>
<td>Newspapers/magazines</td>
<td>74</td>
<td>67.9</td>
</tr>
<tr>
<td>The Internet</td>
<td>47</td>
<td>43.1</td>
</tr>
<tr>
<td>Television/radio</td>
<td>44</td>
<td>40.4</td>
</tr>
<tr>
<td>Environmental organizations</td>
<td>36</td>
<td>33.0</td>
</tr>
<tr>
<td>Friends</td>
<td>27</td>
<td>24.8</td>
</tr>
<tr>
<td>Government agencies</td>
<td>23</td>
<td>21.1</td>
</tr>
<tr>
<td>Doctors</td>
<td>16</td>
<td>14.7</td>
</tr>
<tr>
<td>Nurses</td>
<td>5</td>
<td>4.6</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>3.7</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
** The base for each of the stated percents excludes Missing.
4.14 Information Needed

Between the two communities there were several significant differences about what information respondents said they wanted to receive (Question 14). Ellenville respondents primarily wanted more information about ‘Clean water’ followed by ‘Contaminated soil’ (Table 15). South Plainfield respondents were much less concerned about clean water. Instead, receiving information about ‘Disease and illness’ was their primary need; an item chosen by 90% of the South Plainfield responders. By contrast, only 31% of Ellenville responders checked ‘Disease and illness’, ranking it only as 14 out of the 17 items they listed. Other information items that the two communities significantly differed on were garbage disposal, parks & recreation, the dumping of solid waste, how to organize the community, documenting/publicizing contamination, school safety and housing. A write-in response from South Plainfield for the category ‘Other’ said ‘impact on home values’.
### Table 15

*Information Needed in Ellenville and South Plainfield*

<table>
<thead>
<tr>
<th>Information Needed</th>
<th>Ellenville</th>
<th></th>
<th>South Plainfield</th>
<th></th>
<th>Rank</th>
<th>Diff</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%**</td>
<td>Rank</td>
<td>#</td>
<td>%</td>
<td>Rank</td>
<td></td>
</tr>
<tr>
<td>Clean water</td>
<td>89</td>
<td>81.7</td>
<td>1</td>
<td>58</td>
<td>65.2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Contaminated soil</td>
<td>75</td>
<td>68.8</td>
<td>2</td>
<td>59</td>
<td>66.3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Effect of chemicals on the body</td>
<td>70</td>
<td>64.2</td>
<td>3</td>
<td>61</td>
<td>68.5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Dumping of solid waste</td>
<td>68</td>
<td>62.4</td>
<td>4</td>
<td>39</td>
<td>43.8</td>
<td>7½</td>
<td>3 ½</td>
</tr>
<tr>
<td>Legal rights</td>
<td>57</td>
<td>52.3</td>
<td>6</td>
<td>42</td>
<td>47.2</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Effects of radiation</td>
<td>57</td>
<td>52.3</td>
<td>6</td>
<td>39</td>
<td>43.8</td>
<td>7½</td>
<td>1 ½</td>
</tr>
<tr>
<td>Garbage disposal</td>
<td>57</td>
<td>52.3</td>
<td>6</td>
<td>16</td>
<td>18.0</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Handling hazardous materials</td>
<td>53</td>
<td>48.6</td>
<td>8½</td>
<td>52</td>
<td>58.4</td>
<td>5</td>
<td>3 ½</td>
</tr>
<tr>
<td>Documenting/publicizing contamination</td>
<td>53</td>
<td>48.6</td>
<td>8½</td>
<td>31</td>
<td>34.8</td>
<td>9</td>
<td>½</td>
</tr>
<tr>
<td>Parks &amp; recreation</td>
<td>51</td>
<td>46.8</td>
<td>10</td>
<td>19</td>
<td>21.3</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>School safety</td>
<td>44</td>
<td>40.4</td>
<td>11</td>
<td>26</td>
<td>29.2</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Housing</td>
<td>43</td>
<td>39.4</td>
<td>12</td>
<td>22</td>
<td>24.7</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>How to organize the community</td>
<td>39</td>
<td>35.8</td>
<td>13</td>
<td>12</td>
<td>13.5</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>Disease &amp; illness</td>
<td>34</td>
<td>31.2</td>
<td>14</td>
<td>80</td>
<td>89.9</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Worker safety</td>
<td>30</td>
<td>27.5</td>
<td>15½</td>
<td>18</td>
<td>20.2</td>
<td>13½</td>
<td>2</td>
</tr>
<tr>
<td>Reducing smells</td>
<td>30</td>
<td>27.5</td>
<td>15½</td>
<td>18</td>
<td>20.2</td>
<td>13½</td>
<td>2</td>
</tr>
</tbody>
</table>

* *z*-test > 1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

** The base for each of the stated percents excludes Missing.
4.15 Most Trustworthy Sources for Environmental Health Information

Question 11 asked who the respondent would trust the most and the least to provide reliable environmental health information. Although respondents from both communities indicated in the first half of the survey that they primarily received environmental health information from printed media, and less often from environmental organizations and licensed professionals, when in the later half of the survey, they were asked who they would trust the most to provide reliable environmental health information, they stated that environmental organizations were the preferred source of information (Table 16). Doctors and nurses were also considered to be sources of reliable information, ranking above the Internet, and government agencies.

There is a strong correlation between the rankings responders from the two localities give to the different sources, yet when comparing percents, three significant differences are observed. Environmental organizations, considered the most reliable source by a majority of responders from both communities, were checked by a greater percent of people from South Plainfield than by people from Ellenville (83% versus 69%). Responders living in South Plainfield appear to rely much more on newspapers/magazines than do responders from Ellenville. The other significant difference in percents involved pharmacists who were ranked fourth, chosen by 37% of the Ellenville respondents, but only eighth (23%) by respondents from South Plainfield.

Write-in responses from Ellenville for the category ‘Other’ were: ‘Pastor. He is on the village board.’, ‘mostly unsure about whose info to trust’.
Table 16

**Most Trustworthy Sources of Environmental Health Information**

<table>
<thead>
<tr>
<th>Most Trustworthy Sources</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>Rank</th>
<th>Diff</th>
<th>z-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental organizations</td>
<td>75</td>
<td>68.8</td>
<td>1</td>
<td>74</td>
<td>83.1</td>
</tr>
<tr>
<td>Doctors</td>
<td>56</td>
<td>51.4</td>
<td>2</td>
<td>40</td>
<td>44.9</td>
</tr>
<tr>
<td>Nurses</td>
<td>46</td>
<td>42.2</td>
<td>3</td>
<td>35</td>
<td>39.3</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>40</td>
<td>36.7</td>
<td>4</td>
<td>20</td>
<td>22.5</td>
</tr>
<tr>
<td>Television/radio</td>
<td>37</td>
<td>33.9</td>
<td>5</td>
<td>26</td>
<td>29.2</td>
</tr>
<tr>
<td>Newspapers/magazines</td>
<td>35</td>
<td>32.1</td>
<td>6</td>
<td>47</td>
<td>52.8</td>
</tr>
<tr>
<td>The Internet</td>
<td>30</td>
<td>27.5</td>
<td>7</td>
<td>26</td>
<td>29.2</td>
</tr>
<tr>
<td>Government agencies</td>
<td>25</td>
<td>22.9</td>
<td>8</td>
<td>25</td>
<td>28.1</td>
</tr>
<tr>
<td>Friends</td>
<td>24</td>
<td>22.0</td>
<td>9</td>
<td>18</td>
<td>20.2</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

4.16 Least Trustworthy Sources for Environmental Health Information

As part of Question 11, respondents checked their least trustworthy sources of reliable environmental health information. In both communities, government agencies were indicated as being the least trustworthy sources (Table 17). Television/radio was perceived to be much less trustworthy by Ellenville respondents than by South Plainfield respondents ($p = 0.05$). So too were newspapers and magazines. With the environmental organizations and members of the health care professions being checked relatively infrequently, these ‘Least trustworthy’ rankings confirm the earlier ‘Most trustworthy’ rankings listed in Table 16.

By ranks, there is a strong direct correlation ($p = 5\%$ exactly) between the two communities regarding who they believed to be the least trustworthy sources for environmental health information.
Table 17

**Least Trustworthy Sources for Environmental Health Information**

<table>
<thead>
<tr>
<th>Least Trustworthy Sources</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>Rank</th>
<th>Rank</th>
<th>Diff</th>
<th>z-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government agencies</td>
<td>48</td>
<td>44.0</td>
<td>1</td>
<td>46</td>
<td>51.7</td>
<td>1</td>
</tr>
<tr>
<td>Television/radio</td>
<td>47</td>
<td>43.1</td>
<td>2</td>
<td>19</td>
<td>21.3</td>
<td>4</td>
</tr>
<tr>
<td>Friends</td>
<td>29</td>
<td>26.6</td>
<td>3</td>
<td>21</td>
<td>23.6</td>
<td>3</td>
</tr>
<tr>
<td>Newspapers/magazines</td>
<td>23</td>
<td>21.1</td>
<td>4</td>
<td>8</td>
<td>9.0</td>
<td>7 ½</td>
</tr>
<tr>
<td>The Internet</td>
<td>22</td>
<td>20.2</td>
<td>5</td>
<td>25</td>
<td>28.1</td>
<td>2</td>
</tr>
<tr>
<td>Doctors</td>
<td>17</td>
<td>15.6</td>
<td>6</td>
<td>8</td>
<td>9.0</td>
<td>7 ½</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>16</td>
<td>14.7</td>
<td>7</td>
<td>8</td>
<td>9.0</td>
<td>7 ½</td>
</tr>
<tr>
<td>Nurses</td>
<td>8</td>
<td>7.3</td>
<td>8</td>
<td>10</td>
<td>11.2</td>
<td>5</td>
</tr>
<tr>
<td>Environmental organizations</td>
<td>7</td>
<td>6.4</td>
<td>9</td>
<td>8</td>
<td>9.0</td>
<td>7 ½</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

4.17 Most Trustworthy Sources for Environmental Laws and Rights

When asked who they would trust the most and the least to help them understand environmental laws and their rights (Question 13), there was a strong correlation between the ranking of sources by responders from the two communities, with environmental organizations being the preferred source of information (Table 18). Newspapers and magazines are considered reliable sources by respondents from both communities, with South Plainfield respondents indicating them as being even more reliable than do Ellenville respondents (51% versus 31%). Responders living in South Plainfield tend to have more faith in government agencies and in print media than do Ellenville people. Doctors and nurses are also possible sources of information, ranking above the Internet, but below government agencies. One write–in response from Ellenville for the category, ‘Other’ said: ‘Pastor’.
Table 18

*Trusted the Most for Environmental Rights*

<table>
<thead>
<tr>
<th>Most Trusted Sources</th>
<th>Ellenville #</th>
<th>%</th>
<th>Rank</th>
<th>South Plainfield #</th>
<th>%</th>
<th>Rank</th>
<th>Difference</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental organizations</td>
<td>79</td>
<td>72.5</td>
<td>1</td>
<td>73</td>
<td>82.0</td>
<td>1</td>
<td>0</td>
<td>1.62</td>
</tr>
<tr>
<td>Doctors</td>
<td>37</td>
<td>33.9</td>
<td>2</td>
<td>27</td>
<td>30.3</td>
<td>4</td>
<td>2</td>
<td>0.54</td>
</tr>
<tr>
<td>Newspapers/magazines</td>
<td>34</td>
<td>31.2</td>
<td>3</td>
<td>45</td>
<td>50.6</td>
<td>2</td>
<td>1</td>
<td>2.80*</td>
</tr>
<tr>
<td>Nurses</td>
<td>31</td>
<td>28.4</td>
<td>4 ½</td>
<td>42</td>
<td>47.2</td>
<td>3</td>
<td>1 ½</td>
<td>2.74*</td>
</tr>
<tr>
<td>Government agencies</td>
<td>31</td>
<td>28.4</td>
<td>4 ½</td>
<td>42</td>
<td>47.2</td>
<td>3</td>
<td>1 ½</td>
<td>2.74*</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>30</td>
<td>27.5</td>
<td>6</td>
<td>17</td>
<td>19.1</td>
<td>9</td>
<td>3</td>
<td>1.41</td>
</tr>
<tr>
<td>The Internet</td>
<td>26</td>
<td>23.9</td>
<td>7</td>
<td>25</td>
<td>28.1</td>
<td>5</td>
<td>2</td>
<td>0.68</td>
</tr>
<tr>
<td>Television/radio</td>
<td>24</td>
<td>22.0</td>
<td>8</td>
<td>24</td>
<td>27.0</td>
<td>6 ½</td>
<td>1 ½</td>
<td>0.80</td>
</tr>
<tr>
<td>Friends</td>
<td>19</td>
<td>17.4</td>
<td>9</td>
<td>18</td>
<td>20.2</td>
<td>8</td>
<td>1</td>
<td>0.50</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>4.6</td>
<td>10</td>
<td>0</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
<td>2.29*</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

4.18 Least Trustworthy Sources for Environmental Laws and Rights

As one would hope, there was a strong direct correlation ($p = 0.01$) between the rankings of least trustworthy sources in providing environmental laws and rights information in the two communities (Table 19). South Plainfield respondents have least trust in government agencies, followed by television and radio. Ellenville respondents are also cautious about the information they receive from government agencies, as well as television/radio and printed media.

Participants from both communities indicated that they have confidence in nurses as a source for learning about environmental rights. Significantly, none of the South
Plainfield respondents checked nurses as an untrustworthy source. South Plainfield responders viewed newspapers/magazines as a good source for learning about environmental rights. Newspapers/magazines ranked second behind environmental organizations as a trusted source (Table 16) and sixth (along with doctors and the Internet) as a source not to be trusted (Table 17). In comparison, Ellenville responders ranked newspapers/magazines as the third most trusted source and second highest untrustworthy source.

Table 19

*Trusted the Least for Environmental Rights*

<table>
<thead>
<tr>
<th>Least Trusted Sources</th>
<th>Ellenville</th>
<th></th>
<th>South Plainfield</th>
<th></th>
<th>Rank Difference</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>Rank</td>
<td>#</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Television/radio</td>
<td>35</td>
<td>32.1</td>
<td>1</td>
<td>24</td>
<td>27.0</td>
<td>1</td>
</tr>
<tr>
<td>Newspapers/magazines</td>
<td>33</td>
<td>30.3</td>
<td>2</td>
<td>7</td>
<td>7.9</td>
<td>6</td>
</tr>
<tr>
<td>Government agencies</td>
<td>32</td>
<td>29.4</td>
<td>3</td>
<td>33</td>
<td>37.1</td>
<td>1</td>
</tr>
<tr>
<td>Friends</td>
<td>27</td>
<td>24.8</td>
<td>4</td>
<td>16</td>
<td>18.0</td>
<td>3</td>
</tr>
<tr>
<td>The Internet</td>
<td>20</td>
<td>18.3</td>
<td>5</td>
<td>7</td>
<td>7.9</td>
<td>6</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>14</td>
<td>12.8</td>
<td>6</td>
<td>9</td>
<td>10.1</td>
<td>2</td>
</tr>
<tr>
<td>Nurses</td>
<td>11</td>
<td>10.1</td>
<td>7</td>
<td>0</td>
<td>0.0</td>
<td>10</td>
</tr>
<tr>
<td>Doctors</td>
<td>9</td>
<td>8.3</td>
<td>8</td>
<td>7</td>
<td>7.9</td>
<td>6</td>
</tr>
<tr>
<td>Environmental organizations</td>
<td>2</td>
<td>1.8</td>
<td>9</td>
<td>5</td>
<td>5.6</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0.0</td>
<td>10</td>
<td>2</td>
<td>2.2</td>
<td>9</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities
4.19 Nurses

When asked specifically about nurses as the providers of environmental health care information (Question 15), respondents from both communities overwhelmingly (96.6%) indicated that they would trust them to provide such information if they were experienced in these matters (Table 20). Similarly, when provided with a brief description about forensic nurses, an overwhelming percentage of respondents (98.5%) stated that forensic nurses would be trusted to help members of the community.

For an Ellenville respondent who marked ‘No’, the following comment was written: ‘Nurses have same medical knowledge as doctors. Medical community stands by one train of thought’. A respondent from South Plainfield marked ‘Yes’, but wrote ‘Never heard of this degree’.

Table 20

<table>
<thead>
<tr>
<th></th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent*</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Trusts Nurses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>104</td>
<td>95.4</td>
<td>87</td>
<td>97.8</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>4.6</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>Trusts Forensic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>108</td>
<td>99.1</td>
<td>87</td>
<td>97.8</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>0.9</td>
<td>2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two communities

When asked in what areas forensic nurses would be most helpful (Question 16), ‘Educating people about protecting themselves’ was the most frequent response in Ellenville, while ‘Educating people…’ and ‘Treating people with physical or emotional
injuries’ were the most frequent responses (85.4% and 86.5%) in South Plainfield (Table 21). ‘Treating people…’ had a significantly greater frequency ($p < 0.01$) in South Plainfield than in Ellenville (86.5% versus 77.4%). ‘Helping people to understand their rights’ and ‘Investigating environmental problems’ were also selected as areas in which forensic nurses could be helpful in both communities. While these two areas were of lesser concern they were nonetheless checked by fully two-thirds of the two sets of respondents.

Write-in responses from South Plainfield were:

‘People’s advocate to government agencies’

‘Educating people about the extent of environmental risks in the community and about how the EPA determines the level of risk to human health.’
Table 21  

*Areas in Which Forensic Nurses Would be Most Helpful*

<table>
<thead>
<tr>
<th>Areas of Help</th>
<th>Ellenville</th>
<th>South Plainfield</th>
<th>z-test*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educating people about how to protect themselves from contamination</td>
<td>93</td>
<td>76</td>
<td>0.01</td>
</tr>
<tr>
<td>Treating people who have been physically or emotionally injured by contamination</td>
<td>80</td>
<td>77</td>
<td>2.36*</td>
</tr>
<tr>
<td>Investigating environmental problems</td>
<td>71</td>
<td>56</td>
<td>0.32</td>
</tr>
<tr>
<td>Helping people to understand their rights</td>
<td>70</td>
<td>61</td>
<td>0.64</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2</td>
<td>0.20</td>
</tr>
</tbody>
</table>

* z-test >1.64 indicates a significant difference (probability < 0.05) between the data from the two Communities

As a follow-up question, Question 17 asked whether there was anything that the researcher may be able to do to help, and what the respondent needs. Respondents had to write their answers.

Responses from Ellenville were:

‘Information about local water, soil, pollutants, etc.’

‘Give me general knowledge. That would be lovely!’

‘Information’

‘Have someone speak at NAACP meeting’
‘Pray on; prayer’

‘Information that we (agency) can pass on to our clients’

‘Issue 1 – outdoor ‘wood’ stoves (people have been burning tires and other potential contaminants). Issue 2 – in village of Ellenville some people burn garbage in fireplaces in homes all year round’

‘Impact study on steel pollution’

‘To offer general knowledge as to what to be aware of in our community’

Responses from South Plainfield were:

‘More understanding’

‘I think it would be helpful to have “mappings” available to pinpoint specific areas and problems’

‘To know that the companies on South Clinton Avenue are being monitored.’

‘Information’

‘Information on contamination’

‘Environmental problems which affect people. They may get cancer.’

‘Better publicity about avoiding existing hazards such as contaminated fish in Spring Lake/Bound Brook/New Market Pond.’

‘More effort to educate the community via school literature sent home and local newspaper.’

4.20 Introduction to Qualitative Results

Of the 198 participants who completed the survey in the quantitative phase of the study, 40 respondents marked ‘Yes’ to Question 28. This question asked whether they were willing to participate in an individual interview to discuss their experiences concerning the contamination in their community. Two of the respondents marked ‘Yes’ but did not provide contact information; address, email, or telephone number. When the
researcher contacted the remaining respondents, only eleven responded, and agreed to participate. Interview times were set up for seven people, but only five met the researcher at the appointed time. One South Plainfield woman had not attended the first phase of the study but read about the research in the local newspaper. She called the researcher and requested an interview. Ultimately six men and women were interviewed. Two males were Ellenville residents, and there were four participants (two males, and two females) from South Plainfield. The participants ranged in age from 55 to late 70s. Five of the participants were Caucasian, and one was African-American. Three of the participants were fully employed. One participant had active, chronic health issues.

The interviews were held in locations that were both agreeable to the participants, and provided privacy and comfort. Locations included the back of a quiet cafe in Ellenville, and a private office in the Police Athletic Building in South Plainfield. The researcher began each interview by thanking the participant for agreeing to be interviewed, saying that she would ask a few questions about their experiences living in a community that has environmentally contaminated areas, and then asking permission to start the voice recorder. The researcher then asked the participant to tell her a little about himself/herself. She then asked the participant what it is like to live in his/her community, how they first found out about the environmental contamination, and their initial reactions. Finally she asked participants to discuss their personal experiences living with contamination. Most of the interviews lasted 30 to 40 minutes. If the interview was held in a cafe, the researcher bought coffee or tea for the participant. As small thank you gift for their time, Ellenville participants received a $5 gift card for Shoprite, the local supermarket, and South Plainfield participants received a $5 gift card for their local A&P
4.21 Findings and Themes

Although the interviews covered a wide range of topics, several themes emerged. The following themes were identified through data analysis: A lack of knowledge; needing help; political involvement; the economy and personal finances; and how nurses can help. The following sections will present the similarities and differences between the participants’ comments.

4.21a. A lack of knowledge.

The condition of needing to know more about contamination, or the condition of not knowing enough about the contamination in his/her community was identified by all the participants. Key words and phrases in this theme were “I didn’t know”, “I wondered”, “Maybe”. Some of the information they did not know included not knowing who to go to for information or help, not knowing how the contamination was going to be resolved, and not knowing what they should do once they found out about the contamination.

One Ellenville participant discussed his experience when he first learned about the contamination: “When I first heard, I wondered what it was all about. Then one woman got really excited about it.” Another participant’s pervasive lack of knowledge about the contaminated site was evident when he said, “We didn’t think anything about swimming in the waters there, and playing in the junk yard. We didn’t know it was dangerous…. Nobody has told us anything.”

A South Plainfield resident wondered about what she still does not know. “I know this town has had a lot of problems with contamination, and I think there are still problems.”
A lack of knowledge included not knowing who to ask for information. “I don't know who to go to for help. I don't know who can tell me whether those smells are dangerous or not.” Another resident also wondered who she would go to. “I haven't complained or gone for help because I don't have any proof, and I don't know who to go to.”

Another resident did not know about the repercussions of speaking about the contamination:

I was wondering what would happen if I said anything. We weren't able to move. I wasn't sure of my health, I just didn't know…. His [her husband’s] position depended upon him living in town. As much as you think, let's get out, where can you go?

Several participants were concerned about unexplained environmental issues. A South Plainfield participant who lives near the old Nike Missile Base said,

He [her son] said that my building was built right next to a shooting range, and I'm wondering whether that is why I have so many health problems. I'm wondering whether they cleared out all the metal and debris from the rifle range before they built the buildings, or did they just bury everything? Maybe that's why I'm sick.

Another South Plainfield resident has wondered for years about what trucks were removing from the ASARCO site.

So one morning when they were trying to sell the site [ASARCO], I was going to work. Its winter-time. It’s black out at 5 o'clock. There were two trucks leaving there, I'm assuming with soil in them. Large trucks covered up with white. But I often wondered what were they pulling up at 5 o’clock that was covered? Why couldn't you do it in the daylight?...I don’t know where this plant started. I don't know how it was there, but there's obviously water contamination there…. I know that I was living in a contaminated area, but people would say, "No, its farmland.”

An Ellenville resident said, “I’m sure there are other polluters in this area, like the knife factory [Imperial Shrade Company], and some other factories in the area.”

Several South Plainfield respondents mentioned an unidentified black goo that oozed out of the ground near Veterans Park. They still do not know what it was. One resident said,
“You know, my husband played at that ball field in Veterans Park. You know when he was out and about there was black stuff coming up. But you think ‘That's over there.’

Discussing the same tarry substance, another resident said,

Another spot is less than a quarter mile from here, over in the park. There was like tar coming up out of the ground; ‘bout six or seven years ago. Cause after our Labor Day parade they used to have the town party down in the park. They had to stop. They moved it over to the PAL over on Maple Avenue because they didn't want people in the area. I don't know if the tar is still coming up. Maybe it’s like the La Brea Tar Pits.

A lack of knowledge concerned more than curiosity about a specific site. The impact of potential toxins on health was also a concern. One woman said, “I don't know but I think there's a very high incidence of cancer in this town.” Wondering about his neighbors’ lack of knowledge, an Ellenville resident said. “I wonder if they know what they are living next to”. A South Plainfield woman said,

I have breast cancer. First, my friend's property backs up to part of ASARCO. She just recently died of breast cancer. We moved in around '73, around '73. The girl who lived in the first house facing Park Avenue, which is just about half a block in, had MS. The girl in the next house had melanoma. She moved. The girl who moved in next died of colon cancer. The girl across the street from her died of a rare cancer. Skip a house, come to my house. I have breast cancer. The house next to me, the woman died of colon cancer, and her husband has a melanoma. The house next to her, the husband died of colon cancer. I'm sorry, bladder cancer. The boy down the street was diagnosed with leukemia. Behind me the woman had MS. She since had breast cancer and uterine cancer. The girl cattycorner to me, the woman there had lupus. The girl living there now has melanoma, and is dying.

Another South Plainfield resident was uncertain about how the toxins were affecting her health:

I'm wondering whether it [health problem] has something to do with where we live. Everyday there is dust on my furniture; all over my house, even with the windows closed. And I don't know why that would be. There is a fine dust that covers everything- no matter how much I dust. Maybe that dust is full of toxic chemicals.
Politics was mentioned by at least half of the participants, as a reason why the environmental contamination issues have not been resolved sooner. The South Plainfield resident who had cancer, said,

I don’t know how much politics is involved. This is a big Democratic town that supports a very big, powerful, democratic county that hence goes up the ladder to the state. So I mean, we've had mostly democratic mayors in the town. Just recently there have been Republicans. For years we had a whole democratic council. Everybody. Mayor on down, for years. Even if I didn't like you and you were a Republican, I would just vote you in just to get a voice on the Council that was different. I was like a crazed person. You would be the most miserable person, but if you were a Democrat, they voted for you. But that's how strong. So I think nobody wanted to open up a can of worms, and say "This town is fricking loaded with cancer." Because of the politics in this town.

Another response related politics, and a lack of progress at the Ellenville Dump. “That’s the problem in New York State. It’s all one party - no opposition. It doesn’t matter if it’s Republican or Democrat. If there’s no opposition, it’s a problem.” The other Ellenville resident also saw no effective response by politicians. “The politicians haven’t said much about it.” In South Plainfield, another resident did not expect politicians (aka government officials) to help with the contamination. “Politics doesn't really concern me. One's just as bad as the other. Whatever party gets in, the other one's going to say they're wrong. It just goes back and forth.”

The economy and personal finances were frequently mentioned by Ellenville and South Plainfield residents, as a reason why the environmental contamination had not improved. In Ellenville, “The problem is that the economy is bad here, and nobody wants to rock the boat.” Another resident said, “The bad economy is more of a problem, so
people aren’t as concerned about pollution, especially if they don’t live next to it.” In South Plainfield, the woman who had survived breast cancer explained her rationale for not leaving the borough when she first realized she was living in a contaminated community.

[I thought] What are we going to do? We can't move. We don't have any extra money. Three kids to put through college. I'm going to die any day now. I used that excuse for a long time. But I guess, you know, we did kind of put our heads in the sand, and just said, what could we do? We just didn't have the money to pick up and get out.

As time passed, she continued to evaluate the possibility of moving.

We needed his income. His position depended upon him living in town. As much as you think, let's get out, where can you go?...We're concerned now, because most of my husband's retirement money is tied up with the State. We're afraid of what the government is going to do to us. We were planning on moving.

A South Plainfield resident who has survived colon cancer also explained why environmental issues were a low priority to some residents (including him).

To me, I've been on unemployment for almost a year, working sporadically. When that runs out, I've got to buckle down and get something else. My wife and I both get Social Security now. I just got a raise. They made a mistake. They were paying me $14 like a month too little for the last year. Last Saturday there was $168 in my account I didn't know about. Yesterday I got a letter, explaining they weren't paying me enough. It ain't much, but its something….I think if most people don't see the black smoke belching out of the smokestack, they're not worried. Nobody wants to see money spent on something they can't see.

4.21d Needing Help

Residents of both communities wanted more help in understanding the contamination, and help in understanding the impact of environmental contamination on their health. “No one has come to ask questions, or to test the soil. Never, ever.” Another resident was also looking for someone to provide guidance to the community.
I don't think there is one voice who is speaking out, and saying "Let's look at this"....When we first came in, there were people who were very active. There was one man who was very active. Then he just faded out. I don't know if he just moved, or what. I think he had a doctor's degree, and he was very vocal. He probably died of cancer. He was vocal for many, many years.

One South Plainfield resident said she had agreed to the interview because she was very frustrated at the lack of accountability in the borough. “We need people to help us get to the right people; people who can tell us what’s going on.” A South Plainfield man wanted more answers than he has heard from community leaders:

Like what they've done here, I don't think that's going to totally solve everything, because they say they're finding things in the water. Contamination can go a quarter mile away, and then it sinks into the ground. It can go north or south. I remember a couple of years ago, less than a quarter mile from here, they were drilling to test for contamination. They did a few around town.

After recounting the incidences of cancer in her community, one South Plainfield resident wanted to have a proper investigation of the cancer rate. She said, “But no one has come into town to do it.” For some residents, the idea of help also means protection. “There’s some fencing around the site [Ellenville Scrap Metal], but that’s not the same as protecting us from what’s out there.”

Although both Ellenville and South Plainfield have environmental commissions, the respondents were either not aware of the commissions, or found them to be ineffective. One Ellenville resident said, “But there are no effective environmental organizations in the area. If there were, they would be kooks. I join these different environmental organizations, conservationists, and I quit. I quit every one of them because they don’t look at the whole picture.” Another participant said, “And I don’t hear the solutions. I don’t hear the long-term solutions about the long-term problems.”
4.21e Nurses Can Help

All of the participants believed that nurses could be beneficial in their communities’ contamination issues. The help included providing information in a manner that can be readily understood by lay people, caring for people who potentially have been affected by the contamination, and doing research. “Nurses are really important in health care. They know what’s going on. And they speak to you in regular language. They’re approachable. A lot of times doctors speak a different language.”

One resident had a high regard for nurses after his hospitalization for cancer surgery.

Nurses know a lot about disease. They have to know a lot because they take care of people who could die any second, if they weren’t watching them. When I was in the hospital, the nurses were excellent. They knew what they were doing, and what to look for. The guy next to me was really sick, and the nurses knew exactly what to do.

A South Plainfield resident said, “We need people to help us get to the right people; people who can tell us what’s going on.”

Residents in both communities were very receptive to the literature they received at the survey sessions.

The handout you gave was very helpful, because it’s easy for regular people to read. It’s hard if the words are too technical; people won’t bother reading. But information that is written in simple English, saying what the effects are of the chemicals would be good.

Another resident said, “Nurses could be really helpful here. We need to have people who care about what’s going on. These papers you handed out were really helpful. We need more of that.”
Chapter 5

Discussion of the Findings, and Implications for Nursing

5.1 Discussion of Findings

In this section, preceding data will be triangulated, and the results compared. A major concern prior to conducting the questionnaire sessions was whether the results from the two communities could be related. On the one hand, the researcher was looking for communities that had distinctively different characteristics, but she was also hoping to see some commonality in the responses between Ellenville and South Plainfield. Happily, the data sets often buttressed each other’s results, and showed that even for communities that are very different, common interests and concerns exist.

The quantitative data could stand alone in answering the two research questions concerning the self-identified needs of people who live in communities that have been exposed to environmental contaminants, and the potential role of forensic nurses in communities where there is environmental contamination. However the qualitative results add more context and depth of feeling to the questionnaire responses. Additional context was added by short fill-in remarks that some participants added to their questionnaires. The qualitative data also demonstrated the individuality of needs; some respondents were focused on their illnesses, while others were less concerned about their diagnoses, but still had environmental questions that had never been answered.

The qualitative data corroborated the quantitative data concerning what communities need. Despite initial responses that indicated a majority of respondents had a positive level of satisfaction in their environmental knowledge; as the survey progressed, residents from both communities marked that they had questions about
environmental contamination. In addition, two-thirds of the responders in both communities said they knew little or nothing about their environmental rights or the laws that protect those rights. The sources of information may indicate why the knowledge is poor. Many residents rely on printed and electronic media for their information, and do not receive information from knowledgeable health care professionals or environmental experts. Although when given the choice they indicated that they would prefer to use knowledgeable health care professionals or environmental experts, clearly they are using the resources that they perceive are most available to them. Taylor-Clark, Koh, and Viswanath (2007) also reported that the Internet and printed media were prime sources for getting environmental information, but that Internet information was also a barrier to knowledge, because it can be very technical, and overwhelming. The qualitative interviews also revealed a lack of knowledge, with respondents stating they did not know about what was occurring in their communities, and had questions about whether their health problems arose as a result of contamination. Harnish, Butterfield and Hill’s (2006) qualitative study of parents’ perceptions of environmental risk also found that people in affected circumstances report a lack of knowledge. However, simply supplying information may not be sufficient to mitigate exposure or risk. It may also be necessary to create socioeconomically and culturally appropriate interventions that the people can practice. One of the conclusions in the Taylor-Clark article (2007) was that information materials provided to community members should be concise and easy to read. Participants in this study reiterated this request.

Both quantitative and qualitative findings confirmed a lack of trust in government agencies. The intrusion of politics into contamination issues was mentioned by several
respondents as demonstrated by the low quantitative rankings for government agencies. The relationship between politics and environmental issues was documented extensively in Chapter 3. The lack of progress in codifying Executive Order 12898 is a prime example of how politics can impact environmental needs on a local level. Multiple attempts by Congressional Democrats to enact legislation to codify E.O. 12898 so that it cannot be nullified in the future, have been unsuccessful due to Republican opposition. This failure to enact protective legislation means that there is no guarantee that the environmental rights of jeopardized individuals will remain protected.

It is important to note that respondents mentioned that there was no one in the community who was helping them. Although there are environmental commissions in both locales, clearly the persons interviewed were either unaware of their existence, or did not see these organizations as viable resources. These findings corroborate the 2005 Gallup survey (Saad, 2009) that found that less than a third of the respondents put a ‘great deal’ of trust in federal or state environmental agencies, national or state environmental organizations, or local government agencies. The data from the two phases of this study is also corroborated by the results of Taylor-Clark et al. (2007). Although they focused on lower socioeconomic populations, they found that when discussing environmental contamination their respondents had a high level of distrust of those in authority.

It was interesting to note the frequent mention of the economy and personal finances as reasons for respondent’s lack of environmental action. The interview responses clearly show that participants believed that when needs are prioritized, financial concerns have greater importance compared to the well-being of residents.
Given the options, many respondents clearly want to trust someone, and they are willing to put their trust in nurses. An overwhelming percentage of respondents (96.6%) would trust nurses concerning environmental issues. Forensic nurses would also be trusted (98.5%). These findings also corroborate Gallup studies (Saad & Gallup, 2008), which found that nurses have the highest ranking among professionals for honesty and ethical standards, and currently have no peer in the rankings. The pollsters interviewed 1,010 adults by telephone (land-lines and cell phones), and asked them to rate the honesty and ethical standards of 21 different professional groups, including nurses, pharmacists, doctors, teachers, bankers, lawyers, accountants, clergy, and policemen. For the seventh straight year that the poll has been given, nurses had the highest ranking; 24% were rated as having a ‘Very high’ level of honesty and ethical standards, 60% ‘High’, and 14% ‘Average’, and 1% ‘Low’. Nurses have been ranked as the top professionals since 1999, when they were added to the survey. The only year that nurses were not selected as the top professionals was in 2001 after the terrorist attacks, when firefighters were added to the list on a one-time basis.

High regard for nurses is corroborated by CEHRAT respondents’ comments that nurses are knowledgeable, and that the respondents have had positive experiences when dealing with nurses. The role of the nurse as an educator in the questionnaire results (85.3% selected this) is supported by the interview responses which mentioned that there was much respondents needed to know concerning what was occurring in their environments. Actually all the respondents were very receptive to all four areas of help that were listed in the questionnaire; educating people about how to protect themselves from contamination, treating people who have been physically or emotionally injured by
contamination, investigating environmental problems, and helping people to understand their rights.

5.2 Implications for Nursing

Dixon and Dixon’s Integrative Environmental Health Model (2002) was the conceptual framework for this study. The model interrelates four domains of environmental concerns; the physiological domain, vulnerability domain, epistemological domain, and health protection domain. This research has demonstrated that environmental contamination can be understood using this model.

The physiological domain which concerns processes through which environmental agents affect individuals, was well-documented through extensive reports for the contaminated sites in and around Ellenville (EPA, 2011g; NYSDEC, 2011a; NYSDEC, 2011b) and South Plainfield (EPA, 2011h; EPA, 2011i; NJDEP, 2011a; Office of the Attorney General of New Jersey, 2005). Community and individual characteristics that address the vulnerability of Ellenville, South Plainfield, and their residents have been documented by census data, historical records collected by community historians and local librarians, and information collected by the researcher during site visits.

The epistemological domain, which focuses on how individuals and communities came to know about the effects of environmental agents, involves both personal thoughts and social knowledge. The thoughts and knowledge are very subjective, and may actually defy scientific evidence, but are important in understanding community and individual dynamics as the contamination issue is addressed by government agencies. By conducting the two phases of this study, this researcher has explored how participants came to know of the contamination, and how they think the contamination has affected
them. Generally the residents learned about the contamination from printed and electronic media. One individual saw trucks leaving a contaminated site in the early predawn hours, and inferred that there were toxic chemicals in her neighborhood. Her initial fears were well-founded; the ASARCO site did contain hazardous chemicals.

The health protection domain which focuses on what people do about the environmental exposure is comprised of three elements: concerns about environmental health, a belief that something can be done to address the issue, and actions that can be taken individually or collaboratively to protect the individual and community. Sadly, once the contamination was revealed in Ellenville and South Plainfield, public response was muted. For reasons which were revealed through this research, there was little individual or collective response. As one participant said, she buried her head in the sand. Other participants said that the need to be financially solvent was more important than pursuing environmental concerns. This is an important aspect to environmental contamination, because it harkens back to the issue of environmental justice; some people are too unempowered, or unknowledgeable to mount an effective defense against the contamination. The lack of power may not simply be due to race, or education, but to income and the need to balance priorities and personal responsibilities. As several participants said, earning an income takes priority over attending environmental meetings, especially if the contamination is invisible, or if remediation does not happen for years. Health care clinicians need to consider their responsibility as advocates when they see such constraints.

Dixon and Dixon’s model has been a valuable model for encapsulating the knowledge, thoughts, and actions that are generated when contamination occurs in
communities. As Harnish et al. (2006) found, the model is a good fit “both conceptually and strategically” for generating data in the field. An understanding of the various components of how to approach contamination is essential for the nurse and other care providers to who want to promote health and well-being in affected communities. The specific beliefs and behaviors identified in this study contribute to both environmental nursing, and forensic nursing, and provide a foundation for future study.

5.3 Limitations of Study

Several factors limited the generalizability of this study. Although every community has unique characteristics and problems, cost and time constraints limited the investigation to only two communities. The researcher recognizes however that each community has unique characteristics and challenges based upon the community's history, the type of contamination, the community’s geographic attributes, and social, demographic, economic, and racial characteristics. Therefore results obtained from these communities may not be representative of the hundreds of other communities that have environmental concerns. People living in communities with emerging environmental problems that have not been acknowledged may have a greater desire for outside intervention and a different desire for forensic nurses to help them.

The study was also limited by the demographics of the respondents. Because this was a convenience sample, the respondents in both communities were older than the general populations of their respective communities; 35.9 mean years for Ellenville, versus 54.3 years in the sample, and 37.9 mean years in South Plainfield versus 50.5 years in the sample. Since older residents may have different concerns than younger childbearing or childrearing residents, the results of this study may not mirror the
attitudes of the broader population in each community. Also, since participation in the study occurred through snowball sampling, residents with other viewpoints may have inadvertently been excluded. However this study is a starting point for further research. Later studies can help health care providers to understand how the environmental needs and concerns vary according to age and gender.

Another limitation is that the quantitative instrument has only recently been developed, and therefore has not undergone extensive validity and reliability testing. However this instrument was used because the researcher was unable to find an instrument that in its entirety contained the questions relevant to this research.

Lastly, since the research seeks to determine the possibility of expanding the role of forensic nursing, interviews conducted by a nurse may have caused some participants to be biased in favor of nurses; especially when they responded to Question 11 (“Who would you trust the most to provide you with reliable environmental health information?”) and Question 13 (“Who would you trust the most to help you about your environmental laws and your rights?”).

If the researcher repeated this study she would shorten the questionnaire. Some respondents mentioned that the questionnaire was lengthy. A larger font for the confidentiality form might be helpful for some of the older participants who demonstrated difficulty when reading the size 12 font. Allotting more time to trying to understand the politics of the community prior to initiating data collection would be helpful in future studies.
5.4 Relevance of Study

This study will add to the body of knowledge concerning contaminated communities, and how forensic nurses can best be utilized in this area. The results speak favorably for nurses, and lend credibility to forensic nurses who want to direct their attention toward environmental health care. The study provides opportunities for new challenges and endeavors, and expands the ways that nurses can care for individuals and communities.

Forensic nursing is an emerging profession for nurses who want to expand beyond their core nursing abilities and become experts in clinical diagnosis, legal nurse consulting, assisting in criminal and civil prosecution cases, and providing care to sexual assault victims. Forensic nurses are educated in criminal and civil proceedings, are knowledgeable about conducting investigations, and have the scientific training necessary to proceed in such investigations. Forensic nurses also receive education on how to work as part of an interdisciplinary team of scientific and healthcare professionals.

Recalling suggested nurse-related interventions on the EnviRN website (2011), some interventions such as collecting client history on the exposure to potential toxins; investigating the possible risks; identifying patterns of illness; educating individuals, community members, and other nurses about health risks, policies, and regulations; and advocating for changes in the conditions, and in policies that allowed the exposures to occur are within the scope of forensic nurse practice. In support, the recent Institute of Medicine report, *The Future of Nursing*, (2010), advocates that advanced practice nurses be allowed to practice within their full scope, without impediments.
Findings from this dissertation research should encourage more advanced practice forensic nurses to focus on environmental issues. For example, forensic nurses could work with communities to investigate and collect data on active or past contamination, and do health mapping. For communities where there is a perception that the prevalence of cancer is high, residents are very concerned about whether those cancers have resulted from contamination. One South Plainfield participant noted a seemingly high incidence of cancer, but no government official had ever questioned her, and she was not aware of any health mapping being conducted in her neighborhood.

Forensic nurses can also advocate for people who feel like they do not have a voice. They can also be a liaison between people who have the information, and those who have questions, by helping people to articulate their concerns to government agencies and environmental polluters. With their knowledge of legal matters, forensic nurses can also work as expert witnesses. However, the research indicated that to be effective nurses will have to be seen as advocates for the laypersons, and not merely employees of government agencies or of polluters. Study participants disdained the politics and other dealings which appeared to put financial gain over health. It will be important for forensic nurses to be transparent in their interactions, and to clearly distinguish risk from actual harm.

Forensic nurses must be knowledgeable about public health; that is, population-based community health nursing. Public health may not have been part of their prior nursing education. Being more knowledgeable about public health will increase their ability to improve community health. When she first began her research, this researcher encountered opposition from public health nurses who stated that environmental issues
are within the domain of public health nursing, and that forensic nurses should not try to become involved. However as has been discussed in this research paper, environmental health care is so broad, and the needs are so great, that this topic does not lie solely within the realm of one type of nursing. Environmental contamination covers such a wide range of issues, that there is room for forensic nurses who want to contribute their expertise. In other words, collaboration between the public health nurse and the advanced practice forensic nurse can only serve to enhance the support for communities dealing with environmental contamination.

Any nurse who wishes to become more involved in environmental issues will need to spend time in affected communities. What a particular community and its members need depends upon many factors, including the socioeconomic and cultural texture of the community, the financial, political, and business dynamics, and the actual or perceived risk. An in-depth understanding of the community by researching historical information, and hearing the stories of community members will help the investigator to understand the community’s problems and needs. This in-depth understanding of the unique needs of a community is well within the educational level, and scope of practice of forensic nurses.

Based upon this study the primary community desire is for further education; the public wants more knowledge, and is reluctant to accept that information from government sources. Other opportunities include educating people about health risks policies and regulations, and advocating for change.

It is unclear whether nurses who work for the government would be accepted. Barring that option, nurses will need to find out who will pay for their skills. Will
communities hire forensic nurses to provide education? Should entrepreneurial nurses solicit environmental groups, or communities which have been contaminated for positions as investigatory consultants or educators? Depending upon individual state regulations which govern nursing practice, these may be viable options. This could encourage more advanced practice forensic nurses to develop environmental consulting businesses. The businesses would provide education to the affected communities, and could help communities that want to prevent contamination.

This study will be the starting point for the researcher’s future work in environmental health. She will consider the different health needs by the age of respondents, and their life stages (childrearing, elderly, etc.) to understand how these needs can be addressed at a community level. She will also investigate the needs of urban residents to understand how their needs vary from those of suburban/rural residents. Her ultimate goal is not merely to document what has occurred, but to anticipate community needs in vulnerable communities, so that residents feel more knowledgeable and empowered, and to encourage government interventions that address the deeper needs and concerns of communities. The researcher also wants to tackle the thorny issue of payment for services; that is, who will pay for forensic nurses? This question will involve not only asking communities, but also posing this question to government officials, politicians, and community leaders. If communities believe they need nurse involvement, what can government do to address these needs? Advocacy for independent nurse practices may provide a palatable alternative for cash-strapped governments, who want to appear to be responsive to community needs.
The results of this study will add to the body of knowledge for contaminated communities, and for forensic nurses. It provides opportunities for new challenges and endeavors, and expands the ways that nurses can care for individuals and communities. The results were consistent with prior studies, as it concerned barriers to community involvement, such as distrust, and a lack of knowledge.

5.5 Dissemination of Results and Community Follow-up

Now that the quantitative and qualitative data analyses have been completed, and conclusions drawn, the researcher will disseminate the results to individual participants and organizations within the researched communities by mutually agreed upon means. The researcher anticipates that she will meet with survey participants and other community members in an open forum, and that she will also distribute the results in writing, or for participants who so requested, by email. The results will maintain the confidentiality of participants by not linking individual responses to names or images. Also confidentiality will be maintained by removing any quotations that can identify its source. The findings will be presented using terminology and information tools that are compatible with the general educational level and knowledge base of the group (DuBay, 2007). Readability of printed materials will be confirmed by the Flesch-Kincaid test, the SMOG (Simple Measure of Gobbledygook) test, and reading ease levels. Informing the participants and discussing the implications will show respect for their contribution to the study, and will perhaps enable them to develop new ideas and strategies for managing their environmental risks. The information will be provided with the understanding that the social dynamics of the community and the perceived individual and group risks may cause participants to become more expressive about their circumstances, either to
advocate for change, or to advocate for the status quo (Sandman, 1991; Vaughan, 1995). The researcher also recognizes that there may be conflicting attitudes within the communities due to the historical, racial, cultural, and other socioeconomic conditions that exist. Being prepared to discuss not just the results, but their implications will be an important part of the meeting. The researcher will remain available to the community to help problem-solve, to provide resources for publicizing their issues, and in other ways that community members may find helpful. Throughout this phase the researcher will utilize the EPA's handbook on risk communication, which provides well-documented approaches to communicating with communities concerning environmental issues (Reckelhoff-Dangel & Petersen, 2007). The researcher will also present her findings in nursing journals (in particular, forensic nursing journals) and conferences.

5.6 Conclusion

The purpose of this study was to provide an understanding of the self-perceived physiological and psychosocial needs of persons living in communities which have been exposed to environmental contamination, and to provide an understanding of how forensic nurses can be utilized in these communities. Using Dixon and Dixon’s Integrative Environmental Health Model as a theoretical framework, the study used quantitative and qualitative methods in a cross-sectional triangulated study. The Community Environmental Health and Rights Assessment Tool (CEHRAT) was used to elicit quantifiable responses. One-on-one qualitative interviews were then conducted. The results from each phase of the study were then analyzed separately and merged.

The researcher enlisted persons over the age of 18 who lived or worked in Ellenville, New York, or South Plainfield, New Jersey. Questionnaires were returned by
198 participants (109 from Ellenville, and 89 from South Plainfield). For the qualitative phase, six residents were interviewed (two from Ellenville, and four from South Plainfield).

The majority of participants in each community were at most, ‘Somewhat satisfied’ with the environmental information they receive (32.4% for Ellenville and 53.5% for South Plainfield) with 40.7% of the Ellenville respondents being ‘Dissatisfied’. Less than a fifth of the respondents from both communities, considered themselves to be at least ‘Knowledgeable’ about environmental contamination in their community. Two-thirds of the responders in both communities said they know little or nothing. In both communities government agencies were ranked below environmental organizations as sources of environmental health information. Respondents stated that environmental organizations were the preferred source of information. Doctors and nurses were also considered to be sources of reliable information, ranking above the Internet, and government agencies.

Over 96 percent of respondents indicated that they would trust nurses to provide environmental information if the nurses were experienced in such matters. Similarly, when provided with a brief description about forensic nurses, an overwhelming percentage of respondents (98.5%) stated that forensic nurses would be trusted to help members of the community. Eighty-five percent of residents from both communities primarily wanted educational information so they could protect themselves from contamination. The qualitative data revealed themes that buttressed results from the earlier phase, and prior data: a lack of knowledge; the negative impact of politics, economics, and personal finances on remediating contamination in their communities; the
need for outside help; and that nurses can help affected communities by providing education, treatment, and investigation.

Nurses, especially forensic nurses, are needed in communities that have been environmentally contaminated. In addition to advancing their profession, forensic nurses can be catalysts for action by providing educational information, treating people who have been physically or emotionally affected by the contamination, and investigating active or prior contaminations. Forensic nurse involvement can also mitigate the anticipated public health nursing shortage. As the number of public health nurses is expected to decline by 2020 (ASPH, 2010), more nurses are needed to fill the void. This shortage can be addressed in part, by the forensic nurses.
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Appendix A

Community Environmental Health and Rights Assessment Tool

Please take a moment to complete the survey below. The purpose of the survey is to get your opinions about community health issues and health care providers.

1. In the following list, what do you think are the most important environmental problems in your community? (Select all that apply).

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking water</td>
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<tr>
<td>Tobacco smoke</td>
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<tr>
<td>Chemical pollutants</td>
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<td>Garbage disposal</td>
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<tr>
<td>Hazardous material handling</td>
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<tr>
<td>Pests/rodents</td>
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<tr>
<td>Noise</td>
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<td>Sewage disposal</td>
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<tr>
<td>Mold</td>
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<tr>
<td>Smells</td>
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<tr>
<td>Animal droppings</td>
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<tr>
<td>Polluted streams/rivers</td>
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<tr>
<td>Air quality</td>
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<tr>
<td>Contaminated soil</td>
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<tr>
<td>Food safety</td>
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<tr>
<td>Pesticides</td>
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<tr>
<td>Other</td>
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</tbody>
</table>

2. How would you rate your community? (Circle one)

1. Very unhealthy
2. Unhealthy
3. Somewhat healthy
4. Healthy
5. Very healthy
3. How would you rate your health? (Circle one)

1. Very unhealthy
2. Unhealthy
3. Somewhat healthy
4. Healthy
5. Very healthy

4. How would you rate your community as a place to grow up, or to raise children? (Circle one)

1. Very unsafe
2. Unsafe
3. Somewhat safe
4. Safe
5. Very safe

5. Have you or any one in your immediate family had any of the following illnesses? (Select all that apply).

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Diabetes</td>
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<td>Cancer</td>
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<td>Heart disease</td>
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<tr>
<td>Lung disease/asthma</td>
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<tr>
<td>Alcohol or drug dependency</td>
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<tr>
<td>High blood pressure</td>
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<td>Hepatitis</td>
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<td>Arthritis</td>
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<td>Hearing or vision loss</td>
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<td>Depression or anxiety</td>
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<tr>
<td>Other</td>
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</table>

6. How do you pay for your health care? (Select all that apply)

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>No insurance (pay cash)</td>
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<tr>
<td>Health insurance</td>
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<tr>
<td>Veterans Administration</td>
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<tr>
<td>Medicaid/Medicare</td>
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<tr>
<td>Medicare Supplement</td>
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<td>Indian Health Service</td>
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<tr>
<td>Don’t know</td>
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<tr>
<td>Other</td>
<td></td>
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</tbody>
</table>
7. How satisfied are you with the health care information you receive? (Circle one)
   1. Very dissatisfied
   2. Dissatisfied
   3. Somewhat satisfied
   4. Satisfied
   5. Very satisfied

8a. How much do you know about the environmental contamination in your community? (Circle one)
   1. No knowledge at all
   2. Know a little
   3. Somewhat knowledgeable
   4. Knowledgeable
   5. Very knowledgeable

8b. Do you have questions about the environmental contamination in your community?
   Yes____    No ___

9. How satisfied are you with the information you have received about environmental issues in your community? (Circle one)
   1. Very dissatisfied
   2. Dissatisfied
   3. Somewhat satisfied
   4. Satisfied
   5. Very satisfied

10. From whom do you receive your environmental health information? (Select all that apply).

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Environmental organizations</td>
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<tr>
<td>Nurses</td>
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<td>The Internet</td>
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<tr>
<td>Government agencies</td>
<td></td>
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<tr>
<td>Pharmacists</td>
<td></td>
<td></td>
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<tr>
<td>Doctors</td>
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<td>Friends</td>
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<td>Newspapers/magazines</td>
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<tr>
<td>Television/radio</td>
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<tr>
<td>Other _______________________</td>
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</tbody>
</table>
11. Who would you trust the most and the least to provide reliable environmental health information? (Select all that apply).

<table>
<thead>
<tr>
<th>Item</th>
<th>The Most</th>
<th>The Least</th>
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<tbody>
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<td>Television/radio</td>
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<td>Doctors</td>
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<td>Newspapers/magazines</td>
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<td>Government agencies</td>
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<td>Friends</td>
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<td>Nurses</td>
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<td>Pharmacists</td>
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<td>The Internet</td>
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<td>Environmental organizations</td>
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<tr>
<td>Other</td>
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</tbody>
</table>

12a. How much do you know about your environmental rights and the laws that protect your rights? (Circle one)

1. No knowledge at all
2. Know a little
3. Somewhat knowledgeable
4. Knowledgeable
5. Very knowledgeable

12b. Do you have questions about your environmental rights and the laws that protect your rights? Yes____ No ___

13. Who would you trust the most and the least to help you about environmental laws and your rights? (Select all that apply).

<table>
<thead>
<tr>
<th>Item</th>
<th>The Most</th>
<th>The Least</th>
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<tr>
<td>Newspapers/magazines</td>
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<td>Government agencies</td>
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<td>Nurses</td>
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<tr>
<td>Other</td>
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</tbody>
</table>
14. What information would you like to have concerning the environmental contamination in your community? (Select all that apply).

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease and illness</td>
<td></td>
<td></td>
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<tr>
<td>Legal rights</td>
<td></td>
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<tr>
<td>Handling hazardous materials</td>
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<tr>
<td>Clean water</td>
<td></td>
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<tr>
<td>Parks and recreation</td>
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<tr>
<td>Effects of chemicals on the body</td>
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<tr>
<td>How to organize the community</td>
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<tr>
<td>Effects of radiation</td>
<td></td>
<td></td>
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<tr>
<td>Documenting/publicizing contamination</td>
<td></td>
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<tr>
<td>Housing</td>
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<td></td>
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<tr>
<td>School safety</td>
<td></td>
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<tr>
<td>Worker safety</td>
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<tr>
<td>Garbage disposal</td>
<td></td>
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<tr>
<td>Reducing smells</td>
<td></td>
<td></td>
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<tr>
<td>Dumping of solid waste</td>
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<td></td>
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<tr>
<td>Contaminated soil</td>
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<tr>
<td>Other __________________________</td>
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</tr>
</tbody>
</table>

15. Would you trust nurses to give you information about your health, community, and environmental issues if they were experienced in these matters? Yes____ No ____
If you answered 'No', Please explain
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Forensic nurses investigate situations where people, their families, and communities have been physically or emotionally affected by abuse, accidents, violence or criminal activity. They also help care for those who are affected. Do you think a forensic nurse would be able to help you or other members of your community? Yes____ No ____
If you answered 'No', Please explain
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
If you answered ‘Yes’ in what areas would the forensic nurse be most helpful? (Select all that apply).

_____ Treating people who have been physically or emotionally injured by the contamination

_____ Investigating environmental problems

_____ Helping people to understand their rights

_____ Educating people about how to protect themselves from contamination

_____ Other __________________________________________________________

17. In general, is there anything that we may be able to do to help you? What do you need?
________________________________________________________________
________________________________________________________________
________________________________________________________________

Please answer the following questions about yourself so that we can understand how different people feel about community health issues.

18. Your Gender:  1. Male        2. Female

19. Your zip code: ___________________

20. Your age:
   1. 18-25 years
   2. 26-29 years
   3. 30-39 years
   4. 40-49 years
   5. 50-59 years
   6. 60-69 years
   7. 70-79 years
   8. Over 80 years

21. Do you smoke or chew tobacco products (cigarettes, cigars, pipes, chewing tobacco)?

   1. Yes
   2. No

22. How many different medicines do you take in a day? _____
23. Ethnic group you most identify with:

1. African-American/Black
2. Asian, Pacific Islander
3. Caucasian/White
4. Hispanic/Latino
5. Native American/Alaskan Native
6. Don’t know
7. Other ___________________

24. Annual household income:

1. Less than $20,000
2. $20,000 to $29,999
3. $30,000 to $39,999
4. $40,000 to $49,999
5. $50,000 to $59,999
6. Over $60,000

Number of people in your household ______

25. Your highest educational level:

1. Never attended school/ kindergarten only
2. Grades 1-8 (Elementary)
3. Grades 9-11 (Some high school)
4. Grade 12 or GED (High school graduate)
5. College 1-3 years (Some college, or technical school)
6. College 4 years or more
7. Masters degree or higher

Are you currently employed?  (Circle one)

1. Out of work
2. Self-employed
3. Employed part-time  ________ hours per week
4. Employed full-time
5. A homemaker
6. Retired
7. Unable to work
27. How would you like to receive the results of this survey?

1. By postal service mail
2. By email
3. At a community meeting
4. I am not interested in knowing the results
5. Other ____________________________

28. Are you willing to participate in an individual interview to discuss your experiences concerning the contamination in your community?

1. Yes
2. No

If you would like to be interviewed, please provide the following information, so we can contact you.

Name: _____________________________________
Address: ____________________________________
Telephone: _________________________________
Email: _________________________________

This concludes our survey. Everyone’s answers will be combined to give us information about the health practices of people in your community. Thank you very much for your time and cooperation!
Appendix B

Guide for the Researcher to Locate Key Informants and Research Participants

Script:

“Good morning. My name is Wendy Robinson. I am a graduate nursing student at Duquesne University, and I am conducting a study about the health and knowledge needs of people who live communities that have been exposed to environmental toxins. Your name was given to me, as someone who knows a lot about the community, and can direct me to people who would be willing to answer the survey questions. May I ask you a few questions?”

Questions will be posed from the following list:

- “Who are the people who know this community best?”
- “Who do people go to when they want changes made?”
- “Who are the most respected people in the community?”
- “Who are the people most vocal about the environmental issues?”
- “Who are the people who know this community’s history best?”
- “Who are the most isolated groups of people in the community?” “Who or what group reaches out to them?”
- “Which local groups are best at getting local residents to work on community projects?”
- “Are there many local associations (groups where members do most of the work)?”
• “Which are most successful at taking on community projects?” “Is your group one of those groups?”

• “How do local residents socialize? Where do they socialize?”

If the informant is a member of an organization, the researcher will ask:

• “Do you think your group members would be willing to answer a short survey?”

• “Will I need to receive clearance from someone besides from you?”

• “What would be a convenient time to meet the group?” “Where will the group feel most comfortable meeting?”

• “How many members should I expect?”

Upon concluding the conversation, the researcher will thank the informant for his/her help, and will leave her contact information (telephone number and email address). When a survey session is arranged, the researcher will confirm the meeting with the informant by telephone or email, a week in advance.
Appendix C

Qualitative Interview Guide and Prompts

Interview Guide:

“Thank for agreeing to speak with me. As a nurse researcher, I am interested in learning about your experience living in a community that has been contaminated. This information will help provide insight into how people who are living in similar circumstances can be helped.”

Questions will be posed from the following list:

- “Please tell me about yourself."
- “How did you feel when you first learned about the contamination?"
- “How have you (and your family) been affected by the contamination?"
- “What should be done to make this community better?"
- “What help do you and your community need to make that happen?"
- “How can nurses help you and your community?"
- “Is there anything else you would like to tell me?"

Prompts:

- “Go on.”
- “Can you tell me more about that?"
- “Could you give me an example?"
- “How do you feel about that?"
November 05, 2010

Dr. Kathleen Sekula  
School of Nursing  
Duquesne University  
Pittsburgh PA 15282

Re: The role of forensic nurses in communities experiencing environmental contamination  
(Protocol # 10.89)

Dear Dr. Sekula:

Thank you for submitting the research proposal of your student, Ms. Wendy Robinson. Based upon the recommendation of IRB member, Dr. Linda Goodfellow, along with my own review, I have determined that your research proposal is consistent with the requirements of the appropriate sections of the 45 Code of Federal Regulations 46, known as the federal Common Rule. The intended research poses no greater than minimal risk to human subjects. Consequently, the research is approved under 45 CFR 46.101 and 46.111 on an expedited basis under 45 CFR 46.110.

In addition the protocol has been reviewed and approved by HIPAA Officer, Dr. Joan Kiel.

The consent form is attached stamped with IRB approval and expiration date. Ms. Robinson should use the stamped form as original for copies that she distributes or displays.

The approval must be renewed in one year as part of the IRB’s continuing review. You will need to submit a progress report to the IRB in response to a questionnaire that we will send. In addition, if the consent form is still in use in one year, it will need to be renewed by our office. In correspondence please refer to the protocol number shown after the title above.

If, prior to the annual review, you and Ms. Robinson propose any changes in procedure or consent process, you must inform the IRB of those changes and wait for approval before they are implemented. In addition, if any unanticipated problems or adverse effects on subjects are discovered before the annual review, they must be reported to the IRB Chair before proceeding with the study.
When the study is complete, please provide us with a summary, approximately one page. Often the completed study's Abstract suffices. You or Ms. Robinson should retain a copy of research records, other than those destroyed for confidentiality, over a period of five years after the study's completion.

Thank you for contributing to Duquesne's research endeavors.

If you have any questions, feel free to contact me at any time.

Sincerely yours,

[Signature]

Paul Richer, Ph.D.

C: Ms. Wendy Robinson
Dr. Linda Goodfellow
IRB Records
POST CARD HAND-OUT

ELLENVILLE COMMUNITY SURVEY
SATURDAY, JUNE 4th, 11 am to 2 pm
ELLENVILLE PUBLIC LIBRARY & MUSEUM

SAVE THE DATE!!
TAKE THE ELLENVILLE COMMUNITY SURVEY
SATURDAY, JUNE 4th, 11 am to 2 pm
ELLENVILLE PUBLIC LIBRARY & MUSEUM

You must be at least 18 years old to participate.
The questionnaire takes about 15 minutes to complete.
All responses are kept strictly confidential.
Everyone who completes the survey receives a $5 gift card for a local store.
Pick up free literature about environmental issues in the community.

Want to know more? Contact Wendy Robinson at robinson2145@duq.edu
COMMUNITY SURVEY
If You Live or Work in Ellenville

Saturday, June 4th
11 am - 2 pm
Ellenville Public Library

A survey is being conducted to understand more about
the health needs in Ellenville.

Survey Details:
✓ You must be at least 18 years old to participate.
✓ The questionnaire takes about 15 minutes
to complete.
✓ All responses are kept strictly confidential.
✓ Everyone who completes the survey receives a $5
gift card for a local store.

Let Us Know What You Think!

The Ellenville Public Library & Museum is located at 40 Center Street in Ellenville, New York
For further information, contact Wendy Robinson at robinsonw2145@duq.edu

This community study has been approved by Duquesne University’s Institutional Review Board (Protocol #10-89).
Appendix G

Ellenville Community Survey - Opix

Ellenville Community Survey
Posted in the Ellenville Forum

If you live in Ellenville, come to the Ellenville Public Library on Saturday, June 3rd, between 11 am and 2 pm to take the Ellenville Community Survey. This questionnaire consists of 20 questions and takes about 15 minutes to fill out. The questionnaire asks about what you think the community needs to make it healthier and what you need to be more informed about environmental health issues. All people who complete the survey receive a $5 gift card for a local store, and educational literature as a thank you for their participation. For further information, email Wendy Robinson at robinson214@bellsouth.net.

Kriick
Since Apr 10
146

Wendy Robinson
South Benning, NY

Kriick posts: Is this the same survey that was done at Pleasant Stone Farm store not too long ago?

Wendy Robinson posts: Yes, this is the same survey that was given in February at Pleasant Stone Farm.

Tell me when this thread is updated: [ ] Add to my tracker [ ] Send me an email

1 of 4

6/25/11 12:38 AM

195
COMMUNITY SURVEY
If You Live or Work in South Plainfield

TODAY
Saturday, June 25th from 11 - 3
at the PAL Building

A survey is being conducted to understand more about the environmental health needs in South Plainfield.

✔ You must be at least 18 years old to participate.
✔ The questionnaire takes about 15 minutes to complete.
✔ All responses are kept strictly confidential.

✔ Everyone who completes the survey receives a $5 A&P gift card.
✔ Refreshments.

Have You Taken the Survey Yet?
Appendix I

South Plainfield Observer: Welcome

http://www.spopserver.com/events.php

South Plainfield Observer

events around town

Be sure to mark your calendar!
For out of town events, see Page 4-5 in this week's Observer!
To submit an event via e-mail, click on "Contribute" then scroll down to events, or fax your event to (908) 769-4899.

- Motivational Speaker at the Library - June 23
  A motivational program, "It's Your Lucky Day," will be held at the South Plainfield Library on
  Thursday, June 23 at 7 p.m.
  The program will be conducted by motivational speaker Judy England-McCarty, RN.
  The free program will include audience discussion and questions and answers.
  For more information, call (908) 754-3825, or visit the library's website at
  www.southplainfieldlibrary.org.

- Singin' with Spaghetti Benefit Dinner - June 24
  Singin' with Spaghetti Benefit Dinner for Brittany offer's will be held on Friday, June 24 from
  5 to 8 p.m. at 3021 Post Rd, WIS. 711 Sorrento St. Brittany is a South Plainfield girl who has been
  battling leukemia for six years, since she was 16 years old. Her parents, Mrs. and Mrs. Sorrento.
  Adults $10; children free to $7; two and under are free.
  For more information, call Camille at (718) 595-2388.

- SP Community Health Survey - June 25
  A community health survey will be held on Saturday, June 25 from 11 a.m. to 3 p.m. at the
  P&K Building on Maple Ave. Must be at least 18 years. Free literature about
  environmental issues in your community. Everyone completing a survey receives a $5 gift
  card for a local store. Refreshments.
  For more information, email robin@popmail.com.

- Eighth Annual Art Muglia Golf Outing - July 8
  The eighth annual Art Muglia Memorial Golf Outing will take place on Friday, July 8 at The
  Shireman's Country Club in the Paterson. All net-proceeds will go to arts favorite charity, the
  Matheny School for those with cerebral palsy. The cost for golf, continental breakfast, cart,
  prizes and clubhouse lunch is $50 per person.
  Those interested, please call Jim Muglia at (973) 667-2466 or email
  Artmuglia69@yahoo.com.

- Blood Drive - July 23
  A community blood drive will be held on Saturday, July 23 at the municipal building, located at
  1209 Maple Ave., from 10 a.m. to 2 p.m. Donors will receive two free lunch tickets. One
  donation can save up to three lives. Walk-ins welcome.
  For more information, call 1-800-558-6202 or go to www.nybloodcenter.org.

- Cedarcraft Free Bible School - July 23-29
Appendix J

Event: South Plainfield Community Survey
Sponsored By: Wendy Robinson, Family Nurse Practitioner
Day: Saturday, June 25th, 2011
Time: 11:00 a.m. until 3:00 p.m.
Location: PAL Building
T1: Yes

Comments

Stop by to take the South Plainfield Community Health Survey. The survey will provide an understanding of the environmental health needs of people who live or work in South Plainfield, along with an understanding of community strengths, and potential resources to address those needs.

You must be at least 18 years old to participate. The survey will take about 15 minutes to complete. All responses will be kept strictly confidential. Pick up free literature about environmental issues in your community. Everyone who completes the survey will receive a $5 gift card for a local store. Refreshments will be served.

For further information call (914) 224-7701 or email robinsonw214@duq.edu

Event: SonSurf Beach Bash Vacation Bible School
Sponsored By: Cedarcroft Bible Chapel
Day: Monday - Friday, July 25-29, 2011
Time: 9:30 a.m. until 12:00 noon
Location: 1715 Kenyon Ave., South Plainfield, N.J. 07080
T1: Yes

Comments

FREE - FREE - FREE - FREE - For children age 4 - those entering 8th grade in September

Singable Songs, Special Stories from the Bible, Creative Crafts, Great Games, Super Snacks

Mothers' Class: Tuesday - Friday

Register on line at www.cedarcroft.org
Appendix K

South Plainfield Community Health Survey

Category: Other
When: Today, June 25, 2011 11:00 am - 3:00 pm
Add to Calendar

Where: PAL Building
1250 Maple Avenue
South Plainfield, NJ 07080

Cost: Free
Submitted by: Wendy R. See all of Wendy R's events →

Who's going?

Are You Interested?
You Replied: I'm in!
Cancel
Send me a reminder the day before
Email me with Event Talk updates

Why's it in?
1 response

Sounds cool
No one is in yet.

Discuss This Event
No one has commented on this event yet.

Talk About This Event

Edit Event Details
Send to Friends
Flag as inappropriate

Get email updates about this conversation

http://www.yelp.com/events/south-plainfield-south-plainfield-co...
Appendix L

Ellenville Chapter of NAACP  
P.O. Box 229  
c/o Ms. Maude Bruce  
Ellenville, New York 12428-0229

Dear Ms. Bruce;

My name is Wendy Robinson and as a doctoral student in nursing, I am asking for your organization’s participation in a research study titled, *The Role of Forensic Nurses in Communities Experiencing Environmental Contamination*. This study uses a short survey (15-20 minutes) to understand the environmental health needs of people living in communities where environmental contamination has occurred.

As a long-time member of the NAACP, and a past president of the Northern Westchester chapter, I hope to include your chapter in the study to ensure that all members of the Ellenville community have the opportunity to express their views.

I would greatly appreciate it if your members agree to complete the survey. All participants will receive a small thank you gift when they complete it, and will receive results of the study.

Thank you in advance for your contribution to this timely issue. To arrange a convenient time for your members to participate, I can be reached at (914)224-7701 (cell) or (914) 232-8696 (office).

Sincerely,

Wendy Robinson, MS, RN, FNP-C  
Doctoral Candidate  
Duquesne University School of Nursing

December 17, 2010
Appendix M

Ellenville Chapter of the NAACP
c/o Maude Bruce
P.O. Box 229
Ellenville, New York 12428-0229

Dear Ms. Bruce;

I look forward to the upcoming NAACP Health Fair. I have enclosed some additional information about my health survey. Please let me know if there is anything else that is needed prior to the Health Fair.

Sincerely,

Wendy Robinson
(914) 232-8696 (o)
(914) 234-7701 (c)
wrobinson@kadara.com
Appendix N

In My Opinion

Residents of South Plainfield:

I have been conducting a survey in South Plainfield as part of my doctoral research, to understand what information and services community residents (and people who work in the community) believe we need to make the community healthier, what information they need to be more informed about environmental health issues, and which needs can be fulfilled by nurses. The South Plainfield community was selected because it has two environmentally contaminated Superfund Sites (Crenell Publications and Eskin's New Garden). I am conducting this study in a neighborhood in south Plainfield to learn about the needs of residents and to provide an accurate picture of the health of the community.

Sincerely,

WENDY ROBINSON,
MS, RN, FNP-C

McGriskin-Gustafson
An Independent, Family-Owned & Operated Funeral Home

HOME FOR FUNERALS, LLC

(908) 561-8000

2425 Plainfield Ave, South Plainfield, NJ 07080

PREFUNERAL SERVICES

Pre-arrangements • SSI Medicare Protection • Cremation Services

Greenville

James A. Gustafson, Prop. Mgr. • S.J. Lic. No. 4280
Richard W. McGriskin, Vice Pres. Dir. • S.J. Lic. No. 2764

South Plainfield

Funeral Home

202
Appendix O

DUQUESNE UNIVERSITY
600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

Consent To Participate in a Research Study

Title
The Role of Forensic Nurses in Communities Exposed to Environmental Contamination

Principal Researcher
Wendy Robinson, MS, RN, FNP-C
3 Lake Street, Goldens Bridge, New York 10526
914-252-8696

Faculty Advisor
Kathleen Sekula, PhD, APRN-BC
Duquesne University School of Nursing
412-396-4865

Purpose
I am being asked to participate in this study because my community has been exposed to environmental contaminants. This study seeks to understand how forensic nurses can provide care and assistance to persons living in communities such as mine.

Participation
If I agree to participate in the study I will be asked to fill out a survey. The survey will take approximately 20 minutes to complete. If I indicate interest, I may also be asked to participate in a one-on-one interview. The interview will take about one hour, and will be audio-taped.

Compensation
I understand I will receive a $5 gift card for completing the survey. I will also receive a guide to governmental and non-governmental resources that may help me and my community. If I am interviewed I will receive a second gift card.

Risks and Benefits
Participating in this study involves no known risks beyond those of everyday life. However there is the possibility that answering the survey or interview questions may make me feel very emotional. If this occurs, I can contact Wendy Robinson. If I desire counseling, a social worker will be provided for a one-hour session, at no cost to me.

Confidentiality
I will meet with the researcher in a place that is mutually convenient. No information that specifically identifies me or anyone I discuss will be included in any published documents. The information collected through this study will be stored in a locked cabinet at the Principal Researcher's home. The cabinet's contents will be only accessible to the researcher or her assistant. Kathleen Sekula and the other research committee members may have access to the data, but only after any information that may personally identify me has been removed.

(continued)
Confidentiality: After all data has been collected and the research is published my survey and interview responses will be destroyed. Shared transcriptions of tapes will delete all identifying material of me and anyone I speak about. Research findings may be published or shown at conferences. However, at no time will I be identified in any publications or at any conferences unless I give permission.

Right to Withdraw: I understand that I do not have to participate in the study, and may withdraw from the study at any time. I agree that I am over 18 years of age, and that any documents shown to me will be in a language I am comfortable reading and speaking.

Summary of Study: A summary of the study will be provided to me upon request.

Voluntary Consent: I have read the above statements and understand what is being requested of me. I also understand that my participation is voluntary and that I am free to withdraw my consent at any time, for any reason. On these terms, I certify that I am willing to participate in this research project.

Contact: If I have any questions concerning the study I can contact the Principal Researcher, Wendy Robinson (914-232-8696), Dr. Kathleen Sekula (412-396-4865), or Dr. Paul Richer, Chair, Duquesne University IRB, (412-396-6326).

Signature of Participant: __________________________ Date: ____________

Signature of Researcher: __________________________ Date: ____________
Need More Information?

- Diane Salkie is the EPA Remedial Project Manager for this site: Telephone (212) 637-4370, or e-mail at salkie.diane@epa.gov

- The South Plainfield Public Library is the local repository for government reports and documents related to this Superfund site.

- The Agency for Toxic Substances & Disease Registry (ATSDR) gives information about the health effects of each contaminant found at the site: www.atsdr.cdc.gov

- To follow the cleanup progress at Woodbrook Road, go to http://cfpub.epa.gov/superpad/cursites/csitinfo.cfm?id=0204260

- The Edison Wetlands Association is a local grassroots environmental nonprofit organization: www.edisonwetlands.org
Triple C Ranch & Nature Center, P.O. Box #1208, South Plainfield, NJ 07080 Telephone: 732-321-1300

This information was prepared by:
Wendy Robinson, PhD-C, RN, FNP-C
Family Nurse Practitioner
Doctoral candidate at Duquesne University
Tel: (914) 224-7701 or e-mail: robinsonw2146@duq.edu

Information About:

Woodbrook Road Dump
Superfund Site
The site is a 70-acre inactive dumping area located north of Woodbrook Road. It lies within the wetlands of the Dismal Swamp.

Surface water runoff causes the contaminants to migrate through the Dismal Swamp wetland, and the Bound Brook.

Operated during the 1940s and 1950s, previous owners operated the site as a dump, and accepted household and industrial wastes.

In September 1999, members of the Edison Wetlands Association discovered that there were leaking capacitors in the Dismal Swamp wetlands. The following month the U.S. Environmental Protection Agency conducted an investigation.

The Woodbrook Road Dump was listed as a Superfund Site in 2003.

The first EPA cleanup action began in October 2003.

Capacitors have been removed, and fencing has been installed to deter trespassing, but a final remedy for removing contamination has not been devised.

Major Contaminants at the Site
(Found in Soils, Sediment, Surface Water, and Groundwater)

- High levels of PCBs (polychlorinated biphenyls). PCBs cause respiratory, skin, and liver damage, and affect fertility. They also have caused cancer in laboratory animals.

- Pesticides (including DDT, DDD, and DDE). DDT, DDD, and DDE are cancer-causing agents.

- Heavy metals (including arsenic, chromium, mercury, and lead). Heavy metals can cause neurological damage.

More Information:
- The Dismal Swamp is the largest natural wildlife refuge in the area.

- A New Jersey DEP fish consumption advisory remains in effect for Bound Brook, including New Market Pond. Fish caught from these waters should not be eaten, because of elevated levels of PCBs and dioxins detected in the fish.

- Risk from the contaminants depends on an individual’s age, prior health conditions, gender, and many other factors. Everyone does not have the same risk of being affected.
Certificate of Completion

The NIH Office of Human Subjects Research certifies that Wendy Robinson successfully completed the National Institutes of Health Web-based training course “Protecting Human Research Participants”.

Date: 03/15/2008
Certification Number: 9432
Appendix R

Dr. Sekula's NIH Certificate

Certificate of Completion

The NIH Office of Human Subjects Research certifies that Kathleen L. Sekula completed the computer-based training course on the Protection of Human Research Subjects.

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Page 40 of 40