ABSTRACT

NOXIOUS ODOR IN RESIDENTIAL ENVIRONMENTS: COPING IN REACTIVE AND PROACTIVE WAYS IN THREE NEW JERSEY COMMUNITIES

by
Maria Beatriz Yabur

Currently little is known about the effects of noxious odor on people's daily lives. This lack of knowledge is apparent in the rules and regulations concerning odor. This dissertation addresses this lack of knowledge by looking at the effects of current noxious odor on residents' lives in three residential communities in northern New Jersey: West Caldwell, Newark's North Ward and Garfield-Lafayette in Jersey City. The research examines the coping process residents adopt to deal with this environmental annoyance.

In this study I explore two ways residents cope with odor: reactively (trying to keep the odor out of their homes) and proactively (taking actions to eliminate the source of odor). A model was developed to study the determinants of each of the two types of coping; both models include socioeconomic characteristics. The variables in the model for reactive coping include: perception of odor, community attachment, and physical reactions to the odor. The variables in the model for proactive coping include: knowledge of the correct agencies to contact concerning the odor, feelings of helplessness, and feeling of hopelessness, in addition to the predictors in the model for reactive coping. Reactive coping is measured by: residents' daily activities to avoid the odor and their desire to move

away. Proactive coping is measured by: contacting anyone to complain about the odor and contacting the correct agencies

Data was obtained from in-person interviews with residents in the three communities and site observations. The sample of residents interviewed consists of 90 respondents, which includes male (n=33) and female (n=67) residents over the age of 24 of diverse ethnic backgrounds (white, African American and Hispanic). The majority of respondents (81%) smelled the odor. Of those who smelled the odor (n=73), 61 respondents tried to eliminate the odor from their homes and 23 respondents considered moving away due to the odor. Less than half of the respondents who smelled the odor knew about the correct agencies to contact regarding the odor (40%); 39% of the respondents contacted someone and 26% of the respondents contacted the correct agencies. The multivariate regression analysis revealed that perception of odor and physical reactions are needed to engage in the coping behavior of trying to keep the odor out of their homes. Considering moving away is only affected by perception of odor. Three variables showed a significant relationship with the proactive coping outcome of contacting anyone about the odor: perception of odor, problem solving, and feeling helpless or hopeless. The variables affecting the likelihood that a resident contacted the correct agencies are: perception of odor, feeling helpless or hopeless, knowledge of the correct agencies and feelings of attachment,

The results suggest that ethnicity plays an important role in the way residents react to noxious odor and that odor regulation policies and procedures are largely unknown among respondents. Concerning types of coping, the results

indicate that physical reactions to odor affect reactive coping behaviors but they are not necessary for considering moving away or for either of the two proactive coping outcomes.

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To my father

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CHAPTER 1

INTRODUCTION

Odor is a form of pollution that diminishes the quality of life (CIC, 1970, 1971; Turk et al., 1974; NRC, 1979; Bruvold et al., 1983; Dawes, 1987; Schiffman et all, 1995a; Thu et al., 1997; Siddiqui & Pandey, 2003; Moser & Robin, 2006; Tajik, 2008). Odor produced by industrial facilities in residential areas can interfere with everyday life. In the state of New Jersey, increasing population growth and housing needs together with developers' building without concern for the health of buyers have resulted in residential areas that share space with industry, waste water treatment plants, slaughterhouses, swine operations, and composting areas.

Odor pollution is not a new concern. In the 1960s the United States and Europe faced major air pollution problems (dust, fog and odor) as documented in many complaints, surveys and studies. Public perception of odor has also been studied (deGroot & Samuels, 1962; Cederlof, Friberg, Jonsson, & Kajil, 1964; Jonsson, 1964; Medalia, 1964; deGroot et al., 1966; deGroot, 1967; CIC, 1970, 1971; Jonsson, Dean & Sanders, 1975; Turk, Johnston & Moulton, 1974;). In the United States, as a result of these studies and complaints to local authorities, enforcement of general nuisance ordinances regarding odor pollution were implemented, starting in the mid 1960s (Turk, Johnston & Moulton, 1974). The Air Quality Act of 1967 and the subsequent amendment of the Clean Air of 1970 were established to collect information on the sources, effects, measurement and control of odors as well other air pollutants (Turk, Johnston & Moulton, 1974; NRC, 1979). In 1977 another amendment to the Clean Air Act was passed with the intention

to study and regulate the effects of air pollution, including odor, on public health and welfare.

In New Jersey, odor emission is regulated under the Air Pollution Control Act; it is defined as "the presence in the outdoor atmosphere of one or more air contaminants in such quantities and duration as tend to be injurious to human health or welfare, animal or plant life or property, or would unreasonably interfere with the enjoyment of life or property...," (N.J.S.A. 26:2C-2). Odor is regulated through the issuing of violations and penalties to the facilities producing the odor. The NJDEP distinguishes between two types of odor (air pollutants), those that are injurious to human health and those that interfere with the enjoyment of life and property. It is the later type of odor that was investigated in this dissertation.

The Clean Air Act brought about a reduction of air pollution. However, small pockets of noxious odor still affect those communities on the boundaries between residential and industrial areas (Pope, 2002; Park, n.d.).

1.1 Odor and Daily Life

Environmental stressors, including the pollution of water, land, and air, noise and climate, affect people's quality of life (Schiffman et al., 1995a, 1995b; Thu et al., 1997; Khan, 2001; Siddiqui & Pandey, 2003; Mose & Robin, 2006;). Poor environmental conditions can cause discomfort, annoyance and even stress (Glass and Singer, 1972; Kaplan & Kaplan, 1982). Such is the case with recurrent and intense odors (Turk,

Johnston & Moulton, 1974; NRC, 1979; Schiffman et al., 1995a; Mose & Robin, 2006; Tajik, 2008).

Since ancient times, people have associated unpleasant odors with unpleasant aspects of social and spiritual life (National Research Council (NRC), 1979; Classen, 1992,). Bad odors were believed to cause diseases; the word "malaria" comes from the Italian expression "bad air." Even today, noxious odors carry a negative connotation. One respondent in this study reported "How can it be healthy if it smells bad. It can't be?" The world has achieved considerable advances in the understanding of the causes of disease but the effects of odor on people's lives remain to be fully understood.

Although scientists have made important discoveries concerning olfaction processing and the way we smell, their understanding of people's sensory experience of olfaction is still in a "growth phase" (Shepherd, 2009). Only recently have social scientists become interested in the senses. Mason and Davies (2009) recommend that social science should become more sensorial than it has been. The authors ask researchers to recognize that the sensory is part of people's "involvement in the world" (p. 1).

One of the least studied senses in social science is olfaction, even though it plays an important role in the quality of life. On October 27, 2005 a sweet smell inundated New York downtown and spread quickly north, generating concern among officials and residents (DePalma, 2005). The event was widely reported in the news with citizens describing unusual behavior and urges usually kept secret. The sweet smell brought back memories and fears; the city's emergency hot line received hundreds of calls. The source and type of smell were never determined.

On January 8, 2007, during the morning rush hour, a gas-like odor penetrated the New York urban region. The intensity of the smell and fears of a possible explosion caused the evacuation of several buildings, the interruption of train service and the closing of fresh air intake of HVAC systems in some buildings (Hauser & Chan, 2007). A large number of calls to 911 were made and officials investigated the source of odor. It did not pose any harm since no concentration of natural gas was found in the air but still the city stank. People reported dizziness, shortness of breath, nausea and headaches; at least two people were hospitalized. Once again, the source of the odor remains a mystery. These two cases demonstrate how intrusive a smell can be and how much an odor can disrupt people's lives even when the smell is rather pleasant.

1.2 This Study

This research examines people's experiences with and reactions to long term, noxious odor in three residential communities in New Jersey: West Caldwell, Newark's North Ward and Garfield-Lafayette in Jersey City. One community is adjacent to a waste water treatment plant, another is next to a food and chemical drying facility, and the third is adjacent to a wood recycling facility.

The objective was to study the extent to which noxious odor interferes with residents' lives, as apparent in the disruption of daily activities, in their physical discomfort and their adoption of coping strategies. Given previous research about people's reactions to odor, including changes in perception and behavior (Medalia, 1964; Bruvold et al., 1983), this study is based on the premise that people affected by odor react in two ways. One way is trying to keep noxious odor out of their homes and modifying

their activities to avoid the odor. These responses are called *reactive coping*. The other way people may react is by engaging in actions that aim to eliminate the source of the odor. These responses are called *proactive coping*. To pursue this research on odor and coping, two theoretical models were developed, one for each type of coping.

This study contributes to the emerging field of research on the senses in the social sciences. By bringing a more empirical approach than is usual to the field, this study investigates the variables that affect reactive coping behavior. Although the types of activities in which people engage in this coping behavior are known, it is not known what causes these activities. This study also investigates the variables that affect proactive coping behavior. To my knowledge, this type of coping behavior has not been previously studied. Findings from this study suggest that changes to the New Jersey Department of Environmental Protection odor investigation process are necessary to facilitate residents' efforts to file complaints.

CHAPTER 2

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Social scientists have begun to recognize the importance of the senses in people's lives. This growing interest started in the 1970s when Largey and Watson (1972) published an article on the sociology of odor. In 1988 The Concordia Sensorial Research Team (CONSERT) was established in Montreal as part of Concordia University. In the 1990s the works of Constance Classen (1992, 1993, 1994) and David Howes (2004, 2006), both members of CONSERT, expanded existing knowledge about the sociology of the senses. In 2005 the Canadian Center for Architecture, in cooperation with CONSERT, presented a series of lectures on "Sensing the City: Sensuous Explorations of the Urban Landscape," and produced the book *Sense of the City: An Alternate Approach to Urbanism* (Zardini, 2005). In 2006 a pioneer journal, *The Senses and Society,* started publication. That same year, two other books were published: *Smell Culture Reader* (Drobnick, 2006), which includes 37 articles on the sense of smell and society. And in 2009 a book about methods of sensory research was published: *Doing Sensory Ethnography* (Pink, 2009).

This work in the social sciences on the sense of smell has explored several aspects of odor (historical, cultural, experiential) but a lack of empirically-based knowledge still exists regarding odor and daily life (Beer, 2009). We need to conduct more empirical research about sensorial experiences.

2.1 Previous Studies of Noxious Odor

As far as this researcher can tell, 17 empirical studies have been published about residents' experiences of noxious odor in their neighborhoods. Five of them examined only perception of odor (deGroot & Samuels, 1962; Medalia, 1964; Dawes, 1987; The Water Resource Research Institute, 1991; McGinley, 1995). Six studies looked at both physical reactions to and perception of odor (Bundy, 1992; Schiffman, 1995a, 1995b; Thu et al., 1997; VanDevender, 1996-1997; Radon et al., 2004). Three examined possible health effects in addition to both physical reactions to and perception of odor (Schiffma, 1988; Wing and Wolf, 2000; Wing et al., 2008). One (a national survey) examined the social and economic effects of odor (Copley International, 1970, 1971). Only two studied types of coping behaviors (Bruvold et al., 1983; Tajik, 2008).

Many of these studies show that noxious odor influences people's well being by affecting them physically and psychologically (Turk, Johnston & Moulton, 1974; NRC, 1979, Schiffman et al., 1995a; Tajik, 2008). People affected by an odor may experience different degrees of physical discomfort depending on their own health conditions and the odor type and intensity. The most common reactions are nausea, vomiting, headache, shallow breathing, coughing, sleep disturbances, loss of appetite, eye watering, asthma, allergy, headache and digestive problems (Turk, Johnston & Moulton, 1974; NRC, 1979; Schiffman et al., 1995a; WEF Manual of practice No. 22, 1995; McGinley & McGinley, 1999). Changes in mood, lack of concentration, stress and depression are the detected psychological effects of noxious environmental odor (Jacobs et al., 1984; Schiffman et al., 1994; Thu et al., 1997; McGinley & McGinley, 1999).

Odorous air affects mood (Schiffman et al., 1995a, 1995b; Chen, Haviland-Jones, 1999; Chen & Dalton, 2005). Chen & Haviland-Jones found that a pleasant odor improves a negative mood and an unpleasant odor may cause a negative mood or augment an already existing one. Schiffman et al. (1995a) found that residents exposed to odor from swine operations experience a deteriorated mood compared with those who are not.

Researchers have shown how people modify their daily activities to evade a noxious odor (Bruvold et al., 1983; Tajik, 2008). Some of the most frequent activities are not being able to go outside, to open the windows, to have guests, to have outdoor parties and to garden. It is not known, however, what shapes such behaviors. The authors of these 17 studies on odor report that the number of citizens affected by odor is much larger than the number who complain or who want to complain. The complaint rate reported in previous research ranged from 10 to 12 percent (deGroot & Samuels, 1962; Turk, Johnston & Moulton, 1974; NRC, 1979; Dawes, 1987; Greenberg & Schneider, 1996, Tajik, 2008). Even though these studies report a low complaint rate, none have studied why this occurs. Regarding complaint behavior, only McGinley (2004) has proposed, in theory, "what makes an odor episode become a citizen complaint." With "the citizen complaint pyramid" (Figure 2.1) he lists the odor characteristics that lead a person to complain: the character of odor, strength, duration and frequency, extending from the most important (odor character) to the least important (frequency).

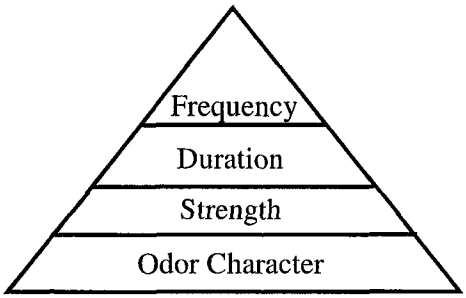


Figure 2.1 Citizen Complaint Pyramid. Source: McGuinley, 2004.

2.2 Types of Coping

Dealing with environmental stressor conditions (such as odor) adversely affects people's quality of life (Selye, 1956; Dubos, 1965; Glass and Singer, 1972; Wohlwill, 1973). Seyle (1956) states in his stress theory that an organism's response to a stress stimulus is, at first, one of alarm; a prolonged exposure will bring exhaustion. Dubos (1965) has stated the same in explaining people's responses to environmental conditions. The adaptation process itself brings with it a level of stress, which varies depending on the skill of the person adapting. During the adaptation process people engage in coping behavior as an effort to manage the stressful demands which are intrinsic to the adaptation process (Monat & Lazarus, 1991). The better and more skillful people are at coping, the less stress they experience (Pearlin & Schooler, 1978).

While the coping process aims to reduce stress, coping itself can be stressful (Monat & Lazarus, 1991). The more successful people's coping process is, the less stress they experience and their mood is not much affected. But the more complicated the coping process becomes, the more the stress level rises and mood deteriorates (DeLongis, Folkman & Lazarus, 1988).

Researchers have developed several classifications of the coping responses that people employ to cope with stressful events. Two such classifications are pertinent to this study: active-behavioral coping (Monat & Lazarus, 1991) and problem-focused coping (Pearlin & Schooler, 1978; Monat & Lazarus, 1991). Active-behavioral coping refers to the visible behavioral attempts that people make to evade a stimulus and its effects. Problem-focused coping refers to behavioral attempts to modify and eliminate the source of the stimulus. For this study, these two types of coping are redefined as reactive and proactive coping respectively.

Reactive coping behavior consists of ways that people modify their activities to eliminate an odor from their immediate environment. Bruvold et al. (1983) enumerate some of the ways that California residents evaded odor from a waste water treatment plant: closing the windows, not going outside, and not having guests (but not eliminating the source of the stimulus). Tajik et al. (2008) report a longer list of curtailed daily life activities in addition to those reported by Bruvold et al.: can't have family reunions, can't garden, had to purchase and use air conditioner, had to buy a clothes dryer. In this type of coping, individuals experience the intrusion of the stimulus in their lives and learn to evade it.

Proactive coping behavior aims to eliminate the source of the stimulus by filing a complaint and organizing the community to act together to eliminate the stimulus. It is widely reported in studies of odor that the complaint rate is low (10 to 12%), when the odor actually affected a large number of people (deGroot & Samuels, 1962; Turk, Johnston & Moulton, 1974; NRC, 1979; Dawes, 1987; Greenberg & Schneider, 1996, Tajik, 2008). McGinley proposes the complaint pyramid (Figure 2.1) which includes the

components of odor perception that may lead a resident to complain but he does not test this model. There is no existing research on proactive coping behavior in response to noxious odor.

Reactive and proactive coping are not mutually exclusive stratgies. Reactive coping can occur with or without proactive coping and vice versa. Both proactive and reactive coping refer to actions taken by individuals to adapt to odor stimuli. This study shares the view of other researchers that the adaptation process is one in which people play an active role (Franck, Unseld & Wentworth, 1974).

To investigate the two types of coping, two theoretical models were developed. One model concentrates on reactive coping and the other on proactive coping.

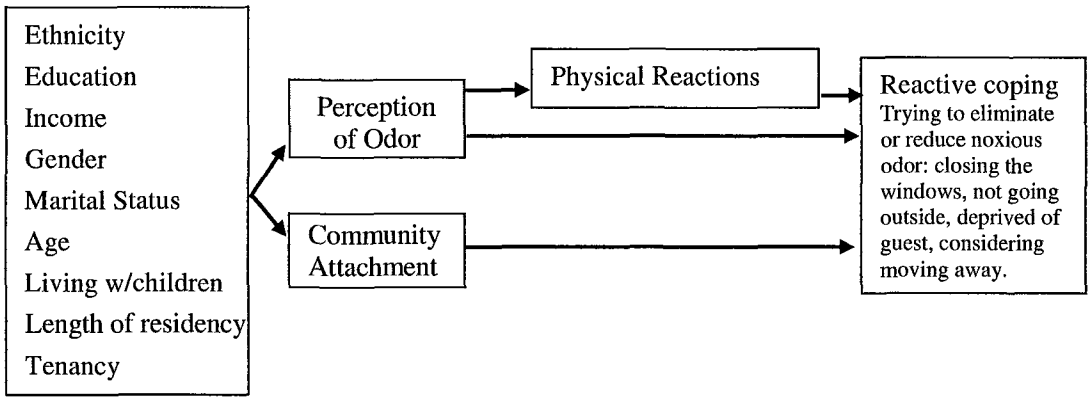


Figure 2.2 Theoretical model of reactive coping in response to odor.

Reactive coping is likely to be affected by people's perception of odor, their attachment to the community and disturbances in their physical comfort (physical reactions), as shown in Figure 2.2. Perception of odor varies among people. Previous odor experiences, people's health and sense of smell are some of the principal reasons why people have different perceptions of the same odor. Perception of the intensity,

annoyance, frequency and duration of the odor are factors that lead people to engage in reactive behavior. Some people react to the perception of odor but others perceive the odor, experience physical reactions and do not react. People who experience physical reactions are more likely to engage in reactive coping.

People's attachment to their community probably modifies their perception of odor and reactions to it. People who are attached to their community are likely to perceive the odor as a stronger annoyance than those who are not attached to the community because they care about what happens to their community (Medalia, 1964). Also, people attached to their communities are less likely to move due to the odor (Medalia, 1964).

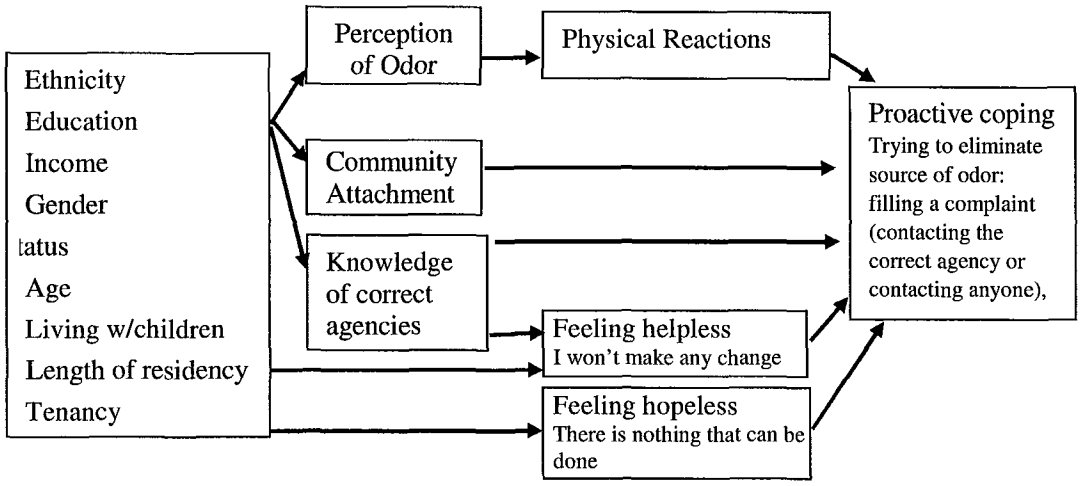


Figure 2.3. Theoretical model of proactive coping in response to odor.

As indicated in Figure 2.3, the proactive coping model shares the same variables that affect reactive coping plus three additional ones: (1) people's knowledge of the correct agencies to call to eliminate the odor; (2) people's feelings of helplessness ("I

can't generate a change." "Why complain if the odor won't be eliminated?"); and (3) people's feelings of hopelessness ("There is nothing that can be done, or there is no solution to the problem"). Two of the shared factors (perception of odor, physical reactions) are expected to affect proactive coping the same way they affect reactive coping.

Community attachment is expected to shape proactive coping. Medalia (1964) found that the more the individual is attached to the community, the more she or he perceives the odor as noxious. Woldoff (2002) found that the more attached the individuals are, the more likely they are to be actively involved in actions to eliminate a neighborhood problem which, in this case, is odor. Kasarda & Janowitz, (1974) found that the longer people live in their community, the greater their desire to participate in solving the community problem.

Knowledge of the correct agencies is one of the factors expected to affect proactive coping. deGroot & Samuels (1962) reported that citizens wanted to complain but did not because they did not know what to do. The authors asked respondents if they knew what could be done to remediate the problem of air pollution. More than half of the participants wanted to complain but did not proceed because they did not know what to do and where to file a complaint. This finding suggests that one possible reason behind a low rate of complaining about odor is lack of knowledge, although the authors of the study did not make that link themselves. From the community participation literature, Poulin and Kauffman (1995) identify knowledge as the key variable explaining an individual's community participation. Thus, for this study, knowledge is expected to affect people's proactive coping (Figure 2.3).

In a later article, deGroot (1966) discusses why people do not complain about odor. He reported that people do not complain about air pollution because they think nothing can be done to solve the problem. Therefore they do not complain. This idea that the odor cannot be abated reflects a feeling of hopelessness. If there is nothing that the individual can do to solve the problem, then there is no reason to engage in proactive behavior. deGroot's research suggests two factors that may well shape proactive behavior: knowledge of the correct agencies to contact and what this research calls "feelings of hopelessness."

People's feelings of helplessness, another factor that may well affect proactive coping, has not been studied in odor research. However, in psychology Seligman (1975) describes a theory of helplessness. An individual loses his or her willingness to eliminate a stressor stimulus following repeated experiences of failing to achieve such aim. This same argument can be made regarding people's willingness to complain about noxious odor. If individuals feel they cannot help to eliminate the noxious odor, then why complain? Therefore, proactive behavior would not be pursued.

Depending on the intrusiveness, intensity, duration and frequency of noxious odor people's reactive behavior may differ and proactive behaviors may occur. The more intense and frequent the odor is perceived to be, the stronger people's reactive behavior will be. Their avoidance of noxious odor will intervene more in quotidian activities (Bruvold et al., 1983; Tajik, 2008), and they will be more likely to act against the source of the odor. But also people who perceive a noxious odor, even if it causes no physical reactions, may still engage in reactive coping to avoid it.

Community attachment also plays a role in the perception of odor. People who perceive a noxious odor and are attached to the community may be more likely to be concerned with the odor and the source of odor (Medalia, 1964). These people might be more likely to adopt a reactive coping response, stay in the community and engage in proactive coping.

In this study it is hypothesized that those who have knowledge of the complaint process are more likely to engage in proactive coping. And those who do not know how the process works may feel helpless in achieving a solution and do not engage in proactive coping. There is no existing information on the effects of demographic characteristics and feelings of hopelessness and helplessness when a noxious odor is present. It is hypothesized in this study that demographic characteristics may shape one's feelings of hopelessness and helplessness and thereby affect proactive coping (see Figure 2.3).

2.3 Community Attachment

Community attachment is a multidimensional concept (Kasarda & Janowitz, 1974; Riger & Lavrakas, 1981; Goeppinger & Baglioni, 1985; Woldoff, 2002). Woldoff (2002) lists the variables used by most researchers and classifies them, making clear the multidimensionality of the concept. For her, community attachment consists primarily of two types of attachment: attitude and behavior. Attitude includes sentiment toward the community (making bonds to the community, feeling at home, and feeling of belonging) and evaluation of place (community satisfaction, and the overall rating of quality of life).

And behavior includes neighboring (social connections, interaction and routine) and problem solving (activities directed to solution of community problems).

Woldorff (2000) presents the clearest model and most thorough questionnaire in all the cited literature on community attachment and includes all the variables that previous studies mention. Therefore, this study adopts some of the questions used in Woldorff's questionnaire to measure attachment attitude and behavior of respondents. This study also adopts Woldorff's terms to describe previous studies.

Poulin and Kauffman (1995), Riger and Lavrakas (1981), and Kasarda and Janowitz (1974) identify the key demographic variables that affect community attachment. These demographic variables, along with others, are included in my theoretical models (Figure 2.2 and 2.3). Kasarda and Janowitz (1974) found that length of residence is the most influential factor in determining community attachment. This factor strongly affects attitude and behavior in a positive way. Sentiment, social-neighboring and problem solving all increase with length of residence. Kasarda and Janowitz also found that age is the second most influential factor shaping attitude.

Riger and Lavrakas (1981) expanded Kasarda and Janowitz's list of demographic variables that affect attachment. Riger and Lavrakas found that in addition to length of residence and age, home ownership is another important factor affecting attitude. In their study attachment behavior is primarily affected by the number of children at home and secondarily by race. Blacks reported more social neighboring than whites. In addition, Riger and Lavrakas found that people reporting high levels of social neighboring behavior are more likely to engage in community activities (talk with neighbors about

local problems, to be vigilant on current local problems and offer their help to solve local problems).

Poulin and Kauffman (1995) focus their attention on factors that shape citizen participation in preventing undesirable activities in a community such as drug abuse, drug dealing, alcohol abuse, unemployment, crime, juvenile delinquency, homelessness, pollution, teenage pregnancy and racial tension. The authors found that knowledge has the strongest direct effect on individual participation in trying to resolve such problems. Knowledge is comprised of awareness of the available services and perceived effectiveness of such services.

These findings concerning community attachment coincide with some of the findings in the odor literature concerning proactive and reactive coping. Length of residence, home ownership, and knowledge are variables affecting the likelihood of proactive and reactive coping with odor. In the models for this study (Figure 2.2 and 2.3) demographic variables are viewed as affecting community attachment which in turn affects the likelihood of both types of coping.

2.4 Demographic Variables and Odor

Previous research indicates that some demographic variables affect people's reactions to noxious odor. The findings regarding income and education differ: some authors have found that these demographic variables do affect perception of odor and other authors found no such effects (deGroot & Samuels, 1962; Medalia, 1964; CIC, 1970, 1971; Bruvold et al., 1983). Gender and age are also well studied variables (Wysocki & Gilbert, 1989; Murphy et al., 1991; Watson, 1999). Women are generally more sensitive and

more accurate at perceiving and identifying odor than men (Wysocki & Gilbert, 1989; Watson, 1999). Age also affects perception of odor (Wysocki & Gilbert, 1989). After the age of 45 people's sense of smell tends to decrease, and before 25 the sense is less alert and less accurate (Wysocki & Gilbert, 1989; Murphy et al., 1991).

deGroot & Samuels (1962) found that marital status and having children affect people's perception of air pollution. Married or divorced people are more conscious of the possible health effects of air pollution and are more likely to try to evade it than single people. Kasarda and Janowitz (1964) found that the length of time that residents had lived in the neighborhood affected people's coping: the longer people live in the area, the more likely they are to be proactive. One study found that those who rent adopt a denial attitude regarding the presence of odor while home owners are more concerned (Kahn, 2001). There is no information on possible differences caused by people's ethnic background.

CHAPTER 3

METHOD

The two theoretical models presented in Chapter 2 suggest two broad research questions: (1) How do demographic characteristics of residents affect reactive coping behavior through their effects on perception of odor, community attachment, and physical reactions? (2) How do demographic characteristics affect proactive coping through their effects on the intervening variables of perception of odor, physical reactions, community attachment, knowledge of correct agencies, and feelings of helplessness and hopelessness?

In order to gather the data necessary to answer these questions, residential communities experiencing noxious odor had to be located and residents in these communities had to be interviewed. This chapter explains the sources of data used, the selection of sites chosen for study, the design and administration of the survey instrument and the analytic techniques used.

3.1 Sources of Data

Three types of data were collected: interviews with experts in health departments and a review of their records, observation of study areas and a survey of residents. Experts and records were consulted at the beginning of the study for site selection and development of the instrument. Observations were needed for site selection and were continued during the survey of residents.

3.1.1 Experts and Records

Information about the occurrence and location of noxious odor in northern New Jersey was obtained from interviews with staff at county health departments and a review of their records. The health departments contacted were Essex, Hudson and Union. These three counties were selected due to their proximity to the researcher's university.

The researcher interviewed staff at: Hudson Regional Health Commission (Gary Garetano, Assistant Director); Essex Regional Health Commission (Thomas Longo, environmental specialist, and Ted Pilas, field engineer); and the Health Department in Linden in Union County (Richard Drozd, environmental specialist). The staff and records of complaints were consulted to gather information about: the rules and regulations concerning noxious odor in New Jersey, the size of the areas affected by an odor, the history of the problem, information on the existence of complaints, and records of fines to the facility producing the noxious odor.

Gary Garetano explained the rules and regulations concerning odor complaints in New Jersey. In addition, he supplied information about noxious odor problems in two Jersey City neighborhoods (Society Hill and Garfield-Lafayette).

Thomas Longo and Ted Pilas enumerated the areas with odor problems in Essex County: Newark's North Ward, Cedar Grove, West Caldwell and the Port of Newark. They also provided documentation of odor complaints and the fines given to the offending facilities. The researcher reviewed documentation on the location of odor in two of the communities: Cedar Grove and West Caldwell. A map of the streets around the offending facilities in Cedar Grove and West Caldwell showed where the field

inspector perceived the odor (the researcher made no copies of these records but took notes). Newark's North Ward had no such map. For this community, Ted Pilas named the streets from which residents had called with complaints: Manchester Place, Beaumont Place, Parker Street, Ridge Street, and Tiffany Boulevard.

Richard Drozd reported that there were no odor complaints in any residential areas in Union County.

Historical information about the sites chosen for study was obtained from additional sources. The intention was to determine which existed first: the source of the noxious odor or the residential community. For the West Caldwell community, information was gathered at the Development and Building Department of the town and at the Caldwell Waste Water Treatment Plant (WWTP). Records at the Development and Building Department were reviewed to gather information about the Caldwell WWTP (year of construction, operations, and permits) and residential development around the WWTP. Calls to the Caldwell WWTP were made to corroborate the information gathered at the Development and Building Department on the construction, expansion, and the beginning of operations of the facility.

In Newark, supplemental historical information was gathered at Custom Drying (the source of the noxious odor). The Development and Building Department at Newark City Hall was also visited. Staff at Newark City Hall reported that they did not have the information on the year that Custom Drying started operations and no other department confirmed having such information. Custom Drying provided the year they started

operations. The information on what existed first (the residential or industrial area) was obtained from Turner and Koles (1997).

Historical information about Garfield-Lafayette in Jersey City was obtained from two residents: John Tichenor and Angus Vail. John Tichenor, an activist and member of the Lafayette Neighborhood Action Committee, supplied documents about the operations of Reliable Wood Products and the complaint process that the neighbors followed. Angus Vail, the president of the Lafayette Neighborhood Action Committee, supplied documentation of the odor complaints that the committee had filed.

3.1.2 Observations

To gather information leading to site selection, the researcher visited six communities with noxious odor in Hudson and Essex counties (see Table 3.1). Every site visit generated data about noxious odor and residents' activities outdoors. In a diary the researcher recorded whether an odor was present or not, the odor characteristics, strength and duration while the site visit lasted. The investigator's physical reactions to the noxious odor were also registered. Temperature, wind, day of the week and time were also recorded along with the presence of outdoor activity and any observation of outdoor furniture in the area.

The purpose of the diary was to document any noxious odor; to observe the residents' use of outdoor area with and without the presence of the noxious odor and to create a map of the communities to be used to record responses during the survey administration (Figures 3.2, 3.4, 3.5).

Table 3.1 All Residential Areas Visited in Hudson and Essex : Winter 2006

Place	Source of odor	Number of complaints to RHC*	Streets Visited
West Caldwell	Caldwell Waste Water Treatment Plant	215 comp. from 2002 to 2006	Whitaker Pl. Pine Three and Lombard Dr.
Newark's North Ward	Custom Drying and Fine Foods	218 comp. from 2002 to 2006	Manchester Pl.
Cedar Grove	Cedar Grove Waste Water Treatment Plant	32 comp. from 2002 to 2006	Little Fall rd. and Old Bridge rd.
Ironbound	Slaughter house	39 comp. from 2004 to 2006	Bay Ave. and Wheeler Pt Rd.
Society Hill	Odor from Newark industrial area.	2 comp. from 2004 to 2005	Internal Neighborhood
Garfield-Lafayette	Odor from Reliable Wood Products	139 comp from 2005 to 2006	Large number of streets

*RHC: Regional Health Commission at Essex and Hudson. This column shows the number of complaints the RHC received.

3.1.3 Survey of Residents

A survey of residents from the three communities was the main source of data for this research. In-person interviews were conducted using a questionnaire of 85 questions developed for this research (See section 3.3 for more detail on questionnaire design and administration). One person per household was interviewed.The survey started on October 30th 2007 and finished at the end of May 2008 with a total 90 interviews.

Residents were approached in different ways. Knocking at doors was the first approach. If knocking did not work, I asked respondents if they could help me contact other neighbors and whether they could recommend an organization or association that could introduce me to residents.

Other aspects of the site were also recorded: the response of each resident approached and the interaction with every person in that day, how many opened their doors, how many accepted enrollment in the study, the receptivity of the residents in general, how many people were approached on the street and how many were outside (either in a car or on foot). If applicable, the number of times each house was approached was recorded.

3.2 Site Selection

After consulting staff at local health departments, the following criteria were used to select the final study sites: (1) the presence of a recurring noxious odor within the past year at least the (2007); (2) that the affected area is mainly or exclusively residential; (3) the existence of filed complaints from residents; (4) the size of the residential area affected (at least 30 residences).

Based on information from the county experts, severe noxious odor problems were identified in two northern New Jersey counties: Hudson and Essex. The following residential and industrial communities were most affected: West Caldwell, Newark's North Ward, Cedar Grove, the Ironbound in Newark, Society Hill in Jersey City, Garfield-Lafayette in Jersey City, and the Port of Newark (See Table 3.1).

The researcher visited these residential communities to determine the suitability of the site for the research. After visiting the areas listed in Table 3.2, and applying the selection criteria, three communities were selected: West Caldwell, Garfield-Lafayette in Jersey City and Newark's North Ward (see Chapter 4 for detailed descriptions of these communities).

The sources of noxious odor for the selected sites are: the Caldwell Waste Water Treatment Plant (WWTP) in West Caldwell; a food drying plant in Newark's North Ward; and a wood recycling plant in Garfield-Lafayette. During visits to West Caldwell and Newark's North Ward the noxious odor was present and strong. At both sites the researcher experienced strong physical reactions to the odor. During initial visits to Garfield-Lafayette no noxious odor was perceived (either within the plant's storage area or along the streets around the plant). However, many residents have complained to Hudson Regional Health Department about the noxious odor there. This site was included in the study because of the ongoing complaints from the residents. During the survey the researcher did experience the odor.

Cedar Grove, Society Hill in Jersey City and the Ironbound in Newark were not selected for this study because they did not meet all the site selection criteria. Although the odor from the Cedar Grove Waste Water Treatment Plant was recurrent and noxious, the number of residents affected was too small (10 at most) to be included in the study. Society Hill in Jersey City was been affected in the past by Newark's industrial area on the other side of Passaic River but currently has no noxious odor problem. And the Ironbound has a recurrent, powerful noxious odor from a rendering plant. However, the affected area is mainly industrial with five residents affected, at most.

Table 3.2 Visits to the Residential Areas in Hudson and Essex: Winter 2006

Place	Visit day/hour	Temp. and wind	Source of odor	Odor Background	Odor Characteristic	Land use	Approx. # of Houses Affected	Outdoor traces/activity	Physical Reactions
West Caldwell	June 8th. Friday - 5 pm	63 F Sunny Little wind	Caldwell Waste Water Treatment Plant	Plant existed; residential development grew next to it.	Odor is a mixture of floral scents with fecal and putrid. It is evident that the WWTP is masking* the noxious odor with a floral one.	Residential	35 at least	People: jogging, using front yard, and children toys in back and front yard.	Unpleasant odor but not constant enough to produce a reaction
Newark's North Ward	June 6th. Wednesday - 5 pm.	59 F Rainy Some wind	Custom Drying and Fine Foods	Industry was built in a residential area	Odor is extremely nauseating. It invades all your senses.	Residential and commercial	more than 50	Front yard with furniture, people walking but not hanging around.	Very unpleasant, nose and eyes watery, coughing, dizzy and nausea.
Cedar Grove	June 9th. Saturday - 11 am.	63 F Sunny Windy	Cedar Grove Waste Water Treatment Plant	Plant existed; residential development grew next to it.	Odor is a mixture of fecal and putrid.	New residential and light industrial / commercial	10 at most	Playground and pool present in backyard. No one was outside.	Very unpleasant odor that struck me in the stomach.
Ironbound	June 21st. Thursday- 3 pm.	70 F Sunny and windy	Slaughter house	Plant was built in a residential area	An overwhelming putrid odor.	Commercial and Residential	2 at most	Street deserted	Strong coughing, and mind blockage
Society Hill	Gated community. I could not enter until I had an interview.		Odor from Newark industrial area.	Industrial site existed; residential development occurred latter		Residential	About 50	No one walking outside.	Never smelled it
Garfield-Lafayette	February 16th Friday 8 pm	58 F night	Odor from local Reliable Wood Products	Plant was built in a residential area	Chemical smoke	Residential and commercial	More then 100	People walk on the street and presence of some backyard furniture	Not unpleasant but felt like a dust in my throat

*Masking odor: is the process by which a pleasant odor is used to hide the existing noxious odor.

3.3 Design and Administration of Survey Instrument

A survey instrument was developed, using some content from published questionnaires and developing additional items.

3.3.1 Design of Questionnaire

A structured questionnaire was developed comprising fixed-response (simple selection and five-point likert scales) and open-ended questions. Some questions were drawn from previous studies: deGroot & Samuels (1962), Medalia (1965), Bruvold et al. (1983), CIC (1970, 1971), McGinley (1995), Woldoff (2002), Goeppinger and Baglioni (1985), and Kasarda and Janowitz (1974) (Appendix A). A few more questions were taken from the Odor Investigation Field Data from, a DEP form used by field inspectors to collect field data during odor investigations (Appendix B).

With a total of 85 questions, the instrument measures several constructs: odor perception, physical reactions, community attachment, knowledge of the correct agencies to complain, feelings of hopelessness and helplessness, reactive coping, and proactive coping (Appendix C). The questionnaire also elicited demographic information. The questionnaire was written and administered in English and Spanish, since two of the chosen neighborhoods have a large number of Hispanic residents (Newark's North Ward and Garfield-Lafayette).

To facilitate the administration of the questionnaire, a set of response cards was made for the fixed-response questions (See Appendix D). The intention was to guide the respondents and at the same time to keep their attention on the questions. A total of 25

response cards were numbered sequentially on one side; on the other side was the likert scale. The cards were laminated in plastic to facilitate handling.

3.3.2 Validity and Reliability

The content validity of the survey instrument was assessed in two stages. After developing a set of questions for each construct and arranging them in a logical order, I gave the questionnaire to experienced odor field engineers from the Hudson and Essex Regional Health Commissions for their review. They were in a position to assess whether the sample population would understand the questions. They gave me comments on the accuracy of the wording and question relevance, as well as suggesting additional questions that they felt were necessary.

A pretest of the questionnaire was conducted with residents of two sites with odor problems but which were not selected for the study: Society Hill in Jersey City and Cedar Grove. The researcher conducted eight interviews that helped modify the questionnaire, making it more understandable and identifying additional questions. Informed consent was also obtained for the pretest. This testing process took place from the end of May 2007 until the end of October 2007.

Intervening variables covered in the questionnaire included the following:

- Odor perception was assessed with questions regarding ever having smelled the odor, its intensity, duration and frequency.

- Physical reaction was measured by questions concerning experiencing any physical reaction, types of physical reaction and the intensity of such reactions.

- Community attachment was assessed with questions concerning evaluation and sentiment toward the community, neighboring and problem solving.

- Knowledge was measured with questions about knowledge of the correct agency to complain to about noxious odor and knowledge of the complaint process.

- Feelings of helplessness were assessed with questions about being able to eliminate the odor.

- Feelings of hopelessness were measured with questions concerning not believing the odor can be eliminated (See Appendix A for detailed questions).

For the dependent variables the constructs are the following:

- Reactive coping, which was assessed with questions on efforts residents made to eliminate or reduce exposure to the noxious odor

- Proactive coping was measured with questions regarding any actions taken to complain about the noxious odor

Construct validity was assessed by principal components analysis of the construct items. Three constructs were assessed: *reactive coping, odor perception*, and *community attachment*. As indicated in Table 3.3 below, reactive coping resulted in one component with an eigenvalue greater than 1.0, which explained 54.0% of the variance. The scree test was also consistent with a one component solution.

Table 3.3 Principal Component Analysis of Reactive Coping – trying to eliminate or reduce the noxious odor.

Trying to Eliminate or Reduce the Noxious Odor	
Question #	Component 1*
27. Has(have) the odor(s) ever forced you or any other members of your family to go indoors?	.838
28. Have you reduced the amount of time you spend outdoors because of the odor(s)?	.876
29. Has(have) the odor(s) ever prevented you from giving outdoor parties?	.638
30. Are there things you no longer do outside because of the odor(s)?	.758
31. Have you ever stayed away from your house because of the odor(s)?	.297
33a. Due to odors, have you ever been unable to go outside?	.839
33b. Due to odors, have you ever been unable to interact with neighbors outside?	.532
33c. Due to odors, have you ever become bored when you were forced to stay inside because of outdoor odor?	.817
33d. Due to odors, have you ever been unable to open the windows?	.816

*Explains 54% of Variance

As indicated in Table 3.4 below, principal components analysis of the odor perception items showed a single component with an eigenvalue greater than 1.0, which explained 67.1% of the variance. The scree test was consistent with a one factor solution.

Table 3.4 Principal Component Analysis of Odor Perception

Odor perception

Question #	Component 1*
14. Have you noticed the odor(s) in your yard?	.859
15. Have you noticed any odor(s) inside your home coming from outside?	.558
17. How often have you noticed this(these) odor(s)?	.824
19. When the odor(s) was/were present, how long did it(they) last?	.846
20. When the odor(s) was/were present, how strong was(were) it(they) most of the time?	.904
22. Can you tell me how much each of the items listed on the card bothers you:	
22.1. Number of times that I notice the odor	.923
22.2. Strength of the odor in the air	.900
22.3. Length of time that the odor last	.914
22.4. Physical effects the odor has on me	.606
22.5. Psychological effect the odor has on me	.766

*Explains 67.1%% of Variance

As indicated in Table 3.5 below, principal components analysis of the community attachment items resulted in three components with eigenvalues greater than 1.0. The scree test and an examination of the factor loadings on Component 3 were also consistent with a three component solution. However, strong loadings on Components 2 and 3 (highlighted in Table 3.5), corresponded to questions that belonged to the same theoretical concept (Woldoff, 2002). Therefore, these two components were combined into one variable. As a result of this principal component analysis, community attachment was divided into two constructs: attachment (Components 2 and 3) and problem solving (Component 1).

Table 3.5 Principal Component Analysis of Community Attachment.

Community Attachment			
Question #	Component 1	Component 2	Component 3
6. About how many people in your neighborhood do you know by name?	.374	.507	-.385
During the past six months: 7a. How often did you say hello to your neighbors?	-.111	.791	.334
7b. How often have you had a longer talk with a neighbor?	.030	.879	.055
7c. How often have you borrowed something from a neighbor or helped a neighbor out?	.069	.028	.778
7d. How often have you helped a neighbor out?	.256	.253	.542
8. Have you ever gotten together informally with any of your neighbors to solve a neighborhood problem	.725	.196	.067
9. Have you ever worked through a neighborhood association to solve a neighborhood problem?	.683	.026	.145
10. Have you ever attended another type of public meeting about a problem in your neighborhood?	.771	-.175	.044
% of Variance	28.8	19.8	13.3

Inter-item reliability was assessed with Cronbach's alpha coefficient. As can be seen in Table 3.6 below, reactive coping and odor perception have very strong coefficients. Although the attachment and problem solving coefficients were relatively weak (.70), they were used in the analysis. Items to measure attachment were taken from the questionnaire developed by Woldoff (2002).

Table 3.6 Reliability of Attachment, Problem Solving, Reactive Coping and Odor Perception

Construct	**Cronbach's Alpha**
Attachment	.614
Problem Solving	.570
Odor Perception	.928
Trying to Eliminate or Reduce the Noxious Odor	.884

Table 3.7 below shows a summary of all the constructs and variables used for the analysis. Some constructs were divided and others were merged into revised variables.

Table 3.7 Constructs, Variables and Measurement Items

Construct	Variables	Form	Items
Physical reaction	Physical Reaction	Index	41, 42.1-42.12
Odor perception	Odor Perception	Index	14, 15, 17, 19, 20, 22.1-22.5
Community attachment	Attachment	Index	6, 7a-7d
	Problem Solving	Index	8, 9, 10
Reactive coping	Trying to eliminate or reduce noxious odor	Index	27 – 31, 33a – 33d
	Considering moving away	Dichotomous	34
Knowledge of complaint agency	Knowledge	Dichotomous	60
Helplessness	Helplessness/hopelessness	Dichotomous	46
Hopelessness			
Proactive coping	Contacting anyone	Dichotomous	49
	Contacting correct agencies	Dichotomous	50

3.3.3 Administration of Questionnaire

Administration of the instrument started with leaving bilingual invitation letters at the entrance of each resident's house (See Section 3.4.1 for selection of residents). About a week later an initial contact with residents was attempted by knocking at their doors. Residents were asked if they wanted to participate in the study. If they agreed, an appointment was made to conduct the interview and the resident was asked to provide a phone number in order to be reminded of the interview. The option to do the interview at that moment was also offered (this option was rarely taken).

The survey started on October 30th 2007 with the delivery of 13 invitation letters to residents in the community of West Caldwell along Pine Tree Place. A week later I knocked at the residents' doors to start the interviews. For about one month I continued

interviewing West Caldwell residents exclusively (knocking on doors and interviewing). Next, one street in Newark's North Ward (Manchester Place) was chosen for the initial interviews. Ten days later interviews in the third community, Garfield-Lafayette, were started. In Garfield-Lafayette the interviews started by contacting a resident by phone to do the interview (the name and phone number of this resident was provided by Louis Manzo, Assemblyman). Letters in this site were only delivered along a section of Garfield Avenue because the researcher was advised by John Tichenor (a resident) not to visit other streets due to crime and drug dealing (Figure 3.4.4). The survey of residents was completed at the end of May 2008 with 90 interviews among the three communities

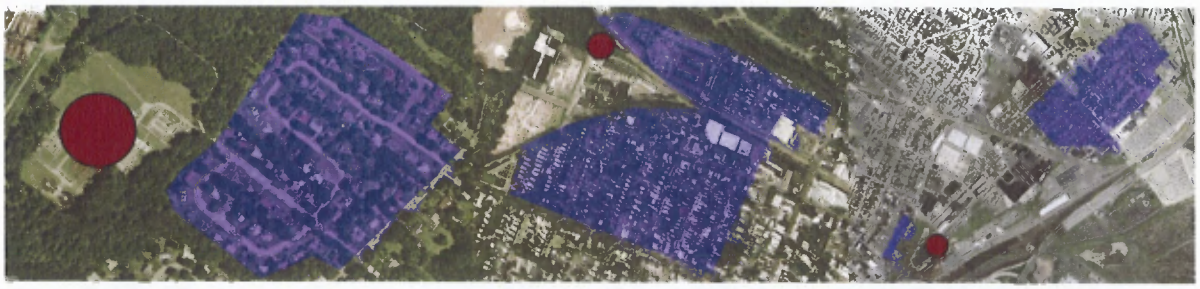
Before each interview could begin, formal consent (in English or Spanish) was obtained from the participants (Appendix E). Participants were given a two page document to read and were offered the option of having it read to them. Before the residents signed the consent form an opportunity to ask questions was offered in case clarification was needed. Once signed, a copy of the consent was given to the participant to keep.

Participants were then handed the response cards and given instructions on how the interview would proceed with the use of the cards. The amount of time needed for the interview was about 35 minutes, excluding the time needed for obtaining the informed consent. However, most interviews took longer (one hour or more) because participants asked questions about the researcher's field, or because they wanted to talk about the research community.

3.4 Survey of Residents

3.4.1 Selection of Potential Respondents

Residents' inclusion in the survey was based on proximity of their residence to the source of the odor. Figure 3.1 shows survey limits at the three study sites. Residents who were immediately next to the offending facility were chosen first for interviews. The further away a resident lived from the offending facility, the less likely a resident was to be chosen for the survey. The limits of the survey areas were determined based on the researcher's observations and information from the health departments on the area affected by odor. In the case of Garfield-Lafayette, the researcher was advised not to go to certain areas, thus reducing the survey area. Letters were first delivered along one street. As responses to the letters were obtained, the researcher moved to the next street (Figures 3.2, 3.3, and 3.4).



West Caldwell Newark's North Ward Garfield-Lafayette

Figure 3.1 Survey areas in each community shown in blue. Circles show location of source of odor.

Source: Image from google.com and modified by author.

3.4.2 Methods of Approaching Residents.

The method used to approach residents for an interview varied among the three study sites. Knocking at doors was the first method used at all three sites. Other methods were implemented as a result of low response rates in each community. The direct approach to residents on the street was the most effective. Interviewed residents were asked to provide introductions to other residents (snow ball sampling). Political organizations, sport groups, community and religious associations and the local school were also contacted.

In West Caldwell three methods were used. Residents were mainly approached by knocking at their doors. This method worked well in this community; here residents opened their doors most frequently (Table 3.8). The other two methods used were the snow ball approach and the direct approach to residents on the street. In this community no help from organizations was sought because no community associations or any other local organization existed and because people opened their doors to the reasearcher. Of the 61 invitation letters delivered at this site, 39 residents opened their doors. Of these 17 refused to participate. With a total of 16 interviews, only one was obtained from the snowball method.

In Newark's North Ward, knocking at doors was not a successful way of approaching residents. In this community residents did not open their doors even when they were at home (Table 3.8). In a few cases I had an appointment and I saw a person through the glass door but he or she did not open the door. In these cases, I called the person and asked again if he or she wanted to participate. Then on a few occasions he or she did open the door. Due to the low response rate, the researcher sought help from

different entities: the Temple Rock of My Salvation (a religious entity. It did not help at all), two councilman from Newark, The Just One League, and the Ridge Street School (permission from the school principal, Mr. Garruto, was obtained). Carlos Gonzales, a councilman in Newark, told me about the Just One League and the importance of this community group for the residents of Newark's North Ward. Mr. Gonzales gave me the information needed to contact Oscar Rodriguez, coach of the Just One League team. Additionally, Mr. Gonzales advised me to seek help from Councilman Ramos since he serves Newark's North Ward. Oscar Rodriguez informed all the parents living within the study area in his soccer league about the study and asked who would like to take part. He put me in contact with those parents who wanted to participate in the study.

Mr. Rodriguez also advised me to contact Jessica Viruet (a parent outreach person) at the Ridge Street School. Mrs. Viruet delivered invitation letters to the parents who lived within the study area. Mrs. Viruet scheduled in-person interviews at the school with the willing parents. And Alfredo Rivera, aide of Councilman Anibal Ramos, put me in contact with a few neighbors who were willing to participate in the study (one resident at the retirement home and two more residents near Tiffany Blvd). I asked these helpers and the interviewed residents why this community was so reluctant to open their doors and they agreed on one main reason: fear. The residents of this community are afraid of two things: crime and the Immigration and Naturalization Service. In this community sixty interviews were obtained between knocking at doors and the help received; ten persons refused to participate (Table 3.8).

For Garfield-Lafayette two methods were used to approach residents: the snowball method and knocking at doors. The snowball approach was used the most.

Knocking at doors was done at just ten houses over a two day period. The first interview was obtained by calling one resident directly (John Tichenor), whose name and phone number were provided by Assemblyman Luis Manzo. John Tichenor introduced me to residents at a regular meeting of the Lafayette Neighborhood Action Committee (LNAC) and to Angus Vail (president of LNAC). After the meeting with Mrs. Tichenor, the snow ball chain started. The knocking at doors method was barely used since I was advised by Mr. Tichenor and Mr. Vail not to emply it because of drug dealing, gangs and crime in the neighborhood. Fourteen interviews where obtained in this community and six individuals refused to participate.

Table 3.8 Participant Response

Communities	Delivered Letters	Doors not opened	Opened doors	Refused to participate	Requested to come later	Never met on scheduled time	Advised not to go	Snow ball	Refusal rate %*	Total respondents
West Caldwell	61	17	39	17	4	2	5	1	30	16
Newark's North Ward	94	63	18	5	1	4	0	33	7	60
Garfield-Lafayette	23	14	6	6	2	3	4	11	26	14

* Refused to participate and never met divided by delivered letters and snowball referrals

The most important recurrent problem in obtaining interviews was gaining face-to-face access to potential participants. The problem began during the testing of the questionnaire and continued until the end of the interview phase.

One of the sites chosen to test the questionnaire was a gated community. Access was already difficult but since one resident offered help to get participants such restricted access was ignored. This decision was a mistake. It took more than three months to interview some residents at this community.

The method of knocking at doors to ask residents to participate was time consuming and yielded few positive results in two of the communities. Many residents did not open their doors and some others did not want to be bothered. Crime in two of the communities adversely affected the participants' response to knocking at doors. As one respondent said "Nobody opens the door unless they are expecting a visit." And drug dealing kept the researcher from knocking at some doors. Two participants advised the researcher "if I were you, I wouldn't knock at doors in this area."

3.4.3 Survey Progression

In West Caldwell, interviews began on Pine Tree Place, continued along Whitaker Place, and finished on Lombard Drive (Figure 3.2). The former was surveyed in two sections, as shown in Figure 3.2: first, one section of the street, marked as 4ast in Figure 3.2., and moving along as responses were obtained to 4bst, as marked in Figure 3.2. Within a week, the majority of Pine Tree Place residents had responded. Whitaker Place and Lombard Drive took a few months to complete. On both streets the snow ball method was used, not always with positive results.

Figure 3.2 West Caldwell survey response and progression.
Source: Image from google.com and modified by author.

Newark's North Ward was divided into two parts for easy tracking of survey responses: the west and east sides of the railroads tracks. The survey began on the west side of the railroads; about a month later the east side was added. Manchester Place was the first street visited at the west side. Just four residents opened their doors on Manchester Place and two of those agreed to participate. After a few weeks of not getting residents to open their doors, help was sought. The system of going street by street, as in West Caldwell, did not work on this side of Newark's North Ward. Resident participation depended mostly on the snowball method.

Interviews on the east side of the railroad were conducted progressively. First, interviews were obtained at the retirement home, a building located at the end of Tiffany Boulevard. The researcher then moved down Tiffany Boulevard. At the retirement home, there is a "coffee time" activity once a week when most of the residents gather to chat. Two visits to the coffee time with the help of Maria (a resident of the retirement home) resulted in ten interviews. The researcher then delivered letters to the town houses located next to the retirement home on Tiffany Boulevard. Little response was obtained on this portion of the street (See Figure 3.3). Honiss Place and Highland Avenue were next, followed by the portion of Tiffany Boulevard marked last in Figure 3.3.

The response rate on the east side of the railroads was different from the one on the west side of the railroad. Most of the interviews on the east side were obtained by knocking at doors.

Figure 3.3 Newark's North Ward right side progression.
Source: Image from google.com and modified by author.

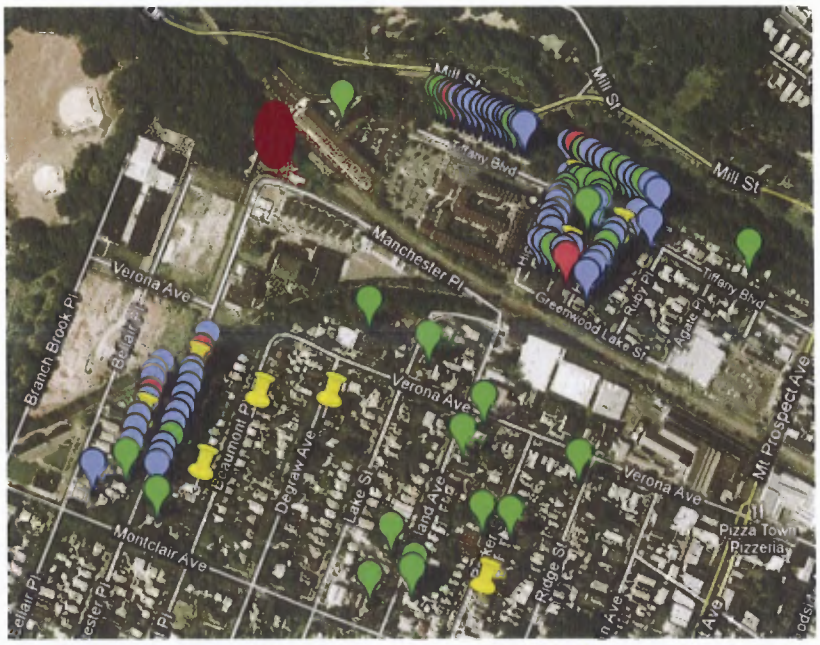


Figure 3.4 Newark's North Ward survey response.
Source: Image from google.com and modified by author.

The survey in Garfield-Lafayette was dependent almost entirely on the snow ball method. This site was divided into two sections: one just in front of the source of the odor (Garfield Avenue) and the other toward the east of the source of odor (Lafayette neighborhood) (Figure 3.5). The survey began on a small section of Garfield Avenue. Only twenty letters were delivered here due to the warnings about crime and drug dealing from the residents. As can be seen in Figure 3.5, many residents did not open their doors along Garfield Avenue. The survey continued with interviews in the Lafayette neighborhood. No invitation letters were delivered in this section. Figure 3.5 shows all the respondents and the houses that the researcher was advised not to visit. Not all refusals to participate are recorded on the map because most of the residents were

contacted by phone and their addresses are not known. For an accurate number of refusals refer to Table 3.8.

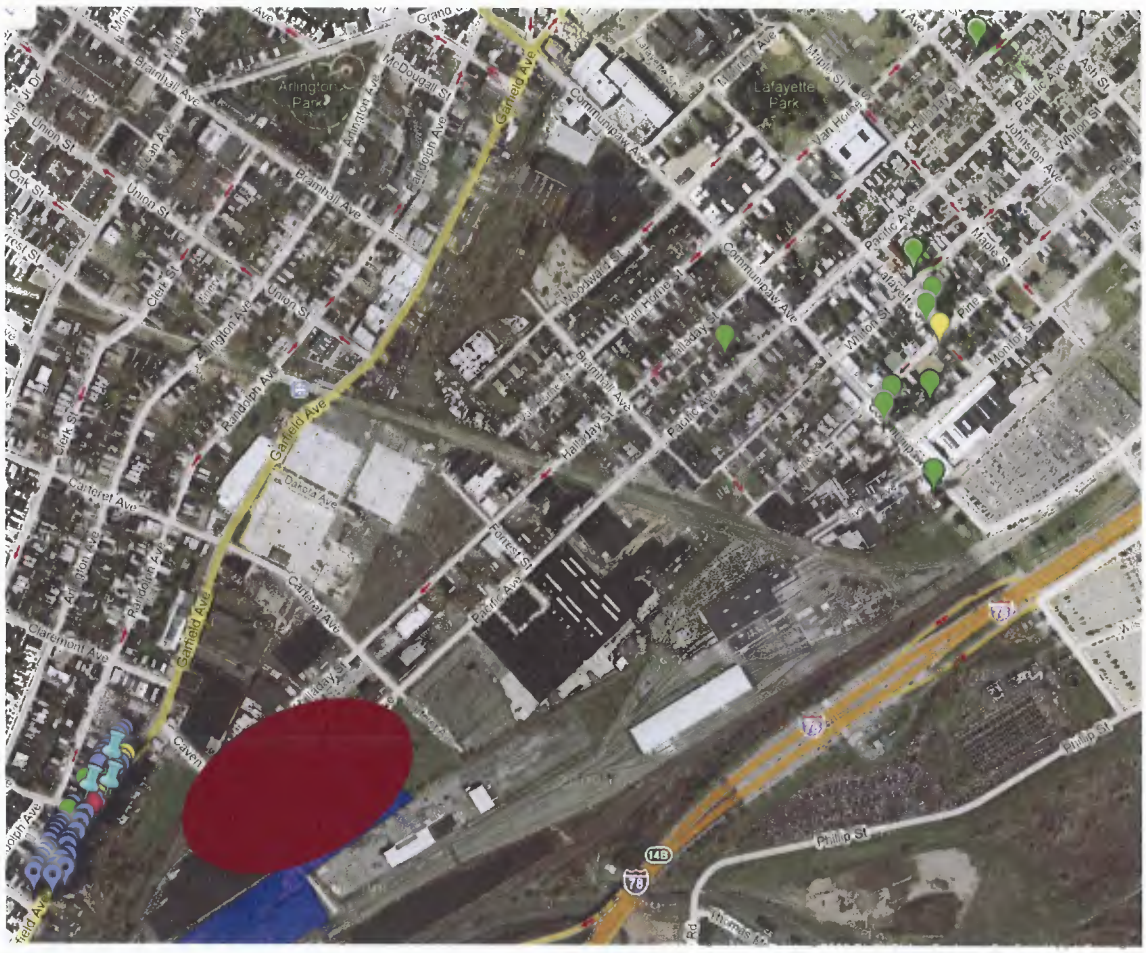


Figure 3.5 Garfield-Lafayette survey response.
Source: Image from google.com and modified by author.

3.4.4 Final Sample

The total number of respondents from the three communities was 90. From these, 17 respondents reported that they had never smelled the odor. For the purpose of the sample

description, the total number of respondents is used but in the statistical modeling the 17 respondents who had never smelled the noxious odor were excluded since no coping data could be obtained from these respondents. The final analytic sample was 73 respondents from the three communities and this is the number of respondents used in the analysis of the theoretical models.

The overall survey sample consisted of 60 female and 30 male residents over the age of 24. The mean age of respondents was 48 years. Almost half of the respondents were Hispanic (n=38), 32 white, 17 African American, and three were from other ethnic groups (See table 3.9 for more sample characteristics).

In West Caldwell the total number of survey respondents was 16 (18% of total sample). The survey sample consisted of 11 females and 5 males. The ethnicity was mostly homogeneous with 14 whites. Their ages ranged from 37 to 80 years with a mean of 57 years. The majority (nine participants) had been living in the neighborhood for more than 11 years. All respondents possessed a college degree or higher and were married with the exception of one who was a widow. All respondents owned their homes and half of them had an income between $100,000 and $200,000 a year (For more detail on residents' demographic data see Table 3.9).

The largest number of residents interviewed were in Newark's North Ward: 60 respondents, representing 67% of the total survey sample. Respondents consisted of 20 males and 40 females. Ethnically, respondents were the most mixed sample of the three communities with 9 whites, 14 African Americans and 35 Hispanics. Their ages ranged from 24 to 82 years with a mean of 49 years. Almost half (27 respondents) were married

and half had children living with them; 32 owned their houses; and 29 were American born (For more characteristics on Newark's sample see Table 3.9).

The survey sample from Garfield-Lafayette is 15% of the total survey sample (N=14). Respondents were 9 females (64%) and 5 males. It was the youngest population of the three communities with 50% of respondents in their 20s and 30s. The sample was ethnically mixed with more than half (nine respondents) white, three African American and two Hispanic. Almost half of the respondents (six) were married. A large group was single with five respondents, one divorced and two living with a partner. All had completed high school at least. Exactly half of those interviewed had lived in the area between two and five years (Table 3.9).

Table 3.9 Sample Demographic Characteristics

		West Caldwell %	Newark's North Ward %	Garfield-Lafayette %	Total Sample %
Sex	Male	31	33	36	33
	Female	69	67	64	67
Ethnicity	White	88	15	64	36
	African American	0	23	22	19
	Hispanic	6	58	14	42
	Other	6	3	0	3
Age	20s	0	3	7	3
	30s	31	29	43	31
	40s	25	22	14	21
	50s	13	19	22	18
	60s	19	19	14	18
	70s	6	7	0	6
	80s	6	1	0	2
Marital Status	Married	94	45	43	53
	Divorced	0	20	7	14
	Single	0	27	36	23
	Live w/partner	0	3	14	13
	Widow	6	5	0	4
Level of Education	8^{th} grade	0	8	0	6
	Some High school	0	13	0	9
	Graduated High school	0	18	7	13
	Some College	6	25	27	22
	Graduated College	44	21	43	29
	Master or higher	50	13	22	21
Income	< $10.000	0	15	0	10
	$10.000-$30.000	6	30	21	25
	$30.001-$50.000	6	13	14	12
	$50.001-$99.999	19	23	36	25
	$100.000-$200.000	50	13	27	22
	> $200.000	0	1	0	1
Time Living in Area in years	< 1	0	5	0	6
	1 – 2	0	23	7	17
	2 – 5	31	15	50	23
	5 -10	13	25	21	22
	> 10	56	28	21	32
Living w/ Children		62	50	28	49
Tenancy	own home	100	53	64	63
American Born		94	49	79	61
N		16	60	14	90

3.5 Data Analysis

The survey provided data to test the theoretical models for explaining variation in reactive and proactive coping (see Chapter 2). Data for the three neighborhoods were entered into the same file. Neighborhoods were analyzed together since the survey samples were too small for separate analyses.

Data were managed and analyzed using SPSS 13.0. Univariate ordinary least squares (OLS) analyses were performed to obtain percentages and frequencies. OLS and binary logistic regressions were used to assess the multivariate relationships indicated by the theoretical models. OLS regression was used for the continuous dependent variables and binary logistic regression was used for the dichotomous dependent variables.

For analytic purposes, each theoretical model was analyzed in two parts. One regression analysis assessed the effects of the intervening variables on the dependent variable; the second regression analysis assessed the effects of the demographic variables on the dependent variables. This divided analysis was performed because the theoretical models contained too many variables for this small study sample. The effects of the demographic variables on the intervening variables were also assessed. Due to the small study sample and in the interest of exploratory research, relationships with p value of .10 were considered statistically significant.

Reactive coping, a dependent variable, was divided into two types: (1) trying to eliminate or reduce the noxious odor and (2) considering moving away. Proactive coping was also divided into: (1) contacting anyone and (2) contacting the correct agencies. This division distinguishes between complaining to the correct or the incorrect agency and

allows comparison with previous studies. The helplessness and hopelessness constructs were merged because hopelessness was reported by only two participants. Details about the variables in the theoretical models that were included in the regression analyses are shown in Table 3.7.

CHAPTER 4

THREE NEW JERSEY COMMUNITIES WITH NOXIOUS ODORS

For this research, three communities experiencing noxious odor in northern New Jersey in 2007 were studied: West Caldwell, Newark's North Ward, and Garfield-Lafayette in Jersey City.

4.1 West Caldwell

The town of West Caldwell is located in the northwest of Essex County. The total population of the town is 10,441 in an area of 20,000 sq kilometers. The majority of the population is white (93%), US-born (91%), and has completed high school (93%) (Census 2008)[1].

The section of West Caldwell where noxious odor is present is in the northwest part of town. This section is primarily residential and consists of single family houses located on spacious lots (half an acre), creating a community with ample green area, as shown in Figure 4.1. The houses and yards are well-kept. Residents use their yards, children play on the street and people jogg. Although these activities do not occur frequently, as observed during site visits, field observations indicate that they are more frequent than in the other two communities.

The streets are clean and well-lit at night. The sidewalks are in good condition. There is not much traffic in this section even though one of the streets, Pine Tree Place, is

[1] Population numbers are estimated by the Census Bureau for 2008.

the main access to the waste water treatment plant (WWTP). It is a very quiet neighborhood. One only hears passing cars or the occasional barking dog.

Figure 4.1 West Caldwell community with waste water treatment plant, aerial photograph

Source: Photograph taken from google.com and modified by author.

4.1.1 Source and History of Odor

The source of odor is the Caldwell Waste Water Treatment Plant (CWWTP). Although there is also another source of odor, Nature's Choice (a composting site), the main source of noxious odor is CWWTP. The odor problem from Nature's Choice was addressed a few years ago and has hardly ever bothered the neighbors since.

There are various accounts of when CWWTP started operating: 1917 (West Caldwell archives, Elson Killman Associates letter to West Caldwell Township Dec. 18, 1987) or the 1920s (M. Patel, personal communication, April 10, 2007). Although the plant was built in the town of West Caldwell, it was planned, initially, to serve only the

town of Caldwell. Originally, it was a small plant that grew over the years to serve the growing population of the area. Today, it serves five communities: Caldwell, West Caldwell, North Caldwell, Roseland and Essex Falls. Three upgrades were made: in the 1930s, in the 1960s and the last one in 1992.

When the Caldwell WWTP was built, there were no houses within a radius of at least 1264 ft. (1935 map of building zones, West Caldwell Building Dep.). In 1935 the closest road, Passaic Avenue, was a dirt road. Figure 4.2 shows that in 1935 the area where the WWTP is located was still not populated. Some houses were located to the south of Passaic Avenue, on the opposite side from WWTP. Also, Figure 4.2 shows that in 1935 the area around the plant was zoned residential.

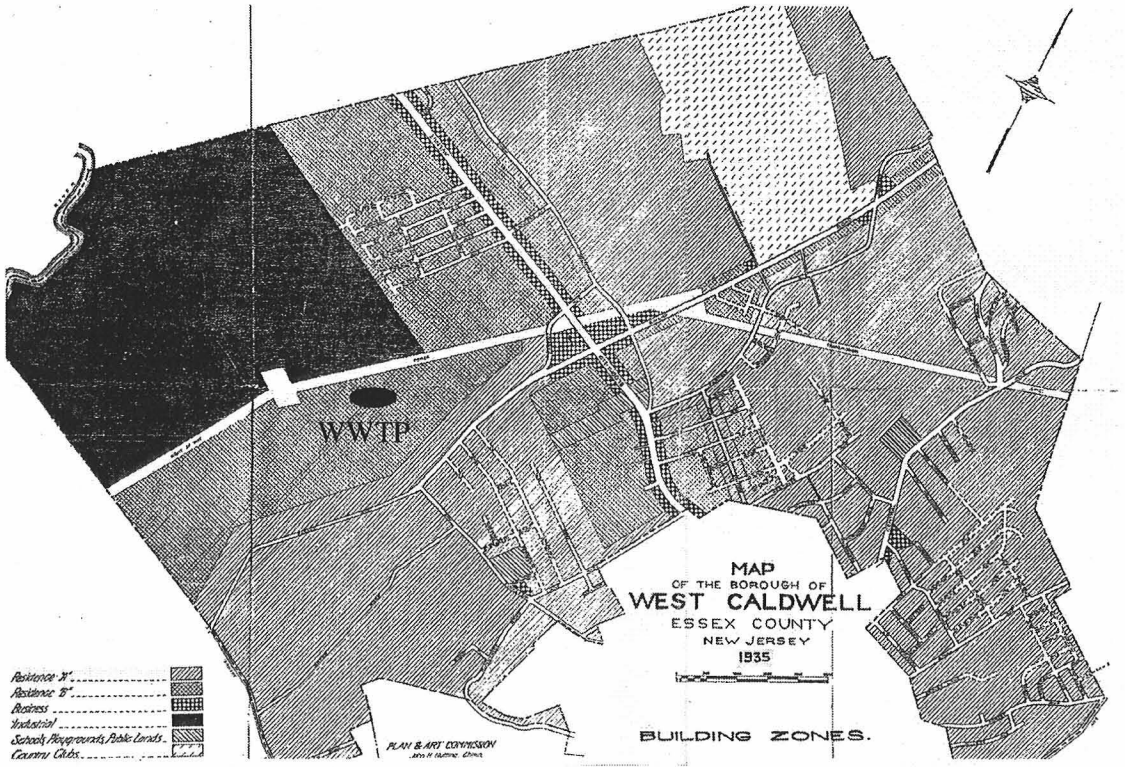


Figure 4.2 West Caldwell Building Zones map.
Source: West Caldwell Building Dep. Archives.

Residential development started in the 1950s, to the south of Passaic Avenue. In 1956 the first residential development started north of Passaic Avenue. After that, the closest house to the WWTP was at a distance of approximately 600 feet to the south of the plant.

Subsequent development occurred in 1968 to the north of Passaic Avenue. Although the location is a little farther from the plant, the closest house is at a distance of over 600 ft. (Figure 4.3). In 1968, the WWTP covered a smaller area. Subsequent plant upgrades included purchasing land to enlarge the size of the plant, as occurred in the 1992 (West Caldwell archives).

Figure 4.3 Aerial view with development years.
Source: Picture taken from google.com and modified by author.

In 1970, further residential development started to the north of Passaic Avenue. This development was much closer to the plant than the two previous ones had been. The closest house to the plant in this development is 400 feet away. The last and closest residential development was built between 1975 and 1980. This development is so close to the WWTP that four houses have their backyards immediately adjacent to the WWTP. About 100 feet of land with trees serve as a curtain so residents do not look directly at the WWTP, but it can still be seen.

The progressive residential development around the WWTP shows that developers preferred the most distant land from the WWTP: this land was the first developed and the construction of houses grew progressively closer to the WWTP (West Caldwell archives). Developers encountered no opposition from the town regarding any of this development.

The residents most affected by the odor from the WWTP are located to the southeast and east of the plant. This is the direction from which the wind blows most of the time. The latest housing developments, built in 1970 and from 1971 to 1981, are closest to the plant in the path of the wind.

Although ERHC did not receive complaints until 1990, residents on Pine Tree Place and Whitaker Place started to complain to various town authorities in 1987 (records of odor complaints in West Caldwell Building Department archives).The Essex Regional Health Commission (ERHC) started receiving complaints about the Caldwell WWTP in August 1990 and has continued receiving them ever since (T. Pilas, personal communication, April 10, 2007). There were complaints as recently as 2007.The

Caldwell WWTP has been fined several times; however, the noxious odor is still present in the neighborhood.

4.1.2 Type of Odor and Physical Reactions

The noxious odor is clearly recognized as a fecal odor. Some days the odor is very strong and intrusive and other days it is very light. No time patterns were observed in the intensity of the odor, according to days of the week or hour of the day. Regarding weather conditions, it was observed that on warm and humid days the odor was very strong. However, if the day was warm and dry, the odor was less intense, and if the day was windy, it was light. On cold days, the odor tends to be light. However, on some winter days the odor was very strong. Independently of intensity, the odor was present for more than an hour during every visit to the site.

The researcher's physical reactions to the odor varied depending on odor intensity and the researcher's location. In two places the odor was more intense than in the rest of the site: at the two houses located at the entrance to the WWTP and at the curve of Lombard Drive, which is the area closest to the plant. Her physical reactions at these two locations included: nausea, shortness of breath, distress[2] and stomach discomfort. When the odor was light, the only physical reaction was a kind of arrhythmia in breathing.

One third of the respondents (31%) reported having some physical reaction to the odor. Nausea was the most frequently reported physical reaction (by 18% of respondents in this community). Eye irritation (13%) and headache (12%) were also frequently reported. Although just 6% of the respondents reported distress, it was the physical

[2] The physical reaction of distress is non-stop thinking about the noxious to the point that the odor gets onto your nerves, preventing your thinking about anything else.

reaction that received the highest ratings of intensity. Nausea and eye irritation also received high ratings of intensity. (Table 6.7).

4.2 Newark's North Ward

Newark is located at the southeast section of Essex County. The total population of the town is 265,375, in an area of 26 square miles. The population is ethnically diverse with 21% white, 53% African American, and 31% Hispanic; 66% of the population is US born, 50% speak only English, 25% own their homes, 27% are married, and 46% have a high school degree or higher (Census 2008)[3].

The section of the North Ward with noxious odor is in the northern section of the ward near Branch Brook Park. The total population of the ward was roughly 55,000[4] in 2009. This section of the ward is mainly residential with one industrial area and a few stores: a supermarket, several convenience stores, a pub, hardware store, some restaurants and car repair shops. This community includes single and multi-family housing. It is more densely populated than West Caldwell, with houses located on small lots and very little green area, as shown in Figure 4.2. Not all the houses have front yards and, if there is a front yard, it is small. Some houses have porches. Very few people were walking on the street during site visits.

This community is divided by a railroad. The source of noxious odor is located right next to the railroad. Field observations suggest that on the south side of the railroad tracks residents are mainly Hispanic. Also on this side, the houses are very close to one

[3] Population numbers are an estimate by the Census Bureau for 2008.
[4] The population number was obtained from the government of Newark's web page: www.ci.newark.nj.us

another and not all the houses are well kept. Across the street from Custom Drying (the source of odor), three three-family houses were under construction in 2008.

On the other side of the railroad tracks the houses are bigger and on wider lots. This section also has two apartment buildings of two stories and a new four-story building that is a retirement home. On this side, all the houses are very well-kept and the gardens are carefully tended. On this side, fewer people were seen walking than on the other side.

On both sides, the streets are dirty and not well maintained. There are sidewalks but they are constantly obstructed with objects or trash and are not well-kept. At night, the lighting on the streets is poor in some areas. Traffic in this community varied by street but in general the streets have little traffic.

Figure 4.4 Newark's North Ward and industrial area.
Source: Picture from google.com and modified by author.

4.2.1 Source and History of Odor

The source of noxious odor is a small industrial plant named Custom Drying. The business consists of drying food or chemicals, including dairy products, animal and vegetables proteins, starch, carbohydrates, clays, ceramics, and latex. The noxious odor comes from one specific drying material, yeast. This material is required for the production of Vitamin E.

Newark's North Ward has been primarily residential for more than 50 years (Jackson, 2000). Custom Drying started operating in 1998 (T. Pilas, personal communication, April 16, 2007) in a small, light industrial area located in the middle of this community. The source of noxious odor was introduced after the residential community was well established.

Complaints to this facility started in March 1999 (T. Pilas, personal communication, April 16, 2007) and have not stopped since. Custom Drying has been fined several times and was required to eliminate the odor problem (T. Pilas, personal communication, November 24, 2007). One of the respondents told me that he was sure Custom Drying was not been fined during the year 2008 because they were operating after 4:00 pm and on weekends with the purpose of evading inspectors from DEP or ERHC.

4.2.2 Type of Odor and Physical Reactions

The noxious odor produced by drying yeast at this site is pungent, putrid and overwhelming when the odor is intense. If the odor is light, it has a faint rotten egg odor.

The odor stays in the air for a few hours and, over that time, effects on the body increase. During one visit, on a day when the odor was very strong, the experience of this researcher was so unpleasant that she had to leave. The researcher's eyes were watering and irritated and she suffered shortness of breath, coughing, discomfort in the stomach, and nausea.

Yet a large number of respondents (39%) reported no physical reaction to the odor whatsoever, with only one third of respondents (33%) having some physical reaction. The two most common reactions were coughing (21%) and nausea (18%). Some other reported reactions were discomfort in the stomach (15%), shortness of breath (13%) and headache (12%). Respondents in the survey did not report such intense reactions to the odor as the researcher experienced. Coughing was reported as the most intense reaction by 15% of those who reported having a reaction. Three other reactions were also reported as strong: dizziness, concentration problems and headache (Table 6.7).

4.3 Garfield-Lafayette, Jersey City

Jersey City is located at the center of Hudson County on the shore of the Hudson River. Due to its excellent location in relation to Manhattan and Newark, Jersey City has been a manufacturing and residential town since its beginning in the 19th century (French, 1997). And still today, Jersey City has industrial sites and residential areas located next to each other. The inland area of the city is 21.1 square miles. Its population as of 2008 is 241,114. Jersey City is a ethnically mixed community with 34% white, 28% African American, and 28% Hispanic; 63% are US born, 50% of the residents speak only English, 33% are home owners, 42% are married, and 81% have a high school degree or

higher.[5] The area affected by noxious odor, Garfield-Lafayette, is located to the southeast and next to Liberty State Park.

The study section was named Garfield-Lafayette for this study because it consists of two separate sections: a small section of Garfield Avenue and a section of the Lafayette community. The section of Garfield Avenue is north of the source of noxious odor, and the section of the Lafayette community is a few blocks to the east of the source of the noxious odor (see Figure 4.5). Both areas are mixed-use, either with retail stores on the first floor of a residential building or solely commercial: convenience stores, liquor stores, car repair, hair salons, supermarkets, banks, restaurants, gas stations, etc. Industrial sites are spread throughout both areas.

In Garfield-Lafayette the housing typology is diverse, consisting of single-family houses, multi-family buildings, brownstones and duplexes. Lots can be medium or small. Single-family houses have porches or not, both front and backyards or not, garages or not. Some houses and buildings are well kept; others look derelict or abandoned and many are undergoing renovation. Of the three communities, Garfield-Lafayette is the one where the most people were observed walking during the day. One reason is because it has public transportation (buses and light rail) and Newark's North Ward and West Caldwell do not. Another reason could be that among the communities, Garfield-Lafayette is the densest in population and in housing.

There is a lot of traffic in Jersey City, at rush hours and other times. Cars drive with some speed. The traffic in both areas varies by street. Garfield Avenue is a main

[5] Population numbers are estimate by the Census Bureau for 2008.

street that lends to a highway, thus the traffic is all day, abundant and fast. The Lafayette section has no main street to a highway and the traffic is less, and not high speed. Compared to Newark's North Ward and West Caldwell, Garfield-Lafayette is the one with the most traffic.

Street maintenance is fair. The sidewalks are, for the most part, wide and in good condition; however, the streets are dirty with lots of litter. The lighting is poor, there are not enough lamps, and the existing ones do not illuminate large areas. The streets are full of parked cars and it is difficult to find a parking spot.

Figure 4.5 Garfield-Lafayette and Reliable Wood Products.
Source: Picture from google.com and modified by author.

4.3.1 Source and History of Odor

The odor producing facility in Garfield-Lafayette is Reliable Wood Products, which is a company that recycles different materials. The activity that produces the noxious odor is the one dedicated to recycling wood. Since 1986, the company has been recycling paper;

in 2005, a new facility was added to recycle wood pallets.[6] The later facility is located at the south end of Cave Point Avenue, near Garfield Avenue.

In this facility, the recycled wood comes from old wooden pallets or tree branches and stumps cleared from highways (Kaulessar, 2007). The wood to be recycled is painted and ground up. The ground-up wood is then used for mulch. Until this processed wood is sold, it is stored in outdoor piles. When this wood is stored in large quantities, it slowly self- combusts and produces smoke and a noxious odor (Figures 4.6, 4.7, 4.8).

Figure 4.6 Thanksgiving weekend and the "Smell."
Source: John Tichenor, 2006.

[6] Information on Reliable Wood Products was obtained in their web page: http://www.reliablewoodproducts.com/jerseycity.htm

Figure 4.7 Dawn behind the statue, the "smell."
Source: John Tichenor, 2006.

Figure 4.8 Burning piles of wood mulch.
Source: John Tichenor, 2006.

The Department of Environmental Protection has fined Reliable Wood Products (Thorbourne, 2007), and the Hudson Regional Commission has also reported some violations and fines. But, as Angus Vail (president of Lafayette Neighborhood Action Committee) said: "It seems to not affect the operations of Reliable and we still have the smell."

4.3.2 Type of Odor and Physical Reactions

The noxious odor in this community is present sporadically but, when it is present, it stays for hours or days. The characteristics of this odor varied, one could not be sure if it was a burning pile of wood or tires, or if it was the smell of compost, or if someone was barbecuing. One of the respondents said that in the beginning he thought "someone in one of these industrial lots was burning tires," and another said that it was "the compost used at the Lafayette Park." Later, both respondents realized that they were wrong in their guesses. One girl called the odor "smoked ham." She told one of the residents that there was the smell of smoked ham when she returned from jogging around the area (Thorbourne, 2007).

This noxious odor produced a slight eye irritation and caused the researcher to feel a sensation at the back of her mouth and in her throat. After a few minutes, she started coughing and her nasal passages started to ache. The odor resembled a barbeque with some chemicals on the meat. At first the odor was pleasant because of its similarity to a barbeque but, after smelling it several times and having some physical reactions to it, the smell bothered her a lot. Most of the participants in Garfield-Lafayette called the noxious odor "the smell."

Half of the respondents reported having some physical reaction to "the smell." Distress was the most common response (35%). Among other physical reactions were eye irritation, headache, and respiratory irritation as reported by 21% of respondents (For more physical reactions see Table 6.7). Distress, besides being the most common reaction, was also one of the strongest reactions. Other reactions reported as strongest were fatigue, respiratory irritation, and sleeping problems.

CHAPTER 5

ODOR REGULATION

In the United States, it is possible in many places for citizens to report noxious odor that they experience in or near their homes to a government agency. Sadly, many American citizens do not know that they can complain about a noxious odor if the odor is affecting them on their property. Only forty percent of the respondents in this study reported knowing about this right.

5.1 Overview of Odor Regulation in the U.S.

Regulation of odor in the United States started in the late 1960s. Increased numbers of odor-producing operations and complaints to local authorities lead the federal government to establish a program for gathering information on odor and other air pollutants under the Air Quality Act passed in 1967 (Turk, Johnston & Moulton, 1974; The National Research Council, 1979). As a result of the Air Quality Act, the Environmental Protection Agency created a series of measures of air quality to be adopted by each state. However, whether a state does adopt odor regulations is optional since odor is not considered to be a harmful health problem but just a nuisance (Turk, Johnston & Moulton, 1974).

The number of states that have adopted odor regulations has increased (D. McGinley, personal communication, November 14, 2008). Depending on local government rules, municipalities and suburbs within a state can create their own odor regulation ordinances if their state has not; one case is the City of Des Moines in Iowa,

which created its own odor ordinance in 1990, and the city of Independence in Oregon, which created its own odor ordinance in 2009 (McGinley, 2009 November). The state of New Jersey is one of the states that has adopted odor regulations.

5.2 New Jersey's Odor Regulation

Each state has its own definition of odor emission, its own rules and regulations and investigation guidelines. In New Jersey, odor emissions are regulated under the Air Pollution Control Act (APCA). The APCA was passed by the legislators in 1969; it defines air pollution as "the presence in the outdoor atmosphere of one or more air contaminants in such quantities and duration as tend to be injurious to human health or welfare, animal or plant life or property, or would unreasonably interfere with the enjoyment of life or property" (New Jersey Status Annotated 26:2C-2). The same air pollution definition is given in Subchapter 5 of the New Jersey Status Annotated (N.J.S.A) 7:27-5, under which an odor produced by an air contaminant and released into the air is considered air pollution. An odor is a violation of the APCA only if the health department determines that "the odor has unreasonably interfered with the enjoyment of life or property" (NJDEP, 2007). Odor itself is not a violation. Thus, what is regulated under the APCA is not the odor itself but the unreasonable interference "with the enjoyment of life or property."

Odor pollution is regulated through the issuing of violations and penalties. The New Jersey Department of Environmental Protection (NJDEP) regulates odor penalties under N.J.A.C. 7:27A, defining two odor types, respectively, as: "air contaminants in such quantities and duration as are, or tend to be, injurious to human health or welfare,

animal or plant life or property" and those that "are not, or do not tend to be, injurious to health or welfare, animal or plant life or property" (New Jersey Administrative Code). Each of these two odor types has its own set of penalties. Since no name is assigned to these types, I will assign a name to facilitate the discussion. Odor injurious to human health will be called "harmful" and odor that is not, or does not tend to be, injurious to human health will be called "nuisance" odor. The focus of this study is on nuisance odor.

In New Jersey, government agencies at different levels regulate odor emission. The state, NJDEP, the county, local health departments and local health agencies all perform investigations under the authority delegated by the County Environmental Health Act (CEHA)[7]. Any of these regulatory agencies must conduct an investigation in order to issue a violation or a penalty if merited. But, for any of these agencies to take any action at all, one or more residents must file a complaint with the agency.

These agencies have trained field inspectors who perform the odor investigation and enforce the regulations. Inspectors are trained in a special Air Pollution Training Program authorized by the NJDEP. During this investigation process, field inspectors use an "odor investigation field data" form (Appendix B) to gather the odor information required during the investigation process.

5.2.1 Investigation Process for a Nuisance Odor

When residents complain about an odor, their goal is to reduce or eliminate the odor altogether. To reach that goal, the complainant must notify the regulatory authorities

[7] The CEHA was created by NJDEP, it certifies and delegates lead county health agencies to implement and enforce environmental health programs (http://www.state.nj.us/dep//enforcement/CEHA%20Scope%20of%20Delegation%202006.pdf).

who, in turn, must conduct their investigations according to specific guidelines regarding citizen odor complaints. The following description of the process is a summary of the "compliance and enforcement air pollution investigation guidelines" from the NJDEP (NJDEP, 2007) and from the "odor field enforcement" training program manual (Rutgers The State University of New Jersey, 2006).

The call. Residents need to call one of the regulatory agencies to complain at the very moment that the odor is present on their property, either outside in their yard or inside their home. With this call, a complaint is filed but no further action by the agency can be taken yet. A field inspector is assigned to the case; he or she calls the complainant to obtain additional information: Is the problem currently occurring? Is there a suspected source? Are other persons affected? What physical reactions have occurred? Then, the field inspector visits the complainant at the affected address to verify the presence of the odor. The field inspector has two opportunities to determine if the odor is harmful or a nuisance: during the call to the complainant or during the inspector's visit. If the complainant reports being at the hospital due to the inhalation of the odor or that the odor smells like chlorine, then the inspector determines that the odor is harmful. The determination of a harmful odor is based on the chemicals that are involved in the production of the odor. Widely known toxic chemicals are considered harmful as in the case of chlorine. If the complainant reports mild physical reactions such as headaches, coughing or eye irritations, then the odor is determined to be a nuisance.

The visit. A field inspector visits the complainant's property without scheduling an appointment in advance. The investigation of the source of the odor can only proceed if the complainant is present when the inspector smells the odor on the complainant's

property. Even if the odor is present next door, the inspector leaves the property without taking further action. In this case, the complainant needs to call the agency the next time the odor is present on his or her property. If the complainant is not present when the field inspector arrives at the complainant's property, the field inspector leaves a business card reporting he or she was there; but no further action can be taken.

Inspector's verification of odor. Once the field inspector verifies (smells) the odor on the complainant's property, then he or she needs to verify that the odor is in "such quantities and duration" (NJSA 26:2C-2) that it is interfering with the life and enjoyment of property. The NJDEP delineates several facts and circumstances for judging wether the odor is interfering with the complainant's life and enjoyment of property. Regulations specify that field inspectors should check the noxious odor for the following:

- Intensity: perceived strength of an odor, a scale from 1 to 5.
- Character: description of the odor, e.g. smell like coffee.
- Hedonic tone: the degree of like or dislike of an odor sensation.
- Frequency: how often the odor occurs.
- Duration: for how long the odor stays in the air.
- Number of persons affected: within the household.
- Area affected: property of or used by complainant.
- How is the complainant affected: must show unreasonable or injurious effects from the odor,

Along with these specifications, inspectors record in the Odor Investigation Field Data (Appendix B) from the following additional information: wind direction, wind speed, weather conditions, temperature, precipitation, relative humidity, time, date and location

After the field inspector completes the form, the inspector judges if the odor is interfering with life and enjoyment of the property. There are no predetermined levels of intensity, number of frequency or duration, character and physical effects that indicate that the odor is in "such quantities and duration" that "would unreasonably interfere with the enjoyment of life or property." Thus, it is up to the inspector to decide if the odor is strong enough to interfere with the complainant's life.

Completion of complaint form by resident. Once the inspector decides the odor is interfering with enjoyment of life and property, he or she gives a "statement of complaint" form to the complainant (Appendix F). On this form, the complainant explains how the odor is interfering with his or her enjoyment of life and property. This is filled out in the presence of the field inspector. Then the field inspector walks upwind of the complainant's property in an attempt to identify the source of odor.

Identification of source of odor. Once the investigator identifies the source of odor, he or she walks upwind, downwind, and around the identified facility to make sure that no other possible sources are contributing to the odor. Then the field inspector performs an inspection of the offending facility, outside and inside. During this inspection, the field inspector attempts to determine why the facility is producing the odor. The inspection is to be performed with a representative of the facility. The inspector asks questions related to: the facility' operating conditions, the time and cause of any episode of malfunction and possible actions that can be taken to abate the current odor emission. A violation is then issued. But, if the field inspector cannot identify the source of odor, no violation can be issued.

The violation. The odor control agencies give a "notice of violation" to the offending facility along with a document listing the changes required to reduce or eliminate the odor. A grace period is given to the offending facility to fix the odor problem. If, within such period, the facility does not perform any improvement, a fine is issued. Once a fine is issued, NJDEP continues with the case. NJDEP collects the fines and enforces the regulation of the offending facility. Monetary fines are increased each time the facility is cited for a violation: the first violation incurs a small fine, it continues to rise as the violation persists (Appendix G).

5.2.2 Nuisance vs. Harmful: Odor Regulation and Investigation Process

The investigation process for the two types of odor is similar, although the process regarding a harmful odor in some ways is much easier. Below the most relevant differences in the investigation process and the penalties are described.

The complaint process begins in the same manner: a citizen must call the appropriate agency and report the presence of an odor on his/her property. After the call, both types of odor require a field inspector to call and visit the complainant's property. The investigation process differs the moment that an odor is determined to be harmful. If a harmful odor is determined during the phone call, then the investigation proceeds without the complainant's further involvement. And if a harmful odor is noted during the visit, the complainant does not need to be at the affected address for the investigation to proceed.

One more difference occurs when the inspector arrives at the complainant's property. If the wind has shifted and a nuisance odor is no longer present at the affected address, but is present a few houses away, the inspector cannot verify the odor and cannot proceed with the investigation to issue a violation. However, if it is a harmful odor, the inspector can verify the odor is present and proceed with the investigation process to issue a violation. Clearly, the reporting of nuisance odors by residents requires more time and dedication from citizens than harmful ones.

Violation penalties differ in dollar amount as well. Harmful odors result in much higher fines than nuisance odors. The facilities that incur a first offence of harmful odors are charged $10,000, while facilities creating nuisance odors receive penalties of $1,000. Subsequent violations at the facility will result in penalties with higher dollar amounts but harmful odors always incur higher fines than nuisance odors. The investigation process and fines show that harmful odors are treated with more severity than nuisance ones.

5.3 Respondents' Criticisms and Suggestions

Some respondents in this study who had contacted the correct agencies (NJDEP, Hudson Regional Health Commission or the Essex Regional Health Commission) experienced many inconveniences in filing their complaints. These discouraged most from proceeding with the complaint they were trying to file. The most common inconveniences that respondents reported concerned the available hours to call and the visit of the field inspector. Eight residents in the three communities experienced at least one of these inconveniences.

In West Caldwell, four respondents reported the following inconvenience: field inspectors did not arrange the date and time of their visits in advance. They visited at times convenient to the inspector to verify the presence of the odor on the complainant's property. One frustrated respondent in West Caldwell reported "they [field inspectors] don't tell you when they are coming out. They show up whenever and that doesn't help." Another respondent in West Caldwell reported that if she calls, she needs to stay home waiting for the inspector to come, "If I call, I can't do anything that day, and the inspector may not even come that day."

Another reported inconvenience is that inspectors may arrive at the complainant's property when the odor is no longer present. A West Caldwell respondent described this problem: "One time I decided to waste my day and stay home to finally file a complaint. And when the inspector came to my house, the odor was not present in my property but two houses down the street. I wasted my day. The inspector did not file a complaint." The odor moves because: (1) the wind shifts and carries the odor in another direction or (2) the weather conditions modify the spread of the odor, changing the size of the affected area. Although this fact is well known by the inspectors, they cannot verify the presence of the odor on a complainant's property if the odor is a few houses away because it is not established in the investigation process guidelines to do so.

A less frequent inconvenience is that the inspectors visit when the complainant is not at home. One respondent in West Caldwell said "[Inspectors] have been in my property but I wasn't here. So I haven't made any complaint although they acknowledge the presence of odor." Although the inspector verified the presence of the odor in the outside area of the complainant's home, the investigation could not proceed because the

complainant needs to be present at the moment the field inspector is on the property in order for the field inspector to proceed with the complaint and with further actions regarding the source of odor.

The last reported problem concerns the hours that agencies receive complaints. It is specified in the guidelines that the complainant should call at the moment the odor is present. However, often the odor is present after the agencies are closed, as in cases of evening and night odors. In West Caldwell, the odor is present primarily during evening hours. One respondent in West Caldwell expressed her concern regarding this weakness in the odor complaint process: "The Environmental Health Commission (ERHC) closes at 4 to 4:30pm. Then there is no place to call. The 1-800 number for 24 hours that ERHC gave me is just for life emergencies."

Overall, West Caldwell residents reported that the complaint process does not work. This comment was made in reference to the investigation guidelines set by the New Jersey Department of Environmental Protection. Several residents volunteered ideas to improve the complaint process: creating a 24-hour service line and having a field inspector available during those hours.

In addition to these problems with the investigation process, respondents in Garfield-Lafayette reported difficulties in understanding the process required to file a complaint successfully at the correct agency. Respondents in this community reported a different experience from those in West Caldwell. One member of the neighborhood association expressed his difficulties in finding out which agencies to contact: "The whole experience to try to figure out who is responsible for what between city and state

agencies is frustrating and discouraging." And another association member described his difficulties in understanding the available written information regarding the complaint process: "I am a lawyer. It is difficult for me to find out what is the real process." The president of Garfield-Lafayette association (Lafayette Neighborhood Action Committee) contacted the correct agencies (NJDEP and Hudson Regional Health Commission) in the name of many neighbors. Several letters were exchanged between the NJDEP and the president of the association.

Many respondents in Garfield-Lafayette agreed that the problem they were facing with the odor lay in the lack of enforcement and not in the complaint process. Respondents arrived at this conclusion because they had successfully filed a complaint and had been informed by the regulatory agencies that Wood Recycling Products had received a few fines. After all their effort no discernable changes had been made at Wood Recycling Products, and the odor was still present. Some respondents blamed this lack of enforcement on the interference of politics in the execution of rules and regulations.

In West Caldwell, there is also a lack of enforcement but it arises from the requirements of the regulatory process. Residents have difficulties successfully filing complaints because it is difficult to meet all three requirements: that the complainant, the inspector and the odor are simultaneously present on the complainant's property.

In Newark's North Ward, respondents did not report experiencing difficulties with the Essex Regional Health Commission (ERHC). Instead they reported that Custom Drying (the source of odor) was evading ERHC. They blamed Custom Drying for hiding their activities from ERHC. These respondents reported that Custom Drying worked

during hours when the ERHC is closed; thus no field inspector could proceed with odor investigation. These respondents lived in a retirement home. The field inspector had visited the retirement home many times and informed complainants that Custom Drying had received a violation and a fine and would be making changes to the operation to eliminate the odor. One respondent reported "It is a lot of money to invest not to produce odor. They [custom Drying] are sneaking and working from Friday to Sunday. They [Custom Drying] know that the inspectors don't work on weekends." In this case, the proposed 24-hour telephone line would address the problem of evening odors.

Respondents' criticisms of the complaint process show how difficult it is to complain about a nuisance odor in New Jersey. Simply determining which agencies to call is a challenge. The successful completion of the entire process requires determination and patience on the part of residents. But even after that, complainants may find that the odor continues unchanged.

CHAPTER 6

REACTIVE COPING

In this dissertation, reactive coping consists of those efforts that residents make to evade a noxious odor and its effects. Some residents try to eliminate the odor from their lives as much as possible by modifying their daily activities. These actions include closing the windows, not using outdoor areas, not having guests or parties at home.

The theoretical model in Figure 6.1 presents those variables expected to influence reactive coping. For the analysis, reactive coping is divided into two categories: (1) efforts to eliminate or reduce the noxious odor on the premises and (2) considering moving away.

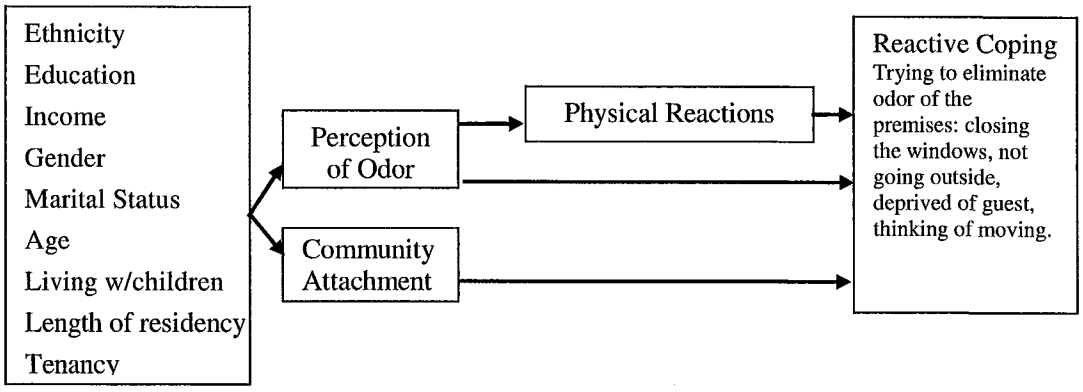


Figure 6.1 Reactive coping: theoretical model.

6.1 Perception of Odor, Physical Reactions and Community Attachment

The reactive coping model has three intervening variables that are likely to affect the likelihood of trying to eliminate or reduce the noxious odor, or considering moving away. These three intervening variables are perception of odor, physical reactions and

community attachment.

6.1.1 Perception of Odor

The source of odor differed among the three communities: in West Caldwell the source is a waste water treatment plant; in Newark's North Ward it is a food drying plant, and in Garfield-Lafayette it is a wood recycling plant. Not surprising then, the characteristics, frequency, duration and intensity of odor as reported by residents also varied.

Respondents were given a list with 26 odor characteristics to choose from. Of the 15 respondents in West Caldwell, 13 reported that the odor smelled like "sewage". In addition, the following four characteristics were most frequently reported: "burnt" (eight respondents), "bloody" (seven respondents), "fecal" (six respondents) and "earthy" (five respondents). In Newark's North Ward the most frequently reported characteristic was "chemical." Of the 44 respondents, 19 reported that the odor smelled that way. Three other characteristics were also reported by a large number of respondents: "burnt" (15 respondents), "bloody" and "sewage" (ten respondents each). Of the 14 respondents in Garfield-Lafayette, ten reported that the odor smelled "smoky," nine chose "chemical," and eight "acrid/pungent." Although the noxious odor was particular to each community, respondents reported some characteristics in common: "chemical," "diesel," "exhaust," "acrid/pungent," "fecal" and "earthy".

Perception of odor can diminish or even fade away if a person is exposed to the same odor continuously (Watson, 1999). Respondents became aware of this fact after the in-person interview. Residents in West Caldwell have been living with the noxious odor for over 20 years. A common question respondents posed to the researcher at the end of

the interview was "Do you smell it now?" After the researcher answered, respondents would give their perceptions: "I don't smell it at all," or "I do too... ." The purpose of their question seemed to be to compare respondents' perceptions to the researcher's perception. Respondents realized that they may have adapted to the odor and might not smell it as frequently as they had before. In Garfield-Lafayette respondents raised the same question, apparently to confirm that indeed the researcher had smelled the odor. At Garfield-Lafayette the odor is relatively recent (two years) and infrequent. In Newark's North Ward this question was never asked.

Of the 90 residents interviewed, 73 (81%) reported that they had smelled the noxious odor. Those respondents who smelled the odor volunteered that the odor is "intrusive," "annoying," "disgusting," and "overwhelming to the senses." As indicated in Table 6.1, of the 17 respondents who reported never smelling the odor, the majority (16 respondents) were from Newark's North Ward and one was from West Caldwell. The West Caldwell respondent commented during the interview that: "I have a very bad nose, I never smelled anything but my neighbors did. They complained about the odor."

Table 6.1 Smelling the Odor by Community

Have you ever smelled the odor?	West Caldwell		Newark's North Ward		Garfield-Lafayette		Total	
	n	%	n	%	n	%	n	%
No	1	6	16	27	0	0	17	19
Yes	15	94	44	73	14	100	73	81
Total N	16	18	60	67	14	15	90	100

As indicated in Table 6.2 below, more white respondents than African American reported smelling the odor. And more Hispanic respondents than white or African American reported never smelling the odor.

Table 6.2 Smelling the Odor by Ethnicity

Have you ever smelled the odor?	White		African American		Hispanic		Other		Total	
	n	%	n	%	n	%	n	%	n	%
No	2	6	3	18	11	29	1	33	17	19
% of total	-	2	-	4	-	12	-	1	-	19
Yes	30	94	14	82	27	71	2	67	73	81
% of total		33		16		30		2		81
Total N	32	36	17	19	38	42	3	3	90	100

For this study, odor perception is measured by combining measures of: intensity (how strong), duration (how long the odor stays in the air) and frequency (how many times do you smell the odor). The statistical results of the multivariate analysis for odor perception are shown in Table 6.3 below. Three demographic characteristics showed a significant relationship to this overall measure of odor perception: tenancy, ethnicity and age. Those respondents who rent were more likely to score higher on the measure of odor perception than those who own. Previous research reports the contrary: those who rent adopt an attitude of denial about odor (Kahn, 2001). Hispanics were more likely than whites to score lower on the measure of odor perception. And the older the respondents were, the lower they scored on the measure of odor perception, as was expected from previous research (Wysocki & Gilbert, 1989; Murphy et al, 1991). Although this relationship did not reach statistical significance of .05, it is considered in this study in the interests of exploratory research.

Table 6.3 Multivariate Linear Regression Model for Predicting Odor Perception

Demographic Characteristics	Coefficient	p-value.
Rent[1]	.35	.042
Time living in the area	.04	.718
Education	-.05	.753
Income	.21	.241
Living w/children	.22	.118
Married[2]	.19	.151
African American[3]	-.06	.680
Hispanic[3]	-.32	.047
Age	-.25	.056
Sex	.11	.312

1 As compared to owning
2 As compared to unmarried
3 As compared to white
R^2=.19

Of the three components of odor perception, two were affected by demographic characteristics: frequency and intensity. As indicated in Table 6.4 below, the older the respondents were, the less likely they were to report smelling frequent noxious odors. And intensity of odor is affected by ethnicity: African Americans reported a stronger odor than whites. However, more whites than African Americans reported smelling any odor at all, as indicated in Table 6.2.

Table 6.4 Multivariate Linear Regression Model for Predicting Intensity and Frequency

Demographic Characteristics	Intensity Model R^2=.16		Frequency Model R^2=.14	
Variables	Coefficient	p-value	Coefficient	p-value
Rent[1]	-.23	.303	.04	.842
Time living in the area	.17	.237	.09	.581
Education	.00	.990	.07	.709
Income	.25	.278	-.19	.417
Living w/children	.00	.988	.28	.121
Married[2]	.05	.739	-.11	.468
African American[3]	.43	.019	-.16	.365
Hispanic[3]	.10	.597	-.00	.988
Age	-.20	.215	-.32	.051
Sex	.03	.798	.03	.784

1 As compared to owning
2 As compared to unmarried
3 As compared to white

The components of odor perception were measured individually to find out which of them was the most bothersome to the respondents. Following the reactive coping model, physical reactions and psychological effects were included in this analysis. Respondents were shown a card listing the following items: "Number of times that I notice the odor," "Strength of the odor in the air," "Length of times that the odor lasts," "Physical effects the odor has on me," "Psychological effect the odor has on me." Then they were asked "how much does each of these items listed on the card bother you: not at all, somewhat or a lot?" Most respondents reported that it was the strength of the odor that bothered them the most, as shown in Table 6.5. Frequency and duration were also reported as bothersome by many respondents. However, physical reactions and psychological effects were reported less frequently as bothersome.

Table 6.5 Component of Annoyance in an Odor Experience

	Strength %	Frequency %	Duration %	Psychological Effects %	Physical reactions %
Not at all	3	3	4	33	42
Somewhat	26	34	40	25	30
A lot	71	63	51	42	23

Of all the effects of demographic characteristics on odor perception, the effect of ethnicity was unexpected. The effect of rent and age on odor perception has been reported in previous studies. However, the effect of rent as reported in previous studies was the opposite of this study: those who rent were less likely to be concerned and bothered by noxious odor (Kahn, 2001). No previous studies have reported differences in odor perception by ethnicity. Adaptation to odor and cultural background may help explain why Hispanic respondents scored low on odor perception. It may be that Hispanic

residents accept the odor as an unavoidable part of their lives. Some Hispanic respondents, after reporting that they did not smell any odor, said at the end of the interview "ah... you refer to that odor." One respondent added "I thought it comes with the neighborhood." Another respondent reported "I smell it but forget about it right away." It is not clear why African Americans reported a greater intensity of odor than whites.

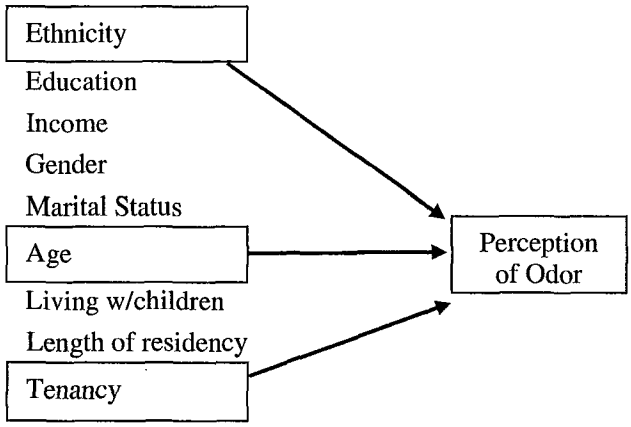


Figure 6.2 Odor perception Model.
Note: → Indicates a significant relationship as shown in the regression analysis.

6.1.2 Physical Reactions

The noxious odor in each community produced a range of physical reactions in respondents, as indicated in Table 6.6. In West Caldwell nausea was the most common reaction; in Newark's North Ward the most common reaction was coughing and in Garfield-Lafayette it was distress. The intensity of the physical reactions also varied by community. The community with the most intense physical reactions was Garfield-Lafayette. In this community, the most frequently reported physical reaction is distress; it also received the highest ratings of intensity. In West Caldwell and Newark's North

Ward, distress also has the highest ratings of intensity but it is not among the most frequent reactions. Regardless of odor source, distress appears to be the most intense physical reaction.

Table 6.6 Types of Physical Reactions and Intensity by Community

Physical Reactions	West Caldwell		Newark's North Ward		Garfield-Lafayette	
	%	Reaction Intensity [1] Median	%	Reaction Intensity[1] Median	%	Reaction Intensity[1] Median
Fatigue	6	3	8	4	1	5
Coughing	0	0	21	5	7	3
Discomfort in the stomach	0	0	15	3	7	2
Nausea	18	4	18	3	14	3
Shortness of breath	6	3	13	4	14	3
Dizziness	6	3	5	5	14	2
Eye irritation	13	4	9	4	21	4
Headache	12	1	12	5	21	4
Respiratory irritation	0	0	6	3	21	5
Concentration Problems	0	0	5	5	20	3
Sleeping problems	6	4	5	4	20	5
Distress [2]	6	5	7	5	35	5
N [3]	5		27		7	

1 Reaction Intensity: On a scale of 0-5.
2 Distress: the odor gets on your nerves and gives you a little anxiety.
3 N: is the total number of people who reported physical reactions within the community.

Of those respondents who reported that they smelled the odor, more than half reported experiencing some type of physical reaction. As indicated in Table 6.7 below, the largest group reporting some physical reaction was from Newark's North Ward. However, respondents in this community scored lower than the other two communities on odor perception overall, as indicated in Table 6.1. One possible explanation is the source of odor, which differed in the three communities. Different types of odor may lead to different physical reactions with different levels of intensity, regardless of the score on

the measure of odor perception. No previous studies have reported differences in physical reactions by source of odor.

Another possible explanation is that many of the respondents in Newark's North Ward live in a retirement home and may have a different health status from respondents in the other two communities. Physical reactions are likely to vary by personal health status (Turk, Johnston & Moulton, 1974; NRC, 1979; Schiffman et al., 1995a; WEF Manual of practice No. 22, 1995; McGinley & McGinley, 1999). However, this research did not include any questions concerning health status.

Table 6.7 Physical Reactions by Community

	West Caldwell		Newark's North Ward		Garfield-Lafayette		Total	
	n	%	n	%	n	%	n	%
Any Physical Reaction	5	33	27	61	7	50	39	53
% of Total	-	7	-	36	-	10	-	53
No Physical Reaction	10	67	17	39	7	50	34	47
% of Total	-	14	-	23	-	10	-	47
Total N	15	21	44	60	14	19	73	100

Proximity to the source of odor plays an important role in physical reactions. In West Caldwell, the respondent living closest to the waste water treatment plant reported developing frequent migraines since she moved to that house. Her husband experienced the same physical reaction. This respondent commented "It [the odor] is very stressful. I believe it creates a chemical imbalance in the body. When you are nauseous, it affects your body, and with time it will affect your behavior or your blood pressure." In Newark's North Ward the respondents most affected were those living in a retirement home, which was located next to Custom Drying. These respondents reported several physical reactions: shortness of breath, sleep problems, increased allergies, eye irritation,

dizziness, nausea, coughing, discomfort in the stomach and distress. One respondent living in this building reported "Some neighbors moved out of the building because the odor was deteriorating their health. The doctor recommended that they move because the odor was affecting their health." Another resident living in this building reported "I have a machine to help me sleep, I never used it before I moved here and the odor came in." In Garfield-Lafayette, two respondents living on Garfield Avenue, right in front of Reliable Wood Products, reported high levels of distress when the noxious odor was present. One respondent reported that the odor woke him up in the middle of the night.

Table 6.8 Multivariate Linear Regression for Predicting Physical Reactions

Variables	Coefficient	Sig.
Odor Perception	.40	.001
Rent[1]	.38	.034
Length of residency	-.21	.084
Education	.05	.726
Income	-.36	.050
Living w/children	.11	.468
Married[2]	-.16	.201
African American[3]	.15	.321
Hispanic[3]	.03	.830
Age	.09	.522
Sex	.03	.774

1 As compared to owning
2 As compared to unmarried
3 As compared to white
R^2 =.63

As predicted by the theoretical model, physical reactions were related to odor perception. The higher the score on the measure of odor perception, the greater the likelihood that respondents reported some physical reaction. As indicated in Table 6.8, physical reactions were also related to tenancy, length of residence (.084) and income. Respondents who owned their houses were more likely to report some physical reaction (although this relationship did not reach statistical significance). The longer respondents

had lived in the area, the less likely they were to report any physical reaction. And the higher the of income of espondents, the less likely they were to report any physical reaction. It is interesting that length of residence showed a negative relationship to physical reactions, although not a very strong one. One explanation could be that those respondents' bodies had adapted to the noxious odor. When odor is constantly present, the olfactory sense shuts off and the olfactory bulb does not smell that odor anymore (Watson, 1999; Berglund, Berglund & Lindvall, 1978).

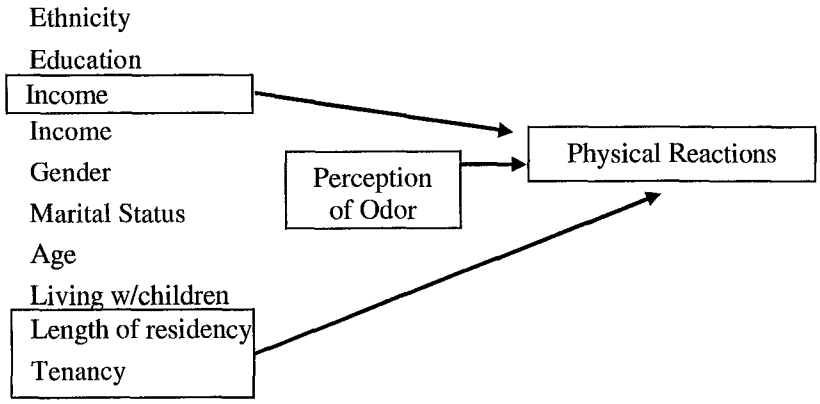


Figure 6.3 Physical reactions model.
Note: → Indicates a significant relationship as shown in the regression analysis.

6.1.3 Community Attachment

Community attachment was measured with two indices: feelings of attachment and participation in problem solving in the communities. Feelings of attachment were measured on a scale from zero to 17, based on five questions (Questions 6, 7a-7d):

- About how many people in your neighborhood do you know by name?
- During the past six months how often did you say hello to your neighbors?
- How often have you has a longer talk with your neighbor?

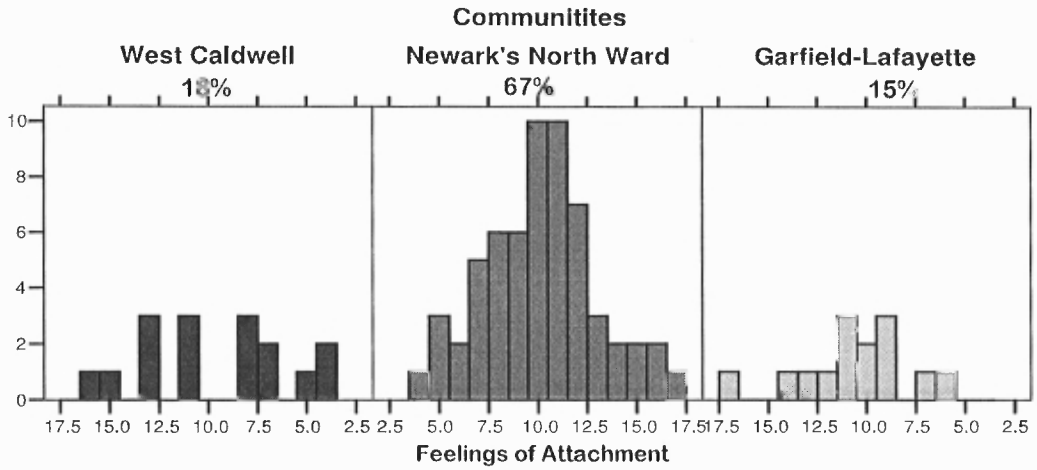


Figure 6.4 Distribution of rating of feelings of attachment by community.

The mean ratings of feelings of attachment among all 90 respondents is 10.0: in general respondents' attachment was at a medium level. Figure 6.4 shows the distribution of feelings of attachment; Newark's North Ward and Garfield-Lafayette have about the same level of attachment. The mean rating of feelings of attachment in these communities is 10.1 and 10.6 respectively.

None of the demographic characteristics had a significant effect on feelings of attachment to the community, as indicated in 6.9.

Table 6.9 Multivariate Linear Regression Model for Predicting Feelings of Attachment

Variables	Coefficient	p-value
Rent[1]	-.09	.609
Time living in the area	-.17	.219
Education	-.17	.290
Income	.06	.771
Living w/children	-.03	.835
Married[2]	.04	.773
African American[3]	-.02	.877
Hispanic[3]	-.19	.253
Age	.07	.592
Sex	.10	.379

1 As compared to owning
2 As compared to unmarried
3 As compared to white
R^2 =.07

Problem solving was measured with a scale that ranged from zero to six, based on 3 questions (8-10):

- Have you ever gotten together informally with any of your neighbors to solve a neighborhood problem?
- Have you ever worked through a neighborhood association to solve a neighborhood problem?
- Have you ever attended another type of public meeting about a problem in your neighborhood?

Respondents reported different kinds of problems that they have attempted to solve in their communities. Some of these issues were bus routes, truck speed, zoning issues, renovation of a park, development, newspaper delivery, traffic, insecurity, litter, alcohol, drug dealing and odor. In West Caldwell the neighborhood problems reported were very few: odor, traffic and newspaper delivery. In Newark's North Ward and Garfield-Lafayette respondents reported more problems than in West Caldwell; many of these problems were similar. Respondents in Garfield-Lafayette reported many problems regarding community development: new buildings, renovation of old buildings, changes in street traffic, and new bus routes. At the time of the study this community was being redeveloped and, as reported by respondents, starting to become gentrified. Of the three communities, Garfield-Lafayette was the only one being redeveloped; this condition may have shaped the results shown in Figure 6.5. Because of the large number of problems in the community two or three residents created the Lafayette Neighborhood Action Committee. Many of the members of the association who were interviewed in this study reported they did not want to move since they had just recently bought their homes. Therefore, the only solution they had was to get involved with the neighborhood issues

and fix them. Many other respondents reported working with Lafayette Neighborhood Action Committee to improve the place where they live.

Respondents' engagement in trying to solve problems in their community varied across communities. The mean rating on the scale of problem solving for the 90 respondents is 2.6. The majority of respondents from West Caldwell and Newark's North Ward were less likely to have engaged in problem solving, as shown in the distribution of problem solving in Figure 6.4 below. The mean rating of problem solving is 1.69 and 1.75 respectively; both communities show low levels of engagement in problem solving. Respondents from Garfield-Lafayette were more likely to have engaged in problem solving. The mean for this community was 3.79, a medium level of engagement.

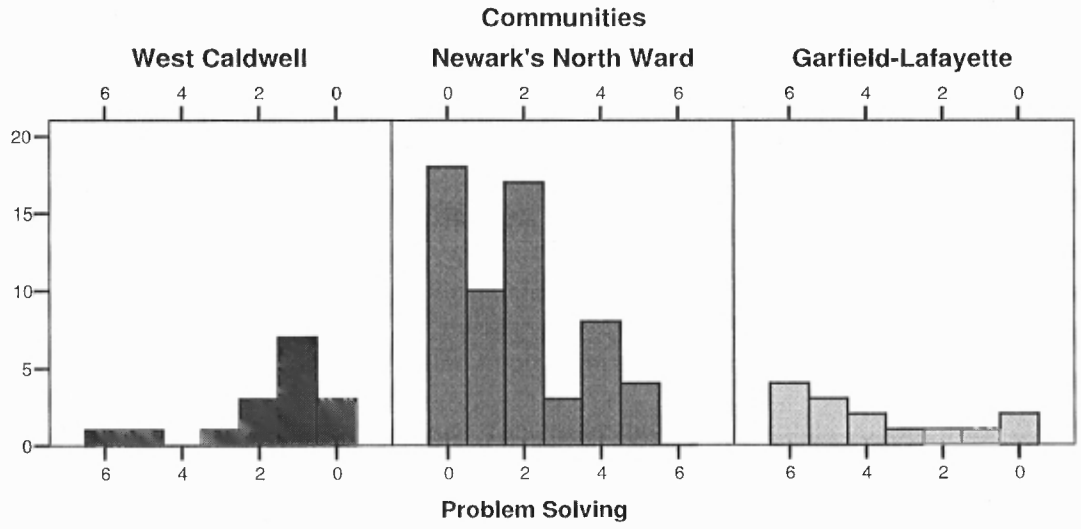


Figure 6.5 Distribution of ratings of problem solving by community.

Of all the demographic characteristics, two have significant effects on the likelihood of having tried to solve problems in the community. Respondents living with children were more likely than those not living with children to have tried to solve

community problems, as indicated in Table 6.10 below. And the greater residents' income, the greater the likelihood of having tried to solve a community problem.

Table 6.10 Multivariate Linear Regression Model for Predicting Problem Solving.

Variables	Coefficient	Sig.
Rent[1]	-.04	.811
Time living in the area	-.14	.240
Education	.09	.531
Income	.32	.066
Living w/children	.28	.041
Married[2]	-.09	.460
African American[3]	-.19	.172
Hispanic[3]	-.04	.777
Age	.12	.348
Sex	.01	.910

1 As compared to owning
2 As compared to unmarried
3 As compared to white
R^2 =.28

6.2 Trying to Eliminate the Odor and Considering Moving Away

Trying to eliminate or reduce the odor and considering moving away are the two types of behaviors in which residents engage to cope reactively with odor.

6.2.1 Trying to Eliminate or Reduce the Odor

Proximity to the source of odor influences coping behaviors just as it influences physical reactions. The respondent living by the entrance of the WWTP in West Caldwell reported several coping behaviors in addition to those listed in Table 6.11. She has air purifiers in every room of the house working 24/7. She has not been able to host a birthday party for any of her children due to a comment made by one of her children's friends: "What is that odor?" The presence of the noxious odor in and around her home has created extra expenses: for the electricity consumed by the many air purifiers, the rent paid for a place

to host birthday parties and the fee paid to gain access to pools and playgrounds since she cannot use her yards.

Many respondents living in the retirement home in Newark's North Ward reported the impossibility of opening their windows or walking around outside the building. Most of these respondents also reported that their doctors told the majority of residents to walk and to go outside in the sun but, since the odor is present in the outdoor areas, they have been forced to stay indoors. Respondents added that they do not drive and public transportation is not close to the building. Therefore, possibilities of being outdoors at other places are limited. Two other reports from respondents living in this building are: "I can't open the windows, I can't turn the air conditioning on because it pulls in the odor," and "... smell terrible, you just don't want to breathe." A few respondents in Garfield-Lafayette reported that they had stopped jogging and gardening. One respondent reported "I do everything I can to avoid the smell."

Table 6.11 Trying to eliminate noxious odor among the respondents who reported smelling the odor

Coping Behavior	% of sample
Had to leave neighborhood temporarily	25
Bothered young children playing outside	31
Being forced to go indoors	64
Reduction of outdoor time	55
Refraining from outdoor parties	18
Other activity no longer done	22
Stay away from home	10
Stopped asking people over	14
Being unable to go outside	41
Being unable to interact with neighbors outside	33
Become bored when forced to stay inside	26
Being unable to open the windows	74
Total N	73

Of those who smelled the odor, a large percentage of respondents tried to eliminate the odor. More than half of the respondents (61%) from all three communities combined reported using at least one coping behavior, as shown in Table 6.12. The three most frequent coping behaviors are: not opening the windows, being forced to go indoors and reduction of outdoor time. Table 6.11 shows all the reactive coping behaviors adopted in the three communities.

Table 6.12 Trying to Eliminate the Odor by Community

	West Caldwell		Newark's North Ward		Garfield-Lafayette		Total	
	n	%	n	%	n	%	n	%
Yes	15	100	34	78	12	86	61	83
% of Total	-	21	-	46	-	16	-	83
No	0	0	10	22	2	14	12	17
% of Total	-	0	-	14	-	13	-	17
Total N	15	100	44	100	14	100	73	100

In the multiple regressions with demographic characteristics as the independent variables with no intervening variables, the demographic characteristics showed no significant relationship to trying to eliminate or reduce the noxious odor.

Table 6.13 Multivariate Linear Regression Model for Trying to Eliminate or Reduce the Noxious Odor: Independent Variables (N=73)

Variables	Coefficient R^2=0.32	p-value
Rent[1]	-.28	.192
Time living in the area	-.01	.926
Education	-.15	.395
Income	-.13	.549
Living w/children	-.02	.904
Married[2]	.13	.374
African American[3]	.02	.902
Hispanic[3]	-.22	.230
Age	.03	.838
Sex	.22	.865

1 As compared to owning
2 As compared to unmarried
3 As compared to white

Two intervening variables show a significant relationship with trying to eliminate or reduce the odor: odor perception and physical reactions (Table 6.14). The greater the perceived intensity and frequency of the odor, the greater the likelihood the respondents have tried to eliminate or reduce the odor. And those residents who reported some physical reaction to the odor were more likely to engage in coping behaviors than those who reported no physical reaction.

Table 6.14 Multivariate Linear Regression Model for Predicting Trying to Eliminate or Reduce the Noxious Odor: Intervening Variables

Variables	Coefficient R^2=0.71	p-value
Odor Perception	.63	.000
Physical Reactions	.17	.077
Feelings of Attachment	-.03	.733
Solving Problem	-.09	.304

Figure 6.6 shows the significant effects of demographic characteristics on perception of odor and physical reactions. These results are from multivariate regressions where perception of odor and physical reactions were each the dependent variables (see Tables 6.3 and 6.8). This figure also shows the effects of the intervening variables on trying to eliminate or reduce the odor. These results are from regressions where this type of coping behavior was the dependent variable (Tables 6.13 and 6.14)

Although there was no a direct influence of the demographic characteristics on the coping behaviors, there was a direct influence on odor perception and physical reactions, and thus presumably an indirect relationship to the reactive coping behaviors. However, the magnitude of these indirect effects cannot be assessed with this small sample although they are theoretically likely given the obtained results. Hispanics scored low on the measure of perception of odor; respondents who scored lower on the measure of

perception of odor were less likely to engage in reactive coping behaviors. Therefore, Hispanics would be expected to be less likely to try to eliminate or reduce the odor. In a similar fashion, the older respondents were, the less likely they were to report smelling the odor. Therefore, the older the respondents were, the less likely they would be to engage in reactive coping behaviors. For both Hispanic and older residents, the lower they scored on the measure of perception of odor, the less they reported having physical reactions. Therefore, the less likely they would be to engage in reactive coping behaviors.

Those respondents who owned their homes were more likely to report having some physical reactions than those who rented. Thus, owners would be more likely to engage in reactive coping behaviors. However, the longer the respondents had lived in the area, the less likely they were to report any physical reactions. Therefore, the less likely they would be to engage in coping behaviors. So, if respondents own they would be more likely to try to eliminate the odor but if they had lived in the area for a long time, they would be less likely to engage in that coping behavior. All these relationships might become more significant if the research were to be repeated with a larger number of respondents.

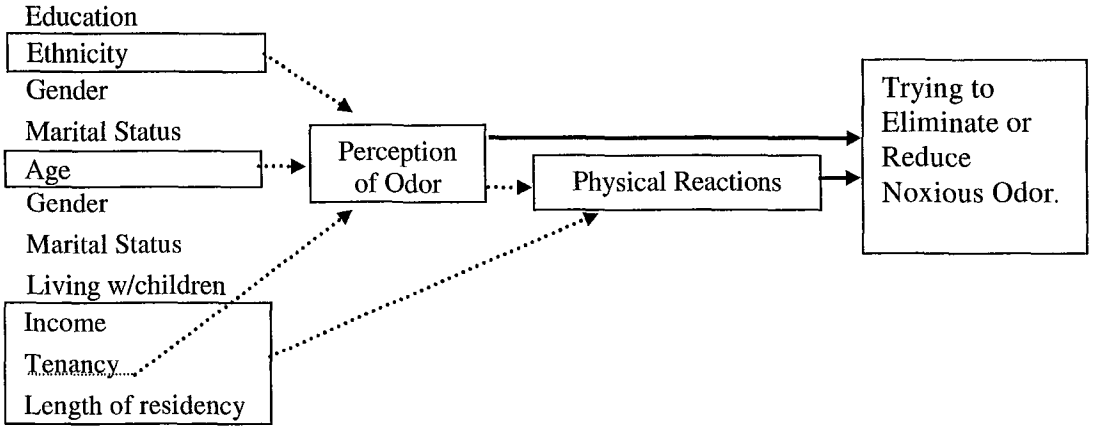


Figure 6.6 Trying to eliminate or reduce noxious odor model combined with odor perception and physical reaction models.

Note: → Indicates a significant relationship in a regression analysis where the dependent variable is trying to eliminate or reduce noxious odor.

⋯▸ Indicates a significant relationship in a regression analysis where the dependent variables are perception of odor or physical reactions.

6.2.2 Considering Moving Away

Almost half of the respondents who reported smelling the odor also reported they had considered moving away. As one respondent in Garfield-Lafayette reported "When I smell it [the odor], it takes me want to move." More white than African American or Hispanic respondents reported considering moving away (Table 6.15).

Table 6.15 Considering Moving Away by Community and Ethnicity

	West Caldwell				Newark's North Ward				Garfield-Lafayette				Total
Have you ever considered moving away?	W	AA	H	O	W	AA	H	O	W	AA	H	O	
Yes	8	0	0	0	1	6	4	0	3	1	0	0	23
No	5	0	1	1	7	5	20	1	6	2	2	0	50

N=73

W=white, AA=African American, H=Hispanic, O=Other.

Two respondents in West Caldwell described their experiences of having tried to move away. The respondent who lived by the entrance to the waste water treatment plant has tried to sell her house on two occasions with no success. Possible buyers perceived

the odor when visiting and on several occasions the realtor told her that the odor had turned away possible buyers. A respondent on the curve of Lombard Drive (the second closest location to the waste water treatment plant) reported a similar experience. A few days after she moved in, the odor came into the house. She wanted to sell immediately but it was impossible. She "contacted an environmental attorney because it wasn't disclosed to us the existence of a waste water treatment plant." Neither were they told of the noxious odor in the community. She added "realtors should let buyers know of such a nuisance." Another respondent in West Caldwell reported a different experience with a realtor: "a real state agent asked me to speak to a buyer to say that there is no odor in this neighborhood, and I say no [I will not do that]."

The relationships of the multivariate model for predicting the consideration of moving away are shown in Table 6.16. Of all the demographic characteristics, three were related to considering moving away. Married respondents were more likely than unmarried respondents to have considered moving away. Whites were more likely than Hispanics to have considered moving away. Also, renters were more likely to have considered moving away than owners.

Table 6.16 Multivariate Binary Logistic Regression Model for Predicting Considering Moving Away: Independent Variables

Variables	OR	p-value
Rent[1]	0.9	.947
Time living in the area	1.0	.940
Education	1.1	.785
Income	0.9	.917
Living w/children	2.3	.442
Married[2]	4.1	.128
African American[3]	0.1	.153
Hispanic[3]	0.0	.022
Age	1.1	.162
Sex	1.5	.610

1 As compared to owning
2 As compared to unmarried
3 As compared to white

Perception of odor was strongly associated with the likelihood that respondents have considered moving away, as shown in Table 6.17 below. The greater the perceived intensity and frequency of the odor, the greater the likelihood that respondents have considered moving away.

Table 6.17 Multivariate Binary Logistic Regression for Predicting Considering Moving Away: Intervening Variables

Variables	OR	p-value
Odor Perception	1.21	.011
Physical Reaction	1.04	.181
Feelings of Attachment	1.06	.566
Problem Solving	1.23	.197

What is interesting in the model shown in Figure 6.7 is that physical reactions are not necessary for residents to have considered moving away. Yet it is one of the variables that affects trying to eliminate or reduce the noxious odor.

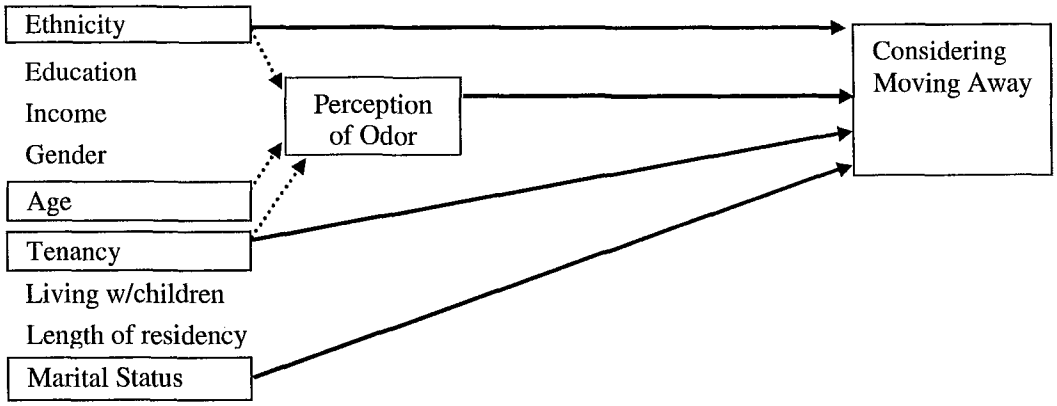


Figure 6.7 Considering moving away model combined with odor perception model.
Note: → Indicates a significant relationship in a regression analysis where the dependent variable is considering moving away.
⋯▸ Indicates a significant relationship in a regression analysis where the dependent variable is perception of odor.

As shown in Figure 6.7 Hispanics, homeowners and unmarried respondents were less likely to have considered moving away. Older respondents scored lower on the measure of odor perception, and were thus less likely to have considered moving away.

Ethnicity, age and tenancy are the three demographic characteristics that affect both types of reactive coping behavior: trying to eliminate or reduce the noxious odor and considering moving away. Both Hispanics and older respondents were less likely to have engaged in either of the two types of coping behavior. Homeowners were more likely to try to eliminate or reduce the odor but would not consider moving away.

CHAPTER 7

PROACTIVE COPING

Proactive coping consists of residents' efforts to modify or eliminate the source of a noxious odor by filing a complaint or working with neighbors to make joint complaints. For analysis purposes, proactive coping is divided into two kinds: contacting anyone at all and contacting the correct agencies. The theoretical model in Figure 7.1 presents those variables expected to influence proactive coping.

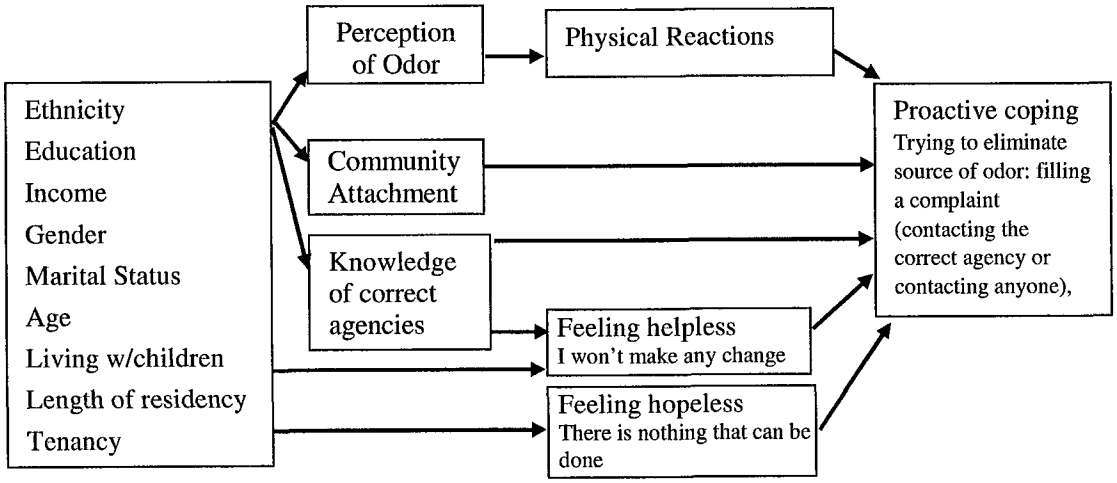


Figure 7.1 Proactive coping: theoretical model.

7.1 Knowledge and Feelings of Helplessness and Hopelessness

The model for proactive coping has three intervening variables that were hypothesized to affect the likelihood of contacting anyone and contacting the correct agencies: (1) knowledge of the correct agencies and (2) feeling helpless and (3) feeling hopeless.

7.1.1 Knowledge of Correct Agencies to Contact

Of those respondents (73) who reported they had smelled the noxious odor, 40% knew that the correct agencies to complain to were the regional health commissions and the New Jersey Department of Environmental Protection. As indicated in Table 7.1, respondents from Garfield-Lafayette were the most likely to know the correct agencies to contact. In Newark's North Ward the majority of respondents did not know that any agency that regulates odor. Many of the respondents in West Caldwell also did not know this. Nonetheless, the majority of those who reported not knowing that there is any agency had actually contacted the correct agencies. When asked whom they had contacted, these residents simply provided the researcher with a phone number. Yet when asked if there is any agency that controls odor, their answer was "no" or "don't know."

Those respondents who knew the correct agencies to call were asked "How do you know about that agency?" The majority of respondents (12) said they learned about the agency from a neighbor; three of them did not remember how they knew the correct agency. Others (seven) were informed when they called the town hall to complain about the odor. Only four respondents actually searched for the correct agencies themselves. One respondent said "it is education" and two said they knew the correct agency because the agency's name was self-explanatory.

Community organizations often inform residents which agencies to contact. This was the case in Garfield-Lafayette, which was the only community of the three studied that had a community association (Lafayette Neighborhood Action Committee) and was the community where many respondents knew the correct agencies to contact. In West Caldwell, residents organized about ten years ago to solve the odor problem but

apparently residents no longer remembered which agencies regulate odor. This might explain why respondents did not remember the name of the agency but had the correct phone number. The lack of a community association in Newark's North Ward may explain why many respondents did not know about any agency that regulates odor.

Table 7.1 Knowledge of Correct Agencies to Contact by Community

Is there any agency that is responsible for controlling odors?	West Caldwell		Newark's North Ward		Garfield-Lafayette		Total	
	n	%	n	%	n	%	n	%
Correct	6	40	15	34	8	57	29	40
% of Total	-	8	-	20	-	11	-	40
Incorrect or Don't Know	9	60	29	66	6	42	44	60
% of Total	-	12	-	40	-	8	-	60
Total N	15	100	44	100	14	100	73	100

When knowledge of the correct agencies was the dependent variable in the multivariate regression analysis, four independent variables showed relationships to it. As indicated in Table 7.2 below, respondents living with children were more likely to know the correct agencies to complain to than respondents who did not live with children. Married respondents were more likely than unmarried respondents to know the correct agencies. Female respondents were more likely than male respondents to know the correct agency. And the longer respondents had lived in the were, the more likely they were to know the correct agencies (In this study, relationships with p-values between .05 and .10 are highlighted due to the small sample size and the need to identify potential candidates for future research).

Table 7.2 Multivariate Binary Logistic Regression for Predicting Knowledge of the Correct Agencies

Variables	OR	p-value
Rent[1]	1.35	.778
Time living in the area	1.76	.057
Education	1.06	.865
Income	0.87	.728
Living w/children	4.57	.068
Married[2]	3.61	.093
African American[3]	0.57	.585
Hispanic[3]	0.28	.151
Age	1.01	.640
Sex	0.31	.076

1 As compared to owning
2 As compared to unmarried
3 As compared to white

deGroot and Samuels (1962) report that in their study demographic variables did not affect knowledge of the correct agencies to contact. However, in this study gender, marital status, living with children and length of residence all showed an influence on knowledge of the correct agencies to contact, as shown in Figure 7.2.

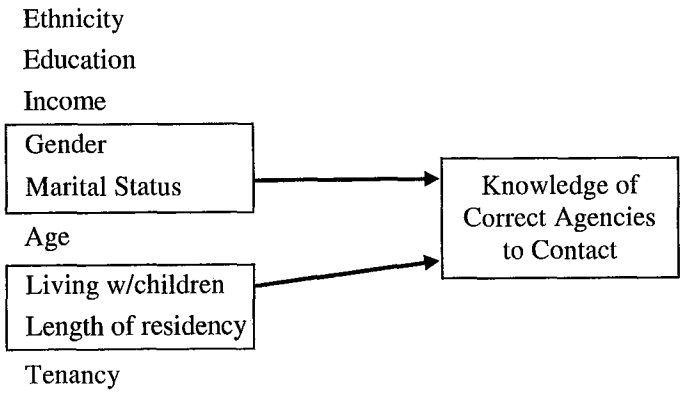


Figure 7.2 Knowledge of correct agencies to contact.

7.1.2 Feelings of Helplessness and Hopelessness

Of the 73 respondents who reported that they smelled the odor, 34 respondents reported feeling helpless but only five reported feeling hopeless. Many of the respondents who reported feeling helpless or hopeless said that complaining "is a waste of time." One respondent from Newark's North Ward expressed his frustration by saying "they [those at the agency] brush you off." In West Caldwell, some of the respondents who reported feeling helpless commented that they had complained but the odor had not changed. A few of the respondents who reported feeling helpless said that it was discouraging to see that their complaints did not produce any results. Some other respondents said that they do not call any more because calling does not make a difference.

In the community of Garfield-Lafayette respondents reported feeling ignored by the odor regulation authorities and expressed their frustration. One reason for this feeling is that the odor was absent when the field inspectors visited the area. Another reason they felt helpless was that they had exchanged letters with the NJDEP. They asked the NJDEP to stop the odor emission; in return, NJDEP sent them a letter reporting the status of their odor complaint. After the agency inspected the facility, it found that Reliable Wood Product was violating the permitted standards for odor emission. The residents successfully completed the complaint process and were informed that Reliable Wood Products had received a violation, yet the odor continues.

The respondents who felt helpless were primarily from Newark's North Ward, as can be seen in Table 7.3 below. These respondents reported "I thought the odor comes with the neighborhood," "It is not in my hands," and "I am not the government." The one

respondent in Garfield-Lafayette who reported feeling hopeless said, referring to the odor, "It is in the air and I cannot change the air."

Table 7.3 Feelings of Helplessness and Hopelessness by Community

	Do you think you can get the odor reduce or eliminated?					
	Yes			**No**		
Do you believe that the odor in your neighborhood can be:	West Caldwell (N)	Newark's North Ward (N)	Garfield-Lafayette (N)	West Caldwell (N)	Newark's North Ward (N)	Garfield-Lafayette (N)
Eliminated completely (Helpless)	4	14	9	6	11	2
Reduced (Helpless)	4	2	0	1	13	2
Cannot be reduced (Hopeless)	0	0	0	0	4	1
Total	8	16	9	7	28	5
Total by Community	15	44	14	15	44	14

N=73

Although deGroot and Samuels (1962) found in their study that demographic characteristics did not affect residents' perceptions of being able to make a change, the multivariate regression analysis in this study showed two significant relationships, as indicated in Table 7.4 below. Hispanic respondents were more likely than whites to feel helpless and hopeless. And those respondents who rent are also more likely than those who own to feel helpless and hopeless.

Table 7.4 Multivariate Binary Logistic Regression for Predicting Feelings of Hopelessness and Helplessness

Variables	OR	p-value
Knowledge	1.53	.552
Rent[1]	11.32	.044
Time living in the area	1.14	.642
Education	1.03	.895
Income	1.18	.666
Living w/children	0.45	.346
Married[2]	0.89	.871
African American[3]	1.64	.630
Hispanic[3]	7.27	.029
Age	0.96	.264
Sex	0.39	.167

1 As compared to owning
2 As compared to unmarried
3 As compared to white

The effect of ethnicity and rent on feeling helpless or hopeless has not been reported in previous studies.

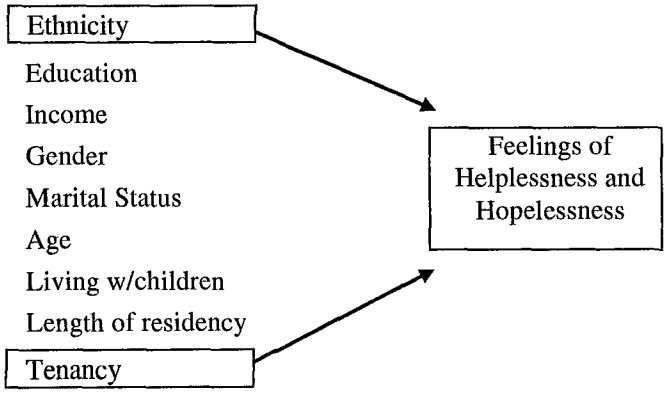


Figure 7.3 Feelings of helplessness and hopelessness.

7.2 Contacting Agencies

In this study proactive coping is divided into two kinds: contacting anyone at all and contacting the correct agency.

7.2.1 Contacting Anyone

During the interviews residents were asked if they had ever contacted anyone about the odor. Thirty-nine percent of the respondents reported they had. This included contacting the correct agencies (NJDEP and the Regional Health Commission) as well as the police department, the town hall, the mayor, a councilman, a congressman, the building department and the facility that was the source of odor.

Table 7.5 Complaints by Community

Have you ever contacted anyone?	West Caldwell		Newark's North Ward		Garfield-Lafayette		Total	
	n	%	n	%	n	%	n	%
Yes	12	80	8	18	9	64	29	39
% of Total	-	16	-	11	-	12	-	39
No	3	20	36	82	5	36	44	60
% of Total	-	4	-	49	-	7	-	60
Total N	15	100	44	100	14	100	73	100
% of Total	-	21	-	60	-	19	-	100

More than half of the respondents have never complained, as indicated in Table 7.5 above. Almost half (49%) of those who never complained are from Newark's North Ward.

Table 7.6 Multivariate Binary Logistic Regression Model for Predicting Demographic Characteristics for Contacting Anyone

Variables	OR	p-value
Rent[1]	1.54	.799
Time living in the area	0.78	.480
Education	0.97	.949
Income	1.44	.559
Living w/children	0.95	.964
Married[2]	2.68	.245
African American[3]	0.11	.115
Hispanic[3]	0.08	.002
Age	1.05	.207
Sex	3.13	.150

1 As compared to owning
2 As compared to unmarried
3 As compared to white

When contacting anyone is entered as the dependent variable in the multivariate regression analysis, only one independent variable showed a significant association with contacting anyone: ethnicity. As indicated in Table 7.6 above, Hispanics are less likely than whites to have called anyone to complain about the odor. One Hispanic respondent

in Newark's North Ward commented "We [referring to her Hispanics neighbors] get used to the odor."

As indicated in Table 7.7, respondents who reported that they perceived the odor are more likely to have coped with the nuisance in a proactive way by calling someone to complain. In addition, respondents who reported being actively involved in solving problems in their communities were also more likely to have called someone about the odor. As expected, those respondents who reported feeling hopeless or helpless were less likely to have called anyone than those not feeling hopeless or helpless.

Table 7.7 Multivariate Binary Logistic Regression Model for Predicting Contacting Anyone: Intervening Variables

Variables	OR	p-value
Odor Perception	1.14	.028
Physical Reaction	0.97	.396
Feelings of Attachment	1.04	.702
Problem Solving	1.46	.029
Knowledge	2.39	.159
Helplessness/Hopelessness	0.32	.073

An interesting finding is that physical reactions showed no relationship to contacting anyone. The perception of odor appears to be sufficient for a respondent to decide to complain.

Figure 7.4 shows the significant effects of demographic characteristics on perception of odor, problem solving and feelings of helplessness and hopelessness. These results are from multivariate regressions where perception of odor, physical reactions and feelings of helplessness and hopelessness were each the dependent variable (see Tables 6.3, 6.9 and 7.4). This figure also shows the effects of the intervening variables on contacting anyone.

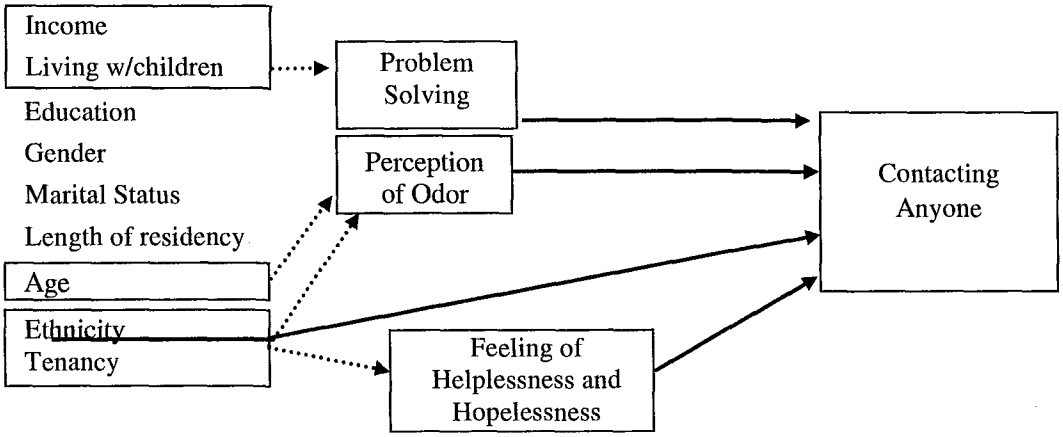


Figure 7.4 Contacting anyone.

Note: → Indicates a significant relationship in a regression analysis where the dependent variable is considering moving away.

⋯▸ Indicates a significant relationship in a regression analysis where the dependent variable is perception of odor.

Although there was only one demographic characteristic (ethnicity) that showed a direct influence on proactive coping behavior, there were several demographic characteristics that showed influences on odor perception, problems solving, and feelings of helplessness and hopelessness, and thus suggested indirect relationships with proactive coping behavior. Although the magnitude of these indirect effects cannot be assessed with this small sample, it is worthwhile to point them out. Hispanics were less likely to have contacted anyone regarding the odor. Also, Hispanics scored low on the perception of odor. Respondents who scored lower on the measure of perception of odor were less likely to engage in proactive coping behavior. Hispanics, in addition, reported feelings of helplessness or hopelessness, thus being less likely to contact anyone regarding the odor.

In a similar fashion, the older respondents were, the less likely they were to report smelling the odor. Therefore, one would expect that the older the respondents are, the less likely they would be to contact anyone. Another interesting indirect relationship is that renters were more likely to feel helpless or hopeless; therefore renters were less likely to

have contacted anyone. Ninety-four percent of the respondents were renters and 55% of the Hispanic respondents were renters. Also, Hispanics were more likely to feel helpless or hopeless and therefore were less likely to contact anyone. All these indirect relationships could become significant if the research were to be repeated with a larger sample.

7.2.2 Contacting the Correct Agencies

Of the 29 respondents who complained to anyone, 19 did so to the correct agencies. As indicated in Table 7.8, the proportion who complained to the correct agencies differed between the three communities. Only in West Caldwell did the majority of respondents complain to the correct agencies.

Table 7.8 Contacting the Correct Agency by Community

Complained to the correct agencies	West Caldwell		Newark's North Ward		Garfield-Lafayette		Total	
	n	%	n	%	n	%	n	%
Yes	8	53	6	14	5	36	19	26
% of Total	-	11	-	8	-	7	-	26
No	7	47	38	86	9	64	54	74
% of Total	-	10	-	52	-	12	-	74
Total N	15	100	44	100	14	100	73	100
% of Total	-	21	-	60	-	19	-	100

If we compare those who contacted the correct agency with those who contacted anyone at all (including the correct agencies) in each community, respondents in Newark's North Ward were the most likely to have contacted the correct agency, as shown in Table 7.9 below. Although respondents in Newark's North Ward were the least likely to have complained at all, those respondents who did complain did so mostly to the correct agency. An important detail here is that in Newark's North Ward only one

Hispanic complained to the correct agency; the other 23 Hispanic respondents never contacted anyone. The only Hispanic respondent who engaged in this proactive coping did so because she is involved in political activities and knows the agencies, their duties and her rights as a resident. Of the other two communities, no Hispanic respondents of the total of three had contacted any agencies at all.

Only in Garfield-Lafayette did a majority of respondents (8) know the correct agencies to call. Nonetheless, only five did so. One possible explanation for this lack of filing complaints could be that since the community has an association, respondents relied on the association to make the complaints. Latané & Darley (1969) report similar behavior in their study of bystander apathy: a bystander is less likely to take action if he or she is part of a group. Such is the case of a respondent who reported that they did not complain because people in the association were doing so.

As indicated in Table 7.9 below, the majority of respondents who complained did so to the correct agency. Of the 39% of respondents who complained, 26% of the complaints were to the correct agencies and 13% to incorrect agencies. This study shows a much higher complaint rate in all three complaint categories than previous studies have reported: 10% to 12% (Turk, Johnston & Moulton, 1974; NRC, 1979; Greenberg & Schneider, 1996; National Research Council, 1979; Bruvold et al., 1983).

Table 7.9 Contacting Anyone and Contacting the Correct Agency by Community

	West Caldwell		Newark's North Ward		Garfield - Lafayette		Total	
	n	%	n	%	n	%	n	%
Contacting anyone at all	12	100	8	100	9	100	29	39
Contacting the correct agencies	8	67	6	75	5	56	19	26
Contacting incorrect agencies	4	33	2	25	3	44	9	13

When contacting the correct agencies is the dependent variable in the multivariate regression analysis, only one independent variable showed a significant relationship (ethnicity). As indicated in Table 7.10 below, Hispanics are less likely than whites to have called the correct agencies.

Table 7.10 Multivariate Logistic Regression Model for Predicting Demographic Characteristics on Contacting the Correct Agency

Variables	OR	p-value
Rent[1]	0.89	.947
Time living in the area	1.02	.940
Education	1.12	.785
Income	0.94	.917
Living w/children	2.30	.442
Married[2]	3.99	.128
African American[3]	0.11	.153
Hispanic[3]	0.02	.022
Age	1.06	.162
Sex	1.49	.610

1 As compared to owning
2 As compared to unmarried
3 As compared to white

As indicated in Table 7.11 below, many intervening variables have a significant effect on contacting the correct agencies. The greater the perceived intensity and frequency of the odor, the greater the likelihood that the respondents had called the correct agencies. The strongest relationship is with knowledge of the correct agencies: respondents who knew the correct agencies were more likely to have called them than

those who did not know. Those respondents who reported feeling attached to the neighborhood were less likely to have contacted the correct agencies than those who were not attached. And respondents who reported feeling helpless or hopeless were less likely to have contacted the correct agencies. (Although this relationship has a p-value of .076, it is worth mentioning.)

Table 7.11 Multivariate Logistic Regression Model for Predicting Intervening Variables on Contacting the Correct Agency

Variables	OR	p-value
Odor Perception	1.19	.023
Physical Reaction	0.97	.426
Feelings of Attachment	0.80	.066
Problem Solving	1.23	.267
Knowledge	8.25	.005
Helplessness/Hopelessness	0.26	.076

As expected, knowledge is highly associated with contacting the correct agencies. Poulin & Kauffman (1995) and deGroot & Samuels (1962) reported this same relationship. However, knowledge showed no relationship to feelings of helplessness or hopelessness. Also, as expected, feelings of helplessness and hopelessness showed a negative relationship to contacting the correct agencies (deGroot, 1966). The author of that study reported that those respondents who thought the odor could not be eliminated felt hopeless and tended not to call even once. Many respondents in this research reported that they did not call any more because their previous calls had not lead to any change in the odor, thus showing a feeling of helplessness. And one respondent reported that she did not complain because the odor cannot be eliminated since it is in the air and the air cannot be changed, a feeling of hopelessness.

Figure 7.5 shows the significant effects of demographic characteristics and the intervening variables on contacting the correct agencies. These results are from multivariate regressions where contacting the correct agencies was the dependent variable. This figure suggests that respondents who were Hispanic, who felt attached to their communities and who felt helpless or hopeless tended not to call the correct agencies. And respondents who scored high on odor perception and knew the correct agencies to call were more likely to call them.

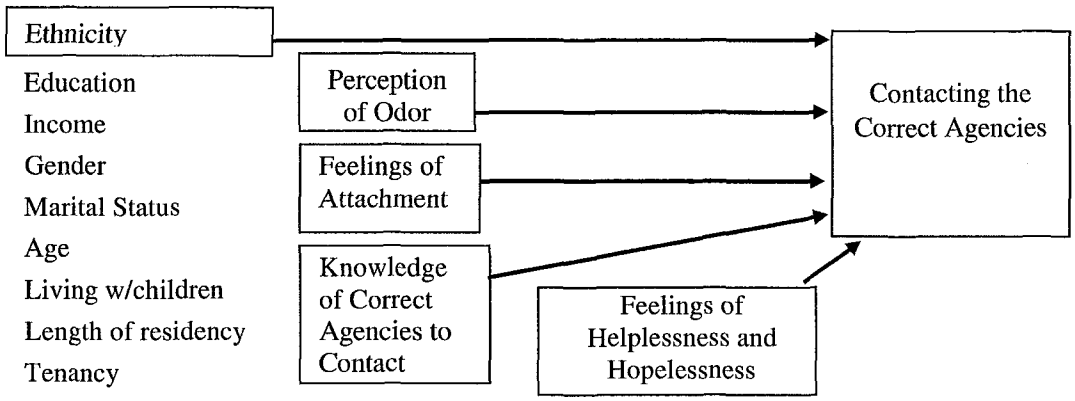


Figure 7.5 Contacting the correct agencies.
Note: → Indicates a significant relationship in a regression analysis where the dependent variable is "considering moving away"

Odor perception and knowledge were expected to positively affect contacting the correct agencies. It was also expected that feelings of hopelessness and helplessness would negatively affect contacting the correct agencies. But ethnicity and feelings of attachment were not expected to affect contacting the correct agencies negatively.

What is interesting in Figure 7.5 is that physical reactions to odor show no relationship to contacting the correct agencies, just as they showed no relationship to contacting anyone. Apparently, physical reactions to the odor are not required to be

proactive. The variables that influence any type of proactive coping are: ethnicity, perception of odor, attachment to the community and feelings of helplessness of hopelessness about the possibility of eliminating the odor. Ethnicity and odor perception are the two variables that affect both reactive and proactive coping.

CHAPTER 8

DISCUSSION

Previous studies of odor in residential communities are quite limited in number (deGroot & Samuels, 1962; Medalia, 1964; Copley International, 1970, 1971; Dawes, 1987; Bruvold et al., 1983; Schiffman, 1988; The Water Resource Research Institute, 1991; Bundy, 1992; McGinley, 1995; Schiffman, 1995a, 1995b; Thu et al., 1997; VanDevender, 1996-1997; Wing and Wolf, 2000; Radon et al., 2004; Tajik, 2008; Wing et al., 2008). These studies have examined odors produced by air pollution, raising pigs, a foundry and waste water treatment plants. The studies have been conducted in the U.S., Europe and Scandinavia. Researchers measured residents' perception of odor, attitudes, physical reactions and coping behavior. None of them however proposed a model to explain when and how residents cope with noxious odor. Accordingly, none of the studies explain the relative low complaint rate of 10 to 12% (Turk, Johnston & Moulton, 1974; National Research Council, 1979; NRC, 1979; Bruvold et al., 1983; Greenberg & Schneider, 1996).

The present study also examined perception of odor, physical reactions and community attachment. Findings show that perception of odor varies among people from different ethnic groups as do the components of odor perception (strength, frequency and duration). This study also suggests that distress occurs with any odor type but that other physical reactions vary by type of odor. Unlike earlier research about odor in residential

communities, this study developed and tested two models of coping behavior.

8.1 Perception of Odor, Physical Reactions and Community Attachment

In this study 73 respondents reported smelling the odor and 17 did not. Ethnicity showed a significant relationship to perception of odor. Such a finding has not been reported before because possible effects of ethnicity have not been previously studied. In this research more whites than African Americans and Hispanics reported smelling the odor. And more Hispanics than their counterparts reported that they never smelled the odor.

Two possible explanations are suggested for this finding. Hispanics' previous experience with intense odor in their home countries or their adaptation to the odor in their neighborhood may have affected their perception of odor. Hispanics may be accustomed to not complaining about odor because of the lack of an efficient regulatory system in their home countries, which may result in learning to live with noxious odor. However, no information on respondents' previous experience with intense odor was collected so no further speculation can be made at this point. More research is needed to better understand why Hispanics reported never smelling the odor and why more whites than African Americans reported smelling the odor.

Ethnicity also showed a significant relationship to one of the components of odor perception. The present study analyzed each of the components of odor perception individually as dependent variables: intensity, duration and frequency. This study shows that African Americans rated the odor as being stronger than whites do. No previous

research has ever reported a relationship between demographic characteristics and any of the components of the measurement of odor perception. Nor have previous researchers studied these components individually.

Another significant result regarding demographic characteristcs and the components of odor perception is that older respondents reported that odors were less frequent than did young respondents. Age tends to decrease the olfactory sense (Wysocki & Gilbert, 1989), but previous research has not mentioned any relationship between age and perception of the frequency of odor.

This study yielded some unexpected findings regarding physical reactions. The longer respondents lived in the area, the less likely they were to report any physical reactions at all. One possible explanation for this is adaptation. Respondents may have adapted to the odor; thus they no longer experience any physical reactions. Previous studies have reported that when a person is exposed to an odor for long periods of time, the person's brain shuts off and they no longer perceive the odor (Berglund, Berglund & Lindvall, 1978; Watson, 1999). This reported adaptation to odor was only in relation to the perception of odor however. No physical reactions were tested in relation to adaptation to odor. The researcher proposes that adaptation may also occur in physical reactions to odor. Therefore, if length of residence reduces residents' physical reactions to odor due to adaptation, then how many years is it before people stop experiencing physical reactions to odor? Further study is needed to answer this question.

Although some physical reactions were common to all three communities, clear differences in types of physical reaction were found between the communities. Nausea,

eye irritation and headaches were most common in West Caldwell; discomfort in the stomach, nausea and shortness of breath in Newark's North Ward; and distress, respiratory irritation, headache and eye irritation in Garfield-Lafayette (Table 6.6). A plausible explanation is that physical reactions vary according to odor type. It is known that noxious odors produce many physical reactions and that different types of odor produce a different intensity of physical reactions. But it is not known if such physical reactions vary according to the source of the odor (Turk, Johnston & Moulton, 1974; NRC, 1979; Schiffman et al., 1995a; WEF Manual of practice No. 22, 1995; McGinley & McGinley, 1999). Findings from this study support the idea that different physical reactions may result rom different types of noxious odor.

The physical reaction of "distress" was reported in all three communities. Although it was not among the most frequent reactions in the three communities, it was one of the reactions reported as being most intense in all three communities. Distress occurs when an individual cannot adapt to stress.[8] Previous studies have reported that the less people are able to cope with stressor stimuli (such as odor), the more stress they experience (Seyle, 1956; Dubos, 1965; Pearlin & Schooler, 1978; Monat & Lazarus, 1991). The respondents who reported experiencing "distress" may have been unable to cope with the odor. The researcher proposes that regardless of the odor source residents may experience the physical reaction of "distress" when living with noxious odor in their neighborhood, if they cannot cope with the odor.

Another finding regarding physical reactions is that the greatest number of respondents reporting some physical reaction was in Newark's North Ward even though

[8].Oxford English Dictionary (2nd ed on CD-ROM, Version 3.0). (2002). Oxford University Press.

respondents in that community gave the lowest ratings on the overall scale of odor perception. One possible explanation for this finding is that some of the respondents in Newark's North Ward live in a retirement community and they volunteered that their health was poor. Previous research shows that those who have deteriorated health conditions tend to experience more physical reactions to odor than those who have good health (Turk, Johnston & Moulton, 1974; NRC, 1979; Schiffman et al., 1995a; WEF Manual of practice No. 22, 1995; McGinley & McGinley, 1999). So, perhaps, the greater number of physical reactions reported in the North Ward resulted from the poor health conditions of respondents in the retirement community. Sadly, no studies have been conducted on possible of health consequences of noxious odor in residential communities among residents in good health or in poor health.

A final, unexpected finding concerns the relationship between community attachment and proactive coping behavior. Given reports from previous research, it was expected that feeling attached to the community would have a positive effect on trying to eliminate the odor. Woldoff (2002) reported that residents who felt attached to their communities were more likely to participate in actions to solve a neighborhood problem. However, Woldoff (2002) did not specify if the active involvement of residents resulted in solving the problem. The results of the present study suggest that being proactive by complaining and being proactive by calling the correct agencies have different relationships to the measures of community attachment (feelings of attachment and problem solving). The present study shows that respondents who tried to solve a problem in their communities were more likely to have contacted someone but not to have contacted the correct agencies. Feelings of attachment showed a negative effect only on

contacting the correct agencies. That is, the more attached a respondent feels to the community, the less likely the respondent is to have contacted the correct agencies. This relationship contradicts previous research which showed that the more a person feels attached to the community, the more involved he or she is in trying to solve problems, the more empowered and the more knowledgeable this person became about solving problems (Manzo & Perkins, 2006). Findings from the present study suggest that the more attached a person feels to the community, the less likely he or she is to call the correct agencies; therefore the less likely he or she is to actually solve the problem.

8.2 Complaining about Odor

A low complaint rate about noxious odor (10 to 12%) has been previously reported (Turk, Johnston & Moulton, 1974; National Research Council, 1979; NRC, 1979; Bruvold et al., 1983; Greenberg & Schneider, 1996). However, these researchers did not indicate what kind of complaint was made. Thus, it is not known if the 10% or 12% refers to complaints made to the correct agencies, to incorrect agencies, or to both. In the present study the complaint rate (39% of the respondents contacted someone) is more than twice what previous studies have reported. Assuming that the 12% refers to both kinds of complaints, the 39% may reflect people's increasing awareness of odor pollution and their recognition of the possibility of eliminating nuisance odors. Although this study's response rate is much higher than in previous studies, the complaint rate is still low, with more than half of the respondents (60%) never complaining at all.

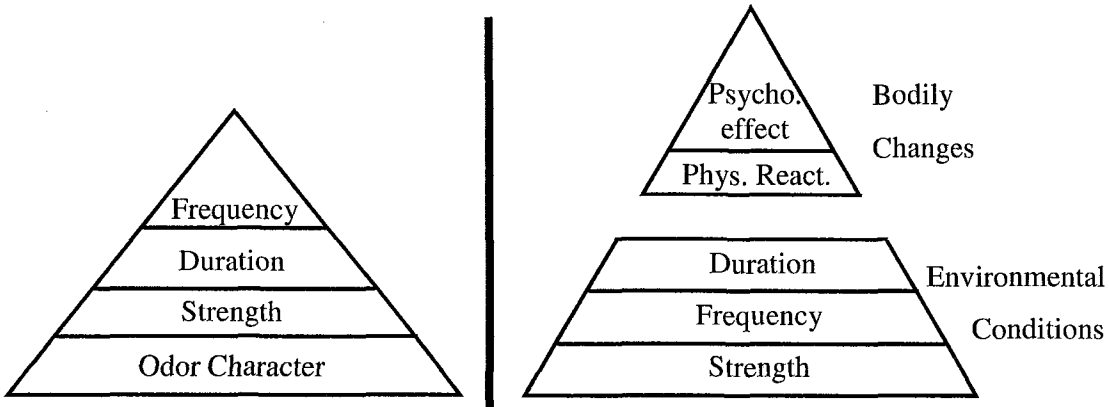
McGinley (2004) proposes that it is the level of annoyance that a noxious odor produces in residents is that leads people to complain. He proposes a "complaint

pyramid" with four components: character of odor, strength (intensity), duration and frequency (Figure 7.4a). The greater the annoyance resulting from the odor experience, the greater the likelihood citizens will complain.

The present study also measured the extent to which the odor components bothered residents in addition to their physical and psychological reactions to the odor. Findings from these measurements on how bothersome the odor was were used to create an expanded pyramid with the intention to compare it with the complaint pyramid proposed by McGinely (2004). The expanded pyramid in this study includes the last three parameters presented by McGinley (which are the three components of odor perception), plus physical reactions and psychological effects (Figure 8.1b). By including the character of odor in the complaint pyramid, McGinley wanted to show that noxious odors are more likely than pleasant ones to lead citizens to complain. However, the character of the odor was not included in this study because all the odors studied in this research were noxious. The two additional parameters were added because it was hypothesized at the beginning of the study that residents' physical reactions to noxious odor (including psychological effects such as distress) was an important variable affecting any coping behavior.

Table 6.5 shows the frequency with which each of these parameters was reported as bothering the respondents. The three components of odor perception were reported more frequently as bothersome than the psychological and physical reactions. Thus, these five parameters can be divided into two groups: (1) environmental conditions, which are strength, frequency and duration of the odor; and (2) bodily changes, which are psychological effects and physical reactions (Figure 7.4b). This result suggests that

respondents were more concerned about the changes in their environment than in their own bodies when facing an odor experience.



A. Citizen complaint pyramid.
Source: McGinley, 2004.

B. Expanded complaint pyramid.

Figure 8.1 Comparison of parameters of odor annoyance.

Odor perception is not the only factor influencing the likelihood that residents will complain. The present study showed that the ethnicity of respondents, knowledge of the correct agencies to call and feeling helpless also affected the likelihood that residents would complain.

The results show that ethnicity has a strong relationship to all of the complaining behaviors. Hispanic respondents did not complain, generally did not contact anyone or the correct agencies to complain about the odor. One possible explanation is that the Hispanic respondents were not sufficiently fluent in English. As one of the Hispanic respondents volunteered "I cannot complain because I don't speak English."

Another possible explanation is a lack of knowledge on the part of Hispanic immigrants who were numerous in this study (25). Many Hispanic respondents (immigrants and non-immigrants) reported not knowing of the existence of an agency that regulates odor. In another field the lack of complaints among Hispanic immigrants has been studied. Romero and Serag (2005) reported that Hispanic immigrants in the U.S. do not complain about police abuse because they lack knowledge of their rights and have experienced flawed complaint systems in their home countries. Also, in a marketing study that compared the complaint behavior of US vs Puerto Rican owners of VCRs, Hernandez et al. (1991) reported that Puerto Ricans did not complain because they have different cultural values about complaining behavior. One cultural value described by the authors is pertinent to this study. Puerto Ricans were less likely to publicly express their dissatisfaction (make a complaint) because of fear of being criticized by their neighbors, so they prefer to deal with dissatisfaction privately.

Hispanics were not the only respondents who did not complain. In Garfield-Lafayette, 20% of the respondents did not complain even though almost all of these respondents knew the correct agencies to call. One explanation is that because this community has an association, respondents relied on that association to file a complaint (Chapter 7). In West Caldwell, 20% of respondents did not complain. In this community lack of knowledge of the regulatory agencies and feelings of helplessness may be the reasons for not complaining. Lack of knowledge of the correct regulatory agencies was common in all the communities. Of the 73 respondents who reported smelling the odor, only 29 (40%) could identify at least one of the regulatory agencies to call. This lack of public knowledge is something the agencies need to address.

Many respondents in West Caldwell volunteered information about their previous attempts to eliminate the odor. Most of them had been proactive some years ago when the odor in the community was unbearable. These respondents reported that many residents had gotten together and hired a lawyer to help them eliminate the odor, and many others had actively complained. But after they managed to reduce the odor by forcing the plant to get an upgrade, they ceased complaining and lived with a sporadic noxious odor. Since then, none of them has complained in the same way. Some of them have called sporadically the number they still retain from years ago but they no longer know whom they are calling. When these respondents were asked why they no longer complain, they answered that it is because their calls do not result in any change. Although they were successful once, they now feel helpless when facing the same problem again.

Of the three communities, West Caldwell was the only one where respondents' responses revealed a change in the dynamic of complaining. In Garfield-Lafayette, the odor problem is so recent that not enough time has passed for a change in complaining behavior to have occurred. And in Newark's North Ward no dynamic could be distinguished since so few respondents have complained at all.

8.3 Models of Coping Behavior

This study examined the coping processes residents adopt to deal with the environmental annoyance of a noxious odor. This study not only looked at the types of coping behaviors that residents engage in but also at the variables that affect such behaviors. From previous research two types of coping behavior were identified: reactive and proactive (Pearlin & Schooler, 1978; Monat & Lazarus, 1991). Reactive coping

refers to the coping behavior people engage in to eliminate or reduce the odor from their homes or by moving away. Proactive coping refers to efforts to eliminate the source of odor by contacting someone and contacting the correct agencies. Two theoretical models were developed to guide the study of these types of coping (Figures 2.2, 2.3).

Each model was proposed with one final outcome -- either reactive or proactive coping. In the end, however, each of these final outcome variables was measured in two different ways. Reactive coping was measured as trying to eliminate or reduce a noxious odor and considering moving away. Proactive coping was measured as contacting someone and contacting the correct agencies.

The two models worked well. One variable, perception of odor, showed significant relationships with all four outcomes. As was expected, residents needed to smell the odor in order to engage in any coping behavior. All other intervening variables showed at least one significant relationship to one of the four outcomes. Of the three intervening variables (perception of odor, physical reactions and community attachment) proposed for both models, two showed significant relationships in only one model. Physical reactions to the odor showed a significant relationship only in the reactive coping model regarding efforts to eliminate or reduce the odor.

Community attachment showed a significant relationship only in the proactive coping model. Before explaining the significant relationship of this variable in the proactive coping model, a short discussion of the division of this variable is needed. Originally, community attachment was conceptualized as a single variable, but analyses showed that this multidimensional concept could not be measured as a single variable.

So, community attachment variable was divided into two: problem solving and feelings of attachment. Each of these kinds of community attachment showed a significant relationship to proactive coping: problem solving affected the likelihood of contacting someone and feelings of attachment were significantly related to contacting the correct agencies.

Of the three intervening variables proposed for the proactive coping model (knowledge of the correct agencies, feelings of helplessness and hopelessness), two showed non-significant relationships with both final outcomes. Respondents who reported feeling helpless or hopeless were less likely either to have contacted someone or to have contacted the correct agencies. And those respondents who reported not knowing the correct agencies to complain to about the odor were also less likely to have contacted them.

Of the demographic variables, only education showed no significant relationship at all with any of the intervening variables or with any of the final outcomes. All other demographic variables showed at least one significant relationship. Ethnicity resulted in the most numerous relationships, affecting the final outcomes of considering moving away, contacting someone and contacting the correct agencies.

Findings indicate that the two models need to be modified. Although all the variables proposed resulted in significant relationships, they were not significant for all four outcomes. Findings showed that each coping behavior had its own model (Figures 6.6, 6.7, 7.4, 7.5). Furthermore, findings suggest that two other variables could be added to both models: respondents' health status and their previous experience with intense

odors. Respondents' health status would measure the health conditions of respondents at the moment of the study. It has been reported that acute health problems may aggravate physical reactions to odor (Turk, Johnston & Moulton, 1974; NRC, 1979). The researcher knew about the relationship of health status and physical reactions to odor but decided not to include health status in the models because this variable had never been measured or mentioned in any of the empirical research on odor in residential areas. Findings from this research, however, suggest that health status should be included in both models. Possible questions to pose to residents to measure this variable could be: How would you describe your health at the present time? Do you suffer from any chronic illness? Have you noticed any deterioration in your health since you have lived here?

Respondents' previous experiences with intense odor may modify their perception of odor, their feelings of helplessness and hopelessness, reactive coping and proactive coping. Findings from the present study regarding the relationship of ethnicity with the intervening and dependent variables suggest that people's previous experience with odor may affect their coping behavior.

Questions such as the following could be used to measure people's previous experiences with odor: Have you experienced noxious odor before? Did the neighborhood where you lived, in your home country, have any noxious odor? Were you ever bothered by any odor in your neighborhood? Did you live close to any industrial activity? Is there an organization in your home country that regulates odor emissions? Did you ever complain about the presence of noxious odor in your neighborhood? Is this odor more bothersome than the odor you previously experienced? Is this odor more

intense than the odor you previously experienced? Did you have any physical reactions to the odor you previously experienced?

Little is known about odor experiences in countries other than the U.S., Europe and Scandinavia. Findings in this study concerning Hispanics demonstrate that research on ethnicity and noxious odor in residential areas is needed. Furthermore, when studying ethnicity, the inclusion of previous experience with noxious odor is important. Not all ethnic groups perceive noxious odor and react to it in the same way; neither do they engage in the same coping behaviors.

The effects of noxious odor on people is a neglected area of study. Even the State of New Jersey does not fully recognize the importance of controlling noxious odor through strict abatement measures. Residents in northern New Jersey suffer from many physical reactions and disruptions to their daily activities due to the failure of the State to regulate noxious odor consistently and thoroughly. In part, failure to abate noxious odor in residential areas results from residents' lack of information regarding the procedures governing the elimination of odor. This lack of information results in a low complaint rate.

8.4 Limitations of The Study

The present study has two kinds of limitations. One is the lack of information on two variables that were not included in the study: health status and previous experience with noxious odor. The other possible limitation concerns the sample of respondents.

8.4.1 Lack of Information

The lack of data on respondents' health status and their previous experience with noxious odor limited an understanding of some of the results regarding physical reactions, odor perception, and reactive and proactive coping. It is important that these two variables be measured in further research on residents' response to noxious odor in their communities.

8.4.2 Sampling Bias

In all three communities the researcher told residents that the study was about "environmental conditions in residential communities." Therefore, residents did not know initially that this study was about the noxious odor they were experiencing. It is unlikely then that they agreed or disagreed based on their knowledge of the precise topic of the research. It is also unlikely that residents guessed the precise purpose of the study and agreed to participate primarily because they had smelled the odor since a full 17 of the 90 respondents who agreed to be interviewed reported they had not smelled the odor.

The way respondents were included in this study varies between the three communities. Although it was intended that all respondents would be reached in the same way, repeated failure to reach residents and possible danger for the researcher in one community forced the researcher to adopt other methods of contacting residents (see section 3.4.2 for more detail).

All respondents in West Caldwell but one were reached by knocking at their doors or through a direct approach on the street. Snowballing was also used in this community but resulted in only one interview out of 16 residents who were approached in that manner. Of the 16 who were approached though snowballing and refused to be

interviewed nine had been described by other residents as having been very vocal about the odor. This suggests that a refusal to participate did not result from not smelling the odor. It also suggests that being vocal about the odor did not necessarily lead residents to agree to participate in the study.

In Newark's North Ward respondents were approached in three different ways: by knocking at doors; through snowballing; and, primarily, through the help of various people and organizations. Since in this community the majority of the respondents were reached through the help of others, one might conclude that the sample is biased. However, analysis showed that the responses obtained in these interviews did not differ from the ones the researcher obtained herself by knocking at doors and through snowballing.

The reported refusal rate in Newark's North Ward is ambiguous because it only represents those residents who refused directly to the researcher. Many of the interviews obtained through the help of others were scheduled by others and the researcher did not meet the resident prior to interview. Therefore, it is unknown how many residents refused to be interviewed prior to meeting the researcher and if those residents in this community who refused to participate were more or less likely to have smelled the odor or were more or less likely to have complained about it.

Garfield-Lafayette residents were approached by knocking at doors and by snowballing. Of the 14 interviews, only two were obtained by knocking at doors. Snowballing in this community occurred among residents who were part of the Lafayette Neighborhood Action Committee (LNAC). The two residents who were interviewed as a

result of knocking on their doors did not belong to LNAC. Because almost all the respondents in this community belonged to LNAC a sampling bias is very likely. It is possible that those who were interviewed were more likely than other residents to have smelled the odor and to have complained. The former is likely since all the residents interviewed in Garfield-Lafayette smelled the odor. The latter is unlikely because not all the residents interviewed reported they had complained even though they knew the correct agencies to call and were bothered by the odor. Thus, the possibility of bias toward proactive coping among these respondents is very unlikely.

The possibility that people were more likely to participate in the study if they had smelled the odor does not weaken the study because all respondents who had never smelled the odor were excluded from the data analysis. As the discussion above indicates, it is unlikely that there is a sampling bias in favor of more proactive respondents in West Caldwell and Garfield-Lafayette since some of the residents who refused to be interviewed in those two communities had been proactive. In Newark's North Ward the number of respondents who reported proactive behavior was so low that it is unlikely that a sampling bias of this kind occurred there.

Another weakness in the sample concerns the possibility that those who were most troubled about the odor could not be interviewed because they have moved away. This is a possibility in West Caldwell because the odor has been present for more than ten years and indeed respondents reported that some residents have moved away because of the odor. This is also a possibility in Newark's North Ward. In Garfield-Lafayette the odor problem is so recent that it is unlikely that many residents have moved away.

However, even there one respondent reported that a neighbor had moved because of the odor. Only a longitudinal study could address this limitation in sampling.

CHAPTER 9

IMPLICATIONS FOR PLANNING AND REGULATION

The findings from this study suggest a number of changes to odor regulation in New Jersey. The proposed modifications are intended to prevent the occurrence of noxious odors in residential communities and to facilitate citizens' complaints.

The recommendations offered below can be adopted without broad changes to the existing regulation system. Other possible changes that might be considered would allow for the objective measurement of odor by field inspectors with, for example, the Scentometer and the Nasal Field Olfactometer (McGinely & McGinely, 2003). However, these devices, while measuring the odor itself, do not measure the degree to which it "has unreasonably interfered with the enjoyment of life or property" (NJDEP, 2007). If these devices were adopted, the regulation system in New Jersey would have to be changed to regulate the odor itself rather that its interference with enjoyment of life and property. This would be a more radical modification than the changes suggested below.

9.1 Planning

As of 2010, odor regulation in New Jersey controls odor emission only after it has been established that an odor interferes with the enjoyment of life and property. There is no regulation for preventing the emission of an odor that is likely to interfere with the enjoyment of life and property in a residential community. The three communities studied would not have had odor problems if a preventive regulation had existed. In the cases of Garfield-Lafayette and Newark's North Ward the odor producing facilities,

Reliable Wood Products and Custom Drying, should never have received permits to operate in those locations in the first place because of their close proximity to housing. These two communities were primarily residential before Reliable Wood Products and Custom Drying were established. Odor emissions are endemic to the activities of both facilities and it is difficult and expensive to control the emission of those odors.

In the case of West Caldwell, the waste water treatment plant (WWTP) was established in its present location prior to the adjacent residential development, which increased over the years. The latest residential development (from 1975 to 1980), which includes Pine Tree Place and Whitaker Place, is the area most affected. This development should never have been permitted. One resident who lives on Lombard Drive, a 1970 development, volunteered that "Pine Tree was a dirt road that leads to the area and it was agreed [at a West Caldwell building permit hearing] that no houses would be built there [on Whitaker and Pine Tree Place]." However, five years later, a developer received the permit to build houses there.

A WWTP does not necessarily produce noxious odor but if management of the plant becomes lax, odor emissions are very likely. The town of Verona, New Jersey, has a WWTP in a residential area, with houses across the street from the plant. The plant was built in 1989 and upgraded in 2006. No neighbors have complained about any odor (J. Helb, personal communication, August 21, 2007). Mr. Helb, Verona Township engineer, explained to this researcher that a WWTP does not necessarily emit noxious odor. If the treatment process is conducted correctly, no odor is produced. The noxious odor coming from a WWTP is likely due to poor management of the treatment process.

The lack of upgrades to the plant in West Caldwell is another possible cause of odor emissions. WWTPs are built to service a certain number of houses but, over time, the number of houses served can increase and the plant will need an upgrade to work properly. However, upgrades to plants are not always performed in a timely matter, due to their cost, as in the case of West Caldwell. One respondent in this town reported: "The odor improved [it did not smell as much] after the plant's upgrade some years ago when we complained and hired a lawyer, but now it is bad again."

No zoning ordinances regulate the construction of WWTPs in existing residential areas or the construction of housing around existing waste water treatment plants. This lack of regulation results in homes being located right next to industrial facilities or waste water treatment plants, as in the case of West Caldwell.

At the Planning Board of West Caldwell, Joseph Dunn, administrator and board member, was told by his predecessor at the department that the land around any public service often produces tax revenue and condemning it would create a tax burden to the town (J. Dunn, personal communication, September 9, 2007). Dunn added in the interview with this researcher that federal laws that regulate and protect public services, such as waste water treatment plants, support such a position. Although the researcher could not find any specific federal law that prohibits the condemnation of land around public services, a lawyer from the zoning board of Union City agreed that land around public services cannot be condemned or taken under eminent domain (U. Isa, personal communication, Sept. 19, 2007). It appears then that none of the residential developments could have been prevented because of their proximity to the wastewater treatment plant.

It was not until 1990 that a buffer zone was recommended in West Caldwell (J. Dunn, personal communications, September 9, 2007). For the 1992 Caldwell WWTP upgrade, the residents of the area asked for a buffer zone with trees to protect them from the plant's odor (Minutes from the building permit hearing, 1992). However, the buffer zone was never created. Still, it is a viable idea to implement in the future since waste water treatment plants are endemic to any urban area.

The Caldwell Waste Water Treatment Plant, Custom Drying and Reliable Wood Products are examples of what can happen if something goes wrong with activities that produce noxious odor. It is much more difficult to regulate odor after the odor has been produced than before the facility starts operations. The time needed to investigate the source of odor and to eliminate it is greater if the odor is already affecting residents.

9.2 Odor Investigation Guidelines

The survey results reveal several problems residents face when trying to file a complaint. Most of the problems arise from the investigation process. Two changes can facilitate the filing of complaints by residents. The first is that field inspectors could schedule their visits to complainants' homes in advance instead of arriving without prior notice. This small change would save time in the investigation process for both field inspector and complainant and it would eliminate the principal experience that generates complainants' frustration and prevents them from calling again. One respondent reported that she had called a couple of times but had never met the inspector. After those experiences she never called again because she works and it would be very unlikely that she would ever be at home when an inspector came to verify the odor. She feels helpless

because she cannot help to eliminate the odor. Another respondent reported that he did not call again because "... those people [agencies staff] do not care about us. Why should I keep calling... ." This respondent is another example of feeling helpless after trying to complain to the correct agency.

The second change regards meeting all three requirements at the complainant's home: the simultaneous presence of complainant, odor and field inspector. This requirement should not be necessary on occasions when the inspector verifies the presence of the odor a few houses away since it is well known that wind can easily carry the odor to another location. In this case the investigation process could proceed even if the odor is not present on the complainant's property and if the odor is of such strength that it interferes with life and enjoyment of property, as stated in the regulations.

One other suggestion arose from the survey of residents. Many respondents proposed the creation of a 24-hour telephone line in order to meet the requirement that residents complain at the very moment the odor is present. These respondents added that a field inspector should be available to perform the verification of odor at all hours as required. With these changes, odors that only occur during evening hours could be regulated.

The regulation of nuisance odors differs from that of harmful odors; both the investigation process and the fine differ (see Chapter 5). Harmful odors are much more strictly regulated than nuisance. Findings from this study suggest that nuisance odors should be treated more strictly than is the case. Studies on odor and residents' reactions to odor, including this study, have shown that noxious odor interferes with residents' lives

by curtailing their daily activities. Respondents living in the retirement home in Newark's North Ward reported being unable to go outside or to open windows; and being forced to stay indoors. Such restriction due to the odor was very problematic for these respondents since it limited their ability to go outdoors. Respondents living in private homes in the three communities reported not being able to enjoy their yards. The odor forced them and their children to stay indoors. They incurred expenses in compensating for the lack of outdoor recreation space. Some residents had to rent places to have birthday parties and had to pay for access to swimming pools and other recreational spaces for their children. In addition to these expenses, some residents ran air purifiers around the clock in order to keep the odor out of their homes. Noxious odor affects the financial situation of residents. Two residents reported not being able to sell their homes. Possible buyers told the realtor that they would not buy because of the odor. And one respondent reported that he was afraid of his future economic situation if the odor was not eliminated. His income comes from rental properties. He rents out two apartments and his renters complained about the odor. "If my tenant goes, no one will rent with this odor." In addition to these curtailed outdoor activities and financial effects, the odor caused many physical reactions. Respondents reported nausea, headaches, eye irritations, discomfort in the stomach, shortness of breath, dizziness, coughing and distress.

This study demonstrated that a noxious odor, which agencies refer to as a "nuisance" odor, can interfere with residents' daily routine, can produce strong physical reactions, cause psychological effects, hinder residents from selling their homes and adversely affect the finances of residents. These finding suggest that the word "nuisance"

does not reflect the seriousness of its possible effects and that noxious odor should be regulated with more severity.

9.3 Informational Campaign

The final suggestion concerns the need for a public educational campaign about the existing regulations. Information about odor regulation should be easily available to citizens. The survey results revealed that 60 percent of the respondents in all three communities who experienced the noxious odor did not know that there are agencies that regulate odor. This lack of knowledge about odor regulation is reflected in the low percentage of respondents who complain. Although lack of knowledge is not the only factor affecting the complaint rate, it is the one with the strongest relationship. Even though the complaint rate in general is higher than in previous studies (39% vs 12%), it is still low if compared to the percentage of respondents affected by the odor (77%).

Another related finding is that of those respondents who knew the correct agencies to complain to, 41% reported that they learned what agency to call from a neighbor. The other common source of knowledge about these agencies is the town hall (20%). Clearly, residents are not finding published information.

Published information about odor regulations should be easily available. It could be included along with the emergency police and fire department information in every town. Emergency information is available in town calendars, on town web pages, and in town library information booklets. Information on where to call to report noxious odor could be added to these resources. The city of Milpitas, California, has on its website the

odor complaint process and a toll free hotline 1800 334 ODOR. NJDEP also has a hotline 1877 WARN DEP. However, the few respondents who knew about this number and had called it reported that it is just for emergencies and noxious odor is not considered an emergency. Also, even though the NJDEP has a hotline, the number is not easily available. The number is available by either calling the state agency or by searching for it on the internet. The only way to obtain the number on the internet is through using very particular keywords: "odor fact sheet." If a person does a search with the key words "odor" and "complaint," the NJDEP number does not come up. However, the 1800 334 ODOR for Milpitas, California does appear. NJDEP could adopt a hotline such as 1800 BAD ODOR, which would be easy to remember. This number would need to be prominently displayed.

Following these recommendations could help reduce the production of noxious odor in residential areas and could facilitate the complaint process for residents. As a result, residents would not have to curtail daily activities and would no longer suffer physical reactions to noxious odor. The financial consequences of noxious odor could also be eliminated. Prevention of noxious odor and an easier complaint process could enable the government to fulfill the right of citizens to breathe clean air, to use their property and to enjoy life.

APPENDIX A

QUESTIONS TAKEN FROM PREVIOUS STUDIES

The questionnaire developed for this study was based in part on previous questionnaires used in odor and community attachment research. Table A.1 shows the questions for each variable as well as the source of each question.

Table A.1 Initial Questions for Questionnaire

Variables	Questions
Perception of odor	- Have you noticed any odor in the last three months? (CIC, 1970, 1971; McGinley, 1995) Frequency - How often have you notice the odor? (CIC, 1970, 1971; McGinley, 1995, Bruvold et al., 1983) At least __ times per week At least __ times per day At least __ times per months Don't Know Duration - How long did the odor last? (CIC, 1970, 1971; McGinley, 1995, Bruvold et al., 1983) Few minutes Several times a day Half an hour Several times a day An hour or more Don't Know Intensity - How strong was the odor? (CIC, 1970, 1971; McGinley, 1995, Bruvold et al., 1983, DEP) No odor Very light Light Moderate Strong Very strong Character - How would you characterize the odor? (McGinley, 1995; DEP) Acrid/pungent, earthy, putrid/rotten, raw meat/bloody, rotten eggs, diesel exhaust, ammonia, burnt, fecal, fishy, manure/farmyard, moldy/musty, oily/fatty, chemical, sour/vinegar, sulfide, vegetable, smoky, chlorine,

	sewage, I don't know. Annoyance - How annoying is the odor when present? (Bruvold et al., 1983; CIC, 1970, 1971) Not annoying Little annoying Annoying Very annoying Extremely annoying -Do you smoke? (Maria Beatriz Yabur) -What are the days and time of the week you regularly spend in your home? (Maria Beatriz Yabur) -Have you noticed any odor in your neighborhood in the last three months? (CIC, 1970, 1971) -When was the last time you noticed odors in your neighborhood? (CIC, 1970, 1971; Medalia, 1964) Have you noticed odors most during… (CIC, 1971; McGinley, 1995) Morning Afternoon Evening When the air is still When the wind blows from All/most of the time Have not noticed any particular time Other Don't know -What do you think are the source of odor in this area? (CIC, 1970, 1971; deGroot & Samuels, 1962; Medalia, 1964; Bruvold et al., 1983)
Physical Discomfort	-Do you, or other members of your house, have any physical reaction when odor is present Such as: (DEP; Medalia, 1964) Eyes irritation, coughing, nausea, discomfort in the stomach, etc. -Has the odor ever cause you to feel sick or ill? (CIC, 1971) -Has the odor cause to other member of the family to feel sick or ill? (CIC, 1971) -Has it forced you to see a doctor? (CIC, 1971)

Hopeless	-Did you or do you think you could eliminate the odor? (Maria Beatriz Yabur) -Do you think that there is a solution to the problem? (Maria Beatriz Yabur)
Helpless	-Which of these statements do you think best describe the effort an agency is making to control odors in this area? (Medalia, 1964) No effort to control odor Very little effort Some effort Great deal of effort Don't know -Do you believe that odors in the neighborhood... (deGroot & Samuels, 1962) Cannot be reduced Can be reduced Can be eliminated -Have you ever thought of asking some authority or agency to take action concerning any of these problems? Which agency have you contacted? (CIC, 1971)
Proactive coping	-Have you thought of reporting the odor? (Medalia, 1964; deGroot & Samuels, 1962) -Have you reported the odor by filing a complaint? (Medalia, 1964, Bruvold et al., 1983; deGroot & Samuels, 1962) If not, Why If yes, How long take you to make such decision? (Maria Beatriz Yabur) -What keeps you from doing it? (deGroot & Samuels, 1962) What makes you to do it? (Maria Beatriz Yabur) -Have you made a complaint recently? (Maria Beatriz Yabur)
knowledge	-Do you know what to do to report an odor? (deGroot & Samuels, 1962) -Do you know that there is an agency in charge of odor complaints (Maria Beatriz Yabur) -How do you know about it? (Maria Beatriz Yabur)

Reactive Coping	-Has the odor around here ever bothered young children playing at your home? (Bruvold et al., 1983) -Has it ever bothered you while doing any outdoor activity? (Bruvold et al., 1983) -Has it ever forced you to go indoors? (Bruvold et al., 1983) -Has it ever bothered you indoors? (Bruvold et al., 1983) -Has it ever bothered you to leave temporarily the neighborhood? (Bruvold et al., 1983) -Have you: (Maria Beatriz Yabur) Not been able to open the windows Not been able to go outside Been bored when forced inside the house due to outdoor odor Not being able to interact with neighbors -Have children been unable to play outside? (Maria Beatriz Yabur) -Have adult been unable to work outside? (Maria Beatriz Yabur) -Have you been unable to do outdoor party not frequently? (Maria Beatriz Yabur) -Have your outdoor activity been reduced or refrain? (Maria Beatriz Yabur) -Are you restrain of visitors or ashamed to have visitors? (Bruvold et al., 1983) -Do you try to be the less possible time at your house? (Maria Beatriz Yabur) -Would you say that these odors have bothered you? (CIC, 1971; Bruvold et al., 1983) -How much would you say they have bothered you? (Bruvold et al., 1983) Very much Much Moderately Little Don't know -Have you ever seriously considered moving away from here because of odor pollution? (Bruvold et al., 1983, CIC, 1971) -Have you made any arrangements to move? (Maria Beatriz Yabur) -Have some other neighbor moved already because of the odor? (Maria Beatriz Yabur) -Do you think your property has lose value due to the odor? (CIC, 1971; Medalia, 1964) -How often have these odors bothered you? (CIC, 1971) Very often Often

	About half the time Infrequently Very infrequently Don't know -What bothers you most about these odors? (CIC, 1971) The number of times that you notice odor The strength of the odors in the air The length of time that the odors last Don't know
Demographics	-What is your age? (all studies) -What is your gender? (all studies) Male Female -What is your marital status? (all studies) Single Married live w/Partner -Do you have any children living with you in the house? What are their ages? (almost all studies) -What is the highest grade of education you've completed? (all studies) Eight grade or less Some High school High school Some college College Master degree Doctorate degree Vocational -What is approximately your total yearly family income? (Medalia, 1964; CIC, 1070, 1971; deGroot & Samuels, 1962) Less than 5,000 5,001 -10,000 10,001 – 15,000 15,001 – 20,000 20,001 – 30,000

	30,001 – 50,000 50,000 – 100,000 More than 100,000 -Do you own or rent your home? (Medalia, 1964; CIC, 1971; deGroot & Samuels, 1962) Own Rent Other_____ -Have you lived at your present address more than six months? (Medalia, 1964) -How long have you lived in this neighborhood? (Medalia, 1964)
Community attachment	-Some people feel their neighborhood is a real home to them, while other people feel their neighborhood is just a place they happen to live. How do you feel? (Woldorf, 2000) Just a place to live Real home -If you ever have to move, would you miss your neighborhood? (Woldorf, 2000) -About how any of your nearest neighbors do you happen to know by name? (Woldorf, 2000) None of them A few of them About half of them Most of them All of them -During the past six months, how often have you and any of your near neighbors done each of the following? (Woldorf, 2000) Said hello to each other or stopped to chat Never few times once or twice a week almost never Had a longer talk Never few times once or twice a week almost never Borrow something from each other or give each other a hand Never few times once or twice a week almost never -During the past two years have you taken any of the following actions on neighborhood problems (Woldorf, 2000) Worked through a neighborhood association Attend another type of public meeting -People have become more concerned about the environment and its pollution. Do people complain about any kind of pollution in your neighborhood? Which types? (CIC, 1971)

	-In general, how would you rate your neighborhood? (almost all researches) Excellent Good Fair Poor Very Poor Don't know -What are the things you like about living in this community, things that you think are advantages or that make it a good place? (Woldorf, 2000) -What are the things you don't like, or are disadvantages in your community? (Woldorf, 2000) -Can you think of any annoying things in your area that your neighbors complain about? Which? (Woldorf, 2000) -Are there any conditions in your neighborhood that would cause you to spend your leisure time away from your home? (Woldorf, 2000) Odor Noise Cold weather or wind Other

APPENDIX B

NJDEP ODOR INVESTIGATION FIELD DATA

When field inspectors verify the presence of an odor, they need to file a form, giving information on weather conditions, location of the odor, level of intensity of the odor and time of the day. This form was obtained from the curses of odor pollution to field inspectors at Rutgers University.

ODOR INVESTIGATION FIELD DATA

Time:_____ AM/PM

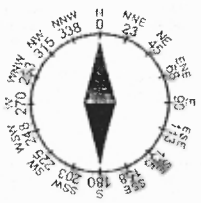
Date:_____

Weather Conditions:

Weather:
- ☐ Sunny (SY)
- ☐ Partly Cloudy (PC)
- ☐ Mostly Cloudy (MC)
- ☐ Overcast (OC)
- ☐ Hazy (HZ)
- ☐ Night (NT)

Precipitation:
- ☐ None (NO)
- ☐ Fog (FG)
- ☐ Rain (RN)
- ☐ Sleet (ST)
- ☐ Snow (SW)

Wind Direction:
(Blowing From)



Wind Speed:
- ☐ Calm (CM)
- ☐ Light Breeze (LB) (1-5 mph)
- ☐ Moderate Wind(MW) (5-15 mph)
- ☐ Strong Winds (SW) (15 or higher mph)

Temperature :_____ ° F/ °C Relative Humidity _____ %

Odor Descriptions:
- ☐ Acrid/Pungent
- ☐ Earthy
- ☐ Putrid/Rotten
- ☐ Raw Meat/ Bloody
- ☐ Rotten Eggs
- ☐ Diesel Exhaust
- ☐ Ammonia
- ☐ Burnt
- ☐ Fecal
- ☐ Fishy
- ☐ Manure/ Farmyard
- ☐ Moldy/Musty
- ☐ Oily/Fatty
- ☐ Burnt Rubber Like
- ☐ Chemical
- ☐ Sour/Vinegar
- ☐ Sulfide Like
- ☐ Vegetable
- ☐ Smoky
- ☐ Chlorine
- ☐ Sewage Like
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Observations During 360

Time	Location	Scale (1-5)	Wind Direction/Wind Speed	Comments:

Signature:_____ Date:_____

APPENDIX C

QUESTIONNAIRE ADMINISTERED TO RESIDENTS

The questionnaire developed for this study was administered to the respondents during in-person interviews, conducted in English or Spanish.

C.1 English

NJIT New Jersey's Science & Technology University	**NEW JERSEY INSTITUTE OF TECHNOLOGY** **323 MARTIN LUTHER KING BLVD.** **NEWARK, NJ 07102**

Code number _____

Date _____

Location: WC N JC

Smelled odor more than a year ago: yes no

CA

For many questions in this interview I will be asking you to choose an answer from a card. I will tell you when to turn to a new card. I am going to start by asking you about your neighborhood.
(Hand cards)

1. What are the things you like about living in this neighborhood?

2. What are the things you don't like about living in this neighborhood?

Please turn to the first card.

3. In general, how would you rate your neighborhood as a place to live?

1 Very good	4 Bad
2 Good	5 Very bad
3 Fair	99DK

Card 2

4. Some people feel that their neighborhood is a real home to them, while other people feel their neighborhood is just a place to live. How do you feel?

Real home	In between	Just a place to live	DK
1	2	3	99

Turn to the next card

5. If you ever had to move, how much would you miss your neighborhood?

Not at all	A little	Some	A lot	DK
1	2	3	4	99

Card 4

6. About how many people in your neighborhood do you know by name?

1 None of them
2 A few of them
3 About half of them
4 Most of them
5 All of them
99DK

Card 6

7. During the past six months

a. How often did you say hello to your neighbors?

1 Never
2 Once or twice a month
3 Several times a month
4 Several times a week
5 Every day
99DK

b. How often have you had a longer talk with a neighbor?

1 Never
2 Once or twice a month
3 Several times a month
4 Several times a week
5 Every day
99DK

c. How often have you borrowed something from a neighbor?

1 Never
2 Once or twice a month
3 Several times a month
4 Several times a week
5 Every day
99DK

d. How often have you helped a neighbor out?

1 Never
2 Once or twice a month
3 Several times a month
4 Several times a week
5 Every day
99DK

Now I am going to ask about people getting together in this neighborhood to solve any problem. Please turn to card 7

8. Have you ever gotten together informally with any of your neighbors to solve a neighborhood problem?

   1 Never
   2 Once or twice
   3 Several times
   4 DK

   a. What was(were) the problem(s)?

9. Have you ever worked through a neighborhood association to solve a neighborhood problem? NA

   1 Never
   2 Once or twice
   3 Several times
   4 DK

   a. What was(were) the problem(s)?

10. Have you ever attended another type of public meeting about a problem in your neighborhood?

   1 Never
   2 Once or twice
   3 Several times
   4 DK

   a. What was(were) the problem(s)?

11. Is there any problem that you have experienced in this neighborhood that caused you to spend your leisure time somewhere else?

    1 Yes 2 No

    (If Yes) What was that?

Card 8

12. Recently, people in many neighborhoods have become more concerned about the environment and its pollution near their home. Do people in your neighborhood ever complain about any kind of pollution?

    1 Never 2 Some times 3 All the time 99DK

    (If 1) Please skip the next card (go to question 13)

    (If yes) Look at Card 9

    a. What type or types of pollution do people in this neighborhood complain about? **please select all that apply**

       1 Odor 2 Noise 3 Traffic 4 Water 5 Other _____ 99DK

OP

In this section I will be asking about the presence of outdoor odors in your neighborhood.

13. During the past year, have you noticed any outdoor odor(s) in your neighborhood?

    1 Yes 2 No 3 More than a year ago

    (If yes or 3) Was it one kind of odor or more than one kind of odor?

    1 One odor 2 More than one odor 99DK **(skip next sentence)**

    (If 2) How many odors did you notice?

    (If no, skip to 72)

Card 10

14. Have you noticed the odor(s) in your yard?

    1 Never 2 A few times 3 Many times 4 All the time 99DK

15. Have you noticed any odor(s) inside your home coming from outside?

1 Never 2 A few times 3 Many times 4 All the time 99DK

16. When was the last time you noticed this(these) odor(s)?

Please, put card 10 aside, and turn Card 11

17. How often have you noticed this(these) odor(s)?

1 More than once a day
2 About once a day
3 Several times a week
4 About once a month
5 A few times during the year
6 Other _____
99DK

Card 12

18. What times of the day did you notice the odor(s)? **select all that apply**

1 Morning
2 Afternoon
3 Evening
99DK

Card 13

19. When the odor(s) was/were present, how long did it(they) last?

1 A few minutes
2 About half an hour
3 An hour or more
4 All day
99DK

Card 14

20. When the odor(s) was/were present, how strong was(were) it(they) most of the time?

1 Very strong
2 Strong
3 Moderate
4 Light
5 Very light
6 Varies

Card 15

21. When are you usually at home?

    1 Most of the time: days and evenings

    2 Evenings and weekends.

    3 Other (*please describe*).

You have told me about noticing the odor. Now I have some questions about how much the odor bothers you.

Card 16

22. Can you tell me how much each of the items listed on the card bothers you: not all, somewhat or a lot?

    1 Number of times that I notice the odor

    2 Strength of the odor in the air

    3 Length of time that the odor last

    4 Physical effects the odor has on me

    5 Psychological effect the odor has on me

    99DK

	1	2	3	4	5
No at all					
Somewhat					
A lot					

Card 10, the one aside

23. How often has(have) the odor(s) bothered you while you were spending time outdoors?

    1 Never 2 A few times 3 Many times 4 All the time 99DK

24. How often has(have) the odor(s) bothered you indoors?

    1 Never 2 A few times 3 Many times 4 All the time 99DK

25. How often has(have) the odor(s) bothered you enough that you had to leave the neighborhood temporarily?

    1 Never 2 A few times 3 Many times 4 All the time 99DK

26. How often has(have) the odor(s) around here bothered young children playing outside, near your home? **NA**

    1 Never 2 A few times 3 Many times 4 All the time 99DK

R C

Now, I would like to know if the odor(s) ever forced you to stop doing certain activities.

27. Has(have) the odor(s) ever forced you or any other members of your family to go indoors?

    1 Never 2 A few times 3 Many times 4 All the time 99DK

28. Have you reduced the amount of time you spend outdoors because of the odor(s)? **NA**

    1 Never 2 A few times 3 Many times 4 All the time 99DK

29. Has(have) the odor(s) ever prevented you from giving outdoor parties? **NA**

    1 Never 2 A few times 3 Many times 4 All the time 99DK

30. Are there things you no longer do outside because of the odor(s)? **NA**

    1 Yes 2 No

    (If yes) What are they?

31. Have you ever stayed away from your house because of the odor(s)?

    1 Never 2 A few times 3 Many times 4 All the time 99DK

32. Have you stopped asking people over because of the odor(s)?

    1 Yes 2 No

33. Due to odors, have you ever: **Same card**

    a. Been unable to go outside

    b. Been unable to interact with neighbors outside

    c. Become bored when you were forced to stay inside because of outdoor odor

    d. Been unable to open the windows

	Never	A few times	Many Times	All the time
a				
b				
c				
d				

34. Have you ever considered moving away because of the odor(s)?

1 Yes 2 No

(If no, skip to 36)

35. Have you made any arrangements to move?

1 Yes 2 No

36. Have any of your neighbors moved because of the odor?

1 Yes 2 No

Card 18

37. Do you think property values have gone down because of the odor(s)?

1 No 2 A little 3 A lot

The following card (19) has a list of different kinds of smells in four categories: Chemical, putrid/rotten, earthy and vegetable.

38. What does the odor smell like: **Please select as many descriptions as apply.**

1 Chemical	8 Putrid/rotten	15 Earthy	22 Vegetable
2 Ammonia	9 Acrid/pungent	16 Manure	23 Sour/vinegar
3 Diesel	10 Raw meat	17 Farmyard	24 Floral
4 Sulfide	11 Bloody	18 Moldy/musty	25 Fruity
5 Chlorine	12 Rotten eggs	19 Smoky	26 Spicy
6 Exhaust	13 Sewage	20 Oily/fatty	99 DK
7 Burnt	14 Fecal	21 Fishy	27 Other

39. Is the smell always the same?

1 Yes 2 No 99DK

(If no) How does it change?

40. What do you think is(are) the source(s) of odor(s)?

PD

41. Have you had any physical reaction to the odor(s) in your neighborhood?

1 Yes 2 No 99DK

(If no) Skip next question

Please turn to card 20. People respond to odors in different ways. Could you tell me:

42. Which physical reactions have you had?

1	Eyes irritation	6	Cough	11	Distress
2	Headaches	7	Nausea	12	Sleep problems
3	Fatigue	8	Dizziness	13	Other_____
4	Respiratory irritation	9	Discomfort in the stomach		
5	Shortness of breath	10	Concentration problems		

a. Could you please rate from 1 to 5 how strong was your reaction? 1 is the least and 5 the most strong.

Strength													
1													
2													
3													
4													
5													

43. Have other members of your family had any of these physical reactions when the odor(s) is(are) present?

1	Eyes irritation	6	Cough	11	Distress
2	Headaches	7	Nausea	12	Sleep problems
3	Fatigue	8	Dizziness	13	Other_____
4	Respiratory irritation	9	Discomfort in the stomach		
5	Shortness of breath	10	Concentration problems		

a. Could you please rate from 1 to 5 how strong was your reaction? 1 is the least and 5 the most strong.

Strength													
1													
2													
3													
4													
5													

44. Has the odor ever caused you to see a doctor?

1 Yes 2 No 99Not sure

(If yes) What was the problem you were having?

45. How about other members of your family, have they had to see a doctor because of the odor?

1 Yes 2 No

(If yes) What was the problem they were having?

H/H

In some places people may try to eliminate odors. In other places they think it is impossible:

46. Do you believe that the odor(s) in your neighborhood:

1 Can be eliminated completely
2 Can be reduced
3 Cannot be reduced
99DK

47. Why do you believe that?

48. Do you think that you can help get the odor reduced or eliminated?

1 Yes 2 No 99DK

Why do you think that?

(If yes) What can you do?

49. Have you ever contacted any one regarding the odor(s)?

1 Yes 2 No

(If no) Why not? **and skip to 59**

50. Whom did you contact? **(write all the contacted persons)**

a. Was there something specific about the odor at that time that made you call?

1 Yes 2 No

(If yes) What was it?

b. How long did you wait before you called?

(If no) What keeps you from calling?

51. When was the last time you contacted (person/agency) regarding the odor in your property? **(for each contact)**

52. How many times have you called (that agency)?

1 Never 2 Some times 3 Several times 4 All the time

53. How did you know that was the right person or agency to contact? **(for each contact)**

54. Do you remember what happened during that call? **(for each contact)**

55. What happened after you made this call? **(for each contact)**

56. Did your call (any of your calls) result in any reduction of the odor(s)?

1 Yes 2 No 99DK

Please turn Card 21

57. Which of these statements do you think best describes the effort this authority/agency made? **(for each contact)**

1 No effort at all
2 A little effort
3 Some effort
4 A great deal of effort
99DK

Ask question if appropriate

58. You have told me that you contacted (agency/person) few years ago about the presence of an odor in your property. You also told me that you have smelled the odor in your property recently. Could you tell me why you haven't contacted (agency) again?

KoCP

59. Is there any particular agency that is responsible for controlling odors?

1 Yes 2 No 3DK

(If no, skip 73)

(If no and right agency in 50 go to 64)

(If no and wrong agency in 50 go to 73)

(If haven't contacted anyone, skip to 73)

60. What agency is that?

If answer is wrong ask 61- 64 and skip to 73

If appropriate.

a. Why you didn't contact "the agency" this time?

61. How do you know about that(those) agency(agencies)?

62. Have you ever thought about contacting that(those) agency(agencies) to report the odor?

1 Yes 2 No

(If no) why not?

PC

63. Have you ever actually contacted that(those) agency(agencies) to report the odor(s)?

1 Never 2 Some times 3 Several times 4 All the time

(If no) Why not? **Skip to 73**

64. Do you know what the process is for reporting an odor to that(those) agency(agencies)?

1 Yes 2 No

(If yes) What is the process?

65. Did you file a complaint?

1 Yes 2 No

(If yes) How many times?

Always ask **c.** Was there something specific about the odor at that time that made you file a complaint?

1 Yes 2 No

(If yes) What was it?

d. How long did you wait before you filed a complaint?

(If no) What keeps you from filing a complaint?

Card 22

66. Did a field inspector ever come to your home?

1 Never 2 Once 3 A few times 99DK

If Never, ask next

67. Do you know if a field inspector ever came to your neighborhood?

1 Never 2 Once 3 A few times 99DK

If Never, skip to 71 otherwise skip to 69

68. Did a field inspector ever verified the presence of odor in you property?
1 Never 2 Once 3 A few times 99DK

If Never, skip to 71 otherwise skip next question

69. Do you know if a field inspector ever verified the presence of odor in you neighborhood?
1 Never 2 Once 3 A few times 99DK

If Never or DK, skip to 71

70. When the inspector was present, did you complete a statement of complaint?
1 Yes 2 No

71. Do you know that in order for the "agency" to take further actions, a field inspector needs to come and verify the presence of the odor in your property?
1 Yes 2 No

If No, skip next question

72. How did you know that this is the process to follow?

D

In this last part of the interview I need some information about you and your house.
1 M 2 F

73. What year were you born _____

74. Where were you born? _____

(If not US)

75. At what age did you move to the US_____

76. What is your ethnicity _____

77. Do you smoke?

1 Yes 2 No

(If yes) How much?

78. Do you have an air purifier in your home?

1 Yes 2 No

(If yes) Why?

How often do you used it?

79. Do you have air conditioning?

1 Yes 2 No

(If yes) How often do you use it?

Turn to Card 23

80. Could you tell me your marital status?

1 Single 2 Married 3 Live with Partner 4 Divorced 5 Widow/ widower

81. Are there any children living with you?

1 Yes 2 No **(skip to next question)**

Looking at Card 24

a. What are their ages?

Less than 2	3-5	6-9	older than 10
1	2	3	4

b. How are they related to you?

Daughter/son	Relative	Grand son/daughter
1	2	3

c. What is their gender?

Children	Age	Relation	Gender
1			
2			
3			
4			
5			

82. What is the highest level of education you have completed?

1 8th grade or less
2 Some high school
3 Graduated high school
4 Some college
5 Graduated College
6 Masters degree or higher

Looking at Card 25

83. Could you please tell me the number that best represents your household income?

1 Less than 10,000
2 10,001 –30,000
3 30,001 – 50,000
4 50,000 – 99,999
5 100,000 – 200,000
6 More than 200,000

84. Do you own or do you rent your home?

1 Own 2 Rent 3 Other_____

85. How long have you lived in this neighborhood?

Is there anything else you would like to tell me?

Thank you very much for your time and your attention.

Interviewer comments on back

C.2 Spanish

NEW JERSEY INSTITUTE OF TECHNOLOGY
323 MARTIN LUTHER KING BLVD.
NEWARK, NJ 07102

Code number _____

Date _____

Location: WC N JC

Smelled odor more than a year ago: yes no

CA

En varias de las preguntas de esta entrevista le voy a pedir que escoja una respuesta de estas tarjetas. Yo le diré cuando pasar a la siguiente tarjeta. Comenzaré la entrevista preguntándole sobre su vecindario.
(Entrega de tarjetas)

1.¿Cuáles son las cosas que le gustan de vivir en este vecindario?

2.¿Cuáles son las cosas que no le gustan de vivir en este vecindario?

Por favor voltee la primera tarjeta.

3.¿En general, cómo calificaría a su vecindario como lugar para vivir?

1 Muy bueno	4 Malo
2 Bueno	5 Muy malo
3 Medio	99NS

Tarjeta 2

4.Algunas personas sienten que su vecindario es de verdad como su casa mientras otros sienten que es sólo un lugar para vivir. ¿Como lo sientes tú?

Como mi casa	más o menos	Sólo un lugar para vivir	NS
1	2	3	99

Pase a la siguiente tarjeta (3)

5.Si tuviera que mudarse, ¿cuánto extrañaría al vecindario?

Nada	Un poquito	Algo	Mucho	NS
1	2	3	4	99

Tarjeta 4

6.¿Como a cuantas personas del vecindario conoce por su nombre?

1 Ninguna
2 Algunas de ellas
3 Como la mitad
4 La mayoría
5 Todas
99NS

Tarjeta 6

7.Durante los últimos seis meses

e. ¿Qué tan a menudo saluda a sus vecinos?

1 Nunca
2 Una o dos veces al mes
3 Varias veces al mes
4 Varias veces por semana
5 Todos los días
99NS

f. ¿Con qué frecuencia ha conversado con cualquiera de sus vecinos?

1 Nunca
2 Una o dos veces al mes
3 Varias veces al mes
4 Varias veces por semana
5 Todos los días
99NS

g. ¿Con qué frecuencia le ha pedido algo prestado o lo ha ayudado?

1 Nunca
2 Una o dos veces al mes
3 Varias veces al mes
4 Varias veces por semana
5 Todos los días
99NS

h. ¿Con qué frecuencia ha ayudado a un vecino?

1 Nunca
2 Una o dos veces al mes
3 Varias veces al mes
4 Varias veces por semana
5 Todos los días
99NS

Ahora le voy a preguntar sobre reuniones de vecinos en este vecindario para resolver problemas. Por favor mire la tarjeta 7

8.¿Se ha reunido, de manera informal, con alguno de sus vecinos para resolver un problema del vecindario?

1 Nunca
2 Una o dos veces
3 Varias veces
4 NS

b. ¿Cuál fue o fueron los problemas?

9.¿Se comunicó alguna vez con la asociación de vecinos para resolver algún problema del vecindario? NA

1 Nunca
2 Una o dos veces
3 Varias veces
4 NS

c. ¿Cuál fue o fueron los problemas?

10. ¿Ha asistido a algún tipo de reunión pública para tratar los problemas el vecindario?

1 Nunca
2 Una o dos veces
3 Varias veces
4 NS

d. ¿Cuál fue o fueron los problemas?

11. ¿Ha experimentado algún problema que le haya hecho pasar su tiempo libre fuera del vecindario?

1 Sí 2 No

(Sí responde Sí) ¿Cuál fue el problema?

Tarjeta 8

12. Recientemente la gente se está preocupando más por el medio ambiente y la contaminación ambiental alrededor de sus casas. ¿Se han quejado, en su vecindario, de algún tipo de contaminación ambiental?

1 Nunca 2 Algunas veces 3 Todo el tiempo 99NS

(Sí su respuesta fue "nunca") Salta la siguiente tarjeta, ve a la pregunta 13
(Sí respondió afirmativamente) Pasa a la tarjeta 9

b. ¿Qué tipo o tipos de contaminación ambiental han sido motivo de queja en este vecindario? **Por favor seleccione todas las que apliquen**

1 Olor 2 Ruido 3 Trafico 4 Agua 5 Otras _____ 99NS

OP

En esta sección le voy a preguntar sobre olores presentes, al aire libre, en su vecindario.

13. ¿Durante el año pasado usted sintió algún olor(es) fuera de su casa, en el vecindario?

1 Sí 2 No 3 Hace más de un año

(Si responde Sí o 3) ¿Sintió un solo tipo de olor o diferentes tipos?

1 Un olor 2 Más de uno 99NS **(Obviar la siguiente frase)**

(Si responde 2) ¿Cuántos olores pudo diferenciar?

(Si responde No, pasar a la pregunta 72)

Tarjeta 10

14. ¿Ha sentido el o los olores en su patio o jardín? NA

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

15. ¿Ha sentido, dentro de su casa, algún olor(es) que venga de afuera?

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

16. ¿Cuándo fue la última vez que sintió este o estos olores?

Por favor, ponga al lado la tarjeta 10 y mire la 11

17. ¿Qué tan a menudo ha sentido este o estos olores?

1 Más de una vez al día
2 Como una vez al día
3 Varias veces a la semana
4 Como una vez al mes
5 Pocas veces al año
6 Otras _____
99 NS

Tarjeta 12

18. ¿En que momentos del día sintió el o los olores? **Escoja todas las que apliquen.**

1 Mañana
2 Mediodía
3 Tarde
99 NS

Tarjeta 13

19. ¿Cuándo el o los olores estaban presentes, por cuanto tiempo duraban?

1 Pocos minutos
2 Como media hora
3 Una hora o más
4 Todo el día
99 NS

Tarjeta 14

20. Generalmente ¿Cuál era la intensidad del olor o los olores, cuando estaban presentes en su vecindario o casa?

1 Muy Fuerte
2 Fuerte
3 Moderado
4 Suave
5 Muy suave
6 Cambiaba de intensidad

Tarjeta 15

21. ¿Por lo general, cuándo esta usted en su casa?

1 La mayor parte del tiempo; día y noche
2 Al final del día y los fines de semana.
3 Otros (*por favor describa*).

Usted me dijo que sintió el o los olores. Ahora le voy a preguntar qué tanto le incomodaron estos olores.

Tarjeta 16

22. ¿Puede usted decir cuánto le molesta cada uno de los puntos mencionados en la tarjeta: nada, un poco o mucho?

1 Frecuencia con que se sienten
2 Intensidad del olor en el aire
3 Tiempo que dura en el aire
4 Efectos que produce en mi cuerpo
5 Efectos psicológicos que produce en mí
99 NS

	1	2	3	4	5
Nada					
Un poco					
Mucho					

Tarjeta 10, la que estaba al lado

23. ¿Alguna vez el(los) olor(es) te molestó mientras estabas en tu patio o jardín? NA

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

24. ¿Alguna vez te molestó mientras estabas dentro de tu casa?

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

25. ¿Te molestó alguna vez lo suficiente como para que te fueras de tu vecindario por poco tiempo?

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

26. ¿Alguna vez el o los olores del vecindario molestaron a los niños que jugaban cerca de tu casa? NA

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

R C

Ahora me gustaría saber si alguna vez el o los olores le obligaron a parar lo que estaba haciendo. Tengo varias preguntas sobre esto.

27. ¿Alguna vez el o los olores te forzaron, a ti o a otra persona de tu familia, a entrar a la casa?

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

28. ¿Han los olores reducido el tiempo que pasa en el alrededor de su casa? NA

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

29. ¿Alguna vez el o los olores evitaron que hiciera una fiesta en el jardín o patio? NA

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

30. ¿Hay algunas actividades que ya no acostumbre hacer afuera debido a los olores? NA

1 Sí 2 No

(De responder Sí) ¿Cuáles son estas actividades?

31. ¿Ha tenido que permanecer alejado(a) de su casa por un tiempo, debido a los olores?

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

32. ¿Ha evitado invitar gente a su casa debido a los olores?

1 Sí 2 No

33. Debido a los olores: **en la misma tarjeta**

e. ¿No ha podido estar en los alrededores de su casa?

f. ¿No puede hablar con sus vecinos al aire libre?

g. ¿Se aburre en casa cuando se ve forzado a quedarse dentro?

h. ¿No puede abrir las ventanas?

	Nunca	Algunas veces	Muchas veces	Todo el tiempo
a				
b				
c				
d				

34. ¿A considerado, alguna vez, mudarse debido a los olores?

1 Sí 2 No

(Respuesta negativa: saltar a la 36)

35. ¿Alguna vez inició algún procedimiento para mudarse?

1 Sí 2 No

36. ¿Se ha mudado alguno de sus vecinos debido a los olores?

1 Sí 2 No

Tarjeta 18

37. ¿Piensa que el precio de la propiedad ha bajado debido a los olores?

1 No 2 Un poco 3 Mucho

La siguiente tarjeta (19) tienen una lista de diferentes tipos de olores clasificados en 4 categorías: Químicos, Podridos, Tierra y Vegetales.

38. ¿Cómo a qué huele en su vecindario: **Puede seleccionar varias.**

1 Químicos	8 pútrido/podrido	15 Tierra	22 Vegetal
2 Amonio	9 agriopunzante	16 Abono	23 avinagrado
3 Diesel	10 Carne cruda	17 Húmedo	24 Floral
4 Azufre	11 Sangriento	18 Hongos	25 Afrutado
5 Cloro	12 huevo podrido	19 Ahumado	26 Picante
6 Combustión	13 Cañería	20 Graso	99 NS
7 Quemado	14 Fecal	21 Pescado	27 Otro

39. ¿Es siempre el mismo olor?

1 Sí 2 No 99NS

(Respuesta negativa) ¿Cuál es la diferencia?

40. ¿Cuál cree usted que sea el origen del olor o los olores?

PD

41. ¿Ha tenido o sufrido alguna reacción física al olor o los olores de su vecindario?

1 Sí 2 No 99NS

(respuesta negativa) Saltar la próxima pregunta

Por favor pase a la tarjeta 20. La gente reacciona a los olores de diferentes maneras.

Podría usted decir:

42. ¿Qué reacción física ha sufrido? **Puede seleccionar varias.**

1	Irritación ocular	6	Tos	11	Angustia/Dolor
2	Dolores de Cabeza	7	Nausea	12	Problemas para dormir
3	Cansancio	8	Mareos	13	Otros_____
4	Irritación pulmonar	9	Molestia estomacal		
5	Ahogo-Asfixia	10	Problemas de Concentración		

a. Podría usted decirme, del 1 al 5, que tan fuerte fue su reacción? Siendo 1 la menor y 5 la reacción más fuerte de todas.

Intensidad													
1													
2													
3													
4													
5													

43. ¿Algún otro miembro de su familia ha experimentado reacciones físicas cuando el o los olor(es) están presente?

1	Irritación ocular	6	Tos	11	Angustia/Dolor
2	Dolores de Cabeza	7	Nausea	12	Problemas para dormir
3	Cansancio	8	Mareos	13	Otros_____
4	Irritación pulmonar	9	Molestia estomacal		
5	Ahogo-Asfixia	10	Problemas de Concentración		

b. Podría usted decirme, del 1 al 5, que tan fuerte fue su reacción? Siendo 1 la menor y 5 la reacción más fuerte de todas.

Intensidad													
1													
2													
3													
4													
5													

44. ¿Ha tenido que ir al medico a causa de los olores?

1 Sí 2 No 99 No esta seguro

(Respuesta positiva) ¿Qué problema tenía?

45. ¿Algún miembro de su familia ha tenido que ir al médico a causa de los olores?

1 Sí 2 No

(Respuesta positiva) ¿Qué problema tenía(n)?

H/H

En algunos lugares la gente trata de eliminar los olores. En otros lugares piensan que esto es imposible:

46. Cree que el olor o los olores de su vecindario:

1 Pueden eliminarse por completo
2 Pueden ser reducidos
3 No pueden ser reducidos
99 NS

47. ¿Por qué cree usted eso?

48. ¿Piensa usted que puede ayudar a reducir o eliminar los olores?

1 Sí 2 No 99NS

¿Por qué piensa eso?

(Respuesta afirmativa) ¿Qué puede hacer?

49. ¿Ha contactado alguna vez a alguien con respecto a los olores?

1 Sí 2 No

(Respuesta negativa) ¿Porqué no? **Saltar a la 59**

50. ¿A quién contactó? **(escribe todas las personas o agencias contactadas)**

a. ¿Había algo en particular en ese olor que le hizo llamar en ese momento?

1 Si 2 No

(De responder "Si") ¿Qué fue lo particular?

b. ¿Cuánto tiempo esperó para llamar?

(Si la respuesta es "No") ¿Por qué no llamó?

51. ¿Cuándo fue la última vez que usted contactó a alguna persona o autoridad, en referencia al olor percibido en su propiedad? **(para cada contacto)**

52. ¿Cuántas veces ha llamado a esa persona o autoridad?

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

53. ¿Cómo supo usted quien era la persona o agencia indicada a contactar? **(por cada contacto)**

54. ¿Recuerda usted que pasó durante esa llamada? **(por cada contacto)**

55. ¿Qué pasó luego de esta llamada? **(por cada contacto)**

56. ¿Su llamada produjo alguna reducción en los olores?

1 Sí 2 No 99NS

Favor pasar a la tarjeta 21

57. ¿Cuál de las siguientes frases describe mejor el esfuerzo que la autoridad (o agencia) hizo?

(por cada contacto)

1 Ningún esfuerzo
2 Poco esfuerzo
3 Algún esfuerzo
4 Un gran esfuerzo
99 NS

Hacer la pregunta si es apropiado

58. Usted me ha dicho que contactó a dicha (persona o autoridad) hace algunos años debido a la presencia de un olor en su propiedad. También me ha dicho que recientemente ha olido ese olor en su propiedad. ¿Podría usted decir porqué no ha vuelto a contactar a dicha autoridad?

KoCP

59. ¿Existe alguna agencia que sea responsable de controlar los olores?

1 Sí 2 No 3NS

(De ser "no", pasar a la 73)

(De ser "no" pero tener la autoridad correcta en la 50, pasar a la 64)

(De ser "no" pero tener la autoridad incorrecta en la 50, pasar a la 73)

(Si no ha contactado a nadie, pasar a la 73)

60. ¿Cuál es esa agencia?

Si la respuesta es equivocada, hacer la 61-64 y luego pasar a la 73

De ser apropiado:

a. ¿Porqué no ha contactado a la (autoridad o agencia) esta vez?

61. ¿Cómo supo sobre esa o esas agencias?

62. ¿Ha pensado alguna vez en contactar esa(s) agencia(s) para reportar el o los olores?

1 Sí 2 No

(Respuesta negativa) ¿Porqué no?

63. ¿Ha usted contactado alguna vez a esa agencia o agencias para reportar el o los olores?

1 Nunca 2 Algunas veces 3 Muchas veces 4 Todo el tiempo 99NS

(De ser "No") ¿Porqué no? Pasar a la **73**

64. ¿Sabe usted Cuál es el procedimiento para reportar un olor ante esa agencia(s)?

1 Sí 2 No

(Respuesta afirmativa) ¿Cuál es el proceso?

PC

65. ¿Introdujo algún reclamo?

1 Sí 2 No

(Respuesta positiva) ¿Cuántas veces?

a. ¿Hubo algo particular en el olor que le hizo presentar el reclamo?

1 Sí 2 No

(Respuesta positiva) ¿Qué fue?

b. ¿Cuánto esperó antes de presentar el reclamo?

(Respuesta negativa) ¿Qué es lo que evita que usted presente el reclamo?

Tarjeta 22

66. ¿Alguna vez ha estado un inspector en su casa?

1 Nunca 2 Una vez 3 Algunas veces 99NS

De ser "no" hacer la siguiente pregunta

67. Sabe usted si un inspector vino alguna vez a su vecindario?

1 Nunca 2 Una vez 3 Algunas veces 99NS

De ser "nunca", pasar a la 71, de lo contrario pasar a la 69

68. Ha sido alguna vez verificada la presencia del olor en su propiedad por algún inspector

1 Nunca 2 Una vez 3 Algunas veces 99NS

De ser "nunca", pasar a la 71, de lo contrario pasar a la siguiente pregunta

69. Sabe usted si algún inspector alguna vez verificó la presencia del olor en su vecindario?

1 Nunca 2 Una vez 3 Algunas veces 99NS

De ser nunca o NS, pasar a la 71

70. Cuando el inspector estaba presente, ¿Lleno usted alguna planilla para la declaración del reclamo?

1 Si 2 No

71. Sabe usted que es indispensable que un inspector verifique (confirme) la presencia del olor en su propiedad para que la (autoridad o agencia) tome cartas en el asunto?

1 Si 2 No

De ser "no", saltar la siguiente

72. ¿Cómo sabe usted que este es el proceso a seguir?

D

En esta última parte de la entrevista le solicito información sobre usted y su casa.

1 M 2 F

73. ¿En qué año nació usted? _____

74. ¿Dónde nació? _____

(Fuera de EUA)

75. ¿A qué edad vino a los EU?_____

76. ¿Cuál es su grupo étnico? _____

77. ¿Fuma usted?

1 Sí 2 No

78. ¿Tiene usted un limpiador de aire en su casa?

1 Sí 2 No

(respuesta positiva) ¿Por qué lo tiene?

¿Qué tan seguido lo usa?

79. ¿Tiene en su casa aire acondicionado?

1 Sí 2 No

¿Qué tan seguido lo usa?

Pasar a la tarjeta 23

80. ¿Puede usted decir cuál es su estado civil?

1 Soltero(a) 2 Casado(a) 3 Vive con su pareja 4 Divorciado(a) 5 Viudo(a)

81. ¿Tiene niños viviendo con usted?

1 Sí 2 No **(saltar a la próxima pregunta)**

Pase a la tarjeta 24

a. ¿Cuáles son sus edades?

Menores de 2	3-5	6-9	mayor(es) de 10
1	2	3	4

b. ¿Cuál es la relación entre ustedes?

Hijo/Hija(s)	Pariente	Nieto(a)(s)
1	2	3

c. ¿Cuál es el género?

Hijos	Edad	Relación	Genero
1			
2			
3			
4			
5			

82. ¿Cuál es el nivel más alto de educación que usted ha completado?

1 8th grado o menos
2 Parte del bachillerato
3 Graduado(a) de bachillerato
4 Algo de universidad
5 Graduado de la universidad
6 Estudios de post-grado

En la tarjeta 25

86. Podría usted decirme cuál es el número que mejor describe el ingreso familiar?

1 Menos de 10,000
2 10,001 –30,000
3 30,001 – 50,000
4 50,000 – 99,999
5 100,000 – 200,000
6 Más de 200,000

87. ¿Usted es dueño de su casa o la alquila?

1 Dueño 2 Alquila 3 Otro_____

83. ¿Hace cuanto vive en este vecindario?

¿Hay algo más que le gustaría decirme?

Muchas gracias por su tiempo
Y por su atención.

Comentarios del entrevistador están al reverso

APPENDIX D

CARDS USED WITH THE QUESTIONNAIRE

During the administration of the questionnaire a set of 25 cards was used listing the answers to be chosen by respondents. They were also in English or Spanish (The cards are not shown in their actual size).

D.1 English

Very good Good Fair Bad Very bad	1 2	 Real home In between Just a place to live
Not at all A little Some A lot	3 4	None of them A few of them About half of them Most of them All of them
No A little A lot	18 6	Never Once or twice a month Several times a month Several times a week Every day

Number of times that I notice the odor Strength of the odor in the air Length of time that the odor last Physical effects the odor has on me Psychological effect the odor has on me	16 20	Eyes irritation Headaches Fatigue Respiratory irritation Shortness of breath Cough Nausea	Dizziness Discomfort in the stomach Concentration problems Distress Sleep problems Other

Chemical	Putrid/rotten	Earthy	Vegetable
Ammonia	Acrid/pungent	Manure	Sour/vinegar
Diesel	Raw meat	Farmyard	Floral
Sulfide	Bloody	Moldy/musty	Fruity
Chlorine	Rotten eggs	Smoky	Spicy
Exhaust	Sewage	Oily/fatty	Other
Burnt	Fecal	Fishy	

No effort at all A little effort Some effort A great deal of effort	21 23	Single Married Live with Partner Divorced Widow/ widower

Odor Noise Traffic Water Other	9 11	More than once a day About once a day Several times a week About once a month A few times during the year Other
Morning Afternoon Evening	12 13	Few minutes About half an hour An hour or more All day
Very strong Strong Moderate Light Very light Varies	14 15	Most of the time: days and evenings Evenings and weekends Other

Very good Good Fair Bad Very bad	1 2 	 Real home In between Just a place to live
Not at all A little Some A lot	3 4	None of them A few of them About half of them Most of them All of them
No A little A lot	18 6	Never Once or twice a month Several times a month Several times a week Every day

D.2 Spanish

Muy bueno Bueno Medio Malo Muy malo	1 2 	 Como mi casa Más o menos Sólo un lugar para vivir
Nada Un poquito Algo Mucho	 3 4	Ninguna de ellas Algunas de ellas Como la mitad de ellas La mayoría de ellas Todas ellas
No Un poco Mucho	18 6	Nunca Una o dos veces al mes Varias veces al mes Varias veces por semana Todos los días

Menores de 2 3-5 6-9 mayor(es) de 10	24 25	1 Menos de 10,000 2 10,001 –30,000 3 30,001 – 50,000 4 50,000 – 100,000 5 Más de 100,000
Nunca Una o dos veces Algunas veces	7 8	Nunca Algunas veces Todo el tiempo
	22	
Nunca Una sola vez Pocas veces	10	Nunca Pocas veces Muchas veces Todo el tiempo

Frecuencia con que se sienten	16	Irritación ocular	Mareos
Intensidad del olor en el aire		Dolores de Cabeza	Molestia estomacal
Tiempo que dura en el aire		Cansancio	Problemas de Concentración
Efectos que produce en mi cuerpo		Irritación pulmonar	Angustia/Dolor
Efectos psicológicos que produce en mí	20	Ahogo-Asfixia	Problemas para dormir
		Tos	Otros
	19	Nausea	

Químicos	pútrido/podrido	Tierra	Vegetal
Amonio	Agriopunzante	Abono	Avinagrado
Diesel	Carne cruda	Húmedo	Floral
Azufre	Sangriento	Hongos	Afrutado
Cloro	huevo podrido	Ahumado	Picante
Combustión	Cañería	Graso	Otro
Quemado	Fecal	Pescado	

	16	
Ningún esfuerzo		Soltero(a)
Poco esfuerzo		Casado(a)
Algún esfuerzo	17	Vive con su pareja
Un gran esfuerzo		Divorciado(a)
		Viudo(a)

Olor Ruido Trafico Agua Otras	9 11	Más de una vez al día Como una vez al día Varias veces a la semana Como una vez al mes Pocas veces al año Otras
Mañana Mediodía Tarde	12 13	Pocos minutos Como media hora Una hora o más Todo el día
Muy Fuerte Fuerte Moderado Suave Muy suave Cambiaba de intensidad	14 15	La mayor parte del tiempo; día y noche Al final del día y los fines de semana Otro

APPENDIX E

CONSENT FROMS

A consent from was obtained from every respondent before administering the questionnaire. The consent form was used in two languages.

E.1 English

NJIT New Jersey Institute of Technology

NEW JERSEY INSTITUTE OF TECHNOLOGY
323 MARTIN LUTHER KING BLVD.
NEWARK, NJ 07102

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE OF STUDY: Environmental Conditions in New Jersey Communities.

RESEARCH STUDY: I have been asked to participate in a research study under the direction of Prof. Karen Franck and PhD candidate Maria Beatriz Yabur.

PURPOSE: The purpose of this study is to gain a better understanding of the intrusiveness of environmental conditions in people's daily life in their homes. The study is designed to explore how people respond to these conditions.

DURATION: My participation in this study includes either a one time interview or two interviews depending upon my schedule. The interview consists of closed ended and open ended questions. I will be asked questions regarding my community, the environmental conditions in my community, and demographic information.

PROCEDURES: I have been told that, during the course of this study, the following will occur: My interview will be used for the sole purpose of this study, will be held in strict confidentiality and will not be revealed to anyone but the researchers. The number assigned to the answer sheet is to carry out statistical analysis. After data analysis the answer sheet will be destroyed.

PARTICIPANTS: I will be one of about 100 participants in this study.

EXCLUSIONS: I will inform the researcher if I have lived less than a year in the neighborhood.

RISKS/DISCOMFORTS: There are no risks or discomforts associated with this study. There also may be risks and discomforts that are not yet known. I fully recognize that there are risks that I may be exposed to by volunteering in this study which are inherent in participating in any study; I understand that I am not covered by NJIT's insurance policy for any injury or loss I might sustain in the course of participating in the study.

CONFIDENTIALITY: I understand confidential is not the same as anonymous. Confidential means that my name will not be disclosed if exists a documented linkage between my identity and my responses as recorded in the research records. Every effort will be made to maintain the *confidentiality of my study records*. If the findings from the study are published, I will not be identified by name. My identity will remain confidential unless disclosure is required by law.

RIGHT TO REFUSE OR WITHDRAW: I understand that my participation is voluntary. I will receive no compensation and I may refuse to participate, or may discontinue my participation at

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Modifications may not be made to this consent form without NJIT IRB approval.

5/15/2007

any time with no adverse consequence. I also understand that the investigator has the right to withdraw me from the study at any time.

INDIVIDUAL TO CONTACT: If I have any questions about research procedures, I understand that I should contact the principal investigator at:

Karen Franck, Professor of Urban Systems at 973-596-3092
or email at karen.a.franck@njit.edu

Maria Beatriz Yabur, PhD candidate at 973-642-7199
or email at mby2@njit.edu

If I have any additional questions about my rights as a research subject, I may contact:
Dawn Hall Apgar, PhD, IRB Chair
New Jersey Institute of Technology
323 Martin Luther King Boulevard
Newark, NJ 07102
(973) 642-7616
dawn.apgar@njit.edu

SIGNATURE OF PARTICIPANT

I have read this entire form, or it has been read to me, and I understand it completely. All of my questions regarding this form or this study have been answered to my complete satisfaction. I agree to participate in this research study.

Subject Name:_____

Signature:_____

Date:_____

E.2 Spanish

NJIT New Jersey's Science & Technology University
NEW JERSEY INSTITUTE OF TECHNOLOGY
323 MARTIN LUTHER KING BLVD.
NEWARK, NJ 07102

CONSENTIMIENTO PARA PARTICIPAR EN EL ESTUDIO DE UNA INVESTIGACION

TITULO DEL ESTUDIO: Condiciones Ambientales en comunidades de *New Jersey*.

ESTUDIO INVESTIGATIVO: Se me ha solicitado mi participación en un estudio investigativo bajo la dirección de la Doctora Karen Franck y la aspirante de doctorado Maria Beatriz Yabur.

EL PROPOSITO: La finalidad de este estudio es alcanzar un mejor entendimiento de cómo las condiciones ambientales invaden y afectan la vida cotidiana, de los residentes, dentro de sus casas. El estudio esta diseñado para examinar las reacciones de las personas ante estas condiciones ambientales.

LA DURACION: Mi participación en este estudio puede incluir una o dos entrevistas, dependiendo de mi disponibilidad. La entrevista requiere algunas respuestas simples y otras a explicar. Se me preguntará sobre mi comunidad, las condiciones ambientales, e información demográfica.

LOS PROCEDIMIENTOS: Se me informa que durante este estudio sucederán las siguientes cosas: Mi entrevista será usada exclusivamente para la realización de este estudio, será guardada en absoluta confidencialidad y solo estará a la disposición de los investigadores. Los números asignados en la hoja de respuestas son para la realización de análisis estadísticos. Luego de analizar la información, dicha hoja de respuestas será destruida.

LOS PARTICIPANTES: Yo estaré participando en este estudio junto a otras 100 personas.

LIMITACIONES: Informaré al investigador si he vivido menos de un año en el vecindario.

RIESGOS/INCOMODIDADES: No hay riesgos ni incomodidades asociados a este estudio. Puede haber riesgos e incomodidades aún desconocidos. Reconozco totalmente, que hay riesgos a los que podría exponerme como voluntario de este estudio y que son los mismos que al participar en cualquier estudio. Entiendo no estar protegido por ninguna póliza de seguro contra daños o pérdidas que puedan ocurrir mientras participo en este estudio.

CONFIDENCIALIDAD: Entiendo que confidencialidad no es lo mismo que anonimato. Confidencialidad significa que si existe algún archivo de la investigación que me relacione con mis respuestas; mi nombre no será revelado. Se realizará todo esfuerzo para mantener la confidencialidad de los archivos del estudio. Si los resultados del estudio son publicados, no seré identificado por mi nombre. Mi identidad permanecerá confidencial a menos que alguna corte exija que sea revelada.

DERECHO A ABSTENCION O RETIRO: Entiendo que puedo rechazar o interrumpir mi participación voluntaria. Yo no voy a recibir ninguna compensación por mi participación y puedo en cualquier momento retirarme del estudio sin ninguna consecuencia adversa. También entiendo que el investigador tiene el derecho de retirarme del estudio en cualquier momento.

PERSONA DE CONTACTO: Entiendo que de presentarse alguna duda con los procedimientos de la investigación; debo ponerme en contacto con el investigador principal:

Karen Franck, Professor of Urban Systems at 973-596-3092
or email at karen.a.franck@njit.edu

Maria Beatriz Yabur, PhD candidate at 973-642-7199
or email at mby2@njit.edu

Si tengo alguna pregunta adicional sobre mis derechos como sujeto participante en la investigación, puedo contactar a :
Dawn Hall Apgar, PhD, IRB Chair
New Jersey Institute of Technology
323 Martin Luther King Boulevard
Newark, NJ 07102
(973) 642-7616
dawn.apgar@njit.edu

FIRMA DEL PARTICIPANTE

He leído toda la planilla, o me ha sido leída, y la entiendo completamente. Todas mis preguntas con respecto a esta planilla han sido contestadas satisfactoriamente. Mediante la presente firma acepto participar en este estudio de investigación.

Nombre:_____

Firma:_____

Fecha:_____

NJIT

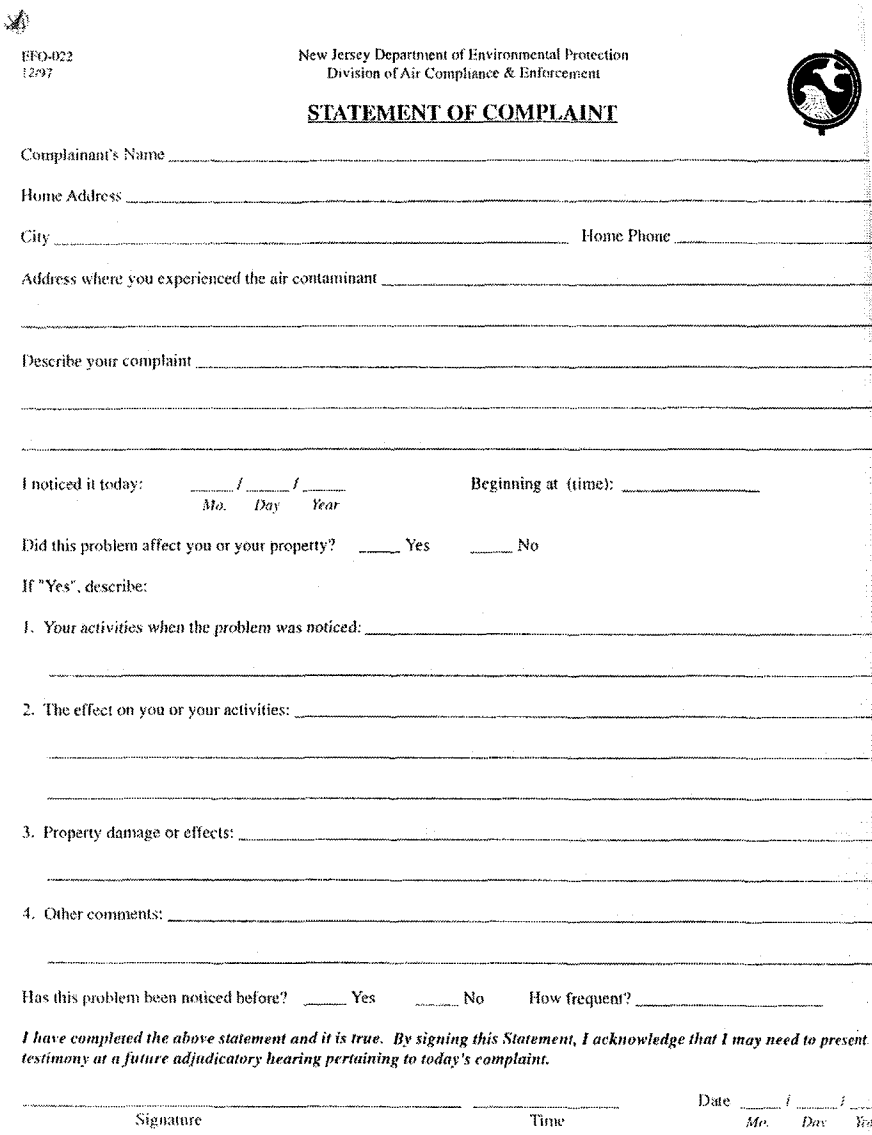
Approved by the NJIT IRB on 5/15/07.
Modifications may not be made to this consent form without NJIT IRB approval.

5/15/2007

APPENDIX F

STATEMENT OF CONSENT FORM

When field inspectors verify the presence of an odor in the complainant's property, he or she asks the complainant to fill out a statement of complaint. Following is a copy of this form, obtained from the curses for odor pollution to field inspector at Rutgers University



EFO-022
12/97

New Jersey Department of Environmental Protection
Division of Air Compliance & Enforcement

STATEMENT OF COMPLAINT

Complainant's Name _____

Home Address _____

City _____ Home Phone _____

Address where you experienced the air contaminant _____

_____

Describe your complaint _____

_____

_____

I noticed it today: ____/____/____ (Mo. Day Year) Beginning at (time): _____

Did this problem affect you or your property? ____ Yes ____ No

If "Yes", describe:

1. Your activities when the problem was noticed: _____

_____

2. The effect on you or your activities: _____

_____

_____

3. Property damage or effects: _____

_____

4. Other comments: _____

_____

Has this problem been noticed before? ____ Yes ____ No How frequent? _____

I have completed the above statement and it is true. By signing this Statement, I acknowledge that I may need to present testimony at a future adjudicatory hearing pertaining to today's complaint.

_____ _____ Date ____/____/____
Signature Time Mo. Day Year

APPENDIX G

CIVIL ADMINISTRATIVE PENALTY SCHEDULE

Facilities that receive a violation for releasing noxious odors into the outdoor air may receive a penalty if they cannot control the odor. The penalties set by NJDEP increase as the violation persists. Each odor type has its own set of penalties. The first set of penalties is for harmful odor, and the second set is for nuisance odor. The following information was extracted from a NJDEP web document (http://www.nj.gov/dep/aqm/rules.html#27A, Oct. 30, 2006) that contains all the rules and regulations regarding air pollution control (accessed nov, 6, 2006).

G.1 Harmful odor

Citation	Type of Violation	First Offense	Second Offense	Third Offense	Fourth and Each Subsequent Offense
N.J.A.C. 7:27-5.2(a), the emission of air contaminants in such quantities and duration as are, or tend to be, injurious to human health or welfare, animal or plant life or property					
Maximum Penalty Per Violation	NM	$10,000 [7]	$25,000 [7]	$50,000 [7]	$50,000 [7]
The maximum penalty may be reduced by applying the following factors:					
(1) Remedial Measures Taken:					

(A) Immediate implementation of measures to effectively mitigate the effects of the violation:	15% Reduction from the maximum penalty
(B) Implementation of measures that can reasonably be expected to prevent a recurrence of the same type of violation	
1. Full implementation	20% Reduction from the maximum penalty
2. Partial implementation	10% Reduction from the maximum penalty
(2) Magnitude of Problem	
(A) Population Affected	
Less than three complainants:	20% Reduction from the maximum penalty
Three to five complainants:	15% Reduction from the maximum penalty
Six to 10 complainants:	5% Reduction from the maximum penalty
Greater than 10 complainants:	0% Reduction from the maximum penalty
(B) Nature of Air Contaminant [9]	
Particulates & other air contaminants:	15% Reduction from the maximum penalty
VOC, NO_x or other criteria pollutant:	5% Reduction from the maximum penalty
EHS, TXS or NESHAP:	0% Reduction from the maximum penalty
(C) Amount of Air Contaminant Emitted in	

Any One Hour	
Less than 22.8 pounds:	15% Reduction from the maximum penalty
22.8 pounds or greater:	0% Reduction from the maximum penalty
(D) Area Covered (Air contaminant)	
Less than 1/2 square mile:	15% Reduction from the maximum penalty
1/2 square mile or greater:	0% Reduction from the maximum penalty
(E) Off-site Property Damage	
No:	15% Reduction from the maximum penalty
Yes:	0% Reduction from the maximum penalty

[7] For instance, for the first offense, if the violator takes remedial measures to mitigate the effects of the violation, the Department may reduce $1,500 (15%) from the maximum penalty. Further, if the violator takes measures that can reasonably be expected to prevent a recurrence of the same type of violation, the Department may reduce an additional $2,000 (20%) from the maximum penalty. Further, if there are less than three complainants related to the violation the Department may reduce an additional $2,000 (20%) from the maximum penalty. Further, if an air contaminant emitted is not a VOC, NO_x, criteria pollutant, EHS, TXS, or NESHAP the Department may reduce an additional $1,500 (15%) from the maximum penalty. Further, if the air contaminant emitted is less than 22.8 pounds in any one hour to the atmosphere the Department may reduce an additional $1,500 (15%) from the maximum penalty. Further, if the air contaminant emitted into the atmosphere covers an area of less than 1/2 square mile, the Department may reduce an additional $1,500 (15%) from the maximum penalty. Further, if there is no off-site property damage from the air contaminant the Department may reduce an additional $1,500 (15%) from the maximum penalty. Summing the total penalty reduction percentages results in a total reduction of 115%. However, an assessed penalty may not be reduced by more than 95% of the maximum penalty; therefore, the maximum reduction for the first offense penalty of $10,000 would be $9,500 resulting in an assessed penalty of $500.00.

[9] VOC (N.J.A.C. 7:27-16)
EHS (N.J.A.C. 7:31-1)
NO_x (N.J.A.C. 7:27-19)
Criteria pollutant (N.J.A.C. 7:27-13)
TXS (N.J.A.C. 7:27-17)
NESHAP (40 CFR 61)

G.2 Nuisance odor

Citation	Type of Violation	First Offense	Second Offense	Third Offense	Fourth and Each Subsequent Offense
N.J.A.C. 7:27-5.2(a), the emission of air contaminants in such quantities and duration as would unreasonably interfere with the enjoyment of life or property and which are not, or do not tend to be, injurious to health or welfare, animal or plant life or property					
Base Penalty per Violation	NM	$1,000 [1]	$2,000 [1]	$5,000 [1]	$15,000 [1]
i. The base penalty may be reduced or increased by applying the following factors, as applicable. The civil administrative penalty for each violation is calculated by summing the base penalty and the increase or decrease from the base penalty for each of the applicable factors in i(1) through (4) below.					
(1) Remedial Measures Taken					
(A) Immediate implementation of measures to effectively mitigate the effects of the violation:	15% Reduction from the base penalty				
(B) [1] Implementation of measures that can reasonably be					

expected to prevent a recurrence of the same type of violation	
1. Full implementation	20% Reduction from the base penalty
2. Partial implementation	10% Reduction from the base penalty
(2) Population Affected	
(A) Three to five complainants:	10% increase to the base penalty
(B) Six to 10 complainants:	15% increase to the base penalty
(C) Greater than 10 complainants:	20% increase to the base penalty
(3) Nature of Air Contaminant [2]	
(A) VOC, NO_x or other criteria pollutant:	15% increase to the base penalty
(B) EHS, TXS or NESHAP:	20% increase to the base penalty
(4) Compliance History	50 % reduction from the base penalty

(A) Upon a showing by a violator within 14 calendar days of receipt of the notice of violation from the Department that, at the time of the pending violation:	
1. The violator was in full compliance with the terms and conditions of all Department permits and certificates related to the pending violation:	
2. The violator was in full compliance with all air pollution control permits and certificates for the facility where the violation is pending, except for the violation of N.J.A.C. 7:27-5.2(a) and N.J.A.C. 7:27-8.3(j); and	
3. The pending violation is the first violation of N.J.A.C. 7:27-5.2(a) for the facility within the five calendar years immediately preceding the date of the pending violation:	

[1] For instance, for the first offense, if the violator takes immediate remedial measures to mitigate the violation, the Department may reduce $150.00 (15%) from the base penalty. Further, if the violator takes measures that can reasonably be expected to prevent a recurrence of the same type of violation, the Department may reduce an additional $200.00 (20%) from the base penalty. Further, if there are less than three complainants related to the violation there is no increase to or reduction from the base penalty. Further, if an air contaminant emitted is not a VOC, AAQS, EHS, TXS, or NESHAP there is no increase to or reduction from the base penalty. Further, if this is the first violation of N.J.A.C. 7:27-5.2(a) for the facility within five years immediately preceding the date of the pending violation and the violator can demonstrate that it was in full compliance with the terms and conditions in all Department permits and certificates related to the pending violation and with all air pollution control permits and certificates, the Department may reduce an additional $500.00 (50%) from the base penalty. Therefore, the minimum assessed penalty for the first offense under this section would be $150.00. In this example, all of the

	reductions were taken to the fullest extent to result in the minimum penalty.
[2]	VOC (N.J.A.C. 7:27-16) EHS (N.J.A.C. 7:31-1) NO_x (N.J.A.C. 7:27-19) Criteria pollutant (N.J.A.C. 7:27-13) TXS (N.J.A.C. 7:27-17) NESHAP (40 CFR 61)

REFERENCES

1. Beer, B. (2007). Smell, person, space and memory. In J. Wassmann & K. Stockhaus (eds.), *Experiencing new worlds* (pp. 187-200). New York: Berghahn Books.

2. Berglund, B., Berglund, U., & Lindvall, T. (1978). Olfactory self-and cross-adaptation: effect of time of adaptation on perceived odor intensity. *Sensory Processes*, *2*(3), 191-7.

3. Bruvold W.H., Rappaport, S.M., Wu, T.C., Blumer, B.E., DeGrange, C.E., & Kooler, J.M. (1983) Determination of nuisance odor in a community. *Journal of Water Pollution Control Federation*, *55*, 229-233.

4. Bundy, D.S. (1992). Odor issues with wastes. Proceedings of the National Workshop of the American Society of Agricultural Engineers (ASAE) 1991, 03-92, 288-292.

5. Bull, M., Gilroy, P., Howes, D., & Kahn, D. (2006). Introducing sensory studies [Electronic Version]. *Senses & Society, 1*(1), 5-8.

6. Classen, Constance. (1992, June). The odor of the other: Olfactory symbolism and cultural categories [Electronic version]. *Ethos, 20*(2), 133-136.

7. Constance Classen. (1993). *Worlds of sense: Exploring the senses in history and across culture,* New York, Routledge.

8. Classen, C., Howes, D., & Synnott, A. (1994). *Aroma.* New York: Routledge.

9. Cederlof, R., Friberg, L., Jonsson, E., Kajil, L., Lindval, T., (1964). Studies of annoyance connected with offensive smell from a sulphate cellulose factory. *Nordisk Hygiene T. 45,* 39-48.

10. Chen, D. & Dalton, P. (2005). The effect of emotion and personality on olfactory perception. *Chemical Senses, 30,* 345-351.

11. Chen, D., & Haviland-Jones, J. (1999). Rapid mood change and human odors. *Physiology and Behavior, 68,* 241-250.

12. Copley International Corporation. (1970). *National survey of the odor problem. Phase 1 of the study of the social and economic impact of odors.* Publication No. PB-194 376. Springfield, VA. Department of Commerce, National Technical Information Service

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13. Copley International Corporation. (1971). *A study of the social and economic impact of odors, Phase II.* Publication No. PB-205 936. Springfield, VA. Department of Commerce, National Technical Information Service.

14. Dawes, C.A. (1987). Odour pollution problems within the district of the Wrekin Council. (Doctoral dissertation, The University of Aston, Birmingham, 1987). Dissertation Abstract International, UK). *Dissertation Abstract International, C 49/04*, 590.

15. deGroot, Ido. (1967). Trends in public attitudes toward air pollution. *Journal of The Air Pollution Control Association, 17*(10), 679-681.

16. deGroot, I., Loring, W., Rihm, A., & Winkelstein, W. Jr. (1966). People and air pollution: a study of attitudes in Buffalo, N.Y. *Journal of The Air Pollution Control Association, 16*, 245-247.

17. deGroot, I., & Samuels, S.W. (1962). *People and air pollution: a study of attitudes in Bufalo, N.Y.* (Interdepartmental report): New York: New York State Department of Health.

18. DeLongis, A., Folkman, S., & Lazarus, R.S. (1988). The impact of daily stress on health and mood: Psychological and social resources as mediators [Electronic Version]. *Journal of Personality and Social Psychology, 54,* 486-495.

19. DePalma, Anthony. (2005, October 29). Good smell vanishes, but it leaves air of mystery [Electronic Version]. *The New York Times.*

20. Drobnick, Jim. (2006). The smell culture reader. New York: Berg Publishers.

21. Dubos, R. (1965). *Man adapting.* New Haven, CT: Yale Univ. Press.

22. Franck, K.A., Unseld, C.T., & Wentworth, W.R. (1974). *Adaptation of the newcomer: A process of construction.* (Final Report). New York City: The City University of New York, Environmental Psychology Program.

23. French, K. (1997). Jersey City 1940-1960: The Dan McNulty collection (NJ) (Images of America). Great Britain: Arcadia Publishing.

24. Glass, D.C. & Singer, J.E. (1972). *Urban stress: Experiments on noise and social stressors.* New York: Academic Press.

25. Goepinger, J., & Baglioni, A.J., Jr. (1985). Community competence: A positive approach to needs assessment [Electronic Version]. *American Journal of Community Psychology, 13*(5), 507-523.

26. Hernandez, S.A., Strahle, W., Garcia, H.L. & Sorensen, R.C. (1991). A cross-cultural study of consumer complaining behavior: VCR owners in the U.S. and Puerto Rico. *Journal of Consumer Policy, 14*(1), 35-62

27. Houser, C & Chan, S. (2007, January 8). Odor Permeates Parts of New York City [Electronic Version]. *The New York Times.*

28. Howes, David. (Ed.). (2004). *Empire of the senses: The sensual culture reader.* New York: Berg Publishers.

29. Howes, David. (2006). Charting the sensorial revolution [Electronic Version]. *Senses & Society, 1*(1), 113-128.

30. Jackson, Kenneth T. (2000). Gentleman's agreement discrimination in metropolitan America. In B. Katz (Ed.), Reflections on Regionalism (pp. 185-217). Washington, DC: Brookings Institution.

31. Jacobs, S.V., Evas, G.W., Catalano, R., & Dooley D. (1984). Air pollution and depressive symptomatology: Exploratory analyses of intervening psychosocial factor [Electronic Version]. *Population and Envioronment, 7*(4), 261-272.

32. Jonsson, E. (1964). Annoyance reactions to external environmental factors in different sociological groups. *Acta Sociologica, 7*, 229-263.

33. Jonsson, E., Dean, S. & Sanders, G. (1975). Community reactions to odors from pulp mills: A pilot study in Eureka, California. *Environmental Research, 10*(2), 249-270.

34. Kaplan, S., & Kaplan R. (Eds.) (1982). *Humanscape: Environments for people.* Ann Arbor, MI: Ulrich's Books.

35. Kasarda, J.D., & Janowitz, M. (1974). Community attachment in mass society. *American Sociological Review, 39*(3), 328-339.

36. Kaulesar, R. (April 6, 2007). The smell that's not swell. Hudson Reporter. Retrieved May 16, 2007, from www.hudsonreporte.com

37. Khan, Matthew. (2001). City quality-of-life dynamics: Measuring the costs of growth [Electronic Version]. *Journal of Real Estate Finance and Economics, 22*(2/3). 339-352.

38. Largey, G.P. and Watson, D.R. (1972). The sociology of odors [Electronic Version]. *The American Journal of Sociology, 7*(6), 1021-1034.

39. Latané, B. & Darley, J.M. (1969). Bystander "apathy." *American Scientist, 57*(2), 244-268.

40. Manzo, L.C. & Perkins, D.D. (2006). Finding common ground: The importance of place attachment to community participation and planning. *Journal of Planning Literature, 20*(4), 335-350.

41. Mason, J. & Davies, K. (2009). Coming to our senses: A critical approach to sensory methodology. *Qualitative Research, 9*(5), 587-603.

42. Medalia, N.Z. (1964). Air pollution as a socio-environmental health problem: Survey report. [Electronic Version]. *Journal of Health and Human Behavior, 5*(4), 154-165.

43. McGinley, Michael A. (1995). Quantifying public perception of odor in a community utilizing telemarketing protocol. Proceedings of Air and Waste Management Association International Special Conference, Bloomington, MN, 310-322.

44. McGinley, M.A. and McGinley, C.M. (1999). The 'Gray Line' between odor nuisance and health effects. Paper presented at Air and Waste Management Association 92nd Annual Meeting and Exhibition. St. Louis, MO, 20-24 June.

45. McGinley, M.A. & McGinely C.M. (2003, September). Comparison of field olfactometers in a controlled chamber using hydrogen sulfide as the test odorant. Paper presented at the International Water Association 2nd International Conference on Odour and VOCs: Measurment, Regualtion and Control Techniques, Singapore.

46. McGinley, M.A. & McGinely C.M. (2004, August). Developing a credible odor monitoring program. Paper presented at the American Society of Agricultural Engineers (ASAE), Ottawa, Canada.

47. McGinley, M.A. (2009, November). U.S. municipalities address updating nuisance odour ordinances. Presentation at the Air and Waste Management Association International Workshop on Environmental Nuisances, Calgary, Alberta, Canada.

48. Monat, A. & Lazarus, R. (Eds.) (1991). *Stress and coping: An anthology.* New York: Columbia University Press.

49. Moser, G. & Robin, M. (2006). Environmental annoyances: and urban-specific threat to quality of life? [Electronic Version]. *Revue Européenne de Psychologie Appliquée, 56*(1), 35-41.

50. Murphy, C., Cain, W.S., Gilmore, M.M., & Skinner, R.B. (1991). Sensory and semantic factors in recognition memory for odors and graphic stimuli: Elderly versus young persons. [Electronic Version]. *American Journal of Psycology, 104*(2), 161-192.

51. National Research Council, Committee on Odors from Stationary and Mobile Sources (Eds.). (1979). *Odors from stationary and mobile sources.* Washington, D.C.: National Academy of Science.

52. New Jersey Department of Environmental Protection Agency (NJDEP). (2007, August). Environmental protection compliance and enforcement air pollution

investigation guidelines. Retrieved June 12, 2009, from http://www.nj.gov/dep/enforcement/sub_5_guidlines_39njr912.pdf

53. Park, Sang Jin. (n.d.) The regulation and measurement of odor in Korea. Dept. of Civil & Environmental Engineering Woosong University, Jayang-dong Dong-gu Daejeon Korea 300-718. Retrieved October 30, 2005, from www.env.go.jp/en/lar/odor_measure/02_1_5.pdf

54. Pearlin, L.I., & Schooler C. (1978). The structure of coping [Electronic Version]. *Journal of Health and Social Behavior, 19*(1), 2-21.

55. Pink, Sarah. (2009). *Doing sensory ethnography*. London: Sage.

56. Pope, Richard J. (2002, January). Odor regulatory approaches. In Malcolm Pirnie, *Independent environmental engineers, scientist and consultants*. Retrieved November 8, 2005, from http://www.pirnie.com/docs/resources_pubs_air_jan02_5.html

57. Poulin, J., Kauffman, S. (1995). Citizen participation in prevention activities: Path model II [Electronic Version]. *Journal of Community Psychology, 23*, 234-249.

58. Radon, K., Peter, S.A., Pra G., Ehrenstan, V., Schulz, CA., Hehl, O. & Nowak, D. (2004). Livestock odours and quality of life of neighboring residents. *Annals of Agricultural Environmental Medicine, 11,* 59-62.

59. Riger, S., & Lavrakas, P.J. (1981). Community ties: Patterns of attachment and social interaction in urban neighborhoods [Electronic Version]. *American Journal of Community Psychology, 9*(1), 55-66.

60. Romero, M. & Serag, M. (2005). Violation of Latino civil rights resulting from INS and local police's use of race, culture and class profiling: The case of the chandler roundup in Arizona. *Cleveland State Law Review, 52*, 75-96.

61. Rutgers The State University of New Jersey. Air Pollution Training Program. (2006). Odor field enforcement. [Class material]. New Brunswick, NJ: Air Pollution Training Program.

62. Schiffman, S.S., Saltely Miller, E.A., Mark S.S. & Graham, B.G. (1995a). The effect of environmental odors emanating from commercial swine operations on the mood of nearby residents. *Brain Research Bulleting, 37*(4), 369-375.

63. Schiffman, S.S., & Saltely Miller, E.A. (1995b). Effect of pleasant odors on mood of males at midlife: Comparison of African-American and European-American Men. *Brain Research Bulletin, 36*(1), 31-37.

64. Schiffman, S.S. (1998). Livestock odors: Implications for human health and well-being. *Journal of Animal Science, 76*(5), 1343-1355.

65. Seligman, M.E.P. (1975) *Helplessness: On depression, development, and death.* San Francisco: W.H. Freeman and Company.

66. Selye, H. (1956). *The stress of life.* New York: McGraw-Hill Book Company.

67. Shepherd, G.M. (2009). New perspectives on olfaction processing and human smell. In A. Menini (Ed.), *The Neurology of Olfaction* (pp. 395-406). Boca Raton, FL: CRC Press.

68. Siddiqui, R.N., & Pandey, J. (2003). Coping with environmental stressors by urban slums dwellers [Electronic Version]. *Environment and Behavior, 35*(5), 589-604.

69. Tajik, M, Muhammad, N., Lowman, A., Thu, K., Wing, S., & Grant, G. (2008). Impact of odor from industrial hog operations on daily living activities. *New Solutions, 18*(2), 193-205.

70. Thorbourne, K. (2007, November 01). 'Reliable' stench. The Jersey Journal. Retrieved November 2, 2007, from www.NJ.com

71. Thu, K., Donham, K., Ziegenhorn, R., Reynolds, S., Thorne, P.S., Subramanian, P., Whitten, P., & Stookesberry, J. (1997). A control study of the physical and mental health of residents living near a large-scale operation [Electronic Version]. *Journal of Agricultural Safety and Health, 3*(1), 13-26.

72. Turk, A., Johston, J. Jr., & Moulton, D. (Eds.). (1974). *Human responses to environmental odors.* New York: Academic Press.

73. Turner J & Koles, R.T. (1997). *Images of America: Newark.* Chicago, IL: Arcadia Publishing.

74. Water Resources Research Institute. (1991, January). Investigation of odor problems associated with wastewater treatment facilities in North Carolina. Retrieved October 26, 2005, from http://www2.ncsu.edu/ncsu/wrri/reports/srs6.html

75. Watson, L. (1999). *Jacobson's organ: And the remarkable nature of smell.* New York: Norton & Company.

76. WEF Manual of practice No. 22. (1995). Odor control in waste water treatment plant. Alexandria, VA: WEF; New York: ACSE.

77. Wing, S., Horton, R.A., Marshall, S.W., Thu, K., Tajik, M., Schinasi, L. & Schiffman, S.S. (2008). Air pollution and odor in communities near industrial swine operation. *Environmental Health Perspectives, 116*(10), 1362-1368.

78. Wing, S. & Wolf, S. (2000). Intensive livestock operations, health, and quality of life among Easter North Carolina residents. *Environmental Health Perspectives, 108*(3), 233-238.

79. Wohlwill, J.F. (1973). *The study of behavioral development.* New York: Academic Press.

80. Woldoff, R.A. (2002). The effects of local stressors on neighborhood attachment. *Social Forces, 81*(1), 87-116.

81. Wysocki, C.J., Gilbert, A.N. (1989). National geographic smell survey: effects of age are heterogeneous. *New York Academy of Science, 56,* 12-28.

82. Zardini, Mirko. (2005). *Sense of the city: An alternate approach to urbanism.* Canada: Canadian Center for Architecture and Lars Müller Publishers.