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J. Scott Osborne, III

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Harry M. Kaulet
Major professor

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PERCEPTIONS OF RISKS TO CHILDREN'S HEALTH FROM INDOOR AIR POLLUTION AND AN INVESTIGATION OF RESPIRATORY ILLNESS SYMPTOMS FROM INDOOR HEATING WITH A WOODBURNING STOVE

By

J. Scott Osborne, III

A DISSERTATION

Submitted to
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in partial fulfillment of the requirements
for the degree of

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Department of Anthropology

1985

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ABSTRACT

PERCEPTIONS OF RISKS TO CHILDREN'S HEALTH FROM INDOOR AIR POLLUTION AND AN INVESTIGATION OF RESPIRATORY ILLNESS SYMPTOMS FROM INDOOR HEATING WITH A WOODBURNING STOVE

By

J. Scott Osborne, III

This study explores perceptions of risks to health (POR), risk-taking behavior (RTB), and associated illness from the perspectives of medical anthropology and epidemiology. Specific objectives included investigation of the following: (1) general POR; (2) POR from indoor air pollution (IAP) and parental usage of IAP sources; (3) the relationship between POR and RTB; factors affecting POR and RTB; (4) the construction of risk domains; (5) sources of intracultural variation in POR, RTB, and the partitioning of risk domains; (6) patterns of indoor heating in central Michigan; and (7) respiratory illness symptoms (RIS) in children from exposure to indoor heating with a woodburning stove (WBS).

POR and RTB were investigated in random and ethnographic samples, RIS in a random sample with an internal comparison group, and indoor heating in a random sample. Interview schedules were developed for each phase of inquiry. The instrument used to investigate POR and RTB includes both qualitative and quantitative scales for POR assessment.

J. Scott Osborne, III

Findings of this study provide an ethnography of risk, an inferential analysis of POR/RTB, and a preliminary assessment of risks of RIS from heating with WBS. Parents generally regarded both social and biomedical factors as risks to health with the result that POR were highly variable and context dependent. Indoor heating with WBS (occurring in 12.7% of study area homes) was found to be significantly associated ($p<.001$) with RIS in children (especially cough and wheeze symptoms of chronic airway irritation). However, POR from IAP did not significantly affect ($p>.13$) RTB-(IAP) by parents, an inconsistency which reflects larger discrepancies between perception and conduct in our society. A model is presented of a network of interrelated factors significantly associated ($p<.05$) with POR and RTB for IAP (including information, illness experience, confidence in biomedicine, sickness criteria, family-health assessment, ecoethic orientation, and sociodemographic factors). The most significant source of intracultural variation in POR and RTB was socioeconomic status; this factor also affected the perceived healthfulness of the home and the differential localization of risks in sociospatially constructed domains. Summary data are complemented by interview transcripts illustrating parents' conceptions of risks to health and the underlying beliefs, meanings, and needs which sustain different patterns of POR and RTB.

This dissertation is dedicated to four generations of parents and children: my wife, Jil, and our son, J. Scott, IV; my parents, Ruby and J. Scott Osborne, Jr. and my brother Lee and his wife Susan; and my grandparents, Elizabeth and J. Scott Osborne, Sr. This dissertation is further dedicated to the memory of Monnie and Gorman Lee Orders.

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CHAPTER 1

INTRODUCTION

The present research seeks to make a contribution on several related levels by investigating a specific set of illness-related issues which have broader implications for anthropology and public health. These issues involve the interrelationship between perceptions of risks to health, risk-taking behaviors, and associated illness experiences.

The principal research objectives of the study involve several areas of inquiry which collectively form a coherent illustration of the dynamic interrelationship between culture, behavior, and health. These objectives are as follows: (1) to identify a practice with a long tradition in the United States--the use of woodburning stoves for indoor heating--as a risk to the health of young children; (2) to explore general perceptions of risks to health by the primary caregivers of young children and their specific perceptions with respect to indoor heating and selected sources of indoor air pollution; (3) to investigate a wide range of beliefs and their interrelationships which affect perceptions of risk and actual conduct; (4) to explore factors which contribute to intracultural variation in risk-related perceptions and conduct; and (5) to assess the correspondence between perceptions of risk and risk-taking

behavior (especially with reference to indoor heating and indoor air pollution).

The broader implications of the study for anthropology and social science derive largely from the potential to extrapolate from the specific issues under investigation to more general issues surrounding the relationship between perception and conduct and, in particular, to explore factors which contribute to intracultural variation in these areas. The specific implications for applied medical anthropology, epidemiology, and public health center around the process and results of identifying a previously unidentified risk to health.

The study is relevant to medical anthropology and public health on several levels. First of all, it constitutes a preliminary assessment of potential risks to the respiratory health of young children from the use of woodburning stoves for indoor heating, a practice which is increasing in popularity in Michigan and the United States. Second, the study goes beyond the identification of a risk to assess perceptions of that risk by the parents of young children. More importantly from the viewpoint of applied anthropology and public health, it assesses the influence of these perceptions and of health-related information on risk-taking behavior. This set of observations is placed in the larger context of perceptions and behaviors with respect to indoor air pollution which, in turn, are placed in the still larger context of general perceptions of risks to health.

The present research agenda has relevance for medical anthropology in particular as an ethnographic account of risk-related beliefs and behaviors and as an investigation of factors contributing to intracultural variation in these areas. These inquiries also have relevance to the formulation and implementation of public health policies (especially relating to education, prevention, and intervention) and as such reflect the potential contribution which anthropologists can make in the development of effective strategies for disease control which have people-costs moreso than economic-costs as their priority. In addition, limitations of current methods of cost-benefit risk assessment are noted which emerge in an anthropological approach to the investigation of illness and associated risk-taking behavior. However, the foci of the study go beyond the applied medical anthropology, epidemiology, and public health concerns of risk identification and prevention to explore the more general aspects of things which govern conduct, the localization of risks and partitioning of risk-domains, and the construction of health-related reality.

CHAPTER 2

ORIENTATION AND BACKGROUND

General Orientation: Culture, Behavior, and Health

Recently there has been an increasing focus in the medical and social sciences on the relationship between behavior and health. This interest has emerged largely as a result of three interrelated factors. First, there is a need and a desire to control disease and to contain increasing costs of medical care. Second, there has been what is referred to in public health as an epidemiologic transition involving a shift from a predominance of acute infectious disease in the populations of "developed" areas to one of chronic illness. The etiology of chronic illness usually involves prolonged exposure to causative or contributing factors and research suggests that many of these exposures are associated with behaviors which are customary in their respective cultures, social groups, milieus, or other settings. Third, prompted by the necessities of the preceding factors, there has been a pragmatically renewed awareness (or at least hope) that "an ounce of prevention is worth a pound of cure." This is true not only from the standpoint of individual health experience but also in terms of economic and larger social costs. These factors combined have motivated efforts to investigate

relationships between behavior and disease toward the ostensible objective of rectifying problems once they have been identified (i.e., of reducing or eliminating diseases by determining their behavioral etiology and inducing appropriate changes in conduct).

It has long been recognized that culture plays a significant role in shaping behavioral norms ranging from mating practices to forms of religious worship to the technological control of nature and application of particular technologies in the home. However, the role of culture in shaping the expression and meaning of health-related beliefs and behavior has only received appreciable attention in the past half-century. Since the 1950's, Paul, Foster, Rubel, Fabrega, Kleinman, Dunn, and many others have elaborated theoretical orientations explicating the ways that culture shapes health-related beliefs and practices, explanatory models of health and illness, norms of health maintenance and illness management, the construction of social and clinical realities, and conceptions of appropriate healthful conduct (Adams and Rubel 1967; Cassel et al. 1960; Dunn 1977a; Fabrega 1974; Foster and Anderson 1978; Kleinman 1978, 1980; Leslie 1977a; Paul 1955; Rubel 1960; Rubel et al. 1984; Wellin 1978). Others have explored relationships between ethnicity (ethnic identity; ethnic groups) and a variety of health-related phenomena in pluralistic (multiethnic) settings, including concepts of health and illness, illness behavior and conceptions of sick

roles, health care utilization patterns, interactions with biomedical and other health care professionals and institutions, and methods of home (popular) treatment and health maintenance (Fabrega and Manning 1979; Foulkes 1972; Harwood 1971, 1981; Hessler et al. 1978; Kleinman et al. 1978; Leslie 1977b; Lewis 1975; Mechanic 1968, 1972a, 1972b; Rosenstock 1966; Roth 1969; Rubel et al. 1984; Scott 1974; Snow 1974, 1977, 1978; Spicer 1977; Suchman 1964, 1966; Young 1981; Zola 1966; 1972).

Frederick Dunn (1977a) focuses on health and illness as "outcomes" and advocates a theoretical orientation which places culture in the specific role of influencing ALL deliberate and non-deliberate behaviors affecting health. The framework is straightforward and useful, even if the compartmentalization of behavior into the categories of deliberate and non-deliberate is an oversimplification which denies the complexities of the processes and phenomena which shape our perceptions, guide our decision-making, and motivate our behavior. Despite this limitation, Dunn's position seems the clearest for present purposes and is the theoretical orientation adopted in this paper, where "culture" is defined after Kleinman (1978:86) as, "a system of symbolic meanings that shapes both social reality and personal experience." This definition implies the "learned" and "shared" dimensions of culture emphasized by other anthropologists and explicitly

addresses the concepts of systems, symbols, and meanings at both social and individual levels.

From this position, all behaviors are influenced by culture and to refer to health-related behaviors as being affected, patterned, or shaped by culture becomes redundant. However, I will continue to refer to health-related behaviors, perceptions, and risks as "culturally-influenced" or "patterned" in order to explicitly emphasize the importance of culture in these areas rather than treat its dynamic and ubiquitous role as a tacit assumption.

In the broadest sense, health-related behaviors include all aspects of behavior related to health care and the utilization of medical systems. They also include coping mechanisms, customs, social interactions, religious practices, manipulations of the environment, applications of technologies, and all other categories of behavior which directly or indirectly affect health and the occurrence of disease. At the individual level, health-related behaviors include many aspects of daily routine, lifestyle, diet, and personal hygiene and habits.

Included in the set of culturally-influenced health-related behaviors are some which constitute risks to health. That is, in some cases there is an association between a particular behavior or way of life and the occurrence of a disease (Blumberg and Hesser 1975; Breslow 1978; Dawber 1980; Dubos 1977; Dunn 1977b; Fabrega 1974, 1981; Finkler 1983; Hamburg et al. 1982; Janzen 1978; Jenkins 1974;

Lindenbaum 1979; MacMahon and Pugh 1970; Nash et al. 1983; Newman 1975; Paul 1955, 1958; Pelto and Pelto 1983; Rothschild 1981a; Rubel 1964; Scotch 1960; Wellin 1958). Generally this association is such that a certain behavior results in direct or indirect exposure to an etiologic factor or agent (from social stress to parasites) which contributes to or causes disease. Several examples should serve to illustrate this concept.

In Egypt, research has shown that the high prevalence of schistosomiasis is directly related to culturally-influenced behaviors surrounding personal hygiene, washing, and bathing (Ansari 1973; Farooq and Mallah 1966; Hairston 1973; MacDonald 1973; Stirewalt 1973). Many Egyptians are Muslims and Islamic religious beliefs prescribe that persons should clean with flowing water if possible after excreting. For this reason, excretion often occurs in or near the running water found in irrigation canals. Other daily routines such as washing and bathing also frequently occur in or near irrigation canals, especially in areas lacking central laundries or bathhouses. All these activities bring people into contact with the biological vector of schistosomiasis--snails which thrive in and around irrigation canals and are the intermediate hosts of the parasite disease agent (cercariae, Schistosoma spp.) of schistosomiasis.

A further consideration is that the prevalence of schistosomiasis is higher among males than females in Egypt.

This difference is also linked with the patterning of behavior by culture and involves the timing of interaction between the disease vector and persons-at-risk. The parasites in the snails are usually released in the heat of the day in the hours before and after noon. Women usually go to the water in the early morning hours (to take baths, bathe children, wash pots, draw water, etc.) and customarily wear clothes when bathing. Men, on the other hand, customarily go to the water for ritual ablutions in the afternoon (when the likelihood of infection is greater) and usually bathe and swim without clothing (making them more susceptible to infection by the parasites than if they wore clothing). Therefore, the different times of day that men and women customarily go to the water and differences in the ways men and women dress for bathing act to make exposure to the biological vector of schistosomiasis greater among men than women.

Among Indians in Mexico we also find an association between customary behavior and exposure to a vector of disease. The high prevalence of oncocerciasis in some regions has been directly associated with aspects of hygiene and sanitation at the household and community levels (Fuente 1941; Gamio 1946). In particular, outdoor excretion in camilpas (small gardens adjacent to houses) and practices surrounding the disposal of garbage and management of other organic wastes all act to increase the population density of black flies (Simulium spp.) which are the biological vector

of oncocerciasis. The bite of infected black flies transmits larvae of the disease agent of oncocerciasis (the parasitic worm Onchocerca volvulus) to human hosts. Here again, culturally-influenced behavior associated with daily routine is related to increased occurrence of disease.

Another instance from the literature where customary behavior is directly linked to illness is found among Indians in the Ica Valley of Peru. The prevalence of typhoid and other water-vehicle diseases in some areas has been shown to be directly associated with a culturally-prescribed belief that water should only be boiled for drinking when persons are "sick" (with the concomitant expectation by members of the community that the afflicted conform to a "sick role"). The reasons for this center around aspects of social interaction which are linked with what Rubel (1966:43) refers to as "the local system of status and role of influentials." As described by Wellin (1955), persons who boiled water for drinking but were not sick (and evidenced no enactment of a sick role) would be deviating from social norms regarding appropriate behavior of the well and ill. Continued aberration from customary behavioral norms would be considered a rejection of those norms and the perpetrators (healthy persons who boiled water for drinking) would risk being shunned or disfavored by other members of the community.

In cultures around the world excessive alcohol consumption is an aspect of lifestyle, personal habit, and

social interaction which is well documented in the anthropological and medical literature as a poignant example of culturally-influenced behavior which is a risk to health. Excessive consumption of alcohol continues in varying fashions (from manioc beer to rice wine to martinis) in almost every culture in the world despite the public knowledge in many areas of associated risks to health such as cirrhosis, heart failure, muscle diseases (myopathy), and neuritis. Smoking tobacco is another dimension of lifestyle, personal habit, and social interaction which has received considerable attention as a culturally-influenced behavior which directly affects the prevalence of many cardiovascular and lung diseases ranging from stroke to lung cancer to emphysema. In addition to being behavioral risks to health themselves, smoking and drinking are also examples of behaviors which act to exacerbate risks from other factors (Everett et al. 1976; Greely et al. 1980; Hamburg et al. 1982; Mail and McDonald 1981; Pozas 1962; Shinkwin and Pete 1982; Wilson 1974).

The expression and meaning of behavioral risks to health as well as the ways in which people respond to their identification are shaped by the social and cultural contexts in which they occur. Recent work by Douglas and Wildavsky (1982) on pollution beliefs in the United States and among the Hima cattle pastoralists of Africa suggests that identified (i.e., publicized) risks are perceived

differently in different cultures. However, their work is not an ethnographic account of perceptions of risks to health in these two different cultures but rather focuses on social and cultural mechanisms which account for constancy and change with respect to pollution beliefs. Elements which support traditional pollution beliefs in Hima society are compared with those which inspire the formation of ecologically oriented interest groups in the United States with an analytical eye toward motivations and political mechanisms (from relations between pastoralists and farmers to the intricacies of state-level bureaucracies).

Other studies demonstrate that there is intracultural variation in health-related beliefs and behaviors (Beals 1980; Erasmus 1952; Foster 1979; Harwood 1981; Hessler et al. 1978; Kirscht and Rosenstock 1979; Landy 1974; Leslie 1977b; Loudon 1976; Mechanic 1972a; O'Nell and Selby 1968; Pelto and Pelto 1978; Rothschild 1981a, 1981b; Taylor 1977; Twaddle and Hessler 1977; Zborowski 1952). The principal debate in this area is not the existence but the extent of intracultural variation and the nature of the relationships (e.g., exhaustive [ubiquitous], linear [inverse or direct], random, conditional, etc.) which obtain between this variation and other cultural phenomena. For example, George Foster (1979) uses data from Tzintzuntzan on the hot-cold dichotomy in relation to disease and treatment to argue that all aspects of culture may show internal variation. In the context of discussing Foster's argument and his own data,

Ralph Beals suggests that the degree of saliency of an aspect of culture is inversely related to the amount of internal variation in the shared meaning of that aspect of culture such that, "In areas of greater saliency to a culture, most people, even if they themselves deviate, can readily give the standard norm..." (1980:291). Thus, from Beals' viewpoint, the greater saliency an aspect of culture has to the members of that culture, the less variability there is in the meaning, expression, and perpetuation of that aspect; conversely, the less the degree of saliency of an aspect of culture the greater its intracultural variation.

However, health is an area of great saliency to the members of most cultures and this salience is especially visible (e.g., media; institutions) in modern pluralistic and multiethnic societies. Yet these societies in particular are characterized by a <u>diversity</u> of health-related and other beliefs and behaviors which are associated as much with socioeconomic differences and other sources of intracultural variation as with the existence of different ethnic groups under the umbrella (after Fredrik Barth) of a larger dominant culture (Barth 1969; Beals 1977; Cohen 1978; Colson and Selby 1974; Dunn 1977a; Green 1984; Iijima 1979; Keyes 1979; Kunstadter 1979; Leslie 1977b; Marlowe 1979). This would suggest a direct (rather than inverse) relationship between saliency and intracultural variability in the area of health.

The explanation of this observation which is most congruent with Beals' (1980) formulation is simply that the maintenance of a wide range of options for health care and of an even wider range of health-related beliefs and behaviors in modern pluralistic and multiethnic societies is also associated with strong central tendencies toward a minimum or modal number of institutionalized alternatives for health care (and of the beliefs and behaviors supporting those alternatives, including those related to risk). In almost every contemporary culture there are many alternatives for health care, some of which usually predominate over others in attendance by the population. These central tendencies account for the majority of the population (i.e., for the majority of cases there is low variability) and a smaller proportion of the population accounts for the wide range of variability observed in the system as a whole. Thus, a large amount of intracultural variation in the highly salient area of health-related beliefs and behavior (a seemingly direct relationship) is consistent with Beals' inverse relationship hypothesis (between saliency and variability) because there are central tendencies in each society to focus perceptions and responses on a limited number of elements from the larger set of alternatives.

In addition to the analysis of ethnographic data, intracultural variation in health-related beliefs and behavior is demonstrable through the analysis of clinical

and epidemiological data. For example, ethnicity and socioeconomic status have been shown to be significantly related to disease rates, the severity of disease, life expectancy, and many of the environmental and genetic components of morbidity (Harwood 1981; Lerner 1969; Morton and Chung 1978; Rothschild 1981a).

On a theoretical level, studies of culturally-influenced behavioral risks to health further our understanding of the ways different groups construct explanatory models of health and illness, formulate and change their perceptions of healthful conduct, and perpetuate or modify both risk-taking behavior in particular and the larger set of health-related behaviors in general. On an applied level, the investigation and identification of culturally-influenced behavioral risks to health may have a significant impact on the health of individuals or entire communities.

Medical anthropology is in a unique position among the social and medical sciences to assess the relationships between culture, behavior, and health. Because of this, I believe that medical anthropologists have an inherent responsibility to conduct applied research which seeks to identify and analyze culturally-influenced behaviors which are potential risks to health. However, our obligation in this regard is shared by many disciplines. In my opinion the unique aspect of our contribution lies as much (if not moreso) in a dedicated effort on our part to build

recommendations around a sensitivity to emic perceptions as in our ability to elicit them. It is the non-partisan theoretical orientation of anthropology, largely derived from enduring concepts of cultural relativism, as well as the participatory method of ethnographic inquiry which distinguishes our approach to achieving goals which are shared by many and it is our unique responsibility to present our findings in a framework grounded on personalizing rather than depersonalizing health-related issues.

The phase of the present research which deals with risk identification is conducted primarily on the applied level and assesses risks to the respiratory health of young children associated with a culturally-influenced behavior (use of woodburning stoves for indoor heating) which is prevalent in Michigan, many other parts of the United States, and throughout the world. This portion of the investigation is most relevant to issues in applied medical anthropology, epidemiology, and public health.

On a more general level the study addresses theoretical issues surrounding the relationship between health and culture by exploring the relationship between perceptions of risks to health and the behavior patterns incurring those risks. Although beyond the scope of the present research, the extent to which perceptions of risk affect risk-taking behavior would be expected, in turn, to exert an influence on the incidence rates of illnesses at

question (i.e., decrease those rates, if some proportion of the people who are informed respond by changing their conduct accordingly). This, in turn, would affect the health care and cultural systems in which (a) the initial culturally-influenced behavior, (b) the investigation and identification of risk, and (c) the response to risk identification all occurred. Further, the ways in which people respond to the identification of risk are mediated by cultural context and should therefore tell us something about the cultural system in which these responses occur. Thus, from a theoretical stance, the study addresses the dynamic interrelationship between health and culture and provides a specific example of the way in which a particular set of culturally-influenced risk-taking behaviors both affect and are affected by associated perceptions of risk and the occurrence of illness.

Background: Indoor Air Pollution and Respiratory Illness

The indoor environment is a significant factor in the health of modern populations. An important aspect of this environment is the quality of indoor air, especially with respect to the presence of hazardous pollutants.

The effects of indoor air pollution on health have been an increasing problem since the agricultural and urban expansions of the Neolithic phase. As noted by Brothwell (1978:133), "By the time chimneyless dwellings had evolved smoke was a certain health hazard in the environment of the home. Anthracosis, resulting from pollution of this kind has been noted in Egyptian mummies, and there is a particularly good example of this disease in an ancient Guanche body."

The increasing concern over indoor air pollution evident today is directly linked, in my opinion, with two complementary aspects of the situation. First, in the past century there has been an enormous increase in the amount of air pollution generated annually on the planet, largely resulting from the development of the internal combustion engine and industrial modes of production. Public concern over these issues has greatly increased, as it should, but is not new. For example, in England a "smokeless zone" was proposed in the Clean Air Bill of 1935 as an attempt to create a sort of refuge from industrial air pollution (Burton et al. 1978). The bill was tabled for 21 years until the problem reached such proportions that in 1956 the

Clean Air Act was finally adopted and has apparently led to significant reductions in "smoke concentrations". Similar awareness of the need to control the production of industrial air pollution has been achieved in most if not all industrial areas and I suggest that a sort of "guilt by association" has been the principal impetus for public awareness regarding domestically produced indoor air pollution.

The second aspect of the situation surrounding increased public concern with indoor air pollution, especially in the United States, bears on two interrelated factors. First, data suggest that urban residents in the U.S. spend more than 90% of their time indoors and that a majority of the population spends more than 80% of its time indoors. Second, the concentrations of some pollutants associated with chronic diseases are higher indoors than they are outdoors (Spengler and Sexton 1983; Task Force on Epidemiology of Respiratory Diseases 1980).

The problem of controlling indoor exposures to airborne hazards to the respiratory system has been emphasized by the Task Force of the National Institutes of Health (NIH) on Prevention, Control, and Education for Respiratory Diseases (1977) and by the NIH Task Force on Epidemiology of Respiratory Diseases (1980). Many of these indoor exposures result from culturally-influenced behaviors relevant to the application of technologies in the home.

The Task Force reports (1977; 1980) note an absence of well-established programs for the identification and control of indoor exposures to airborne hazards. Further, they state that while the relationship between bronchial asthma and a variety of agents is well-established clinically, this is not true for relationships between other prevalent respiratory problems and exposures to airborne pollutants (especially those produced indoors by domestic sources). In addition, the reports point out that the situation regarding airborne hazards in the home is exacerbated by the continual introduction of new agents marketed for home use before their effects on the respiratory tract are identified.

The presence of wheezing, recurrent pneumonia, bronchitis, and tachypnea (rapid shallow breathing) in young children is commonly associated with a family history of atopy, parental smoking, home cooking fuel, or recurrent exposure to viral illnesses in siblings of school age. One possible etiological factor that is neither commonly elicited in medical histories nor well-documented in the literature is a recent change to woodburning stoves for indoor heating. A search of the literature revealed no documentation implicating woodburning stoves as a factor in the occurrence of respiratory illness symptoms in children.

An increasing number of families all over the United States are converting to woodburning stoves in an effort to reduce their winter heating bills. Estimates indicate that

over one million new woodburning stoves are sold each year in the United States for domestic use and that usage is increasing in all socioeconomic groups (Lipfert and Dungan 1983; Meyers and Schipper 1984; Thompson 1984).

Although many types of woodburning stoves are in use, most of them function similarly to the most popular type--the Franklin stove. The Franklin stove is an American cultural artifact which was invented by Benjamin Franklin in Philadelphia in the 1740's (Harrington 1979; Schneider 1980). It was considerably more efficient that other types of woodburning stoves which had been in use for thousands of years, reportedly providing twice the heat of its contemporary counterparts with one-quarter the wood used (an eightfold efficiency increase). According to available accounts, Franklin invented his version of the woodburning stove (originally called the "Philadelphia Fire-Place") in an effort to combat the wood shortage in Philadelphia during the 1740's and unselfishly made it available to the public immediately after its development without filing for a patent (which would have delayed its application by the public but assured him financial gain).

The Franklin-type stove operates as a delayed combuster of wood, releasing carbon monoxide, particulate carbon and other particulates, sulfur and nitrogen dioxides, and a variety of organic and priority-metal pollutants into the ambient environment (Butcher and Sorensen 1979; Cooper 1980; Cooper and Malek 1982; Lipfert and Dungan 1983).

These pollutants become somewhat concentrated in the air envelope surrounding the home and some portion are subsequently reintroduced into the home as part of normal air exchange between the home and the air envelope surrounding it. These airborne hazards are also released directly into the home when the stove is operating and the door is opened to add more wood. Therefore, the question arises as to whether hazardous by-products of wood combustion are being produced in hazardous concentrations in the ambient air and accumulating in homes where woodburning stoves are used as a source of heat--a factor which would account for a higher incidence of respiratory problems among children living in homes heated by this means. This possibility is especially important when one considers the implications of the trend to increase home insulation and overall airtightness in an effort to reduce heat loss and conserve energy (Breysse 1981). Further, while technological and other factors (which will be discussed later) might affect this situation as it pertains to the occurrence of respiratory problems, even the most efficient woodburning stoves emit hazardous pollutants in the home. These concerns are of special significance for the State of Michigan which has a tradition of woodburning.

During the winter of 1980 clinical observations at the Pediatric Chest Clinic of the Michigan State University Clinical Center suggested an increase in the number of preschool children presenting with lower respiratory tract

illness whose history included a recent change to a woodburning stove as a source of indoor heating. In several of these children there were no discernable co-existing factors. A case study of one of these children was published in January, 1983 by the author and two senior authors in Pediatrics, a journal of the American Academy of Pediatricians (Honicky, Akpom, and Osborne 1983). To the best of our knowledge, this is the first documentation in the literature of an association between respiratory illness and the use of a woodburning stove for indoor heating. A second article was published in March, 1985, describing the results of the first (1981-1982) of three winters of observations conducted as part of the present research (Honicky, Osborne, and Akpom 1985). In addition, Dr. Honicky and the present author have written three abstracts and presented two papers at national medical meetings on part of the present data (Honicky and Osborne 1983, 1985a, 1985b, 1985c, 1985d).

Literature on the incidence of lower respiratory tract illness in preschool children reveals significant variability in specific etiological factors. Colley (1971) and Glezen and Denny (1973) suggest that viruses and allergies, rather than bacteria, are probably responsible for many of the more serious respiratory illnesses in infancy. Earlier epidemiological studies by Dingle et al. (1964), Lidwell and Sommerville (1951), Brimblecomb et al.(1958), and others on the patterns of occurrence and

etiology of respiratory infection in the family related frequency of illness to age, sex, and sociocultural factors such as family size and crowding. However, because virologic techniques were not sufficiently advanced at that time, those workers were unable to identify most of the etiologic agents now believed ("known") to be involved (Monto et al. 1971). One important factor which affects the incidence of lower respiratory illness in young children is an attack of bronchitis or pneumonia in a sibling, especially if the sibling is of school age (Leeder et al. 1976). Parental cough-phlegm symptoms also have an influence on the incidence of bronchitis and pneumonia among young children. However, unlike parental cough-phlegm symptoms, parental asthma-wheeze (atopy) appears to exert an influence which is independent of other factors, suggesting that genetic factors may be more important in the latter situation (Leeder et al. 1976).

It is also recognized that the presence of hazardous substances in the air in and around the home increases the frequency of respiratory illness, particularly in atopic children but also in children without a history of atopy. Children of parents who smoke have been shown to have a greater incidence of bronchitis and pneumonia in the first year of life as compared with children of non-smokers (Colley et al. 1974). Colley (1974) reports that much of this effect may be accounted for by cross-infection from parents with bronchitis (the former often due to smoking

cigarettes). Studies by Cameron et al. (1969), Norman-Taylor and Dickinson (1972), Luguette et al. (1970), and Bonham and Wilson (1981) all report a higher incidence of respiratory symptoms or illness among children of smokers as compared with those of nonsmokers.

Other sources of indoor exposure to airborne hazards include cooking with gas and the use of urea-formaldehyde foam insulation. In analyses of the effects on respiratory health of possible indoor pollutants, Melia et al. (1977) and Speizer et al. (1980) found that children from homes in which gas is used for cooking have more cough, chest colds, and bronchitis than children from homes where electricity is used. These problems have been attributed to increased ambient concentrations of oxides of nitrogen which are produced as by-products of the combustion of gas.

As regards use of urea-formaldehyde foam insulation, the subject has been the center of considerable controversy. A March 17th, 1982 release of the Michigan Department of Public Health Public Health Advisory states that exposure to this substance, especially if the foam has not cured properly, may induce a number of respiratory illness symptoms. These symptoms include coughing and shortness of breath which have been attributed to the release of formaldehyde from the foam in the walls. The evidence of potential harm from prolonged exposure was significant enough that the United States Consumer Product Safety Commission voted February 22, 1982 to ban new installation

of urea-formaldehyde foam insulation. However, this position has since been reversed as a result of lobbying pressure, to the disappointment of the public health community and the potentially serious detriment of our population's health, and is still under debate (Ashford et al. 1984; Levin and Purdom 1983; Nation's Health 1984; Sun 1984; Wildavsky et al. 1984).

Risk Assessment and Public Health Policy

The concept of risk is one which holds different meanings to different people and even to the same persons at different times, in different places, situations, and contexts. There are those who generally feel that, "Risk is just a part of life," others who believe that, "Life without risk wouldn't be worth living," and still others who think that the quality of life is improved by reducing risks in our daily activities.

There are few areas which are as poignantly evident and paramount as "health" to each of us as individuals and populations. In efforts to measure or assess health status one could, as in mortality studies, fall back to the ultimate dichotomy in our biologically defined frame of reference: one is either alive or dead. However, as many have elaborated, there is a wide range of conditions which are intermediate to these extremes and which prevail on the quality of life and health as well as how and whether we consider ourselves to be healthy, assessments of degrees of health and illness, and defined sets of culturally-sanctioned appropriate responses to such assessments.

"Health" and its complement "morbidity" (here subsuming the terms illness, sickness, and disease) are outcomes which are considered by most persons with biomedical orientations to be quantifiably and objectively measurable. This view derives largely from the positivistic and reductionistic conviction that objective observation and

subjective experience are somehow separable (or that, "If they aren't it really doesn't matter anyway") and have different degrees of validity.

By way of illustration, the digital-technology world we live in tends to support an illusion of precision and of a capacity to actually perceive or measure a particular aspect of "reality". Of course, any digital product designer or manufacturer knows there is error in digital products, just as researchers know there is error in statistical estimation and inference. However, the digital display of a single piece of information is a concrete, definite answer, a powerful response to the question, "What time is it?" which is taken by many to be a "true" answer. Pursuing the analogy between measuring risk and measuring time a bit further, the earlier chronometric technology of sweep hands on a round watch face at least conveyed to the observer a sense of constant change and of an inability to ever know <u>exactly</u> what time it is. One could approximate the time and with a stopwatch one could even be reasonably certain of "precisely" what time it <u>was</u> when a particular event occured (but only then for that particular stopwatch). However, then as now, people tend to credit the time indicated on a watch with an objective reality which can somehow be separated from the subjective participation of the person(s) reading the instrument.

This is, of course, an oversimplification, but only to a point and solely for the purpose of illustrating how

easy it is to fall into the trap of believing that things can be objectively perceived or, perhaps more importantly, that such perceptions indeed have objective meaning. That these perceptions of "reality" do indeed have meaning is quite clear for we are constantly involved in their prioritization, but what meaning to what persons and in what contexts? Do the same perceptions of what is believed to be objective reality occur in all people in the same way? To whatever extent the answer might be "yes," such commonality of perception would probably be limited to the level of our biological capacities. By and large, the present research suggests that the perceptions people have regarding risks (to health in particular) are quite varied and that their conduct is often inconsistent with these perceptions and the information available to them.

What does all this have to do with risk, and with risks to health in particular? Risk, like most phenomena in our lives, is something which many people feel can be objectively perceived. Perceptions of risk which are attributed an objective sense of reality and validity are often viewed as independent of the orientations (especially the assumptions and biases) of those formulating and subsequently interpreting those perceptions.

The consequences of this process affect us in subtle as well as very tangible ways. For example, they affect the ways we approach different issues, the ways we interact, and the ways we respond to new situations; they affect

legislation, executive action, and enforcement of laws at local, state, national, and international levels. Objectivized perceptions of health risks often constitute the basis for social and legal assessments of responsible conduct and competency; they define criteria for the acceptance, stigmatization, ostracization, and penalization of particular actions; and they are inextricably involved in daily decision-making by individuals, institutions, and other social aggregates.

Of particular interest here is the observation that such objectivized or eticized perceptions constitute the basis for policy formulation in nearly every area which affects health and health care, from public health codes to environmental protection and the nuclear arms situation to regulations affecting the quality of and access to health care. The political and economic processes whereby such policies are implemented form a pivotal locus in the intersection between perception and social action. (These processes in and of themselves are fascinating and are probably very similar in many different areas of application; however, they will not be dealt with here.) The point is that once the machinery is in motion which converts <u>formulated</u> health policy into <u>implemented</u> policy--i.e., once a social decision has been enacted--we are no longer dealing with perceptions or beliefs regarding risks to health but rather with a <u>social perception of those perceptions and beliefs</u>. Some even argue convincingly that

we are actually dealing moreso with political and economic perceptions of health perceptions (all of which are socially constructed).

The important observation for present purposes is that public health policy is often implemented on the basis of social perceptions of "scientific" perceptions involved in risk assessment. This is not bad in and of itself, for there is no viable alternative except to completely abstain from action of any kind. What is unfortunate is that many people fail to recognize this and proceed on the assumption that "facts are facts" rather than operating on the recognition that "perceptions are perceptions".

This recognition is important not only for decision-makers and decision-proposers but also for those who are affected by decisions if they are to appreciate the need to probe the bases, assumptions, and biases (the latter often unknown as well as unstated) upon which decisions are made and subsequent action (including enforcement) is taken. A second reason recognition of the distinction between "facts" and "perceptions" is important is failure to do so facilitates manipulation of the uninformed by vested interest groups. This is especially important in matters related to health because policy implementation in the area of health care and risks to health has ramifications which extend far beyond the particular phenomena or issue being addressed.

For example, much public attention has focused recently on toxic waste disposal and the responsibilities of the Environmental Protection Agency (EPA). The way the EPA acts with respect to the enforcement of regulations directly affects people's health in terms of exposure, disruption of lives (as in areas where people had to leave their homes because regulations were not enforced), and the protection of the environment (which in turn affects every element essential to our survival).

However, enforcement of EPA regulations also directly affects industry, employment, and consumerism, and loops back to exert an effect on public spending and taxation (e.g., unemployment compensation, government spending to support the EPA budget and to investigate the EPA), patterns of production and consumption, and a host of interrelated phenomena; the whole web is so intricate and interconnected that component by component listing would be pedantic. The selective enforcement of EPA regulations, especially in industry, also acts to maintain a system of social stratification which is reinforced by vested interests on profit-motive and consumer-motive levels and is characterized by an inverse relationship between the social position (in terms of access to resources) of company board members, executives, and investors directly responsible for producing toxic waste and the social position of those who must bear the greatest burden of exposure.

Recognition of the multiple effects of implementing health-related policy is an emphasis of the currently popular cost-benefit approach to risk assessment. This approach in the area of health care and safety standards is modeled after other applications of cost-benefit analysis and therefore emphasizes economic dimensions of health over other considerations in its criteria for policy evaluation and recommendation (for example, see Ostrowsky et al. 1985; Vladeck 1984; White et al. 1985). It is most important to appreciate, however, that the inherently subjective aspects of perception (as well as vested interests, prejudice, political ideology, and ethnocentrism) permeate every phase of the process and that these are often ignored, unrecognized, taken for granted, or manipulated by the architects and implementers of health-related policy.

For example, with respect to the subject of pollution it is generally acknowledged that industry is a major contributor and should be accountable for its actions. However, in addition to deflecting responsibility back to the consumer (where much of it belongs), industry in more-developed areas is attempting to exonerate itself by transferring the blame for global pollution to industry in less-developed areas. In a recent international conference of western industrial nations sponsored by the Organization for Economic Cooperation and Development a concensus was expressed that the problem of worldwide pollution in the future will be caused by third world countries (rather than

by the western industrial nations attending the conference). Representing the United States, then Administrator of the U.S. EPA, William D. Ruckelshaus, said that, "The principal environmental battle in the period ahead will undoubtably be fought in the developing countries and the future security of the global environment will depend on the outcome of these battles" (Dickson 1984:152, emphasis added).

Although there is clearly a need to contain the production of hazardous products in developing areas I question the apparent deflection of accountability and the underlying ethnocentrism and other biases which motivate this position. These perceptions of accountability on the part of industry are important because they have a significant influence on the formulation, implementation, and enforcement of policies in areas which directly and indirectly affect the health of entire communities and populations (in both more- and less-developed areas).

Acknowledging as given that health-related policies codify the subjective perceptions of risk-assessments upon which they are based (and that the closest we can get to "objectivity" is "collective subjectivity"), the issue becomes the selection of criteria for decision-making and their prioritization. The criteria presently emphasized, as mentioned earlier, are predominantly economic, as reflected by the comments of William Ruckelshaus at the aforementioned conference that the western industrial nations should adopt a common basis for assessing environmental risks through

cost-benefit analysis and use this to derive joint priorities for "controlling" these risks. The final conclusion of the conference was, "that cost-benefit analysis (in both physical and monetary terms) and risk assessment are important techniques through which environmental considerations can be fully integrated with other policies 'such as agriculture, industry, energy, transportation, and land use management'" (Dickson 1984:152).

The economic consequences of health policy implementation are unquestionably of enormous social significance. However, one might question the extent to which an approach which aims to minimize economic losses from a particular problem is appropriate to decision-making in the areas of health care, occupational safety, and the direction of efforts to control disease. These areas involve potential personal and social losses which are much more significant than potential economic losses (despite their interconnection). Further, in my opinion, many of the variables which are quantified in cost-benefit risk assessments are intrinsically qualitative and unquantifiable except in their own units or dimensions (e.g., life in terms of life, money in terms of material items, but not one of these categories in terms of the other).

The implications of believing that risks to health can be objectively perceived, measured, and quantified are that the initiation and implementation of appropriate

countermeasures will effectively neutralize or eliminate these risks and their associated effects. The failure (or partial success) of numerous health care programs in both modern pluralistic societies and so-called developing areas should attest convincingly to the potential fallacy of this philosophy. However, there have also been successful programs in the effort to control and even eradicate certain diseases.

There are, of course, many significant factors which affect the success or failure of health care programs, ranging from appreciation of cultural norms and values to the congruence of indigenous and biomedical nosologies and health-related beliefs. However, in my opinion the proximal reason, if you will, why some health care intervention and prevention programs fail while others succeed is not so much to be found in an analysis of the particular targeted medical condition(s) or even the implementation strategies (including medical techniques, public relations tactics) employed as it is in an appreciation that persons' subjective perceptions of risks to health are embued with the same guiding sense of objective reality (i.e., objectivization) that pervades the process of qualifying and quantifying risks to health by the medical community. People decide for themselves, and not always (or even often) on the basis of "information", which risks are "real" and which are not --which risks are important to them and which are not--and their responses to health care education and

prevention programs are in a large part shaped by their particular constructions of health-related reality. From this perspective, the role of perceptions and beliefs is not just an epistemological polemic but rather lies at the very heart of people's responses to and the ultimate outcomes of health care education, interventions, and prevention programs.

We live in a world constructed of meanings which are patterned and influenced in a variety of ways and which affect (if not determine) our conduct as individuals and as larger groups (families, neighborhoods, communities, societies, etc.). Some of the meanings we construct pertain to our health and the health of others and of these meanings some pertain most directly to a set of phenomena which we consider to constitute a threat, danger, hazard, or risk to our health in some way. The task faced by those who wish to reduce or eliminate these risks in our lives is incredibly complex for it involves not only the determination of risk (which is problematical in and of itself) but an appreciation of the meanings of the beliefs and conduct which support or contribute to the construction and maintainance of risk-taking patterns.

Recently there has been a serious effort to objectify risks to health as somehow separate from the larger and more obscure realm of risks in general. This is a logical extension of our tendencies to compartmentalize and organize phenomena into categories which we can comprehend (such as

"known" and "unknown"). It is also a reductionistic approach which has as its objective the ranking or prioritization of different risks to health, a prerequisite for which is the categorization of risks to health as separate or at least distinguishable from risks in general. However, it is important to realize that risk is an ambiguous concept and that the compartmentalization of risks to health as a separate category of risk is entirely arbitrary (even if it is essential to any framework of public health action). If, for example, one accepts the position that there is an interconnectedness between mind and body, which there is ample evidence to suggest, and that this is a significant factor in somatic health (e.g., effects of conscious or unconscious stress on the body) then it follows that thoughts and feelings as well as actions may be risks to health. In addition, any form of risk-taking has the potential for health repurcussions and since there need be no conscious participation by the risk-taker one would, therefore, never necessarily "know" if one were taking risks or not. That is, since virtually anything can be a risk and any form of risk-taking has the potential to affect health, the distinction between "risks in general" and "risks to health" is largely a construction of convenience which focuses attention on risks within the purvue of biomedicine.

Despite this realization, the compartmentalization of risks to health as separate from the larger realm of risk

continues to abound. Why? The answer is quite simple: there is no alternative except abstension. It is clear to all of us, though not necessarily for particularly scientific reasons, that there are risks to health in our daily lives. Anyone alive and old enough knows he or she will die (although there are numerous views on "death") and with this knowledge comes an awareness of the concept of danger or risk and a social construction of an intermediate range of phenomena which could prematurely impair our health or kill us. This is the area of "risks to health" and, as previously mentioned, it necessarily and by definition touches every aspect of our lives.

The issue in attempting to reduce or eliminate these risks and associated diseases is not whether the effort would be desirable or beneficial--nearly everyone is agreed it would be. The issue in risk management or control is rather the selection of criteria and priorities for what is to be done, the way it is to be done, for whom, and at what expense (including personal liberty). It is in assessing these factors that anthropology has much to offer because the entire process from risk determination to risk prevention or intervention is one whose success hinges on an understanding of the meanings which risk-taking behaviors and even particular illnesses have to persons in different groups.

CHAPTER 3

MATERIALS AND METHODS

Introduction

The methodology of this investigation integrates anthropological and epidemiological approaches to the study of health and behavior. Anthropology traditionally employs a participatory method of inquiry in the study of contemporary groups and populations which involves intimate contact with the subjects under study. Epidemiology, on the other hand, generally emphasizes survey methods in the investigation of the distribution and determinants of illness and disease. The survey approach lacks the intensive interaction between researchers and subjects characteristic of an anthropological approach but allows the collection of data for a larger number of subjects in a shorter time frame. In addition, epidemiological studies generally survey random samples or samples which are rigorously structured with respect to the presence of particular traits (for example, illness or exposure experience, age, sex, or geographic area of residence). Samples in anthropological research are qualitatively representative of cultural and other groups and provide essential descriptive data but are usually not random in a statistical sense and are therefore not usually amenable to

inferential analysis (i.e., hypothesis testing). On the other hand, only an ethnographic, participatory approach can provide the kind of detailed information which clarifies, refines, and provides a contextual framework for the interpretation of health-related beliefs and behaviors.

The present study has several related research objectives, each of which involved the development of an appropriate methodology. In broad terms these objectives were the investigation of risks to children's respiratory health from a customary form of indoor heating (woodburning stoves), the investigation of risk-related perceptions and conduct by parents of young children (especially with reference to indoor heating and indoor air pollution), and a survey of the sources of indoor heating used by parents of young children in the area under study.

Different phases of the research involved two different reference populations--i.e., young children and their parents--although there was a commonality between them in that they represented families (i.e., households) and the existence of one reference population (i.e., children) was completely dependent upon that of the other (i.e., parents). The following sections describe in detail the materials and methods used to investigate the broad objectives outlined above.

Investigation of Risks to Children's Health from the Use of Woodburning Stoves for Indoor Heating

Study Population and Sample

The population for this portion of the study consisted of 9,977 children, one to seven years of age (as of January 1, 1982), who had attended the ambulatory care clinics of the Colleges of Medicine (the Clinical Center) at Michigan State University for either health maintenance or illness care between 1976 and 1981. Sixty-two children who lived within the five county Greater Lansing area (Ingham, Eaton, Clinton, Ionia, and Shiawassee counties) were selected randomly from this population without regard to reason for visit or primary diagnosis at clinic attended. Participants were recruited by a telephone call to their parents who were informed that the study was being conducted to investigate the occurrence of symptoms of respiratory illness in young children from homes with different types of indoor heating. All of the parents contacted participated in the study except one couple whose child had tragically died.

The children in the sample were classified at the time of selection according to the type of indoor heating used in their home. The primary research objective of the study was, however, to evaluate the occurrence of symptoms of respiratory illness in young children living in homes heated by a woodburning stove and for this reason sampling continued until the required number of children from such homes had been selected. This group of children constituted

the "study group" (i.e, the "exposed" group with respect to the exposure-disease relationship under investigation). Each child in the study group was matched for age, sex, and geographic area of residence with children from homes heated by conventional means (gas and fuel oil furnaces; central electric heat). This group of children constituted the "internal comparison" or "control" group (i.e., a group of children whose homes were not heated by a woodburning stove). The purpose in matching children in the study and control groups for age, sex, and geographic area of residence was to eliminate the potentially confounding effects of these variables on the hypothesized relationship between use of woodburning stoves for indoor heating and the occurrence of respiratory illness symptoms.

The study group consisted of children living in homes heated by a woodburning stove during the winters of 1982, 1984, and 1985. The sample size for the first winter of observation for both groups was statistically determined on the basis of two criteria. The first criterion was the amount of acceptable error in findings, which was determined by formula based upon a 0.05 level of significance. The second statistical criterion involved two related considerations: first, a desire to have enough subjects to utilize the z-statistic in analysis of data from winter 1982, and second, to allow for sample attrition during subsequent winters and still have enough subjects to perform meaningful inferential analyses using the t-statistic. Both

these criteria indicated a necessary sample size of 31 subjects in the study and control groups for the investigation during the winter of 1982.

The children in the study all lived within forty miles of Lansing, Michigan, were between one and seven years of age (mean, 3.5 years), and were predominantly white (97%); 60% were boys and 40% girls (38 boys and 24 girls) during the winter of 1982. Proportions did not change appreciably during subsequent winters. Sample attrition was 24% between 1982 and 1984 and 8.5% between 1984 and 1985. All subjects who moved out of the five county Greater Lansing area were lost to follow up. The attrition rate is not surprising if one considers that out-migration was reported to have exceeded in-migration during the 1980-1985 period in the state of Michigan.

Several families in the sample changed sources of indoor heating during the course of the study. The subjects from these families were reassigned accordingly to the appropriate exposure category (i.e., woodburning stove group or control group). These children will be referred to as "crossover" subjects because they changed or crossed over from one exposure category to the other at some point during the three winters of symptom assessment.

Data Collection

The parents of the sixty-two children in the study and control groups were interviewed over the telephone using an interview schedule modified from the Epidemiology Standardization Project Children's Questionnaire (Ferris 1978). The interview schedule was reviewed and revised by Dr. Richard E. Honicky (Department of Pediatrics and Human Development, MSU) and Dr. C. Amechi Akpom (Department of Community Health Science, MSU) who were the principal investigators on the grant supporting the research during the first winter of study (1982). Dr. David J. Kallen (Department of Pediatrics and Human Development, MSU) and Dr. Howard W. Stoudt (Departments of Community Health Science and Anthropology, MSU) also made valuable contributions to the final version of the interview schedule which will hereafter be referred to as the Respiratory Health Assessment (Appendix I).

The questions on the Respiratory Health Assessment were self-explanatory and required a yes, no, or number response. Open-ended discussion was elicited throughout the interview to supplement information acquired through the closed-ended questions. For the sake of consistency, respondents' first answers were used in the tabulation and analysis of data for all subjects during all three winters of investigation. Respondents were the subjects' mothers in all but one case where the subject's mother had died and the father was the only caregiver. Interviews were conducted

during the late Winter and early Spring of 1982, 1984, and 1985.

The following categories of data were collected with the interview schedule: demographic descriptors (e.g., age, sex, socioeconomic status); sources of heat in the home; use of other potential sources of indoor air pollution (specifically, smoking by family members, cooking with gas, having urea-formaldehyde foam insulation); use of potential pollution-reducing devices (i.e., humidifiers and air filters); histories of respiratory illness, hospitalization, or other serious illness for subjects and their parents; and the occurrence of symptoms of respiratory illness in subjects during the winter. Of particular interest in the last category was whether the children had symptoms of persistent airway irritation such as coughing at night, coughing four or more days per week, or wheezing.

Analysis of Data

The occurrence of symptoms of respiratory illness in the woodburning stove (study) group of children was compared to that in the non-woodburning stove (control) group. The symptoms reported during interviews were classified into categories of severity to reflect the degree of airway irritation by Dr. Richard E. Honicky and reviewed by Dr. Marshall Klaus (Department of Pediatrics and Human Development, MSU). The categories and associated symptoms

were as follows. Mild symptoms consisted of coughing with colds, having one or more episodes of cough during the winter, and having one or more chest colds. The moderate severity category included coughing apart from colds, wheezing with colds, and having one or more episodes of wheeze during the winter. The severe symptoms of respiratory illness most closely associated with persistent airway irritation and airway hyperirritation were coughing at night, coughing most days (defined as coughing four or more days per week), and wheezing apart from colds.

In order to minimize any potential effects of recall bias (parental memory) and informant bias (unknown) with respect to the reporting of particular symptoms, data was translated for each subject and symptom from the reported number of occurrences (i.e., number of episodes) to a binomial categorization (e.g., yes, no) such that symptoms were considered to have been either present or absent. Thus, if a symptom occurred at least once it was treated in the analysis of data as "present" regardless of the actual number of episodes reported. For example, if a control group child had one episode of wheeze during the winter and a study group child wheezed "constantly" they would be treated as if they had had equivalent illness experiences (i.e., wheezing was "present") in analysis rather than weighted proportionately according to the reported number of occurrences. This method of analysis acted to increase the validity of comparisons between the study and control groups

by ensuring against underestimates of symptom occurrence in the control group and against overestimates in the study group (which had a significantly greater number of high frequency symptom occurrences than the control group). This point is important since the research (alternative) hypothesis postulated a greater proportion of children with symptoms in the study group and for that reason it was prudent to take every possible measure to ensure that statistical tests of this hypothesis did not misrepresent any differences observed between the two groups.

The statistical test of choice for comparing observed differences in the occurrence of symptoms in the two groups was the test of difference between proportions. This test is equivalent to the test of difference between means (Students' t-test, in this case for unmatched samples since there was no logical basis for a one to one correspondence between the paired observations and the sample sizes were not identical for all years) except that it is based upon a binomial distribution rather than a frequency distribution. As discussed in the preceding paragraph this approach acted to minimize bias by favoring the control group in comparisons.

The occurrence of symptoms in crossover subjects (i.e., those who changed exposure status with respect to indoor heating during the study) was compared for the winters before and after use of a woodburning stove for indoor heating was adopted or discontinued in their homes.

Results of these comparisons were analyzed with respect to the presence or absence of particular symptoms and are presented descriptively but the small number of cases precluded inferential analysis.

The study and control groups were also compared in terms of their exposures to three sources of domestically-produced indoor air pollution which have been associated with the occurrence of symptoms of respiratory illness in young children. These exposures were parental smoking (and smoking by other household members), cooking with gas, and having urea-formaldehyde foam insulation. The proportions of children in each group exposed to these factors were compared statistically using the hypothesis test of difference between proportions which was used in comparing the occurrence of symptoms.

Perceptions of Risks to Health from Indoor Air Pollution, Risk-Taking Behavior, and General Perceptions of Risks to Health

Study Population and Sample

Two different but complementary methodologies were employed in this phase of the research. The first of these was participant observation and intensive interviews with the parents of young children in the Greater Lansing area over a three year period from 1982 to 1985. The second method utilized a survey approach to interview a random sample of parents of young children from this area.

The specific population from which the sample was drawn for the survey consisted of the parents of children born in the five county Greater Lansing area in 1980 and 1981. There were a total of 12,714 live births in the three Lansing area hospitals with maternity wards in 1980 and 1981 representing approximately 4.5% of all live births in the state of Michigan for those years (see Table 3.1). The birth records for children in the 1980-1981 Lansing area birth cohort were available for two of the three hospitals, representing two percent of all live births in the state of Michigan for those years and 44.6% of all live births from the cohort.

A random sample of 1,068 children was drawn from the 5,665 children born in these two hospitals in 1980-1981 (almost 20% of the cohort) using the Rand Corporation "million random digits" table of random numbers (The Rand Corporation 1955). The parents of each of these children were either contacted to verify the child's age, sex, and current residence or were determined to have moved. A random sample of 100 children was then drawn from the cohort members whose parents had not moved. The parents of these children were then recontacted and recruited into the study on an informed and voluntary basis. The parents of seven of the children declined to participate and were replaced with seven other randomly selected subjects from the cohort. The sample for the survey consisted of the parents of these 100 children.

Table. 3.1: Live Births in 1980 and 1981 for the Five County Greater Lansing Area By Hospital and for the State of Michigan.*

Location	Number of Live Births 1980	1981
St. Lawrence Hospital	1,572	1,652
Lansing General Hospital	1,270	1,171
Sparrow Hospital**	3,539	3,510
5 County Greater Lansing Area***	6,381	6,333
State of Michigan	145,162	140,579

* Data obtained from the Department of Vital and Health Statistics, State of Michigan.

** Birth record information not available from this hospital.

*** The 5 County Greater Lansing Area refers to the counties of Ingham, Eaton, Clinton, Ionia, and Shiawassee.

Data Collection

Data on perceptions of risk and risk-taking behavior, especially with respect to indoor heating and indoor air pollution, were collected by interview and observation. Many of the intensive interviews were recorded on tape; representative selections from these are transcribed in Appendix IV. These open-ended interviews in respondents' homes provided a wealth of information on the range of concerns and ideas which people in the area have regarding risks to health, especially in terms of their perceptions, risk-taking behavior, and views on health-related issues. Based on these interviews an interview schedule was developed for administration to a random sample of parents of young children.

The interview schedule used in the survey underwent numerous revisions from its initial development in January 1983 until its administration in Spring 1985. There were several reasons why it took two years of rigorous revising and pretesting to develop an effective instrument for this project but perhaps the most important was that there was no prototype to base it on (which there had been for the interview schedule used to investigate risks from indoor heating with woodburning stoves).

The questions in the interview schedule assessed over 200 variables, most of which derived from the open-ended materials and the remainder primarily from suggestions by Dr. Harry M. Raulet (Department of Anthropology, MSU),

Dr. Arthur J. Rubel (Department of Anthropology, MSU), Dr. David J. Kallen (Depart-ment of Pediatrics and Human Development, MSU), Dr. Howard W. Stoudt (Departments of Community Health Science and Anthropology, MSU), Dr. Joseph L. Chartkoff (Department of Anthropology, MSU), and Dr. Loudell F. Snow (Department of Anthropology, MSU). These variables fell into four major categories which were expected to be directly related to each other in sequence from the first to the last such that the first category would exert a significant influence on (i.e., be significantly related to) the second, third, and fourth categories; the second category would affect the third and fourth; and the third category would exert its strongest influence on the fourth. Analysis of the data, however, suggests a somewhat more intricate situation.

The first category of variables consisted of socioeconomic descriptors and other demographic data (including health demographics with respect to illness experience and hospitalization). These variables were objective in the sense that, for example, parents either had or had not completed High School, they had a particular religious affiliation or not, and a subject either had or had not ever been hospitalized. There was one subjective variable in the first category: ethnic identity.

The second category of variables assessed the extent to which respondents were informed of risks to health which have been widely publicized in recent years. It also

assessed a wide range of beliefs, attitudes, and orientations which open-ended materials indicated were associated with either the perception of risk or risk-taking behavior. These beliefs ranged from the degree of concern with ecological issues (i.e., ecoethic) to confidence in the medical system, projected life expectancy, self-assessment of health, and criteria for labeling illness. Other types of variables in this category included, for example: self-assessments of capacities to avoid risks to health; the amount of control people feel they have over their health and over what happens to them in their lives; their views of the world as a safe or a dangerous place; and the relative importance to health of individual beliefs and conduct, genetics, and the Will of God.

The third category of variables focused on perceptions of risks to health from several documented sources of indoor air pollution, most of which have been associated with increased risk of chronic and acute respiratory illness in children. These sources of indoor air pollution were heating with a woodburning stove or kerosene space heater, cooking with gas, insulating with urea-formaldehyde foam or asbestos, and smoking tobacco (so-called "passive" or "secondary" smoking).

The third category also assessed perceptions of risks to health from several specific indoor pollutants (e.g., carbon monoxide, radon gas) and from "clean" sources of heat and cooking fuel (e.g., electricity) which are <u>not</u>

known to be associated with increased risk of respiratory or other illness. In addition, beliefs regarding the health risks of several activities and exposures which are either controversial or epidemiologically demonstrable risks to health were included among variables in this category. Finally, as a sort of check on people's reactions to the names of chemical compounds in general, information and beliefs were probed regarding the safety of a compound which is harmless and essential to life.

The variables in the fourth category addressed risk-taking behaviors in households of subjects with respect to activities potentiating the domestic production of indoor air pollution (e.g., type of heat, cooking fuel, insulation, parental smoking). It is a position of this paper that persons using sources of indoor air pollution which are known or suspected to be associated with increased risk of illness to themselves or others (whether they are aware of this or not) may be properly viewed as "taking risks" or engaging in risk-taking behavior (or conduct). Thus, the fourth category assessed the presence or absence of risk-taking behavior with respect to the specific sources of indoor air pollution listed in the previous category. Variables in the fourth category, like those in the first, were objective in the sense that a household either did or did not heat regularly with a woodburning stove, cook with gas, or have members who smoke in the home.

Analysis of Data

The open-ended intensive interviews and observations provided a detailed description of emic views with respect to general perceptions of risks to health and specific perceptions of risks from indoor heating and indoor air pollution. These data in combination with open-ended and closed-ended data from the survey enabled analysis of specific perceptions of risks from different sources of indoor air pollution, beliefs affecting these perceptions, and the degree of correspondence between these perceptions of risk and risk-taking behavior. Further, these observations enabled an analysis of specific perceptions and behaviors regarding indoor heating and indoor air pollution in the larger context of general perceptions of risks to health. The open-ended and survey materials also enabled analysis of factors affecting the partitioning of risk domains and sources of intracultural variation in risk-related perceptions and behaviors.

The variables selected for analysis from the four major categories in the survey are listed in Table 3.2. It should be noted that more information was collected in the open-ended intensive interviews and with the interview schedule in the survey than is reflected in the variable list. In all, 180 variables were selected for computer analysis, representing data entry of over 18,000 pieces of information which were reentered and verified; seven errors were detected and corrected before analysis.

Table 3.2: Variables Selected for Analysis from a Survey of Perceptions of Risks to Health and Risk-Taking Behavior, Especially With Reference To Indoor Air Pollution (IAP), In A Random Sample of the Parents of 100 Children from the Greater Lansing Area.

Variable Categories*, Variable Numbers**, and Variable Labels

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Category I

1. Subject*** Sex
2. Reside IN/OUT Lansing/East Lansing
3. Rural-Urban Continuum
4. Mother Age
5. Father Age
6. Religion
7. Subject Preschool Status
8. Subject Allergies
9. Subject Asthma
10. Subject Serious Illness(es)
11. Subject Hospitalization(s)
12. Subject Illness Experience Scale Score
13. Subject Illness Experience Scale Rank
14. Parents: Number of Children
15. Father Occupation Score
16. Mother Occupation Score
17. Father Education Score
18. Mother Education Score
19. Socioeconomic Status (SES) Scale Score
20. SES Scale Rank

Category II

21. Ever Heard Carbon Monoxide May Be Harmful to Health
22. Ever Heard Smoking May Be Harmful to Health
23. Ever Heard Radon Gas May Be Harmful to Health
24. Ever Heard Cooking with Electricity May Be Harmful to Children's Health
25. Ever Heard Cooking with Gas May Be Harmful to Children's Health
26. Ever Heard Heating with Electricity May Be Harmful to Children's Health
27. Ever Heard Heating with Fuel Oil May Be Harmful to Children's Health

Table 3.2 (cont'd.)

28. Ever Heard Heating with Gas May Be Harmful to Children's Health
29. Ever Heard Heating with a Woodburning Stove May Be Harmful to Children's Health
30. Ever Heard Heating with a Kerosene Space Heater May Be Harmful to Children's Health
31. Ever Heard Heating with a Fireplace May Be Harmful to Children's Health
32. Ever Heard Insulating with Formaldehyde Foam May Be Harmful to Children's Health
33. Ever Heard Insulating with Asbestos Fiber May Be Harmful to Children's Health
34. Ever Heard Parental and Other Smoking in the Home May Be Harmful to Children's Health
35. Information-IAP Scale Score
36. Information-IAP Scale Rank
37. Believe PBB a Serious Health Risk to the People of Michigan
38. Ever Heard Leaded Gas and Paint with Lead May Be Harmful to Health
39. Ever Heard PCB May Be Harmful to Health
40. Ever Heard Jogging May Be Harmful to Health
41. Ever Heard Eating a Lot of Red Meat Such as Beef May Be Harmful
42. Ever Heard High Cholesterol in the Diet May Be Harmful
43. Ever Heard Eating a Lot of Salt with Meals May Be Harmful
44. Ever Heard DES May Be Harmful

45. Respondent Self-Assessment of Health
46. Respondent Assessment of Subject's Health
47. Respondent Assessment of Life Expectancy
48. Respondent Assessment of Subject's Life Expectancy
49. Health Assessment Scale Score
50. Health Assessment Scale Rank

51. Respondent Sickness Criteria: Feel Bad
52. Respondent Sickness Criteria: Fever
53. Respondent Sickness Criteria: Cannot Work
54. Respondent Sickness Criteria for Subject: Feel Bad
55. Respondent Sickness Criteria for Subject: Fever
56. Respondent Sickness Criteria for Subject: Cough at Night
57. Respondent Sickness Criteria for Subject: Wheeze
58. Respondent Sickness Criteria Rank
59. Respondent Sickness Criteria for Subject Rank With Cough at Night Symptom
60. Respondent Sickness Criteria for Subject Rank Without Cough at Night Symptom

61. Extent to Which Respondent Believes Can Avoid Risks to Health In the Home

Table 3.2 (cont'd.)

62. Extent to Which Respondent Believes Can Avoid Risks to Health Out of the Home
63. Extent to Which Respondent Believes Subject Can Avoid Risks to Health In the Home
64. Extent to Which Respondent Believes Subject Can Avoid Risks to Health Out of the Home

65. How Children Avoid Risk: Adult Supervision
66. How Children Avoid Risk: Taught by Adults
67. How Children Avoid Risk: Other Children
68. How Children Avoid Risk: Common Sense
69. How Children Avoid Risk: Home Safeguards
70. How Children Avoid Risk: Community Safety Programs
71. Risk Avoidance Capacity Scale Score
72. Risk Avoidance Capacity Scale Rank

73. Control Over What Happens in Life
74. Control Over Physical Health
75. How Important Own Beliefs and Behavior Are in Physical Health
76. How Important Genetics Are in Physical Health
77. How Important the Will of God Is in Physical Health
78. Control Scale Score
79. Control Scale Rank

80. Extent to Which See World As a Safe or Dangerous Place

81. Believe Natural Foods or Foods With Artificial Ingredients Better for Health
82. Believe Food Is a Potential Risk to Health
83. Believe Quality of Tap Water Has Decreased Over Time
84. Believe Nuclear Power Perfectly Safe
85. Believe Environmental Problems Are Risks to Health Out of the Home
86. Believe Environmental Problems Are Major Risks to the Health of the General U.S. Population
87. Believe Pollution Is a Threat to Recreation
88. Ecoethic Scale Score
89. Ecoethic Scale Rank

90. Believe Can Keep Air In Home Cleaner than Air Outside Home
91. Believe Can Keep Outdoor Air Pollution Out of Home
92. Believe Can Keep Pollen and Dust Out of Home
93. Air Pollution Intrusion Scale Score
94. Air Pollution Intrusion Scale Rank

95. Believe Air In/Out Better to Breathe

96. Believe Way to Stay Healthy Is to Eat Right, Keep Warm, and Not Do Things to Excess

Table 3.2 (cont'd.)

97. Believe Will Get Sick Sooner or Later If Get a Deep Chill from Cold Air or Wind

98. Respondent Believe Doctor If Told Sick
99. Respondent Believe Doctor If Told That Subject Sick
100. Faith in Medicine and Medical Advances as a Factor in Respondent Assessment of Subject's Life Expectancy
101. Confidence in Medical System Scale Score
102. Confidence in Medical System Scale Rank

103. Believe Air Better Quality In Some Parts of Home Than In Others

104. Ever Heard Dihydrogen Monoxide (H2O) May Be Harmful to Health

105. Who Would Decide If Changed Heat Source(s)
106. Who Decides If Subject Is Sick
107. Who Decides to Take Subject to the Doctor

108. Respondent Believe Self Sick If Spouse Says So

Category III

109. Believe Carbon Monoxide May Be Harmful to Health
110. Believe Smoking May be Harmful to Health
111. Believe Radon Gas May Be Harmful to Health
112. Believe Cooking with Electricity May Be Harmful to Children's Health
113. Believe Cooking with Gas May Be Harmful to Children's Health
114. Believe Heating with Electricity May Be Harmful to Children's Health
115. Believe Heating with Fuel Oil May Be Harmful to Children's Health
116. Believe Heating with Gas May Be Harmful to Children's Health
117. Believe Heating with a Woodburning Stove May Be Harmful to Children's Health
118. Believe Heating with a Kerosene Space Heater May Be Harmful to Children's Health
119. Believe Heating with a Fireplace May Be Harmful to Children's Health
120. Believe Insulating with Formaldehyde Foam May Be Harmful to Children's Health
121. Believe Insulating with Asbestos Fiber May Be Harmful to Children's Health
122. Believe Adult and Other Smoking in the Home May Be Harmful to Children's Health

Table 3.2 (cont'd.)

123. How Safe or Harmful Cooking with Gas Is to Children's Health
124. How Safe or Harmful Heating with a Woodburning Stove Is to Children's Health
125. How Safe or Harmful Heating with a Kerosene Space Heater Is to Children's Health
126. How Safe or Harmful Heating with a Fireplace Is to Children's Health
127. How Safe or Harmful Adult and Other Smoking in the Home Is to Children's Health
128. How Safe or Harmful Insulating with Formaldehyde Foam Is to Children's Health
129. How Safe or Harmful Insulating with Asbestos Fiber Is to Children's Health

130. How Much Risk to Children of Having Symptoms of Respiratory Illness Such as Cough (RIS) from Cooking with Gas
131. How Much Risk to Children of RIS from Heating with a Woodburning Stove
132. How Much Risk to Children of RIS from Heating with a Kerosene Space Heater
133. How Much Risk to Children of RIS from Heating with a Fireplace
134. How Much Risk to Children of RIS from Adult and Other Smoking in the Home
135. How Much Risk to Children of RIS from Having Formaldehyde Foam Insulation
136. How Much Risk to Children of from Having Asbestos Fiber Insulation

137. Believe Children Can Get Sick from Breathing Things That Are In the Air

138. Perception of Risk-IAP Scale Score
139. Perception of Risk-IAP Scale Rank

Category II

140. Believe Risks to Health Are Greater Out of the Home Than In the Home

141. Respondent Believe Unknown Risks to Self-Health In the Home
142. Respondent Believe Unknown Risks to Self-Health Out of the Home
143. Respondent Believe Unknown Risks to Children's Health In the Home
144. Respondent Believe Unknown Risks to Children's Health Out of the Home

Table 3.2 (cont'd.)

145. Risks to Health: Always Cause Illness/Injury or Sometimes
146. Risks to Health: Consequences of Risk-Taking Occur Soon, Later, or Anytime
147. Risks to Health: Should Label as Risk If Suspected or Only If Known
148. Risks to Health: How Many People Should Be Affected by Something Before Government Labels It a Risk to Health

149. Believe Leaded Gas and Paint with Lead May Be Harmful to Health
150. Believe PCB May Be Harmful to Health
151. Believe Jogging May Be Harmful to Health
152. Believe Eating a Lot of Red Meat Such as Beef May Be Harmful to Health
153. Believe High Cholesterol in the Diet May Be Harmful to Health
154. Believe Eating a Lot of Salt with Meals May Be Harmful to Health
155. Believe DES May Be Harmful to Health
156. Believe Dihydrogen Monoxide May Be Harmful to Health

Category IV

157. Primary Heat Source
158. Secondary Heat Source (If Any)
159. Tertiary Heat Source (If Any)
160. Quarternary Heat Source (If Any)
161. Ever Heat with Wood
162. Use Humidifier/Vaporizer
163. Use Air Filter(s)
164. Use Air Conditioner/Dehumidifier
165. Cooking Fuel
166. Insulation

167. Respondent Usually Wear Seat Belt in Automobile

168. Parental and Other Adult Smoking in the Home

169. Risk-Taking Behavior-IAP Scale Score
170. Risk-Taking Behavior-IAP Scale Rank

171. Respondent Ever Try Quit Smoking

Category I

172. Ethnic Identity

Table 3.2 (cont'd.)

Dummy Variables (DV) for Subgroups:

Category I

DV1. Religious Affiliation vs. No Religious Affiliation

Category II

DV2. Believe Will of God Is the Primary Factor in Physical Health vs. Do Not Believe Will of God Is Primary
DV3. Believe Own Beliefs and Behavior Are the Primary Factor in Physical Health vs. Do Not Believe Own Beliefs and Behavior Are Primary

Category IV

DV4. Heat with a Woodburning Stove or Wood Furnace vs. Do Not Heat with a Woodburning Stove or Wood Furnace
DV5. Heat with a Kerosene Space Heater vs. Do Not Heat with a Kerosene Space Heater
DV6. Heat with a Woodburning Stove, Wood Furnace, or Kerosene Space Heater vs. Do Not Heat with a Woodburning Stove, Wood Furnace, or Kerosene Space Heater
DV7. Insulate with Formaldehyde Foam vs. Do Not Insulate with Formaldehyde Foam
DV8. Parental or Other Adult Smoking in the Home vs. No Parental or Other Adult Smoking in the Home

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* Variable categories refer to the following general groupings of variables: Category I: Demographics; Category II: Beliefs (including general perceptions) and behaviors expected to affect perceptions of risks to health and risk-taking behavior with respect to indoor heating and indoor air pollution; Category III: Perceptions of risks to health from indoor air pollution; Category IV: Risk-taking behavior, especially with respect to indoor air pollution.

** Variable numbers are the numbers assigned for computer analysis and therefore all the variables in a category are not necessarily grouped together; all variables are identified by category even when this applies.

*** "Subject" refers to the children randomly selected from the 1980-1981 5-county Greater Lansing area birth cohort whose parents were interviewed.

A special category of variables was created by combining responses to sets of related questions. These variables will be referred to as summary variables or scales. The scales provided a more comprehensive and accurate means of assessing attitudes and beliefs in certain areas (e.g., ecology ethic or "ecoethic"; confidence in biomedicine) as well as combining variables which collectively reflected some meaningful parameter such as socioeconomic status, illness experience, or risk-taking behavior. The summary variables (scales) utilized in the computer analysis of data by category were as follows: category I--socioeconomic status and illness experience; category II--information, health assessment, risk avoidance capacity, control of life, ecoethic, air pollution intrusion, and confidence in the (bio)medical system; category III--perception of risk from indoor air pollution; and category IV--risk-taking behavior with respect to indoor air pollution. None of the variables were used on more than one scale (i.e., there was no intersection of variables between sets of scale variables). A complete listing of the variables used for each scale is in Table 3.3.

The scales or summary variables were utilized in analysis in three ways. Each scale had a maximum number of possible points (which varied from scale to scale) based on responses to questions on the interview schedule. The first way scales were used was analysis of raw scores, the second was analysis of ranked and ordered scores, and the third was

Table 3.3: Summary Variables (Scales) Constructed for Analysis of Data from a Survey of Perceptions of Risks to Health and Risk-Taking Behavior, Especially With Reference To Indoor Air Pollution (IAP), In a Random Sample of the Parents of 100 Children from the Greater Lansing Area.

Variable Category and Summary Variable	Constituent Variables
Category I*	
Socioeconomic Status Scale	Father Occupation Mother Occupation Father Education Mother Education
Subject** Illness Experience Scale	Subject Allergies Subject Asthma Subject Serious Illness(es) Subject Hospitalization(s)
Category II*	
Ecoethic Scale	Believe Natural Foods or Foods With Artificial Ingredients Better for Health Believe Food Is a Potential Risk to Health Believe Quality of Tap Water Has Decreased Over Time Believe PBB a Serious Health Risk to the People of Michigan Believe Nuclear Power Is Perfectly Safe Believe Environmental Problems Are Risks to Health Out of the Home Believe Environmental Problems Are Major Risks to the Health of the General U.S. Population Believe Pollution Is a Threat to Recreation
Information-IAP Scale	Ever Heard Carbon Monoxide May Be Harmful to Your Health

Table 3.3 (cont'd.)

Information-IAP Scale, continued	Ever Heard Smoking May Be Harmful to Your Health Ever Heard Cooking with Gas May Be Harmful to Children's Health Ever Heard Heating with a Woodburning Stove May Be Harmful to Children's Health Ever Heard Heating with a Kerosene Space Heater May Be Harmful to Children's Health Ever Heard Formaldehyde Foam Insulation May Be Harmful to Children's Health Ever Heard Asbestos Fiber Insulation May Be Harmful to Children's Health Ever Heard Parental or Other Smoking May be Harmful to Children's Health
Health Assessment Scale	Respondent Self-Assessment of Health Respondent Assessment of Subject's Health Respondent Self-Assessment of Life Expectancy Respondent Assessment of Subject's Life Expectancy
Control of Life Scale	Control Over What Happens in Life Control Over Physical Health How Important Believe Own Beliefs and Behavior Are in Physical Health
Risk Avoidance Capacity Scale	Extent to Which Respondent Believes Can Avoid Risks to Health In the Home Extent to Which Respondent Believes Can Avoid Risks to Health Out of the Home Extent to Which Respondent Believes Subject Can Avoid Risks to Health In the Home Extent to Which Respondent Believes Subject Can Avoid Risks to Health Out of the Home

Table 3.3 (cont'd.)

Air Pollution Intrusion Scale	Believe Can Keep Air In Home Cleaner than Air Outside Home Believe Can Keep Outdoor Air Pollution Out of Home Believe Can Keep Pollen and Dust Out of Home
Confidence in Medical System Scale	Respondent Believe Doctor If Told Sick Respondent Believe Doctor If Told That Subject Sick Faith in Medicine and Medical Advances as a Factor in Respondent Assessment of Subject's Life Expectancy
Category III*	
Perception of Risk-IAP Scale	Believe Carbon Monoxide May Be Harmful to Health Believe Smoking May Be Harmful to Health Believe Cooking with Gas May Be Harmful to Children's Health Believe Heating with a Woodburning Stove May Be Harmful to Children's Health Believe Heating with a Kerosene Space Heater May Be Harmful to Children's Health Believe Insulating with Formaldehyde Foam May Be Harmful To Children's Health Believe Insulating with Asbestos Fiber May Be Harmful to Children's Health Believe Parental or Other Smoking May Be Harmful to Children's Health How Safe or Harmful Each of the Following Is to Children's Health: Cooking with Gas Heating with a Woodburning Stove Heating with a Kerosene Space Heater Insulating with Formaldehyde Foam Insulating with Asbestos Fiber Parental and Other Smoking in the Home

Table 3.3 (cont'd.)

Perception of Risk-IAP Scale, continued	How Much Risk to Children of Having Symptoms of Respiratory Illness Such As Cough from: Cooking with Gas Heating with a Woodburning Stove Heating with a Kerosene Space Heater Insulating with Formaldehyde Foam Insulating with Asbestos Fiber Parental and Other Smoking in the Home
	Believe Children Can Get Sick from Breathing Things That Are In the Air
Category IV*	
Risk-Taking Behavior-IAP Scale	Cook with Gas Heat with a Woodburning Stove Heat with a Kerosene Space Heater Insulate with Formaldehyde Foam Insulate with Asbestos Fiber Parental and Other Smoking in the Home

* Variable categories refer to the following general groupings of variables: Category I: Demographics; Category II: Beliefs (including general perceptions) and behaviors expected to affect perceptions of risks to health and risk-taking behavior with respect to indoor heating and indoor air pollution; Category III: Perceptions of risks to health from indoor air pollution; Category IV: Risk-taking behavior by parents, especially with respect to indoor air pollution.

** "Subject" refers to the children randomly selected from the 1980-1981 5-county Greater Lansing area birth cohort whose parents were interviewed.

division of raw scores (based on their distribution and certain logical constraints) into ordinal groups (such as high, medium, and low).

Summary variables were analyzed with respect to each other and with respect to individual variables; individual variables were also analyzed with respect to each other. In addition, certain subgroups of the sample (so-called "dummy variables") were generated which included all subjects sharing a particular trait (such as living in homes heated by a woodburning stove or having a religious affiliation). The dummy variables used in computer analysis are listed in Table 3.2. These variables were primarily associated with risk-taking behavior and beliefs about controlling health and enabled comparisons of responses to questions between different risk-taking subgroups of the sample, between risk-taking and non-risk-taking subgroups, and between those subgroups and the sample as a whole.

A variety of statistical procedures were applied in analyzing the survey data collected with the interview schedule. Descriptive statistics of central tendency and variation were obtained for each variable. Relationships between and among variables were analyzed with inferential tests appropriate for the variables. Because the sample was randomly selected from a population, parametric tests were used for variables whose distribution within the population was approximately normal and nonparametric tests were used for variables whose distributions were skewed. Principal

among these parametric and nonparametric inferential tests were the following: chi square test of contingency, Tau B and Tau C (measuring concordance and discordance between paired observations), linear correlation (Pearson's r [linear correlation coefficient]), and rank correlation (Spearman's r and Kendall's Tau [rank-order correlation coefficients]). Analyses were conducted with the main computer at Michigan State University using the following SPSS subprograms: FREQUENCIES; CONDESCRIPTIVE; CROSSTABS; PEARSON CORR; NONPAR CORR; and SCATTERGRAM (Hull and Nie 1981; Nie et al. 1975).

The Indoor Heating Survey

Study Population and Sample

The sample for the Indoor Heating Survey consisted of the parents of the 1,068 children who were randomly selected from the 1980-1981 Greater Lansing area birth cohort for the survey on perceptions of risks to health and risk-taking behavior with respect to indoor air pollution. These children represented 8.4% of all births in the five county Greater Lansing area in 1980 and 1981 and about 20% (18.9%) of the cohort of 5,665 children born in Lansing area hospitals with maternity wards for whom birth record information was available. In addition to the random sample of the parents of 1,068 young children, the parents of an additional 335 children from the 1980-1981 birth cohort were

selected systematically (i.e., every tenth birth) for a total of 1,403 households.

Data Collection

The parents of the 1,403 children selected for the survey were either contacted by telephone to determine the type(s) of indoor heating in their homes (with an interview refusal rate of 2.25%) or were determined to have moved. Data was collected during late 1984 and the winter of 1985. Consistent with the net loss of population and high rate of intra-area relocations characteristic of the first half of the 1980's in Michigan (U.S. Bureau of the Census 1984a, 1984b; Michigan Department of Management and Budget 1985; Wang and Rosen 1984), there was a considerable but anticipated out-migration/relocation rate in the sample (69.9%) from residence in 1980 or 1981 (according to children's birth cohort). Thus, parents who were interviewed had lived at their residence since at least 1980 or 1981, representing 316 of the 1,068 randomly selected households from the 1980-1981 Lansing area birth cohort. The interview schedule used for the survey is presented in Table 3.4.

Respondents having more than one source of heat in the home were asked to identify the primary heat source, defined during the interview as providing half or more of the heat in their home. If there were more than two sources

Table 3.4: Indoor Heating Survey Interview Schedule Used To Identify the Source(s) of Heat In a Sample of 1,403 Homes of Parents With Young Children In the Greater Lansing Area.

Subject's* Name _____
Subject Date of Birth _____ Subject Sex _____
Parent's Names _____
Address _____
_____
County _____
Phone _____
Date of Interview _____

---

1. How is your home being heated this winter? _____
   _____
   _____

2. Are you using anything else to heat your home, such as a kerosene space heater, portable electric unit, or fireplace?
   _____
   _____

3. IF MORE THAN ONE SOURCE OF HEAT:

   a. Which of those do you use the most or do you use them about the same? _____
      _____

   b. Which of those provides half or more of the heat for your home (your primary source of heat)? _____
      _____

   c. IF MORE THAN TWO SOURCES OF HEAT: How would you rank the others in order of importance (the amount of heat they provide for your home)? _____
      _____

4. IF HEAT WITH WOOD:

   a. Do you have a woodburning stove or a wood furnace? ___
      _____

Table 3.4 (cont'd.)

4. b. IF A WOODBURNING STOVE:

What type of woodburning stove do you have--is it free-standing, a fireplace-insert, or a furnace add-on? _____

5. IF A FIREPLACE IS INDICATED AS A SOURCE OF HEAT:

Is the primary use of your fireplace as a source of heat or for atmosphere (aesthetics)? _____

_____

_____

_____

_____

* "Subject" refers to the children selected from the 1980-1981 5-county Greater Lansing area birth cohort whose parents were interviewed.

of heat in a home, respondents were asked to rank them in order of importance. In addition, respondents in the survey who heated with wood were specifically asked if they heated with a woodburning stove, a wood furnace, or a fireplace. Those heating with a woodburning stove were further asked the type of stove (free standing, fireplace-insert, or furnace add-on). Finally, those who reported a fireplace as a source of heat were asked if the primary use of the fireplace was for aesthetic or heating purposes.

Analysis of Data

The patterns of indoor heating in the homes of children from the 1980-1981 five county Greater Lansing area birth cohort were analyzed descriptively. Inferential tests were not performed because the objective of the survey was a description of heating patterns as background material for investigation and discussion of perceptions of risk and risk-taking behavior with respect to indoor heating. Only data from the 1,068 households which were randomly selected are reported. The reason for not reporting data for all 1,403 households sampled is that the validity of results would have been compromised by including the 355 households which were not randomly selected, although the heating patterns observed for these families were completely consistent with those in the random sample.

The data acquired in the survey provided detailed information on indoor heating in the homes of parents with young children for the cities of Lansing and East Lansing, the outlying townships and rural areas, and for the five county Greater Lansing area as a whole. The proportions of homes in the sample using different sources of heat, single versus multiple unit heating strategies, and different combinations of sources of indoor heating (including primary-supplmentary distinctions) were compared descriptively for each of these areas (Lansing/East Lansing, rural, five county). In addition, specific breakdowns were performed for households heating with woodburning stoves or wood furnaces describing the types of woodburning units, other sources of heat used in combination with wood, and the use of wood fuel as an only, a primary, or a supplementary heat source.

CHAPTER 4

OVERVIEW OF THE USE OF WOOD FUEL IN THE GREATER LANSING AREA

General Background

The Greater Lansing area has been defined differently in different studies (Michigan Department of Management and Budget 1985; Ramm and Stark 1983). In the present study, this area is defined as including the cities of Lansing and East Lansing and those portions of the five surrounding counties within approximately a forty mile radius of these cities.

The city of Lansing is the capitol of the state of Michigan and borders directly on East Lansing. While Lansing is an industrial center as well as seat of government, East Lansing is best known as the location of Michigan State University. Three of the counties in the Greater Lansing area are considered the Lansing-East Lansing Statistical Metropolitan Area by the U.S. Census. Despite their proximity to these counties and the cites of Lansing and East Lansing, the other two counties are classified by the U.S. Census as part of the Southern Lower Michigan Nonmetropolitan Area. The five counties are Clinton, Eaton, Ingham (the Census SMA), Ionia, and Shiawassee. The populations of these counties, the five county Greater

Lansing area, and the state of Michigan as reported by the 1980 U.S. Census are presented in Table 4.1.

The use of wood fuel has steadily increased in the state of Michigan and the Greater Lansing area since the energy crisis of the mid-1970's. The Michigan Department of Natural Resources Forest Management Division (1984) conducted a survey during the winter of 1982-1983 (n = 3,194,673) and found that 32.1% of Michigan households used wood fuel as a primary or supplementary source of heat. This proportion represented over one million households (1,026,666) from the sample. In addition, the report stated that about 28% of Michigan households used wood fuel as their primary source of heat, about 31% as a supplementary heat source, and over 41% used wood fuel primarily for aesthetic or "recreational" purposes. At that time, 90,000 additional households reported plans to install woodburning units for the following winter (1983-1984).

The Department of Natural Resources report indicated that the use of wood fuel for indoor heating was greatest during the 1982-1983 heating season in the northernmost portions of the state and decreased steadily toward the south. For example, the use of wood fuel was over 52% more prevalent in the Upper Peninsula than in the Southern Lower Peninsula (where the Greater Lansing area is located). Proportions of households using wood fuel for indoor heating for the geographical areas designated in the survey were as follows: Eastern Upper Peninsula (53.4%), Western Upper

Table 4.1: Population in 1980 for the Five County Greater Lansing Area by County and for the State of Michigan.*

Geographic Area	1980 Population
Clinton**	55,893
Eaton**	88,337
Ingham**	275,520
Ionia***	51,815
Shiawassee***	71,140
Five County Greater Lansing Area	542,705
State of Michigan	9,262,078

* Data from the 1980 U.S. Census as reported in the 1985 Summary Report of the Michigan Department of Management and Budget, "Population Projections for Michigan to the Year 2000."

** The counties of Clinton, Eaton, and Ingham comprise the Lansing-East Lansing Metropolitan Statistical Area for the U.S. Census.

*** The counties of Ionia and Shiawassee are considered part of the Southern Lower Michigan Nonmetropolitan Area by the U.S. Census.

Peninsula (50.5%), Northern Lower Peninsula (46.8%), Southern Lower Peninsula (35.1%), and the Detroit Metropolitan Area (24.7%).

The homes heated by wood fuel in the survey used different types of woodburning equipment, primarily fireplaces, modified fireplaces, woodburning stoves, wood furnaces, and combinations of these. In the Southern Lower Peninsula (where the Greater Lansing area is located), 38.2% of homes using wood heat used a woodburning stove or wood furnace (30.5% woodburning stove, 6.4% wood furnace, and 1.3% both). Over forty percent (43.6%) of the homes heated by wood fuel in the survey used a regular fireplace and 11.0% used a modified fireplace; the remainder used various combinations of these basic types of woodburning equipment.

A survey of 62,510 single family residences in Michigan was conducted during the winter of 1978-1979 as part of Project Conserve of the College of Human Ecology Institute for Family and Child Study at Michigan State University. Results of the survey indicated that during the 1978-1979 heating season approximately 3.4% of the households heated with wood and about 1.2% used a woodburning unit as their primary source of heat (Harris 1980; 1982). However, as in the Department of Natural Resources report, the use of wood fuel was greater in the northern than in the southern portions of the state. The Project Conserve survey indicated that 11% of households in the Upper Peninsula heated with wood fuel while only two

percent heated with wood fuel in the Southern Lower Peninsula. As is immediately evident, these proportions are considerably lower than those cited in the Department of Natural Resources report (1984) for the 1982-1983 winter heating season. Unfortunately, neither the Project Conserve data nor the Department of Natural Resources report provided specific information on the use of wood fuel in the Greater Lansing area.

The use of wood fuel in the Greater Lansing area was explored in a survey (n = 339) undertaken by the Michigan State University Agricultural Experiment Station (Ramm and Stark 1983). The results of this survey, conducted by the Forestry Department, indicated that about 16% of households in the Greater Lansing area used "some wood heat." The survey defined the Greater Lansing area as including only the cities of Lansing, East Lansing, Okemos, and Haslett; it should be noted that this is different from what is generally understood by the Greater Lansing area and is not the geographical definition of the Greater Lansing area used in the Indoor Heating Survey of the present study. However, consistent with the methodology of the Indoor Heating Survey conducted as part of the present study, the primary source of heat (or "major fuel source") was defined as supplying half or more of the heat for the home (i.e., "more than 50 percent of residential heat"). On this basis, the survey by the Michigan Agricultural Experiment Station found no (0.0%) homes using wood fuel as a primary source of heat. Eight

percent of the homes surveyed reported having a woodburning stove (free standing, furnace add-on, or fireplace-insert). It is immediately evident that the findings of this survey (which are presumeably for the winter of 1982-1983--the report does not say when the study was conducted) also differed greatly from those of the Department of Natural Resources for the 1982-1983 winter heating season.

The differences between findings of these surveys suggested that patterns of indoor heating for the five county Greater Lansing area were not clearly determined. The only common conclusion of the three reports was that wood fuel was used for indoor heating in some Michigan households; estimates of the extent of this usage varied by as much as a factor of ten (from 3.4% to 35.1%) for geographic regions which included all or part of the five county Greater Lansing area. For this reason, patterns of indoor heating in the Greater Lansing area were investigated during the winter of 1984-1985 for the reference population of the present study (families with young children in the Greater Lansing area).

The Indoor Heating Survey

The Indoor Heating Survey had two principal objectives. The first of these was to investigate the use of woodburning stoves as primary and supplementary sources

of heat by the parents of young children in the five county Greater Lansing area. The second was to investigate general patterns of indoor heating for the parents of young children in this area in order to compare the use of woodburning stoves with other methods of indoor heating.

Eight different types of indoor heating and six different sources of energy (i.e., fuel) were used by the parents in the survey. The eight types of indoor heating were gas furnaces, fuel oil furnaces, central electric heating, woodburning stoves and wood furnaces, solar heat, kerosene space heaters, fireplaces, and electric space heaters. These heat sources used the following fuels: gas, fuel oil, electricity, wood, kerosene, and sunshine. Of these, only wood and sunshine are considered renewable resources. In addition, households heating with consumer electricity and utility gas require constant fuel input from outside sources whereas wood, fuel oil, kerosene, and bottled or liquid propane gas may be stored by individual households.

Four of the sources of heat used by parents in the survey were reported as primary heat sources, defined during the interview as providing half or more of the heat in the home. These four were heating with a gas furnace, a fuel oil furnace, a central electric unit, and a woodburning stove or wood furnace. Fireplaces, kerosene and electric space heaters, and solar heat were only used as supplementary heat sources.

Most (77.8%) of the homes in the five county area had only one source of heat and about a fourth (22.2%) had supplementary sources of heat. However, as with many findings from the survey, some interesting rural-urban differences emerged when the sample for the five county Greater Lansing area as a whole was divided into homes within and outside the Lansing-East Lansing city limits. The homes WITHIN the Lansing-East Lansing city limits will hereafter be referred to as "Lansing" area homes while those OUTSIDE the city limits will be referred to as "Out Lansing" homes. Twenty-seven percent more homes in the Lansing area had only one source of heat than in the Out Lansing area homes. Further, there were twice as many homes in the Out Lansing area with supplementary sources of heat; this applied to having two sources of heat in the home, two or more, and three or more. The proportions of homes in the survey in the five county Greater Lansing area, the Lansing area, and the Out Lansing area which used only one source of indoor heating and more than one source of indoor heating during the winter of 1984-1985 are presented in Table 4.2.

The proportions of homes in the survey using different sources of primary and supplementary indoor heating as well as summary proportions reflecting total usage (regardless of status as primary or supplementary heat) during the winter of 1984-1985 are summarized in Table 4.3. Most (78.2%) homes in the five county Greater Lansing area were heated by gas furnaces as the primary source of

Table 4.2: Proportions of Households Using Only One Source of Indoor Heating and Using More Than One Source of Indoor Heating in a Random Sample of Young Children from the Five County Greater Lansing Area During the Winter of 1984-1985.*

Number of Sources of Heat	Proportions (as %) of Households by Geographic Area**		
	OUT LANSING	LANSING	FIVE COUNTY
Only One Heat Source	67.4	85.3	77.8
Two Heat Sources	28.0	12.5	19.0
Three or More Heat Sources	4.6	2.2	3.2
Two or More Heat Sources	32.6	14.7	22.2

* The random sample of children was drawn from the 1980-1981 Lansing area birth cohort. The five county Greater Lansing area consists of the counties of Ingham, Eaton, Ionia, Clinton, and Shiawassee.

** Geographic areas: LANSING refers to the area bounded by the Lansing and East Lansing city limits; OUT LANSING refers to the portion of the Greater Lansing area outside these city limits but within the five county area.

Table 4.3: Proportions of Households Using Different Sources of Primary and Supplementary Indoor Heating in a Random Sample of Young Children from the Five County Greater Lansing Area During the Winter of 1984-1985.*

	Proportions (as %) of Households Using Sources of Heat By Geographic Area**								
	OUT LANSING			LANSING			FIVE COUNTY		
Source of Heat	PRIM	SUPL	1&2	PRIM	SUPL	1&2	PRIM	SUPL	1&2
Woodburning Stove or Wood Furnace	21.2	23.3	21.7	3.3	18.5	5.2	10.8	21.4	12.7
Gas Furnace	58.3	14.0	47.4	92.4	11.1	82.0	78.2	12.9	66.3
Fuel Oil Furnace	16.7	14.0	16.0	2.7	0.0	2.4	8.5	8.6	8.5
Central Electric Heat	3.8	4.7	4.0	1.6	7.4	2.4	2.5	5.7	3.1
Kerosene Space Heater	0.0	18.6	4.6	0.0	29.6	3.8	0.0	22.9	4.1
Electric Space Heater	0.0	7.0	1.7	0.0	11.1	1.4	0.0	8.6	1.6
Fireplace***	0.0	4.7	1.1	0.0	18.5	2.4	0.0	10.0	1.8
Solar Heat	0.0	14.0	3.4	0.0	3.7	0.5	0.0	10.0	1.8

* The random sample of children was drawn from the 1980-1981 Lansing area birth cohort. The five county Greater Lansing area consists of the counties of Ingham, Eaton, Ionia, Clinton, and Shiawassee.

Table 4.3 (cont'd.)

** Geographic areas: LANSING refers to the area bounded by the Lansing and East Lansing city limits; OUT LANSING refers to the portion of the Greater Lansing area outside these city limits but within the five county area. PRIM refers to Primary Heat Sources reported by parents, SUPL refers to Supplementary Heat Sources, and "1&2" refers to use of different types of indoor heating as either Primary or Supplementary Heat Sources.

*** The use of fireplaces was specifically probed during the interviews to determine if they were being primarily used as a source of heat or for other (e.g., aesthetic) purposes; ONLY the use of fireplaces as a source of heat is reported here.

heat. However, a considerably higher proportion of homes in the Lansing area were heated primarily with gas (92.4%) than in the Out Lansing area (58.3%).

Woodburning stoves and wood furnaces were the next most prevalent primary source of indoor heating (10.8%) in the five county area. However, there was more than a sixfold (6.42) difference between the Lansing (3.3%) and Out Lansing (21.2%) areas in the use of woodburning stoves and wood furnaces as a primary source of heat. Further, wood furnaces were not used as a primary source of heat by any of the Lansing area homes.

Fuel oil furnaces were the next most popular (8.5%) primary source of indoor heating in the five county area. Again, however, there was a notable difference between usage within and outside the Lansing-East Lansing city limits. As was the case for woodburning stoves, fuel oil furnaces were used as a primary source of heat in over six times (6.19) as many homes in the Out Lansing as in the Lansing area.

The least prevalent primary source of indoor heating used by families in the survey was central electric heat (2.5%). Although very few homes were heated primarily by this means in either the Lansing or the Out Lansing areas, the proportion in the Out Lansing area (3.8%) was over twice that in Lansing area homes (1.6%).

The two most popular forms of supplementary heating in the sample for the five county Greater Lansing area were kerosene space heaters (22.9% of homes with supplementary

heat) and woodburning stoves/furnaces (21.4%). Gas furnaces were used by about half as many homes (12.9%) as either of these, followed by usage of fireplaces and solar heat (both 10.0%) and fuel oil furnaces and electric space heaters (both 8.6%). Central electric heat was reported as a supplementary source of heat in 5.7% of homes.

As with primary sources of indoor heating, some interesting differences in supplementary heating emerged when the data was compared for the Lansing and Out Lansing areas. More homes in the Lansing area used central electric heat, electric space heaters, kerosene space heaters, and fireplaces as supplementary sources of heat. On the other hand, more homes in the Out Lansing area used woodburning stoves/furnaces, gas furnaces, fuel oil furnaces, and solar heat as supplementary sources of indoor heating. The differences and similarities in supplementary heating for the two areas are evident in Table 4.3 but one of the more striking is the near similarily of the use of woodburning stoves (not wood furnaces, as will be discussed shortly) as a supplementary source of heat in both the Lansing and Out Lansing areas (in contrast to the significant difference between these areas in the use of woodburning stoves/furnaces as a primary heat source). Fireplaces, on the other hand, were almost four times (3.94) as prevalent in Lansing area homes as a supplementary source of heat. In addition, fuel oil furnaces were not used by any of the Lansing area homes as a supplementary source of heat and the

use of solar heat was over three times (3.78) greater in the Out Lansing area.

The use of woodburning stoves and wood furnaces was a significant source of indoor heating for households in the survey. In all, 12.7% of the homes from the five county Greater Lansing area used woodburning stoves or wood furnaces as primary or supplementary sources of heat; 10.8% heated primarily by this means and 21.4% of homes with supplementary heat used a woodburning stove/furnace for this purpose. Of those homes in the survey heating with a woodburning stove or wood furnace as their primary source of heat, this was the only source of heat in 46.4% of the Out Lansing homes, 33.3% of homes in the Lansing area, and 44.1% for the five county area. While woodburning stoves were used as primary and supplementary heat sources in all three of these geographical areas, wood furnaces were only used in the Out Lansing area. Of those homes heating with a woodburning stove or a wood furnace in the five county area, 93.9% heated with a woodburning stove (the complement, 6.1%, heating with a wood furnace); the proportions for Out Lansing and Lansing area homes were 92.1% and 100% respectively. Further, of homes in the five county Greater Lansing area heating with a woodburning stove or wood furnace, 94.1% used a woodburning stove as their primary source of heat and 93.3% as a supplementary source of heat.

The proportions of homes in the sample heating with the three different types of woodburning stoves (i.e., free

standing, fireplace-insert, and furnace add-on) or with a wood furnace as primary and supplementary sources of heat in the five county, Lansing, and Out Lansing areas are presented in Table 4.4. In the five county area, the most frequently used of these were free standing and furnace add-on woodburning stoves (each 40.8%), followed by use of fireplace-insert woodburning stoves (12.2%) and wood furnaces (6.1%). As with other findings from the survey, interesting rural-urban differences emerged when the use of these sources of indoor heating was compared for the Lansing and Out Lansing areas. Free standing and furnace add-on woodburning stoves were the most prevalent heating units in both areas but 66.5% more homes used furnace add-on than free standing woodburning stoves in the Out Lansing area while within the Lansing area twice as many homes used free standing as furnace add-on woodburning stoves.

Another interesting aspect of the findings related to differences in the the use of these woodburning units as primary versus supplementary sources of heat. For example, the use among woodburners of furnace add-on woodburning stoves as a primary source of heat was greater than the use of free standing units as primary heat sources in both the Lansing and Out Lansing areas. The reverse was true for the use of these types of woodburning stoves as supplementary heat sources, with significantly more homes in both areas using free standing than furnace add-on woodburning stoves

Table 4.4: Proportions of Households Using Different Types of Woodburning Stoves or a Wood Furnace as Primary and Supplementary Sources of Indoor Heating in a Random Sample of Young Children from the Five County Greater Lansing Area During the Winter of 1984-1985.*

	Proportions (as %) of Households Using Sources of Heat By Geographic Area**								
	OUT LANSING			LANSING			FIVE COUNTY		
Source of Heat	PRIM	SUPL	1&2	PRIM	SUPL	1&2	PRIM	SUPL	1&2
Woodburning Stove:									
Free Standing	32.2	50.0	36.8	33.3	80.0	54.5	32.4	60.0	40.8
Fireplace-Insert	7.1	20.0	10.5	16.7	20.0	18.2	8.8	20.0	12.2
Furnace Add-On	53.6	20.0	44.7	50.0	0.0	27.3	52.9	13.3	40.8
Wood Furnace	7.1	10.0	7.9	0.0	0.0	0.0	5.9	6.7	6.1

* The random sample of children was drawn from the 1980-1981 Lansing area birth cohort. The five county Greater Lansing area consists of the counties of Ingham, Eaton, Ionia, Clinton, and Shiawassee.

** Geographic areas: LANSING refers to the area bounded by the Lansing and East Lansing city limits; OUT LANSING refers to the portion of the Greater Lansing area outside these city limits but within the five county area. PRIM refers to Primary Heat Sources reported by parents, SUPL refers to Supplementary Heat Sources, and "1&2" refers to use of different types of indoor heating as either Primary or Supplementary Heat Sources.

(the difference being greater for the Lansing area homes than for those in the Out Lansing area).

The proportions of households in the sample using a woodburning stove or a wood furnace as the ONLY source of heat in the home for the five county area, the Lansing area, and the Out Lansing area during the winter of 1984-1985 are presented in Table 4.5. For this group, most households heated with a furnace add-on (53.3%) or free standing (40.0%) woodburning stove. With respect to rural-urban differences between the proportions of homes using these two sources of heat, the difference was greater in the Out Lansing area than in the five county area as a whole, while in Lansing area homes their use was evenly divided. Fireplace-insert woodburning stoves constituted the only source of heat for 7.7% of Out Lansing homes but were not used by any of the Lansing area homes as the only source of heat. Finally, wood furnaces were not used as the only source of heat in any of the homes in the sample.

Over half the homes heating with woodburning stoves and wood furnaces used other sources of heat in combination with these units. In the five county Greater Lansing area, 55.5% of homes heating with woodburning stoves and wood furnaces also used another source of heat as either a primary or supplementary heat source. However, a greater proportion of these homes used another heat source in the Lansing area (66.7%) than in the Out Lansing area (53.6%). The proportions of households in the sample which heated

Table 4.5: Proportions of Households Using a Woodburning Stove or a Wood Furnace as the Only Source of Indoor Heating in a Random Sample of Young Children from the Five County Greater Lansing Area During the Winter of 1984-1985.*

Source of Heat	Proportions (as %) of Households by Geographic Area** OUT LANSING	LANSING	FIVE COUNTY
Woodburning Stove:			
Free Standing	38.5	50.0	40.0
Fireplace-Insert	7.7	0.0	6.7
Furnace Add-On	53.8	50.0	53.3
Wood Furnace	0.0	0.0	0.0

* The random sample of children was drawn from the 1980-1981 Lansing area birth cohort. The five county Greater Lansing area consists of the counties of Ingham, Eaton, Clinton, Ionia, and Shiawassee.

** Geographic areas: LANSING refers to the area bounded by the Lansing and East Lansing city limits; OUT LANSING refers to the portion of the Greater Lansing area outside these city limits but within the five county area.

with a woodburning stove/furnace in combination with other sources of indoor heating during the winter of 1984-1985 are summarized in Table 4.6.

The most frequently used sources of heat used in combination with woodburning stoves and wood furnaces in the five county area were gas furnaces and fuel oil furnaces (each 36.6%), followed by kerosene space heaters (9.8%), central electric heat (7.3%), solar heat (4.9%), and use of fireplaces and electric space heaters (each 2.4%). However, there were a number of rural-urban differences in the usage of these sources of heat. Homes in the Lansing area used a much greater proportion of gas furnaces and kerosene space heaters and a slightly greater proportion of central electric units in combination with a woodburning stove/furnace than homes in the Out Lansing area. Homes in the Out Lansing area, on the other hand, used a much greater proportion of fuel oil furnaces. Further, indoor heating with electric space heaters, fireplaces, and solar heat in combination with a woodburning stove or wood furnace was only reported in the Out Lansing area.

Table 4.6: Proportions of Households Heating with a Woodburning Stove (WBS) or a Wood Furnace (WF) In Combination with Other Sources of Indoor Heating in a Random Sample of Young Children from the Five County Greater Lansing Area During the Winter of 1984-1985.*

Source of Heat Used in Combination with WBS or WF	Proportions (as %) of Households by Geographic Area**		
	OUT LANSING	LANSING	FIVE COUNTY
Gas Furnace	23.3	72.7	36.6
Fuel Oil Furnace	50.0	0.0	36.6
Central Electric Heat	6.7	9.1	7.3
Kerosene Space Heater	6.7	18.2	9.8
Electric Space Heater	3.3	0.0	2.4
Fireplace***	3.3	0.0	2.4
Solar Heat	6.7	0.0	4.9

* The random sample of children was drawn from the 1980-1981 Lansing area birth cohort. The five county Greater Lansing area consists of the counties of Ingham, Eaton, Ionia, Clinton, and Shiawassee.

** Geographic areas: LANSING refers to the area bounded by the Lansing and East Lansing city limits; OUT LANSING refers to the portion of the Greater Lansing area outside these city limits but within the five county area.

*** The use of fireplaces was specifically probed during the interviews to determine if they were being primarily used as a source of heat or for other (e.g., aesthetic) purposes; ONLY the use of fireplaces as a source of heat is reported here.

CHAPTER 5

INVESTIGATION OF RISKS TO CHILDREN'S HEALTH FROM THE USE OF WOODBURNING STOVES FOR INDOOR HEATING

Introduction

The woodburning stove is an American cultural artifact whose contemporary design and function are essentially the same as that of its prototype developed by Benjamin Franklin in the middle of the eighteenth century. The use of woodburning stoves as a principal source of home heating is a cultural tradition in the United States and has increased rapidly since the energy crisis of the mid-1970's (Lipfert and Dungan 1983; Meyers and Schipper 1984; Thompson 1984). Hazards associated with the use of woodburning stoves range from potentially dangerous indoor air pollution (e.g., accumulation of carbon monoxide in airtight homes) to an increased number of burn injuries and fires (Breysse 1981; Remensnyder and Gryska 1981).

Recent observations in the ambulatory care clinics of the College of Human Medicine at Michigan State University implicated indoor heating with a woodburning stove as the primary etiological factor in recurrent choking and wheezing episodes in a young child (Honicky, Akpom, and Osborne 1983). This portion of the present study was conducted to investigate the occurrence of symptoms of respiratory

illness in children living in homes heated by a woodburning stove (study group) and by conventional gas and fuel oil furnaces or electricity (internal comparison or control group). The effects on symptom occurrence of exposure to several known sources of indoor air pollution (parental smoking, urea-formaldehyde foam insulation, and gas cooking fuel) were also investigated.

The principal objective of this portion of the overall study was to determine if the proportion of children experiencing symptoms of respiratory illness was significantly different for children living in homes heated by a woodburning stove and by conventional means. Two related objectives were to determine the particular symptoms associated with prolonged exposure to a woodburning stove and to interpret the severity of symptoms in terms of indications of chronic airway irritation.

Results

The occurrence of cough and wheezing symptoms during the winters of 1982, 1984, and 1985 was much greater among children from homes heated by woodburning stoves than among children from homes in the control (internal comparison) group (Table 5.1 and Table 5.2). Further, as the severity of symptoms increased the differences between the two groups of children tended to be more significant (Table 5.3). The study group had a high occurrence of symptoms in all three

Table 5.1: Occurrence of Symptoms of Respiratory Illness In Young Children Matched for Age, Sex, and Residence From Homes With Woodburning Stoves (Study Group) and Without Woodburning Stoves (Control Group) During the Winters of 1982, 1984, and 1985.*

Symptom Severity Classification and Symptoms**	Proportions (%) With Symptoms in the Study Group (S) and Control Group (C)*** 1982 S	1982 C	1984 S	1984 C	1985 S	1985 C
Mild						
Cough with colds	71.0	58.1	74.1	65.0	83.3	63.2
>1 episode cough	100.0	87.1	92.6	85.0	87.5	84.2
>1 chest cold	87.1	71.0	66.7	60.0	58.3	63.2
Moderate						
Wheeze with colds	71.0	19.4	25.9	10.0	25.0	15.8
>1 episode wheezing	64.5	16.1	29.6	10.0	41.2	15.8
Cough without colds	67.7	3.2	92.6	20.0	70.8	5.3
Severe						
Cough at night	67.7	3.2	85.2	20.0	70.8	5.3
Cough most days	45.2	0.0	55.6	5.0	54.2	5.3
Wheeze without colds	54.8	0.0	14.8	0.0	20.8	0.0

* Control (internal comparison) group subjects were matched with study (woodburning stove) group subjects for age, sex, and geographic area of residence.

** The full phrasings for symptoms are as follows: Mild: Usually coughs with colds; at least one episode of cough during the winter; at least one episode of chest cold during the winter; Moderate: Occasionally wheezes with colds; at least one episode of wheezing during the winter; occasionally coughs apart from colds; Severe: Usually coughs at night; coughs most days (4 or more days per week) during winter; occasionally wheezes apart from colds.

*** Sample sizes for each winter were as follows, where n_1 = study group and n_2 = control group: 1982: n_1 = 31, n_2 = 31; 1984: n_1 = 27, n_2 = 20; 1985: n_1 = 24, n_2 = 19.

Table 5.2: Significance of Differences in the Occurrence of Symptoms of Respiratory Illness In Young Children Matched for Age, Sex, and Residence From Homes With Woodburning Stoves (Study Group) and Without Woodburning Stoves (Control Group) During the Winters of 1982, 1984, and 1985.*

Symptom Severity Classification and Symptoms**	z-statistic (Z) or t-statistic (T) and Significance (P) of Differences*** 1982 Z	1982 P	1984 T	1984 P	1985 T	1985 P
Mild						
Cough with colds	+1.07	NS	+0.67	NS	+1.50	NS
>1 episode cough	+2.15	.05	+0.81	NS	+0.31	NS
>1 chest cold	+1.59	NS	+0.47	NS	-0.33	NS
Moderate						
Wheeze with colds	+4.78	.001	+1.48	NS	+0.76	NS
>1 episode wheezing	+4.47	.001	+1.77	.05	+1.94	.05
Cough without colds	+7.19	.001	+7.07	.001	+6.17	.001
Severe						
Cough at night	+7.17	.001	+5.79	.001	+6.17	.001
Cough most days	+5.06	.001	+4.72	.001	+4.29	.001
Wheeze without cold	+6.13	.001	+2.17	.025	+2.51	.01

* Symptom occurrences in the study and control (internal comparison) groups were compared by testing the difference between proportions of children manifesting symptoms using the z-statistic and the t-statistic. Control group subjects were matched with study (woodburning stove) group subjects for age, sex, and geographic area of residence.

** The full phrasings for symptoms are as follows: Mild: Usually coughs with colds; at least one episode of cough during the winter; at least one episode of chest cold during the winter; Moderate: Occasionally wheezes with colds; at least one episode of wheezing during the winter; occasionally coughs apart from colds; Severe: Usually coughs at night; coughs most days (4 or more days per week) during winter; occasionally wheezes apart from colds.

Table 5.2 (cont'd.)

*** The z-statistic is used when both study and control groups have sample sizes greater than 30 and the t-statistic is used for groups with sample sizes of 30 or less. "NS" means "Not Significant" and indicates there was not a significant difference ($p>.05$) between the proportions in the two groups for a particular symptom during a given year. The research hypothesis was: H_1: $p_1 > p_2$, where p_1 = study group and p_2 = control group.

Table 5.3: Occurrence of Mild, Moderate, and Severe Symptoms of Respiratory Illness In Young Children Matched for Age, Sex, and Residence From Homes With Woodburning Stoves (Study Group) and Without Woodburning Stoves (Control Group) and Significance of Differences Between Groups During the Winters of 1982, 1984, and 1985.*

Symptom Severity Classification**	Proportions (%) With Symptoms in the Study Group (S) and Control Group (C)***					
	1982		1984		1985	
	S	C	S	C	S	C
Mild	100.0	96.8	96.3	85.0	91.7	89.5
Moderate	100.0	29.0	92.6	30.0	70.8	15.8
Severe	83.9	3.2	92.6	20.0	70.8	5.3

Symptom Severity Classification	z-statistic (Z) or t-statistic (T) and Significance (P) of Differences****					
	1982		1984		1985	
	Z	P	T	P	T	P
Mild	+0.98	NS	+1.25	NS	+0.24	NS
Moderate	+8.71	.001	+5.54	.001	+4.40	.001
Severe	+11.15	.001	+7.15	.001	+6.17	.001

* Symptom occurrences in the study and control (internal comparison) groups were compared by testing the difference between proportions of children manifesting symptoms using the z-statistic and the t-statistic. Control group subjects were matched with study (woodburning stove) group subjects for age, sex, and geographic area of residence.

** Classification of symptoms as mild, moderate, or severe was based on the degree of association with persistent airway irritation.

*** Sample sizes for each winter were as follows, where n_1 = study group and n_2 = control group: 1982: n_1 = 31, n_2 = 31; 1984: n_1 = 27, n_2 = 20; 1985: n_1 = 24, n_2 = 19.

Table 5.3 (cont'd.)

**** The z-statistic is used when both study and control groups have sample sizes greater than 30 and the t-statistic is used for groups with sample sizes of 30 or less. "NS" means "Not Significant" and indicates there was not a significant difference ($p>.05$) between the proportions in the two groups for a particular symptom during a given year. The research hypothesis was: H_1: $p_1 > p_2$, where p_1 = study group and p_2 = control group.

categories of symptom severity (mild, moderate, and severe) while the control group showed an expected decrease of symptom occurrence in relation to severity.

The occurrence of severe symptoms was significantly greater in the study group compared to the control group for all symptoms in these categories during all three winters (see Table 5.2: $p<.001$ for all differences except one which was significant at $p<.025$ in 1984 and $p<.01$ in 1985). The occurrence of moderate symptoms was also significantly greater in the study group ($p<.001$ for all differences except one significant at $p<.05$ in 1984 and 1985 and one which was not significant [$p>.05$] during those winters). However, the proportions of children in each group reporting mild symptoms of the type that commonly occur in their age group during winter months were significantly different ($p<.05$) for only one symptom during only one of the winters (1982) of investigation.

In the category of moderate symptom severity (wheezing with colds, having at least one episode of wheezing, and occasionally coughing apart from colds), 100% of the woodburning stove group children reported symptoms as compared with 29% of the non-woodburning stove group during the winter of 1982. The proportions were very similar to those in 1982 for both groups in 1984, with 93% of the study group children reporting moderate symptoms compared to 30% of control group children. During the winter of 1985 there

was a decrease in both groups with 71% of study subjects manifesting systems and 16% of controls.

The greatest difference in the proportions of children reporting symptoms was seen in the category of severe symptoms of acute respiratory illness, namely: coughing at night, coughing most days (four or more days per week), and occasional wheezing apart from colds. These are symptoms of persistent airway irritation and their occurrence in the woodburning stove group of children during 1982 was 84% compared to only 3% in the control group ($p<.001$). The proportion of children experiencing severe symptoms increased in both groups in 1984, with 93% of study subjects and 20% of controls reporting their occurrence ($p<.001$). Proportions decreased in both groups in 1985 but the differences between them were still highly significant ($p<.001$) with 71% of the study group and 5% of the control group subjects reporting the occurrence of at least one severe symptom.

The proportions of children reporting allergies or asthma diagnosed by a physician are summarized in Table 5.4. There was no significant difference ($p>.05$) in the occurrence of asthma between study and control groups during the three winters of investigation. Allergies, on the other hand, were present in 19% of the study group children and 3% of the control group ($p<.05$) in 1982 with 26% and 5% respectively ($p<.05$) in 1984. Differences between groups in the occurrence of allergies were not significant ($p>.05$) in

Table 5.4: Occurrence of Allergies and Asthma In Young Children Matched for Age, Sex, and Residence From Homes With Woodburning Stoves (Study Group) and Without Woodburning Stoves (Control Group) and Significance of Differences Between Groups During the Winters of 1982, 1984, and 1985.*

	Proportions (%) With Allergies or Asthma in Study Group (S) and Control Group (C)**					
	1982		1984		1985	
Condition	S	C	S	C	S	C
Allergies	19.4	3.2	25.9	5.0	29.2	26.3
Asthma	6.5	0.0	7.4	0.0	4.2	10.5

	z-statistic (Z) or t-statistic (T) and Significance (P) of Differences***					
	1982		1984		1985	
	Z	P	T	P	T	P
Allergies	+2.08	.05	+2.15	.05	+0.21	NS
Asthma	+1.41	NS	+1.43	NS	-0.77	NS

* Symptom occurrences in the study and control (internal comparison) groups were compared by testing the difference between proportions of children manifesting symptoms using the z-statistic and the t-statistic. Control group subjects were matched with study (woodburning stove) group subjects for age, sex, and geographic area of residence. The presence of allergies and asthma was based upon reporting of diagnosis by a physician.

** Sample sizes for each winter were as follows, where n_1 = study group and n_2 = control group: 1982: n_1 = 31, n_2 = 31; 1984: n_1 = 27, n_2 = 20; 1985: n_1 = 24, n_2 = 19.

*** The z-statistic is used when both study and control groups have sample sizes greater than 30 and the t-statistic is used for groups with sample sizes of 30 or less. "NS" means "Not Significant" and indicates there was not a significant difference ($p>.05$) between the proportions in the two groups for a particular symptom during a give year. The research hypothesis was: H_1: $p_1 > p_2$, where p_1 = study group and p_2 = control group.

1985, with the study group showing a slight increase (29%) but the control group showing a dramatic increase in the proportion of children reporting allergies diagnosed by a physician (26%). Although the study group had a greater proportion of subjects with allergies, the removal of subjects with allergies or asthma did not change the significance of differences between groups in the occurrence of symptoms.

Between the winters of 1982 and 1984 the sources of indoor heating changed for three of the children being followed in the sample. These children will be referred to as crossover subjects, as mentioned earlier, because they changed their exposure status with respect to woodburning stove use. The profiles of these children are very similar with respect to variables judged to be pertinent (Table 5.5). All three children were white, female, and from families with middle socioeconomic status.

The homes of all three children were heated by either gas furnaces only or by gas furnaces in combination with woodburning stoves (depending on the year). All three homes were equipped with humidifiers and none used air filters. None of the children were exposed to parental smoking or urea-formaldehyde foam insulation and none were reported to have been diagnosed by a physician as having either allergies or asthma. The only relevant differences among the three children are their ages (one, three, and four in

Table 5.5: Crossover Subjects: Profile of Subjects From Homes Where Use of a Woodburning Stove (WBS) for Indoor Heating Was Either Newly Adopted or Discontinued During the Winter of 1984.*

Factor	Discontinued WBS Winter 1984 Subject 1	Discontinued WBS Winter 1984 Subject 2	Adopted WBS Winter 1984 Subject 3
Age (in 1982)	1	3	4
Sex	Female	Female	Female
Socioeconomic Status	Middle	Middle	Middle
Ethnic Identity	White	White	White
Heat Source(s) 1982	WBS; Gas	WBS; Gas	Gas
Heat Source(s) 1984	Gas	Gas	WBS; Gas
Winters WBS Used	1980-83	1980-83	1984
Cooking Fuel	Gas	Gas	Electric
Parental Smoking	No	No	No
Formaldehyde Insulation	No	No	No
Humidifier	Yes	Yes	Yes
Air Filter(s)	No	No	No
Allergies or Asthma	No	No	No

* The factors selected for the profile of crossover subjects reflect the principal factors suspected of potentially confounding the hypothesized relationship between exposure to woodburning stoves for indoor heating and occurrence of symptoms of respiratory illness in young children, i.e., age and sex (controlled for by matching in the samples); SES; factors affecting indoor air quality which are associated with the occurrence of symptoms of respiratory illness (i.e., cooking fuel, parental smoking, urea-formaldehyde foam insulation); source of indoor heat; use of humidifiers and air filters; and whether subjects have been diagnosed as having allergies or asthma.

1982) and the cooking fuel used in their homes (two used gas and one used electricity).

The crossover subjects provide an interesting case because in a very real sense they act as their own controls. Comparison of the symptom experiences of these three children before and after use of a woodburning stove was adopted or discontinued in 1984 suggests a direct association between symptom occurrence and exposure (Table 5.6). In general, symptoms tended to begin or cease in direct association with initiating or ceasing use of a woodburning stove; symptoms began for the child newly exposed and abated for the two children no longer exposed to a woodburning stove.

In the study group in 1982, 24 of the 31 homes (77.4%) used a woodburning stove as the primary source of heat and the remaining seven (22.6%) as a supplementary heat source. About three-fourths of the homes (77.4%) had furnaces in addition to woodburning stoves, 6.5% supplemented with hot water heat, and one home used a kerosene space heater as a supplementary source of heat. A woodburning stove was the only source of heat in 13% of the homes in the study group. The number of half-cords of wood burned during 1982 ranged from five to 25 with a mean of 12.8 half cords per home. Regression analysis between symptom occurrences and number of cords of wood burned showed no statistically significant correlation (Pearson's r value very close to zero) suggesting that the relationship

Table 5.6: Crossover Subjects: Occurrence of Symptoms of Respiratory Illness During the Winters of 1982 and 1984 In Children From Homes Where Use of a Woodburning Stove (WBS) for Indoor Heating Was Either Newly Adopted or Discontinued During the Winter of 1984.

Symptom Severity Classification and Symptoms *	Discontinued WBS Winter 1984 Subject 1 1982	Subject 1 1984	Subject 2 1982	Subject 2 1984	Adopted WBS Winter 1984 Subject 3 1982	Subject 3 1984
Mild						
Cough with colds	YES	YES	YES	YES	YES	YES
>1 episode cough	YES	YES	YES	YES	NO	YESa
>1 chest cold	YES	YES	YES	NO	YES	YES
Moderate						
Wheeze with colds	YES	NO	NO	NO	NO	YES
>1 episode wheezing	YES	NO	NO	NO	NO	YES
Cough without colds	YES	NO	YES	NO	NO	YES
Severe						
Cough at night	YES	NO	YES	NO	NO	YES
Cough most days	YES	NO	YES	NO	NO	YES
Wheeze without colds	NO	NO	NO	NO	NO	NO

* The full phrasings for symptoms are as follows: Mild: Usually coughs with colds; at least one episode of cough during the winter; at least one episode of chest cold during the winter; Moderate: Occasionally wheezes with colds; at least one episode of wheezing during the winter; occasionally coughs apart from colds; Severe: Usually coughs at night; coughs most days (4 or more days per week) during winter; occasionally wheezes apart from colds.

(a) Subject coughed "constantly" during the winter of 1984.

between stove use and symptom occurrence is probably not a simple dose-response relationship. A majority of woodburning stoves (58%) were installed within a major living area while 42% were installed elsewhere in the home.

The homes of most (77.4%) of the children in the control group in 1982 used fuel oil or gas furnaces as the primary source of heat. Of the remaining control group homes, 12.9% used steam or hot water heat and 9.7% used a built-in electric unit.

In 1984 in the study group, 77.8% of the homes used a woodburning stove as the primary source of heat and the remaining 22.2% as a supplementary heat source. As in 1982, about three-fourths of the homes (74.1%) had gas or fuel oil furnaces in addition to woodburning stoves and 11.1% used a kerosene space heater as a supplementary source of heat. A woodburning stove was the only source of heat in 25.9% of the homes in the study group (twice the proportion in 1982). The homes of most (95.0%) of the children in the control group in 1984 used gas or fuel oil furnaces as the primary source of heat. The remaining 5% of the control group homes used a built-in central electric unit.

In 1985, 83.3% of the homes in the study group used a woodburning stove as the primary source of heat and the remaining 16.7% as a supplementary heat source. About two-thirds of the study group homes (62.5%) had gas or fuel oil furnaces in addition to woodburning stoves and 8.3% used central electric heat as a supplementary source. A

woodburning stove was the only source of heat in 29.2% of the homes in the study group. The homes of most (84.2%) of the children in the control group in 1985 used a gas furnace as the primary source of heat and 15.8% used a fuel oil furnace.

Analysis of the two socioeconomic indicators utilized in the study (namely, the grade of formal education completed by the person considered to be the head of the household and the number of bathrooms in the home as an indicator of income) showed no statistically significant differences ($p>.05$). The distributions of formal education of heads of households in the study and comparison groups were nearly identical (87% having graduated high school) as were the distributions of the number of bathrooms in the home (ranging from one to three or more in half-bathroom increments).

The experience of subjects in the study and comparison groups was assessed in terms of exposure to sources of indoor air pollution which are associated with an increase in symptoms of respiratory illness in children (Table 5.7). In particular, cooking with gas, parental smoking, and urea-formaldehyde foam insulation have been associated with the occurrence of colds, coughing, and wheezing in children. The comparison (control) group made significantly greater use of gas stoves for cooking ($p<.05$) whereas the study group made greater use of electric stoves (1982: $p<.05$; 1984: $p<.01$; 1985: $p<.001$). There was no

Table 5.7: Regular In-Home Exposures of Young Children From Homes With Woodburning Stoves (Study Group) and Without Woodburning Stoves (Control Group) To Parental Smoking, Cooking Fuel, and Urea-Formaldehyde Foam Insulation and Use of Humidifiers and Air Filters During the Winters of 1982, 1984, and 1985.*

Exposure and Equipment	Proportions (%) With Exposure in the Study Group (S) and Control Group (C)**					
	1982		1984		1985	
	S	C	S	C	S	C
Parental Smoking***	48.4	51.6	48.1	45.0	37.5	47.4
Cooking Fuel: Gas	19.4	42.0	11.1	45.0	8.3	47.4
Electricity	77.4	58.0	88.9	55.0	91.7	52.6
Kerosene	3.2	0.0	0.0	0.0	0.0	0.0
Formaldehyde Insulation	6.5	0.0	7.4	0.0	0.0	5.3
Humidifier(s) Used	48.4	48.4	48.1	55.0	54.2	47.4
Air Filter(s) Used	25.8	9.7	18.5	20.0	33.3	36.8

	z-statistic (Z) or t-statistic (T) and Significance (P) of Differences***					
	1982		1984		1985	
	Z	P	T	P	T	P
Parental Smoking	-0.25	NS	+0.21	NS	-0.65	NS
Cooking Fuel: Gas	-1.99	.05	-2.68	.01	-3.06	.001
Electricity	+1.66	.05	+2.68	.01	+3.06	.001
Kerosene	+1.01	NS	0.00	NS	0.00	NS
Formaldehyde Insulation	+1.47	NS	+1.47	NS	-1.03	NS
Humidifier(s) Used	0.00	NS	-0.47	NS	+0.44	NS
Air Filter(s) Used	+1.70	.05	-0.13	NS	-0.24	NS

Table 5.7 (cont'd.)

* Control (internal comparison) group subjects were matched with study (woodburning stove) group subjects for age, sex, and geographic area of residence. Differences between proportions were tested using the z-statistic and the t-statistic (depending on sample size).

** Sample sizes for each winter were as follows, where n_1 = study group and n_2 = control group: 1982: n_1 = 31, n_2 = 31; 1984: n_1 = 27, n_2 = 20; 1985: n_1 = 24, n_2 = 19.

*** At least one parent or other adult member of the subject's household smoking tobacco regularly in the home.

significant difference ($p>.05$) in exposure to parental smoking or urea-formaldehyde foam insulation. The use of equipment which would tend to improve air quality (humidifiers, air filters) was also investigated. There was no significant difference ($p>.05$) between the two groups in the use of humidifiers but the study group made greater use of air filters ($p<.05$) during the winter of 1982.

Discussion

The objective of this phase of the present study was to investigate differences in the occurrence of symptoms of respiratory illness in young children living in homes heated by a woodburning stove. The findings suggest that young children who live in homes heated by a woodburning stove are more likely to develop symptoms of respiratory tract illness than children of the same age, sex, and socioeconomic status who do not live in homes heated with a woodburning stove. The findings further suggest that during the winter months children living in homes heated by a woodburning stove develop the more "severe" symptoms of respiratory illness which are highly associated with persistent airway irritation.

The symptom criteria used in many studies of the respiratory effects of exposure to environmental and occupational pollutants include a history of cough, cough and sputum production occurring over a period of months in

the year, wheezing, breathlessness, or a history of such respiratory diseases as asthma and chronic bronchitis (Dingle et al. 1964; Lidwell and Sommerville 1951; Brimblecombe et al. 1958). However, these symptoms are manifestations of chronic respiratory problems and as such are unsuitable for a study which attempts to evaluate the early states of acute respiratory illness. The symptoms used in this study were selected primarily because they represent the early manifestations of a respiratory tract insult during the course of the development of respiratory illness.

Acute respiratory illness ranges in level of severity from occasional cough and rhinorrhea to cough, wheezing, and sputum production. Most children between one and seven years of age usually experience at least one such attack during the winter months. Viruses are often said to cause such symptoms (Colley 1971; Glezen and Denny 1973). However, similar symptoms may be produced by exposure to respiratory tract irritants. These symptoms may occur independently of, in conjunction with, or as a contributing factor to respiratory illness. In particular, these symptoms may occur during episodes of upper respiratory tract illness but later occur without episodes of upper respiratory tract illness.

More severe manifestations of exposure to respiratory tract irritants include the presence of a cough at night and coughing most days of the week. These acute

symptoms fall within the more classic diagnostic categories of asthma or bronchitis (Leeder et al. 1976). In the present study, the differences between study and control groups with regard to allergies was significant at $p<.05$ for the winters of 1982 and 1984 but not significant for the winter of 1985. The difference between groups in the occurrence of physician-labeled asthma was not significant ($p>.05$). It is possible that the use of woodburning stoves produces the symptoms that lead to a diagnosis of asthma or allergy, thus accounting for the apparent increase in these diagnoses in the study group in 1982 and 1984. In particular, pollutants produced by the use of woodburning stoves for indoor heating may induce symptoms of allergies in children (regardless of their genetic predisposition to allergies), may exacerbate symptom occurrence in children with diagnosed allergies, or may contribute to the development of allergies as a result of prolonged exposure. Reanalyzing the data after removing the subjects who had either allergy or asthma revealed the same highly significant differences between study and control groups. Allergies or asthma may confound or modify the effect of the association between woodburning stove exposure and respiratory illness symptoms. However, quantitative assessment of this potential effect requires much larger samples than those used in the present study.

The major hypothesis for this phase of the research (i.e., the alternative hypothesis) was that the proportion

of children experiencing symptoms of respiratory illness in homes heated by woodburning stoves would be greater than the proportion experiencing symptoms in homes not heated by woodburning stoves. In constructing the research design to test this hypothesis, particular attention was paid to the similarity of the samples and to minimizing the effects of standard sources of bias (selection, observer, informant, and recall biases). Both well and ill children attend the ambulatory health care facility from which the samples were drawn. It is probable that more ill than well persons attend the facility in the one to seven year age group, thereby tending to overrepresent ill persons (as compared with one to seven year olds in the general population--a selection bias sometimes referred to as "Berksonian" bias). However, since children present for preventive medicine as well as sick call, it is reasonable to assume that the samples are representative of young children living in the Greater Lansing area and probably of those in the township populations of south central Michigan.

Other sources of bias involve data collection and analysis. Observer bias was minimized by collecting data primarily through closed-ended interview with questions which required a yes, no, or number answer; respondents' first answers were used in the analysis of data. The policy of informed consent which was applied in recruiting the samples introduced the possibility of underreporting or overreporting of symptoms according to the biases (unknown)

of informants. However, the participants were recruited for a study of the effects of different kinds of indoor heating, thereby minimizing any informant bias which might be associated with a study of a particular type of indoor heating. The potential effects of recall (and informant) bias introduced during data collection were reduced to a minimum in data analysis by treating symptoms as having either occurred or not occurred during the winters of 1982, 1984 and 1985, regardless of the number of episodes. This approach acts to increase the validity of comparisons by favoring the control group (which had a significantly greater proportion of low frequency symptom occurrences than the woodburning stove group).

Data was collected by telephone interview which has the disadvantage that it usually results in lower reporting of symptom frequency than actually occurs (as much as 40% underreporting when compared to personal interview or physician examination) (Jordan et al. 1953; Monto et al. 1971; Monto and Ullman 1974). However, it is reasonable to assume that underreporting of symptoms occurred to the same extent in both the study and control groups, as no stigma was attached to either group and participants were recruited for a general study of the respiratory effects of different types of indoor heating (rather than a specific study of woodburning stoves). An advantage of the tendency for underreporting inherent in the method of data collection is that it acts to ensure against overestimates of symptom

occurrence (especially with reference to the study group); the method of data analysis acts to ensure against underestimates (especially in the control group).

Several factors in the home have been associated with an increase in the frequency of recurrent respiratory tract symptoms and illnesses in children. A number of studies have indicated that there is a higher incidence of respiratory illness symptoms among children (age five and older) of smokers as compared with the incidence among children of non-smokers (Bonham and Wilson 1981; Cameron et al. 1969; Luguette et al. 1970; Norman-Taylor and Dickinson 1972). In addition, there appears to be an increased incidence of bronchitis and pneumonia in the first year of life among children whose parents smoke as compared with children of non-smokers (Colley et al. 1974). Some of this effect may be accounted for by cross-infection from parents with bronchitis, the former often due to smoking cigarettes (Colley 1974). In the present study, the very similar distribution of the exposure of children to cigarette smoking in the home suggests that other factors played a more significant role in causing differences in the occurrence of moderate and severe respiratory illness symptoms in the two groups.

Melia et al. (1977) and Speizer et al. (1980) found that boys and girls from homes in which gas was used for cooking had more cough, "colds going to the chest," and bronchitis than children from homes where electricity was

used. Utility gas was used for cooking in a significantly higher proportion of homes in the control (non-woodburning stove) group, yet the proportion of children with symptoms in this group was significantly lower than for children in homes with woodburning stoves. Therefore, it also seems reasonable to conclude that the part played by the type of cooking fuel used in the home was minimal in producing differences in the occurrence of symptoms.

Exposure to formaldehyde has been shown to be associated with a variety of detrimental effects ranging from symptoms of respiratory illness such as coughing and shortness of breath to damaging DNA, impairing DNA repair in bronchial cells, and potentiating the cytotoxicity of x-rays in bronchial cells. In addition to its irritant, toxic, and mutagenic effects, formaldehyde is also a carcinogen (Grafstrom et al. 1983; Levin and Purdom 1983; Spengler and Sexton 1983; Wildavsky et al. 1984). Very few of the subjects lived in homes with urea-formaldehyde foam insulation. Some (5.3%) of the families in the control group added this type of insulation to their homes between the winters of 1984 and 1985. Also, after the winter of 1984 the subjects from homes in the study group which were insulated with urea-formaldehyde foam moved and were lost from follow-up in 1985. The very low proportions of homes with this type of insulation, and especially the higher proportion in the control group in 1985, suggest that this

factor did not significantly affect differences observed between the two groups.

It is of interest that approximately the same proportion of homes in each group was equipped with air filters and humidifiers (except for the winter of 1982 during which the proportion of homes using air filters in the study group was almost three times that in the control group). This equipment would tend to decrease indoor concentrations of particulate pollutants and reduce respiratory tract irritation due to dry air. Despite the lack of humidity or particulate readings in the homes, the comparable distribution of this equipment in woodburning stove and control gruops and the similarity of symptom occurrences in homes with and without humidifiers in each group suggest that the occurrence of symptoms is not significantly affected by humidifier or air filter use.

The use of wood for space heating in the United States contributes significantly to outdoor levels of pollutants (especially particulates) in many residential areas (Lipfert and Dungan 1983; Cooper 1980). The use of fireplaces and woodburning stoves in the home has been shown to increase indoor levels of particulate pollutants from between 20 to 60 times the amount produced by a family furnace that burns natural gas (Cooper and Malek 1982). Particulate emission factors for two types of woodburning stoves were found to range from 1 g/kg to 24 g/kg of wood burned (Butcher and Sorensen 1979). Hence, depending on the

type of woodburning stove, its use in the home may introduce a significant amount of air pollution.

During the winter months, young children (especially preschoolers) tend to be confined within their homes for a great part of the day and definitely at night. Consequently, these children constitute a group which is maximally exposed to indoor heating. Those children from homes with high levels of indoor air pollution during the winter months would be most likely to manifest severe symptoms of exposure, including acute symptoms of respiratory illness.

Differences in the occurrence of moderate and severe respiratory illness symptoms in the samples are both statistically and clinically significant. If exposure to a woodburning stove is associated with this occurrence, as the research hypothesis and data suggest, then it remains to determine which aspect(s) of woodburning stove use may be involved.

It is likely that symptoms of respiratory illness in young children living in homes heated by woodburning stoves are linked with indoor air pollution generated by the combustion of wood under airtight rather than open (fireplace) conditions. Major pollutant emission by-products of wood combustion in woodburning stoves include the following: carbon monoxide, nitrogen dioxide, sulfur dioxide, respirable particulates, aldehydes (such as acrolein), polycyclic organic compounds, benzo(alpha)pyrene,

carcinogens, organic and elemental carbon, and a variety of priority pollutants (aluminum, calcium, potassium, sodium, sulfur, and silicon) (Cooper 1980; Cooper and Malek 1982).

If any of these by-products of combustion are linked with symptom occurrence, then the question arises whether symptoms are associated with average or peak exposure. Peak exposure would occur during periods of maximum daily use and when the stove door is opened to add wood, while average exposure would occur from the average air exchange between the stove unit and the indoor environment. Although present data do not support an association between stove location or type of stove (free standing, fireplace-insert, or furnace add-on) and the frequency or severity of symptoms of respiratory illness, it is reasonable to assume that these factors have some effect, as might the type(s) and amount of wood burned. The air envelope around the house, the volume and airtightness of the house, and the reintroduction of outdoor pollution from woodburning stoves to the indoor environment are other important considerations in average indoor air quality. Another variable affecting symptom occurrence may be fluctuations in temperature in wood-heated homes as compared with conventional furnace or electric-heated homes which usually have a thermostat keeping ambient temperatures in a fairly narrow range. The relative humidity in the home is probably another significant factor in the occurrence of symptoms, especially at night when woodburning stove use (which reduces indoor humidity) is

greatest for indoor heating. It is possible that there is an inverse relationship between the humidity level in the home and the indoor concentration of pollutants produced by woodburning stoves such that higher concentrations of pollutants tend to be found in homes with lower humidity levels and visa versa. This might occur if at higher humidity levels the pollutants bond with water vapor and precipitate out of the indoor air to a greater extent than at lower humidity levels. The relative contributions of different variables associated with the use of woodburning stoves have not been determined but some are clearly potential risk factors (e.g., air pollution, low humidity).

The results of this portion of the study indicate that differences between the study (woodburning stove) and comparison (non-woodburning stove) groups in the proportions of children manifesting symptoms are significant and appear to be attributable to the use of woodburning stoves for indoor heating. These findings suggest that indoor air pollution or other factors associated with the use of woodburning stoves as a source of home heating may lead to recurrent symptoms of respiratory tract illness in young children.

CHAPTER 6

PERCEPTIONS OF RISKS TO CHILDREN'S HEALTH FROM INDOOR AIR POLLUTION

Introduction

The principal objective of this portion of the study was to investigate perceptions of risks to children's health from indoor heating and indoor air pollution by the parents of young children. A related objective was to investigate the qualities which distinguish parents who perceive such risks from those who do not.

Data is reported on perceptions by parents of risks to children's health from different sources of indoor heating and from sources of indoor air pollution customarily used in American homes. In addition, perceptions by parents of risks to their own health from two specific pollutants and smoking tobacco are reported. Finally, a profile is presented of persons who tend to perceive indoor air pollution as a risk to children's health.

Perceptions of risks to children's health were investigated for six different sources of indoor heating, specifically, heating with an electric unit (i.e., central electric heat), a fuel oil furnace, a gas furnace, a woodburning stove or wood furnace, a fireplace, or a kerosene space heater. Perceptions were also investigated

with respect to six documented sources of indoor air pollution. These sources of indoor air pollution were heating with a woodburning stove or kerosene space heater, cooking with gas, smoking in the home by parents and others, and having either urea-formaldehyde foam or asbestos fiber insulation. Each of these is an entirely customary occurrence in our society (with the recent exception of insulating with asbestos fiber which is being removed from most buildings) and all but heating with a kerosene space heater have been associated with an increased occurrence of respiratory problems in children. Data was also collected on cooking with electricity, the principal alternative to cooking with gas fuel. Perceptions by parents of risks to their own health were investigated specifically for the pollutants carbon monoxide and radon gas and for smoking tobacco.

Results

The results of this study suggest that parents of young children perceive a variety of risks to their children's health from different types of indoor heating and from the domestic use of different sources of indoor air pollution. The findings further suggest that parents who tend to perceive indoor air pollution as a risk to their children's health are distinguishable from those who do not

on the basis of criteria which can be evaluated both qualitatively and quantitatively.

Perceptions of Risks to Children's Health from Indoor Heating and Sources of Indoor Air Pollution

The ethnographic data collected by interview and observation (see Appendix IV) suggest that parents' perceptions of risks to children's health from indoor heating fall into three major categories, namely, fire, air quality, and accidents. As one would expect, the risk of fire was emphasized for all the sources of heat investigated. However, risks associated with air quality and accidents were only perceived for some of these sources of heat.

The sources of indoor heating investigated were central electric units, fuel oil furnaces, gas furnaces, woodburning stoves and wood furnaces, fireplaces, and kerosene space heaters. The only perceived risk to children's health from heating with central electric units was fire, as was the case for cooking with electricity (with the additional risks of contact burns and electric shock).

Fuel oil furnaces were associated with risks from the possibility of fire and with respiratory problems from the fumes. Gas furnaces were associated with several risks which also applied to the use of gas for cooking. Perceived risks to children's health from the use of gas fuel were fire (and contact burns from cooking with gas), explosions, and suffocation, each of which was reported in the context

of concern about gas leaks, the pilot light going out, or "turning the gas on--but not completely on--and accidently leaving it on."

Woodburning stoves and wood furnaces were also considered risks to children's health because of the possibility of fire and burns but were further viewed as affecting the quality of indoor air through the presence of smoke (which can often be seen and smelled, especially when wood is added) and the tendency of woodburning units to "dry the air". In addition, a few parents reported concerns related to allergies to mold, wood, and dust and one couple considered heating with a woodburning stove a risk (and changed from heating primarily with a free standing woodburning stove) because their one year old tried to crawl into it while it was in use (see Interview 1 in Appendix II). The only risk reported by parents from heating with a fireplace was fire, although this risk was considered to be greatly reduced by using a screen. Finally, the risks perceived from heating with a kerosene space heater were fire, burns, "accidently knocking it over," and the fumes. Of these six sources of indoor heating, the use of fuel oil furnaces, woodburning stoves, and kerosene space heaters were the only ones perceived as negatively affecting the quality of indoor air and having potential health repurcussions for children living in homes heated by these means.

Perceptions of risks to childrens health were investigated for six sources of indoor air pollution, three of which were heating with a woodburning stove and using gas for heating or cooking fuel (discussed above). However, unlike perceptions for these, the concerns of parents regarding the other three sources of indoor air pollution--parental smoking and insulating with formaldehyde foam and asbestos fiber--were specifically focused on the quality of indoor air.

Risks to children's health from parental smoking were primarily associated with burns, fire, and smoke. A few parents perceived risks from children eating tobacco or cigarette filters in ashtrays and playing with matches. However, most parents did not emphasize burns, the possibility of fire, or consumption of tobacco (i.e., pica) and viewed risks to children's health as being primarily related to effects on the respiratory system (although some parents felt these effects were considerably more significant than others). In addition, tobacco smoke was viewed by some as a risk because of its irritating effects on children's eyes and sinuses. A few parents expressed concern over risks of cancer for their children so exposed, a few felt it might interfere with normal growth, and some were convinced that parental smoking has no effect on the health of children.

Perceptions of risks from formaldehyde insulation were vague in most cases but despite an apparent uncertainty

as to precisely what the effects were supposed to be there was nevertheless a clear conviction that it was harmful and to be avoided. Most persons with opinions felt the fumes caused respiratory problems. Several of the families in the study with this type of insulation wanted assistance getting information on how to get help from the government to have it removed from their homes. None of the families in the study had asbestos fiber insulation but all were familiar with it as a substance to be avoided. As with formaldehyde foam, many of the parents were uncertain as to why they believed asbestos to be harmful. However, others believed that asbestos "dust" and "particles in the air" cause lung cancer, tuberculosis, chronic cough and wheeze (apnea), emphysema, and "death". No one interviewed mentioned asbestosis. One couple had a tragic experience involving the chronic illness and death of a family member which they firmly believed was caused by exposure to asbestos particles; members of their family are currently engaged in a law suit with the employer (a construction company) of the deceased (see Interview 5 in Appendix IV).

Results of the survey of 100 parents of children from the 1980-1981 Greater Lansing area birth cohort support the findings of open-ended interviews and observation. While the survey did not provide the details of perceptions acquired through the ethnographic approach, it complemented this qualitative descriptive data with a quantitative description of what could appropriately be referred to as a

perception distribution for each of the sources of indoor heating and indoor air pollution assessed. In addition to statistical description, results of the survey demonstrated statistically significant relationships for some of the factors which the long-range interviews had suggested were related to parents' perceptions of risks to health from these indoor sources of heat and air pollution.

The survey addressed two complementary aspects of the issue of perception of risk from indoor air pollution. The first of these was information--i.e., whether parents had ever heard that something might be harmful to their or their children's health. The second was perception of risk from that activity--i.e., whether parents believed that it might be harmful.

With respect to indoor heating, 95% of the parents interviewed in the survey had not heard anything negative about heating with electricity whereas 37% had heard that heating with fuel oil might be harmful to children's health, 28% had heard that heating with gas might be harmful, 69% had heard that heating with a woodburning stove might be harmful to children's health, 38% had heard this about heating with a fireplace, and 78% about a kerosene space heater. Proportions for cooking with electricity and gas were very similar to those for heating, with only two percent of respondents having heard that cooking with electricity might be harmful to children's health while 35% had heard that cooking with gas might be harmful.

As regards information about risks associated with insulation materials, 76% of the respondents had heard that insulating with formaldehyde foam might be harmful to children's health while 88% had heard this of asbestos fiber. All respondents in the survey had heard that adult smoking might be harmful to children's health.

The proportions of parents who believed that the different sources of indoor heating investigated in the survey might be harmful to children's health closely paralleled the proportions who reported having heard this. Ninety-two percent of the parents did not believe that heating with electricity might harm children's health (and 95% felt this way about cooking with electricity) while 32% perceived heating with gas as a risk to children's health (and 34% felt cooking with gas might be harmful). Heating with fuel oil was perceived as a risk to children's health by 46% of the parents, 64% felt this way about a woodburning stove, 51% about a fireplace, and 87% about a kerosene space heater.

With respect to insulation in the home, 80% perceived insulating with formaldehyde foam as a risk to children's health while 86% believed this of asbestos fiber. Ninety-eight percent of the respondents believed that adult smoking might be harmful to children's health.

The raw and adjusted proportions of parents in the survey who had ever heard and who believed that each of these customary indoor exposures might be harmful to

children's health are summarized in Table 6.1. The raw proportions represent the proportions of affirmative (i.e., "yes") responses from the full set of possible responses (i.e., "yes," "maybe," "no," and "don't know"). The adjusted proportions exclude those parents whose responses were "don't know" and therefore represent the proportions of affirmative responses among those parents who had an opinion of "yes," "no," or "maybe" on the various items assessed.

Inferential analysis supported the implied relationships in the descriptive data presented above. In particular, the proportions of parents who were had heard something might be a risk to health (regardless of validity) corresponded closely in most cases with the proportions who believed it might be harmful. The results of both parametric and nonparametric hypothesis tests of association, concordance, and correlation showed that the relationship between information and parents' perceptions were statistically significant at $p<.00001$ for all the sources of indoor heating and indoor air pollution investigated except insulating with formaldehyde foam which was significant at $p<.02$. The implication of this is that parents tend to believe what they hear.

Perceptions of risks to children's health were explored in greater detail for the six sources of indoor air pollution assessed in this study which are customarily used in our society. These six sources of indoor air pollution were cooking with gas, heating with a woodburning stove or

Table 6.1: Proportions of Parents in a Random Sample of 100 Young Children from the Greater Lansing Area Who Have Ever Heard and Who Believe That Customarily Used Sources of Indoor Heating and Indoor Air Pollution May Be Harmful To Children's Health.

Source of Indoor Air Pollution		Heard Harmful (Percent) Raw	Heard Harmful (Percent) Adjusted*	Believe Harmful (Percent) Raw	Believe Harmful (Percent) Adjusted*
Heating:	Electric Heat	5.0	5.0	8.0	8.7
	Gas Furnace	28.0	28.0	32.0	34.8
	Fuel Oil Furnace	37.0	37.0	46.0	48.9
	Fireplace	38.0	38.0	51.0	53.1
	Woodburning Stove	69.0	69.0	64.0	65.3
	Kerosene Heater	78.0	78.0	87.0	89.7
Cooking:	Electricity	2.0	2.0	5.0	5.4
	Gas	35.0	35.0	34.0	36.2
Insulation:	Formaldehyde	76.0	76.0	80.0	92.0
	Asbestos	88.0	88.0	86.0	93.5
Adult Smoking		100.0	100.0	98.0	98.0

* Adjusted percentages are calculated by deleting responses of "Don't know" and recalculating percentages based only on responses of "Yes," "No," or "Maybe." Percentages reported here represent those parents who responded "yes" (the numerator of the quotient) out of all parents who responded "yes," "maybe," or "no" (the denominator). The effect of this is to focus on responses which represent opinions and eliminate those responses which are essentially abstentions. Adjusted percentages for "ever having heard" that something may be a risk to children's health are identical to the raw percentages because there were no "Don't know" responses--i.e., all respondents reported that they had either heard or not heard things were harmful.

kerosene space heater, smoking tobacco in the home by parents or other household members (hereafter referred more succinctly as "parental smoking"), and use of formaldehyde foam or asbestos fiber for insulation. In addition, greater detail was obtained regarding beliefs of potential harm to children's health from heating with a fireplace in order to provide some measure of differences in the perception of risk between this very prevalent use of wood fuel and the increasing practice of heating with wood in woodburning stoves. It should be noted from the earlier discussion of indoor heating in subjects' homes that woodburning stoves constituted a primary source of heat in a significant portion (10%) of homes whereas fireplaces were not used as a primary heat source in any of the homes in the survey.

Parents' perceptions of risks to children's health in terms of safety and potential harm were assessed for these seven variables in two ways. First, they were assessed qualitatively using an ordinally ranked scale of very safe, safe, harmful, and very harmful. (It should be noted that for almost all questions in the interview "don't know" was an alternative response.) Second, respondents were asked to quantitatively rank each of these seven variables on a scale from zero to ten (where zero was defined as being no risk at all) in terms of how much risk they believed there was to children of having respiratory symptoms such as cough if each of the seven items were used or done indoors. The

correlation between the ordinal scale and the quantitative scale was positive and very significant ($p<.001$).

Results from the ordinal scale indicated that the source of indoor air pollution perceived as being least harmful was cooking with gas (11% of respondents ranking this as harmful or very harmful; conversely, 89% ranked this as safe or very safe). The second safest source of indoor air pollution was perceived as being heating with a fireplace (equipped with a screen), although the risk to children's health from this was viewed as being over three times as great as the risk from cooking with gas (with about 38% of respondents ranking the use of a fireplace for heat as harmful or very harmful). Heating with a woodburning stove was perceived as being only slightly more risky for children's health than heating with a fireplace, with about 43% of parents believing this to be harmful or very harmful. For the other four sources of indoor air pollution more than three-quarters of the parents perceived the risks to children's health as being harmful or very harmful, with 80% of parents feeling this way about using a kerosene space heater, 79% about formaldehyde foam insulation, 82% about asbestos fiber insulation, and 98% about parental smoking. The absolute (raw) and adjusted proportions of parents who felt each of these indoor exposures were very safe, safe, harmful, or very harmful are presented in Table 6.2.

It is interesting to compare the raw and adjusted proportions of parents who perceived the activities

Table 6.2: Proportions of Parents in a Random Sample of 100 Young Children from the Greater Lansing Area Who Believe That Customarily Used Sources of Indoor Air Pollution Are Very Safe, Safe, Harmful, or Very Harmful To Children's Health.**

Sources of Indoor Air Pollution	Believe Very Safe (Percent)		Believe Safe (Percent)		Believe Harmful (Percent)		Believe Very Harmful (Percent)	
	Raw	Adj*	Raw	Adj*	Raw	Adj*	Raw	Adj*
Cooking: Gas	7.0	7.1	81.0	81.8	11.0	11.1	0.0	0.0
Heating:								
Woodburning Stove	1.0	1.0	55.0	55.6	38.0	38.4	5.0	5.1
Fireplace***	1.0	1.0	60.0	60.6	33.0	33.3	5.0	5.1
Kerosene Space Heater	0.0	0.0	15.0	15.8	63.0	66.3	17.0	17.9
Insulation:								
Formaldehyde	0.0	0.0	6.0	7.1	53.0	62.4	26.0	30.6
Asbestos	0.0	0.0	6.0	6.8	49.0	55.7	33.0	37.5
Adult Smoking	0.0	0.0	2.0	2.0	64.0	64.0	34.0	34.0

* Adjusted percentages are calculated by deleting responses of "Don't know" and recalculating percentages based only on responses of "Yes," "No," or "Maybe." Percentages reported here represent those parents who responded "yes" (the numerator of the quotient) out of all parents who responded "yes," "maybe," or "no" (the denominator). The effect of this is to focus on responses which represent opinions and eliminate those responses which are essentially abstentions.

Table 6.2 (cont'd.)

** For raw percentages which do not sum to exactly 100.0%, the difference is attributable to responses of "Don't know" (e.g., 1.0% of respondents answered they did not know if cooking with gas may be very safe, safe, harmful, or very harmful to children's health). Any other proportions which do not sum to exactly 100.0% are due to rounding (e.g., adjusted percentages for insulating with formaldehyde foam).

*** Heating with a fireplace is included to provide a basis for evaluating perceptions of risks from heating with a woodburning stove in relation to another popular use of wood as fuel. Heating with a fireplace does not produce a significant amount of indoor air pollution by comparison to the six sources investigated in this study.

investigated as risks to children's health. These proportions were the same or nearly the same if there were no "don't know" responses (or a very low proportion) for a question. However, if there were a number of "don't know" responses the raw and adjusted proportions might be the same or they might be different, depending on how many persons had particular opinions out of the total number of respondents who had opinions.

The adjusted proportions were greater than the raw proportions for all the sources of indoor air pollution except parental smoking (for which everyone in the survey had an opinion). The differences between raw and adjusted proportions tended to become greater as the perceived severity of risk increased, such that the sources of indoor air pollution viewed as having the lowest risks had small differences between these proportions while sources viewed as having greater risks had greater differences. For example, the indoor activity which was perceived as least harmful to children's health was cooking with gas and for this activity the raw proportion of parents who felt it might be harmful or very harmful was 11.0% compared to an adjusted proportion of 11.1%. For heating with a woodburning stove the raw proportion who felt it might be harmful or very harmful was 43.0% and the adjusted proportion was 43.5%. However, for insulating with formaldehyde foam the raw proportion was 79.0% and the adjusted proportion was 93.0%; respective proportions for

insulating with asbestos fiber were 82% (raw) and 93.2% (adjusted). This observation has two implications. First, for the customary indoor activities viewed as having the greatest risks, a greater proportion of parents responded that they did not know if a particular indoor occurrence was safe or harmful. Second, of those parents who had an opinion, there was an increase in the proportion who considered the activity to be harmful or very harmful.

The quantitative assessment of parents' perceptions of risks to children's health from sources of indoor air pollution focused on risks of respiratory symptoms such as cough. Parents assigned a number value on a scale of zero through ten (where zero was defined as "no risk") for each item used or done indoors. The results closely paralleled those obtained with the ordinal scale which focused on whether parents felt the activities might be harmful to children's health (but did not specify risks). As with the ordinal scale, cooking with gas was perceived as the least harmful activity (mean = 2.3), followed by heating with a fireplace (4.5), heating with a woodburning stove (4.8), heating with a kerosene space heater (6.3), insulating with formaldehyde foam (7.1), parental smoking in the home (7.4), and having asbestos fiber insulation (mean = 7.6). The ranking of risks to children were identical on the qualitative and the quantitative scales except for the ranking of parental smoking and asbestos fiber insulation as most harmful and second most harmful. The activity

perceived as having the highest risk (using asbestos fiber insulation) was over three times as great as that perceived as having the lowest risk (cooking with gas). Further, as with the ordinal scale, there was little difference in perceptions of risks from indoor heating with a fireplace and with a woodburning stove, while use of a kerosene space heater was consistently viewed as being riskier than use of wood fuel through either of these means. Measures of central tendency (mean, median, mode) and variation (standard error and range) as well as confidence interval estimates at the 0.95 level of confidence for perceptions of risk as reflected by the quantitative scale are presented in Table 6.3.

The measures of variation for this data indicate that despite a clear ranking of perceived risks from the sources of indoor air pollution investigated, there was also great variation in the perception of these risks. Parents' responses ranged from zero (no risk at all) to ten (as much risk as possible) for all the sources of indoor air pollution except cooking with gas (range = 9) which was perceived as less risky and parental smoking (range = 8) which was perceived as a great risk.

Perceptions of Risks to Parents' Health from Sources of Indoor Air Pollution

In addition to their perceptions of risks to children's health from indoor air pollution, parents' perceptions of risks to their own health from two indoor air

Table 6.3: Measures of Central Tendency, Variation, and Interval Estimates for a Quantitative Scale of Parents' Perceptions of Risks to Children of Respiratory Symptoms Such as Cough from Customarily Used Sources of Indoor Air Pollution.*

Source of Indoor Air Pollution	Mean	Median	Mode	Standard Error	Range	0.95 Confidence Interval
Cooking: Gas	2.33	2.35	0.0	0.207	9.0	1.92 to 2.74
Heating:						
Fireplace**	4.47	4.65	5.0	0.265	10.0	3.94 to 5.00
Woodburning Stove	4.79	4.77	5.0	0.262	10.0	4.27 to 5.31
Kerosene Space Heater	6.34	6.56	5.0	0.261	10.0	5.82 to 6.86
Insulation:						
Formaldehyde	7.14	7.82	10.0	0.301	10.0	6.54 to 7.73
Asbestos	7.64	8.46	10.0	0.304	10.0	7.04 to 8.25
Adult Smoking	7.35	7.83	10.0	0.234	8.0	6.89 to 7.82

* The quantitative scale had a range of zero to ten, where zero was no risk at all; it should be noted that any value greater than zero indicates perceived risk.

** Heating with a fireplace is included to provide a basis for evaluating perceptions of risks from heating with a woodburning stove in relation to another popular use of wood as fuel. Heating with a fireplace does not produce a significant amount of indoor air pollution by comparison to the six sources investigated in this study.

pollutants and smoking tobacco were investigated. As previously mentioned, the two indoor pollutants were carbon monoxide (a well-known aspect of indoor air pollution, even in cars) and radon gas. Radon gas has been recognized as a serious contaminant of indoor air for some time but there appears to be little public awareness of its existence or associated risks. The most reasonable explanation for why risks from this compound have not been widely publicized is based on the two-pronged observation that radon gas is present in almost all indoor environments and that no one seems certain we can do very much about it. However, when we are dealing with daily exposure to a substance which could be causing or contributing to as many deaths from lung cancer per year as are attributed to cigarette smoking it would seem appropriate to both increase public awareness and seek effective solutions.

The risks parents perceived from carbon monoxide were uniformly related to suffocation and asphyxiation. The usual responses to questions about radon gas, however, were on the order of, "Radon what?" or, "You mean that stuff the Army uses?" A few persons were aware of its emission from buildings (walls, floors, ceilings, and furnishings) and that it contributes to background radiation levels. No one was aware that it contributes <u>most</u> of the background radiation dose from all sources of internally deposited radionuclides in the indoor environment (specifically, in the form of alpha particle emissions from the radon decay

chains of the parent compounds radon 226 and thorium 232). However, while only a few persons reported having heard of possible risks to health from radon gas exposure, nearly everyone believed that it would be harmful. Most parents could not specify why they believed radon gas would be harmful but some perceived risks of cancer, "being gassed" (in a military sense), and the full gamut of respiratory problems.

The perceptions parents of young children had about risks to their health from smoking tobacco were somewhat varied but everyone had heard of the Surgeon General and that "cigarette smoking is or may be hazardous to your health." Some parents considered cigarette smoking to be one of the greatest existing risks to health and that it should be entirely outlawed while others felt that more people should try it. For every person against smoking it seemed another was for it but regardless of other factors, everyone believed that smoking was harmful for <u>some</u> people and most expressed a belief that in the U.S. population as a whole smoking is "supposed to be" associated with the occurrence of lung cancer, cancer of the throat and mouth, emphysema, chronic cough, and general respiratory problems.

The results of the survey of 100 parents of young children concurred with and lent quantitative support to those of ethnographic interviews and observations with respect to perceptions of risks to health from carbon monoxide, radon gas, and smoking tobacco. Ninety-nine

percent of respondents had heard that carbon monoxide might be harmful while 100% had heard that smoking might be harmful and only 21% had heard that radon gas might be harmful to health. The proportion of parents who believed that carbon monoxide might be harmful to their health (99%) was identical to the proportion who were informed. For smoking tobacco there was only a slight difference (2%) from the proportion who were informed with 98% of parents believing that it might be harmful to their health. A very interesting instance in contrast to these is that of radon gas for which only 21% reported that they had heard it might be harmful (as mentioned above) and 27% believed it might be harmful. However, the adjusted proportion revealed that 72% of the respondents replied that they did not know whether they believed radon gas was harmful to their health; of those parents who expressed an opinion as to whether it might be harmful or not, 96.4% responded affirmatively (as compared to less than four percent who believed that it might not be harmful).

Factors Affecting Perceptions of Risks to Children's Health from Indoor Air Pollution

The parents who tended to perceive indoor air pollution introduced by indoor heating or other means as risks to children's health were qualitatively different from parents who did not perceive these risks, but not in the ways expected when data collection for this phase of the research commenced in 1982; these initial expectations and

hypotheses are discussed in Chapter 9. Results of open-ended interviews and observations (see Appendix IV) suggested a set of factors affecting parental perceptions of risks to children's health from indoor air pollution which appeared to be independent of ethnic identity and socioeconomic status. (The relationship between perceptions and conduct or risk-taking behavior is the subject of Chapter 7 and is not discussed here.)

The factors most parents considered to strongly influence their perceptions regarding indoor air pollution were their attitudes about pollution in general, where they lived (e.g., proximity to industrial sources of air pollution and to roads [auto exhaust]), their personal conduct such as smoking tobacco, and the intrusion of outdoor air pollution into their homes. Etically, a relationship was observed between parents who perceived risks from indoor air pollution and their attitudes and beliefs regarding health-related issues (such as sickness criteria for their children, illness experiences of their children and everyone else they knew, their confidence in the biomedical system, projected life expectancies, and beliefs regarding their capacity to avoid risks to health).

It was also clear from these data that parents often tended to believe (and repeat) what they heard on radio, television, in the newspaper and magazines, and from their friends. However, a surprizing number of people ironically appeared to have less confidence in what their doctors told

them about themselves (i.e., their own health) than they did in what was said concerning their children. Nearly everyone interviewed during the three years of data collection referred to the advances which medicine has made in identifying substances and behaviors which cause or contribute to disease and death. Further, in the majority of cases parents were confident that "medical science" will continue to make successful advances against disease and suffering. For example, most parents felt their children would live longer than they would because "we know more about things which can harm us and how to take care of ourselves." Thus, information emerged as a factor significantly influencing people's perceptions; further, information (irrespective of the medical authority of the source) appeared to be more consistently related to perception than most other factors (e.g., illness experience). However, many persons also perceived risks to health which they had never heard anyone make specific reference to (e.g., "Well, I never heard anybody say it was a risk but I've always thought it would be").

As previously discussed the questions asked during interviews with the parents of 100 children from the 1980-1981 Greater Lansing area birth cohort were based on factors which emerged in open-ended interviews. The results of the survey corresponded closely with those of the ethnographic data and provided a quantitative measure of the relative importance of different factors affecting perception. This

is particularly useful because the ethnographic data provided a rich description of perceptions and their linkages with other beliefs (see Appendix IV) but did not enable a clear distinction of which factors might be more important than others.

A number of variables assessed in the survey emerged as being significantly related to parents' perceptions of risks to children's health from indoor air pollution; these variables are listed in Table 6.4. The strongest predictors of whether parents perceived such risks were whether they had ever heard that a source of indoor air pollution might be harmful (especially to children's health) and their degree of concern with ecological issues. The summary variable (or scale) for perception of risks to health from indoor air pollution was positively correlated with the information scale at the 0.00001 level of significance and with the ecoethic scale at $p<.00015$. The perception of risk scale was significantly related ($p<.03$) to one other summary variable--self-assessment of health for the respondent and subject--but the relationship was not as strong as for the previous two variables.

Summarizing all variables which were significantly related to perception at the 0.05 level of significance, a profile emerged of parents who tended to perceive risks to their children's health from indoor air pollution. On this basis, parents who perceived these risks had generally heard something about them and regarded environmental problems

Table 6.4: Variables Significantly Related ($p<.05$) To Perceptions of Risks To Health From Indoor Air Pollution by the Parents of a Random Sample of 100 Young Children From the 1980-1981 Greater Lansing Area Birth Cohort.

Variable	Correlation Coefficient: Direct (+) or Inverse (-) Relationship	Significance
Information Scale*	+ .42	.001
Ecoethic Scale*	+ .35	.001
Health Assessment Scale*	- .19	.03
Reside Outside Lansing-East Lansing	+ .25	.007
Parents: Sickness Criteria for Children	+ .24	.009
Number of Children	- .20	.026
Mother Occupation	- .18	.035
Believe Able to Avoid Most Risks Out of the Home	- .17	.048
Perceive Environmental Problems As Major Risks to Health of the U.S. Population	+ .21	.020
Perceive Pollution As a Threat To Recreation	+ .17	.049
Believe Risks Always Cause Problems or Sometimes Cause Problems***	- .17	.049
Subject**: Sex***	- .21	.017
Preschool Status	+ .18	.037
Allergies	+ .19	.030
Asthma	+ .18	.035

Table 6.4 (cont'd.)

Variable	Correlation Coefficient: Direct (+) or Inverse (-) Relationship	Significance
Risk-Taking Behavior by Parents:****		
Ever Try Quit Smoking	+ .43	.008
Heat with a Kerosene Space Heater	- .23	.011
Heat with a Woodburning Stove	- .18	.034

* These are summary variables or scales which consist of groups of individual variables; the individual variables incorporated in the summary variables are summarized in Table 3.3.

** "Subject" refers to the children randomly selected from the 1980-1981 Greater Lansing area birth cohort whose parents were interviewed.

*** The value codes for the variable of "risk being perceived as always or sometimes causing problems" were (1) always and (2) sometimes; the negative correlation suggests that parents who perceive high risks to health from indoor air pollution tend to believe risks always result in problems. Subject sex was inversely related to perception of risk from indoor air pollution; the value codes for this variable were (1) male and (2) female, indicating that perceptions of risk tended to be higher for parents with boys than with girls.

**** Risk-taking behavior by parents was significantly related to perception of risks to health from indoor air pollution for these variables. However, this is not discussed in this chapter because it is the subject of Chapter 7. This data is presented in this table for the sole purpose of providing a complete profile (based on the stated statistical criteria) of parents who tend to perceive risks to health from indoor air pollution.

(and pollution in particular) as serious risks to health. The survey data also suggested that parents who perceived these risks as being very high (as opposed to believing they might be harmful) tended to have had more personal experiences with health problems than other parents and were more aware of symptoms of illness in children (from a biomedical standpoint). They tended to feel that they could not avoid many risks to health, believed they were unable to avoid risks out of their homes, and believed that risks to health nearly always cause illness or injury. These parents also tended to have only one child, mothers were generally unemployed, and the families tended to live in the rural and township areas outside the Lansing-East Lansing city limits. Parents with boys often perceived risks from indoor air pollution to their children's health as being greater than parents with girls. Parents whose children attended preschool, nursery school, or day care also perceived these risks as being greater than parents whose children remained confined primarily within the home (especially during the winter months which are extensive and very cold in Michigan). In addition, parents who perceived these risks generally believed that a wide variety of things in addition to indoor air pollution may be harmful to health.

CHAPTER 7

CORRESPONDENCE BETWEEN PERCEPTIONS OF RISKS TO CHILDREN'S HEALTH FROM INDOOR AIR POLLUTION AND RISK-TAKING BEHAVIOR BY PARENTS

Introduction

The principal objective of this phase of the study was to investigate the correspondence between parents' perceptions of risks to children's health from commonly used sources of domestic indoor pollution and their use of these sources of indoor air pollution (i.e., risk-taking behavior). It is a position of this paper that persons who use or do things which are known or suspected of being risks to health (whether they are aware of this or not) are taking risks and may be properly viewed as engaging in risk-taking behavior. In keeping with this orientation, two related objectives were to investigate the factors which influence risk-taking behavior in the area of indoor air pollution and to explore the qualities which distinguish parents who take these risks from those who do not.

Data are reported on risk-taking behavior and the extent to which this corresponded with perceptions of risks to children's health from the use of domestic sources of indoor air pollution. The reasons most frequently given by parents for using these sources of indoor air pollution are

reported and a profile is presented of parents who tended to use or do things which have a negative impact on indoor air quality. Finally, a model is presented of the interrelationship between perceptions of risks to health from indoor air pollution and risk-taking behavior by parents of young children. The model reveals an intricate network of factors mediating the relationship between perceptions and behavior and suggests that socioeconomic status is the most significant source of intracultural variation in this area.

The sources of indoor air pollution investigated were cooking with gas fuel, heating with a woodburning stove, heating with a kerosene space heater, insulating with urea-formaldehyde foam, insulating with asbestos fiber, and smoking by parents and others in the home. All of these except heating with a kerosene space heater have been associated with an increased occurrence of respiratory problems in children and all but insulating with asbestos fiber are entirely commonplace in our culture today.

Results

The results of this portion of the study suggest that perceptions of risks to children's health from domestic sources of indoor air pollution do not significantly affect their use by the parents of young children. Risk-taking behavior in this area is sometimes consistent but often

inconsistent with parents' perceptions of risks to their children's health and the extent to which they are informed of these risks. In addition, the findings suggest that parents who use domestic sources of indoor air pollution also tend to have similar socioeconomic status and share other characteristics and beliefs.

Ethnographic Findings

The sources of indoor air pollution investigated were cooking with gas fuel, heating with a woodburning stove, heating with a kerosene space heater, insulating with urea-formaldehyde foam, insulating with asbestos fiber, and smoking tobacco in the home by parents and others. As one would expect, different persons gave different reasons for using or doing these things indoors. However, by combining different responses from the open-ended materials a set of reasons emerged for using these sources of indoor air pollution (listed below), any of which might apply to a particular family.

Persons reported that they used a gas stove for cooking because gas was less expensive than electricity or because a gas stove came with their house. Some persons reported they preferred cooking with a flame over electric burners or a microwave.

The reasons reported by parents for heating with a woodburning stove were more varied than for any of the other sources of indoor air pollution investigated, ranging from

aesthetics and roasting marshmallows to economic necessity. Only one family heated with a woodburning stove because "it came with the house," and they had used it as their primary source of heat for over fifteen years. The other families interviewed had all purchased and installed their woodburning stoves as primary or supplementary sources of heat (generally in lower and middle SES families) or for aesthetic or "recreational" purposes (among middle and upper SES families).

The single most important reason that parents gave for heating with a woodburning stove was the economy of heating with wood, especially if they had readily available access and did not have to pay "city prices" for pre-cut wood. The importance of access to wood seemed to apply regardless of residence (i.e., inside or outside the city limits) for families motivated by economic concerns but was most apparent for families who cut wood on their own land. Families living in the city reported little difficulty, however, in obtaining wood free of charge or for a small (or "reasonable") price from nearby locations. Families who purchased pre-cut wood and used their woodburning stove as a principal source of heat, on the other hand, also felt convinced that they were saving a considerable amount by comparison to the cost of heating by alternative means (especially fuel oil and electricity). Surprisingly, there was no serious consideration of solar heating by most parents heating with wood.

Other reasons for heating with a woodburning stove were less pragmatic. Most persons heating with wood expressed a sense of independence from "the system" and expressed a sense of self-reliance from being able to confront the day to day realities of surviving freezing cold in a "natural way". For instance, when it is cold one does not simply adjust the thermostat if heating with wood because there generally is no thermostat (unless a family has one on a wood furnace or attached from a main furnace to a furnace add-on woodburning stove). For homes heating with wood as a primary source of heat wood is added three to six or more times per day, depending on the woodburning unit, the outdoor temperature, the desired indoor temperature, and other factors. While generally acknowledged as a "chore", most parents felt that the sense of self-sufficiency they derived from the daily routine of going outside to bring in wood acted to enhance rather than detract from the quality of their lives. It is as though the endless ritual of keeping the fire going somehow kept them in touch with the realities of moment to moment survival and, most importantly, with their success at this ongoing struggle. Among most families there was definitely a strong sense of "being able to make it on our own." Others, however, were saving diligently for a gas furnace and looked forward to "care-free heating."

Parents reported using a kerosene space heater for primarily economic reasons, although feelings of self-

sufficiency similar to those associated with using woodburning stoves were apparent. The use of kerosene was perceived as being considerably less expensive than fuel oil or electricity because the use of a space heater for certain areas of a home or at certain times of day (e.g., "in the kitchen in the morning before the [wood] heat gets going") eliminated the need to heat the whole house with a furnace. Several families had kerosene space heaters as backup sources of heat in the event of an emergency but did not use them on a regular basis.

The principal reasons parents gave for having formaldehyde foam insulation were that it came with the house or was recommended to them when they "improved" the insulation in their homes. While some were indifferent to having formaldehyde foam insulation others were concerned by public health warnings and a few parents wanted assistance getting the government to help them have it removed. None of the parents reported having asbestos fiber insulation in their homes.

The reasons offered for smoking tobacco in the home fell into three principal categories: parents either reported they enjoyed smoking, that it was a habit they didn't like but couldn't break, or that they didn't know why they smoked. The motivations for smoking are, of course, many and varied, ranging from oral fixation to nicotine addiction. Many parents reported a connection between smoking and eating or, more specifically, between smoking

and their ability to control their weight. Others felt it was calming and relaxing on the one hand and stimulating and refreshing on the other. The reasons for smoking in the home around children, however, were split into two groups based upon whether or not parents felt that exposure would "hurt my kid(s)". Those who felt it was potentially harmful generally thought the exchange of indoor and outdoor air eliminated the problem. Others rationalized their behavior by concluding it wasn't <u>that</u> harmful or professed that they did <u>not</u> smoke around their children in the home (but were often observed to do so).

The degree of correspondence between parents' use of these sources of indoor air pollution and their perceptions of risks to their children's health varied in accordance with the reasons for which parents used or did particular things. The conduct of parents who did not take these risks was generally consistent with their perceptions of associated risks to health. For example, one couple felt that exposure to cigarette smoking and heating primarily with a woodburning stove were serious risks to the health of their two young children and they did not do either of these things. However, their beliefs and behavior were influenced by experiences with their youngest child who had apnea during his first year (which would have been aggravated by smoke exposure) and tried to crawl into their free standing woodburning stove (which had been the family's primary source of heat until the episode occurred). Most parents

who perceived exposure to smoking, kerosene fumes from a kerosene space heater, formaldehyde foam and asbestos fiber insulation as risks to their children's health (in particular their respiratory health) and did not do these things said they did not use or do them for that reason. In many cases, however, the reasons parents gave for not using some of these sources of indoor air pollution (e.g., heating with wood) were unrelated to perceptions of risks to their children's health (for example, see Appendix III.5 which presents reasons given by parents in the survey for not heating with wood).

Parents who used these sources of indoor air pollution and did not perceive any risks to their own or their children's health were behaving in a way which was consistent with their perceptions. Likewise, those who had heard that things they use or do may be harmful to their children's health but did not believe it were also behaving in manner consistent with their perceptions of risk.

However, parents who perceived their use of these sources of indoor air pollution as risks to their children's health and continued to use them were behaving in a manner which was not logically consistent with their perceptions of associated risks to health. The observation that parents continued to use these sources of indoor air pollution, even when they were informed and believed that they may be harmful, suggests that risk-taking behavior with respect to the use of these sources of indoor air pollution is not

determined primarily by associated perceptions of risks to health. Data from the open-ended materials further suggest that family economics, personal habits, beliefs, and a number of other factors (discussed at the end of this chapter) have a stronger influence on conduct than perception. For example, parents who heated with a woodburning stove and perceived it as a risk to health invariably cited economic factors as the primary reason they continued to heat in that fashion. As one mother of five stated,

> Well, we ain't got no choice but to use wood. We cut it up for free and that's what gets us through the winter. But, with your lungs and breathing all that (smoke) in, I guess it just really gets them dirty. You probably would eventually have breathing problems. It's <u>real</u> dirty, too--the windows are real dirty. When we wash them off and look at the rag it's black from the soot, but it doesn't look like it would be when you look at the window. But when you look where you wiped you can tell that it's definitely really bad.

Another parent heating with a woodburning stove offered the following comments: "Sometimes the wood stove gets really clogged up and the pipes just smoke up the house really bad, and everybody starts coughing and it's really in your throats for about a week after that." Her opinions of the day to day risks from heating with wood were,

> Mostly just the coughing, irritated throat, and irritated eyes. But I <u>know</u> it doesn't bother (my husband)--he's pretty used to it. During winter (now) he's up almost all night keeping it going--five or six times a night--and every time he opens up the door smoke rolls out and comes right up the stairs into our rooms.

Another case where parents continued to heat with wood despite their belief that it was a risk to health is that where the perceived risk was fire. The comments of one parent demonstrate how these perceptions (or "fears" in this instance) are often minimized by what they view as the unavoidability of a situation promulgated by the economic necessity of taking the risk. In the parent's words, the reason for heating with their woodburning stove was, "It saves a lot of money and the money (which would otherwise be spent) can be put towards other things. It definitely gives you something to do in the winter, cutting wood, hauling wood, stuff like that." When asked about the fear she had expressed that one day the house might burn down she always replied by relating experiences of others:

> Our neighbor has a wood stove and their house almost burnt down one time from their wood stove. They're thinking about switching because they don't really want to put up with cleaning it all the time and getting the wood and doing it (heating) that way. They don't really like the idea of having a wood stove. I don't know the exact reason why, but I'm sure it's the hazards of it. There are some people down the side road who had a fire from their stove, and way down at the end a house burnt down completely because of the fire in the wood stove. We had a fire last year--it was a small one, but still it could have got worse if nobody would have saw it.

Smoking in the home is another area where an apparent contradiction between perception and conduct existed for parents who reported that they had heard and believed that it might be harmful to their children's health. Parents in this category tended to respond that they perceived smoking as a risk to their children's health and "do it anyway",

denied smoking around their children but actually did so (though not to the extent they would have liked), or chastised themselves with repeated self-recriminations. For example, when asked if he believed children could get sick from breathing things which were in the air, the two-pack-a-day smoker father of a four year old commented,

> Sure, like me smoking. I worry about that, you know. I'm worried about him just inhaling my smoke. I'm sure there's a lot of contaminants in the air we breathe--that's just one of those things, you know. You gotta live with it. There's not much you can do about it. I'm sure there's a hell of a lot of people contributing to air pollution, chemicals and such--the air quality's deteriorating and it's just one of those things. But he gets my smoke even if he's not directly near us and he's within a room here in the house. Sometimes it really bugs me that I smoke--it <u>really</u> bugs me. 'Course, I never had any fresh oxygen, pure oxygen, you know--I don't know what it'd do to me.

Another representative point of view of parents who felt adult smoking was potentially harmful to children's health but continued to smoke was that, "Yeah, I know it's bad and I really should do something about it, but, I don't know." This view was especially prevalent among parents who felt that there was already so much air pollution that "a little bit more really doesn't matter" (despite the visibility of their contributions indoors). However, many parents who smoked and felt it might be harmful for their children expressed a sense of accountability, which they acknowledged, and some said they felt that they were not behaving in the best interests of their children's health. A smoking mother of a preschooler summarized this position

well when she said that she felt there was little she and her husband could do about preventing risks to her children from things in the air, "Except for our smoking--we could do something about that. I think about that--about his (their son) breathing our smoke, our cigarette smoke--'cause I know what it does to my lungs."

Survey Findings

The results of interviews with the parents of a random sample of 100 young children from the Greater Lansing area closely complemented the general findings of open-ended interviews and observations. Further, the sample design and the quantitative dimensions of the data allowed statistical testing of inferences (hypotheses) generated from the open-ended materials. In order to establish a descriptive frame of reference for specific findings regarding the relationship between parents' perceptions and risk-taking in the area of domestic indoor air pollution, a description of the sample will precede presentation of results.

Overview of Survey Sample

The sample of 100 randomly selected preschool children from the 1980-1981 Lansing area birth cohort was 51% male and 49% female. All these children (hereafter referred to as subjects) lived in the 5-county Greater Lansing area (Ingham, Eaton, Clinton, Shiawassee, and Ionia counties) with 50% of the subjects residing within the

Lansing-East Lansing city limits (43% in Lansing; 7% in East Lansing) and the remaining half in the surrounding townships and rural areas. In contrast to this etic division of residence based on address, 35% of the respondents in the survey considered themselves to live in a city, 14% in a town, 26% in the suburbs, and 25% in the country. Ninety-two percent of the families in the survey lived in houses, six percent in an apartment or townhouse, and two percent in a mobile home. The length of residence in the five county area ranged from four to 38 years with a mean of 15.3 years.

The respondents during interviews were generally the mothers of subjects (95%); three percent of respondents were fathers who were the usual primary caregiver for the child during the time of day the interview was conducted and two percent were subject's grandmothers raising their daughter's children. Ninety-five percent of respondents classified themselves and their families as being white when asked their ethnic identity; two percent classified themselves as black, two percent as hispanic, and one percent classified the ethnic identity of the father as black and of the mother and children as white. The ages of mothers of subjects in the survey ranged from 21 to 43 years and were very nearly normally distributed, the mean being 32.2 years, the median 32.6, and the mode 33 years. The ages of the fathers of subjects ranged from 25 to 49 years. The mean age of the fathers of subjects was slightly higher at 34.4 years with a median of 34.2 and a modal age of 38 years. Unlike the age

distribution of subjects' mothers, the age distribution of fathers showed a nearly equal frequency in each single year age class from 30 to 38 years inclusive.

Allergies were reported in 18% of the subjects and asthma in eight percent. Sixty-six percent of the subjects were reported to have never had a serious illness of any kind, while 32% had one serious illness and two percent had three. Respondent assessments of subject's serious illness experiences corresponded closely with the reported hospitalization experiences of subjects in the sample, with 62% of the subjects never having been hospitalized, 27% having been hositalized once, four percent having been hospitalized twice, four percent three times, one percent four times, one percent seven times, and one percent eight times. Forty-two percent of the subjects in the sample did not have any of the aforementioned (allergies, asthma, serious illness, or hospitalization) while 58% had at least one of these illness experiences.

The number of children of parents of subjects in the survey ranged from one to ten. Most (75%) of the parents interviewed in the survey had two or three children with 45% having two and 30% having three children; 14% had only one child and the remaining 11% had between four and ten children.

As regards employment, six percent of subjects' fathers were not employed as compared with 37% of their mothers. Employment status for the occupations of fathers

and mothers was ranked into three ordinal categories (low, middle, high) and results showed that 57% of the fathers were employed in low status positions, 34% in middle status, and 3% in high employment status positions as compared with 50% of working mothers in low status employment, 12% in middle status, and 1% in high. One notes in comparing these distributions that the proportions of working fathers and mothers with lower status employment is approximately the same and that the greatest difference between the two distributions (fathers' and mothers' occupation scores) is in the category of middle employment status where fathers tended to be significantly more employed than mothers (approximately three times as many). This difference is accounted for by the greater proportion of mothers who were not employed (six times as many as fathers).

With respect to education, 67% of subjects' fathers completed high school or had some college education (39% high school graduate, 28% some college). Twenty-two percent of subjects' fathers graduated from college while five percent had at least some graduate study and two percent did not graduate from high school. Sixty-nine percent of subjects' mothers completed high school or some college (42% graduated high school, 27% some college); 21% of subjects' mothers graduated from college while six percent had at least some graduate study and three percent did not graduate from high school. As one observes from comparing these

proportions the education distributions for the mothers and fathers of subjects are nearly identical.

A summary scale for socioeconomic status was created by combining scores for the occupation and education of subjects' mothers and fathers. Income was not elicited during the interview as pretesting of the interview schedule indicated this question could be very intimidating to respondents and was not essential to evaluating socioeconomic status since occupation and education vary directly with and are very strong indicators of income (the third customary criterion for assessing socioeconomic status). The logical assumption was made that for equivalent employment statuses between (not within) households, those households where both the mother and father were working had greater income than those where only one primary caregiver was working. On this basis, the occupation scores for both mother and father were added to the education scores for both mother and father to provide a summary score for socioeconomic status. Subsequent ranking of these scores (based on their raw distribution) provided a breakdown into conventional ordinal categories for socioeconomic status (SES) of lower, middle, and upper, as follows: 36% lower SES, 40% middle, and 24% upper SES.

Indoor heating for households in the sample was assessed in terms of primary and supplementary (secondary, tertiary, quarternary) heating. The primary source of heat for a household was defined for respondents during

interviews as providing half or more of the heat for their home. A supplementary heat source is any additional source of heat used in conjunction with a primary source of indoor heating. The phrase secondary heat source refers to the source of heat which respondents considered to be second most important; likewise, tertiary heat source represents the third most important and quarternary the fourth. None of the households in the survey had more than four sources of heat in the home.

Most (79%) of the households in the survey heated with gas as the primary source of heat, nine percent with fuel oil, two percent with electricity, and 10% with a woodburning stove or wood furnace. Fifty-five percent of the households had a supplementary heat source. Secondary heat sources (as designated by respondents) and their associated proportions in the sample were as follows: no second heat (45%), fuel oil (5%), gas (3%), electricity (2%), woodburning stove (8%), electric space heater (11%), fireplace (17%), kerosene space heater (6%), and solar (3%). Eighty-six percent of the households in the sample had only two sources of heat while one percent designated gas as a tertiary heat source, three percent electric space heaters, six percent a fireplace, and four percent a kerosene space heater. Ninety-six percent of the households in the sample did not have a fourth source of heat in the home, with one percent using an electric space heater, two percent a fireplace, and one percent a kerosene space heater. Seventy

percent of the families in the sample had never heated with wood as a primary or supplementary source of heat while 30% either did so currently or had in the past.

Seventy-six percent of the households used a humidifier or vaporizer in the home (about 25% of the humidifiers being attached to a furnace) while 17% used an air filter (59% of these being attached to a furnace). Fifty-three percent of the households used an air conditioner or dehumidifier, with approximately half as many air conditioners as dehumidifiers in use.

As regards cooking fuel, 73% of the households in the sample cooked with an electric stove. The remaining 27% used a gas stove fueled by utility gas or bottled liquid propane.

Eight percent of the households in the survey reported having urea-formaldehyde foam insulation, none reported asbestos, approximately one-third (31%) did not know the kind of insulation in their home, and the remaining 61% used reportedly "safe" insulation materials such as fiberglass and cellulose.

Parental smoking was fairly evenly divided in the sample with 55% of the subjects' parents being non-smokers and 45% smoking tobacco of some form (predominantly cigarettes). Twenty-seven percent of the households had one adult smoker among the primary caregivers while 16% had two smokers and two percent had three smokers. In all, 45% had at least one adult smoker in the home. Of parents who had

ever smoked 90% reported that they had either tried to quit or succeeded; of parents who were currently smoking, 62% reported that they had at some point tried to quit and 11% were currently trying to quit.

Correspondence Between Perceptions of Risks from Indoor Air Pollution and Risk-Taking Behavior

The data presented above describing the sample and the use of things which affect the indoor environment provides sufficient background to focus on the use of sources of indoor air pollution. Of the six sources of indoor air pollution investigated in this study, five were used by the parents of young children in the sample, specifically, cooking with gas fuel (27% of the sample), heating with a woodburning stove (18%), heating with a kerosene space heater (11%), having formaldehyde foam insulation (8%), and smoking by parents and other members of the household in the home (hereafter referred to more concisely as parental smoking; [45%]). None of the households in the sample had asbestos fiber insulation in their homes. As previously noted, each of these except heating with a kerosene space heater has been associated with an increased occurrence of respiratory problems in young children. Further, there is documented evidence that kerosene space heaters emit some of the same pollutants (in excess of recommended standards) produced by sources of indoor air pollution which have been associated with respiratory problems in children.

A majority (75%) of the parents in the sample used at least one of the sources of indoor air pollution investigated. Forty-five percent of the parents used only one of these and 30% used two or more. For those using two or more, 26% of the parents in the sample used two and four percent used three of the five sources of indoor air pollution; (none used four or all five).

The risk most frequently taken among parents using only one of the sources of indoor air pollution was smoking tobacco in the home (22% of the sample). Cooking with gas was less than half as prevalent as a single risk (10%), followed by heating with a woodburning stove (8%), heating with a kerosene space heater (4%), and insulating with formaldehyde foam (only 1%).

There was no clear pattern of association between the taking of one risk and another for parents using more than one of these indoors; the use of each source of indoor air pollution was found in association with at least one of the others for all five. Parental smoking was proportionately more prevalent than the other four as a risk-taking behavior found in conjunction with others, as one would expect from its proportionately greater occurrence among parents in the sample. Parental smoking was found in combination with cooking with gas in 10% of the homes in the sample and in combination with heating with a woodburning stove in five percent. While only four percent of the parents used three sources of indoor air pollution in their homes, it is

interesting to note that half of these involved heating with a woodburning stove, insulating with formaldehyde foam, and parental smoking (although not the same homes). The proportions of parents using the different sources of indoor air pollution are presented in detail in Table 7.1.

The extent to which the use of these sources of indoor air pollution corresponded with parents' perceptions of associated risks to their children's health varied among different risk-taking subgroups, although general patterns did emerge for parents who tended to take these risks (discussed later in the chapter). Of particular interest is that the ranking by parents of these sources of indoor air pollution from least to most harmful to children's health was the same for the combined subgroups of risk-takers as it was for the sample as a whole. There were, however, some very interesting differences for some subgroups of risk-takers between the proportions of parents who perceived risks in the subgroups and in the entire sample. The following paragraphs will examine each risk-taking subgroup with respect to the proportion who perceived the source of indoor air pollution they used as a risk to children's health, a comparison of this with the proportion for the whole sample, and an evaluation of the degree of consistency between perceptions of risk and risk-taking behavior.

Cooking with gas was perceived as being the least harmful of the sources of indoor air pollution investigated, considered harmful or very harmful by 11.1% of the parents

Table 7.1: Proportions of Parents in a Random Sample of Young Children from the 1980-1981 Greater Lansing Area Birth Cohort Who Used Domestic Sources of Indoor Air Pollution (Grouped by Number of Sources Used).*

Number of Sources Used and Domestic Sources of Indoor Air Pollution (IAP)	Proportion of Parents (Percent)
One IAP Source Used:**	
Cooking with Gas	10.0
Heating with a Woodburning Stove (WBS)	8.0
Heating with a Kerosene Space Heater (KSH)	4.0
Insulating with Formaldehyde Foam (HCHO)	1.0
Parental Smoking***	22.0
Two IAP Sources Used:****	
Heating with WBS and Cooking with Gas	2.0
Heating with WBS and Heating with KSH	1.0
Heating with WBS and Parental Smoking	5.0
Heating with KSH and Cooking with Gas	1.0
Heating with KSH and HCHO Insulation	1.0
Heating with KSH and Parental Smoking	3.0
HCHO Insulation and Cooking with Gas	1.0
HCHO Insulation and Parental Smoking	2.0
Parental Smoking and Cooking with Gas	10.0

Table 7.1 (cont'd.)

Number of Sources Used and Domestic Sources of Indoor Air Pollution (IAP)	Proportion of Parents (Percent)
Three IAP Sources Used:	
Heating with WBS, Heating with KSH, and Cooking with Gas	1.0
Heating with WBS, HCHO Insulation, and Parental Smoking	1.0
HCHO Insulation, Parental Smoking, and Cooking with Gas	2.0

* Percentages presented represent proportions for the entire sample (e.g., 10% of all parents in the sample had a gas stove which was the only domestic source of indoor air pollution in their homes). On this basis, 75% of the parents in the survey used at least one of the sources of indoor air pollution; 45% used one source of indoor air pollution, 26% of all parents in the sample used two sources, and 4% used three.

** These are presented in order from least to most harmful to children's health as perceived by parents who used the sources of indoor air pollution investigated.

*** Parental smoking refers to smoking tobacco by parents and others in the home.

**** Each combination is presented only once in the interest of brevity. For example, 2% of parents heated with a woodburning stove AND cooked with a gas stove. This data is presented only once rather than also being listed as "2% cooked with a gas stove AND heated with a woodburning stove."

in this subgroup; conversely, it was perceived as being safe or very safe by 88.9%. This proportion is identical to the proportion of parents in the entire sample who perceived cooking with gas as being harmful or very harmful. The low proportion of parents who considered this activity a risk to their children's health suggests that the behavior of parents in this area is generally consistent with their perceptions of associated risks to health. In addition, the correlation between use of gas for cooking and perceptions of risks to children's health from the larger category of indoor air pollution in general was very near zero, suggesting that perceptions of risks to health in this area did not exert a significant influence on the use of gas cooking fuel.

Parents who heated their homes with a woodburning stove or wood furnace provide an interesting statistical illustration of the kinds of contrasts which were observed in the field. Heating with a woodburning stove was perceived as being harmful or very harmful to children's health by 27.7% of parents heating by this means. However, in the sample as a whole 43.0% perceived the use of woodburning stoves as harmful or very harmful (55% more than among woodburning stove users). Thus, parents heating with a woodburning stove tended to perceive it as being about half as risky to their children's health as parents in the sample as a whole. This suggests a correspondence between perception and conduct for parents in this subgroup as

almost three-quarters (72.3%) of the parents heating with wood perceived the use of a woodburning stove as being safe or very safe. In addition, the correlation between use of a woodburning stove or wood furnace for indoor heating and perceptions of risks to children's health from indoor air pollution was negative (indicating an inverse relationship) and statistically significant ($p<.034$). This indicates that parents who heated with wood tended to perceive associated risks to their children's health as being low and, conversely, that parents who did not heat with wood tended to perceive associated risks as being high. This observation supports the earlier conclusion that the use of wood fuel for indoor heating by parents in the sample was logically consistent with their perceptions of risks to health. The correlation data further suggest that perceptions of risks to children's health from indoor air pollution have a significant influence on the use of woodburning stoves for indoor heating by the parents of young children.

The source of indoor air pollution perceived by the risk-taking subgroups as next most harmful was heating with a kerosene space heater. This was considered harmful or very harmful to children's health by 36.4% of the parents who used this source of heat. The comparison between proportions of parents in this subgroup and in the entire sample who perceived heating with a kerosene space heater as being harmful or very harmful to children's health was very

similar to findings of the comparison for the woodburning subgroup. Eighty percent of parents in the sample as a whole perceived heating with a kerosene space heater as harmful or very harmful, over twice the proportion for those heating with kerosene space heaters. Thus, as with woodburning stoves, parents heating with a kerosene space heater tended to perceive this as involving considerably less risk than parents in the entire sample. This suggests a correspondence between perceptions of risks to health and the use of this form of indoor heating. However, the correspondence does not seem as strong as for the woodburning subgroup because only 63.6% of parents heating with kerosene space heaters perceived the activity as being safe with respect to their children's health. On the other hand, the correlation data support the conclusion of a general correspondence between perception and conduct for parents in this subgroup. The correlation between use of kerosene space heaters and perceptions of risks to children's health from the general category of indoor air pollution was negative (indicating an inverse relationship, as with the woodburning stove subgroup) and significant at $p<.011$. This indicates that parents who used this source of heat tended to perceive associated risks to their children's health as being low and parents who did not use this source of heat tended to perceive risks to health as being high. The correlation data further suggests that parents' perceptions of risks to children's health from indoor air

pollution had a significant effect on the use of kerosene space heaters for indoor heating by parents in the sample.

The use of formaldehyde foam insulation was ranked as the second most harmful of the sources of indoor air pollution investigated. Unlike the three previously discussed subgroups, a majority (75%) of parents whose homes had this type of insulation perceived it as harmful or very harmful to their children's health. This was almost identical to the proportion of parents in the sample as a whole who perceived insulating with formaldehyde foam as harmful or very harmful (79%). Comparison of these proportions suggests that the use of this form of insulation is inconsistent with parents' perceptions of associated risks to children's health. In addition, the correlation between use of formaldehyde foam insulation and parents' perceptions of risks to children's health from indoor air pollution in general was positive and although the relationship was not significant at $p<.05$ it was significant at $p<.10$. This supports the conclusion that use of this insulation was generally inconsistent with perceptions of risks to health and suggests that perceptions of risks from indoor air pollution had no significant influence on the use of formaldehyde foam insulation.

The source of indoor air pollution perceived as being most harmful to children's health was smoking in the home by parents and others (parental smoking). Almost all parents who smoked (95.6%) perceived their conduct as harmful or

very harmful to children's health. This corresponded closely with the proportion in the entire sample who perceived smoking as harmful or very harmful to children's health (98.0%) and suggests that smoking in the home is inconsistent with parents' perceptions of associated risks to children's health. However, the correlation was negative (although not very significant) between parental smoking and perceptions of risks to children's health from indoor air pollution in general, indicating that parents who perceived risks from indoor air pollution as being high tended not to smoke in the home while those who perceived risks as low were more likely to smoke. This suggests a consistency between perception and conduct for smoking parents which is not supported by data on the proportion of smoking parents who believed their smoking was harmful or very harmful to children. On the other hand, the relationship between parental smoking and perceptions of risks from indoor air pollution was not significant ($p>.05$) which suggests that parents' perceptions did not exert an appreciable influence on their behavior in this area. The proportions of parents who used these five sources of indoor air pollution and perceived them as being safe, very safe, harmful, and very harmful are presented in Table 7.2.

Analysis of the relationship between the summary variables for perceptions of risks from indoor air pollution and risk-taking behavior in this area suggest that, in general, perceptions of risks do not significantly influence

Table 7.2: Proportions of Parents in a Random Sample of Young Children from the Greater Lansing Area Who Used Sources of Indoor Air Pollution and Perceived Their Use as Very Safe, Safe, Harmful, or Very Harmful to Children's Health.

Sources of Indoor Air Pollution	Proportion (as %)* Who Perceived the Use of Sources of Indoor Air Pollution as Being: Very Safe	Safe	Harmful	Very Harmful
Cooking: Gas	11.1	77.8	11.1	0.0
Heating:				
Woodburning Stove	5.6	66.7	22.2	5.6
Kerosene Space Heater	0.0	63.6	36.4	0.0
Insulation:				
Formaldehyde Foam**	0.0	12.5	62.5	12.5
Parental Smoking	0.0	4.4	77.8	17.8

* If percentages do not sum to exactly 100.0% it is due to rounding error (e.g., heating with a woodburning stove) unless otherwise noted.

** 12.5% of parents using formaldehyde foam insulation responded that they did not know if it was safe or harmful. There were no "don't know" responses for any of the other sources of indoor air pollution.

risk-taking behavior. However, the correlation between these summary variables was negative, indicating that there was a tendency for parents who perceived risks from indoor air pollution as being high to not use the sources of indoor air pollution investigated while those who perceived risks as low tended to use them. Another important qualification is that these tendencies were not very strong.

Descriptive data comparing the proportions of parents who perceived risks as high or low (based on ordinal groupings) to the proportions who were in the high or low risk-taking category with respect to indoor air pollution supports the conclusions of the correlation data. For example, of the parents who perceived risks from indoor air pollution as low, 59.2% were in the low risk-taking group and 40.8% were in the high risk-taking group. However, of the parents who perceived risks from indoor pollution as being high, 62.7% were low risk-takers and 37.3% were high risk-takers. It is evident from this data that as perceptions of risk increased the proportion of parents in the high risk-taking group decreased. This reversal of the proportions in the low and high risk-taking groups conforms to what one would expect in that it demonstrates a degree of consistency between perceptions and behavior. A similar pattern emerges when comparisons of the proportions of parents in low and high risk-taking categories who perceive associated risks from indoor air pollution as low or high are evaluated. Of parents in the low risk-taking group,

47.5% perceived risks from indoor air pollution as low and 52.7% perceived them as high. While this is nearly an even split, the proportions reversed for the high-risk taking group, with 51.3% perceiving risks as low and 48.7% as high. This data supports the seemingly contradictory findings from the open-ended materials in that while there appeared to be no significant relationship between perceptions of risk and associated risk-taking behavior there also appeared to be some relationship.

The proportions of parents in different categories for the entire sample further support these conclusions, with 29% of parents who perceived risks as low being in the low risk-taking category while a smaller proportion, 20%, perceived risks as low and were in the high risk-taking category. Similarly, 32% of parents in the sample as a whole perceived risks from indoor air pollution as being high and were low risk-takers while a smaller proportion, 19%, perceived risks as high and were in the high risk-taking category. These findings corroborate the conclusion that although the relationship between perception and behavior with respect to indoor air pollution was not very strong, there was at least some consistency between perceptions of risk and risk-taking behavior in the random sample of parents.

Factors Affecting Use of Sources of Indoor Air Pollution by Parents of Young Children

The open-ended ethnographic materials indicated that a number of factors affected risk-taking behavior with respect to the domestic use of sources of indoor air pollution. (These are discussed in earlier chapters and are the principal basis of [and included in] the interview schedule in Appendix II.) Further, these observations suggested that the extent to which perceptions of risks to health influenced risk-taking behavior varied according to the source of indoor air pollution under consideration.

The factor which emerged most frequently in the open-ended materials in relation to the use of these sources of indoor air pollution was the socioeconomic status of a family. This was consistent with the findings from the survey, which provided an additional quantitative perspective (discussed later). The illness experiences of children was another factor indicated by the open-ended materials as having a significant effect on the use of domestic sources of indoor air pollution by parents. In addition, a set of beliefs emerged which seemed related to the kinds and amount of risk parents perceived on the one hand and the risks they took on the other. Perceptions of risks to health from indoor air pollution may properly be viewed as a subset of this larger collective of beliefs, which is qualitatively distinguishable from more objective categories such as socioeconomic status, illness experience, and risk-taking behavior.

The application of this categorical framework to analysis of the distributions and interrelationships of variables assessed in the survey revealed an intricate network of factors which were significantly related ($p<.05$) to both perceptions and risk-taking behavior regarding the use of sources of indoor air pollution. The model suggested by the survey data of the principal factors intermediating the relationship between perceptions of risk from indoor air pollution and associated risk-taking behavior is presented in Figure 1. One of the most interesting aspects of this model is that only one factor was shared in common (with no intervening variables) between perceptions of risk and risk-taking behavior (which themselves were <u>not</u> significantly related [$p = .123$; $r = -.117$]). That factor was the degree of concern parents had with ecological issues (i.e., ecoethic) as reflected by their score on the ecoethic scale (see Chapter 3). The ecoethic summary variable was, however, much more strongly related to perception than behavior, being directly correlated with perceptions of risk at $p<.00015$ and inversely correlated with risk-taking behavior at $p<.024$.

The summary variable for information with respect to indoor air pollution was the single greatest influence on perceptions of risk by parents in the sample, being directly related at $p<.00001$. This was, in fact, the most significant relationship which emerged in the entire

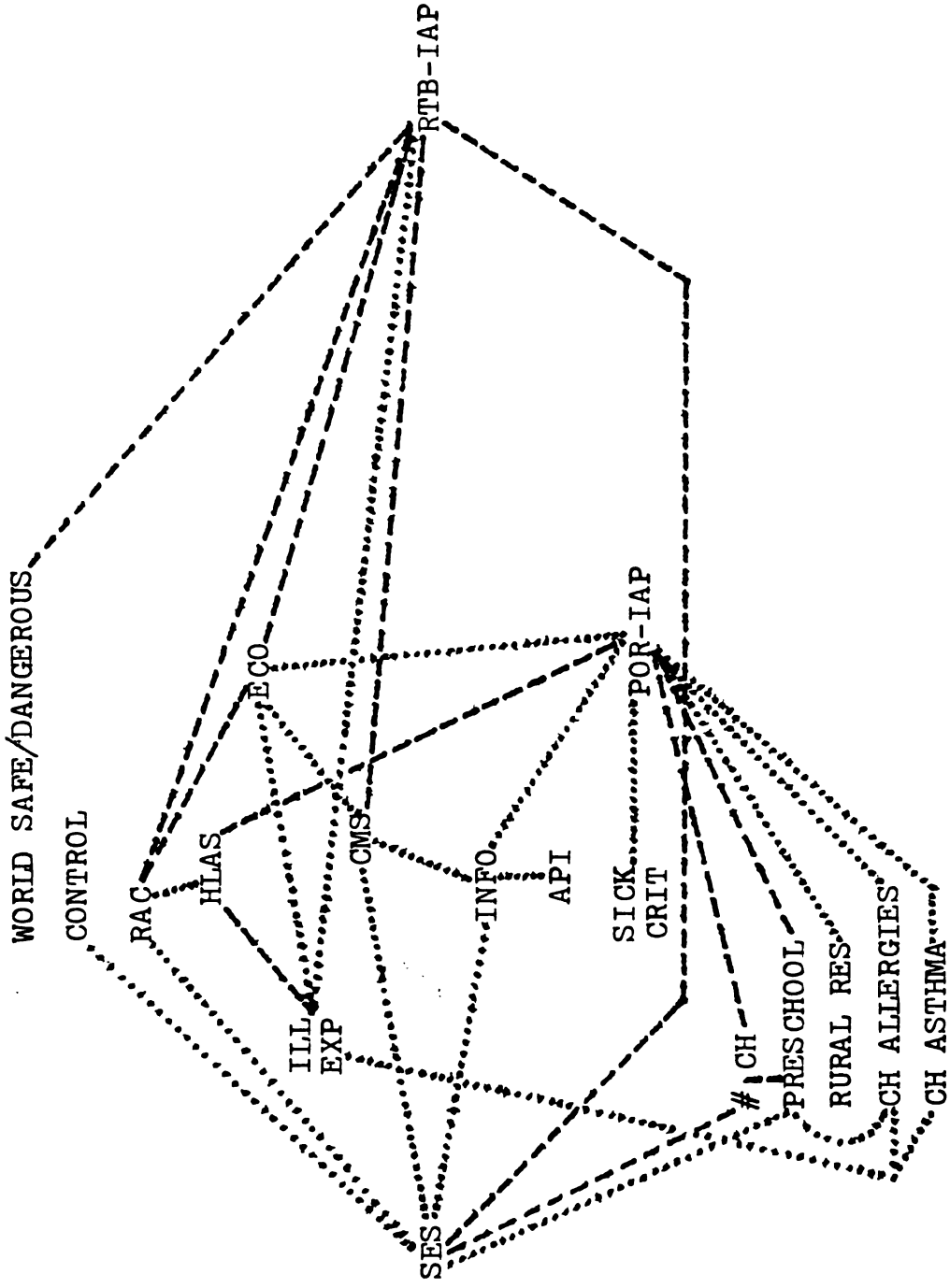

Figure 1. Network of Factors Significantly Related ($p < .05$) to Parents' Perceptions of Risks to Children's Health from Indoor Air Pollution (POR-IAP) and Their Use of Sources of Indoor Air Pollution (RTB-IAP).

Figure 1: Network of Factors Significantly Related ($p<.05$) To Parents' Perceptions of Risks to Children's Health from Indoor Air Pollution (POR-IAP) and Their Use of Sources of Indoor Air Pollution (RTB-IAP).

KEY:

..... = Direct Linear Relationship

---------- = Inverse Linear Relationship

POR-IAP	Perceptions of Risks to Children's Health fromIndoor Air Pollution
RTB-IAP	Risk-Taking Behavior by Parents with respect to the Use of Sources of Indoor Air Pollution
SES	Socioeconomic Status
ILL EXP	Illness Experience of Parents' Children
HLAS	Self-Assessment of Health (Parents & Children)
SICK CRIT	Parents' Sickness Criteria for Children
CMS	Confidence in Biomedicine
INFO	Information Regarding Risks to Health
ECO	Ecoethic--Degree of Concern with Ecological Issues
API	Air Pollution Intrusion from Outdoors into the Home
CONTROL	Control of Air Quality and Physical Health
RAC	Perceived Risk Avoidance Capacity
RURAL RES	Rural Residence
# CH	Number of Children in Family
PRESCHOOL	Preschool Status of Children
CH ALLERGIES	Children Have Been Diagnosed as Having Allergies
CH ASTHMA	Children Have Been Diagnosed as Having Asthma

analysis; the third most significant relationship ($p<.00015$) was that between ecoethic and perceptions of risk.

The second strongest relationship in the sample was between socioeconomic status and risk-taking behavior, which were inversely related at $p<.00006$. While the summary variable for socioeconomic status did not emerge as being significantly related to perceptions of risks to health, socioeconomic status was significantly related (a positive correlation) to parents' information status with reference to indoor air pollution which, in turn, was the strongest single influence on perceptions of risks from indoor air pollution. Thus, socioeconomic factors emerged as being the most significant determinants of both perceptions of risks from indoor air pollution (via information status) and associated risk-taking behavior by the parents of young children in the sample.

In addition to suggesting a model of the network of variables mediating the relationship between perceptions of risks to children's health and the use of domestic sources of indoor air pollution, the survey data also suggested a profile of parents with young children who tended to take these risks. The variables assessed in the survey which were significantly related ($p<.05$) to risk-taking behavior with respect to indoor air pollution are listed in Table 7.3. Based on these findings, parents with young children who used the domestic sources of indoor air pollution investigated in this study tended to have lower

Table 7.3: Variables Significantly Related ($p<.05$) To the Use of Sources of Domestic Indoor Air Pollution by the Parents of a Random Sample of 100 Young Children From the 1980-1981 Greater Lansing Area Birth Cohort.

Variable	Correlation Coefficient: Direct (+) or Inverse (-) Relationship	Significance
Socioeconomic Status Scale*	- .37	.001
Self-Assessment of Ability to Avoid Risks to Health: Risk Avoidance Capacity Scale*	- .29	.002
Ecoethic Scale*	- .20	.024
Confidence in Biomedicine Scale*	- .20	.026
Subject** Illness Experience Scale*	+ .18	.037
Parents:		
Believe Risks to Health Always or Sometimes Result in Problems***	- .28	.002
Believe Doctor Regarding Their Own Health	- .25	.004
Assessment of Subject** Health	- .18	.036
Having a Religious Affiliation	- .22	.014
Believe Air Outside the Home Is Better to Breathe	+ .19	.030
Believe There Are Unknown Risks to Children's Health Outside the Home	- .18	.040
Consider Self Sick If Spouse Says So	+ .18	.036

Table 7.3 (cont'd.)

Variable	Correlation Coefficient: Direct (+) or Inverse (-) Relationship	Significance
Parents (continued):		
Use an Air Conditioner or Dehumidifier	- .19	.035
Use an Air Filter	+ .18	.040
See the World As a Safe or Dangerous Place****	- .17	.043
Assessment of Ability to Avoid Risks to Their Own Health Inside the Home	- .16	.045

* These are summary variables or scales which consist of groups of individual variables; the individual variables incorporated in the summary variables are summarized in Table 3.3.

** "Subject" refers to the children randomly selected from the 1980-1981 Greater Lansing area birth cohort whose parents were interviewed.

*** The value codes for this variable were (1) always and (2) sometimes; the negative correlation indicates that parents who used these sources of indoor air pollution tended to believe that taking risks to health always results in problems.

**** The value codes for this variable were (0) safe, (1) both, (2) dangerous; the negative correlation indicates that parents who used these sources of indoor air pollution tended to perceive the world as a "relatively safe place" as opposed to a "relatively dangerous place" or "both".

socioeconomic status and to not be concerned with ecological issues (especially environmental pollution). Risk-taking parents also generally believed they could not avoid most risks to their or their children's health, especially in the home, and that there were very few unknown risks to their children's health outside their homes. The children of these parents tended to have a significantly greater occurrence of serious illness and were more often assessed by their parents as having poor or fair health than the children of non-risk-takers. In contrast to this observation, the risk-taking parents generally had little confidence in modern biomedicine and did not usually believe what doctors told them about their own health. On the other hand, they generally considered themselves to be ill if their spouse said so. Parents who used sources of indoor air pollution did not usually have a religious affiliation and tended to believe that taking risks always results in injury or illness. In addition, these parents generally viewed the world as a safe place while non-risk-taking parents viewed the world as a more dangerous place. Finally, and not surprisingly, parents who used these domestic sources of indoor air pollution believed that the air outside their homes was usually "better to breathe" than the air inside their homes.

CHAPTER 8

GENERAL PERCEPTIONS OF RISKS TO HEALTH

Introduction

The research objectives of this study focused primarily on risks to children's health from indoor air pollution and parents' perceptions of these risks. However, parents' perceived a wide variety of risks to children's health other than indoor air pollution. The principal objective of this portion of the study was to investigate general perceptions of risks to health by the parents of young children, especially with respect to the concept of risks to health and the range of risks perceived. A corollary of this objective was to situate specific perceptions of risks to children's health from indoor air pollution in the larger context of general perceptions of risks to health and to explore the partitioning of risks into spatial domains where their occurrence was perceived by parents as being most and least likely.

Data are reported on parents' perceptions of the meaning of the phrase "risk to health", the qualities they associate with these risks, the risks they consider to be important, how they think risks to health should be labeled, and the extent to which they think the public should be informed of exposures which the medical establishment considers

potentially harmful. Parents' perceptions of risks to children's health from "breathing air" are explored in detail. In addition, data is reported on the extent to which perceptions of risks to health corresponded with parents' information about seven risks to health which are customary, controversial, or widely publicized. These risks were related to diet (cholesterol; salt; red meat such as beef), exercise (jogging), medicine (DES or diethylstilbestrol), and the environment (polychlorinated biphenyls or PCB's; leaded gasoline and paint with lead). The relationship between information status and perceptions of risks to health for these seven things is compared to the relationship between information and perceptions with respect to the use of domestic sources of indoor air pollution (discussed in Chapters 6 and 7). Finally, evidence is presented which indicates that risks to health are partitioned into discrete domains by the parents of young children which are perceived differently in different socioeconomic groups. This data supports the conclusion from earlier chapters that socioeconomic status is a significant source of intracultural variation in the perception of risks to health.

Results

The results of this portion of the study suggest that there is a relatively uniform understanding of the concept

of risks to health by the parents of young children, that most parents have definite though varied perceptions of these risks, and that parents are as concerned with social risks as they are with risks of illness or accidental injury. In addition, the findings suggest that these risks to health may be interpreted as being partitioned into discrete domains (i.e., home, yard, outside world) based on an indoor-outdoor dichotomy defined in terms of physical and social space. These domains are perceived as having varying degrees of intersection between their constituent elements (i.e., risks) and the magnitude of this commonality--the extent to which risks are perceived as being similar or different in different domains--appears to be significantly related to the socioeconomic status of the parents. This suggests that socioeconomic status is a significant source of intracultural variation in general perceptions of risks to health and supports earlier conclusions regarding the significance of this factor in perceptions of risks to children's health from the use of sources of domestic indoor air pollution.

Parents' Conceptions of Risks to Health

The phrase "risk to health" had different meanings to different people. Most parents made reference to concepts such as "harm", "danger", "hazard", deviation from "normal", illness or injury, and premature death. More importantly, parents' conceptions of risks affecting health were linked

with a much wider range of concerns and phenomena than those emphasized in the biomedical conception of risks to health.

Several general qualities or defining characteristics which parents associated with the concept of risks to health emerged in the intensive interviews and were later explored for a large number of parents during the survey. These central elements included two related qualities perceived by most parents as being general features of risks to health.

The first of these qualities could be referred to as the probabilistic quality of risk--the perception of risk and risk-taking as something which is associated with variable likelihoods of incurring consequences. Perceptions of this probabilistic quality of risks to health also involved associated perceptions of variability in the severity of outcomes, given their occurrence.

The second general quality of risk was closely related to these qualities and dealt with perceptions of the timing of outcomes of risks. These perceptions ranged from qualifying risks to health as events whose occurrence must demonstrate immediate effects on the one hand to long-range effects many years after the occurrence on the other. Most parents, however, had moderate perceptions of the criteria qualifying risks to health in the sense that they viewed these risks as being associated with different likelihoods of occurrence, manifesting different degrees of severity, and having the potential to do either of the above at any point in time after risks are taken.

The preceding qualities were also closely related to two other criteria which were perceived by most parents as being central issues in designating or labeling things as risks to health. The first of these related to the number of people parents thought should be affected by something before it should be labeled a risk to health. Although here as elsewhere there was considerable variability in perceptions, most parents felt that things should be considered risks to health if they had a negative effect on the health of even a few people. However, this generality was often qualified with respect to perceptions of the necessity of different activities, especially those relating to children, home life, and essentials for survival.

The second central issue perceived by parents in designating something a risk to health was closely related to the preceding parameter and involved the amount of information they felt the medical community should have before the public should be informed about things which are "suspected" of being or "known" to be risks to health. This dimension also involved the degree of credibility or validity attributed by parents to the opinions of the biomedical community, whose ostensibly objective perceptions were a significant aspect of the composite basis upon which parents formulated opinions about the existence and relative importance of different risks to health. The following interview exerpts reflect some of the complexities of the

situation as they were perceived by the parents of young children.

Exerpt from Interview 3 in Appendix IV:

Q: What does the phrase "risk to health" mean to you--what do you think of when you hear that phrase, how would you define it?

M: Essentially, anything that could be harmful to you, including things you eat or risks you take when you go out on the street or that type thing.

C: Anything that would be harmful: things of danger that are around the house or somewhere, people that are sick--being around other people that are sick, just different things like that.

M: We talk about nuclear weapons and that type thing, God forbid, and that's a one-type shot. Or just the fan short-circuiting or something causing a fire, and then the everyday smoke and pollution and everything that you deal with. Just the fact that something's built that could potentially down the road cause an injury--not necessarily, but has the potential.

C: I worry about everything, so I'm the type that thinks of all these things that could happen and they may never happen, but--

M: Well, the more you know something's prone to causing injury the more you worry about it, the more you look into it and the details, whatever; but something that may (be a risk), you may not pay too much attention to it or not look into it that much.

C: Just like food goes, you know, they say <u>everything</u> causes cancer nowadays. You're always wondering if you should eat certain things, if eventually (in) years to come if it may cause some kind of disease or cancer.

M: I don't think I'd consider it as great a risk until I knew there was some study or, you know, some information by somebody knowledgeable enough to tell me that it could be a risk. I don't pay as much attention to going outside and getting hit by a car or something like that. I am more worried about things around the house--everyday

things that could cause (problems)--or something that I eat that I don't know the risk.

Q: When would something have to affect you for you to consider it a risk?

C: I would probably think right away--I would be more concerned with something happening right away.

M: I think it goes along with knowledge--the more knowledgeable you are about something happening, the more you--I don't know, it's kinda hard to explain--the more you connect it with, you know, the effect happening right away or whatever.

Q: Would you consider something a risk if it might cause a problem many years from now?

M: Oh, yeah.

C: I would. But if they know that this certain thing causes problems, I don't think they should have to have a million people get sick from it before they do something about it.

Q: Uh huh--so, how many would you feel--

C: Oh, I don't know--like cigarette smoking. I think they should have done something about that a long time ago, you know. If they think that just being in the same room with somebody could harm them, I don't think it should have gone that far.

M: Yeah, but you got to take into account that certain people have sensitivities and other things that others don't, so I think you have to go more than just a few (people) and you have to see, you know. It's hard to give exactly a number but you have to take into account that certain people are just going to react differently than the majority of the people will.

Q: O.k., that raises an interesting issue--so are you saying that if something has some value to the people that are doing it the situation is more complicated with respect to calling it a risk?

M: Yes, exactly.

Q: What if the people at a plant are doing something and you know or think that what they are doing is not good for you but the plant keeps running?

C: I don't think that it should go on. I think--one or two people, if it's harming them--I don't think that it should go any further than that. It just depends on what, though.

M: Yeah, but I mean certain things like drugs or something--some people are going to have a reaction to them that other people aren't--

C: That's true.

M: --if 95% or 96% of the people aren't affected (negatively) by it and it's a good thing for those 96% you can't necessarily rule it out because those other four (percent) react to it.

C: I guess they would have to do more, you know, study more about it and find out what people are sensitive to certain things. I don't know how they would do it.

Q: O.k., so in general then how many people do you think should be affected before we label something a risk to health?

C: I would say just a few.

M: Just the fact that maybe it affects anybody.

C: If it's hazardous and it's not needed that much, I mean if it's not a necessity, why even have it?

Exerpt from Interview 4 in Appendix IV:

Q: What does the phrase "risks to health" mean to you?

V: Something that endangers your health, or could somehow endanger your health in the future.

P: That sounds pretty good. Something I'd be better off not doing.

Q: How much do you think we need to know about things before we call them risks to health?

V: I think you just go by your own common sense--that's what you go by.

P: Well, to say something's a risk you don't necessarily have to have solid proof.

V: Well, if you go by what all the big shots say, <u>everything's</u> a risk.

Q: What big shots?

V&P: Oh, the Attorney Generals, Surgeon Generals, and the doctors of this and that.

P: <u>Anything</u> you do nowadays is a risk. I'm sure even in beer there could be some foreign chemicals.

V: There's also a risk right there of getting a tanned fanny (speaking to their four year old son who was playing on the chair). You don't climb up on the furniture, do you? That's a <u>bad</u> risk!

P: You don't have to have <u>proof</u> that's a risk to health, now son (referring to getting spanked), and you don't have to have proof that that (chair) could fall down.

Q: How do you feel about the consequences of risks?

V&P: I think they'd be long range.

V: But not necessarily--driving, it could be anytime. You could be a big boozer too, you could drink a lot--that would be a risk to health.

P: Well, that would be long range.

V: Not necessarily--you could be like your friend Bill. You drink one night and you get killed the same night. He didn't know he was gonna get killed that night.

Q: How do you think policy makers should decide when to call something a risk to health?

V: You mean like before the government would come out with some little thing like the warning on cigarette packages?

Q: Yes, something like that.

V: Well, I wouldn't think they could get away with putting any labels on it unless there were a lot of cases of whatever happening because of it.

What right would they have to put labels on it? There's always a risk in everything!

Q: How do you feel about it, Paul? How do you think they should make those policy decisions?

P: Well, they probably should have several cases happen before they issue some kind of warning.

V: Well, I think that they would want to make the public aware of things, but they shouldn't put labels on things, you know. I think it's good that they come out and make announcements of what they have found of what might be happening, and then it's up to the person's own discretion if they want to quit doing whatever.

P: I'm sure there's a lot of things happening that you don't hear about.

Q: Like what?

P: Well, you know, there might be things that they don't let you know about, and maybe it's something they should let you know about, warn people about.

V: Well, if it's something you're in contact with you'd want to know, I would expect them to tell me, to let people know, just so I could say, "Big deal," or, you know, have a more open mind about it, think about it, study into it, see how it affects my body. If it's cigarettes or whatever, if I get any opinions in my mind, I would also like to know if they find something, a rat in the beer, whatever.

P: Well, you hear so many things nowadays anyway, you read things in the paper. There's so much happening nowadays, there's things happening all the time. They could tell me something and I wouldn't pay any attention to it! I'm sure that I'd pay attention if they came out every day and said, "O.k., these are the things--don't do this today or don't do that," like L.A., you know, smog warnings.

V: Well, the smog warnings are just for the people that have asthma or heart conditions or whatever to stay indoors. If I had asthma I would stay indoors. I would be glad that they told me to stay indoors that day so I wouldn't have to suffer.

Exerpt from Interview 5 in Appendix IV:

Q: What does the phrase "risk to health" mean to you--how would you define it?

J: Something that's dangerous to your health.

B: Something that could cause you harm in some way. There's all kinds of risks.

J: It could be to your body.

B: Yeah, or it could be to your mental, some risk to your mental health or to your physical health. When you say risk, it's just something bad, possibly something bad, I don't know. When you take a risk, you take a risk.

J: Or take a chance.

Q: How much do you think we should know about things before we call them risks to health?

B: I think we should know everything--everything!

J: We should have studies on it or something.

B: You're darn right! I don't like the idea of, "Well, we'll wait a few years and see if that risk factor is really as high as we think it's gonna be or as low as it's gonna be." I'd rather have them know! Like the things with sweeteners now--I'm not too crazy about that idea, where they don't know exactly what it could do to you.

J: But they don't know it so they don't call it a risk, because they don't know everything about it.

B: That's still a risk to me, though, because they don't know everything, and they don't know if it's gonna cause anything bad--it's still a risk to me. I just don't like that. If they're gonna give it to the public it should be 100% proven "Great!" I don't think things should have any side effects, possible side effects. We should know that it's safe before we call it safe. Why should there be a risk factor? Why say, "Well, kinda most likely it's going to be safe." Why can't they say, "It is safe." Heck, if I was gonna build something and told somebody it was safe, I would make sure it was safe. I'm a carpenter and if I'm going to build a house and someone says, "Well, is that

house going to be safe to live in?" I should surely be able to say, "Yes, that house is going to be safe to live in." I don't think I should be able to say, "Well, yeah, it's safe--right now it's safe." I just don't like that idea. I like the 100% guarantee that it's safe.

Q: How do you feel about it, Joan?

J: Yeah, I agree, but I think that certain things take more time to find out if they are risks or not. It depends when we're being so general--it depends on the subject. Like when it comes to childhood things for kids, yes--that should be proven really safe. But like with artificial sweeteners, (if) you don't want to have it, don't have it! You know, something like that--having a choice. When it's something that you've gotta do then that should be proven (to be safe). If it's an option in your life, then I guess it doesn't have to be proven, 'cause then you make the choice.

B: Yeah, I agree with that too.

J: I think they should let you know when there's a suspicion of it (a risk to health).

B: Yeah, but that could give and take there, because if you say there could be something wrong with it, and then it's proved that there's nothing wrong with it, that could kill somebody's business, someone's livelihood. If it's really gonna kill somebody's business then I guess it'd be good to wait, but if it was proven bad then I guess you'd be sorry. If it was proven bad then you would be out of luck 'cause you might have disease or cancer or something.

J: I don't think that affects it--I think that people would do it anyway, even if it says right on it "cancer causing". It don't stop people from buying it. It might stop a small percentage. People have it anyways and I guess you just have to make that choice. They study on rats, right? Well, they can't study on humans, so, I don't know. How else are they going to study what things do on people--it takes a long time with people doing it. Maybe they should study with people from the prisons. Rats might not react the same as we do, you know.

Q: So how do you feel about labeling risks--calling things risks to health?

J: I think they should say when it's possible, but not say it is possible until we know.

B: Yeah, but if it's written on there then they know that something's wrong.

J: They don't know, they think--as long as they say "possibly" or "maybe", as long as they don't say there "is"--that "if you use this product it's dangerous to your health." That's saying it positively; they don't write that on there. As long as they say "maybe" then it's up to you to make the choice.

Q: How do you feel about the consequences of taking risks?

J: I think probably the sooner it happens, the more you can say it's the fault of that thing, where if it happened ten years later it could be nine other things you did.

B: Yeah, I don't know--it's kind of a tricky situation.

J: Just like with Bill's uncle with that asbestos. He ended up dying of cancer and that's not right, you know.

Q: Lung cancer?

J: Yeah, 'cause he worked on something with asbestos in it.

Q: So you consider asbestos to be a risk to health?

B: Yeah it's a risk--it's the biggest risk you could ever take!

J: Well, especially now, 'cause now it's proven that it causes that (lung cancer).

B: Yeah, one little particle of asbestos can cause cancer if it gets into your lungs.

J: So, that's a risk for sure!

B: I would say so--I'd say it's a hell of a risk. I saw him die.

The preceding exerpts from three of the interviews with the parents of young children in Appendix IV illustrate the extent to which very moderate probes reveal the intricate involvement of several central qualities associated with risks to health. The comments in these exerpts further reveal the general uncertainty observed in almost all parents as to how decisions relating to health policy should be made. Other interviews in Appendix IV also illustrate these complexities and could as well have been included here.

The definitions of risks to health in the preceding interview exerpts were representative of the open-ended responses of most parents. The most striking common denominator in parents' conceptions of risks to health was that ANY risk was perceived as potentially affecting health. Parents perceived a range of health-related risks which extended far beyond the foci of a biomedical framework.

The open-ended interviews indicate that most parents view risk as a probabilistic phenomena with variable degrees of severity of outcomes. These outcomes or consequences of risk-taking are perceived as potentially occurring at any point in time after a risk is taken, although parents were more concerned with imminent than long-term possibilities. This in turn was linked with whether a risk was publically labeled as a "certain" risk or as a "possible" risk. The worst risks were "known" to have a high probability of undesirable health effects of great severity and immediate

consequence while the risks of least concern were only "suspected" to have a low probability of consequences of mild severity many years in the future.

The extent to which a risk to health was assessed by the biomedical community as being suspected of causing or known to cause particular outcomes was also related to parents' perceptions regarding the process of publically labeling risks to health. There is a considerable amount of ambiguity in this area, as aptly reflected in one parent's comment that, "I think they should say when it's possible, but not say it's possible until we know." Most parents, however, felt that if something was suspected of being a risk--<u>especially</u> to children's health--that it should be so labeled and that the decision to take or avoid that risk would then be the responsibility of an informed public.

A related issue which parents perceived as complicating the process of labeling risks to health was the number of people who should be affected before public warnings should be issued. Most parents felt that only a few persons should experience adverse effects before something should be labeled a risk. However, this was qualified with respect to the perceived benefits of taking a risk (e.g., employment) and the geographic distribution of affected persons (e.g., in the same or different locations).

The concept of risks to health was also explored open-endedly in the survey of the parents of 100 randomly selected children from the five county Greater Lansing area.

Analysis of responses showed a skewed distribution when viewed from the standpoint of whether the definitions given were general, specific, or or mixture of these. For example, a typical general definition of a risk to health was, "Anything that can cause a health problem." A representative specific definition was, "Things in the environment that would make you sick or allergic," or, "Things such as fumes or chemicals." An example of a response incorporating both general and specific elements was, "Anything that would be hazardous, like smoking, drinking, no seatbelts, drugs." Sixty-nine percent of respondents gave general definitions of a risk to health, 18% gave specific definitions, and seven percent gave definitions with both general and specific components; six percent of the respondents said they did not know. A complete listing of the definitions of a risk to health given by parents interviewed in the survey is presented in Appendix III.1.

The general definitions of risks to health from the survey focused primarily on the concepts of "causing harm," "causing illness or sickness," "being hazardous to your health," or "endangering health." Only a few of the parents mentioned mental health, made reference to the future, referenced death explicitly, or specified the importance of intentionally "doing bad" or "living dangerously". One parent's definition of a risk to health was based on

"jeapordizing perfect health" and one parent reflected on the question for a while and succinctly replied, "Anything."

Results from the survey provided an interesting quantitative perspective on parents' perceptions of the central qualities of risks to health which had emerged in open-ended materials. Eighty-six percent of the parents felt that risks to health were probabilistic and only caused illness or injury some of the time, while 14% perceived risks to health as always resulting in consequences. The same proportion (86%) of parents who felt that risks to health caused illness or injury some of the time also felt that the consequences of risk-taking could occur at any time; 13% felt the consequences would occur many years after the risk was encountered and one percent felt that the consequences of taking risks to health must occur soon after the event.

The survey results also provided an interesting descriptive perspective on parents' views regarding the appropriate criteria for labeling things as risks to health. The two principal criteria which emerged in the open-ended materials were (1) whether things should be labeled risks if they are suspected of being risks or only if they are known to be risks, and (2) the number of people who should be affected before something is labeled hazardous to health. Parents' views on these issues showed the same high degree of variability in the survey results as had been observed during open-ended interviews and observations. The majority

opinion was fairly clear on the first issue, with 75% of parents responding that "something should be labeled as hazardous to your health if it's simply suspected of causing illness" and 25% responding that something should be so labeled "only is it's known to cause illness." However, the views of parents regarding the number of people who should be affected by something before it is labeled a risk were considerably more varied. Twenty-four percent of the parents felt that "very few" people who have contact with something "should get sick before the government should label it hazardous to your health," 20% felt the appropriate number of people was "a few," 41% responded "some," 10% felt most people should be affected, and five percent believed that everyone--"all" people--should "get sick" before the government labels something a risk to health. Grouping these proportions, the responses of parents were fairly evenly divided between those who felt fewer (44%) and those who felt more (56%) people should be affected before labeling things risks to health, reflecting some of the difficulties faced in formulating public health policy. There was, however, a relatively strong central tendency toward "some" people being affected (as opposed to a "few" or "very few") as an appropriate criterion for labeling risks and, despite the observation that 56% of the parents felt that "some," "most," or "all" people should "get sick" the overall distribution of responses tended toward a lower number of casualties.

Risks Perceived by Parents

The results of open-ended and survey data indicated that the parents of young children perceived a wide variety of risks as affecting health. While risks from indoor air pollution were generally referenced by parents (see Chapter 6) they were also perceived as being less significant than numerous other risks of greater or more imminent consequence. Many risks to health were perceived as being primarily biomedical in that they dealt with injury and illness resulting from accidental physical trauma, infectious conditions, environmental exposures, and activities and exposures contributing to chronic illness. However, most parents were equally concerned with social risks to their children's health which ranged from divorces, spiritual matters, and routine driving to sexual abuse, child abduction, drunk drivers, pollution, and nuclear war. A representative selection of the risks to health perceived by parents of young children is presented in the transcripts of open-ended interviews in Appendix IV. The following interview exerpts illustrate perceptions of some of these risks.

Exerpt from Interview 11:

Q: What do you consider to be some of the greatest risks to your daughter's health?

D: Well, I watch her, you know--she go outside by herself, I stay in the window and watch her if I don't feel like goin' down. And there's some kids

out here that try to sneak kids in the buildin' and take off their clothes, you know, all kind of things. So, I'm very skeptical who she play with.

Q: So you think that's a risk outside your home?

D: Uh hmm, that's a risk.

Q: What else do you think of as a risk to her health?

D: Smoking. I smoke, but most things I smoke she's in the bedroom or she's outside, you know, I try keep it 'way from her, 'cause when she was small she was having problems with her eyes and breathing and the doctor told me to keep her away from smoke. And also, I don't like her hanging 'round bigger kids, picking up slang and doin' what they do, you know, 'cause I have a lot of nieces and nephews and she'll go home with mom and she'll come back doin' something I don't like, you know, and it take me about two weeks get her to stop doin' it. And drinkin'--I don't like to be aroun' too much drinkin'--other people drinkin', 'cause she go, "Ma, can I drink that?" you know, an' I tryin' to get that out the way, too. It's hard bein' a single parent tryin' to raise 'em, so I'm trin' to do the best I can, with the support of my family. It's a lot of badness in the world, dangers in the world, so, you know, that's why I'm protective about who she play with.

Q: What dangers do you think of--what comes to mind?

Q: Oh, big kids playing with knives and bricks, you know, throwing bricks. I seen one guy with a knife in here (their apartment building) the other day, and you never know what they could do--<u>anything</u>! You have to watch out for that.

Q: What other risks do you think there are to Eta's (her daugher) health?

D: Bein' healthy--tryin' to stay healthy.

Q: What would cause her not to be healthy?

D: Just gettin' outside an' play.

Exerpt from Interview 16:

Q: What do you think are the greatest risks to your health?

R: The greatest risk is somethin' that hasn't happened yet, 'cause nuclear war is the greatest risk, would be the greatest risk if they were to have it.

A: The first thing that pops into my mind is that we think it's risky for anyone in the whole world not to examine the scriptures and see what it has to say and not follow it in a spiritual sense. That's the first thing that pops into my mind. There are, of course, a whole lot of other things.

Q: Like what?

R: Pollution--we are becoming a very polluted country and it's gettin' even worse.

A: Being Jehova's Witnesses we are not politically minded, so it's just on a general basis world wide that we tend to see things. We don't feel one nation is better than another nation, whereas things in one nation may be better than things in another nation. Because (if you believe that) one nation is better than another nation then you're getting to nationalism and you get into racism, and being neutral then you're safe 'cause that's the position that Jesus took--one nation wasn't better than another nation. No matter what nation it is, we're all prone to the risks that's prevalent in that society.

Q: What do you think the greatest risks to health are in our society?

R: It seems to me that our two biggest risks are our lack of morals and our materialistic pursuits. They seem to be putting, materialism seems to be putting the family and everything else second place, you know, to love and, you know, the thing is to earn the almightly dollar. I mean, as far as personal relationships with people go, they seem to be going further and further away from that and more into things, and I think that could be very risky for our future.

Q: How?

R: Oh, you know, the divorces, the children from broken homes. The children don't have the family

bonds that they should have and who's to say that when these kids do grow up, what kind of kids will they raise because they didn't have any closeness.

A: And another thing--everything's become a materialistic pursuit, so everything else suffers.

R: And then, of course, that takes on other things 'cause of the pollutions and things that the factories don't want to get rid of 'cause it's money, you know. Cars--they want to make the bumper smaller! I was readin' somewhere even though it's less safe, you know, they can save a few pennies. The new bumpers aren't gonna be quite as safe.

A: Money does have a bearing--we got starvation in the world and in this country because of money. Tons and tons of food are burned and dumped to keep the prices where they are. It's money. Everything is situated around money, the materialistic aspect and no brotherly love. Money first, and if you somehow get in the way, o.k. That's the way the system is bent. The system is based on war. Without war this country wouldn't be wealthy as it is. It's based on other people's plight. That's the system.

R: It seems like everybody wants to get into war.

A: And the pollution--man has got to the point now where it's taken over mother nature. The earth is wonderful, man. It filters itself. But now it's gone to the point where it's taken over mother nature just about.

Q: What's taken over mother nature?

A: The pollution--and it would cost so much money to clean it up, ain't no way in the world that these companies come along. They're bein' fined, some of them are, and they go right back and do another way. The big companies, corporations, businesses that are polluting the air or the water, they get their little hands slapped but they pay the lobbyists and, you know. The whole system is bent toward corruption and so it's irreversible. That's why it's going to take God's Kingdom to straighten out the mess. Man is not going to do it.

Exerpts from Interviews 4 & 9:

Q: What do you think are the major risks to your and your son's health?

P: I think probably the biggest risk in your life now is driving.

Q: What risks to your health do you think there are in your home?

V: Fire--that's the biggest thing I think about is a fire--and just little accidents like falling down the stairs.

P: If I fall down the stairs, well, you know, it's just one of those things--you know, I don't consider it a risk. You go, "Well--boom!" and you get rug burns on your arms.

V: For an adult there's not that many risks really but for a child there's <u>everything</u>, especially when he was younger. When he was younger, <u>everything</u> (was a risk to his health).

P: I'm concerned about big things falling on him.

V: When he was younger there were the burners on the stove, the oven--he got that a couple times.

P: Yeah.

V: Things under the sink, all the cleaning agents under the sink, and the bathtub--drowning.

P: You were more worried than I was. And cat bites--that's a risk around here. I forgot about that risk. I'm not kidding--somebody will be walking by and the cat will attack you.

Q: How about now that Timmy is older?

V: The street...

P: She's more of a worrier than I am.

V: That's my biggest worry is the street--being hit by a car running out into the street, or being nabbed by somebody. I get scared when he gets out of my sight.

P: Yeah, that's something I worry about--being nabbed by somebody.

V: Because of just everything you've heard about missing children.

P: Right where we live--that's what we're concerned about here, with all the missing children, and you know somebody could nab your kid while he's out playing. If I was living in the country I wouldn't have these fears; it wouldn't be a risk for him then.

V: I check on him about every five minutes, you know, just peak out the door, see if I can see him or see if I can see his bike.

P: Well, you're more concerned with it than I am.

Q: Why?

P: Because she's the mother and I'm the father and that's the way it is! I'm concerned about him, you know, but she has motherly instincts.

Q: What do you think are the greatest risks to the general health of the U.S. population right now?

V: Ronald Reagan.

Q: O.k.--anybody or anything else?

V: No, I shouldn't say that. I'm not real crazy about his ideals and the way he runs the country and the things he does with the other countries.

Q: Do you think the political situation is a serious risk?

V: Yes. If it were up to me we'd still have Nixon, but it's not up to me. Reagan is just hungry to fight. He wants to be almighty and I think he likes to just agitate people.

P: He just likes to eat at people.

Q: What do you think are the greatest risks to health, Paul?

P: To the general U.S. population? Well, there's always a political risk, like Vera said. There's driving--I think driving your car, you know, just 'cause so many people drive. Then there's the nuclear thing--I'm big on the nuclear thing. I think one day we're gonna "nuke-out"--nuclear war, because of the political activity going throughout

the world, I mean, not just here--just in general. You don't know what's gonna happen, you know.

V: The food is a risk, too.

Q: Food? How?

V: The farmers are all gonna quit farming soon, I think, because they're not getting paid the money that they need to get paid for raising their crops, which is feeding the United States--and they're not getting paid! So, soon there won't be any farmers and then there won't be any food. That's another high risk, I think--maybe even higher than Ronald Reagan.

P: Then there's pollution--I don't care for it! Like that sulfur pit or whatever it is out here on Pennsylvania (Avenue) right next to the highway--you know, that's pollution. It's just the way things are nowadays. It's just the way the world is. There's a lot of things that shouldn't be, but they are.

V: I don't think the pollution is right but it's gotta be for things to keep changing and keep getting better. If they're finding new ways to do whatever they're doing, they have to pollute in a different way.

Q: Do you think PBB is a risk to the health of the people in Michigan?

V: I don't know.

P: I don't know--I don't know that much about it and I'm not affected by it.

V: You might be.

P: I might be. Some people are--in some areas it's a concern, but it doesn't affect me, so.

V: It's just in the soil and they're (crops) just sucking it up in the roots. There was a farm down by our house--they had to destroy their whole herd of cattle or pigs, one of the two, and it was horrible. They dug these big ditches with these bulldozers and just threw them in there and they just covered them over. They dug these big trenches and they just threw the animals down and buried them over. And three farmers in my area where my parents lived lost their entire farms and went bankrupt because they had to destroy their

livestock. But they, all three of them, lost everything they had because of this. And why would they do it unless there was something really big about it? So, that's all I know about it, but that was enough for me. I mean, it's amazing the tremendous amount of livestock just piled in these ditches. They just shot them and buried them there. I can't even describe it to you. Hundreds and hundreds killed, just piled in there like these old movies you see, these war movies where they're just piling bodies in the ditches. That's what these were, just piles in these ditches, and they just plowed them over. And now they're just fields, you know. The farmers are gone, they went bankrupt. And I'm sure there's danger from all those rotting carcasses under that soil, comin' up through the soil, if someone would farm that land someday. Today that land is just barren, so I suppose they're just gonna let it go for however many years that it takes for it to go out, because the land still is barren and that was over ten years ago.

Exerpts from Interviews 7 & 12:

Q: What do you think are the greatest risks to people's health today?

B: I think the greatest risk is probably something that contaminated our ground water, the way it looks now. It seems like every day there's something, our ground water's gettin' contaminated with this or with that. And it's a hell of a risk, 'cause water is like the essence of everything. If your water's no good, then nothing's gonna be any good. And you drink it and you wash your body with it--it's gonna affect you somehow, it's bound to affect you, I would think. I think our biggest problem is and will be water pollution.

J: I think air and water pollution.

B: Water first, water first. Things inside (the home), you know, might be able to cut down on part of the air pollution, but inside and outside water's the same. Plus, it rains.

J: Yeah, and when it rains if the air was bad that would make the water bad too! So it's all tied

together. I like the fact that we live in Michigan 'cause we have more water than anybody else and if there comes a time when there isn't any water to go around I'll be glad I'm livin' here as far as that goes. I think that water's gonna be like gold pretty soon.

Q: Can you think of any other risks to health you think are important?

J: Nuclear war or a nuclear power plant blowing up. If it were war, it wouldn't matter. If that's done, then it's all over. So, I'm not as worried about that as I am about something that's just gonna hurt you a little bit; and if there <u>is</u> a nuclear war, we won't have to worry about it.

B: Neither one--nuclear war, nuclear power--scares me as much as the water issue and chemicals, you know, dump sites that's just gonna contaminate the water and of course it's gonna contaminate the earth. And if we don't have earth and water, you know, what good are we? Nuclear isn't any good either 'cause we aren't gonna need it. I think we should take care of the earth before anything else--it could be our main thing, save the earth. Nuclear will have something to destroy it but I think chemicals and things like that are going to destroy the earth. I mean, if we let it--I'm not saying it's going to. That's two of our biggest risks.

Q: How about PBB--do you think that is a risk to the health of the people in Michigan?

B: I dare say that it probably will be a long-term risk.

J: You mean when we get to be 50 (years old) it's gonna show up or something, Bill?

B: It sure might, it sure might. I can't see where a flame retardant could be good for you in ANY way!

J: I just thank goodness that then, 1974, we were too poor to eat much beef. Then we had lots of casseroles, so I didn't eat that much contaminated beef. I'm sure I was exposed to it, though.

B: It was in milk, all dairy products. Hell, we were ALL exposed to it. I think it was a big mistake and somebody screwed up. I think it is going to be a risk, I sure do. I'm sure it's

gonna affect somebody that really had a large amount of it incorporated into their body--I'm sure they're gonna have a risk. I would be willing to bet money that they're gonna have a risk.

Q: They're going to have risks or they are going to have problems?

B: I think it is a risk and could lead to problems. I would dare say that it will be a problem because, hell, they were burning the cattle out at Michigan State right in the incinerator and lettin' it go right up into the air.

Q: At Michigan State?

B: Sure--they were burning cattle right in their incinerator, contaminating people like hell. I was working at East Lansing at the time and it just flipped me out, I'll tell you that right now! They wanted to get rid of them and they didn't want to bury them. They buried a lot of them, but they were scared that that could have got in the ground water. They should have shipped them off and given them to some other state. It really pisses me off! That was one of the biggest farces that ever happened in Michigan as far as I'm concerned. It really pissed me off that somebody could let something like that happen. It was one of the biggest blunders that they ever did and they got more people irate than you can imagine. And then when we found out they were burning them out at Michigan State it just made me furious, 'cause we didn't know when it happened and we were working outside and could have been sucking that in, you know. Why didn't they sound off a siren, like for an air raid or something, to tell people to get in their houses?

J: That wouldn't matter anyway 'cause it would be in your home.

B: Well, not that much. I don't know what came out that smokestack but whatever it was, I am sure it went straight up into the atmosphere and I think that was a big blunder. They should have foreclosed that company right there on the spot. They screwed up and they should have paid.

Q: I take it you have pretty strong feelings about it?

B: Sure! I think everyone in Michigan should have strong feelings about it. If you had lived here at the time, you probably would have had strong feelings against it, I'm sure. It blows me away sometimes how assanine somebody could have been. When it comes to products like that or something that is gonna get into the major food chain, they should have security checks and safety checks to scrutinize everything that comes out of that place. It is stupid! When it comes to that grain feed and stuff, hell, there's nobody watchin' that stuff. I'm sure they don't hardly ever even test it. It would just be more red tape for the state to send somebody out there to take a sample, bring it back in, get it tested, and then say, "Hey, there's PBB in there!" Hell, you know they don't--I'd bet money on it.

J: But, it was the Farm Bureau that was the company involved and they aren't going to let that happen again.

B: Well, maybe not. But the Farm Bureau's a big company. Besides, it could just be another product.

J: I think they check things.

B: I definitely think they don't! With all the budget cuts they they've had lately, there ain't nobody checkin' that grain and stuff. I would be willing to bet a million dollars on it.

Q: What do you consider to be the major risks to your health and your child's health in and around your home?

J: Electrical sockets.

B: Cleaning chemicals, like Draino and stuff like that.

J: Sharp edges, like right over there (pointing to a table corner). Steps--we've got a lot of steps in this house.

B: The steps don't scare me.

J: The stove.

B: Chemicals and electricity would probably be the main two.

J: Cars.

B: Accidents.

J: Running out in the road. Not too many things outside the house, in the yard. Rakes.

B: Sharp objects.

B: Kidnapping and child molesters, that's what scares me, 'cause when we were kids, if somebody offered you something you said, "Thank you." Nowadays, you've got to say, "No, I don't want that," that's one thing that's bad about things that are goin' on.

J: But I think people are getting more aware of it so the kids will be less available to the weirdos. If we're gonna be more safe, you see, we're not gonna let the kids be off by themselves and we're gonna make it less easier. The kids just have to learn nowadays.

B: Yeah, when I grew up I wasn't scared at all--there wasn't anything to be scared of.

Q: Can you think of any other risks?

B: Sure, like in the building products. There could be some bad chemical in some of this paint we been using around here.

J: Or in the paper (wallpaper).

B: Or something in the fabric of the furniture.

J: There's gasoline outside, too.

B: Gee, I don't know--you could eat something poisonous outside the house. When it comes to kids, I guess nothing's safe. You gotta watch 'em every minute--well, not every minute--but nothing's safe with kids. If there's something bad, they're gonna get into it.

Exerpt from Interview 14:

Q: What do you think are the greatest risks to people's health these days?

M: Apathy--people just don't care anymore, and people aren't friendly like they used to be. My

grandfather and grandmother've been robbed three times at gunpoint, and last time when it happened, in self defense, he had to shoot the guy in his house--killed him. They were gonna blow my grandmother's and his head off, they told him. Now they won't even go out at night anymore. They're scared. As it is, you know, they're surrounded by a six foot fence--he's literally turned his house into a fortress.

C: Everything's gettin' so big and there's so much crime around lately, you get afraid of everything. You know, most people think--and that's they way I thought--you hear it on the news and stuff, and you never think that that's gonna happen to you or close to home, but it does! You never know what the other person's gonna do. You could go into some place and they could hold you up, you never know. Anything. Like just what happened over at Meijers the other day. Did you hear about the shooting? I was goin' to Meijers and they were flagging me out of the parking lot having fits, you know, "Get out, get out!" There was a guy in there that went crazy. He started shooting in there and got somebody hostage in the pharmacy.

M: The guy went into sporting goods and wanted to see a shot gun and he got his hands on ammunition and from there he went from sporting goods to the pharmacy. It's almost a sense of helplessness. I mean, I don't let it overwhelm me--I don't think about it all the time, you know, but when you sit and think about it--.

C: I look around. I'm concerned in the parking lot going to my car. I mean, so many things have happened that I've heard about, like people hiding underneath your car. I find myself thinking about these things a lot.

M: I think the worst feeling I have, though, is when she's out by herself at night or when she's out with him (their son), 'cause I've heard of people goin' right up into the shopping center and snatching the child from the mother, you know, that type thing.

C: A friend of ours kid was snatched. She (the girl who was abducted) was at school and somebody got her from there. They saw her one minute and the next minute she was gone, so somebody must have snatched her right out of the school. So, you worry about those things, I worry about things like that. And they haven't found her yet; no

trace. They had search parties out and nobody found her. Her grandfather's very wealthy and they put up a big reward for somebody who would turn 'em in, and they never heard nothin' from 'em. She was like seven years old--cute little girl.

M: I worry more about that than I do about a lot of other things. That's the only thing where I've become almost paranoid about it.

Q: What other risks do you think of?

M: Stress and anxiety. If you want to be worried, just look at the nightly news. There's risks from the environment, you know, the water, air, foods--everything!

C: Traffic--driving in a car. These drivers sometimes! There are come crazy drivers out there.

M: I think it's just that people in general right now, to me, are more crazier than I've noticed (in the past). I don't think they interact like they used to.

The preceding interview exerpts reflect the wide range and diverse nature of the risks which parents perceive as affecting their and their children's health. It should be noted that these exerpts do not attempt to represent ALL the risks mentioned by parents nor do the comments of any parent include all risks mentioned by that individual (e.g., references to indoor air pollution). Reiterating the list of risks enumerated in the open-ended interviews would be an encyclopedic and pedantic undertaking because everything was perceived as potentially affecting health, especially children's health. Risks of illness and accidental injury were important to all parents but equally important were

social, economic, political, moral, and other categories of risk which collectively encompassed the full gamut of human activity from love to war, from disposing of toxic compounds to faith in God.

The risks which parents interviewed in the survey perceived as being "the greatest risks to the health of the general U.S. population" as well as their perceptions of the avoidability and unavoidability of these risks are transcribed for all 100 respondents in Appendix III.2. An interesting aspect of these responses in addition to the variation referred to earlier was the incongruence sometimes evident between parents' perceptions of the avoidability and unavoidability of the risks they considered most important. This incongruence generally resulted from perceptions of avoidability which were based upon either hopes for solutions to problems or cynicism regarding people's willingness to act in their own best interests.

In addition to assessing general perceptions of risks to health, the data from the survey also assessed seven specific risks which have been controversial or widely publicized in recent years. These risks were related to diet (cholesterol; salt; red meat such as beef), exercise (jogging), medical care (DES [diethylstilbestrol]), and the environment (PCB's [poly-chlorinated biphenyls]; leaded gasoline and paint with lead).

A comparison of the proportion of parents who had heard each of these might be harmful to health and who

perceived them as a risk to health showed very similar results to those obtained with reference to the more focused area of indoor air pollution addressed in earlier chapters. Of the seven items assessed, only jogging and eating a lot of red meat showed any appreciable difference between the proportions of parents who reported being informed of risks to health and who perceived risks. This would be expected for these two items (jogging because of its association with "getting healthy" and red meat because steaks and "beef and potatoes" are American culinary traditions). The other five items assessed (cholesterol, salt, lead, PCB, DES) have all been identified, with varying degrees of associated controversy, as risks to health by the biomedical community and have been widely publicized in recent years in the media.

Regarding dietary factors, 98% of parents reported they had heard that high cholesterol levels might be harmful to health, 96% had heard this of eating a lot of red meat such as beef, and 99% of eating a lot of salt with meals. The proportions of parents who perceived high cholesterol levels (92%) and eating a lot of salt with meals (96%) as risks to health were very similar to the proportions who reported having heard about them; the proportion who perceived eating a lot of red meat as a risk (73%) was somewhat lower. As was the case for eating red meat, the proportion of parents who perceived jogging as a risk to

health (64%) was lower than the proportion who reported having heard it might be a risk (93%).

Perceptions of the environmental exposures assessed were uniformly high and corresponded closely with reported information status. Ninety-eight percent of parents reported having heard that leaded gasoline and paint with lead might be harmful as compared to 97% who perceived this exposure as a risk to health; 99% had heard PCB's might be harmful and 92% perceived these compounds as risks. However, only 58% of the parents had heard that DES (diethylstilbestrol) may be harmful to health, which is rather surprizing in view of the widespread television and other media publicity which the DES issue has received. On the other hand, the proportion of parents who perceived DES as a risk to health (55%) corresponded closely with the proportion who were informed. Further, adjusting proportions by deleting those parents who had no opinion on the DES question (i.e., who responded "don't know" during the interview) showed a similar pattern to that obtained earlier with respect to radon gas in that the adjusted proportion was considerably greater than the raw proportion (i.e., the unadjusted relative frequency). Of those with opinions on the DES issue, 95% perceived DES as a risk to health, indicating that nearly everyone who had heard DES was a risk tended to perceive it as such.

The most striking similarily between this data and that for the use of domestic sources of indoor air pollution

was the consistency of the relationship between information and perception. These descriptive findings were further supported by inferential analyses indicating that the relationship between information status and perceptions of risks to health was statistically significant. In addition, for those items assessed where a large proportion of parents abstained by responding "don't know" (e.g., radon gas and DES), almost all parents with opinions (generally the parents who reported being informed) perceived them as being risks to health.

A related aspect of the relationship between information status and perception of risks which emerged during fieldwork was the observation that parents often responded to things they were not familiar with and to chemical names in particular (chemophobia) by perceiving such things as risks to health. To probe this dimension of the problem, even if only slightly, an unconventional name for a common and well-known compound was included in the interview schedule with the aforementioned items and customary indoor activities assessed in earlier chapters. This compound was water--not tap water or lake water but <u>pure</u> water (H_2O)--which was referred to as "dihydrogen monoxide" (literally, two hydrogen atoms and one oxygen atom per molecule of the compound). Unlike the other items investigated only 26% of parents reported having heard that dihydrogen monoxide might be harmful to health (74% saying they had never heard this). This conformed to what one

would expect since, at least to my knowledge, there has been no publicity regarding risks from this substance as named. The most likely explanations, based on open-ended materials, for 26% reporting having heard something which they could not possibly have heard were that they responded to all chemical names as if they had heard them or they confused the name with that of another compound (e.g., the term "monoxide" carries close connotations with carbon monoxide which most parents had heard of and pereived as a risk to health). The proportion of parents who perceived dihydrogen monoxide as a risk to health (33%) was higher than the proportion who reported being informed. However, 59% of the parents replied that they did not know if the compound was harmful, which was a reasonable response for those who said they had never heard of it being a risk. As was the case for other exposures where a large number of parents abstained (e.g., radon gas and DES), the great majority (93%) of parents who had an opinion perceived this substance as a risk to health. These observations, despite their limitations, support the conclusion that parents tended to identify the unknown--or at least unfamiliar chemical compounds--as risks to health.

Risks from Breathing Air and Risk Domains

Parents' perceptions of risks to their children's health from "breathing air" were explored in detail through in-depth open-ended interviews and through open-ended

questions during the survey. This information provided a larger context within which perceptions of risks to children's health from the use of domestic sources of indoor air pollution could be viewed. Most parents were certain that children (and adults as well) could develop a number of problems from breathing things in the air, ranging from infectious diseases to mild and chronic respiratory ailments. The following brief exerpts from open-ended interviews transcribed in Appendix IV serve to illustrate the range of parents' perceptions in this area.

Exerpt from Interview 14:

Q: Do you believe that children can get sick from breathing in things that are in the air?

C: Uh huh.

M: I believe so.

Q: What could they get and how would you know when they got it?

M: I'd be alarmed if I heard him coughing or maybe expelling anything when he was coughing, you know. I'd right away wonder if there was something in his lungs. I know with all the smoke in the air that he could have problems.

C: I'm sure exhaust, you know, in busy metropolitan areas is bad for you and smoke from smokers, like at restaurants. It bothers me terribly. I have sinus troubles and it drives me crazy so I can imagine what it would be like for a child.

M: Yeah, and especially 'cause their system is progressing still, is growing, and I can see where they'd run into a lot of problems. That's why we try to keep him away from those situations right now. And, you know, we like to take him outside, get fresh air, whatever, but, "You can run but you sure can't hide" (from pollution).

Q: How would you know when they got it?

C: They could be wheezing or congested or even develop something on their skin maybe, you know, due to allergies and stuff.

Exerpt from Interview 6:

Q: Do you think children can get sick from breathing things which are in the air?

P: Sure, like me smoking. I'm worried about him just inhaling my smoke. I'm sure there's a lot of contaminants in the air we breathe--that's just one of those things, you know. You gotta live with it.

Q: Well, what kinds of things do you think Timmy and other children might get from breathing things that are in the air and how would you know when they got them?

V: Emphysema, asthma, when they cough, hack, wheeze, start wheezing and complain of their lungs.

Q: How else could you tell that the children got something from breathing things in the air?

V: Maybe their complexion, maybe their skin would change--just from physical (indications) would be all it would have to be.

P: Or a change in behavior.

Exerpt from Interview 18:

Q: Do you think children can get sick from breathing things which are in the air?

F: Sure, 'cause there's contagious things that you can get just by if you stood next to somebody and you were breathing in a cold. You can catch things from somebody.

Q: If children did get sick from breathing something in the air how would you know when they got it?

F: Probably if they're behavin' or actions change, most likely in the course of the same day.

Exerpt from Interview 7:

Q: Do you believe that children can get sick from breathing in things from the air?

J&B: Sure, uh huh.

B: They can get all kinds of things--emphysema, allergies, viruses, you name it! You don't know what the hell's in the air nowadays.

Q: How would you know when they got something?

B: That's a good question--how would you know when they got it?

J: Coughing or a fever or redness in their ears, redness in their throat. And when children are older, they will tell you.

The preceding comments suggest that parents perceive a range of risks to children's health from breathing air indoors or outdoors. Most of the risks associated with breathing air were perceived as involving the respiratory system (e.g., cough, wheeze, asthma, emphysema). However, these risks were also associated with the body in general (e.g., colds, viruses, skin rashes) and with changes in children's behavior.

Results from the survey of a random sample of parents were consistent with earlier findings though more varied in

expression than those presented above (as one would expect from a larger number of responses). Parents' perceptions of risks to children's health from breathing air as well as their symptom criteria for attributing a problem to this cause are presented in Appendix III.3.

The survey results also provided interesting quantitative perspectives on this and related questions. Almost all the parents (98%) believed that children can "get sick from breathing things which are in the air." Forty-five percent of the parents believed that there was no difference between the air indoors and outdoors while 44% thought that outdoor air was better to breathe and 11% thought indoor air was better to breathe. Ninety percent of respondents agreed that, "No matter how hard you try outdoor air pollution is going to get into the air in your home" and the same proportion (90%) felt this way about their inability to keep pollen and dust out of their homes. Another aspect of this intrusion of air pollution (man-made [e.g., industry; auto exhaust] and natural [e.g., pollen; dust]) from outdoors to indoors which emerged in the open-ended materials was cleanliness--i.e., whether parents felt they could keep the air inside their homes "cleaner" than the air outside. The frequent use of air fresheners and filters by many parents attested to their desire for the air inside to at least seem cleaner than the air outside. In the survey parents' opinions were fairly evenly divided on this question, with 51% stating that "I can keep the air in

my home cleaner than the air outside my home," 34% disagreeing, and 15% responding that they did not know. A small proportion (5%) of the parents in the survey believed that they could prevent any and all intrusion of airborne pollution or materials into their homes.

Another aspect of the issue which emerged in earlier fieldwork and was assessed during the survey dealt with perceptions of differences in air quality within the home. In general, areas perceived as having lower air quality were the peripheral areas of homes such as basements and attics; most distinctions were based on seasonal differences in humidity and temperature between the regions of the home which were less and more preferred. In the survey, 58% of the parents believed that the air in some parts of their homes was "better to breathe" than the air in other parts of their homes, three percent believed this was sometimes the case, and 39% reported they perceived no differences in air quality in different parts of their homes.

Parents' beliefs regarding differences between indoor and outdoor air, as well as differences in the air quality of different parts of their homes, reflected what other data showed to be two consistent features of perceptions of risks to health. The first of these was a partitioning of risk domains by parents of young children such that risks to health were allocated to one or more areas of most likely engagement. The second feature was a close corollary of the

first and could perhaps be most appropriately summarized by the phrase "home is where it's safest."

The risk domains constructed by parents could be interpreted in a number of different ways. One could assign risks to cultural, social, political, economic, moral, or any other domains based on respective criteria for categorization. Theoretically, there is no limit to the number of categories of risk which could be constructed; on the other hand, all risks could be viewed as belonging to a single domain containing all possibilities. This is, in point of argument if not fact, most likely a more accurate description of the realm of risks than any other, at least from a theoretical stance.

The findings of the present study support an interpretive framework of risks to health as being partitioned by parents into domains based on an indoor-outdoor dichotomy such that the home (i.e., house, apartment, etc.) constitutes one domain and the outside world (including the yard, if any) the other. While this is a somewhat arbitrary and simplified construction, it is congruent with the study's focus on indoor air pollution and is entirely consistent with parents perceptions regarding areas of greatest and least control and safety. The boundaries of these domains are defined in terms of physical space--i.e., the physical boundaries of the home--and sustained by the family-centered meanings and activities which define the home as a social space separate from the

outside world. The following brief exerpts from interviews in Appendix IV supplement exerpts presented in earlier sections (especially "Risks Perceived by Parents") to illustrate the discoursive evidence supporting this interpretation:

Exerpt from Interview 13 in Appendix IV:

Q: Which do you think are greater--the risks inside or outside your home?

M: Outside.

C: Outside.

Q: Why?

M: Because we're better able to control what we have in here--you can't move the cars off the street or the weirdos out of the street or anything like that, so I think we're more secure in our home.

Q: I'd like to get a sense of your feelings of control over what happens--do you think you can control most of the things that happen to you in your lives?

C: Pretty much.

M: I think within the confines of our home, yes. But as we go outdoors, you know, then it's a whole different ball game I think.

C: Yeah.

M: You can't control what our government's doing, you can't control what Meijer's is doing--not one person by themselves, so, when you get out you lose control of the situation.

Q: How about your physical health?

C: I think you have pretty much control, cause once you start feeling bad--I mean, if it's the foods you're eating you start getting on a better diet, you know. Or, if it's, umm, if you're sick,

you know, you go to the doctor. I think it's pretty much under your own control.

M: Yeah, but I don't think you can control--

C: Now, if you're talking about diseases and stuff like that, there's really nothing (you can do)--you can try to stay away from people that are sick or something like that, but if it's something, you know, in public, there's nothing you can do about it.

M: Well, there are certain things like just what comes out of the smokestacks at Board of Water and Light or something like that that, you know, you're not gonna be able to (control). I mean, you can do something about it but it's gonna take a long effort and by that time you'll probably have felt some of the effects.

C: Oh, yeah.

M: I mean, I think you have a better chance of helping yourself when you have a flu or something like that than you do of the effects of the air or water or whatever like that.

Q: O.k., so how much control do you think you have over your health--over what it is today and over keeping it the way you want it?

M: I think I have control over how I feel when I'm home--I can control that situation a lot better <u>because</u> I'm home--but once you get out at school or work or whatever then the tide's turned on you, then somebody else is kinda pulling the old strings there, and you have to go along with the ball game if you want to get anywhere. So, I see a lot of change as you go outside. For the most part it's more in my favor than it is in theirs because I can still tell myself, "Well, what the hell, you know, it's just they're doing it, you know, it doesn't have to affect <u>me</u>," you know--I can still come home and feel good about what's going on or just relax with the wife and kid and feel pretty good about it, but the odds are building up in their favor I think.

Q: You mean you have a sense of losing control?

M: Yeah, slowly.

Exerpt from Interview 8 in Appendix IV:

Q: Where do you think that the risks to your health are the greatest--at work, out of your home, or in your home?

R: I've always felt like it was greater outside. Somehow I feel I have more control over what goes on here in the house. In here it's just me and the family mostly but out there you've got to deal with <u>everybody</u>! You know, you go by kids and you hope that they don't hit you in the head with the baseball.

A: Well, I think it stinks. I mean, I have my own circle of friends but I'm also aware that outside the environment is dangerous. I do like outdoors, but I'm very conscious, very conscientious, of walking at night--especially when I'm working the second shift and gettin' off at around 11:00 and home around 11:30 (p.m.). I get home at 11:30 at night I'm watchin' over my shoulders, waitin' for somebody to dart from behind a tree. I'm <u>very</u> conscious! I think it's dangerous outside 'cause crime has gotten to the point where it used to be done just at night but not anymore. In some areas it's dangerous 24 hours a day.

Q: How do you feel, Ruthann?

R: I feel the same way. Of course, I'm originally from Chicago so this is a little safer, but I don't feel like I'm gonna go walking out at night alone--not even here! I haven't really had any incidents but I still feel like it's dangerous outside.

A: I don't know about you, but I have <u>always</u> heard about child molestation and child kidnapping. I heard about it a long time before I was married and had a child. They <u>do</u> steal babies and put them on the black market or raise them up for whatever, and I'm very conscious with our child.

Q: So, how much control do you think you have over what happens to you in your life?

A: Very little, personally. We control <u>some</u> things, especially in our home, but there's just some things that we can't--we have no control over them.

Q: Like what?

A: Oh, I think I can control where I live to a certain extent, whether or not to get out of poverty to to continue to stay in it, what kind of food I can eat. But I can't control health. You know, we're cast into a big pot and some of us are gonna sink and some of us are gonna swim. We just have no control over some of those things. Your health would be better is you stay in more or go out with a machine gun--it would make you feel a little bit safer, you know, but it varies.

Exerpt from Interview 7 in Appendix IV:

Q: Where do you think risks to health are greatest--inside or outside of your home?

B: I'm sure there's risks everywhere that we don't know about. The unknown risks would probably be more on the outside, 'cause inside you can at least control your environment, inside, somewhat. But outside, what can you do with the air, the water? I mean you like to think the inside's safer, but you don't really know until something happens. But you can at least <u>try</u> to control that environment. Outside, you know, you don't have much control. You don't know what could be in the air that day and if your child is outside and playing close to the railroad tracks over there then somebody could be carrying something on there that could get into the air or there could be a derailment and you just never know with all the factories around here what could be pumped into the air.

J: I agree--I think there are more risks outside.

Exerpt from Interview 4 in Appendix IV:

Q: Do you think the risks to Timmy are greater outdoors or indoors?

P: I think more outside.

V: I think outside because of the traffic--that really worries me, about traffic, cars.

P: He falls down more outside.

V: He doesn't have much sense about them (cars) yet. He knows to watch for cars but if he's after another kid, an animal, or cat or something, he's just going to run right across the road. He won't look--he doesn't have that much sense. I know he wouldn't. I know he would just run across the road and follow the other kids. Whatever they do he's gonna follow them and go too. It's hard to make him understand that, "You can't do this because this might happen." It just kind of worries me. That's my biggest worry is the street--being hit by a car running out into the street, or being nabbed by somebody. I get scared when he gets out of my sight.

The preceding interview exerpts reflect the tendency of parents to compartmentalize risks and assign them to spatial domains, from the present interpretation, where their occurrence in considered to be most or least likely. These risk domains are not particularly complex but were of paramount importance to the parents interviewed in the study and, from their accounts, to the well-being of their children. In particular, the indoor domain was perceived as the place with the least significant risks, a place of safety and security in contrast to the dangerous and uncontrollable outdoor domain.

The open-ended interviews also suggested that the indoor domain was further refined with respect to different areas of the home and that the outdoor domain was usually divided into the area closest to the home (generally the

yard or neighborhood) and the outside-world in general. Risks of illness and accidental injury (i.e., biomedical risks) were perceived for all these domains but social risks (here subsuming all non-biomedical risks) were more often perceived as part of the outdoor domain. For example, risks from indoor air pollution were generally viewed as belonging to the indoor (in the home) domain of risks to health and outdoor air pollution principally to the outdoor domain (although the latter was perceived by many as penetrating the indoor domain). Risks of catching a cold or accidental injury with sharp objects were perceived for both domains. On the other hand, risks of being killed by a drunk driver or of having your child molested or stolen were generally viewed as belonging to the outdoor (out of the home) domain of risks to health. It should be noted that some social risks perceived by parents (such as divorces and children living in broken homes, apathy, spiritual matters, materialism, crime, unemployment) crosscut these domain boundaries and in many instances completely transcend them.

In addition, the open-ended interviews and observations indicated socioeconomic differences in parents' perceptions of risks in indoor and outdoor domains. There was a strong connection between socioeconomic status and the extent to which risks were perceived as being shared by different domains (in particular, the extent to which risks of the outdoor domain were perceived as penetrating the indoor domain). Socioeconomic status also affected

perceptions of risks in different areas within these domains (e.g., different parts of the home; the yard versus the outside world in general). The greatest consequence of socioeconomic differences pertained to the perceived safety of the home compared to the outside world. Parents of higher socioeconomic status generally perceived risks out of the home as being different from risks in the home; they further tended to perceive a greater number of risks for the outdoor domain than the indoor domain. Parents of lower socioeconomic status, on the other hand, perceived less differences both qualitatively and quantitatively between the risks in different domains, largely due to the perceived intrusion of risks from the outdoor domain into the home. The situation is perhaps most succinctly summarized in the mixed cliche offered by a parent who commented, "Home is where it's safe, but it's safer for some than for others."

The results of the survey supported the conclusions from open-ended materials and provided additional evidence supporting an interpretation of risks as being partitioned into spatial domains by the parents of young children. Parents were asked what they considered to be the greatest risks to their and their children's health inside their homes and outside their homes. Their open-ended responses to these questions are transcribed in Appendix III.4 and clearly reflect the extent to which parents were concerned with social as well as more biomedical risks to health. Almost all parents perceived risks to health as differing

for these different domains. Further, most parents differentiated between risks to their children's health in the areas near their homes (which most parents explicity referenced as "the yard") and the outside-world in general. This partitioning of risk domains was consistent with findings discussed earlier regarding the partitioning of domains for air pollution (i.e., differentiations between the quality of indoor and outdoor air).

A number of descriptive findings from closed-ended questions on the survey also supported the interpretation of risks as partitioned into spatially defined domains. The great majority (81%) perceived risks to health as being greater out of the home than in the home. Those who did not perceive a difference (17%) or did not know (1%) were predominantly from the city areas and of lower socioeconomic status. This not only suggested a strong distinction between risks in and out of the home but further implied that socioeconomic status was a significant factor in the extent to which risks were perceived as being shared by these domains.

An interesting contrast to the observation that four of five parents perceived risks outdoors as greater than indoors is that perceptions of "the world" as safe (35%), dangerous (24%), or safe and dangerous (41%) were fairly normally distributed. Thus, regardless of how safe or dangerous parents perceived the world as being, risks to

health were generally considered to be least in the home and to increase the farther one went from this center.

Other indicators of the partitioning of risks were parents' perceptions of their and their children's ability to avoid risks to health in and out of their homes and whether parents believed there were unknown risks to their and their children's health in and out of their homes. Results indicated that about half the parents believed that they and their children could avoid "some" risks to health in and out of their homes. Results further indicated that parents who believed that they and their children could avoid most risks in their homes felt that the avoidable risks to health in the home were about half those out of the home. In contrast to this finding, parents who believed that they and their children could only avoid a few risks in their homes perceived avoidable risks in the home to be about twice those out of the home. In addition, while parents did perceive themselves as being able to avoid more risks than their children, there was only a small difference between parents' perceptions of their own and their children's abilities to avoid risks to health in each of these domains. With respect to perceptions of the existence of unknown risks to health, parents clearly believed there were unknown risks in their homes to themselves (76%) and their children (77%) and out of their homes (94% for both parents and children). While parents perceived more unknown risks out of their homes than in their homes, there was no

appreciable difference between the proportions of parents who perceived unknown risks to themselves and to their children in each of these domains.

Findings from the survey also suggested that parents' perceptions of spatial risk domains was significantly related to their socioeconomic status. In particular, results indicated that this factor was significantly related to differences in parents' perceptions of abilities to avoid risks to health in and out of the home, the number of risk domains perceived, and differences between these domains. Parents of higher socioeconomic status tended to perceive themselves and their children as being able to avoid significantly ($p<.007$) more risks to health than families of lower socioeconomic status. Parents of higher socioeconomic status also perceived themselves and their children as being able to avoid more risks in the home than out of the home; conversely, parents of lower socioeconomic status tended to perceive fewer differences between these domains with respect to the avoidability of risks. In addition, socioeconomic status was directly related to the number of risk domains which parents differentiated such that parents of higher socioeconomic status tended to perceive more domains and greater differences within and between them than parents of lower socioeconomic status. For example, there was a significant tendency ($p<.015$) for parents of higher socioeconomic status to perceive their homes as consisting of more than one risk domain for risks associated with air

quality. Parents of lower socioeconomic status, on the other hand, made significantly fewer differentiations between and within risk domains. Finally, socioeconomic status was directly related to perceptions of the relative magnitudes of risks in different domains. Parents of higher socioeconomic status tended to perceive risks to health as being greater outside the home while parents of lower socioeconomic status perceived fewer differences between the magnitudes of risks in these domains. While this supported the hypothesis that the home would be perceived as being safer than the outside world, it also underscored the observation that the extent to which perceptions differed for these domains was greatly affected by socioeconomic status. These findings support earlier conclusions regarding the importance of socioeconomic status as a source of intracultural variation in perceptions of risks to health and emphasize its importance in perceptions of risks from domain-bound exposures such as the use of domestic sources of indoor air pollution.

CHAPTER 9

DISCUSSION

The present study had two principal research objectives. The first of these was to investigate an hypothesized relationship between the use of woodburning stoves for indoor heating and the occurrence of symptoms of respiratory illness in young children. A survey of indoor heating by the parents of young children was conducted in the area selected for study (the five county Greater Lansing area in south central Michigan) to estimate the prevalence of indoor heating by this and other means. The second objective was to investigate parental perceptions of risks to children's health from heating with woodburning stoves and other sources of domestic indoor air pollution customarily used in our society. In conjunction with this objective, an assessment was made of the extent to which parents' perceptions of risks to children's health corresponded with their information about associated risks and their use of sources of indoor air pollution. In addition, sources of intracultural variation in these areas and parents' general perceptions of risks to health were investigated.

The findings of this study have a number of interesting implications. The data suggest that young

children living in homes heated by woodburning stoves are more likely to develop symptoms of respiratory illness than children living in homes heated by gas, fuel oil, or electricity. In particular, these children had a significantly greater occurrence of persistent coughing and wheezing, both symptoms of chronic airway irritation.

Indoor heating is a necessity for survival in many parts of the world and as a modification of our environment represents one of the most significant technological achievements of human culture. At the beginning of this century about 70% of the total heat energy in the United States came from wood fuel and the use of wood for heating and cooking fuel is still important worldwide. During the winter of 1984-1985, approximately 11% of parents with young children in the five county Greater Lansing area heated with a woodburning stove or wood furnace as their primary heat source and about 13% used at least one woodburning stove/furnace as a source of heat in their homes. A woodburning stove or wood furnace was the only source of heat in about half the homes heating primarily by this means--about 5% of homes in the area. The data indicate that parents using wood fuel for their primary (and especially their only) source of heat tended to do so of economic necessity, while others had less pragmatic motivations. Therefore, subtracting the proportion of homes using woodburning stoves or wood furnaces as their only or primary source of heat from the total, about two percent to

six percent of parents with young children in the Greater Lansing area could potentially reduce the occurrence of persistent coughing and wheezing symptoms for their children by reducing their use of these units or by changing to fuel oil, gas, or electricity for indoor heating.

It should be noted that there are midrange technological alternatives to changing from wood fuel which would reduce the concentrations of pollutants produced by woodburning stoves. However, while these measures might have some effect on the frequency or severity of respiratory illness symptoms the present findings do not suggest that they would eliminate their occurrence (see "Discussion" in Chapter 5). With respect to woodburning equipment per se, different types of woodburning stoves vary in quality and efficiency (and cost). Further, the use of other equipment such as heat exchange units and the newly marketed catalytic converters would affect heating efficiency and the quantity of stove emissions. In addition, properly adjusting the damper and using wood which has been cured for at least six months minimize the concentrations of pollutants affecting indoor air quality. However, none of these measures completely eliminate the hazardous by-products of wood combustion in woodburning stoves and even under the best of circumstances approximately 10% of the pollutants produced would be expected to be emitted in the ambient environment.

While the children of two percent to six percent of parents in the Greater Lansing area constitute a clinically

significant proportion (especially to children experiencing the symptoms), they do not represent a major proportion of the population and patterns of energy consumption in the area would probably not be significantly affected if use of wood fuel were discontinued by these parents. However, the Michigan Department of Natural Resources estimates that approximately one-third of Michigan households use wood fuel as a primary or supplementary source of heat and over one-quarter use wood fuel as their primary heat source. The effects of over three million people changing from wood fuel to gas, oil, or electricity for indoor heating are potentially significant.

Several other sources of domestic indoor air pollution were also investigated which have been associated to varying degrees with an increased occurrence of symptoms of respiratory illness in young children. For example, cooking with gas has been associated with increased occurrence of coughing, colds, and bronchitis in young children. Data from the present study suggest that about 40% of homes with young children in the Greater Lansing area cook by this means and that most (about 80%) of these homes are not heated with wood. At present the best alternative to cooking with gas appears to be cooking with electricity, for which there is no information indicating potential risks to children's respiratory health. Consider the implications of parents responding to the information that heating with

wood or cooking with gas may be harmful to their children's health by changing fuels for these respective functions.

Eliminating the use of these sources of domestic indoor air pollution could significantly reduce the occurrence of associated respiratory symptoms and illnesses in young children. Further, there is evidence to suggest that childhood respiratory illness may affect the occurrence and severity of respiratory problems in adulthood. This implies that reducing these exposures during childhood could potentiate a reduction in the occurrence and severity of adult respiratory problems which would otherwise have occurred, eventually affecting the prevalence of respiratory illness for all age groups in the population.

However, conversion to heating or cooking with electricity, for example, by all households heating with wood or cooking with gas could have a potentially serious effect in terms of the increased demand for electricity and the mechanisms by which this demand is met. The cure might be worse than the disease if an increased number of nuclear power plants are required to produce enough electricty to fuel the electric units in households previously using wood for heat or gas for cooking. This added use of nuclear power could create a greater hazard than the nitrogen dioxides generated from cooking with gas or pollutants from wood combustion if the reactor waste products are not properly managed, effective procedures for which are highly controversial at this time. There are other alternatives

for generating more electricity, such as increasing the use of coal as fuel in power plants. However, this also carries increased risks from sulfur dioxide emissions in particular which not only affect respiratory health but also contribute to acid rain (which is affecting the entire ecosystem). There are, of course, alternatives for indoor heating other than using electricity, but any major shift in patterns of energy use could potentially have consequences more serious than the existing problems which changes would intend to reduce. In addition, any change in our patterns of energy consumption affects not only the distribution of currently available resources (especially non-renewable fossil fuels) but also affects the rate at which remaining global reserves are depleted.

Thus, IF parents respond to the information that indoor heating with woodburning stoves may affect children's health by changing to another source of heat a series of related changes may occur. At the level of material culture, one would expect a decrease in the prevalence of indoor heating with woodburning stoves, an American tradition which is presently increasing in popularity in Michigan and throughout the United States. Changes associated with increasing use of alternate fuels would, in turn, promulgate changes in social, economic, and political networks as the local, state, national, and international energy distribution systems adjusted to changing patterns of household consumption. In addition, data from the indoor

heating survey for the five county Greater Lansing area suggest rural-urban differences in adaptive strategies for indoor heating which would probably affect the extent of change in different regions. The use of woodburning stoves and wood furnaces, for example, was over six times more prevalent in the rural than the urban portions of the five county Greater Lansing area. Further, rural households tended to have more than one source of heat and tended to use fuels which could be stored (wood, fuel oil, kerosene, liquid propane), both of which are effective survival strategies if snowed-in or if there is a power failure. Urban residents, on the other hand, tended to rely on utility gas and electricity, both of which require constant supply from external sources and cannot normally be stored. Thus, the effects of changes in indoor heating patterns would probably not be uniformly distributed and the rural areas would probably exhibit both the greatest resistance to change and the greatest consequences from changing.

Another aspect of social and political change associated with indoor heating with woodburning stoves relates to their contribution to outdoor air pollution. This has not been a focus of the present study but has potentially significant implications for the future use of wood fuel for indoor heating. As stated previously, the use of woodburning units is increasing in Michigan and many other portions of the United States. In some regions, the contribution of wood smoke to outdoor air pollution has

prompted community action and even legislation ranging from emission standards for the stoves themselves to designated periods when their use is and is not permitted. This is especially true in industrial areas where the concentrations of industrially produced air pollution are already so high that the added particulates and polycyclic organic compounds from domestic heating with wood fuel cause outdoor pollution levels to exceed EPA air quality standards. Examples of legislation enacted thusfar include the following: standards for woodburning stoves and fireplaces in Juneau, Alaska with penalties for violation of up to thirty days in jail and a $500 fine; regulations against heating with wood when the air is stagnant in Reno, Nevada and Missoula, Montana; and emission standards for new stoves in Oregon. Proposals for emission standards have been made in New York, New Jersey, and six New England states. In other areas, such as Albuquerque, New Mexico and several parts of Colorado, signals are being used (e.g., a red light on a tall building) to request voluntary reductions in the use of wood fuel.

The identification of indoor heating with a woodburning stove as a source of outdoor air pollution and as a potential risk to children's health also has implications on an ideological level. Most people using wood fuel consider it a "natural" way of heating and further consider most things which are natural to be "good" (excluding catastrophe, snakebite, poisonous plants, and the

like). This equation of what is perceived as natural with what is perceived as good affects the way in which a variety of other things are perceived, from the use of chemicals in agriculture and food processing to the production of nuclear weapons. The identification of heating with woodburning stoves as a contributor to outdoor air pollution and as a potential risk to children's health negates the natural-good equation in this specific area and might exert an effect on the extent to which other things perceived as natural and good continue to be so perceived. On the other hand, since no one considers all things which occur in nature to be good, it may be that orientations toward the natural as good would be essentially unchanged and that indoor heating with woodburning stoves would simply be reassigned to a category of natural things which are no longer perceived as being good for health (like tobacco and beverages with caffeine). In addition, classifying wood heat as a risk to health (as well as regulations in some areas restricting or controlling use of woodburning units) depreciates the sense of autonomy from "the system" which persons heating with wood generally express. They become forced to deny or rationalize risks if they continue to use wood heat or to become more dependent on alternative energy sources whose cost and supply are perceived as being less within their control.

Thusfar, discussion of issues surrounding the use of woodburning stoves for indoor heating has been based on the assumption that if parents heating with woodburning stoves

were informed of potential risks to their children's health that they might change to alternate sources of heat. However, data from the present study suggests that this is not necessarily a valid assumption. For example, parents heating with woodburning stoves tended to perceive associated risks to children's health as being lower than parents who did not heat with wood. Further, regardless of type of heat, the use of sources of domestic indoor air pollution in general was often inconsistent with perceptions of associated risks to children's health as well as the extent to which parents reported being informed of these risks.

The relationship between perceptions of risks to health and the taking or avoiding of those risks is a central issue in the prevention of most chronic diseases. In a broader sense, the extent to which our risk-taking behaviors are consistent with our beliefs and information is not only one of the crutial junctures between thought and action, it is also a meaningful measure of our rationality as individuals and populations. However, the extent to which behavior is <u>inconsistent</u> with perceptions serves as an equally meaningful indicator of our capacity for rationalization and of the selection and prioritization of risks within a larger framework of meanings, wants, and needs.

It is entirely rational, for example, to choose indoor heating with a woodburning stove over freezing to

death, regardless of possible risks to respiratory health. The risks of children coughing or wheezing would be perceived as insignificant by comparison to the health consequences of not having heat. For that portion of the population heating only or primarily with wood out of economic necessity, continuing to do so would be the only logical alternative.

However, priorities themselves are not always rational and may involve agendas which parents are either unaware of, reluctant to admit, or completely deny. Further, it is not unlikely that feelings associated with particular activities, such as heating with wood, and the interpenetration of people's feelings about health issues in general significantly affect the way they respond to the identification of risks. For example, smoking tobacco is an increasingly controversial source of indoor air pollution and unlike heating and cooking is not a necessary indoor activity. It is logically inconsistent for parents who smoke tobacco and perceive smoking as a risk to their or their children's health to continue to do so. Nevertheless, this is the case for most parents who smoke: they have heard and they believe that smoking may be harmful to their or their children's health but continue to smoke.

For some parents, the ambiguities of risks to health and apparent inconsistencies in labeling different substances as hazardous are sufficient to rationalize risk-taking behavior (such as smoking). From this perspective

the consequences of risk-taking behavior are viewed as highly variable from individual to individual and the probabilistic quality of risk is emphasized. For other parents there are hidden agendas (such as weight control and stress management with respect to smoking) which act to sustain risk-taking patterns and contribute to the process of their rationalization. Other parents deny the existence of risks to <u>their</u> health (or their children's health) while saying that something could affect <u>other</u> people, reporting that they consider themselves either immune or resistant to health consequences. Further, many parents tend to situate risks such as smoking tobacco in the larger context of risks to health, ranging from getting cancer from artificial additives in food to being vaporized in a nuclear blast. From this perspective, risks from indoor air pollution are viewed as less important than a large number of other risks perceived as being more imminent, of greater consequence, or both.

Risks and their exercise or avoidance are characterized in a number of ways in our society. We speak of risks as being good or bad, high or low, acceptable or not, foolish or sensible, necessary or unnecessary, calculated, justified, believed, and denied. We speak of them as real, imaginary, known, unknown, suspected, or hidden and we even speak of risks as being dangerous or safe. We take risks for a wide variety of reasons ranging

from ambition to desparation, habit to necessity, and self-indulgence to self-sacrifice.

However, humanity has the singular distinction of having increased the number of risks to well-being beyond the range provided in nature--a consequence which affects not only our own species but every living thing on Earth. Our propensity for risk-taking is evident in human history and current events and one could speculate that it has played a significant role in human evolution over the past four million years. The manner in which this capacity is channeled in the forseeable future will certainly be a significant factor in both the quality of our lives and our prospects for survival.

In American society we expect to take risks--indeed we actively seek some risks--to achieve "progress", fame, and fortune. There is and historically has been in America an entrepreneurial emphasis on self-achievement and "success" and it is a tacit understanding that the process involves taking risks. This risk-oriented value system pervades almost every aspect of our lives, from economic competition to politics to games. We codify these values in aphorisms like, "Nothing ventured, nothing gained," and we romanticize and glorify risk-taking in the name of progress, exploration, and, perhaps most personally, in the pursuit of love and happiness.

However, the processes by which we select the risks which are important to <u>us</u> and the factors which affect the

risks we take or avoid are extremely complex. For example, with respect to the use of sources of domestic indoor air pollution by the parents of young children, the principal research hypothesis of this study was that the extent to which parents were informed of risks to their children's health would significantly affect their perceptions of risks and that this, in turn, would significantly affect risk-taking behavior in this area. However, as discussed earlier, this was not the case. Information status had the most significant effect of all factors assessed on perceptions of risks to children's health, but this was not particularly surprising in view of the intimate relationship between information, "knowledge," and perception. On the other hand, the finding that perceptions of risks to children's health from indoor air pollution did not seem to significantly affect the use of sources of indoor air pollution was unexpected.

The rationalization of non-essential activities (such as smoking tobacco) and the essential nature of others (e.g., heating with wood out of economic necessity) partially explain this situation. However, the present data also suggest a number of other factors which affect the relationship between parents' perceptions of risks and their conduct which contribute to intracultural variation in patterns of risk-taking. The degree of concern with ecological issues in general was the most significant intermediating factor between perceptions of risk and use of

sources of domestic indoor air pollution (being directly related to the former and inversely to the latter). This finding is logically consistent since the category of pollution is of ecological relevance regardless of the domain (i.e., indoor, outdoor) in which it occurs. The most significant source of intracultural variation in perceptions of risks to children's health and risk-taking behavior with respect to indoor air pollution was socioeconomic status (being directly related to perceptions via information status and inversely related to risk-taking behavior).

Socioeconomic status also emerged as a significant source of intracultural variation in the perception of risk domains. Although the construction of these domains could be viewed in a number of ways, the present data support an interpretive framework of risks to children as partitioned by parents into domains based on an indoor-outdoor dichotomy defined in terms of physical and social space. The boundaries of these domains are defined physically in terms of differences between the areas within and outside the home and socially in terms of the meanings which sustain and localize perceptions of risks and risk-taking behavior in respective domains. Within this framework, the data suggest that socioeconomic status significantly affects the perceived interpenetration of domains--the extent to which the risks of one domain are perceived as being shared by another. This, in turn, directly affects the degree to which the home (the indoor domain) is perceived as "safe".

Specifically, findings of the present study suggest that socioeconomic status is inversely related to the perceived intersection of risk domains and that the greater this intersection the less the indoor domain is perceived as "safer" than the outdoor domain.

While parents of young children are at any point in time only a fraction of the total population, certain extrapolations from their views and conduct regarding indoor air pollution to the larger arena of risk perception and risk-taking in general by the population as whole can still be reasonably made. Three brief examples should serve to illustrate this, the first dealing with a hypothetical exchange of longevity for risk-free success, the second with nuclear war, and the third with the production of hazardous chemicals. In all three instances, the commonality with the indoor air pollution data is a strong relationship between information and perceptions of risks but an apparently inconsistent relationship between perceptions of risks and risk-taking behavior which is sustained by personal and culturally-shaped meanings.

Recently, the United States hosted the World Olympics (in Los Angeles, California), a ritual game which symbolizes not only our capacity for peaceful competition but the epitome of our conception of physical well-being: the Olympic athlete. In the U.S. these athletes are not drafted by the state and therefore represent the promise to young people that through determination and hard work almost

anyone has the potential to achieve Olympic status and accompanying fame and fortune. However, games involve risks of winning or losing and everyone knows that it requires a considerable investment of time and energy to train to compete in the Olympics. During the games in Los Angeles, a random sample of sixteen year olds attending the event were asked in a Harris Poll if they would be willing to take a drug which would guarantee their winning an Olympic gold medal but would cause them to die in exactly five years; over half responded they would like to take the drug, have gold medal status, and only live for five more years.

One would assume that reasonable beings would not actively seek lethal risks to their own health except as a consequence of addressing some higher priority, and therein lies the crux of the matter. We all have priorities and agendas, as individuals, communities, and populations, which shape our perceptions of which risks are "real" or important and affect our decisions about the risks we take or avoid. In addition, the meanings which sustain risk-taking behaviors are not always apparent or rational.

Since World War II, we have all lived with the constant threat of nuclear war. This reality has engendered a sense of fatalism and powerlessness in many people. We feel we cannot control some of the most significant risks in our lives and this leaves each of us, to varying degrees, uncertain, shaken, and afraid. Would the world be different without nuclear weapons? Of course it would. But how

different? There has always been the risk of attack by enemies. One of the major differences, besides the scale of destruction, between nuclear and conventional warfare is the total destruction of the concept of central places which are more "safe" than outlying areas. In the past, the centers of population were usually aware of invaders before actual engagement; now these centers are targets whose populations have no chance of escape and little chance of warning. How many of us would be able to effectively respond to a two minute warning of nuclear attack (assuming we were always tuned to an emergency broadcasting system station)? Or for that matter, how many of us would want to? But these are apocalyptic concerns of almost instantaneous consequence should they occur. The same sense of powerlessness and desparation and the same depreciation of "safe centers" (e.g., the putative safety of the home) pervades our lives with respect to a host of other risks of our own creation ranging from pollution to crime.

Around the world there is increasing concern regarding the manufacture of hazardous substances, from methylisocyanate (MIC) gas in Union Carbide plants in Bhopal, India to dioxin and PBB in Michigan. These concerns are becoming highly publicized in the U.S. with attention focusing in particular on industrial accidents, food contamination, air and water pollution, and toxic waste disposal (including nuclear waste).

Yet, for example, in the United States the Environmental Protection Agency and the American people do not even know how many chemical plants there are which are producing hazardous substances (estimates range from 1,500 to 6,000) because they are not registered on that basis. Why not, and why is there no comprehensive legislation regarding the production of hazardous chemicals? There is no single answer to these questions. Part of the problem pertains to the political dominance of business interests over those of labor and environmental groups. However, on a more general social level, a useful explanatory perspective would be that Americans tend to accept the risks from hazardous chemicals and many other things as necessary evils, unavoidable consequences of our lifestyles and levels of consumption which we trade-off for perceived benefits of manufactured products, processed foods, medicines, and jobs. This exchange of risks of undesirable consequences for expected or potential benefits is a significant component of the value system which sustains risk-taking behavior and is central to an understanding of the relationship between the risks we perceive and those we take. It is important to an appreciation of occupational safety standards and trade-offs between risks to health and job opportunities; it is the central concept in current cost-benefit approaches to risk assessment; and it is as important to understanding the relationship between the risks we perceive and those we take as communities and populations as it is to understanding

this relationship for individual families. However, it is not the only component, and findings of the present study suggest that a number of factors (from illness experience to views on ecological issues to socioeconomic status) affect perceptions, conduct, and the relation between the two. The findings further suggest that perceptions and risk-taking patterns are often grounded in meanings which can be as ambiguous as the phenomena they sustain.

Risks to health are reified by the biomedical community and politicized in the social and economic translation of biomedical information into health policy and the estimation of "costs". This process supports a construction of health-related reality which partitions risks to health from the larger realm of risk in general. However, it is important to recognize that this distinction is arbitrary and that the compartmentalization of risks to health as a separate category of risk does little to reduce their ambiguity. Further, the range of phenomena which parents perceive as risks to health extends well beyond that emphasized by the biomedical community and from an anthropological perspective is far more congruent with a construction of health-related reality situated in the larger context of social reality.

The designation of risks as health-related by parents could be viewed as conforming to a biomedical categorizationn of health risks as separate from "other" risks. However, qualifying this interpretation is the

observation that most parents perceive ALL risks as potentially affecting health. Thus, while virtually all biomedical risks are perceived as health risks, not all risks affecting health are perceived as being biomedical. This is clearly reflected in parents' selection and prioritization of risks to children which include as great an emphasis on social, political, and economic risks (ranging from crime, driving, and apathy to pollution and nuclear war) as on risks of illness.

The relationship between perceptions of risks and risk-taking behavior in the home is a microcosm of larger aspects of the relationship between perception and conduct. In this respect, inconsistencies between parents' perceptions of risks to children's health and their use of sources of indoor air pollution are a reflection of larger inconsistencies between perception and conduct in our society. While risks from indoor air pollution are perceived as less consequential than many other risks, their investigation illustrates the complexities of the factors which shape perceptions of risks and their role in our behavior. Most parents are concerned that there seem to be more and more risks which threaten not only the quality of their children's lives but their very survival. These concerns are real, and their resolution a rising priority in a world where the risks we face in our daily lives are increasingly of our own creation.

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VOLUME II

APPENDICES

463-1329

APPENDIX I

RESPIRATORY HEALTH ASSESSMENT INTERVIEW SCHEDULE

APPENDIX I

RESPIRATORY HEALTH ASSESSMENT INTERVIEW SCHEDULE

Name _____
Address _____
_____
Phone _____

1. Person interviewed and relation to subject.
   _____

2. Do you live with this child? 1. Yes 2. No

3. Sex of child 1. Male 2. Female

4. Date of birth of child _____

5. Has child ever attended day care, nursery school, or preschool? 1. Yes 2. No

6. What is (are) the age(s) of other child(ren) living in this child's home, if any? _____

7. How many bathrooms are there in this child's home? _____

8. What is the highest grade completed in school or highest education degree of the head of this child's household?

ENVIRONMENT

9. How is this child's home heated?

10. If a woodburning stove or wood furnace is used in this child's home, please specify:

    a. How long? _____
    b. Use as primary or supplementary heat? _____
    c. Type of unit? _____
    d. Location in home? _____

11. How many face cords (4'X8'X2') (Note: full cord = 4X8X4) of wood are burned per winter? _____

12. Are there any humidifiers or air filters in this child's home? _____

13. Has (have) the parent(s), guardian(s), or primary care giver(s) of this child ever smoked tobacco while living in the home with this child? 1. Yes 2. No

    If YES, please specify type (cigarettes, cigars, pipe): _____

14. Does/do he/she/they currently smoke while living in the home with this child? 1. Yes 2. No

15. About how much tobacco (packs, cigars, bowls) does/do he/she/they smoke per day now? _____

16. Does this child regularly spend time in any place(s) other than his/her home? 1. Yes 2. No

    If YES, a. About how much time does he/she spend there per day? _____

    b. Is another child or are other children present? 1. Yes 2. No

    If YES, please specify ages: _____

    c. How is (are) this (these) place(s) heated? _____

    Is heat supplied by wood fuel? 1. Yes 2. No

    If YES, please specify as primary or supplementary heat: _____

    d. Does anyone at this (these) place(s) smoke tobacco? 1. Yes 2. No

THESE QUESTIONS PERTAIN MAINLY TO THE CHEST. IF YOU ARE IN DOUBT ABOUT WHETHER YOUR ANSWER IS YES OR NO, RESPOND NO.

COUGHS/COLDS

17. Does this child usually have a cough with colds? 1. Yes 2. No

18. Does this child usually have a cough at night? 1. Yes 2. No

19. Does this child cough on most days (four or more days per week)? 1. Yes 2. No

20. During which months does this child's cough give him/her the most trouble? _____

21. How many times has this child had a cough this winter (since Thanksgiving)? _____

22. How many times has this child had a cough within the last two months? _____

23. On the average, how many chest colds per year does this child get? _____

24. How many chest colds has this child had this winter (since Thanksgiving)? _____

25. How many chest colds has this child had within the last two months? _____

WHEEZING

26. Does this child's chest ever sound wheezy or whistling:

    a. When he/she has a cold? 1. Yes 2. No
    b. Occasionally apart from colds? 1. Yes 2. No
    c. Most days or nights? 1. Yes 2. No
       If YES, when is it most noticeable? _____

    If YES to "b" or "c":

    d. For how many years has wheezing or whistling in the chest been present? _____
    e. During which months does this child's wheezing give him/her the most trouble? _____

27. How many times has wheezing or whistling in the chest been present this winter (since Thanksgiving)? _____

28. How many times has wheezing or whistling in the chest been present within the last two months? _____

29. Has this child ever had an attack of wheezing that caused him/her to be short of breath? 1. Yes 2. No

    If YES: a. Has this child had two or more such episodes? 1. Yes 2. No
    b. Has this child required medicine or treatment for the(se) attack(s)? 1. Yes 2. No
    c. How old was this child when he/she had his/her first such attack? _____
    d. Is or was breathing completely normal between attacks? 1. Yes 2. No

30. Does this child ever get attacks of wheezing after exercising or running? 1. Yes 2. No

CHEST ILLNESSES

31. Since birth or for the past three years has this child had any chest illness that has kept him/her from his/her usual activities for as much as three days?
1. Yes 2. No

If YES: a. Did he/she bring up more phlegm or seem more congested than usual with any of these illnesses? 1. Yes 2. No
b. How many illnesses like this has he/she had since birth or for the past three years? _____
c. How many of these illnesses have lasted for as long as seven days? _____

32. Was this child ever hospitalized for a severe chest illness or chest cold before the age of two years?
1. Yes (# times _____) 2. No

33. Did this child have any other severe chest illness or chest cold before the age of two years? 1. Yes 2. No

34. Were either of this child's natural parents ever told by a doctor that they had a chronic lung condition such as:

	Mother		Father	
a. chronic bronchitis	1. Yes	2. No	1. Yes	2. No
b. emphysema	1. Yes	2. No	1. Yes	2. No
c. asthma	1. Yes	2. No	1. Yes	2. No
d. hay fever/allergies	1. Yes	2. No	1. Yes	2. No
e. lung cancer	1. Yes	2. No	1. Yes	2. No
f. tuberculosis	1. Yes	2. No	1. Yes	2. No
g. other	_____		_____	

35. How many times has this child been seen by a doctor this winter? _____

36. Has this child ever been diagnosed by a doctor as having allergies or asthma? _____

APPENDIX II

PERCEPTION OF RISK INTERVIEW SCHEDULE

APPENDIX II

PERCEPTION OF RISK INTERVIEW SCHEDULE

Subject # _____ Respondent's Relation to Subject _____
Subject Date of Birth _____ Sex _____
Date of Interview _____

1. First of all, we would like to know if you live in a city, a town, the suburbs, or the country?
   1. City 2. Town 3. Suburbs 4. Country

2. Do you live in a house, apartment, or mobile home?
   1. House 2. Apartment 3. Mobile Home 4. Other _____

   IF a house: Do you own_____or rent_____your home?

3. How long have you lived in the area? _____

4. For each of the following, please tell me if it is used to heat your home:
   1. fuel oil furnace
   2. gas furnace
   3. built-in electric unit
   4. woodburning stove or wood furnace
   5. fireplace
   6. portable electric unit
   7. kerosene space heater
   8. Other _____

   IF more than one heat source: What do you consider to be the principal source of heat, providing half or more of the heat in your home? _____

5. IF A WOODBURNING STOVE IS USED:

   a. What type of woodburning stove do you have? Is it free-standing, a furnace add-on, or a fireplace-insert?
      1. FS 2. FAO 3. FI (4. WF)

   b. Is the stove installed within a major living area?
      1. Yes 2. No (Location _____)

   c. How long have you heated with wood? _____

IF A WOODBURNING STOVE OR WOOD FURNACE IS NOT USED:

d. Have you ever heated your home with wood?
1. Yes 2. No
IF YES: Why did you change? _____
_____
IF NO : Why not? _____
_____

6. Do you have any humidifiers, vaporizers, or air filters in your home? 1. Yes 2. No
IF YES: Where?
a. humidifier on furnace
b. humidifier in room(s)
c. vaporizer in room(s)
d. air filter on furnace
e. other air filters

7.a. Do you use an air conditioner to cool your home when it's hot outside? 1. Yes 2. No
IF YES: a. the whole house
b. certain rooms
c. Is ---'s bedroom air conditioned?
1. Yes 2. No

b. Do you use a dehumidifier to cool your home when it's hot? 1. Yes 2. No

8. What fuel is used most for cooking in your home?
1. electricity 2. gas 3. other _____

9. How is your home insulated?
1. formaldehyde foam
2. asbestos fiber
3. fiberglass
4. cellulose
5. other _____ 6. Don't know ____

10. Does anybody in the house smoke tobacco?
1. Yes 2. No
IF YES:
a. Who? 1. Father
2. Mother
3. Other adult
4. Older children
5. Younger children

b. For each person who smokes, does ---- smoke mostly:

	Father	Mother	Other Adult	Older Child	Younger Child
1. cigarettes	_____	_____	_____	_____	_____
2. pipe	_____	_____	_____	_____	_____
3. cigars	_____	_____	_____	_____	_____

c. About how much does ---- smoke per day?

	Father	Mother	Other Adult	Older Child	Younger Child
1. cigarettes (packs/day)	_____	_____	_____	_____	_____
2. pipe (bowls/day)	_____	_____	_____	_____	_____
3. cigars (cigars/day)	_____	_____	_____	_____	_____

11. IF RESPONDENT SMOKES: There's been a lot of talk lately about people who smoke trying to quit. Some people who smoke think it's worthwhile to try to quit while others don't. How do you feel about it?
    a. Have you ever tried to quit smoking? 1. Yes 2. No
    b. How long have you smoked? _____
    c. Are you presently trying to quit? 1. Yes 2. No
    d. Have you ever quit before? 1. Yes 2. No
    IF YES: Number of times? _____

    IF RESPONDENT DOES NOT SMOKE:
    Have you ever smoked? 1. Yes 2. No
    IF YES: Why did you stop smoking? _____
    _____
    IF NO: Why did you never start? _____
    _____

FOR QUESTIONS 12 THROUGH 15: When you were growing up:

12. Did your parents smoke (either or both)? 1. Yes 2. No
    Your spouse's parents? 1. Yes 2. No 3. No spouse
    9. Don't know

13. What did your parents use for indoor heating? _____
    9. Don't know
    Your spouse's parents? _____
    3. No spouse 9. Don't know

14. What did your parents use for cooking fuel? _____
    9. Don't know
    Your spouse's parents? _____
    3. No spouse 9. Don't know

15. How was your parent's home insulated? _____
    9. Don't know
    Your spouse's parents? _____
    3. No spouse 9. Don't know

The following questions deal with perceptions of risks to health.

16. First of all, what does the phrase "risk to health" mean to you--how would you define a "risk to health"? _____

_____

_____

_____

I'm going to ask you some questions about health risks.

17. For something to be a risk to health would it always have to cause injury or illness or just sometimes?
1. Always 2. Sometimes

18. Do you think that something should be labeled as hazardous to your health only if it's known to cause illness or if it's simply suspected?
1. Known 2. Suspected

19. Would you consider something to be a risk to health if it might cause you to get sick many years later, would it have to happen soon afterwards, or could it happen anytime? 1. Later 2. Soon 3. Anytime

20. If something can make people sick, how many people who have contact with it should get sick before the government should label it hazardous to your health: all, most, some, a few, or very few? 1. All 2. Most 3. Some 4. Few 5. Very Few

21. Do you see the world as a safe place or as a relatively dangerous place? 1. Safe 2. Dangerous 3. Both

22. Do you usually wear a seatbelt when traveling in an auto-mobile? 1. Yes 2. No

23. What do you consider to be the major risks to your and your child(ren)'s health in your home? _____

_____

_____

24. What do you consider to be the major risks to your and your child(ren)'s health outside your home (your yard, neighborhood, or the world in general)? _____

_____

_____

25. When do you consider yourself to be ill or sick? _____

_____

26. Do you consider yourself to be ill or sick:

	Yes	No	Maybe
1. when you don't feel well?	1	2	3
2. when you have a fever?	1	2	3
3. when a doctor says so?	1	2	3

4. when your spouse or other	1	2	3
household member says so?	1	2	3
5. when you cannot work or perform	1	2	3
your usual activities?	1	2	3

27. Would you consider your child(ren) to be sick if he/she/they:

	Yes	No	Maybe
1. felt poorly?	1	2	3
2. had a fever?	1	2	3
3. coughed at night?	1	2	3
4. wheezed?	1	2	3
5. was/were told so by a doctor?	1	2	3

28. Do you think that what happens to you in your life is usually the result of what you do and believe or usually the result of things beyond your control?
1. What do/believe 2. Out of own control 3. Both

29. Do you think that your physical health is usually the result of what you do and believe or usually the result of things beyond your control?
1. What do/believe 2. Out of own control 3. Both

30. Which of the following do you think is most important to your health: your own beliefs and behavior, your genetic inheritance, or the Will of God?
1. Own beliefs/behavior 2. Genetics 3. Will of God

Second most important?
1. Own beliefs/behavior 2. Genetics 3. Will of God

31. Can children get sick from breathing things which are in the air? 1. Yes 2. No 3. Don't Know

IF YES: What can they get? _____
_____
How would you know when they get it? _____
_____

32. Do you think that the air inside your home is usually better to breathe than the air outside your home, do you think there's no difference, or do you think the outside air is usually better?
1. In Better 2. No Difference 3. Out Better

33. Do you think that the air in <u>some</u> parts of your home is better to breathe than the air in <u>other</u> parts of your home?
1. Yes 2. No 3. Don't Know 4. Sometimes (when?)
_____

For each of the following statements, please tell me whether you agree. disagree, or don't know.

	A	D	DK
34. I can keep the air in my home cleaner than the air outside my home.	1	2	3
35. No matter how hard you try outdoor air pollution is going to get into the air in your home.	1	2	3
36. No matter how hard you try pollen and dust are going to get into the air in your home.	1	2	3
37. If you get a deep chill from cold air or wind you will get sick sooner or later.	1	2	3
38. The way to stay healthy is to eat right, keep warm, and not do anything too much.	1	2	3
39. Natural foods are better for you than foods with artificial ingredients.	1	2	3
40. The chemical PBB is a serious health risk to the people of Michigan.	1	2	3
41. No matter what you eat these days it seems like there's always something in it that's supposed to be bad for you.	1	2	3
42. Nuclear power is perfectly safe.	1	2	3
43. Tap water is more polluted now than when I was a child.	1	2	3

---

44. Some people feel that if they know about risks that they can avoid them. Other people feel that there are risks that they cannot avoid even if they know about them. How do you feel? Think first of the risks to your health which you know about which are <u>in</u> your home. Do you think that you can avoid all of them, most, some, a few, or that you can't avoid any of them?
    1. All 2. Most 3. Some 4. Few 5. None

45. How about your child(ren)?
    1. All 2. Most 3. Some 4. Few 5. None

46. Think now of the risks to your health which you know about which are <u>outside</u> your home. Do you think that you can avoid all of them, most, some, a few, or none of them?
    1. All 2. Most 3. Some 4. Few 5. None

47. How about your child(ren)?
1. All 2. Most 3. Some 4. Few 5. None

	Yes	No	Maybe	DK
48. Do you think that the risks to your health are greater out of the home than in the home?	1	2	3	4
49. Do you think that there are risks to your health which you are NOT aware of: a. at home?	1	2	3	4
b. out of your home?	1	2	3	4
50. Do you think that there are risks to your child(ren)'s health which you are NOT aware of: a. at home?	1	2	3	4
b. out of your home?	1	2	3	4

51. There are some risks to your child(ren)'s health which he/she/they manage to avoid. Do you think each of the following is important, very important, or not very important in helping your child(ren) to avoid these health risks?

	Very Important	Important	Not Very Important
1. supervision by adults	1	2	3
2. what they're taught by adults	1	2	3
3. what they learn from other children	1	2	3
4. their own common sense	1	2	3
5. safeguards at home	1	2	3
6. community safety programs	1	2	3
7. other _____	1	2	3

52. What do you consider to be the greatest risks to the health of the general U.S. population? _____

_____

_____

Why? _____

53.a. Which of these risks do you think are avoidable or preventable? _____

_____

b. Do you think any of them are not avoidable or preventable? (IF YES: Which?) _____

_____

54. Do you see man-made pollution as a threat to your or your child(ren)'s recreation?
1. Yes 2. No 3. Maybe
IF YES: How? _____

_____

55. For each of the following please tell me (a) if you've ever heard that it may be harmful to your health, and (b) whether or not you believe it may be harmful:

	Ever Heard		Believe			
	Yes	No	Yes	No	Maybe	DK
1. leaded gasoline/paint	1	2	3	4	5	6
2. PCB	1	2	3	4	5	6
3. dihydrogen monoxide	1	2	3	4	5	6
4. carbon monoxide	1	2	3	4	5	6
5. jogging	1	2	3	4	5	6
6. eating a lot of red meat such as beef	1	2	3	4	5	6
7. high cholesterol levels	1	2	3	4	5	6
8. eating a lot of salt with meals	1	2	3	4	5	6
9. DES	1	2	3	4	5	6
10. smoking	1	2	3	4	5	6
11. radon gas	1	2	3	4	5	6

56. There is a certain amount of controversy over possible health effects of some aspects of the indoor environment. Some people believe that some of the things customarily used and done indoors may be harmful to children's health; other people disagree. Here is a list of things which occur indoors. For each thing please tell me (a) if you've ever heard that it may be harmful to children's health, and (b) whether or not you believe it may be harmful to children's health:

	Ever Heard		Believe			
	Yes	No	Yes	No	Maybe	DK
1. cooking with electricity	1	2	3	4	5	6
2. cooking with gas	1	2	3	4	5	6
3. heating with electricity	1	2	3	4	5	6
4. heating with fuel oil	1	2	3	4	5	6
5. heating with gas	1	2	3	4	5	6
6. heating with a woodburning stove	1	2	3	4	5	6
7. heating with a fireplace with a screen	1	2	3	4	5	6
8. heating with a kerosene space heater	1	2	3	4	5	6
9. insulating with formaldehyde foam	1	2	3	4	5	6
10. insulating with asbestos fiber	1	2	3	4	5	6
11. adult tobacco smoking in the home	1	2	3	4	5	6

57. Do you believe that the following things customarily used or done indoors are safe, very safe, harmful, or very harmful for children's health:

	VS	S	H	VH
1. using gas for cooking fuel	1	2	3	4
2. heating with a woodburning stove	1	2	3	4
3. heating with a kerosene space heater	1	2	3	4
4. adult tobacco smoking	1	2	3	4
5. heating with a fireplace with a screen	1	2	3	4
6. having formaldehyde foam insulation	1	2	3	4
7. having asbestos fiber insulation	1	2	3	4

58. On a scale of zero to ten (where 0 = no risk at all) how much risk do you think there is that children might have respiratory symptoms such as cough from the following things which customarily occur indoors:

	Number (0 to 10)
1. adult tobacco smoking	_____
2. cooking with gas	_____
3. heating with a woodburning stove	_____
4. heating with a kerosene space heater	_____
5. heating with a fireplace with a screen	_____
6. having formaldehyde foam insulation	_____
7. having asbestos fiber insulation	_____

59. Has ---- ever been diagnosed by a doctor as having an allergy or asthma? Allergy: 1. Yes 2. No
IF YES: What? _____
Asthma: 1. Yes 2. No

60. Has ---- ever had a serious illness? 1. Yes 2. No
IF YES: What? _____

61. Has ---- ever been hospitalized? 1. Yes 2. No
IF YES: How many times? _____
Why? _____

62. Compared to other children ----'s age, would you say that his/her health is excellent, good, fair, or poor?
1. Excellent 2. Good 3. Fair 4. Poor

63. Compared to other persons your age, would you say your health is excellent, good, fair, or poor?
1. Excellent 2. Good 3. Fair 4. Poor

64. Do you believe that your life span--the number of years you expect to live--will be greater than that of your parents? 1. Yes 2. No 3. Maybe 9. Don't know

65. Do you believe that your children will have a greater life span than you will?
1. Yes 2. No 3. Maybe 9. Don't know
Why? _____

66. Does ---- presently attend day care, preschool, nursery school, or any other school?
1. Day care 2. Preschool 3. Nursery school
4. Other _____

67. Which of the following categories would you say best describes ----'s ethnic or racial background and that of ----'s parents?

	Subject	Mother	Father
1. white	_____	_____	_____
2. black	_____	_____	_____
3. Hispanic	_____	_____	_____
4. native American	_____	_____	_____
5. Asian	_____	_____	_____
6. Another group not listed (specify)	_____	_____	_____

68. What is ----'s religious affiliation, if any, through his/her parents?
   1. Protestant: Denomination _____
   2. Catholic
   3. Jewish: a. Orthodox b. Reformed c. Conservative
   4. Other _____
   5. None

69. Who else lives with you and ---- in your home?

Name	Relation to Subject	Approximate Age

70. Are you currently employed? 1. Yes 2. No
   IF YES: What is your occupation? _____
   IF NO: Have you ever been employed? 1. Yes 2. No
   IF YES: What was your occupation? _____

71. Is your husband/wife currently employed? 1. Yes 2. No
   IF YES: What is his/her occupation? _____
   IF NO: Has he/she ever been employed? 1. Yes 2. No
   IF YES: What was his/her occupation? _____

72.a. What is the highest level of education that you have completed? _____

   b. Your husband/wife? _____
   No spouse_____

73. Who usually decides if ---- is sick? _____

74. Who usually decides whether or not to take ---- to the doctor? _____

75. If you were to change your heating system, who would decide what to change it to? _____

APPENDIX III

PERCEPTION OF RISK INTERVIEWS: OPEN-ENDED RESPONSES

APPENDIX III.1

EMIC DEFINITIONS OF THE PHRASE "RISK TO HEALTH"

IN A RANDOM SAMPLE OF 100 MID-MICHIGAN PARENTS OF

YOUNG CHILDREN (BY SUBJECT NUMBER).

1. Anything that may cause me to become physically ill.
2. Something that endangers your health or in the future could endanger your health in some way.
3. Not having a proper diet.
4. Something hazardous--something that could hurt you or has the potential for harm.
5. Anything that might jeapordize having perfect health.
6. Something that would be hazardous to your health.
7. Doing something that I know is bad; doing something that is not good for you.
8. Doing things that could harm your body.
9. Don't know.
10. Something in the air or food or environment in general which could cause a health problem and physical things like accidents which could cause a health problem.
11. Anything that would potentially impair your health.
12. Things like fire, car accidents, accidents away from home, kids falling down, drowning in the bathtub or swimming, etc.
13. Doing something to endanger your health.
14. Anything!
15. Anything that could hurt you.
16. Anything that causes more than normal problems.

17. Don't know.

18. Something which has a lot of risk, not just a little.

19. Things like smoking, poor eating habits, or lack of exercise.

20. Things like diet--not eating the right things--and not keeping clean, (lack of) cleanliness.

21. Things like smoking.

22. Anything that causes physical or mental bodily harm.

23. Anything that would cause harm.

24. Things that could cause harm to your body.

25. Something intentionally done that may harm the body.

26. Anything that would endanger your health.

27. Something that's proven to be harmful.

28. Anything that would endanger health.

29. Something that can make you sick.

30. Something that's done that endangers your health.

31. Something that's bad for you.

32. Taking risks with your life.

33. Don't know.

34. Anything that would injure your body or break down parts of your body.

35. Living dangerously.

36. Something that's in the environment that's not under control.

37. Something artificial that would give you health problems.

38. Anything in the environment that could be a risk to physical or mental health.

39. Anything that could cause harm.

40. Not taking proper care of (your)self.

41. Something that makes you sick.

42. Anything that would give you a long term illness.

43. Any dangerous thing to you.

44. Something that's going to hurt you physically.

45. Anything that can cause a health problem.

46. A cause of death, like jumping in front of a bus.

47. Anything endangering longevity.

48. Don't know.

49. Something dangerous to your health.

50. When you're not going to make it (going to die) or when you're "set up" ("laid up") in bed.

51. Don't know.

52. Anything that would be hazardous, like smoking, drinking, no seatbelts, drugs.

53. Anything that harms your body.

54. Any threat that may damage your health.

55. Anything that will hurt you physically or mentally.

56. Don't know.

57. Something that causes immediate or chronic illness or potential illness.

58. Any potential danger.

59. Things like smoking.

60. Something potentially dangerous or hazardous to your health.

61. Something that could cause injury.

62. Anything that makes you not normally healthy.

63. Anything that could cause injury.

64. Something that would cause you to become ill.

65. Something that would harm me.

66. Anything that would cause harm to me.

67. Anything that could potentially damage health long and short range.

68. Anything that would cause your body harm.

69. Things like smoking, taking drugs.

70. Things like fire.

71. Something that would make you ill mentally or physically.

72. Things like smoking.

73. Things in the environment that would make you sick or allergic.

74. Things like smoking cigarettes which are hazardous to your health.

75. Something that damages (your health).

76. Something that isn't healthy.

77. Something that could cause illness or harm.

78. Any kind of toxic substance eaten or inhaled; high tension in life; insufficient amounts of heat and food.

79. Intentionally doing something potentially harmful.

80. Things such as fumes or chemicals.

81. Something not good for you.

82. Things like smoking cigarettes and drinking alcohol.

83. Anything hazardous to your health.

84. Something that's injurious.

85. Something would be a risk to health if you knew that it caused illness.

86. Something bad for you.

87. Things like cigarette smoking; excessive anything.

88. Things like tobacco and drugs; something poisonous or which would have side effects in the long run.

89. Something basically harmful to health.

90. Something that interferes with a normal body function.

91. Things that are bad for you.

92. Something that increases the likelihood of disease.

93. Something that makes you ill or endangers health.

94. Anything which causes illness or physical stress.

95. Anything that would harm you as a human.

96. Lack of exercise, etc., and things like not getting cholesterol levels checked.

97. Something that would be detrimental to your body.

98. Anything that would cause illness.

99. For instance, smoking.

100. Things that would lead to illness; also, illness itself would be a risk to health.

APPENDIX III.2

EMIC PERCEPTIONS BY PARENTS OF YOUNG CHILDREN OF THE GREATEST RISKS TO THE HEALTH OF THE GENERAL U.S. POPULATION AND THEIR AVOIDABILITY (A) AND UNAVOIDABILITY (N)

[BY SUBJECT NUMBER]

1. Cigarettes; drunk drivers; known carcinogens.
   A: All.
   N: Drunk drivers--for their victims.

2. The political situation; war; food, because farmers are gonna quit farming because they're not getting paid (in the U.S.); natural catastrophe; alcohol.
   A: All, especially the food situation.
   N: What government does.

3. Nuclear bombs; air pollution; PBB in food and foods with bad chemicals.
   A: All.
   N: None.

4. Chemical or toxic poisoning; nuclear war; air pollution.
   A: Nuclear war; all avoidable if we clean up the environment.
   N: None.

5. Drunk drivers, because they're allowed to keep going and not enough is done about them; water and air pollution, because water and air are necessities to life.
   A: All.
   N: None.

6. Nuclear war with Russia; food additives and air pollution; polluting ourselves to death.
   A: Things can be helped.
   N: They can only be partially prevented.

7. Pollution; cancer; AIDS; nuclear war.
   A: Cancer, because we know to eat well and take care of ourselves and exercise.
   N: Pollution, probably, and nuclear war.

8. All the artificial things used in food; pollution.
   A: Could be.
   N: None.

9. Pollution, because it's getting worse every year.
   A: All.
   N: None.

10. Toxic waste dumping which seeps into groundwater; nuclear war, especially from a (i.e., initiated by a) third world country.
   A: Pollution, if we get our act together.
   N: Nuclear war by a third world country.

11. The willingness of politicians to exchange the safety of the public for dollars; nuclear power; profit drugs from big drug companies; not requiring air bags because of trading-off with the car companies for seat belts; pollution and the environment.
   A: All but pollution.
   N: Pollutants--in the society we live in it's a question of how much and how many; nuclear power.

12. Atomic bomb.
   A: There's hope.
   N: None.

13. On the job hazards because employees have the least control over (working) conditions and don't find out about risks until it's too late.
   A: All.
   N: None.

14. Pollution, especially air pollution.
   A: Like to try.
   N: None.

15. Water conditions (i.e., poor quality); food.
   A: Food problems.
   N: None.

16. Nuclear war; automobile accidents; environmental pollution.
   A: All.
   N: None.

17. Don't know.

18. Nuclear war; alcoholism and drugs.
   A: The majority if dealt with properly.
   N: None.

19. Cancer; nuclear power.
A: Cancer.
N: Nuclear power.

20. People ignoring problems and being unwilling and too uncaring to change.
A: Some.
N: Some.

21. Pollution.
A: Preventable pollution.
N: Unpreventable pollution.

22. People that do not use common sense--laziness and not learning and not getting enough exercise; cancer.
A: All, with good education.
N: Cancer.

23. Man himself--our own actions, largely because of ignorance.
A: All.
N: None.

24. Toxic waste.
A: All.
N: Some.

25. Nuclear problems; pollution; crime.
A: All could be prevented.
N: A certain percentage.

26. Cancer.
A: None.
N: Cancer.

27. Contaminated fish and food; air pollution.
A: All--it just takes money.
N: None.

28. Being uninformed; air pollution; nuclear power.
A: Being uninformed.
N: Nuclear power; air pollution.

29. Pollution in air.
A: Air pollution.
N: None.

30. Nuclear war; the government trying to break Christian values; television programming; violence.
A: TV programming.
N: Nuclear war, maybe.

31. Reagan, nuclear power, government, and Russia.
A: None.
N: All.

32. Nuclear war.
A: Nuclear war.
N: None.

33. Crime.
A: Crime.
N: None.

34. Unemployment.
A: Unemployment.
N: None.

35. Don't know.

36. Nuclear war; violence.
A: All, with a lot of work.
N: None.

37. Heart attack; war.
A: None.
N: All.

38. Other people--crime, automobiles and reckless driving.
A: Some, to a degree.
N: All, if you're at the wrong place at the wrong time.

39. Toxic waste; cancer related to occupation.
A: Both if manufacturers take preventative and careful measures.
N: Neither.

40. Don't know.

41. Cancer; heart disease; ulcers; mental distress.
A: All.
N: Cancer, if any.

42. Air and water pollution.
A: Could be.
N: Maybe some aspects.

43. Air pollution, air quality.
A: Somewhat.
N: Industry making air pollution.

44. Nuclear war; air and noise pollution.
A: All avoidable but not necessarily preventable.
N: None.

45. Automobile accidents; pollution; sprayed things (pesticides); alcohol and cigarettes.
A: Alcohol and cigarettes; maybe auto accidents.
N: Pollution and sprayed things (pesticides).

46. Cancer; AIDS.
A: Cancer, maybe.
N: In some cases.

47. Cigarette smoking; inactivity.
A: All.
N: None.

48. Not taking care of yourself.
A: All.
N: None.

49. Pollution of the air.
A: All, I think.
N: None.

50. Drug abuse and alcohol.
A: None.
N: All.

51. Pollution of the atmosphere.
A: Somewhat.
N: Don't know.

52. Nuclear war.
A: All.
N: None.

53. Cancer; cigarette smoke--heart disease, stroke, hypertension.
A: Cigarette smoking.
N: Sometimes both.

54. Nuclear war.
A: Hope so.
N: Sooner or later it's not avoidable.

55. Contaminated water; any type of pollution because we must eat and drink to live.
A: All.
N: None.

56. People who don't get along and delight in hurting others; accidents.
A: All--we must be aware of the problem but not be paranoid.
N: None--if it's going to happen it will but there are ways to avoid being hurt.

57. Nuclear war; food and environment and air pollution; chemicals.
A: Very few.
N: Probably most of them.

58. Communicable diseases like herpes; drunk driving; nuclear power plants; toxic chemicals in groundwater; smoking.
A: Communicable diseases; drunk driving with new laws; smoking.
N: Nuclear power and pollution, because big business pushes nuclear stuff and water pollution even with the work they've done to help.

59. Pollution; cancer and other diseases.
A: All.
N: None.

60. Don't know.

61. Water pollution and air pollution.
A: Both.
N: Neither.

62. Drugs and alcohol; doing things in excess.
A: All.
N: None.

63. Auto accidents; pollution; smoking; cancer.
A: Smoking; some pollution.
N: Car accidents; smoking; some pollution.

64. Air pollution; nuclear contamination.
A: Both to varying degrees--they already exist but we can reduce risks.
N: None.

65. Misuse of nuclear power; nuclear weapons.
A: None.
N: All.

66. Chemicals and accidents involving chemicals because of a lack of importance placed on this by people in control.
A: All, with work; chemical company authorities should have less profit concern and more safety concern.
N: None.

67. Pollution of air, water, and the environment.
A: None.
N: All.

68. AIDS; herpes.
A: All.
N: None.

69. Nuclear war; germ warfare.
A: All.
N: None.

70. Auto accidents; home injuries; fellow human beings; nuclear war.
A: All can be with the right handling.
N: None.

71. Additives in food.
A: All.
N: None.

72. Don't know.

73. Nuclear war.
A: Yes.
N: No.

74. Pollution; society and social problems; nuclear weapons; insecticides; food causing cancer.
A: A lot could be if people went along with needed changes.
N: Pollution.

75. Pollution--air, water, and general.
A: Air and water pollution.
N: None.

76. Drunk driving and cigarette smoking.
A: Both.
N: Neither.

77. Air and water pollution; chemical pollution.
A: All, in a general view.
N: None.

78. Nuclear and industrial pollution; foods--salt, sugar, etc.
A: Foods--salt and sugar in particular.
N: Pollution.

79. Don't know.

80. The unknown factors in life.
A: All--as we discover them, they are avoidable.
N: None.

81. Other people, because everybody's out to get somebody.
A: Hope so.
N: None.

82. Child abuse; atomic bombs.
A: Not sure.
N: All.

83. Don't know.

84. Automobiles.
A: None.
N: All.

85. Drugs and chemicals which are handled too loosely.
A: Chemicals could be avoided at greater cost and more government control.
N: Only if they are unknown.

86. Cancer.
A: None.
N: Cancer.

87. Environmental pollution; nuclear threat.
A: Both.
N: Neither.

88. Nuclear war; pollution of air and water.
A: All, if people get together.
N: None.

89. Water and air pollutants.
A: Some factory pollutants.
N: Pollution, because with wants (material) come pollutants.

90. People not calling on God.
A: It is.
N: None.

91. Don't know.

92. Diet, exercise, and smoking; automobile accidents.
A: Quite a few.
N: None.

93. Air pollution; traffic (transportation); chemicals; food additives; aerosol cans.
A: Junk foods with additives and aerosol cans if we don't buy as much.
N: Air pollution; traffic.

94. Pollutants of air and water; chemicals.
A: None.
N: All--breathing air and drinking water are not avoidable.

95. Drinking and driving; drugs; missing children (child abductions).
A: All.
N: None.

96. Air pollution from smoking and chemicals.
A: You can cut down on them.
N: You can't eliminate them altogether.

97. Artificial (food) additives; chemical dumping in the soil.
A: We can limit what's done in the future.
N: Not what's already done.

98. Air and environmental pollution; toxic waste.
A: All are preventable but maybe not avoidable.
N: Maybe some.

99. Don't know.

100. Nuclear war.
A: Nuclear war.
N: None.

APPENDIX III.3

EMIC PERCEPTIONS BY PARENTS OF YOUNG CHILDREN OF RISKS TO CHILDREN'S HEALTH FROM BREATHING AIR: WHAT THEY CAN GET AND HOW YOU KNOW WHEN THEY'VE GOT IT (BY SUBJECT NUMBER).

1. What Get: air pollutants; dust.

   How Know: responses; cough; wheezing; shortness of breath.

2. What Get: emphysema; asthma.

   How Know: cough; hack; wheeze; complain of their lungs; complexion or skin changes; physical changes; change in behavior.

3. What Get: viruses; colds; flu; lung disease.

   How Know: they're sick--fever; quiet; whinney or whine; or they say they're sick

4. What Get: Don't know.

   How Know: Go to doctor for tests.

5. What Get: emphysema; different lung diseases; allergic reactions; skin rashes; eye irritations.

   How Know: general behavior; eyes redden; skin rash; cough.

6. What Get: allergies; poison fumes; cleaning solutions.

   How Know: cough; wheeze; runny nose and eyes.

7. What Get: lung problems.

   How Know: Don't know.

8. What Get: cold; flu.

   How Know: act different; lay around.

9. What Get: Don't know.

   How Know: Don't know.

10. What Get: viral infections; cancer.

    How Know: crankiness; fever; runny nose; cough.

11. What Get: asthma; allergies; a whole range of health things I'm unaware of.

    How Know: change in behavior; cough; fever; listlessness.

12. What Get: cold; flu.

    How Know: cough; runny nose; diarrhea; throwing up.

13. What Get: viruses; pollution must make them ill though not immediately, I suppose.

    How Know: see symptoms; lethargy; fever; look flushed or pale; congestion; waking at night; sleeping during the day.

14. What Get: diseases.

    How Know: way act--act different.

15. What Get: cough; respiratory problems.

    How Know: if they're not born with it, watch her and get check ups.

16. What Get: asthma; lung problems.

    How Know: sound of breathing; doctor says so.

17. What Get: Don't know.

    How Know: feel poorly.

18. What Get: hay fever.

    How Know: Don't know.

19. What Get: allergies; toxic fumes.

    How Know: wouldn't know--need to go to doctor.

20. What Get: colds and stuff.

    How Know: wouldn't necessarily know but germs are in the air.

21. What Get: asthma; emphysema.

    How Know: wheezing; symptoms of some kind.

22. What Get: lung diseases; pneumonia; colds.

    How Know: way they act and look; temperature.

23. What Get: allergies; colds; viruses; bacteria.

    How Know: fever; rash; act different.

24. What Get: colds; diseases.

    How Know: acted sick.

25. What Get: allergies; sinus problems; bronchial problems; terminal diseases.

    How Know: change in behavior and physical signs.

26. What Get: germs; chemicals.

    How Know: wouldn't be able to.

27. What Get: allergies; cough; factory fumes.

    How Know: if sick a lot or doctor said so.

28. What Get: respiratory illness; illnesses of other organs.

    How Know: look for signs and symptoms.

29. What Get: allergies.

    How Know: ask doctor.

30. What Get: chicken pox; colds; some kinds of VD (venereal disease).

    How Know: would have symptoms.

31. What Get: hay fever; allergies; asthma.

    How Know: wheezing and not feeling well.

32. What Get: whooping cough, etc.

    How Know: behavior changes.

33. What Get: Don't know.

    How Know: Don't know.

34. What Get: colds; chicken pox; measles.

    How Know: fever; cough; runny nose.

35. What Get: allergies; congestion.

    How Know: wheezing; cough.

36. What Get: nicotine; chemicals.

    How Know: symptoms like wheezing and colds.

37. What Get: colds; flu.

    How Know: coughing; sneezing; vomiting; diarrhea; sore throat.

38. What Get: respiratory cancer.

    How Know: vomiting; nausea.

39. What Get: chicken pox; measles; Strep throat.

    How Know: pox; fever; sore throat.

40. What Get: allergies.

    How Know: coughing; runny nose.

41. What Get: respiratory infections.

    How Know: get bronchitis.

42. What Get: viruses; allergies; asthma.

    How Know: act different.

43. What Get: all kinds of stuff.

    How Know: you couldn't unless you knew what was bad in the air.

44. What Get: viruses; flus; colds.

    How Know: how they act and feel.

45. What Get: sinus problems; allergies.

    How Know: sneezing; wheezing; ask doctor.

46. What Get: colds; flu; polio.

    How Know: wouldn't know.

47. What Get: lung cancer.

    How Know: Don't know.

48. What Get: mumps; measles.

    How Know: the signs.

49. What Get: cold.

    How Know: box of kleenexes (tissues) gets emptied.

50. What Get: asthma; allergies; smoke.

    How Know: breathing changes.

51. What Get: Don't know.

    How Know: if they got sick.

52. What Get: viruses; cold; flu.

    How Know: runny nose; congestion; wheezing.

53. What Get: smoke; asthma; pesticides; lung problems.

    How Know: Don't know.

54. What Get: allergies; respiratory problems.

    How Know: breathing patterns; how active they are; continuous cough not from cold.

55. What Get: colds; germs; communicable things.

    How Know: when they get sick.

56. What Get: viruses; asthma.

    How Know: eyes running; wheezing.

57. What Get: emphysema; allergies; asthma; bronchitis.

    How Know: coughing; wheezing; runny nose or eyes; skin rash.

58. What Get: germs; pneumonia; woodburner fumes.

    How Know: fever; pneumonia; wheezing.

59. What Get: respiratory illness.

    How Know: wheezing; congested cough; headaches.

60. What Get: poisons.

    How Know: their breathing; other symptoms.

61. What Get: colds; respiratory diseases; infections.

    How Know: prolonged cough.

62. What Get: allergies to insulation and fuel.

    How Know: when insulation and fuels are around you can expect illness.

63. What Get: Nothing.

    How Know: I never got anything.

64. What Get: bronchial infections; diseases of respiratory system.

    How Know: way of breathing; cough; other behavior.

65. What Get: asthma; allergies.

    How Know: fever.

66. What Get: colds; germs; asthma.

    How Know: wheezing; coughing.

67. What Get: asthma; allergies; lung problems.

    How Know: not breathing right; cough; wheezing; short of breath.

68. What Get: viruses; bacteria; pollutants; carcinogens.

    How Know: fever; cough; grouchy.

69. What Get: bugs; germs; cancer.

    How Know: fever; regular check ups.

70. What Get: lead from exhaust; lots of disease from the air.

    How Know: unusual behavior; illness.

71. What Get: strep throat; colds; flus.

    How Know: eyes glassy or droopy.

72. What Get: toxic things; germs.

    How Know: sickness.

73. What Get: allergies; a lot of things.

    How Know: coughing and other reactions.

74. What Get: asthma; allergies; headaches.

    How Know: way they act.

75. What Get: poison ivy from smoke from burning it; allergies; any fumes; fumes from gas line.

    How Know: change in behavior.

76. What Get: colds; viruses; allergies.

    How Know: act different; lay down; tell me; eyes red.

77. What Get: germs; cold.

    How Know: runny nose; cough; sneezing.

78. What Get: formaldehyde and toxic chemicals.

    How Know: if became allergic; more cough and cold; skin damage; lung-related stuff.

79. What Get: hay fever; allergies.

    How Know: itchy nose; red eyes; sneezes.

80. What Get: allergies; pollutants.

    How Know: symptoms; what doctor says.

81. What Get: respiratory infections.

    How Know: fever; cough; breathing trouble.

82. What Get: asthma; allergies.

    How Know: wheezes; coughs.

83. What Get: a lot of things; sore throats.

    How Know: complaints of symptoms.

84. What Get: colds; asthma; allergies; chemicals.

    How Know: sniffling; vomiting.

85. What Get: colds; flu; allergies; undiscovered things.

    How Know: fever; headaches.

86. What Get: colds; viruses.

    How Know: don't eat; behavior; slow down.

87. What Get: pesticides; smoke.

    How Know: physical signs.

88. What Get: colds; flu; chicken pox.

    How Know: runny nose; fever; laying around.

89. What Get: flu; chicken pox; basic childhood illness; pollutants.

    How Know: self-evident; reactions to medical tests.

90. What Get: any bug; any lung disease; colds; flus; toxic things.

    How Know: lots of times you don't; cold and flu by symptoms.

91. What Get: Don't know.

    How Know: if they were around someone who was sick.

92. What Get: toxic fumes like painting stripper; germs.

    How Know: you'd know fumes; otherwise, behavior.

93. What Get: asthma; lung cancer; allergies.

    How Know: allergies and asthma are obvious; coughing; coughing blood.

94. What Get: viruses; bacteria; respiratory infections.

    How Know: fever; cough; sneeze; any symptoms.

95. What Get: allergies; breathing affected by smog.

    How Know: breathe funny; watery eyes; stuffy nose; many effects.

96. What Get: asthma; allergies.

    How Know: wheezing; respiratory problems; dark circles under eyes.

97. What Get: lung diseases; cancers.

    How Know: check ups.

98. What Get: smoke; chemical pollution; acid rain; pesticides.

    How Know: not sure you would--you'd think they had a cold.

99. What Get: respiratory infection from smoke.

    How Know: cough; wheeze; feel real bad; fever.

100. What Get: allergies; chicken pox.

     How Know: take them to doctor.

APPENDIX III.4

EMIC PERCEPTIONS OF MAJOR RISKS TO HEALTH IN AND OUT OF THE HOME BY PARENTS OF YOUNG CHILDREN (BY SUBJECT NUMBER).

1. IN: Accidents; falling down stairs.
   OUT: Yard: Bees and wasps.
   World: Accidents due to self and others.

2. IN: Fire; accidents like falling down stairs; for children, <u>everything</u>--burners on the stove, the oven, cleaning agents and things under the sink, drowning in the bathtub, cat bites, and being punished (spanked).
   OUT: Yard: Being nabbed by somebody, especially where we live.
   World: Driving; other drivers; being hit by a car in the street;being nabbed by somebody (child abduction).

3. IN: Smoking.
   OUT: Yard: Traffic.
   World: Pollution.

4. IN: Radiation from the television; air pollution (especially automobile exhaust).
   OUT: Yard: Air pollution, especially automobile exhaust.
   World: Major pollution, especially air pollution.

5. IN: Carelessness.
   OUT: Yard: Accidents.
   World: Accidents.

6. IN: Electrical outlets; stove, oven.
   OUT: Yard: Wild animals; falling out of a tree; eating poisonous berries on trees.
   World: Traveling; danger from strangers; childnapping.

7. IN: Our free standing woodburning stove because our kid has tried to climb into it while it is burning.
   OUT: Yard: Accidents.
   World: Pollution--cigarettes in public places, waste dumping, water pollution, air pollution.

8. IN: Stairs.
   OUT: Yard: None.
        World: Traffic, cars.

9. IN: Bathtub; electrical outlets; stairs.
   OUT: Yard: Swimming pool.
        World: Anything; walking in roads and being hit by a car; child molesting; childnapping.

10. IN: Toys you could kill yourself tripping over; stove; steps (stairs); slipping or drowning in bathtub.
    OUT: Yard: Windstorms, especially limbs falling from trees; stray animals; boating injuries; car accidents; swing set; accidents in the garage.
         World: Toxic waste dumps; ground water contamination; food additives; car accidents; drunk drivers.

11. IN: Stairs; getting hurt playing; stove; hot water burns; also, my (subject's mother) children are a risk to my health.
    OUT: Yard: Getting hurt playing; the jungle gym.
         World: Cars and automobile accidents; known toxic waste; unknown toxic waste; nuclear power.

12. IN: Fire.
    OUT: Tornados.

13. IN: Viruses; nothing unsafe about home itself.
    OUT: Yard: Stray animals.
         World: Childnapping; child molesting; car accidents or kids being run over by a car; neighbors who have serious emotional problems.

14. IN: None, but I guess anything (in the home) could be.
    OUT: Yard: Anything.
         World: Anything, especially driving.

15. IN: Gas leaks; what you eat.
    OUT: Air pollution; traveling without wearing a seatbelt.

16. IN: Accidents.
    OUT: Yard: Accidents.
         World: Accidents.

17. IN: Don't know.
    OUT: Drivers (automobiles, trucks, etc.).

18. IN: Fire.
    OUT: Cars; pollution.

19. IN: Fire.
    OUT: Yard: None.
         World: Nuclear power; cancer.

20. IN: Accidents from not picking things up.
    OUT: Yard: Animals in yard attacking the children; spray pesticides.
         World: Anything, really, especially car accidents.

21. IN: Nothing.
    OUT: Yard: Lawn mowers.
         World: Drivers.

22. IN: Smoking.
    OUT: Yard: Swing set.
         World: Automobile travel.

23. IN: Stove; stairway.
    OUT: Yard: The family car.
         World: Nuclear bombs.

24. IN: Polluted tap water.
    OUT: The ground--hazardous waste.

25. IN: Stove; water being too hot (hot water burns from bath or other sources).
    OUT: Yard: Trees and branches falling; lawn mower; gasoline.
         World: Pollution; cars and traffic; childnapping.

26. IN: Accidents; falling down.
    OUT: Yard: Other people.
         World: Other people; traffic.

27. IN: Fire.
    OUT: Yard: Being hit by cars.
         World: Child abductions; being hit by cars.

28. IN: Lack of knowledge.
    OUT: Being uninformed.

29. IN: Husband's (subject's father) smoking.
    OUT: Yard: Nothing.
         World: Crazy people.

30. IN: Fibers in the air from using "Bounce" in the dryer; food which is high in cholesterol.
    OUT: Yard: None.
         World: Toxic chemicals; drunk drivers.

31. IN: Don't know.
    OUT: Yard: Dogs next door.
         World: Nuclear war.

32. IN: Climbing and falling.
OUT: Yard: None.
World: Speeders--autos.

33. IN: Electrical things.
OUT: Yard: Chemical things like fertilizers; poisonous tree berries and poison ivy.
World: Chemicals.

34. IN: Don't know.
OUT: Yard: Kidnapping or harm from a looney.
World: Don't know.

35. IN: None.
OUT: Yard: Traffic--getting hit or in an accident.
World: Traveling.

36. IN: Furnace and fire.
OUT: Yard: None.
World: Nuclear war; car accidents.

37. IN: Fire; gas leak; poison.
OUT: Yard: Poisons.
World: Car accidents; pollution.

38. IN: Fire; falling down stairs.
OUT: Yard: Other people.
World: Automobiles; other people.

39. IN: Slipping in the bathtub; spills (hot grease or other liquids).
OUT: Auto accidents.

40. IN: Falling down stairs.
OUT: Yard: None.
World: Highways (automobile accidents).

41. IN: Fire.
OUT: Yard: Snake bite; being hit by a car.
World: What they eat.

42. IN: None.
OUT: Yard: The air (quality); traffic (automobile, etc.).
World: Pollution.

43. IN: Cigarette smoke.
OUT: Yard: None.
World: Car accidents.

44. IN: Smoking; accidents.
OUT: Yard: Accidents; falling down the outdoor stairs.
World: I try not to think about it.

45. IN: Cigarette smoking; electrical outlets; the stove.
    OUT: Yard: Pollution; high noise levels.
         World: Pollution.

46. IN: None.
    OUT: Yard: Child abduction; accidents.
         World: Being struck by lightning.

47. IN: Home accidents.
    OUT: Yard: Drowning.
         World: Car accidents.

48. IN: None.
    OUT: Yard: None.
         World: None.

49. IN: Don't know.
    OUT: Yard: Anything can get ya.
         World: Anything can get ya.

50. IN: Fire from the wood stove.
    OUT: Yard: None.
         World: Drunks (drunk drivers).

51. IN: Smoking.
    OUT: Yard: Don't know.
         World: Don't know.

52. IN: Cleaning products; unsafe wiring (electrical).
    OUT: Yard: Chemicals.
         World: Driving; pollution.

53. IN: None.
    OUT: Yard: Pesticides.
         World: Auto accidents.

54. IN: Poisons; cigarettes.
    OUT: Yard: Poisons.
         World: Traveling.

55. IN: Gas leak; electrical short.
    OUT: Yard: Chemicals.
         World: Traveling in a car.

56. IN: Accidents; stairs; each other.
    OUT: Yard: Other people.
         World: Other people.

57. IN: Smoking (cigarettes); woodburning furnace and using treated lumber (for fuel); plants; balconies; open stairs.
    OUT: Yard: Sunlight overexposure; child abductions.
         World: Automobile travel; child abductions.

58. IN: Creosote buildup in the woodburning stove; poisonous fumes; fire.
OUT: Yard: Ash around the yard from the woodburner; playiny too close to or in the street.
World: Streets and busy roads--car accidents.

59. IN: Father (subject's) smoking (cigarettes) if anything.
OUT: Yard: Swing set.
World: Automobiles.

60. IN: Poisonous substances and not being careful.
OUT: Yard: None.
World: Cars.

61. IN: Fire.
OUT: Yard: None.
World: Automobiles.

62. IN: Fire.
OUT: Yard: None.
World: Car accidents.

63. IN: Fire; accidents; falling down the stairs; burns from the stove or oven.
OUT: Yard: Nothing.
World: Car accidents.

64. IN: Appliances (accidents and electrical problems).
OUT: Yard: Mostly safe.
World: Air pollution; traffic; contact with people or anything.

65. IN: Foam insulation (urea-formaldehyde foam); fire; chemicals in fire (chemicals which would be released in a fire which we'd be exposed to if there were a fire).
OUT: Yard: Wasps.
World: Direction of the world in general.

66. IN: Not knowing what's in purchased food.
OUT: Yard: Air pollution.
World: Not knowing what's in restaurant food; air pollution.

67. IN: Accidental injury with pots and pans on the stove; sharp objects; medicine (children getting into).
OUT: Yard: Garden tools.
World: Smoking; high cholesterol and sugar in processed food; toxic waste.

68. IN: Carelessness; falling; running into toys which are in the way.
OUT: Yard: Swing set.
World: Vehicles.

69. IN: Smoking.
OUT: Yard: Crime.
World: Crime.

70. IN: Falling down stairs.
OUT: Yard: Lawn mower.
World: Automobiles.

71. IN: Slipping or falling.
OUT: Yard: Dogs (bites).
World: Drunk drivers.

72. IN: Accidents--bathtub, stairs, falling; the stove in the kitchen; poisons.
OUT: Yard: None.
World: Automobiles.

73. IN: Fire.
OUT: Yard: None.
World: Auto accidents.

74. IN: Carelessness.
OUT: Yard: None.
World: Other people.

75. IN: Smoking cigarettes.
OUT: Yard: None.
World: Pollution of the air and soil.

76. IN: Fire.
OUT: Yard: Don't know.
World: Cars.

77. IN: Drinking water--water pollution.
OUT: Yard: Air pollution.
World: Air pollution and water pollution.

78. IN: Falling against furniture.
OUT: Yard: Accidents.
World: Traffic.

79. IN: Air itself--pollution.
OUT: Yard: Air pollution.
World: Air pollution and other pollution.

80. IN: Falls.
OUT: Yard: Accidents from playing.
World: Automobiles.

81. IN: Don't know.
OUT: Yard: None.
World: Cars and traffic.

82. IN: Nothing.
OUT: Yard: Nothing.
World: Nutty people.

83. IN: Poisons.
OUT: Yard: Crazies--people; chemicals.
World: Car accidents; ground water quality.

84. IN: Medicines; matches; cleaning fluids.
OUT: Yard: Gasoline.
World: Automobile accidents.

85. IN: Poisons--cleaning agents and medicines; electric shock; gas leaks.
OUT: Yard: Bumps and scrapes; eating dangerous plants in the yard.
World: Number of legal and illegal drugs and medicines; traffic (car).

86. IN: The air.
OUT: Yard: Air pollution.
World: Air pollution and the environment in general.

87. IN: Cigarette smoke.
OUT: Yard: Pollution.
World: Pollution.

88. IN: Accidents; falling down stairs.
OUT: Yard: None.
World: Car accidents.

89. IN: Common household products.
OUT: Yard: Poisons.
World: Drunk drivers; pollutants.

90. IN: Fire; wire shorting (electrical).
OUT: Yard: None.
World: Auto accidents.

91. IN: Don't know.
OUT: Don't know.

92. IN: Poisoning; fire; contamination of food and water.
OUT: Yard: Poisoning; contamination of the water.
World: Traffic; nuclear war; chemical pollution of the environment.

93. IN: Stairs; bathtub.
OUT: Yard: Accidents.
World: Air and other pollution; traffic accidents.

94. IN: Diet, especially the amount of salt in cooking.
OUT: Yard: Deadly nightshade and other poisonous plants; accidents in the barn.
World: Nuclear power and nuclear waste (disposal).

95. IN: Don't know.
OUT: Yard: The road--autos.
World: Smog.

96. IN: None.
OUT: Yard: mosquito spray pesticide.
World: Cigarette smoking.

97. IN: Fire.
OUT: Yard: Child abduction.
World: Child abduction.

98. IN: Fire; chemicals; cigarette smoke.
OUT: Yard: Equipment (yard); air pollution.
World: Air and chemical pollution; crime.

99. IN: Don't know.
OUT: Yard: Don't know.
World: Other people.

100. IN: Burglary.
OUT: Yard: Strangers.
World: Crime.

APPENDIX III.5

REASONS GIVEN BY THE PARENTS OF YOUNG CHILDREN FOR NOT HEATING WITH WOOD: FAMILIES WHO CHANGED FROM HEATING WITH WOOD TO OTHER HEAT SOURCES AND FAMILIES WHO NEVER HEATED WITH WOOD (BY SUBJECT NUMBER)

I. FAMILIES WHO CHANGED FROM HEATING WITH WOOD TO OTHER HEAT SOURCES (BY SUBJECT NUMBER):

2. Moved and can't use in apartment.

6. It is dirty and dusty; also, my daughter (subject's sister) and I (subject's mother) are allergic to house dust and our doctor recommended that we not heat with wood.

11. Unanswered questions about whether or not it is a risk (to health).

23. Moved.

24. Moved.

26. Moved.

37. It's a lot of work and also because we moved.

44. Our gas furnace and fireplace are sufficient.

56. Moved and have no access to wood.

83. Gas bills aren't bad.

93. Because now we go south in the winter.

95. Moved.

II. FAMILIES WHO NEVER HEATED WITH WOOD (BY SUBJECT NUMBER):

1. Don't have stove and we have heard about respiratory problems from using them.

3. Expensive to install.

4. Don't want to.

10. A woodburning stove costs money and is a fire hazard.

12. Trouble finding wood, but have thought about it.

13. Never considered it.

14. Costs too much to hook up.

15. Haven't converted--too expensive and too much trouble.

16. The smoke bothers me and the kids too.

17. We live in an apartment so there is no way.

18. Just never did it.

19. Can't afford stove.

20. Never got around to it.

21. Don't know--never got around to it.

22. Wood heat bothers my husband (subject's father) and because there is no safe place in our home.

25. No facilities.

27. My husband (subject's father) didn't want to.

28. Never got around to installing.

29. Just never have.

30. Never had to.

31. Too much trouble to get wood.

32. Don't like it.

33. Don't know.

35. Don't know.

36. It's not convenient.

38. No equipment and also because of the time involved and because it's not practical.

39. Costs too much money; also, we have an older home which is not fire-safe.

40. Didn't have it (a woodburning stove) to do.

41. It's a fire hazard.

42. Don't care to.

43. We live in an apartment building.

45. Don't know.

46. Nothing to burn wood in.

51. Not sure.

52. Don't have a fireplace or any other place to burn wood.

54. No desire.

55. Just never have but we are getting a wood stove to use next winter.

59. Haven't needed to and they (woodburning units) aren't warm enough.

60. No stove or fireplace.

61. Don't have a wood stove.

62. There's no facility to burn wood now--maybe eventually.

63. It's not convenient.

64. Our house is not able.

65. Don't have a unit.

66. Problems of allergies with my children.

67. It's not convenient and we aren't sure about safety.

68. The new house came with gas.

69. Don't have a wood burner.

70. Don't need to.

71. Too expensive.

72. Not efficient for setup in our house.

73. There's no (woodburning) unit.

74. Never thought about it.

75. Just haven't but have thought about it.

76. Because we rent.

77. The gas furnace is fine.

79. Haven't had the money to add on to our gas furnace.

80. It's dirty and we have no access to wood.

85. This is our first home and it came this way (with a gas furnace).

86. We have no (access to) wood.

88. Don't have a woodburning stove.

89. Don't have facility.

90. Gas is adequate.

91. Too expensive to hook up.

94. Don't have a woodstove and I've (subject's mother) heard about respiratory symptoms from using them.

96. Costs a lot for installation.

98. Don't have a fireplace (or other woodburning unit).

99. No access to wood.

100. Wood costs too much money.

APPENDIX IV

EDITED INTERVIEW TRANSCRIPTS

Interview 1: Mary A.

Q: Mary, you said that you and John used to heat primarily with wood. Why did you stop using the woodburning stove as your main source of heat?

M: Well, we don't use it for the last two years because I have a little boy and I don't want him around it. When he was little and we used it and he was just starting to crawl around, he decided he thought he'd try to crawl inside of it.

Q: While it was in use?

M: Yeah, so we had a pretty scary scare with that--so, we just automatically quit using it. So, we really haven't used it (since then). The only time we use it is if the kids are in bed--not so much my older daughter but the little one, we just don't want to use it around him.

Q: You mean the woodburning stove was going when he tried to crawl into it?

M: Um hmm--sure was!

Q: Really--and he just opened the doors?

M: The door was open, there was a screen on it, and he just (zip!)--and it was like <u>burning</u> hot--and we just turned one second and he was there! So that was that!

Q: So you just use the woodburning stove a little now?

M: We did use it this winter but it was at night when no one was up, when the children weren't up. So we've used it but they haven't been around it when we've used it.

Interview 2: Mary A.

Q: What does the phrase "risk to health" mean to you--how would you define a risk to health?

M: A risk to your health? I would think a risk to my health would be doing something that I know is bad and that to me is a risk--taking and doing things that you know yourself aren't good for you and then going ahead and doing it anyway.

Q: Would a health risk always have to cause a problem or just sometimes?

M: Well, I think anything--if there's gonna be something that could cause a problem to your health it doesn't have to be all the time, it could be part of the time too.

Q: Do you think we should label things as risks to health only if they're known to cause illness or if they're suspected?

M: I think if they're <u>suspected</u>.

Q: O.k.--and when do you think a risk you take might cause a problem if it's going to?

M: Oh, anytime!

Q: How many people do you think should be affected by something before it's labeled as hazardous?

M: I think most people should be affected.

Q: What do you think of when you think of risks to health--what risks do you think there are in your home?

M: In my home right now? Nobody smokes--that would be my number one for my kids, and I don't let people smoke in my house when they come over. ...David had apnea at birth and was hospitalized twice during his first year. He was on a moniter for a year, and it went off twice--God, that put a scare into you--but he's all right now. Gee, I don't know--with two small children our house is pretty proofed as far as anything for anybody to get hurt. The only thing I think maybe would be the woodburning stove--that we did not put in, and we would not put one in with small children around (it came with the house).

Q: O.k., and what do you consider to be the major risks outside your home?

M: Pollution, cigarettes--like when you're in a public place in a restaurant or anywhere that people are allowed to smoke in when you're in that same area. I don't care if they stick you

M: in a stupid little different section or not, I think that cigarette smoking should be outlawed completely in public, that it's something you should do in your home. And, you know, pollution--waste dumping, that kind of thing. I live over by Lake Lansing and there's all that talk about bottled water and arsenic in the wells and that kind of thing. I don't know, I just think that sometimes we just don't have a lot of choices about what goes on with what the government can do and what these people in these factories and different industries can do with their waste, and I feel like that's a hazard to my children and to myself and my husband. ...In some places it's so bad--and in some places like your bigger cities it's out of control. ...Every year I think it gets worse--it's in our lakes and such, 'cause I know that when we were children they were a lot better to swim in in a lot of the areas than they are now. They're trying to clean 'em up, but I just, I don't know, I just wonder.

Q: Do you see it as a risk to your children's health?

M: Yes, eventually--as they get older.

Q: When do you consider yourself to be ill?

M: Well I'm basically a healthy person--I guess if I've got an upset stomach or temperature, that kind of thing.

Q: Do you think children can get sick from breathing things which are in the air?

M: Yes.

Q: What can they get?

M: I don't know--there's not that much proven but I would think, like, I don't let people smoke around my children and I think that that would be one thing I would be concerned about is them breathing smoke from cigarettes.

Q: How would you know when they got it?

M: I don't know....

Q: Would you consider them sick if they, say, didn't feel well, had a fever, coughed at night, wheezed, or something?

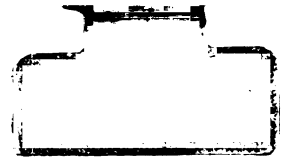
M: Yes, if they didn't feel well or had a temperature or wheezed, but not if they coughed at night--anybody can cough at night.

Q: We've talked several times about the future, both for you and John and for Beth and David. How do you feel about the question of life expectancy?

M: Well, I would think pretty much that mine and John's would be the same or better as our parents and I think the kids' will be longer than ours.

Q: Why do you think that?

M: Well they're learning so much about diseases and they're learning so much more about taking care of yourself and every, it seems like with every person that lives that generations are living longer than they used to very many years ago. So I would think it would, that the way it's aiming right now it looks to me like that's what's gonna be, that their life expectancy is going to be greater than mine.



Interview 3: Michael and Cathy C.

Q: What does the phrase "risks to health" mean to you--what do you think of when you hear that phrase, how would you define it?

M: Essentially anything that could be harmful to you, including, you know, things you eat or, you know, risks you take when you go out on the street or that type thing.

Q: How do you feel about it Cathy?

C: Same thing--anything that would be harmful: things of danger that are around the house or somewhere, people that are sick--being around other people that are sick, just different things like that.

M: We talk about nuclear weapons and that type thing, you know, it's a once in a lifetime thing--

L: Yeah--

M: --God forbid, and that's a one-type shot. Or another (risk), you know, (would) be just the fan--you know, short-circuiting or something causing a fire. And then, the everyday smoke and pollution and everything that you deal with.

Q: Uh huh. Well, would you feel that something would always have to cause a problem to be a risk?

C: It could happen just sometimes or right away.

M: Yeah--just the fact that something's built that could potentially down the road cause an injury--not necessarily, but has the potential.

Q: O.k.--how much do you think we should know about something before we call it a risk?

C: I could just suspect it--I worry about everything, so I'm the type that, you know, thinks of all these things that could happen and they may never happen, but--.

Q: Uh huh.

M: Well, the more you know something's prone to causing injury the more you worry about it, you know, the more you look into it and the details, whatever; but something that may (be a risk), you may not pay too much attention to it or not look into it that much.

C: Just like food goes, you know, they say <u>everything</u> causes cancer nowadays. You're always wondering if you should eat certain things, if eventually (in) years to come if it may cause some kind of disease or cancer.

M: But I don't think you worry about that as much as you do the everyday things that could cause (problems)--

C: No, (I'm more concerned) with the everyday things, but I meant it as an example.

M: I don't think I'd consider it as great a risk until I knew there was some study or, you know, some information by somebody knowledgeable enough to tell me that, you know, it could be a risk.

C: It's like all these different things with artificial sweeteners, and you have pros and cons about it, you know, that it--they say that it does do something if you have so much of it, you know, but what is "so much?"

Q: What do they say it does?

C: Causing cancer, lung problems, or something like that.

M: I heard that it could cause like brain-type, brain disorders, something like that. I don't trust that type thing--I don't, you know. (If) there's chemicals involved (and) things like that, I really, <u>that</u> I'm <u>really</u> leery about more than other things.

C: Yeah, all these new things that come out.

M: I'd rather, if I'm going to eat something, I'd rather have the natural sugar or, you know, and just eat it in moderationn, than eat something, some new chemical or something like that that they really (don't know about).

C: Yeah.

Q: You said you are more worried about that than about other things--like what?

M: Than, uh, like I don't pay as much attention to going outside and getting hit by a car or something like that. I am more worried about, you know, things around the house or something like that that I eat that I don't know the risk.

Q: When would something have to affect you for you to consider it a risk?

C: I would probably think right away--I would be more concerned with something happening right away.

M: I think it goes along with knowledge--the more knowledgeable you are about something--

C: --the more you know about it, yeah--

M: --happening, the more you--I dont' know, it's kinda hard to explain--the more you connect it with, you know, the effect happening right away, or whatever.

Q: Would you consider something a risk if it might cause a problem many years from now?

M: Oh, yeah.

C: Yeah, I would. But if they know that this certain thing causes problems, I don't think they should have to have a million people get sick from it before they do something about it.

Q: Uh huh--so, how many would you feel--

C: Oh, I don't know--like cigarette smoking. I think that they should have done something about that a long time ago, you know. If they think that just being in the same room with somebody could harm them, I don't think it should have gone that far.

M: Yeah, but you got to take into account that certain people have sensitivities and other things that others don't, so I think you have to go more than just a few (people) and you have to see, you know. It's hard to give exactly a number but you have to take into account that certain people are just going to react differently than the majority of the people will.

Q: O.k., that raises an interesting issue--so you're saying that if something has some value to the people that are doing it the situation is more complicated with respect to calling it a risk?

M: Yes, exactly.

Q: What if the people at a plant are doing something and you know or think that the stuff's no good for you but the plant keeps running?

C: I don't think that it should go on. I think--one or two people, if it's harming them--I don't think that it should go any further than that. It just depends on what, though.

M: Yeah, but I mean certain things like drugs or something--some people are going to have a reaction to them that other people aren't--

C: That's true.

M: --if 95% or 96% of the people aren't affected (negatively) by it and it's a good thing for those 96% you can't necessarily rule it out because those other four (percent) react to it.

C: I guess they would have to do more, you know, study more about it and find out, you know, what people are sensitive to certain things. I don't know how they would do it.

Q: O.k., so in general then how many people do you think should be affected before we label something a risk to health?

C: I would say just a few.

M: Just the fact that maybe it affects <u>anybody</u>.

C: If it's hazardous and it's not needed that much, I mean if it's not a necessity, why even have it?

Q: What risks do you think there are to your health in your home?

C: Living in an apartment, fires. We have smoke alarms and they're really sensitive, so that's one good thing. That's about it.

M: You always know you could trip and fall on top of something, so potentially anything really becomes dangerous. Something in the foods we eat.

Q: How about risks to your son's health?

M: I'm not so worried about him--I mean, I worry about him, leaving him unattended or something like that. I could see him sticking his finger in a fan or, you know, that type of thing.

C: Cleaning things, chemicals in the cabinets and stuff, and then sharp items laying around I guess--things like that.

Q: What about out of the home? What do you think are the greatest risks to your health outside your home?

C: Traffic--driving in a car. These drivers sometimes--there are some crazy drivers out there. And even when

you think you're safe somebody can just come and pop you. Even if you're driving slow, you never know.

M: The environment--air, water, you know--things like that.

Q: What else about the environment?

M: I don't know, I think it's just that people in general right now to me are more crazier than I've noticed (in the past). I don't think they interact like they used to. I mean, you can't get somebody to say hello to you on the street. Generally, you walk by and say hello to somebody and they right away think you're out to mug 'em or, you know, do something to them.

C: Everybody's scared.

Q: Do you see that as a risk to health?

C: More as a result of a risk (like being mugged).

M: I see it as a risk in that if you ever need (help), you know, if you're ever injured or you need help from somebody or something like that, I don't think they're going to come run to your aid right away.

C: Definitely not. I've heard so many stories, you know, that somebody's being mugged or something and they see it but they don't want to get involved.

M: I like to think that if I was laying in the street, you know, bleeding to death, that somebody would at least, you know, put a dime in the--twenty cents in the phone and, you know, give a call.

C: Well, I think about a lot now with our son when we take him to a nursery or something like that--all these things are going on with kids, you know, being molested and stuff like that at an early age. And even school, drugs in school with these young kids. My sister's a school teacher and she tells me about, you know, first graders buying drugs and it's just sad to think about, you know, what they have to get into once they get that age. Hopefully it will get better.

M: There are so many things--the political climate. You think of things--you know, you see a risk just about in everything you do.

Interview 4: Vera and Paul M.

Q: What does the phrase "risks to health" mean to you?

V: Something that endangers your health, or could somehow endanger your health in the future.

P: That sounds pretty good. Something I'd be better off not doing.

Q: How much do you think we need to know about things before we call them risks to health?

V: I think you just go by your own common sense--that's what you go by.

P: Well, to say something's a risk you don't necessarily have to have solid proof.

V: Well, if you go by what all the big shots say, <u>everything's</u> a risk.

Q: What big shots?

V&P: Oh, the Attorney Generals, Surgeon Generals, and the doctors of this and that.

P: <u>Anything</u> you do nowadays is a risk. I'm sure even in beer there could be some foreign chemicals.

V: There's also a risk right there of getting a tanned fanny (speaking to their four year old son who was playing on the chair). You don't climb up on the furniture, do you? That's a <u>bad</u> risk!

P: You don't have to have <u>proof</u> that's a risk to health, now son (referring to getting spanked), and you don't have to have proof that that (chair) could fall down.

Q: How do you feel about the consequences of risks?

V&P: I think they'd be long range.

V: But not necessarily--driving, it could be anytime. You could be a big boozer too, you could drink a lot--that would be a risk to health.

P: Well, that would be long range.

V: Not necessarily--you could be like your friend Bill. You drink one night and you get killed the same night. He didnl't know he was gonna get killed that night.

Q: How do you think policy makers should decide when to call something a risk to health?

V: You mean like before the government would come out with some little thing like the warning on cigarette packages?

Q: Yes, something like that.

V: Well, I wouldn't think they could get away with putting any labels on it unless there were a lot of cases of whatever happening becaause of it. What right would they have to put labels on it? There's <u>always</u> a risk in <u>everything</u>!

Q: How do you feel about it, Paul? How do you think they should make those policy decisions?

P: Well, they probably should have several cases happen before they issue some kind of warning.

V: Well, I think that they would want to make the public aware of things, but they shouldn't put labels on things, you know. I think it's <u>good</u> that they come out and make announcements of what they have found of what might be happening, and then it's up to the person's own discretion if they want to quit doing whatever.

P: I'm sure there's a lot of things happening that you don't hear about.

Q: Like what?

P: Well, you know, there might be things that they don't let you know about, and maybe it's something they <u>should</u> let you know about, warn people about.

V: Well, if it's something you're in contact with you'd <u>want</u> to know, I would <u>expect</u> them to tell me, to let people know, just so I could say, "Big deal," or, you know, have a more open mind about it, think about it, study into it, see how it affects my body. If it's cigarettes or whatever, if I get any opinions in <u>my</u> mind, I would also like to know if <u>they</u> find something, a rat in the beer, whatever.

P: Well, you hear so many things nowadays anyway, you read things in the paper. There's so much happening nowadays, there's things happening all the time. They could tell me something and I wouldn't pay any attention to it! I'm sure that I'd pay attention if they came out every day

and said, "O.k., these are the things--don't do this today or don't do that," like L.A., you know, smog warnings.

V: Well, the smog warnings are just for the people that have asthma or heart conditions or whatever to stay indoors. If I had asthma I would stay indoors. I would be glad that they told me to stay indoors that day so I wouldn't have to suffer.

Q: How do you see the world--do you see it as a safe place, as a dangerous place?

P: Well, it's nuked-up, you know, that's the way I look at it. One of these days some bomb is gonna come down and take care of us all anyways. Nuclear war--we're gonna be fried here, living in Lansing. But I hope not in my lifetime, but I don't know, the way things are building up. As far as a safe place, it depends on where you live. If you're out in the mountains, maybe. As for here, you got to accept the world as it happens, you know. Everybody's getting shot or killed around Lansing, you know--I pick up the paper every day and somebody's getting killed or shot or something. You just take it; it's part of where you live. I enjoy it here.

V: I think the world is just as safe as you want to make it, in the style that you want to live in, and the way you want to make things happen for yourself, just how good or bad it's going to be for you. And if you want to go out and let somebody shoot you, go ahead, but if you don't you can get around those things. You don't have to be there, you don't have to eat all this crap that they say is bad for you to eat. You can eat what you want, live your life the way you want it, and be thoughtful. There's enough available around here that you can do just what you want to do, make yourself just as safe as you want. It's dangerous, but to a certain extent you can control it--but I wouldn't think that necessarily it's that dangerous.

Q: How much control do you think you do have over what happens to you in your life?

V: You have some, you have some control just taking precautions and just living your clean life and trusting in God--that's the only Person that's gonna take care of you anyway, God is. He's gonna see you in or out.

P: I think you have some control over things.

Q: Well, how about your physical health--how much control do you think you have over that?

V: I really don't know about that.

P: I'd be better off if I didn't smoke, you know--that's one control.

V: You have control in that way--smoking or drinking or eating in all of these McDonalds and whatchamacallit restaurants, eating that junk that they say is no good, that sinks like a rock into your stomach--burger chow. I think it's mostly how you have been brought up, too. I was brought up as a farm kid, you know, and you eat good things--we ate good things--and you don't have to spend a lot of money to eat good things, and I think most of it's what you eat!

P: Go to see the doc and try to get fixed up if something's ailing ya.

V: Or you can call Granny and ask her what to do, and Granny usually says the right thing to do. You don't have to go to the doctor.

Q: Paul, do you feel the same way?

P: No, not really--I'd rather see a doc.

V: He doesn't have a Granny like my Granny. But I do rely on my doctor a lot, just to call him, even if it's just to talk to him about some problem with Timmy. He encourages us to call him just for questions. He's our family doctor and takes care of everybody. It's good if you have a good doctor like we do--we have an excellent doctor--and if somebody has someone like him that really cares (it can mean a lot) because I probably wouldn't have made it without him when Timmy was younger.

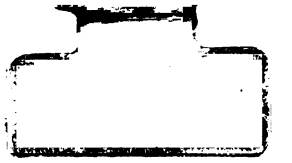
Q: Do you usually wear a seat belt when you drive?

V: I always wear my seat belt--every since I learned how to drive I've always worn a seat belt. It's just an automatic thing for me. If I'm in a car without a seat belt, I'm not comfortable. Before I even shut the door I have a seat belt on.

Q: Paul, how about you?

P: About fifty-fifty. If I'm in a car and it's easy to access, I wear it, but not so much in my truck.

V: But he started wearing his more since his parents had their accidents. They were wearing seat belts, which saved their lives both times, and he's been wearing his more. He's a good boy.



Q: How long ago were the accidents?

P: My folks?--about a year ago. They got in two wrecks and totaled both cars.

V: One in November and then in February, and the other people were killed in both cases. But Paul, he doesn't wear his (seat belt) for short trips, just for long trips. That's something I've always not even thought about, because if you would just think if you hit something what could happen if you're not in your seat.

Q: What do you think are the major risks to your and your son's health?

P: I think probably the biggest risk in your life now is driving.

Q: What risks to your health do you think there are in your home?

V: Fire--that's the biggest thing I think about is a fire--and just little accidents like falling down the stairs.

P: If I fall down the stairs, well, you know, it's just one of those things--you know, I don't consider it a risk. You go, "Well--boom!" and you get rug burns on your arms.

V: For an adult there's not that many risks really but for a child there's <u>everything</u>, especially when he was younger. When he was younger, <u>everything</u> (was a risk to his health).

P: I'm concerned about big things falling on him.

V: When he was younger there were the burners on the stove, the oven--he got that a couple times.

P: Yeah.

V: Things under the sink, all the cleaning agents under the sink, and the bathtub--drowning.

P: You were more worried than I was. And cat bites--that's a risk around here. I forgot about that risk. I'm not kidding--somebody will be walking by and the cat will attack you.

Q: How about now that Timmy is older?

V: The street.

P: She's more of a worrier than I am.

V: That's my biggest worry is the street--being hit by a car running out into the street, or being nabbed by somebody. I get scared when he gets out of my sight.

P: Yeah, that's something I worry about--being nabbed by somebody.

V: Because of just everything you've heard about missing children.

P: Right where we live--that's what we're concerned about here, with all the missing children, and you know somebody could nab your kid while he's out playing. If I was living in the country I wouldn't have these fears; it wouldn't be a risk for him then.

V: I check on him about every five minutes, you know, just peak out the door, see if I can see him or see if I can see his bike.

Q: Do you think the risks to Timmy are greater outdoors than indoors?

P: I think more outside.

V: I think outside because of the traffic--that really worries me, about traffic, cars.

P: He falls down more outside.

V: He doesn't have much sense about them (cars) yet. He knows to watch for cars but if he's after another kid, an animal, or cat or something, he's just going to run right across the road. He won't look--he doesn't have that much sense. I know he wouldn't. I know he would just run across the road and follow the other kids. Whatever they do he's gonna follow them and go too. It's hard to make him understand that, "You can't do this because this might happen." It just kind of worries me.

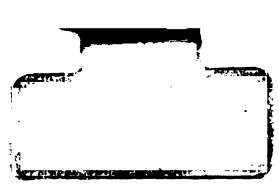
P: Well, you're more concerned with it than I am.

Q: Why?

P: Because she's the mother and I'm the father and that's the way it is! I'm concerned about him, you know, but she has motherly instincts.

Q: Would you feel the same way Paul if Timmy had been a girl?

P: Oh, I'd be more protective. It's all according to their age, too. When they grow up or when they're younger, there are different risks for them then.



Q: Do you think there are more risks when they are younger?

V&P: I'm sure.

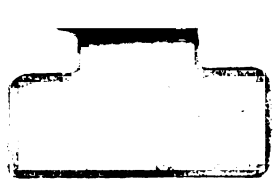
V: There are more risks for them in the home when they're younger, because there's more for them to get into.

Q: Do you think there is a change in the outside risks as they get older?

V: I think so, but when they get older you're not watching them all the time and you don't know what he's doing. Like now, he comes back and he'll tell you if he's been in the road, like, "I went in the road," or, "I didn't go in the road," because he knows he shouldn't do it and he does it and then he--I don't know if he feels guilty or what, but--he comes back and tells me about it. So think what could have happened in that time, that five minutes when I didn't check on him.

Q: How do you think the risks have changed outside since he's gotten older?

V: I think they've increased. Maybe at a certain age--seven or eight, I don't know--there will be less because he'll know more how to take care of himself, how to run from someone if someone tries to get him in their car. Now I don't know if he'd run away from someone or not. I keep approaching him and trying to say, "Well, what would you do if someone did this?" but I don't know if he'd do it. But when he's older like that (seven or eight) he'll have more of a mind of his own and he would run from them I'm sure, from just all that he's been taught and preached into his head over the years.



Interview 5: Joan and Bill T.

Q: What does the phrase "risk to health" mean to you--how would you define it?

J: Something that's dangerous to your health.

B: Something that could cause you harm in some way. There's all kinds of risks.

J: It could be to your body.

B: Yeah, or it could be to your mental, some risk to your mental health or to your physical health. When you say risk, it's just something bad, possibly something bad, I don't know. When you take a risk, you take a risk.

J: Or take a chance.

Q: How much do you think we should know about things before we call them risks to health?

B: I think we should know everything--everything!

J: We should have studies on it or something.

B: You're darn right! I don't like the idea of, "Well, we'll wait a few years and see if that risk factor is really as high as we think it's gonna be or as low as it's gonna be." I'd rather have them know! Like the things with sweeteners now--I'm not too crazy about that idea, where they don't know exactly what it could do to you.

J: But they don't know it so they don't call it a risk, because they don't know everything about it.

B: That's still a risk to me, though, because they don't know everything, and they don't know if it's gonna cause anything bad--it's still a risk to me. I just don't like that. If they're gonna give it to the public it should be 100% proven "Great!" I don't think things should have any side effects, possible side effects. We should know that it's safe before we call it safe. Why should there be a risk factor? Why say, "Well, kinda most likely it's going to be safe." Why can't they say, "It is safe." Heck, if I was gonna build something and told somebody it was safe, I would make sure it was safe. I'm a carpenter and if I'm going to build a house and someone says, "Well, is that house going to be safe to live in?" I should surely be able to say, "Yes, that house is going

to be safe to live in." I don't think I should be able to say, "Well, yeah, it's safe--right now it's safe." I just don't like that idea. I like the 100% guarantee that it's safe.

Q: How do you feel about it, Joan?

J: Yeah, I agree, but I think that certain things take more time to find out if they are risks or not. It depends when we're being so general--it depends on the subject. Like when it comes to childhood things for kids, yes--that should be proven really safe. But like with artificial sweeteners, (if) you don't want to have it, don't have it! You know, something like that--having a choice. When it's something that you've gotta do then that should be proven (to be safe). If it's an option in your life, then I guess it doesn't have to be proven, 'cause then you make the choice.

B: Yeah, I agree with that too.

J: I think they should let you know when there's a suspicion of it (a risk to health).

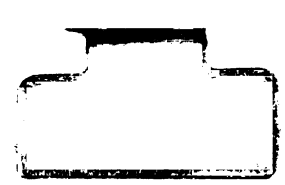
B: Yeah, but that could give and take there, because if you say there could be something wrong with it, and then it's proved that there's nothing wrong with it, that could kill somebody's business, someone's livelihood. If it's really gonna kill somebody's business then I guess it'd be good to wait, but if it was proven bad then I guess you'd be sorry. If it was proven bad then you would be out of luck 'cause you might have disease or cancer or something.

J: I don't think that affects it--I think that people would do it anyway, even if it ways right on it "cancer causing". It don't stop people from buying it. It might stop a small percentage. People have it anyways and I guess you just have to make that choice. They study on rats, right? Well, they can't study on humans, so, I don't know. How else are they going to study what things do on people--it takes a long time with people doing it. Maybe they should study with people from the prisons. Rats might not react the same as we do, you know.

Q: So how do you feel about labeling risks?

J: I think they should say when it's possible, but not say it is possible until we know.

B: Yeah, but if it's written on there then they know that something's wrong.



J: They don't know, they think--as long as they say "possibly" or "maybe", as long as they don't say there "is"--that if you use this product it's dangerous to your health. That's saying it positively; they don't write that on there. As long as they say "maybe" then it's up to you to make the choice.

Q: How do you feel about the consequences of taking risks?

J: I think probably the sooner it happens, the more you can say it's the fault of that thing, where if it happened ten years later it could be nine other things you did.

B: Yeah, I don't know--it's kind of a tricky situation.

J: Like if a lawyer wants to know or something like that, trying to prove somebody faulty of something?

Q: That could be an example.

J: Well, I don't know. Just like with Bill's uncle with that asbestos. They're saying it's not asbestos--it could have been any other thing because it takes ten years for it tohappen and it only took five or six years for him. He ended up dying of cancer and that's not right, you know.

Q: Lung cancer?

J: Yeah, 'cause he worked on something with asbestos in it and it didn't happen in the frame of time that they say it's suppose to happen. It happened sooner, you know, so maybe his body acted differently or something to it (asbestos).

B: Plus, too, 'cause he smoked, they think the cancer could have came from smoking.

J: Or maybe that's why it (asbestos) affected him sooner.

B: Yeah, that's what I think too--it escalated the fact, you know, the combination of both asbestos and cigarette smoking.

J: They have a suit going now.

Q: Who?

B: My mother's brother, he's the one who's died though my mom's doing it, his sister. Well, there's two sisters and my mother. There's three of them in on the law suit.

Q: So you consider asbestos to be a risk to health?

B: Yeah it's a risk--it's the biggest risk you could ever take!

J: Well, especially now, 'cause now it's proven that it causes that (lung cancer).

B: Yeah, one little particle of asbestos can cause cancer if it gets into your lungs.

J: So, that's a risk for sure!

B: I would say so--I'd say it's a hell of a risk. I saw him die.

Q: How long ago was that?

B: About six months ago. He died a painful death. They come up and the videotaped it and everything.

Q: Who did?

B: The company lawyers, because they didn't think that he was dying.

J: They were trying to cut off his "Medicaids", sayin' he didn't need it.

B: The lawyers against him, the company's, come up and videotaped him in bed, you know, lift(ed) up his shirt and show(ed) how much weight he'd lost and how frail he looked, you know, 'cause it had started to curve his spine 'cause the cancerous growth on the back of his lungs was getting to his spine and his spine started to curve out. So, he was kinda half crooked over all the time, he couldn't walk very good, he couldn't sleep very good, and he was in pain 24 hours a day and on medication all day long. I seen him deteriorate from 160 pounds to 95 (pounds). It was kinda wicked--made me not want to go over there too often, I'll tell you that.

J: Makes you not want to get around asbestos, too!

B: Thank God, being a carpenter, they don't use that product anymore, 'cause I sure wouldn't want it in my lungs! And I just couldn't believe that lung cancer would cause--you know, from cigarette smoking--would affect him that fast and that strong and make him die that quick.

J: No, it was something else. He was too young--he was only 40 something.

B: Yeah, early forties.

J: It was the asbestos.

B: So, now they're (the company) trying to fight the law suit 'cause they said that it just happened too quick, that it would take ten years before it would show up and it only took five or six (years).

J: I don't understand it. Why don't they just give it to them? It's not like they're suing for some little knit pick thing, you know--he's dead! It killed him!

B: But they're still fightin' it like crazy, 'cause they're probably afraid that if, you know, if they find out that somebody got some money out of the company, then somebody else might turn it in, 'cause I'm sure there was more than one person that was affected by it.

J: Somebody might say, "Well, this is what happened to my friend," and they might not have suspected it.

B: Yeah, they might just figure, "Well, he died of cancer of some sort." You know, they come out (the company lawyers), they made 'em cut the tape because my uncle started to cry 'cause they asked him all kinds of questions and they were saying, you know, "Well, you're just faking it," you know, "Get out of bed! You've been on a diet--you're not really that skinny," and all this crap, you know. Hell, he couldn't even get out of bed and they were just badgering him and my Ma and sister got into it with the lawyers and said, "Hey, leave the guy alone!" So then they had to shut the tape off, erase that, and then ask the questions all over again 'cause they (other people) couldn't be in the tape. It was just supposed to be a tape of him, so they wouldn't put what my Mom, my aunt, and what my grandma had to say on the tape as evidence 'cause it was just hearsay, you know--it was not proven, whatever they said. They (lawyers) just wouldn't believe that, they wouldn't take it as evidence. All they wanted was a physical picture of him asking him questions. If I was on the jury and I took one look at him (my uncle), I'd say, "Guilty! You guys (the company) are at fault--you killed this man!" But who knows who'll see the tape. They may have to settle out of court. They (the company) are trying to settle out of court. There were telling Mom that, you know, that it will be another ten years before they (the courts) even get ready to settle the case. It would take forever. They'll (the company) appeal it and appeal it and appeal it.

Q: What are they suing for?

B: The money to pay the medical bills. It's about $60,000.

J: Yeah, for eight weeks at a time he'd be in the hospital and all those drugs cost a lot.

Q: Do you think that this experience had affected the way you think about other risks, or risks to health in general, in your life?

J: A little bit.

B: Somewhat. It kinda made it more graphic.

Q: Did it make you think, "This could happen to me?"

B: When you work with building stuff (materials) you always wonder, 'cause they come out with new products all the time.

J: Right--and then they'll find out later (if it's hazardous).

B: Like that polyvinylchloride or PVC, you know. I've heard bad things about that, but I don't work with that very much--but sometimes I do.

J: Just plain ol' fiberglass--they might find out later that that's not good for you too! Like, he'll (Bill) come home and his arms hurt because it (fiberglass) gets on his arms and prickles, so it's gettin'--what he's breathin'--is still gettin' in his lungs.

B: I'm sure if you wear a mask some of it still gets through.

Q: Do you usually wear a mask?

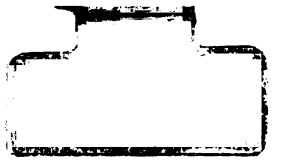
B: Yeah.

J: But it's not like a gas mask.

B: Well, when you're doing insulation, most of the job gets done in one or two days and you wear gloves. You protect yourself as much as you can, but I'm sure there's still some of the fiberglass fibers getting into you. When you're done working they're (fiberglass fibers) floating around all over the room, so just an innocent bystander comin' in would be suckin' them in.

Q: Do you think more about it (risk) than before your uncle died?

B: No, because I don't do it anymore. If I had to have a job where I was insulating I would take as much precautionary measures as possible. I'd get a better mask and I'd get a charcoaled filtered one, a real nice one. I wouldn't just wear those little paper ones that they give you. I'd wear goggles!



J: So don't you think it has affected you, hon(ey)?

B: Yeah, I guess it has. Sometimes it's kinda self-conscious (unconscious) I think. You don't really think that it affects you, but I'm sure it does. You don't want to believe it.

J: 'Cause there's not much you can do about it. I mean, you can't say, "No, I'm not gonna do this" in some parts of your job. Like me doing perms (permanents). I know they're not very good, but I can't say, "No, I can't give this perm because I don't want to smell it," you know, and that kind of stuff.

Q: Could you improve the ventilation?

J: Well, that's not my choice. I can't really do it. If it was my own building or something, then I could. Plus, I don't stick around. I'm there for about three minutes (during a permanent) and then I'm gone. So, you know, I leave. I don't stay in the room, so that helps too. It doesn't say anything on the permanent (box) about whether this is a risk to your health, but I think it's bad--I've always thought it would be.

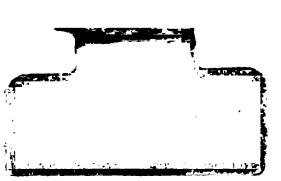
B: Yeah, you could write the company, but they'd say, "Oh, it's fine--you can drink the stuff. My babies grew up on it." I don't trust the companies.

Q: You don't trust the big companies?

B: Well, some little ones too, I would imagine. But I mean, I just don't like people telling me that, "Oh yeah, it's safe. No problem!" I want to know if it's safe! I'm one of those people that believes half of what they hear. I gotta see it and hear it, and the more you repeat it the more I believe it.

Q: Do you see the world as a safe place or as a relatively dangerous place, or what?

B: I like to think it's safe, but the more you hear, you know, Love Canal, the dioxin thing, and things like that, you know--it just makes you wonder. I'd like to say it was safe but I'm sure it's not in some places. I'm sure some places are safer than others, but, you know--if I lived at the Love Canal I'm sure that I would say that this isn't a safe place. And spreadin' all those dioxins on the road, I don't go for that either. Over here in Dewitt a friend of mine lives on a dirt road and a few years ago they (Dewitt Township) had this company come in and oil down the roads and they were using waste products from Oldsmobile and other plants, you know, dioxins,



things like that, and they were mixing it with recycled oil.

Q: Here in Michigan?

B: Yes, man! And spreadin' it on the roads. This one friend of mine's mother--she's a real health nut. She thinks the world is a very bad place to live in and she got to thinking about that town down south--I can't remember the name of the town--but every road was just about a dirt road in that town and they spread that oil on them with those kinds of chemicals in it, dioxins in it, you know. Every place they took a measure, a reading, it was high in dioxins. So, she heard that and she got the company name off the truck or something (in Dewitt) and she called in and asked them exactly what were they putting on the road, you know, what chemicals. They read off a list of the chemicals, and she goes, "Well, hey--that's dioxin!"

J: Isn't that what they found in the fish, too?

B: Mercury--mercury's big around here. The dioxin fish were up by Midlands, but mercury is a problem in the Great Lakes for sure!

J: But I think too that humans can take more than we think we can.

B: Yeah, but why should we have too?

J: Oh, I'm not saying that--there's just nothing you can do about a lot of things, except protest.

Q: Why did they put the oil on the roads?

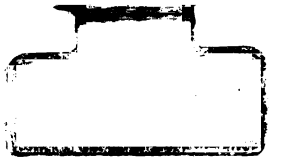
B: To keep the dust down. Now they put chloride on it.

J: Is that any better?

B: Well, I'm sure it gets diluted down and chloride's gotta be better than dioxin and all the oil and all that crap I would think. At least chloride is one stable chemical, compared to mixing a bunch of chemicals together that you don't know what's goin' to be stable with another chemical or how it's going to react, so I guess I'm happier with the chloride than with the dioxin and oil.

J: They ought to pave the road.

B: Yup--they ought to black-top it. It's been a dirt road for years and there's plenty of people that live there on it. They certainly should black-top it but they haven't. It's been like that for years. And then, you go out in



the woods and see some old road with just a couple of houses on it and it's black-topped.

J: Politics!

B: Yeah. They (the residents on the crowded dirt road) can't figure out what the deal is over there. Part of it (the problem) is because part of the road goes into Bath; part of the road is in Bath Township and part of it is (in) Dewitt Township. So, probably neither one of them want to commit to paying for paving it. It's (the road) all (in) Bath school district but part of it's Dewitt Township.

J: I think the world used to be safer. Either that or they're just finding out more now.

B: Yeah, I'm sure it was safer then because there's more chemicals now!

J: Yeah, plastics and all that.

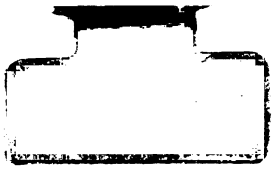
B: I'm sure if you looked at a list of the chemicals that have been developed in the last twenty years it would be a lot!

J: Yeah, but not all of them are bad--some of them are good! So, I don't know. I wish I knew more about it. Even some food preservatives--not all of them are that bad. We tend to think they're <u>all</u> terrible. I think they're tryin' to get things better.

B: Well, I <u>still</u> think it was a safer place 'cause there wasn't as many factories and there wasn't as much pollution.

J: Yeah, and less people.

B: Yeah, less people. We're all filthy as pigs. Really! We throw garbage away and we all do this and we all do that and we all drive cars. So, I'm <u>sure</u> it was safer in the past.



Interview 6: Vera and Paul M.

Q: When would you consider yourself to be ill?

V: When I wasn't able to get out of bed or when I had been wretching for a couple or three days straight, not being able to eat anything, or sometimes if my knee bothers me. When things persist a week and don't go away maybe I better consult with my doctor and see what's going on.

P: Yeah, you gotta figure, "Is this something that can be cured?"

V: I have to feel pretty bad before I go to the doctor. I don't have to feel <u>that</u> real bad but it has to be something that's eating at me enough that it starts to worry me.

P: I'm not one of the type persons that goes running to the doctor, you know. I'll put up with a little pain for a while--it would have to be really bad, where I couldn't do anything for several days.

V: If I had a fever and it lasted more than a day, I would probably think I was sick.

P: Usually by the time I go to the doctor I'm not sick anymore!

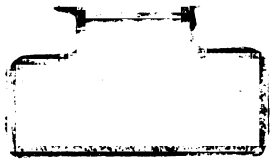
V: If the doctor told me I was sick and gave me a good explanation of what was wrong with me, I would think there was something wrong with me. I might not think I was <u>sick</u> but I'd think I had something wrong with me--but to be sick I would have to be <u>sick</u>, physically ill.

P: I'm sure there's some diseases she wouldn't notice. I'm stubborn, you know--you really don't notice a slow gradual change in your body. I'm not a doctor. Maybe there's something wrong with me that I don't know about. Well, if I die tomorrow, well, I goofed--"I should have went to the doctor last week, darn it."

Q: How about Timmy (their son)--when would you consider Timmy to be sick?

P: Well, you know, you get more concerned about your kids.

V: When he has a high fever, when he doesn't act himself, you know, you just know when he's not himself. And anytime with a fever with Timmy I get really scared 'cause he has convulsions (febrile convulsions).



P: His fever gets real high real fast.

V: I keep thinking he's going to outgrow them (febrile convulsions)--my brother and sister outgrew them.

P: Would you consider Timmy to be sick if he coughed at night?

V: If he did it a lot, yeah.

P: Well, persistently, yeah.

Q: How about if he were wheezing?

V: If he started wheezing a lot I would think asthma. Occasionally it concerns me, like if he has the croup or sometime, a cold. Usually we don't worry about things like that, an occasional wheeze, you know--so what? Once a night you hear him start wheezing or something.

Q: Do you hear wheezing sounds in his chest?

V: Yeah, especially when he has a cold.

Q: We were talking earlier about control of your physical health--what do you think is most important in your physical health?

V: The Will of God.

P: I think just the way you are personally. Genetics is important too, and I think the Will of God enters into it.

V: He enters into it all right!--but that's the difference between you and me. I think what you do and what you believe for yourself is important, too.

Q: How do you see God's Will as a factor in your health--do you think He actively intervenes?

P: I don't know--He probably does.

Q: Well, what do you think, Vera?

V: Well, I think He has control of everything. I think that if you get injured or sick or something there's some reason He's allowing this to happen. And if you're gonna get well He's gonna make you well, and if you're not there's a reason He's gonna take you away. That's just the way I feel, the way I've always felt.

P: Well, your belief is stronger than mine.

V: Well, you know, it's how I was raised.

Q: In which faith were you raised?

V: Methodist.

Q: How about you, Paul?

P: Methodist also.

V: I've always been more involved with the church than Paul. I was into the church a lot from high school and after high school--it was a fun thing for me. We had a fun church. All my friends were from the church, all the friends I had, and so these things were pounded into my head and I was taught all these things. These are the things I was taught and these are the things that I believe. I was raised in a very small town and we didn't have that much to do. So, the friends I had, we had our church group and that was our social acticities, was the church. I was out in the country, way back in the country, and that was all there was to do was the church, so we went.

P: The older I get the more I start believing in Him (God). Yep, she's a farm girl and her life was the church activities.

V: It was fun, though.

Q: Are you still very involved?

P: My folks are involved in the church.

V: Not as much--we haven't gone for a while since we've been up here.

Q: How long have you lived up here?

V: Five years.

Q: Where did you live before?

V: Just off the Indiana line in Michigan.

Q: And did you grow up in Michigan too, Paul?

P: Yes--same area.

V: Yeah, we moved from there to here--a big jump for this little girl.

P: Sure was.

V: Biggest city I ever saw. I thought I was moving to Los Angeles or something when I came to Lansing.

Q: Do you think children can get sick from breathing things which are in the air?

P: Sure, like me smoking. I worry about that, you know.

V: With him (their son) inhaling it.

P: I'm worried about him just inhaling my smoke. I'm sure there's a lot of contaminants in the air we breathe--that's just one of those things, you know. You gotta live with it. There's not much you can go about it. I'm sure there's a hell of a lot of people contributing to air pollution, chemicals and such--the air quality's deteriorating and it's just one of those things.

V: Like he says, what can you do about it?

P: Think what it's gonna be like in a hundred years from now.

V: Except for our smoking--we could do something about <u>that</u>. I think about that--about his (Timmy) breathing our smoke, our cigarette smoke--'cause I know what it does to <u>my</u> lungs.

P: But he gets my smoke even if he's not directly near us and he's within a room here in the house. About a hundred years from now who knows--there might not <u>be</u> the water, there might not <u>be</u> any air quality.

V: People might be in domes--people might have communities in domes.

P: Sometimes it really bugs me that I smoke--it <u>really</u> bugs me. 'Course, I never had any fresh oxygen, pure oxygen, you know--I don't know what it'd do to me.

Q: You say you're worried about the cigarette smoke and about the air quality (as both parents light cigarettes in a smoke-filled room with their son sleeping on the couch)--what kinds of things do you think Timmy and other children might get from breathing things that are in the air and how would you know when they got them?

V: Emphysema, asthma, when they cough, hack, wheeze, start wheezing and complain of their lungs.

P: I know <u>I'm</u> not well here (pointing to his lungs) after smoking these things (cigarettes) for all these years--I <u>know</u> that!

V: Yeah, you must be a mess inside--you gotta be a mess inside.

P: What am I doing, killing myself here, you know? Here's something (cigarette smoking) you could do something about.

Q: So, you don't think it's good for you but you keep doing it?

P: Yeah. Sometimes it really bugs me that I smoke--sometimes it <u>really</u> bugs me. A lot of times, when we're around people who don't smoke, we don't smoke, that much, anyway. We cut down, you know. It's just like I feel guilty.

V: Well, you don't want to smoke when you're in someone's home that doesn't smoke, you know. I wouldn't expect someone to do it to <u>me</u> if I didn't want smoke in my home, because I know how it makes your home smell.

Q: How else could you tell that the children got something from breathing things in the air?

V: Maybe their complexion, maybe their skin would change--just physical would be all it would have to be.

P: Or a change in behavior.

V: Yeah, I would think so. Like how I feel just from smoking, how you feel in the morning.

Q: But if he started acting strangely would you connect that with something in the air?

V: I would go through different things, think what it could be, you know--is this a possibility, or is this. What's causing it, why is he acting like this? You know, and narrow it down. You can probably figure out why (he's acting that way). Write to your congressman: "Too much pollution--my kid's sick!"

Q: What difference do you see between the air inside and outside your home?

V&P: The outside air is better--sure!

Q: Do you think the air in some parts of your home is better to breathe than other parts of your home?

V: The bedroom air is the best 'cause there's no smoke up there and the windows are open or cracked all of the time, except sometimes in winter--there's whatever fresh air can come through the window.

P: And there's odors--there's different odors in the living room than there are upstairs. I don't know if it's just air quality, but there's just odors in the air downstairs.

V: Upstairs, too--you have the showers so you have more humidity up there.

P: I don't think the air quality is any different, upstairs, downstairs, or in the bedroom, but the odors are different. Outside I assume would be a little bit better. It's not as stuffy of an air as in here. It's probably about the same air quality (inside and outside).

V: There's no heavy smoke hanging in the upstairs like there is in the rest of the house. It's purer to breathe upstairs, I would think.

Q: Well, how about the issue of cleanliness--do you think the air is cleaner outdoors or in your home?

P: I think it's about the same.

V: Probably outdoors would be cleaner--it would be cleaner outdoors.

P: Well, I don't know--outdoors you get a lot of dust in the air and you're breathng a lot of dust and dirt, you know, where inside you have smaller particles.

V: Yeah, but you have the more natural things outdoors.

Q: Well, how do you feel about air pollution--do you think you can keep it out of your home?

P: Sure, if you board up the windows and get a liquid oxygen tank. I don't think so. Air creeps in wherever, unless you live in an airtight environment with artificially filtered air. You can put humidifiers on and change the humidity in the air, but I don't think it's gonna change the quality, the quality of the air--it just makes it moister by adding moisture to the air and physically makes you more comfortable.

V: Humidifiers would not make it better air to breathe, just moister.

Q: Do you think you can keep pollen, dust, and things like that out of your home?

V: No, I don't think you could at all.

P: Yeah, but I'm not allergic to anything. I'm sure with like pollen in the air, if you come inside you're gonna

feel better, I'd assume--that's why people (with allergies) don't go outside.

V: A whole lot of people control it with their air conditioners, too.

P: People do, I assume, control their environment.

Interview 7: Joan and Bill T.

Q: What do you consider to be the major risks to your health and your child's health in and around your home?

J: Electrical sockets.

B: Cleaning chemicals, like Draino and stuff like that.

J: Sharp edges, like right over there (pointing to a table corner). Steps--we've got a lot of steps in this house.

B: The steps don't scare me.

J: The stove.

B: Chemicals and electricity would probably be the main two.

J: Cars.

B: Accidents.

J: Running out in the road. Not too many things outside the house, in the yard. Rakes.

B: Sharp objects.

B: Kidnapping and child molesters, that's what scares me, 'cause when we were kids, if somebody offered you something you said, "Thank you." Nowadays, you've got to say, "No, I don't want that," that's one thing that's bad about things that are goin' on.

J: But I think people are getting more aware of it so the kids will be less available to the weirdos. If we're gonna be more safe, you see, we're not gonna let the kids be off by themselves and we're gonna make it less easier. The kids just have to learn nowadays.

B: Yeah, when I grew up I wasn't scared at all--there wasn't anything to be scared of.

Q: Can you think of any other risks?

B: Sure, like in the building products. There could be some bad chemical in some of this paint we been using around here.

J: Or in the paper (wallpaper).

B: Or something in the fabric of the furniture.

J: There's gasoline outside, too.

B: Gee, I don't know--you could eat something poisonous outside the house. When it comes to kids, I guess nothing's safe. You gotta watch 'em every minute--well, not every minute--but nothing's safe with kids. If there's something bad, they're gonna get into it.

Q: Where do you think risks to health are greatest--inside or outside your home?

B: I'm sure there's risks everywhere that we don't know about. The unknown risks would probably be more on the outside, 'cause inside you can at least control your environment, inside, somewhat. But outside, what can you do with the air, the water? I mean you like to think the inside's safer, but you don't really know until something happens. But you can at least try to control that environment. Outside, you know, you don't have much control. You don't know what could be in the air that day and if your child is outside and playing close to the railroad tracks over there then somebody could be carrying something on there that could get into the air or there could be a derailment and you just never know with all the factories around here what could be pumped into the air.

J: I agree--I think there are more risks outside.

Q: How much control do you think you do have over what happens to you in your life?

B: You can control it to a certain point, but like I said, when it comes to the environment you can sign all the petitions you want but that doesn't mean something's gonna get done.

J: You can control your personal habits and that's a good way to help reduce risks.

B: Yeah, you can kinda control your personal health. If you're a healthy person and you come across something bad in the environment you can maybe fight it off, like a virus, hopefully you'll be able to fight off that virus. You can do your part as much as you can. If you're someone who's overweight and sick all of the time I guess you'd have more of a chance of being more at risk I would think. Then again, you don't know 'cause there could be something that was so terrible and so harmful that no matter how good a shape you are in that it could affect you just like that!

J: Yeah, you have some control, but not all control.

B: It's just fate. What's gonna happen is gonna happen.

Q: When would you consider yourself to be sick?

J: When I can't work.

Q: Anything else?

J: That's about it.

B: It would take something pretty serious. I hurt myself playing basketball every once in a while, but that's about the only thing that's gonna keep me out. If I catch a cold or something, that's not gonna keep me out. If I felt a little bit tired or a little bit weak, I wouldn't be sick. Maybe if I had a real bad fever for a while and was throwing up a lot.

J: You are weird when it comes to sick--I mean, when you're sick you have a fever! That's the definition of "ill". If you have a fever, what do you call it then if you don't call it sick?

B: I call it a fever. To be sick, to me, you just gotta be laid up I guess--so sick you can't get out of bed. I guess that's what I'd call sick. I don't know, 'cause I can deal with pain better than she can, too, so I think that has something to do with it. If I'm uncomfortable, in discomfort, I just try to make myself more comfortable.

Q: Would you consider your child to be sick if he coughed at night?

J&B: Yes.

B: The alarm would go off real quick. We'd go to the doctor.

Q: How about wheezing?

J&B: Definitely, we'd be very worried.

Q: How do you feel about God and His relationship to your health, your physical well-being and your mental well-being?

B: It doesn't affect me.

J: I really don't believe it has anything to do with it.

B: I was raised a very strict Catholic and I seen all my relatives pray for my grandparents when they were dying and when they were sick and, you know, that didn't stop

anything. So, when it comes to health I don't think He has anything to do with it. That's kind of a touchy subject. Some people really believe that if they are sick it is because of God. I think it's more your lifestyle and your personal habits and health.

Q: What do you mean by "personal health"?

B: Well, I consider myself to be a healthy person because I watch what I eat, I try to eat good foods, exercise, and things like that. I've got a job where I gotta use my hands and my muscles and my body, so I consider myself pretty healthy. And I don't think God had anything to do with that. I think it was more myself than Him. So, when it comes to health, I don't think He has anything to do with it. I think it's yourself. If you don't believe in yourself, your body responds, I guess. What's God going to do for you? He's not gonna kick you in the butt and tell you, "Hey, you better get on the stick and lose thirty pounds." You gotta make yourself do what you gotta do.

J: Yeah, you gotta be your own inner guide--keep yourself strong, whatever. I think God helps for some people, you know. If you really <u>believe</u> that (God helps) and that's what's gonna do it, then maybe it does help some people.

Q: What helps--believing in God?

J: Yeah, believin' in Him and praying to Him that you're gonna be better. You know, more power to 'em! But I don't know if He really does help. I think that if I got <u>real</u> <u>sick</u> that God might become <u>real</u> <u>important</u> to me, but right at the moment, you know, it's not a real issue. But I think I would probably think more about it if I got cancer or something. I don't know if it would help, but I'd try <u>anything</u>! I'd be praying to Him every night even if I'm not a real big believer of it. I think your genetics are real important and also that you have a lot of control.

B: I think what you believe and how you take care of your body would be more important than genetics, 'cause if you had a genetic defect maybe there was something you could do to change that. So, I don't know if that would be that important. I mean, I'm sure that it's important. If you've got good genes in your family then that's gonna help you out. But, if you don't take <u>care</u> of that body to begin with, what are genetics going to do for you? Nothing.

Q: Do you believe that children can get sick from breathing in things from the air?

J&B: Sure, uh huh.

B: They can get all kinds of things--emphysema, allergies, viruses, you name it! You don't know what the hell's in the air nowadays.

Q: How would you know when they got something?

B: That's a good question--how would you know when they got it?

J: Coughing or a fever or redness in their ears, redness in their throat. And when children are older, they will tell you.

Q: How do you feel about indoor versus outdoor air? Which do you think is better to breathe?

B: I'm sure there is a difference, especially in the winter time. You know, 'cause you compound the fact that all the windows are closed, there's no fresh air comin' in, plus your furnace is pumpin' dry air in. In the summer, I guess there wouldn't be much of a difference.

J: Unless you had allergies--then the inside would be better. I mean, you could air condition or heat your house and keep it air tight and it would be better for you than having outside air with pollen. But, I like fresh air.

Q: Well, how about inside your home--do you think the air is better in one room as opposed to another?

J: Well, maybe the basement is a little different. It's more musty.

B: Yeah, the basement. You never know what kind of fungi or something could be growin' down there, so I guess there could be something, some kind of difference.

J: Yeah, I wouldn't live in a basement.

Q: Do you think you can keep the air inside cleaner than the air outside?

B: Probably not.

J: No, you can dust but if you got your window open it comes right back in. You can keep it cleaner in the winter time.

Q: How about man-made pollution, industrial pollution?

J: That might be better inside.

B: Yeah, but you can't keep it out!

J: No, but you might be sheltered from it a little bit.

B: Well, if they're solid particles. But if they're not, you'd suck them up inside or outside.

J: With the windows closed I don't smell any exhaust or whatever. Sometimes it smells fresh inside and you go outside and you smell different smells. Sometimes it seems cleaner inside.

B: But still, you're breathin' the same air.

J: Yeah, I'm sayin' "seems"--I'm not sayin' it's (cleaner) for sure. But with the window closed it just seems like you can't smell it (pollution) as much.

B: But that air gotta come from somewhere, and if it's polluted you're gonna be suckin' in polluted air.

Interview 8: Ruthann and Andy B.

Q: Where do you think that the risks to your health are the greatest--at work, out of your home, or in your home?

R: I've always felt like it was greater outside. Somehow I feel I have more control over what goes on here in the house. In here it's just me and the family mostly but out there you've got to deal with <u>everybody</u>! You know, you go by kids and you hope that they don't hit you in the head with the baseball.

A: Well, I think it stinks. I mean, I have my own circle of friends but I'm also aware that outside the environment is dangerous. I do like outdoors, but I'm very conscious, very conscientious, of walking at night--especially when I'm working the second shift and gettin' off at around 11:00 and home around 11:30 (p.m.). I get home at 11:30 at night I'm watchin' over my shoulders, waitin' for somebody to dart from behind a tree. I'm <u>very</u> conscious! I think it's dangerous outside 'cause crime has gotten to the point where it used to be done just at night but not anymore. In some areas it's dangerous 24 hours a day.

Q: How do you feel, Ruthann?

R: I feel the same way. Of course, I'm originally from Chicago so this is a little safer, but I don't feel like I'm gonna go walking out at night alone--not even here! I haven't really had any incidents but I still feel like it's dangerous outside.

A: I don't know about you, but I have <u>always</u> heard about child molestation and child kidnapping. I heard about it a long time before I was married and had a child. They <u>do</u> steal babies and put them on the black market or raise them up for whatever, and I'm very conscious with our child.

Q: So, how much control do you think you have over what happens to you in your life?

A: Very little, personally. We control <u>some</u> things, especially in our home, but there's just some things that we can't--we have no control over them.

Q: Like what?

A: Oh, I think I can control where I live to a certain extent, whether or not to get out of poverty to to

continue to stay in it, what kind of food I can eat. But I can't control health. You know, we're cast into a big pot and some of us are gonna sink and some of us are gonna swim. We just have no control over some of those things. Your health would be better is you stay in more or go out with a machine gun--it would make you feel a little bit safer, you know, but it varies.

R: I feel I have a little bit of control. I mean, you now you can choose when you want to go out, and where you're gonna go, and you can lock your doors and lock your cars and buckle your seatbelt. You know, you have some control as to what happens to you.

Q: How much control do you think you have over your physical health?

R: Well, I might not be realistic, but I think I have a lot of control over that. They're finding out the things that causes you to have bad health, and if you choose to ignore that, then that's still within your control.

A: Yeah, but there's so much you can't control--there's always a chance of the furnace blowin' up and it's a zoo outside. Lady in our building was raped last week, beaten pretty bad. So now they put bars on the windows of the next building over--a lot of good that does us, or her.

Interview 9: Vera and Paul M.

Q: What do you think is the best way to stay healthy?

V: Oh, I would think just watch what you eat, eat the right foods, keep yourself on a pretty well-balanced diet, eat what you need and I don't think there's any more than that that you can do.

Q: Do you think it's important to stay warm and to do things in moderation--not to do anything to excess?

V: No, you don't have to do things in moderation, I don't think. I don't do things in moderation and I'm pretty basically a healthy person, and I don't always keep warm.

P: Me too.

Q: How do you feel about the use of natural foods and foods with artificial ingredients?

V: Well, I being raised a farmer I eat mostly good food.

Q: What's "good food?"

V: Fresh vegetables and good meat--chicken, fish. We don't eat a lot of pork and things like that. We don't eat a lot of frozen or canned stuff, just from the way I was raised.

Q: Is there a problem with canned foods?

V: No, not really. I just never monkeied with them too much because my Mom never did, except for things that I freeze and can.

Q: Paul, what do you think is the best way to stay healthy?

P: Life weights, don't smoke, run, jog, you know--keep your mind healthy. You should enjoy what you do in your job.

Q: How do you feel about artificial ingredients in foods?

P: I eat them and I don't worry about them.

V: I don't worry about artificial ingredients that much, but I think, "Do I want to eat that or do I just want to make my own?" I just think maybe it's something we'd be better off without. I guess I do worry about it to a certain extent because I think, "Well, I don't want to eat that so I'll just make it myself," and I guess that

would be worrying about it. If you don't know what it is (an artificial ingredient), why eat it?

Q: Do you think PBB is a risk to the health of the people in Michigan?

V: I don't know.

P: I don't know--I don't know that much about it and I'm not affected by it.

V: You might be.

P: I might be. Some people are--in some areas it's a concern, but it doesn't affect me, so.

V: It's just in the soil and they're (crops) just sucking it up in the roots. There was a farm down by our house--they had to destroy their whole herd of cattle or pigs, one of the two, and it was horrible. They dug these big ditches with these bulldozers and just threw them in there and they just covered them over. They dug these big trenches and they just threw the animals down and buried them over. And three farmers in my area where my parents lived lost their entire farms and went bankrupt because they had to destroy their livestock. But they, all three of them, lost everything they had because of this. And why would they do it unless there was something really big about it? So, that's all I know about it, but that was enough for me. I mean, it's amazing the tremendous amount of livestock just piled in these ditches. They just shot them and buried them there. I can't even describe it to you. Hundreds and hundreds killed, just piled in there like these old movies you see, these war movies where they're just piling bodies in the ditches. That's what these were, just piles in these ditches, and they just plowed them over. And now they're just fields, you know. The farmers are gone, they went bankrupt. And I'm sure there's danger from all those rotting carcasses under that soil, comin' up through the soil, if someone would farm that land someday. Today that land is just barren, so I suppose they're just gonna let it go for however many years that it takes for it to go out, because the land still is barren and that was over ten years ago.

Q: How do you feel about the issue of diet and cancer?

V: I think a lot of fats are bad for you. We're not eating that much red meat, fatty meats, anymore, you know. We've cut down on that. We're eating a lot more vegetables and fibers and things now.

P: Yeah, I guess we do--and I think a lot of it has to do with the little editorials or one minute spots you see on TV (television) about fibers and so on. After year after year after year of hearing this stuff, you know, you say, "Well, I'm getting a little bit older, here. I think I'll straighten up my act a little bit."

V: Well, it makes sense--it does make sense if you think about it. It does!

P: Younger people, when you're young you don't think about it and when you start to get old you think, "Maybe this would be a good time to cut this out or do a change here." There's something wrong with <u>everything</u> we eat, probably.

Q: Do you think so?

V&P: I'm sure there is.

V: But we eat mostly just fresh stuff, since he married a farmer, you know.

P: Yeah, but I don't know.

Q: How do you feel about nuclear power--do you think it's safe?

P: Sure. I don't know. If I was living next to a nuclear power plant I might feel differently. If I was living right next door I might have some concerns about it, but as long as it's "over there," sure--why not?

V: I don't know. Look at Three Mile Island. What can I say--I think they're as safe as they can be. What are you going to do--they're <u>there</u>! I wouldn't worry about it unless there was one fairly close to us that had a crack and the radiation was leaking out. I don't think about it too much 'cause it's just one of those things that's there, and what can you do about it? You can't spend your life just sitting around thinking, "Oh my God--what's gonna happen?"

Q: How do you feel about the quality of tap water?

V: I know it's more polluted now than when I was a child. I drank well water growing up and I don't like to drink this water up here <u>at all</u>, 'cause it's filtered and refiltered water, and I don't like it at all. But what can you do? I'm sure the filter is tohelp it but there's still those nasty little critters getting through and you can drink them. It's not like good old hard iron water out of the well.

P: I agree!

Q: How do you think that you successfully avoid some of the things we've been talking about?

V: Common sense, and the Will of God. That would be about it I would think.

P: I don't really think about avoiding risks. I just let things happen and I really don't think about a risk.

V: Well, you do avoid risks, you know, when you're driving and drinking. You're avoiding risks that way.

P: Well, yeah--I don't go out, get smashed, then drive too much.

Q: How about Timmy (their son)? How do you think he avoids most of the risks that he has to deal with?

P: He just drives right in, and, well, "I got hurt!"

V: "I'll know better next time." I don't think at this stage he really trys to avoid anything. He just goes in and does it aand if it turns out bad he doesn't do it again. But I don't think he tries to avoid anything. He's at the, "I'll try it!" stage, "I'll do it." He does avoid risks by not going in the street when the rest of the kids go in the street. He stands on the sidewalk and looks at them.

Q: Why does he do that?

P: Because we've trained him.

V: Because we've taught him to not go in the street 'cause he'll have a red bottom if he does!

Q: What do you think are the greatest risks to the general health of the U.S. population right now?

V: Ronald Reagan.

Q: O.k.--anybody or anything else?

V: No, I shouldn't say that. I'm not real crazy about his ideals and the way he runs the country and the things he does with the other countries.

Q: Do you think the political situation is a serious risk?

V: Yes. If it were up to me we'd still have Nixon, but it's not up to me. Reagan is just hungry to fight. He wants

to be almighty and I think he likes to just agitate people.

P: He just likes to eat at people.

Q: What do you think are the greatest risks to health, Paul?

P: To the general U.S. population? Well, there's always a political risk, like Vicki said. There's driving--I think driving your car, you know, just 'cause so many people drive. Then there's the nuclear thing--I'm big on the nuclear thing. I think one day we're gonna "nuke-out"--nuclear war, because of the political activity going throughout the world, I mean, not just here--just in general. You don't know what's gonna happen, you know.

V: The food is a risk, too.

Q: Food? How?

V: The farmers are all going to quit farming soon, I think, because they're not getting paid the money that they need to get paid for raising their crops, which is feeding the United States--and they're not getting paid! So, soon there won't be any farmers and then there won't be any food. That's another high risk, I think--maybe even higher than Ronald Reagan.

Q: Do you think we can prevent or avoid any of these risks?

M: Some of them are--by the right people--I'm sure some of the political situations are preventable, but it depends on the person in there. As far as cancer and such goes, I don't know if someday they might come up with a cure for cancer. There's always that chance. They may be able to cure all types of cancer. There's always that hope.

V: I think the food situation is preventable, but the government--the men that are in charge of whatever in the government that are in charge of all the food. Maybe if they would just play the role of a farmer for a while they'd find out what it <u>is</u> to be a farmer, and to raise these fields of crops, and to get paid this measly little amount that they're getting paid, and see if <u>they</u> could make their farm go, and they would see that they couldn't do it <u>either</u>, and maybe they would pay these guys really what they <u>need</u>, what they're worth! That's preventable for sure--there's no way that that's not preventable.

P: Well, I don't know--that's all political too, though.

V: Well sure it is. It'd be preventable if they could get someone in office that would run the country that would look out for all the people instead of just part of the people. Like Ronald Reagan, I think, looks out for the rich people, the people with the money and not the farmers or the women or the black people. I think he's just concentrating on the rich Americans. And I think if they could find someone, I don't know who--probably they couldn't find anyone.

P: Another program to cut. The world's getting so big now that you rely on the government to run things.

V: I think it all depends on who you can get in office, who can run things, who can be for everybody and for all nations.

P: I think the government controls a lot of your destiny--there's your everyday risk, there's your risk that you have no control over!

Q: Like what?

P: Well, you know, like the government. You don't have any control over it.

V: Everyone has a say in opinions and I'm sure that if everyone was willing to go out and do something about it, make a change--but you can't get the majority of people to do that. So, probably a lot of these are not preventable.

P: Then there's pollution--I don't care for it! Like that sulfur pit or whatever it is out here on Pennsylvania (Avenue) right next to the highway--you know, that's pollution. It's just the way things are nowadays. It's just the way the world is. There's a lot of things that shouldn't be, but they are.

V: I don't think the pollution is right but it's gotta be for things to keep changing and keep getting better. If they're finding new ways to do whatever they're doing, they have to pollute in a different way.

P: We're a wasteful species here--you know, we waste a lot.

Q: You mean we're wasteful in this country?

V: Oh, yeah.

P: Yeah, in this country and other industrial countries. We are wasteful.

Q: Do you think they're not as wasteful in other countries?

P: Well, yeah--they're not as industrialized, they don't use as much resources, and so on.

V: When you're right, you're right.

Q: Well, how about recreation? Do you view man-made pollution as a threat to your recreation?

P: Well, the only thing I'd be concerned about would be the water, you know, like the lake. I enjoy the lakes around Michigan and if they become polluted or something then there's nowhere to go.

Q: If they become polluted?

P: Well, I'm sure they already are.

V: They're becoming polluted, yes they are.

P: It concerns me because I enjoy the water.

V: You don't want to swim in water that's got nasty things floating all over it or soap suds floating in it, or crud, dead fish floating on the top.

Q: How about the air?

V: I don't think about that so much, about the air.

P: You really don't notice it. You smell odors or something like that but you really probably don't feel the effects on your body. You can smell odors but not feel them.

V: I don't think about air so much because, you know, <u>look</u> at all the air there is! Look at all the pollution you'd have to have in the air before it became noticeable.

P: I mean, with water you can <u>see</u> it, you can touch it, but not the air.

V: With air, just think of the vast universe--think of all the air--and I don't think about pollution in the air.

P: I don't think about it at all. I know it's happening, that it's there, but I don't think about it.

V: There's so much air--why would anyone even think about pollution. I don't. I don't even think about it, unless it starts burning my eyes or my nose starts running--<u>then</u> I think about it.

Q: What about foods--do you think about pollution with respect to food?

P: Sort of, but when I'm eating it I don't care.

V: I think about all the new chemicals that they're coming out with to spray on things and all the fertilizers and chemicals they're putting into fertilizers.

P: You know, sometimes you go, "I'm gonna eat that?" and open up the can of whatever and you look at the ingredients and say, "Oh, well." I mean, you think about it but you don't have an immediate effect on your body. If all of a sudden I got ill, well, maybe I don't eat that again. A lot of things you don't know that it might be nice if they told you about, but you don't know about them.

V: Well, I think lots of times about all the new chemicals and the new fertilizers they come out with and the new insect control sprays. That's got to get into the food you eat. It's got to get up into the roots and it's gotta grow into the food that you're eating.

P: But you don't think about it when you're eating it.

V: Yeah, you think about it. Think about what they did in the old days. They put manure on there and if the bugs ate part of the crops, well, too bad. They didn't have anything to do with the bugs then (pest control) and what amount of food did the bugs eat then? And they didn't have to put all that junk on it that they put on it now. I don't know--it's just all that stuff. Don't you think about it?

P: Oh, yeah.

Interview 10: Joan and Bill T.

Q: Do you usually wear a seat belt when you drive?

J: I do.

B: She does, I don't!

Q: Why?

B: Because I was in a car accident once and I got thrown from the vehicle and I broke my back, but if I wouldn't have been thrown from the vehicle I probably would have been paralyzed.

Q: Why?

B: Why? Because it (the car) was completely smashed right where I sat.

J: That's not the norm, though.

B: That's true, that's not the norm. But thirty days later I was involved in another accident and I wasn't wearing my seatbelt. I was still in a back brace and three of us were sittin' in the front seat of a car and we'd been drinkin'--we were pretty snuckered. I was drivin' to begin with but the guy who's car I was drivin' decided he wanted to drive again because somebody had gone past us and thrown stones at the car. So, he wanted to drive. He said, "I want to catch that son of a bitch!" So, we took off and there's a little jog (curve) in the road and he missed the jog and we went across and went into the ditch and we went over a driveway where there was a culvert and a ditch and it made like a little ramp. He was just drunk and couldn't control the car and we flipped. On the <u>first</u> flip he went out the windshield. <u>None</u> of us had seatbelts on and on the <u>next</u> flip his (the driver's) uncle went out the back window. And then on the <u>third</u> flip the car just landed on all four wheels and because I was in the middle, somehow "centripugal" (centripetal) force kept me perfectly still! I mean I didn't have to hold onto anything--it was just like a rollercoaster ride. The car rolled, rolled again, and rolled again, and then we were on all four tires and I just shook my head, "My God," I thought, you know--the doors were closed and here I am sittin' by myself with the front and rear windows smashed out and I thought, "My God--what happened?"

J: And the same cop that came to his other accident came to this one!

B: Yeah, the same cop. And he goes, "My God, what are you doing here?" and I said, "Well John, you ain't gonna believe it," and he just couldn't believe it and he said, "You're lucky to be alive!" and I said, "Well, I guess so." I guess in a collision a safety belt is fantastic, but when it comes to a roll job and things like that it's better not to have them. Now if they could build a product where they could guarantee me that the roof would not cave in then I would wear my seatbelt all the time!

J: Yeah, but if you get thrown out you could get killed that way too.

B: Yeah, you could hit a tree. But if they try to make you wear the safety belt they're tryin' to tell you that the vehicle is safe to stay in, and sometimes they're not. The first accident that I mentioned I was fifteen or sixteen, I was goin' fast down a dirt road but then we hit a bunch of bumps and I lost control of the car. But it wasn't like I went out and got drunk and drove it off a cliff or something. Sixteen, I guess I was sixteen. If I'd been wearing a safety belt then I would have probably been paralyzed, so, I'm glad I wasn't.

J: Well, maybe if you hadn't gotten thrown out of the car you would have been in there longer to put on the brakes.

B: No, the car was already rolling. I was in a ditch and flipping over at that time (when thrown out), but I mean I'm glad I did get thrown out of the car 'cause I probably would have broke my neck instead of just fracturing my vertebrae. That car got squashed down to about two foot, so there wouldn't have been much room for me. If I'd been wearing my safety belt I would have been held right in that seat and that would have just compressed everything (me) down. So, that wouldn't have been good.

Q: That's one way of looking at it.

B: Yeah, and with the second accident I sat right there and I didn't have a safety belt on and I was perfectly safe. I didn't get a scratch. How do they explain that? There must be a certain position in the car where you're perfectly safe. It's like you take a bucket of water and throw it around and nothing comes out. I was like the water in the bucket. I didn't go nowhere.

Interview 11: Dorinda Lee R.

Q: What do you consider to be some of the greatest risks to your daughter's health?

D: Well, I watch her, you know--she go outside by herself, I stay in the window and watch her if I don't feel like goin' down. And there's some kids out here that try to sneak kids in the buildin' and take off their clothes, you know, all kind of things. So, I'm very skeptical who she play with.

Q: So you think that's a risk outside your home?

D: Uh hmm, that's a risk.

Q: What else do you think of as a risk to her health?

D: Smoking. I smoke, but most things I smoke she's in the bedroom or she's outside, you know, I try keep it 'way from her, 'cause when she was small she was having problems with her eyes and breathing and the doctor told me to keep her away from smoke. And also, I don't like her hanging 'round bigger kids, picking up slang and doin' what they do, you know, 'cause I have a lot of nieces and nephews and she'll go home with mom and she'll come back doin' something I don't like, you know, and it take me about two weeks get her to stop doin' it. And drinkin'--I don't like to be aroun' too much drinkin'--other people drinkin', 'cause she go, "Ma, can I drink that?" you know, an' I tryin' to get that out the way, too. It's hard bein' a single parent tryin' to raise 'em, so I'm trin' to do the best I can, with the support of my family. It's a lot of badness in the world, dangers in the world, so, you know, that's why I'm protective about who she play with.

Q: What dangers do you think of--what comes to mind?

Q: Oh, big kids playing with knives and bricks, you know, throwing bricks. I seen one guy with a knife in here (their apartment building) the other day, and you never know what they could do--<u>anything</u>! You have to watch out for that.

Q: What other risks do you think there are to Eta's (her daugher) health?

D: Bein' healthy--tryin' to stay healthy.

Q: What would cause her not to be healthy?

D: Just gettin' outside an' play.

Q: Do you think the risks are greater in or out of your home?

D: Inside--but, I don't know. It's probably more danger outside but sometimes it seems about the same. You know, we do all right, we get along, manage.

Q: Do you think there are any risks to your or your daughter's health in your home that your aren't aware of --that you don't know about?

D: No, nope.

Q: How about outside?

D: Nope.

Q: How much control do you feel you have over your life and your physical health?

D: I'd say I have a lot of control, believin' in God and the prayers and all, and you get help from your friends, you know. I think I have a lot of control, 'cept for what goes on around here.

Interview 12: Joan and Bill T.

Q: What do you think is the best way to stay healthy?

J: Eat right, get enough rest, all those things they tell you. Don't smoke, don't drink too much, exercise.

B: Exercise is a big part of it and then just everything else in moderation. 'Cause you can say what's good and what's bad, but we don't know what's good and what's bad in <u>everything</u>, so.

J: Well, the obvious things like drinking.

B: Well, drinkin', yeah, but you can drink a little bit. You'd like to think the government would tell you what's healthy, but they'll tell you one thing is bad and then leave another thing on, so you can't always believe them either. You know, like the cigarettes. They pulled the cigarette ads but they leave the alcohol ads on. Why not pull them <u>both</u> off? If they're gonna pull one they might as well pull the other one off.

Q: How do you feel about natural and artificial ingredients in foods?

B: I think natural foods are better for you. They've got natural fiber, natural vitamins. Compared to a processed food I would pick the natural food over the processed food hands down. Like our vegetables--we buy all fresh vegetables annd stuff and we try not to use canned or frozen (food). Sometimes we have to, but 90% of the time we use fresh. We don't buy processed food so much. We prepare most of our food. I don't like processed artificial this and artificial that. We all eat junk food and there's certain things you just get cravings for, but as a rule we prefer natural over artificial.

Q: Do you think natural foods are better for you or do they taste better, have a better flavor, or what?

J: I think it tastes better <u>and</u> I think it's better for you. I don't think the other is gonna kill you, but if you make a daily diet of it, it might!

B: You get better nutrition with natural foods, I think, unless the processed food is fortified with some artificial vitamins, but who knows how good those are either.

J: They say artificial vitamins and real vitamins are the same, but I don't know if they are or not. I don't know if your body takes them in the same way.

B: Yeah, they'll tell you, "This has got the same thing in it that the natural vitamin does," but they don't say that your body is gonna absorb it the same way. There could be some coating on that artificial vitamin that kicks off a negative reaction with your body that we don't know about--that they can't prove or we don't know.

Q: How about PBB--do you think that is a risk to the health of the people in Michigan?

B: I dare say that it probably will be a long-term risk.

J: You mean when we get to be 50 (years old) it's gonna show up or something, Bill?

B: It sure might, it sure might. I can't see where a flame retardant could be good for you in ANY way!

J: I just thank goodness that then, 1974, we were too poor to eat much beef. Then we had lots of casseroles, so I didn't eat that much contaminated beef. I'm sure I was exposed to it, though.

B: It was in milk, all dairy products. Hell, we were ALL exposed to it. I think it was a big mistake and somebody screwed up. I think it is going to be a risk, I sure do. I'm sure it's gonna affect somebody that really had a large amount of it incorporated into their body--I'm sure they're gonna have a risk. I would be willing to bet money that they're gonna have a risk.

Q: They're going to have risks or they are going to have problems?

B: I think it is a risk and could lead to problems. I would dare say that it will be a problem because, hell, they were burning the cattle out at Michigan State right in the incinerator and lettin' it go right up into the air.

Q: At Michigan State?

B: Sure--they were burning cattle right in their incinerator, contaminating people like hell. I was working at East Lansing at the time and it just flipped me out, I'll tell you that right now! They wanted to get rid of them and they didn't want to bury them. They buried a lot of them, but they were scared that that could have got in the ground water. They should have shipped them off and given them to some other state. It really pisses me off! That was one of the biggest farces

that ever happened in Michigan as far as I'm concerned. It really pissed me off that somebody could let something like that happen. It was one of the biggest blunders that they ever did and they got more people irate than you can imagine. And then when we found out they were burning them out at Michigan State it just made me furious, 'cause we didn't know when it happened and we were working outside and could have been sucking that in, you know. Why didn't they sound off a siren, like for an air raid or something, to tell people to get in their houses?

J: That wouldn't matter anyway 'cause it would be in your home.

B: Well, not that much. I don't know what came out that smokestack but whatever it was, I am sure it went straight up into the atmosphere and I think that was a big blunder. They should have foreclosed that company right there on the spot. They screwed up and they should have paid.

Q: I take it you have pretty strong feelings about it?

B: Sure! I think everyone in Michigan should have strong feelings about it. If you had lived here at the time, you probably would have had strong feelings against it, I'm sure. It blows me away sometimes how assanine somebody could have been. When it comes to products like that or something that is gonna get into the major food chain, they should have security checks and safety checks to scrutinize everything that comes out of that place. It is stupid! When it comes to that grain feed and stuff, hell, there's nobody watchin' that stuff. I'm sure they don't hardly ever even test it. It would just be more red tape for the state to send somebody out there to take a sample, bring it back in, get it tested, and then say, "Hey, there's PBB in there!" Hell, you know they don't--I bet money on it.

J: But, it was the Farm Bureau that was the company involved and they aren't going to let that happen again.

B: Well, maybe not. But the Farm Bureau's a big company. Besides, it could just be another product.

J: I think they check things.

B: I definitely think they don't! With all the budget cuts they they've had lately, there ain't nobody checkin' that grain and stuff. I would be willing to bet a million dollars on it.

J: Well, if it wasn't, it is now.

B: When it comes to things like that, I think there should be an agency--a chemical agency--that goes around and checks every damn chemical that people use on everything! They've got agencies for every other damn thing in the world.

J: I think things are gonna get better.

B: Well, they better get on the stick as far as I'm concerned. I think there ought to be a degree from a college that's for the environment, like an environmental degree or something. There would be a lot of people that would be interested in that, I'm sure. They've got degrees for hotel and restaurant management--they ought to have them for something <u>important</u> like the environment and the world we live in!

Q: How do you feel about nuclear power?

B: Well, in some ways I think that it is safe, but I think it could be safer than what it is. I think there's a need for it but there's another part of me that says, "God, get those things OUT of here!" You're stuck in the middle there. We all need electricity and I don't really know if I want to see them change all the nuclear plants for coal burners 'cause then the're gonna be pumpin' all that sulfur and crap through the atmosphere. They say they can put all these filters on it and filter it out, but when you put these filters on it, what about the gas it gives off after that? It may be just as bad.

J: I think they should try to teach people to be more conservative with energy.

B: You can only do that to a certain point, too. We're all, we're gonna need it (energy). I mean, as the world's goin', the United States population is maintaining rather well but the rest of the world--<u>that's</u> what I'm worried about. The United States I don't worry about so much but you get some country like China or India or Africa or something that really needs the energy, and someone talks them into building a nuclear plant and they don't have the technology that we have, and they go over and build a half-ass nuclear plant, you know, there's a nuclear explosion and that's not gonna do <u>us</u> any good.

Q: Why do you think it would hurt us?

B: Well, if there's a nuclear explosion then it gets into the atmosphere and I'm sure that sometime, sooner or later, it would drop something on <u>us</u>.

Q: O.k.--so how do you feel about testing nuclear weapons?

B: I'm not crazy about that either. I don't care if it's under the surface or way above the atmosphere up by the moon or whatever, I just don't like that idea that much. I mean, nuclear waste--what the hell are you gonna do with it?

J: Whoever created it, did they think it wasn't gonna do any harm? Is that why they created it?

B: No, they created it for a bomb. As far as nuclear power goes I don't think they thought it was gonna be so bad, but you use so much of it and then you've got a waste product from it. I don't think they ever figured out that they were gonna have that much of a waste product from what they were gonna do with it (nuclear power). They figured that they could store it in some safe container of some sort. But what do you consider safe? How much of a risk it's (nuclear waste) gonna be, I don't know. A pretty big risk, I would imagine. Even with just plain ol' garbage we're runnin' out of space. The United States--I'm sure that we're the biggest garbage dump that there is in the world 'cause we waste more products than anybody else in the world.

J: Yeah, we're spoiled bad.

B: I heard in Japan that they built this great big ol' factory to recycle garbage where it separates all the metals and paper products and the garbage itself is put into a big vat and collects the gasses that it (garbage) gives off and turns them into a methane gas that they can burn. And it just turns into compost after that, gives off a gas product at the same time, and they can use the compost to enrich the earth.

J: We should do something like that.

B: Well, hell, they won't ever do it 'cause it costs too much money. Here the Japanese already got one made and they're usin' it. I mean, I don't know if it's self-containing but who cares? So what that it costs money to operate it! It's gonna help us in the long run, it's gonna save space for earth 'cause we won't have to dump garbage in a garbage dump and you're not gonna have any seepage or waste product comin' off or any toxic chemicals or anything. I just think it'd be better in the long run if we'd invest in that. At least, I would think any straightforward-thinking guy would think that, I would think--at least I would hope.

Q: How about diet and cancer--do you think there's a connection there?

J: Yeah, I think so. I think that's why there's so much more cancer now, 'cause our diet's kinda weird.

B: Yeah, I think there's a connection with that--something!

Q: How do you think children avoid many of the risks they deal with?

B: I think it's a trial and error thing.

J: That or constant reinforcement from the parents to help them learn to do or not to do that.

B: Like, if they got into something that they weren't supposed to get into and they took a little taste of it and it tasted real bad then maybe they're not gonna do it again 'cause it tasted awful or they burned their mouth or something, you know. Maybe a little isn't gonna be good for 'em but I'd rather let them taste it and see, "Oh, God! This is terrible!" and the next time they won't do it then.

Q: What else do you think of?

J: Common sense. I think that's very important and I think it's imperative. I think it's in the brain and that you're either born with it or you're not. That's my feelings about that. You either <u>have</u> common sense or you <u>don't</u>!

B: If you hang around somebody that's got common sense it'll rub off on you.

J: Yes, a little bit.

Q: Are you saying that you think common sense is genetic?

J: Yes, I think so--you're either born with it or you're not.

B: I guess it all depends really how the kid is conditioned.

Q: Do you think your children will have a longer life span than you will?

B: Yeah.

J: Yeah, it would have to be gettin' higher all the time.

Q: Why?

B: 'Cause you've got better medical facilities and people are more aware of taking care of themselves.

J: Yet the air and the water are gettin' more polluted, so that doesn't make much sense. I think our bodies are gettin' immuned (immune) to it (pollution)--changing for it, you know, just like the animals had to change for it. Evolution.

B: I don't know about that, but I think our kid's life will last a little longer (than ours) 'cause of a combination of a lot of things: medical advances and better living and exercise and watching what you eat. Everybody's so aware of it now I think we're taking a step in the right direction--we're not going backwards.

Q: What do you think are the greatest risks to people's health today?

B: I think the greatest risk is probably something that contaminated our ground water, the way it looks now. It seems like every day there's something, our ground water's gettin' contaminated with this or with that. And it's a hell of a risk, 'cause water is like the essence of everything. If your water's no good, then nothing's gonna be any good. And you drink it and you wash your body with it--it's gonna affect you somehow, it's bound to affect you, I would think. I think our biggest problem is and will be water pollution.

J: I think air and water pollution.

B: Water first, water first. Things inside (the home), you know, might be able to cut down on part of the air pollution, but inside and outside water's the same. Plus, it rains.

J: Yeah, and when it rains if the air was bad that would make the water bad too! So it's all tied together. I like the fact that we live in Michigan 'cause we have more water than anybody else and if there comes a time when there isn't any water to go around I'll be glad I'm livin' here as far as that goes. I think that water's gonna be like gold pretty soon.

Q: Can you think of any other risks to health you think are important?

J: Nuclear war or a nuclear power plant blowing up. If it were war, it wouldn't matter. If that's done, then it's all over. So, I'm not as worried about that as I am about something that's just gonna hurt you a little bit; and if there is a nuclear war, we won't have to worry about it.

B: Neither one--nuclear war, nuclear power--scares me as much as the water issue and chemicals, you know, dump

sites that's just gonna contaminate the water and of course it's gonna contaminate the earth. And if we don't have earth and water, you know, what good are we? Nuclear isn't any good either 'cause we aren't gonna need it. I think we should take care of the earth before anything else--it could be our main thing, save the earth. Nuclear will have something to destroy it but I think chemicals and things like that are going to destroy the earth. I mean, if we let it--I'm not saying it's going to. That's two of our biggest risks.

Q: Do you think these are avoidable in any way?

B: Sure, there's plenty of good fresh water around.

J: I think people are doing more about it--I think they're more involved, they're making it better.

B: They're makin' people <u>pay</u> for it, too. Like in Mason where they made the city hook them up to city water 'cause there was a dump site out there--not a dump site, but a place where they were storing all their chlorides for the winter time, their salt. It got into the ground water and they finally admitted to it and they paid for these people to hook up to city water 'cause they couldn't use their well water. You know, people are payin' for it. They're gonna pay for it in the long run, so they might as well do something about it now.

Q: Do you think man-made pollution affects your recreation?

B: Sure. I like to fish, I like to use the water, I like to ski, I like to swim, and if that's (the water's) polluted, if <u>that's</u> destroyed, that's gonna take away part of my lifestyle. You're darn right it's gonna piss me off!

J: Yeah, especially swimming in the lakes and stuff.

B: And if there's pollution in the air, that's gonna mess up anything that's recreational because that will mess you up and <u>then</u> you can't do <u>anything</u>!

Interview 13: Michael and Cathy C.

Q: Which do you think are greater--the risks inside or outside your home?

M: Outside.

C: Outside.

Q: Why?

M: Because we're better able to control what we have in here--you can't move the cars off the street or the weirdos out of the street or anything like that, so I think we're more secure in our home.

Q: O.k. How about work? Do you feel there are any risks to your health in your work environment?

C: Well, I'm not working right now, but I did. Stress was a risk.

Q: Stress?

C: Yeah. It was a pretty stressful job, working with who I worked with, but I handled it. ...That's why I'm not going back to where I was--he was a really hard person to get along with. Everybody's leaving and it's not worth the stress--you might as well get out of it, you know, it's not worth your health.

M: The profession I've chosen (law) is real stressful and there's a lot of anxiety. We're responsible for people and their lives and that type of thing, so I see a lot of, I can see potential problems down the road.

Q: Do you feel you have much control over that?

M: No, except to get out, I think.

Q: Well, let's turn this around a little bit and talk about illness--when do you consider yourself to be ill or sick?

C: Well, different symptoms that come up--fever, you know, not feeling good, fatigue.

M: Sometimes stress and anxiety can cause you, you know, you're not going to show any symptoms of fever or anything, but you might just feel down, depressed, whatever. As far as physical illness like a bruise or something like that, I really have to go a long ways

before I consider (myself to be ill), you know, 'cause if I got a sniffle or something like that I really don't think about it. I feel more mentally ill than I do physically, because, you know, sometimes I'm at work and you just say, "Damn, I want to go home!"

Q: I'd like to get a sense of your feelings of control over what happens--do you think you can control most of the things that happen to you in your lives?

C: Pretty much.

M: I think within the confines of our home, yes. But as we go outdoors, you know, then it's a whole different ball game I think.

C: Yeah.

M: You can't control what our government's doing, you can't control what Meijer's is doing--not one person by themselves, so, when you get out you lose control of the situation.

Q: How about your physical health?

C: I think you have pretty much control, cause once you start feeling bad--I mean, if it's the foods you're eating you start getting on a better diet, you know. Or, if it's, umm, if you're sick, you know, you go to the doctor. I think it's pretty much under your own control.

M: Yeah, but I don't think you can control--

C: Now, if you're talking about diseases and stuff like that, there's really nothing (you can do)--you can try to stay away from people that are sick or something like that, but if it's something, you know, in public, there's nothing you can do about it.

M: Well, there are certain things like just what comes out of the smokestacks at Board of Water and Light or something like that that, you know, you're not gonna be able to (control). I mean, you can do something about it but it's gonna take a long effort and by that time you'll probably have felt some of the effects.

C: Oh, yeah.

M: I mean, I think you have a better chance of helping yourself when you have a flu or something like that than you do of the effects of the air or water or whatever like that.

Q: O.k., so how much control do you think you have over your health--over what it is today and over keeping it the way you want it?

M: I think I have control over how I feel when I'm home--I can control that situation a lot better <u>because</u> I'm home--but once you get out at school or work or whatever then the tide's turned on you, then somebody else is kinda pulling the old strings there, and you have to go along with the ball game if you want to get anywhere. So, I see a lot of change as you go outside. For the most part it's more in my favor than it is in theirs because I can still tell myself, "Well, what the hell, you know, it's just they're doing it, you know, it doesn't have to affect <u>me</u>," you know--I can still come home and feel good about what's going on or just relax with the wife and kid and feel pretty good about it, but the odds are building up in their favor I think.

Q: You mean you have a sense of losing control?

M: Yeah, slowly.

Q: What do you think is most important to you in your own physical health?

M: Well, I believe in God and everything but I think a lot of it, the majority of it, is your own attitudes and beliefs.

C: Yeah. What will be will be, but I think if you help it along, you know.

Q: What would be second most important?

C: Probably the Will of God.

M: It sounds corny but, you know, you hear some people saying you're crazy, but I believe that there's a power out there but I don't know if it's the way that they teach you in Catholic or Baptist or whatever (school)--I don't know if that's the way it is. I believe there's something out there and I think coupled with that and your own actions and beliefs, that that's what's going to happen. 'Cause even if you're prone to being sick you can still for the most part control it, you know.

Q: How do you feel about predetermination with respect to health, or about divine intervention--how does all that relate to health in your mind?

M: I don't know--that's a toughie; that's a tough one. I mean, I do know that I see in some families that cancer of a certain organ or whatever runs in that family. Now

I don't know how much that has to do with God or whatever. I do know it's got to be part of the plan to get rid of people, you know, make way for the new.

Q: Do you mean like death itself?

M: Yes, death itself. So there has to be a way, but I don't know if God says, "All right, everybody in your family is gonna have cancer of the colon," you know, that that's what's gonna happen. I don't know if that's true but I can't rule it out, but I can't say that I belileve that that's the way it works.

Q: Well, do you think God makes people sick or makes them well or actively intervenes or participates in these things?

C: I do not. I believe there's a purpose for it but I don't know, you know--everybody can't live forever. You have to have something wrong with you so you can die.

M: I believe that He gives everybody the ability to do what they're doing. I don't believe that He now, or, you know--maybe He <u>did</u> at one time--but I don't believe that He says, "You're cured!" I just don't think that's the way it works.

Q: Do you think He says, "You're sick?"

M: Uh, that's harder to answer. I know there has to be a balance of nature--you know, some people are going to have to leave and some are gonna be born.

Q: Well, what about the illness episodes we survive, and the new life support systems to prolong life? And, what about the many illnesses that people have that they recover from while other people die from those illnesses?

C: Yeah, you wonder why some people die (and others don't). That's what we were talking about the other day (in a previous interview). If God really wanted us to have an artificial heart, you know, why wasn't this thought of a long time ago, you know?

M: But on the flip side you say, why allow you to have the technology to create an artificial heart or whatever?

C: Yeah, it's like, why have we created such a thing if it wasn't meant to be?

M: It's like a coin toss--you want to believe, I really believe that there is something out there, but it's kinda hard to answer just, you know, how far to go with it,

'cause you always see a pro and con, you know, you always see something in favor of it and something against it.

Q: Do you believe in predetermination--do you think that the things which happen in your life are predetermined?

C: In a way I do, in a way I don't--I don't know.

Q: Where would "health" fall?

C: In a way I think that, you know, it <u>is</u> predetermined--and only He knows when we're going to die. We might be dead tomorrow, you never know. Like, when I was five months pregnant all of a sudden I had like a swollen area, like around my groin area, just a swollen area, and it just started throbbing like as if there was a knife in me, you know. So I went to the doctor and he checked it. He didn't know what it <u>was</u>! He thought it could have been a hernia, it could have been a hair follicle, you know, all kinds of crazy things. He wasn't even going to check me internally, you know--check the baby or anything--but he decided to before I left, and when he checked me I had to go straight to the hospital. He said I would have miscarried if I would have gone home! And, it was just like something appeared--they didn't know what it was--to make me go to the doctor, you know, to save this baby. I don't know, it's freaky like that to me 'cause it disappeared as soon as I lay down in the hospital.

M: Yeah, it disappeared as soon as she went <u>into</u> the hospital, and never reappeared.

C: It was like that for about four days just killing me at work--I couldn't even stand up. And they didn't even know what it was. They couldn't rule out a hernia because they couldn't let me stand up to see if it would come back again--and it never reappeared.

M: It disappeared and never reappeared, so, you know, it makes you say, "Man!", you know.

C: You kinda wonder, you know, is this a sign--that He made me go to the doctor to save the baby--you never know. It was a miracle. The doctor said I would have lost him and he said most people that have my situation (low blood sugar) miscarry two times before they can even have a baby.

Q: Were they able to pinpoint the problem later?

C: No, they still don't know what it was.

M: It disappeared and never reappeared.

C: It just never came back again.

M: So, you know, it's one of those things, you say, "God!", you know--was that a sign, 'cause everything was just going perfect and we never would have known.

C: Everything was perfect, I mean, I would have never thought I had any problem with my pregnancy--ever! I mean, I was saying, "Aw, this is a breeze; I'll have five of them," you know, and then all of a sudden they told me I had to stay in bed for four months, so.

M: I probably say that He does (intervene), I don't know--I get this feeling that things are predetermined for you because the whole road for me led to becoming a lawyer. Things happened at key points that led me this way. All of a sudden things just triggered, and you say, "Damn, maybe it was meant for me to do this."

Q: How about in your health--do you think that it spills over into that area too?

M: It's almost like a coin toss--you want to believe, because certain things happen to you, but then you say, "Well, damn, you know, if I feel ill I can go to the doctor and maybe he can do something for me," where if I just sat there, sure, I could go ahead and maybe die from whatever it is, but there is a way for me to change the course. But maybe God put the doctor there to change the course, you know. It's like,
M: "God," you know, it's one of those things. And I guess my beliefs lead me more in favor of believing that the Man upstairs has some kind of master plan, you know, than not.

Q: Do you think that prayer is important in your health?

C: It makes you feel better sometimes.

Q: How about in your child's health?

C: Yes, I think so.

A: I don't do it because I feel hypocritical about it because a lot of times I don't follow the faith, you know, what's been told me. And, I don't think that just because all of a sudden you decide to pray one day for something that, you know, it's gonna miraculously happen or whatever. And I think that if you're gonna be a good Catholic or a good Baptist or a good whatever, then you gotta follow that road and maybe prayer then may benefit you.

Q: What denomination are you?

C & M: Roman Catholic.

M: Well, I was born--well, not born--but I was raised in Catholic schools, the whole works, nine yards of it, and at one time I guess then I would have said that, you know, everything's predetermined, you know, prayers can change everything, but when you get out in the real world and everything my beliefs changed a little bit. I still believe there's a God. But, I see things now that bother me as far as like with the Church, you know, that, uh, I don't want to feel hypocritical about going when I don't feel comfortable about going because of some of the things that I see.

Q: Like what?

M: You know, you just wonder what happens to all the money in these collection boxes, you wonder why the Pope can live the way he does in the Vatican with the gold this and the gold that, and, then, you know, they turn about and they talk about, uh, you know, helping the poor and, uh, and you just wonder about it.

Q: Does it seem hypocritical?

M: It does sometimes to me, and, uh, so I feel, you know, I believe in God, you know, and I try to live as straight a life as I can, and I figure, you know, if that's not what He wants then I guess later on I'll pay for it. But, I just don't feel good, I don't feel comfortable with going to church. It's like, I don't want to name the church, but we decided when we got up here we were going to join, uh, one of the
M: parishes here and then first thing when we joined--we didn't even get a letter saying, "Welcome to the parish, welcome this, that, and the other,"--first thing they sent us was a box of envelopes for the collection plates. And instead of trying to build a relationship between the people (and the church)--I don't know if maybe it was an accident, maybe some letter should have came before, uh--

C: They just sent us a box of envelopes and that's what they were pushing, you know, the whole time that I was talking to them on the phone, so--

M:--right away it turned me off, and I said, "Damn, you know, I can't go there--I wouldn't feel comfortable going there." Now, Cathy tries to get me to go more 'cause she's, she's really into the, going to the ceremony, uh, deal, and I, you know, I don't disagree with her that she feels comfortable with that--that's fine. And I'm sure she'll keep taking our son--I want him to get some taste of religion, or whatever, and then when he gets older

it's up to him to believe what he feels comfortable with. It's a tough one. When you're younger, you don't question anything. But as you get older and you see it for yourself then you just wonder what the hell's going on sometimes.

Q: Do you believe that you can communicate directly with God, or not?

M: That I do believe. And I don't think that it makes a difference whether you do it in your home, you know, or whether you do it in the ceremony right at the church or whatever.

Q: Does the church preach that--is that their belief too?

M: As far as the teachings when I was growing up in the church and everything was that you had to be there on Sunday and you had to pay your dues there.

Q: My understanding was that in the Roman Catholic faith you needed an intermediary like a priest in order to talk to God--is that true?

M: Yeah, a priest. And I don't think that's how it really works. I mean, I believe they (priests) serve a purpose as far as, you know, you becoming familiar with the, you know, with the religion and that type thing, but I don't think that you need an intermediary, you know, someone communicating to Him for you.

Q: How do you feel, Cathy--do you think you can talk or communicate directly with God, especially relating to health, or do you need someone to assist?

C: No, I feel I can pray directly to Him. He seems to have answered some of my prayers.

Interview 14: Cathy and Michael C.

Q: Do you believe that children can get sick from breathing in things that are in the air?

C: Uh huh.

M: I believe so.

Q: What could they get and how would you know when they got it?

M: I'd be alarmed if I heard him coughing or maybe expelling anything when he was coughing, you know. I'd right away wonder if there was something in his lungs. I know with all the smoke in the air that he could have problems.

C: I'm sure exhaust, you know, in busy metropolitan areas is bad for you and smoke from smokers, like at restaurants. It bothers me terribly. I have sinus troubles and it drives me crazy so I can imagine what it would be like for a child.

M: Yeah, and especially 'cause their system is progressing still, is growing, and I can see where they'd run into a lot of problems. That's why we try to keep him away from those situations right now. And, you know, we like to take him outside, get fresh air, whatever, but, "You can run but you sure can't hide" (from pollution).

Q: How would you know when they got it?

C: They could be wheezing or congested or even develop something on their skin maybe, you know, due to allergies and stuff.

Q: What do you think are the greatest risks to people's health these days?

M: Apathy--people just don't care anymore, and people aren't friendly like they used to be. My grandfather and grandmother've been robbed three times at gunpoint, and last time when it happened, in self defense, he had to shoot the guy in his house--killed him. They were gonna blow my grandmother's and his head off, they told him. Now they won't even go out at night anymore. They're scared. As it is, you know, they're surrounded by a six foot fence--he's literally turned his house into a fortress.

C: Everything's gettin' so big and there's so much crime around lately, you get afraid of everything. You know, most people think--and that's they way I thought--you hear it on the news and stuff, and you never think that that's gonna happen to you or close to home, but it does! You never know what the other person's gonna do. You could go into some place and they could hold you up, you never know. Anything. Like just what happened over at Meijers the other day. Did you hear about the shooting? I was goin' to Meijers and they were flagging me out of the parking lot having fits, you know, "Get out, get out!" There was a guy in there that went crazy. He started shooting in there and got somebody hostage in the pharmacy.

M: The guy went into sporting goods and wanted to see a shot gun and he got his hands on ammunition and from there he went from sporting goods to the pharmacy. It's almost a sense of helplessness. I mean, I don't let it overwhelm me--I don't think about it all the time, you know, but when you sit and think about it--.

C: I look around. I'm concerned in the parking lot going to my car. I mean, so many things have happened that I've heard about, like people hiding underneath your car. I find myself thinking about these things a lot.

M: I think the worst feeling I have, though, is when she's out by herself at night or when she's out with him (their son), 'cause I've heard of people goin' right up into the shopping center and snatching the child from the mother, you know, that type thing.

C: A friend of ours kid was snatched. She (the girl who was abducted) was at school and somebody got her from there. They saw her one minute and the next minute she was gone, so somebody must have snatched her right out of the school. So, you worry about those things, I worry about things like that. And they haven't found her yet; no trace. They had search parties out and nobody found her. Her grandfather's very wealthy and they put up a big reward for somebody who would turn 'em in, and they never heard nothin' from 'em. She was like severn years old--cute little girl.

M: I worry more about that than I do about a lot of other things. That's the only thing where I've become almost paranoid about it.

Q: What other risks do you think of?

M: Stress and anxiety. If you want to be worried, just look at the nightly news. There's risks from the environment, you know, the water, air, foods--everything!

C: Traffic--driving in a car. These drivers sometimes! There are come crazy drivers out there.

M: I think it's just that people in general right now, to me, are more crazier than I've noticed (in the past). I don't think they interact like they used to.

Interview 15: Vera and Paul M.

Q: Have you ever used a woodburning stove for indoor heating, or has anyone in your family ever used one?

V: Paul and I did.

Q: Tell me about it.

P: Well, <u>that</u> was a ten on the Richter scale.

Q: What do you mean?

V: It was a wonder we didn't burn to a crisp!

P: We lived in this little house--one bedroom, bathroom, small living room--down on the lake, back in the woods. We had been using propane gas and it was costing a hundred dollars a month or whatever--liquid propane, bottled, a big tank. Then we got a Franklin woodburning stove, freestanding. I just hooked the two pipes into one and ran it out the chimney. It was a apretty smokey atmosphere every once in a while, and we almost burned the house down.

V: Hot walls--the walls started turning brown and you couldn't even touch it, it was so hot. And the one time it was <u>real</u> bad we decided we better put the fire out, and it was the middle of January and we're opening the doors and the windows to get it cooled down in that house.

Q: Because you were scared of fire?

V&P: No--it was so hot you couldn't stand it!

V: It must have been a hundred degrees.

P: Once we got it cooking, boy, it was cooking! We finally got our fire wall built, though. But we always had a lot of smoke in the air, though no worse than smoking cigarettes but, you know, I didn't think about it at the time.

V: It was worse, worse than cigarette smoke. It was dirty--dirty!

Q: Why did you stop using it?

V&M: We moved to Lansing and we didn't need it.

Q: Why not?

P: Well, we were living out in the sticks then, back in the woods, and there were lots of trees.

V: It was an alternative to paying a hundred dollars a month for gas--that's why we used it.

P: When we moved I brought it in with me and re-did the house.

V: It saved us a lot of money.

P: When we wanted wood I would just go out in the woods. I'd just walk out in the woods, "Ah, here's a tree," take the chain saw and cut it and haul the wood back and I'd have about a three or four day's supply. Never had a big wood stack built up. We lived day to day, week to week out there. I used mostly dead wood.

V: I kind of miss it out there. It was fun, the good ol' days around Sturgis (Michigan).

P: We almost had a fire the first night we hooked it up (the woodburning stove). I was ready to get the hoses. We didn't have a fire wall put up and the draft waasn't right and the room filled with smoke and all the heat in back of it just went into the wall. And it got so hot you couldn't touch it. So, the next day we went out and got a bunch of bricks and we built a big ol' fire wall behind it. It was hot and smokey in that house, though. I'm sure our health--it wasn't most beneficial to our health living there. But we didn't worry about it then. I've been having some serious thoughts about cigarette smoking. I'm going to have some serious health risks here if I don't quit smoking, I think. I might even if I do quit smoking.

Interview 16: Ruthann and Andy B.

Q: What do you think are the greatest risks to your health?

R: The greatest risk is somethin' that hasn't happened yet, 'cause nuclear war is the greatest risk, would be the greatest risk if they were to have it.

A: The first thing that pops into my mind is that we think it's risky for anyone in the whole world not to examine the scriptures and see what it has to say and not follow it in a spiritual sense. That's the first thing that pops into my mind. There are, of course, a whole lot of other things.

Q: Like what?

R: Pollution--we are becoming a very polluted country and it's gettin' even worse.

A: Being Jehova's Witnesses we are not politically minded, so it's just on a general basis world wide that we tend to see things. We don't feel one nation is better than another nation, whereas things in one nation may be better than things in another nation. Because (if you believe that) one nation is better than another nation then you're getting to nationalism and you get into racism, and being neutral then you're safe 'cause that's the position that Jesus took--one nation wasn't better than another nation. No matter what nation it is, we're all prone to the risks that's prevalent in that society.

Q: What do you think the greatest risks to health are in our society?

R: It seems to me that our two biggest risks are our lack of morals and our materialistic pursuits. They seem to be putting, materialism seems to be putting the family and everything else second place, you know, to love and, you know, the thing is to earn the almightly dollar. I mean, as far as personal relationships with people go, they seem to be going further and further away from that and more into things, and I think that could be very risky for our future.

Q: How?

R: Oh, you know, the divorces, the children from broken homes. The children don't have the family bonds that they should have and who's to say that when these kids do

grow up, what kind of kids will <u>they</u> raise because they didn't have any closeness.

A: And another thing--everything's become a materialistic pursuit, so everything else suffers.

R: And then, of course, that takes on other things 'cause of the pollutions and things that the factories don't want to get rid of 'cause it's money, you know. Cars--they want to make the bumper <u>smaller</u>! I was readin' somewhere even though it's less safe, you know, they can save a few pennies. The new bumpers aren't gonna be quite as safe.

A: Money does have a bearing--we got starvation in the world and in this country because of money. Tons and tons of food are burned and dumped to keep the prices where they are. It's money. Everything is situated around money, the materialistic aspect and no brotherly love. Money first, and if you somehow get in the way, o.k. That's the way the system is bent. The system is based on war. Without war this country wouldn't be wealthy as it is. It's based on other people's plight. That's the system.

R: It seems like everybody wants to get into war.

A: And the pollution--man has got to the point now where it's taken over mother nature. The earth is wonderful, man. It filters itself. But now it's gone to the point where it's taken over mother nature just about.

Q: What's taken over mother nature?

A: The pollution--and it would cost so much money to clean it up, ain't no way in the world that these companies come along. They're bein' fined, some of them are, and they go right back and do another way. The big companies, corporations, businesses that are polluting the air or the water, they get their little hands slapped but they pay the lobbyists and, you know. The whole system is bent toward corruption and so it's irreversible. That's why it's going to take God's Kingdom to straighten out the mess. Man is not going to do it.

Interview 17: Joan and Bill T.

Q: How do you feel about air pollution from indoor heating?

B: What kind?

Q: Well, how about central electric heat?

B: Well, the fact that it's so dry--any dry heat I would think could be harmful to anybody's health.

J: I've heard that it's (electricity) real clean heat.

B: Now fuel oil I think could be harmful 'cause you can just walk down into the basement and just smell it. If you can smell it then there has to be some odor and it has to be something there. I think it could be harmful--I don't know that it is, but I think it could be. I guess gas would be all right unless there was some leak in the heat exchanger or something like that passing carbon monoxide up with the heat or something like that. If nothing goes wrong I guess it's (heating with a gas furnace) o.k.

Q: Have you ever heard that heating with wood could be harmful to children's health--either a woodburning stove or a fireplace?

B: Yes. I don't think a fireplace would be as harmful as a woodburning stove, 'cause in a fireplace most of it's goin' up the chimney and I don't reaally know if you get that much heat from a fireplace or if it's gonna be that farmful to you 'cause a lot of it goes up the chimney itself--the heat as well as anything that would be bad, 'cause it all rises. I think it (a fireplace) acts more like a vacuum, I think it sucks everything out of the room, so I don't know if the fireplace would be as harmful (as a woodburning stove). The fireplace is open and it's suckin' everything out with it but the wood stove is controlled--you dial it down and the gasses that it's giving off may stay in the room longer 'cause you're not having so much suction as you are with a fireplace. You know, with a fireplace you can feel a draft really easy.

Q: How are you heating your home this winter?

B: With a gas furnace.

Q: Have you ever used a woodburning stove?

B: Yeah, we have one in the back that we used to use but we don't anymore.

Q: Why not?

B: We only use it now maybe a few times in the late Fall if we're gonna have some people over to party or something. But, we don't use it 'cause it smokes more than it does anything else and I think it's a fire hazard. You can see the smoke comin' out of it sometimes. I don't use it now because we've got more money and I think it's dirty, messy, dry, and a fire hazard. Besides, it was too much work cutting wood. Gas is cheaper--time and all that--now that we can afford it. It costs us $69 a month for everything--heat, the stove, hot water, the works--and you couldn't pay me $69 now to cut up a cord of wood.

Interview 18: Felissa Mae S.

Q: Do you think children can get sick from breathing things which are in the air?

F: Sure, 'cause there's contagious things that you can get just by if you stood next to somebody and you were breathing in a cold. You can catch things from somebody.

Q: If children did get sick from breathing something in the air how would you know when they got it?

F: Probably if they're behavin' or actions change, most likely in the course of the same day. Probably the air in our home would be a little bit safer 'cause you filter out a lot of things. And outside, you can't filter all the stuff that's in the air.

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