Flood Hazard Vulnerability: A Study of Tropical Storm Allison (TSA) Flood Impacts and Adaptation Modes in Louisiana

By

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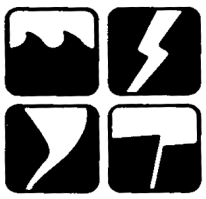
2003

QUICK RESPONSE RESEARCH REPORT #162



Abstract

Several communities along the Gulf Coast are especially vulnerable to tropical storms, hurricanes, and flood hazards. Systemic hydro-meteorological factors, geological conditions, and human factors account for most flood disasters in the region. This study focuses on the impacts of Tropical Storm Allison (TSA) of June 2001 in Louisiana. Shortly after the devastation of TSA with more than 2000 homes impacted in Slidell and Covington both in St. Tammany Parish of Louisiana, 149 households afflicted in Slidell communities participated in a survey designed to assess the impacts of TSA, vulnerability, coping and adaptation modes of the impacted population. Theoretical frameworks–including environmental inequity, human ecology, and conservation of resources models on these aspects of disasters are discussed. The results of the survey and data analyses addressing specific research objectives and questions are presented in this report.

Acknowledgments

A number of people and entity who contributed to the successful completion of this project deserve appropriate recognition and gratitude. I am indebted to the Natural Hazards Center which granted a Quick response grant for this endeavor. Special thanks go to Laura M. Zaidan of the City of Slidell Office of Emergency Preparedness Liaison for generously providing the list of residents impacted by Tropical Storm Allison's flooding. The efforts of my graduate research assistant, Michael A. Long, who diligently handled numerous tasks in different phases of the project and Wendy F. Desroche, an undergraduate senior who volunteered to participate in the door-to-door administration of survey instruments, are well appreciated. Nevertheless, all credits, interpretations, omissions, ambiguities or errors are the sole responsibility of the author.

Introduction

Among all naturally occurring environmental hazards, flooding is the most common, claiming over 20,000 lives annually and adversely affecting approximately 75 million people across the globe (Smith, 1996, Alexander, 1993; Smith and Ward, 1998). Evidence suggests that floods represent the most costly natural hazard in the U.S. in terms of deaths, damages to infrastructures, properties, and destruction of crops and wildlife (Mileti, 1999:71-2). Floods are generally defined as the overflow of areas that are not normally submerged or a stream that has broken its normal confines or has accumulated due to the lack of drainage or failure of flood control structures (Malilay, 1997). Floods often accompany other hydro-meteorological conditions such as hurricanes and sea surges, as recently occurred in South Carolina, Louisiana, and Texas. The moment water levels rise above normal stages and overflow to the extent that the surrounding communities become vulnerable to rising water, flooding becomes a serious hazard. In addition to its physical impacts such as injuries, property damages, and deaths, flooding is often a major cause of health, economic and socio-psychological problems.

Most floods are induced by systemic forces such as hydro-meteorologic factors, geologic conditions, and seasonal variation in weather patterns. However, these systemic forces may be exacerbated by anthropogenic disturbances such as urban population encroachment on marginal low-lying riverine lands or swamps, improper construction techniques, and poor levees and drainage systems (see Abramovitz, 2001; David et al., 1999; Prater and Lindell, 2000). Absence or failure of flood control structures–i.e., levees, floodwalls, channels, etc., may exacerbate flood problems. As noted by Smith and Ward (1998:3), floods continue to be an increasing problem catching people and communities by surprise in a repetitively exasperating manner, and causing serious disruptions, extensive property damages, and loss of life across the globe.

This study focuses on the impacts of Tropical Storm Allison (TSA) which caused severe flooding in June 2001 in several communities in Louisiana. Specifically, factors associated with increased vulnerability of people to flood hazards and modes of adaptation and coping of flood

victims are explored. Following the introduction, background information on flood events, research objectives, and theoretical frameworks are presented. Subsequently, the research methods and results are summarized with brief concluding remarks.

Background

Natural hazards are extreme, low probability systemic events that have the potential to cause major disasters upon impact on human communities (Mileti, 1999). Most social scientists agree that natural disasters are cataclysmic stressors which, depending on their magnitude, may over-tax available resources and undermine survivors' sense of control, efficacy, predictability, safety, and trust (Kaiser, Sattler, Bellack, and Dersin, 1996; Sattler, Kaiser, and Hittner, 2000; Steinberg, 2000; Smith and Ward, 1998). Natural disasters pose a significant threat to human health and well-being, safety, property, and physical and social infrastructures (Sattler, Adams, and Watts, 1995; David, Baish, and Morrow, 1999). They represent a category of social crisis once a community is impacted. Wenger (1978:27) states that:

> At the community level, disaster refers to a condition in which the traditional structure, due to the impact of a precipitating systemic event, is destroyed and is no longer collectively defined as an appropriate guide for social behavior. Within the community, disaster connotes a crisis of relatively high intensity. It creates demands upon the community system that cannot be met by the community's traditional, institutional structures.

Thus, at the community level, natural disasters create social disorganization and a significant distress which may overwhelm coping, adjustment, and cultural adaptation mechanisms.

Recent weather oscillation from *El Nino* to *La Nina* has been linked to increased flooding, landslides, hurricanes, and other hydrological hazards both in the U.S. and other parts of the world. According to the Worldwatch Institute in Washington, DC, weather-related disasters in 1998 were estimated at a cost of $89 billion, resulted in the loss of more than 32,000 lives, and rendered several million people homeless. Several communities are especially prone to flooding in the southeastern part of the state of Louisiana located along the Gulf Coast and Mississippi river beds. Smith (1996) suggests that the reason why the entire region is prone to

flooding lies in the fact that there is a widespread geographical distribution of river flood-plains and low-lying areas, and the long-standing attractions for human settlement. For instance, the city of New Orleans and several communities within forty miles radius of the city, are prone to storm surge and periodic flooding. As noted by Steinberg (2000:75), the New Orleans metropolitan area is below the sea level, it is encapsulated by water including Lake Borgue, Lake Pontchartrain, the Mississippi River, and numerous bayous and small lakes. Thus, a slight storm surge or the mechanical failure of sunction pumps, levees, and floodgates, may trigger massive flooding. For instance, pump failure was partly attributed to the flooding of several communities in the New Orleans metropolitan area in May, 1995.

In other parts of the U.S., the historic Midwest floods of spring and summer 1993 along the Mississippi and Missouri rivers impacted 9 states. More than 50,000 homes were destroyed and approximately 54,000 people were evacuated from flooded areas, and more than 4 million hectares of farmland were inundated. The total losses ranged between $15 to $20 billion (U.S. Department of Commerce, 1994). In July 1996, massive flooding devastated 35,000 homes in 21 communities in the Chicago metropolitan area. Total losses were estimated at $650 million and 8 flood-related deaths were reported (Sheaffer, Mullan, and Hinch, 2002:34). Other natural disasters with devastating impacts within the past decade include Hurricane Andrew (affecting southern Florida and some parts of Louisiana), Hurricane Emily, Hurricane Bertha, Hurricane Fran, Hurricane Georges, and Hurricane Floyd. In addition, Hurricanes Mitch and Iniki respectively caused loss of human life and extensive property destruction in Central America including Honduras, Nicaragua, El Salvador, and Guatemala, along with Hawaii (see Glantz and Jamieson, 2000).

Research Objective and Questions

Even though there is a growing interest in natural disasters research among social scientists, there is still a significant gap in our understanding of the factors associated with flood hazards vulnerability. Several prominent questions remain unresolved. The primary objectives of

this study are: (1) to assess the vulnerability of people to flooding; (2) to evaluate the actual impacts of Tropical Storm Allison (TSA); and (3) to identify the modes of adaptation of the victims of flood by demographic and socioeconomic characteristics in affected communities in south eastern Louisiana.

This study will meet these specific objectives by addressing the following research questions:

1) What are the characteristics of flood victims – i.e., impacted community and individual households?
2) What physical environmental features such as hydrological or geologic risk factors are present that make the community more or less prone to flooding?
3) What are the major impacts of the flood event and what kind of attitudes do the residents have about flood hazards?
4) What precautionary flood control measures did the respondents implement prior to TSA?
5) Are there variations by race and socioeconomic factors in flood vulnerability, impacts, and modes of adaptation; i.e., are certain groups more or less vulnerable to flood hazards?
6) What are the major obstacles to flood prevention in the communities?
7) How do the residents perceive the effectiveness of available flood control measures?
8) Are there racial and socioeconomic differences in flood insurance, reliefs, and coping measures?
9) What are the residents' flood problem-solving behaviors and what are the major sources of coping with the impacts of TSA?

These questions are addressed using empirical information collected from the victims of TSA in Louisiana. Theoretical explanations of adjustment, adaptation, and coping mechanisms for people confronting extreme natural disaster events are presented in the following section.

Theoretical Framework

Theories of environmental disasters are gradually evolving. In recent years, a number of theoretical perspectives have been developed to analyze human responses (such as coping and adaptation) to natural hazards and human-induced technological disasters. Couched in classical sociological traditions, conflict, structural functionalism, and psycho-social or social constructionism perspectives have been used to explain human adjustment to cataclysmic events – including different phases of mitigation, preparedness, response, and recovery (see Wenger, 1978; Quarantelli, 1978; Mileti, 1999). While conflict paradigm is more prominent in technological disaster studies, structural functionalism and human ecology perspectives have been used to explain adjustments and adaptation to natural disaster episodes. For the purpose of this study, the environmental inequity, human ecology, and conservation of resources theoretical frameworks are presented. Each of these perspectives are summarized in the subsequent sections.

The Environmental Inequity Paradigm

The environmental inequity paradigm asserts that structured inequality or disproportionate access of people to resources by race, ethnicity, class, gender, and age is directly related to unequal exposure to disasters such as flooding, hurricanes, landslides, tornadoes, and technological hazards in society. Previous literature suggests that the poor, African-Americans, and other minority groups are most likely to reside in relatively vulnerable or hazards prone landscapes across the U.S. (see Adeola, 1999, 2000; Bolin, 1986; Morrow, 1999; Perry, Greene, and Mushcatel, 1983; Peacock and Girard, 1997).

In a capitalist society such as the U.S., there is unequal access to opportunities as well as unequal exposures or vulnerability to disasters. The poor, minority, elderly, children, and women bear disproportionate impacts of flooding and other natural hazards (see Phifer, Kaniasty, and Norris, 1988; Peacock and Girard, 1997). Evidence shows significant racial/ethnic disparities in disaster-related deaths, injuries, shelter, coping, and recovery measures (Perry et al., 1983; Dash, Peacock, and Morrow, 1997). Morbidity and mortality rates are generally higher among

minorities and the poor. As noted by Peacock and Girard (1997) and Girard and Peacock (1997), during Hurricane Andrew in Florida, there was evidence of much greater damage to minority homes; nevertheless, home owners received less-adequate insurance settlements relative to their Caucasian counterparts.

Minority groups are often excluded from participation in community disaster planning and preparation activities and they are more inclined to depend on kin and social networks for disaster-related information (Morrow, 1999:8). Due to their powerlessness and disadvantaged position, these groups often rely on different means of coping with conditions of stress and deprivation. It has been noted in the literature that African-Americans in the U.S. depend on extensive kinship and social networks to deal with the impacts of disasters than their Caucasian counterparts (Bolin, 1983). The conditions of absolute and relative deprivation of valuable resources are exacerbated by the impacts of environmental hazards—anthropogenic or natural disasters. For technological hazards, powerful groups in capitalist society often externalize the costs of production shifting the burden to poor minority communities (Bullard, 1990). Locally Undesirable Land Uses (LULUs) disproportionately imposed on minority communities are the precursors of adverse impacts of systemic events such as floods, hurricanes, landslides, etc. For natural disaster episodes, the question as to whether they are the "acts of God" or "acts of humans," remains ambiguous and unresolved in the literature.

The Human Ecology Perspective

For the human ecology perspective, the distribution of human settlements, social organizations, and technology in natural hazards-prone environments are the focus of analysis. This framework presents the interaction among the parameters of ecological complex including human population (P), social organization (O), the physical environment (E), and technology (T) (see Hawley, 1986; Humphrey, Lewis, and Buttel, 2002). Human population is defined as an aggregate of people (*Homo sapiens*) of various sizes, composition, rate of growth and distribution within a given geographical location. Social organization connotes the life-

supporting activities of the population including occupational niches or functional roles, the distribution of population within the roles, and interdependencies among the niches. Technology refers to tools, techniques, practical application of knowledge, and the built environment used by human population. The environment refers to the biophysical surroundings of a population, including the biotic and abiotic components (Humphrey et al., 2002: 23).

The human ecology theoretical framework contends that environmental hazards such as floods, hurricanes, earthquakes, etc., do not exist independently of society in as much as these hazards are socially created, reshaped, and redirected. Thus, natural hazards represent the products of interaction between natural processes and social forces in the course of human adjustment and adaptation to the bio-physical environment (Hawley, 1986; Milleti, 1999:18; Abramovitz, 2001). In the literature, a community susceptibility to environmental hazards (natural or anthropogenic) has been linked to the nature of the physical environment, socio-cultural environment, organization, technology, and adjustments made to cope with the hazards (see Burton, Kates, and Whites, 1978; cf. Prater and Lindell, 2000:73). To reduce the impacts of natural hazards, therefore, individual and social adjustments are imperative. The ecological complex or POET framework is particularly suitable for analyzing the dynamics of factors associated with major natural disasters such as floods and hurricanes.

The Conservation of Resources Perspective

While acknowledging the ubiquity of stress in natural disaster events, the Conservation of Resources (COR) theoretical framework examines the impact of negative experiences on individual psycho-social functioning after their exposure to a natural disaster (Hobfoll, 1989; Freedy, Shaw, Jarrell, and Masters, 1992). According to Hobfoll (1989:516), the basic tenet of COR model is that people strive to retain (conserve), protect, build and accumulate valuable resources and that what is threatening to them is the potential or actual loss of these resources. Resources connote those objects, personal characteristics, conditions, or energies that are valued by the individual or that serve as a means for attainment of these elements. Thus, resources are

the instruments used by an individual in reaching a desirable end. This perspective suggests that the loss or threatened loss of resources attenuates coping ability and elevates distress level. However, replacement of diminished resources will strengthen coping ability and attenuate psychological distress (see Hobfoll, 1989; Freedy et al., 1992; Freedy, Kilpatrick, and Resnick, 1993).

Four categories of resources are specified within the COR framework including object resources (e.g., automobile, boat, home, household items, etc.), condition resources (e.g., a wide range of social roles including employment, marriage, kinship, and organizational participation), personal characteristic resources (e.g., the self and world-view including a sense of worth, optimism, meaning and purpose, feeling independent, and personal efficacy), and energy resources including time, money, knowledge and information which are valued as crucial means of acquiring other valuable resources (Hobfoll, 1989:517; Freedy et al., 1992:444). One additional category of resources not included by Hobfoll (1989) and Freedy et al. (1992) is social capital – embodied in the relations among persons or a network of interrelationships involving mutual obligations and expectations, trust, information potential, responsibility, norms and sanctions (Coleman, 1990). Individuals who suffer loss in multiple categories as a result of natural disasters are less able to cope and more prone to stress. According to Freedy et al. (1993:55), natural disasters impact the availability of social support; on the one hand, a natural disaster may bring kin and acquaintances together to provide a mutually beneficial emotional and instrumental support; and, on the other hand, social ties may be strained or severed temporarily or permanently.

Consistent with the environmental inequity perspective, the COR model suggests unequal loss of resources, coping, and vulnerability to disasters and associated stresses and strains. Some groups such as the poor, minorities, elderly, single female parents, and children may start with fewer resources prior to a disaster and remain more susceptible to resource loss, inability to cope, and elevated stress level in the post-disaster phase. Thus, resource loss is directly related to post-disaster psycho-social dysfunctions. Furthermore, availability of resource replenishing

instruments such as insurance and government assistance will attenuate the level of stress according to the COR perspective. As mentioned earlier, African-Americans are most likely to rely on kinship and social networks when disaster strikes.

Research Design

Southern Louisiana was the original designated study area. As stated earlier, due to its proximity to coastal and riverine ecosystems, systemic atmospheric changes inducing severe impacts on human population occur quite frequently. Specifically, the cities of Slidell and Covington in St. Tammany Parish (county) of Louisiana were originally targeted for this study because they both suffered major flooding during the Tropical Storm Allison (TSA). As reported by Rloux and Stanley (2001), after pounding St. Tammany Parish with thunderstorms for almost a week, TSA delivered an unexpectedly severe impact on Monday June 11, 2001, with more than 10 inches of rainfall before dawn and flooding several homes and business establishments. In Slidell, over 2,000 flooded homes were reported and in Covington, more than 200 homes were inundated (The Times Picayune, 2001). Even though site visits were made to both Covington and Slidell in the aftermath of TSA, due to budget constraints, data were collected only in Slidell communities–specifically in Wimbledon, Lake Village, Crossgates, and North Forest subdivisions. In keeping with the Quick response approach, field work for data collection was carried out during the post-impact phase of TSA.

St. Tammany Parish is among the fastest growing areas in Louisiana in recent years. While several push factors such as poor public schools, high crime rate, high tax brackets, saturated housing market, and depressed job market are forcing people to move out of Orleans Parish, St. Tammany Parish offers some pull factors – a better public school system, lower crime rate, affordable homes, and more green space – which combine to attract new residents. Thus, the greater Slidell area now hosts a population of more than 53,000 (DBER, 1997). However, the city is especially susceptible to flooding due to its location at the juncture of a floodplain and

coastal zone and the construction of new homes on riverine areas without a sufficient drainage system.

Sample and Survey

Consistent with a Quick response design, the impacted communities were visited during the immediate post-impact phase of the disaster to gain first-hand information about the residential units affected. Houses that displayed flood-damaged properties (pulled carpets, furniture, mattresses, and other household items) on their front lawns for garbage pick-up were identified for sampling. A list of 1,200 residential addresses where flood-related garbage was picked up following TSA was made available by the city of Slidell. A total sample of 300 homes was drawn from this sampling frame. However, only 149 subjects actually completed the questionnaire that was administered, which represents a 50 percent response rate.

An 11 page questionnaire constructed for the purpose of the study was pre-tested, distributed by hand, and then picked up from selected households. In some instances, respondents were given a stamped self-addressed envelope to return the completed questionnaire. For the latter, fewer completed questionnaires were returned. Unfortunately, due to limited budget, there was no follow-up. Trained graduate and undergraduate students participated in different aspects of the project – including data collection, coding, and data processing. Information about social and demographic characteristics, damage, health, physical, and psychological consequences were obtained using both closed and open-ended questions.

Results

The results are grouped and summarized by social and demographic attributes and themes that correspond with the research questions. The results of empirical analyses and open-ended (qualitative) items of the survey are also presented.

Socio-Demographic and Ecological Characteristics

The socio-demographic characteristics of respondents are examined first. The average age is 50.54. Mean values are 4.28 for education(some college), 5.63 for total household ($30,000-39,999), and 5 years for length of residency.. On average, homes are within one and a half to three miles distant from bodies of water and have a somewhat low base-flood elevation levels. Based on the average household income and values of home averaging $99,999, it appears the areas included in the survey are working class to middle class neighborhoods.

As shown in Table 1, the distribution of the sample include race, 84.4% Caucasian, 13.4% non-Caucasian (i.e., 9.2% African-American and 4.2% others); sex, 44.7% male , 52.5% female and 2.8% others; age, 32.8% for 20-39, 46.9% for 40-69, and 17.8% for 70 years and above, (with 2.8% "don't know" or no answer). In terms of home ownership, the majority of respondents (86.5%) own their homes and 13.4% are non-homeowners (i.e., renters). About 50.4% of the homes are estimated at $50,000 to $99,999 while 36.2% are valued at $100,000 to $149,999. Only 5 homes in the sample are estimated at more than $150,000. Estimates for about 9 homes were not given. Fifty-nine point six percent of respondents indicated that they attended college or completed 4 years of college, while 19.1% indicated they completed high school and 4.9% indicated they have less than a high school education. About 14.2% reported they completed some graduate program or graduate/professional degree, and 2.1% of respondents did not report their level of education.

The distribution by employment status includes 66% full-time and part-time employment, 24.1% retired, and 8.5% unemployed (i.e., 4.3% unemployed and 3.5% homemakers). Different income brackets are represented in the sample with 16.3% reporting less than $20,000 total household income and 42.6% reporting $20,000 to $59,999, and 29.1% reporting $60,000 or more total household income for the year 2000 respectively. About 17 (12.1%) respondents did not disclose their total household income as requested. For marital status, an overwhelming majority (72.3%) of the sample was married relative to 26.2% unmarried. Respondents were also asked about their political beliefs on a scale of very liberal to very conservative and their

response includes 5.7% very liberal, 14.9% somewhat liberal, 24.8% moderate or middle of the road, 26.2% somewhat conservative and 17.7% very conservative. About 10.6% did not know where they stand along the scale (see Table 1). The results in Table 1 directly addressed the first research question raised at the outset.

Next, the results of questionnaire items asking the respondents about ecological risk factors associated with flooding in their communities are presented. Specifically, respondents were asked to indicate how long they have lived in their present homes, the flood elevation of their homes, approximate distance of their homes from the nearest body of waters (i.e., bayous, rivers, lakes, or sea), and the frequency of flooding since their residency. The majority (46.1%) of respondents indicated they have lived in their present homes for more than 10 years, another 30.5% indicated they have resided in their houses for at least 4 to 10 years and 23.4% have lived in their homes for 3 years or less.

Flood elevation level is a critical factor in flooding, hence, it is the basis of the requirement for home owners to carry flood insurance. Flood insurance rates are calculated based on a property's location and the base flood elevation (or the 100-year regulatory flood) (Sheaffer et al., 2002). Among the respondents, 15.6% and 32.2% indicated their communities' flood elevations are in the ranges of extremely low and somewhat low respectively. Another 36.9% indicated an average elevation level and only 7.8% indicated a higher flood elevation level. Most of the latter are new constructions which most older residents now consider part of the flooding problem as mentioned earlier.

Another critical ecological factor in flooding is proximity of homes to bodies of water. In our sample, 13.5% of respondents indicated their homes are located within less than 100 yards to one quarter of a mile from the nearest body of water, another 12.8% indicated they are within one quarter of a mile to one mile and a half, 31.2% are in the range of two to five miles, and 29.1% are located more than 5 miles away from any body of water. These are important answers to research question #2, i.e., proximity to bodies of water and low base elevation levels predispose residence to flood risks.

Whether required or not, an overwhelming majority of respondents (80.8%) indicated they carried flood insurance prior to Tropical Storm Allison.. Only 16.3% indicated they did not carry flood insurance. In response to the item asking respondents: "How many times has flooding occurred in your home prior to TSA?" about 33.3% indicated never, 34.0% indicated at least once, 19.1% reported at least twice, and 8.5% reported more than three times. Thus, more than 50% of the sample may be characterized as repeat flood victims. When asked if the respondents plan to relocate as a result of the impacts of TSA of 2001, only 17% expressed a willingness to relocate. This is not surprising given the fact that 84.4% of respondents rated their community as a good to excellent place to live despite the impacts of TSA. Only 11.3% and 4.3% rated their community as either " fair" or " poor."

The Impacts of TSA's Flooding

Specific items were included in the questionnaire to obtain information about the physical and financial impacts of TSA to address our research question #3. Respondents were asked: "How much has TSA's flooding affected your family, would you say not at all, a little, not very much, a fair amount, or a great deal?" About 69% indicated their families were affected a fair amount to a great deal, another 24.1% reported their families were affected a little or not much (see Q1 in Appendix B). To assess the physical impacts of TSA on respondents' homes and automobiles, questionnaire items asked them to indicate the extent to which they experienced the impact of TSA's flooding by asking them to describe damage to property as a "total loss," "severe damage," "moderate damage," "slight damage," "very minimal damage," or "no damage at all." The results indicate that 58.2% reported moderate to severe damage to their homes and another 26.9% said they suffered minimum to slight damage (see Table 2 in Appendix A). For automobiles, only 19.8% reported moderate damage to total loss; another 24.2% indicated they sustained very minimal to slight damage. More than 55% of respondents did not experience automobile damage associated with TSA's flooding mostly because they were able to move their vehicles to higher grounds.

Furthermore, the respondents were asked to rank the degree of material destruction in their households on a scale of 0 (no destruction) to 10 (maximum destruction). The results are summarized in Table 3 in Appendix A. Most respondents (65.2%) reported a maximum destruction to their floor coverings and about 57.2% reported a major destruction to their furniture, beds, mattresses and other household materials. One questionnaire item asked respondents to indicate if they experienced any health problems associated with TSA flooding. Only 12% indicated they have experienced some type of health problems including allergies, emotional trauma, headaches, infected toes, sinuses, stress, respiratory problems, and strained back muscle due to lifting furniture. One respondent reported a serious emotional problem because his wife had a heart attack and open-heart surgery which coincided with TSA.

Respondents were also asked to provide a range of estimated total dollar losses suffered by their households as a consequence of TSA's flooding. The results are summarized in Table 4 in Appendix A. A significant percentage indicated their households suffered monetary losses in the range of over $20,000 (27.7%), $10,000 to $19,000 (19.1%) and $1,000 to $9,999 (31.2%) respectively.

Attitudes About Flooding

To fully address research question #3, Table 5 shows the results of items on respondents' attitudes about flooding. In the questionnaire items using Likert scale, the respondents were asked to strongly agree, agree, indicate if undecided, disagree, or strongly disagree to a series of statements displayed in Table 5. The majority agreed or strongly agreed that floods are the work of nature and cannot be totally prevented; that flooding has their top priority; that people are partly to blame for some of the damages caused by flooding, and that the government should bear the responsibility of protecting citizens' homes from flooding. Respondents were undecided or strongly disagreed on two items suggesting that: homeowners should be responsible for protecting their homes from flooding and that with the power of science and technology, flooding is totally preventable.

Precautions Taken by Respondents and Perceived Obstacle to Flood Mitigation

Respondents were provided with a list of precautionary measures against flooding and were asked to indicate if they implemented each of the measures prior to TSA. Table 6 presents the results which address question #5. Getting flood insurance was the major precaution reported by the majority of respondents. A significant percentage of them also indicated they investigated flooding problems in their neighborhood before purchasing a home. However, only 36.2% reported implementing some physical flood control barriers. Less than 25 percent indicated they stockpiled sandbags, cinder blocks, and created water diversion paths around the homes.

Obstacles To Flood Prevention

Next, respondents were asked: what is the biggest obstacle to solving flood problems in your neighborhood? They were asked to rank a list of items (shown in Table 7 in Appendix A) on a scale of 0 (not an obstacle) to 8 (biggest obstacle). The results which respond to question #6 are summarized in Table 7. As expected, inadequate drainage system was reported by the majority (63.1%) of respondents as the biggest obstacle; lack of adequate funding was reported by 58.8% as moderate to biggest obstacle; and about 47.6% identified inadequate levee system as a moderate to biggest obstacle to flood prevention in the communities. The lack of adequate flood protection was considered a moderate obstacle by 29.1% of the sample. Thus, it appears that monetary and structural measures to improve drainage system are urgently needed to mitigate future flooding in the communities.

Perceived Effectiveness of Flood Control Measures

In terms of specific measures needed to prevent future flooding, respondents were presented with 10 items and asked to rank each one on a scale of 1 (very ineffective) to 5 (very effective) in protecting homes from future flooding (see Table 8). As shown in Table 8, improved drainage was considered to be the most effective approach, followed by increased

government enforcement of flood elevation, land use restrictions, funding home owner's flood control projects, government subsidizing flood insurance, and installing more sump pumps respectively. About 43% of respondents indicated constructing more levees would be ineffective and about 40% thought adding sandfill next to homes would be ineffective, and another 35.5% indicated building flood walls around the house are generally ineffective. The results in Table 8 answered research question #7.

Flood Problem-Solving Behavior of Respondents

A battery of 8 items on flood problem-solving behavior was included in the questionnaire. Respondents were asked: "By answering 'most frequently,' 'frequently,' 'occasionally,' 'seldom,' 'never,' or 'don't know,' which of the following activities (see Table 9) have you or any member of your household performed in order to address flooding problem in your community?" As shown in Table 9, these response categories were collapsed into four. Given the frequency of flooding in the area, it is surprising that a substantial percentage of respondents indicated they had never engaged in these activities. About 40% indicated they had frequently to most frequently voted for a candidate based on his/her views on flood control, and 31.2% indicated they had frequently attended government meetings addressing flooding problems. Another 29.0% had frequently contacted elected officials to address flood-related issues (see Table 9 in Appendix A). These findings address Question #9. In an open-ended item asking respondents to indicate other activities they have performed in order to mitigate flooding, a number of them reported they have: stockpiled sandbags, raised ground level of lot and installed 4" drainage pipe, dug trenches around the home, constructed new drainage in the rear of the house, retrofitted floors, doors, and outer walls, constructed subsurface drainage, and applied for grants from FEMA. One respondent indicated: "we planted trees and bushes (worth $1,000) and installed a $3,000 underground drainage system to drain the backyard (which becomes a lake when it rains) into the street. But when the street floods, the drainage system is useless."

Coping With The Impacts of Tropical Storm Allison (TSA)

To assess different sources of coping with the devastation of TSA, respondents were asked to indicate to what extent each specific elements of social capital–including relatives/kinship, friends, acquaintances, church and religious groups, civic associations, etc., were helpful during the immediate post-impact phase of the storm. Table 10 in Appendix A presents the results; friends and acquaintances were indicated as the most helpful by the majority of respondents (68.6%), followed by relatives/kinship networks (62.5%). Government agencies and church/religious groups were reported as the most helpful by about 33 percent of the respondents.

Next, respondents were asked to indicate their primary sources of relief during the TSA flooding. As expected, the majority indicated receiving assistance from the Federal Emergency Management Agency (FEMA). Red Cross is the second primary relief agency mentioned (see Table 11).

To address questions 5 and 8 posed, analyses of selected items in the survey were performed. Two Ordinary Least Squares (OLS) regression equations were estimated in order to determine if there are variation by race and socioeconomic factors in flood impact, controlling for other variables. The equations take the form:

$$Y_{(\text{Total \$ losses})} = a_o + b_1X_{1(\text{Total Income})} - b_2X_{2(\text{flood insura})} + b_3X_{3(\text{homedamage})} + b_4X_{4\ (\text{waterprox})} + b_5X_{5\ (\text{furniture})} + b_6X_{6\ (\text{appliance})} - b_7X_{7(\text{education})} + b_8X_{8(\text{age})} + b_9X_{9(\text{sex})} + b_{10}X_{10(\text{race})} + e_i$$

Where: Y_i = the dependent variable, a_0 = the intercept, b_i = the regression coefficient, X_i = the independent variable, and e_i = the error term.

The results of the two OLS equations are displayed in Table 12 in Appendix A. As expected, amount of damage to home is the most powerful predictor of total dollar losses (Beta = .581, $p < .01$). Total household income, age, and damages to household materials (appliances, furniture, etc.) are also significant predictors of total dollar losses. Education and carrying flood insurance policy attenuate total dollar losses (Beta = -.207, $p < .01$; Beta = -.114, $p < .10$). Sex

and race failed to reach any appreciable level of statistical significance and were dropped in equation 2. In terms of vulnerability to flood hazards, the results suggest that the elderly are more vulnerable than any other groups included. Perhaps due to small sample of African-Americans respondents and the fact that the sample is from working-middle class neighborhoods, the racial inequality of flood impacts is difficult to determine.

On the question of whether there are racial and socioeconomic gaps in sources of reliefs, coping, flood insurance, and base-flood elevation, a simple calculation of differences of the means for each items was conducted between African-Americans and Caucasians. The results are presented in Table 13 in Appendix A. Items with negative signs are those in which African-Americans have advantage and those without negative signs represent Caucasian advantage. In general, Caucasians are most likely to: receive emergency relief, have flood insurance policy, live in homes with higher base-flood elevation levels than their African-American counterparts. In terms of sources of reliefs, most African-Americans depend on relatives/kinship networks, church and religious organizations, government agencies, charitable organizations and local civic associations as social capital for coping with the stresses and strains of flood hazards as predicted. Thus, major differences exist between African-Americans and Caucasians on sources and mechanism of coping with a natural disaster such as flooding. These results partially support both the environmental inequity and conservation of resources perspectives.

In addition to closed-ended items in the survey, the last item is in open-ended format in which the respondents were asked if there is anything else they would like to tell us about their individual experiences during TSA. Consistent with POET framework, one respondent (R#048) expressed his opinion and frustration concerning the complexity of flooding problem in Slidell in an open-ended item as:

> I requested my district Councilman to look into flood problems. I even gave him pictures and other pertinent information about the problem in our area, which he gave to the parish President. I wrote to the parish President about the problem and received only a one line reply saying he is doing everything he can. Yet, he refused to support a building monitor to study drainage problem throughout the parish...During a meeting in our area, large builder of homes (in the $200,000 to $500,000 range) said

> he exceeds slab height on his subdivisions homes by 18 inches so his customers will not experience flooding. The newer homes with higher elevation are causing serious flooding problem for the older homes. My district Councilman told me they can't deny permits in newer subdivisions because that would erode their tax base, as most older subdivisions are under homestead exemption, most tax revenues are from newer expensive subdivisions. The people who have lived in their homes for over 20 years are being flooded out while the people in new houses are staying high and dry.

Another respondent remarked that:

> City engineers do not seem to be able to develop technology to solve the problem. The continued *influx of population* and building of homes and cementing over of green spaces have affected the drainage system. Government should bear the responsibility to ensure subdivisions and home sites are built to high enough elevations, adequate drainage constructed with a large safety margin, and stop re-zoning of soil/water absorbing areas being replaced with concrete.

Thus, complex factors of human population, social organization, and technology have direct influence on both the built and physical environment susceptibility to systemic "natural forces.

The following are some of the comments provided by the respondents. Each respondent is designated by a given ID number (R#). For instance, R #004 wrote: Please help us with the drainage problem in our subdivision; and R #006 and R #027 stated that: "due to its erratic nature, Allison did not lend itself to forewarn people of the flooding threat, i.e., approximately 10 inches of rain fell between 1:00 a.m. and 3:00 a.m. Thus, no prior caution was possible.

The flood was very unexpected because the water rose so fast and there wasn't much warning of the water rising."

R #007 wrote: "we live next to W-14 drainage canal in Slidell. It needs to be widened or enlarged. Presently it cannot handle heavy rains without overflowing." Another respondent, R #017 remarked: "The drainage canal W-14 was completely full causing it to back up and enter our home. The city should never have issued building permits without filling in and raising the level of properties." R #018 noted: "Our lack of preparedness and readiness was mostly due to poor forecast by the National Weather Service. New development in our area contributed to our flooding." Another respondent, R #056, wrote: "You cannot even imagine what this is like, unless you experience this first-hand. Standing there helplessly watching the water come into your home and you can't do anything about it. These recurring floods have taken a toll on my

marriage, my children, and my finances." R #057 commented: "It was one of the worst experiences I have ever been through in my life. I pray I never have to go through that again."

R #065 stated: "I have lived in my house for 23 years and the street in front of my house never flooded until 1983 and subsequently it flooded twice in 1995 and flooded again in 2001. What has changed since when I first moved in here? Too much building without concerns for flooding and drainage. I am not an engineer but it seems odd that my house flooded twice and subdivisions around me never flooded and they got the same amount of rain as I did." R #67 indicated: "My problem is that if we receive 3 to 4 inches of rain in one hour time, the drains just cannot handle it and we flood. It has happened three times in the past six years." And, R #68 wrote: "Flood insurance is a scheme for the government to take your money and give it to someone else."

R #072 chronicled his/her experiences as: "At midnight I tried to prepare. I packed clothes, medicines, and toiletries when the rain was coming down in sheets. I removed my books from lower shelves too. When my neighbor awakened me at 3:30 a.m., I walked out of the house, water was already 4 inches high, outside it was 6 inches high. I drove my car to a higher place and parked and waited about 8 hours for the water to recede. I don't think the pumps were automatic, but it wasn't raining as badly then (3:30) as it had been earlier. I sure hate brick house, I feel vulnerable and scared! A little snake came in." Another respondent (R #073) wrote: "We bought cement blocks to raise furniture. I contacted city government to request clearing of drainage. We have owned our home for 25 years and flooded in 1995 which we understood. But why are we flooding now?"

Summary and Conclusions

The primary objectives of this study were to: (1) assess the vulnerability of people to flooding, (2) evaluate the impacts of TSA-induced flooding of 2001, and (3) pinpoint the modes of adaptation and coping of the population affected in Slidell, Louisiana. Through a quick response approach, several communities reported in the media to be severely flooded were

identified, visited, sampled, and surveyed in the immediate post-impact phase of TSA. These communities include Wimbledon, Lake village, Crossgates, and North Forest subdivisions. Through structured (closed) and some open-ended questionnaire items, data were collected, processed, and analyzed to address the research objectives and the research questions posed. The research questions were addressed using the empirical results of the survey. Both the human ecology and environmental inequity hypotheses are supported by the empirical analyses conducted. For the latter, the elderly people are more prone to severe impact of natural hazard such as TSA flood than any other social groups.

While there is no statistically significant difference by race on impact, major racial and socioeconomic differences were found for access to resources, emergency reliefs, sources of relief, flood insurance policy, social capital, and flood-base elevation. As hypothesized, African-Americans are more likely to rely on relatives and kinship networks and church and religious organizations for support during the period of crisis relative to their Caucasian counterparts (see Bolin, 1986; Peacock and Girard, 1997; Perry et al., 1983 for similar findings). Furthermore, African-Americans and other people of lower socioeconomic status were found to reside in relatively flood-prone landscapes with low base-flood elevation levels relative to Caucasians and people of higher socio-economic status.

Among the limitations of this study are the small sample size and the extent to which the results can be generalized due to the uniqueness of the natural hazard event investigated. The study design only allows the assessment of acute impacts during the immediate post-impact phase of Allison's episode. Thus, the assessment of chronic impacts of TSA is beyond the scope of the present study. Although this report is not geared toward hypothesis testing, nevertheless, three theoretical perspectives offering divergent views on natural disasters and social systems are presented and partially supported by the research. The environmental inequity, human ecology, and conservation of resources theoretical perspectives are promising in terms of their potentials to contribute to the body of knowledge in the field of natural disasters. Through hypothesis testing utilizing the type of data collected in this project, major contributions to this important

area could be made. Thus, there are both theoretical and applied policy implications of the findings reported in this paper.

Among the policy implications are: (1) the need for local government to review the building permit process taking into consideration the environmental, hydrological, and geological risk factors present in a given community; (2) to assess the vulnerability of community landscapes to flooding; (3) to increase expenditure on flood prevention schemes, such as physical infrastructure improvements like better drainage, expanded canals, power pumps, and an enforceable threshold for flood elevation; (4) to educate homeowners about the benefits of flood insurance and encourage them to have adequate coverage; (5) the need for people to develop self-help initiatives on flood prevention within their community, and (6) the need for the Federal Emergency Management Agency (FEMA) to provide flood insurance subsidies to home owners, especially those with lower income. As chronicled by respondents, TSA's flood of 2001 impacted people along several dimensions including economically, emotionally, psychologically, physically, and socially. Implementation of flood-mitigation measures identified in this study are absolutely imperative to present the events of 2001 from recurring in the future.

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APPENDIX A

Table 1

Socio-demographic Characteristics

Values	Frequency	Percent
Sex		
Male	63	44.7
Female	74	52.5
DK/NA/M	4	2.8
Race		
White/Caucasian	119	84.4
Black/African-American	13	9.2
Others	9	6.3
Age on last birthday		
20-29	17	12.1
30-39	29	20.7
40-49	30	21.4
50-59	23	16.3
60-69	13	9.2
70 and above	25	17.8
DK/NA/M	4	2.8
Home ownership status		
Own home	122	86.5
Renting/Leasing home	16	11.3
DK/NA/M	3	2.1
Approximate value of home		
Less than $50,000	5	3.5
$50,000 - $99,999	71	50.4
$100,000 - $149,999	51	36.2
$150,000 or more	5	3.5
DK/NA/M	9	6.4
Education		
Less than High School	7	4.9
High School or GED	27	19.1
Some college/vocational school	55	39.0
Completed four year college	29	20.6
Some graduate school/completed grad school	20	14.2
DK/NA/M	3	2.1
Marital status		
Married	102	72.3
Un-married	37	23.4
DK/NA/M	2	1.4

Table 1 (continued)

Socio-demographic Characteristics

Variables	Frequency	Percent
Employment status		
Employed	93	66.0
Unemployed/homemaker	11	7.8
Retired/student/other	35	24.8
DK/NA/M	2	1.4
Total household income		
Less than $10,000	6	4.2
$10,000 - $19,999	17	12.1
$20,000 - $29,999	18	12.8
$30,000 - $39,999	17	12.1
$40,000 - $49,999	11	7.8
$50,000 - $59,999	14	9.9
$60,000 or more	41	29.1
DK/NA/M	17	12.1
Political beliefs		
Very liberal	8	5.7
Somewhat liberal	21	14.9
Moderate or middle of the road	35	24.8
Somewhat conservative	37	26.2
Very conservative	25	17.7
DK/NA/M	15	10.6

Table 2

Respondents' Self-Assessment of Damage to Home and Automobile

Item(s)/Variable(s)	Moderate to Total loss n (%)	Minimal to Slight n (%)	No Damage n (%)	DK n (%)
Damage to home	82 (58.2)	38 (26.9)	21 (14.9)	-
Damage to automobile	28 (19.8)	34 (24.2)	78 (55.3)	1 (.7)

Table 3

Physical Impacts of TSA's Flood: Material Destruction Within Households

Item(s)/Variable(s)	Extent of Destruction: Maximum Destruction n (%)	Moderate to Serious Dest. n (%)	Minimum Destruction n (%)	ND/NA/DK n (%)
Damage to:				
Floor Coverings	92 (65.2)	12 (8.4)	11 (7.7)	26 (18.4)
Furniture, beds, & mattresses	16 (11.3)	48 (34)	17 (11.9)	60 (42.5)
Appliances	10 (7.1)	34 (24)	20 (41.1)	77 (54.6)
Stereos and TV	6 (4.3)	18 (12.7)	12 (8.4)	105 (74.4)
Draperies	15 (10.6)	11 (7.8)	21 (14.8)	94 (66.6)
Clothes, towels, etc.	15 (10.6)	23 (16.2)	24 (17.1)	79 (56)
Electrical devices	11 (7.8)	22 (15.6)	15 (10.6)	93 (65.9)
Household materials	17 (12.1)	15 (8.5)	6 (4.2)	103 (73)

Table 4

Respondents' Estimated Dollar Losses Due to TSA's Flooding

Range	n (%)
More than $20,000	39 (27.7)
$10,000 to $19,999	27 (19.1)
$1,000 to $9,999	44 (31.2)
Less than $1,000	7 (5.0)
Unable to provide an estimate	24 (17.0)

Table 5

Respondents' Attitudes Toward Flood Prevention

Item(s)/Variable(s)	SA	A	U	D	SD	DK
Floods are the work of nature & cannot be totally prevented	41 (29.1)	48 (34)	14 (9.9)	18 (12.8)	17 (12.1)	3 (2.1)
Compared to my other concerns flooding has my top priority	41 (29.1)	29 (20.6)	22 (15.6)	26 (18.4)	15 (10.6)	8 (5.7)
Homeowners should be responsible for protecting their homes from flooding	14 (9.9)	27 (19.1)	34 (24.1)	27 (19.1)	32 (22.7)	7 (5.0)
The gov't should bear the responsibility of protecting citizens' homes from flooding	36 (25.5)	48 (34.0)	17 (12.1)	22 (15.6)	10 (7.1)	8 (5.7)
People are partly to blame for some of the damages caused by flooding	33 (23.4)	49 (34.9)	18 (12.8)	15 (10.6)	18 (12.8)	8 (5.7)
With the power of science and technology, flooding is totally preventable	13 (9.2)	18 (12.8)	26 (18.4)	53 (37.6)	25 (17.7)	6 (4.3)

Note: SA = Strongly Agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly Disagree, and DK = Don't Know respectively.

Table 6

Flood Mitigation Measures Taken By Respondents

Variables/items	Yes (1) N(%)	No(2) N(%)	DK/NA N(%)
Had flood insurance	110 (78.0)	30 (21.3)	1 (.7)
Investigated flooding problems before purchasing home	65 (46.1)	75 (53.2)	1 (.7)
Implemented flood control measures	51 (36.2)	83 (58.9)	7 (5.0)
Stockpile sandbags	31 (22.0)	101 (71.6)	9 (6.4)
Stockpile cinderblocks	13 (9.2)	118 (83.7)	10 (7.1)
Purchased water pump	4 (2.8)	125 (88.7)	12 (8.5)
Water diversion paths	21 (14.9)	110 (78.0)	10 (7.1)
Evacuate ground floor	12 (8.5)	115 (81.6)	14 (9.9)

Table 7

Respondents' Perception of the Major Obstacle to Flood Prevention

Item(s)/Variable(s)	Biggest Obstacle n (%)	Moderate Obstacle n (%)	Low Obstacle n (%)	Least Obstacle/DK/NA n (%)
Money	43 (30.5)	40 (28.4)	43 (30.5)	15 (10.7)
Lack of gov't intervention	28 (19.9)	51 (36.2)	43 (30.5)	19 (13.5)
Lack of homeowners initiative	11 (7.8)	39 (28.4)	70 (49.6)	21 (14.9)
Lack of adequate flood protection	12 (8.5)	41 (29.1)	64 (45.4)	24 (17)
Inadequate levee system	34 (24.1)	33 (23.5)	54 (38.4)	20 (14.2)
Inadequate drainage system	89 (63.1)	19 (13.4)	22 (15.5)	11 (7.8)
Inadequate emergency preparedness & warning system	20 (14.2)	31 (22)	68 (48.2)	22 (15.6)
Others (miscellaneous problems)	19 (13.5)	5 (3.5)	14 (9.9)	103 (73)

Table 8

Effectiveness of Flood Prevention Measures

Variables(items)	Effective to very effective n (%)	Not Sure n (%)	Ineffective to very ineffective n (%)	N/A n (%)
Improved drainage	129 (91.5)	5 (3.5)	5 (3.5)	2 (1.4)
Flood walls around the house	38 (26.9)	40 (28.4)	50 (35.5)	13 (9.2)
More levees	48 (34.0)	40 (28.4)	60 (42.6)	9 (6.4)
Install more sump pumps	73 (51.8)	33 (23.4)	27 (19.2)	8 (5.7)
Add sand fill next to house	35 (24.8)	38 (27.0)	56 (39.8)	12 (8.5)
Permanent sand bag depot	68 (48.3)	23 (16.3)	39 (27.6)	11 (7.8)
Funding home owner' flood contol projects	87 (61.7)	28 (19.9)	18 (12.8)	8 (5.7)
Land use restrictions	97 (68.8)	24 (17.0)	15 (10.7)	5 (3.5)
More gov't enforcement of flood elevation	106 (75.2)	12 (8.5)	17 (12.1)	6 (4.3)
Gov't subsidizing flood insurance for home owners	88 (62.4)	24 (17.0)	22 (15.6)	7 (5.0)

Note: Respondents were asked: Given your experience with TSA floods, how effective would you say each of the following items would be in protecting your home from future flooding, would you say (1) very ineffective, (2) ineffective, (3) not sure, (4) effective, or (5) very effective?

Table 9

Flood Problem Solving Behavior of Residents

Variables(items)	Frequently to most freq. n(%)	Seldom to occasionally n(%)	Never n(%)	DK n(%)
Organized grassroots interest group	22 (15.6)	28 (19.9)	82 (58.2)	9 (6.4)
Contacted elected officials	41 (29.0)	37 (26.2)	57 (40.4)	6 (4.3)
Signed petition concerning flooding problem	37 (26.3)	15 (10.6)	80 (56.7)	9 (6.4)
Contacted gov't agency	38 (27.0)	24 (17.0)	70 (49.6)	9 (6.4)
Voted for candidate based on their views on flood control	56 (39.7)	26 (18.5)	50 (35.5)	9 (6.4)
Attended gov't meetings addressing flooding problems	44 (31.2)	25 (17.7)	62 (44.0)	10 (7.1)
Participation at local self-help efforts	18 (12.8)	27 (19.1)	86 (61.0)	10 (7.1)
Contributed money to a joint effort to prevent flooding	10 (7.1)	19 (13.5)	96 (68.1)	16(11.3)

Table 10

Major Sources of Coping With The Impact of TSA*

Sources of coping	Ranking Not Helpful (0) n (%)	Helpful (1 - 4) n (%)	Most Helpful (5 - 7) n (%)	DK n (%)
Relatives/kinship networks	24 (17.0)	17 (11.9)	88 (62.5)	12 (8.5)
Friends and acquaintances	15 (10.6)	17 (12.0)	97 (68.6)	12 (8.5)
Church and religious groups	60 (42.6)	21 (14.9)	46 (32.5)	14 (9.9)
Local civic associations	92 (65.2)	27 (19.2)	9 (6.3)	13 (9.2)
Charitable organizations	69 (48.9)	28 (19.8)	31 (22.0)	13 (9.2)
Government agencies	51 (36.2)	31 (22.1)	46 (32.6)	13 (9.2)
Other community residents/neighbors	58 (41.1)	31 (22.0)	40 (28.4)	12 (8.5)

*Note: Respondents were asked: On a scale of 0 to 7 (with 0 indicating no help and 7 indicating most help), please rank the degree to which each of the following is helpful to you and your family in coping with the impact of Tropical Storm Allison flooding.

Table 11

Primary Sources of Emergency Relief

Agency	n (%) Who Received Help
Federal Emergency Management Agency (FEMA)	44 (31.2)
The Red Cross only	11 (7.8)
FEMA and Red Cross	11 (7.8)
City government	1 (0.7)
State government agency	2 (1.4)
Non-governmental agency	2 (1.4)
Others	11 (7.8)
No answer/Don't know	59 (41.8)

Table 12

Regression of Total $ Losses Due to TSA on Physical Impacts and Sociodemographic Variables

Independent Variable	Model 1 Unstandardized Coefficient (Beta)	Model 1 Std. Error [t]	Model 2 Unstandardized Coefficient (Beta)	Model 2 Std. Error [t]
(Constant)	.004	1.365	-1.016	1.157
Proximity of home to the bayou, river, lake or sea	.096 (.047)	.123 [.782]	.147 (.071)	.124 [1.190]
Amount of damage to home	1.160*** (.581)	.152 [7.625]	1.144*** (.570)	.151 [7.578]
Damage to furniture, beds, and mattresses	.107* (.057)	.057 [1.878]	.107* (.163)	.056 [1.920]
Damage to appliances, refrigerators, stoves	.107** (.053)	.053 [2.033]	.116** (.163)	.051 [2.271]
Had flood insurance prior to flooding of TSA	-.768* (-.114)	.418 [-1.837]	-.684* (-.102)	.409 [-1.674]
Sex	-.216 (-.043)	.306 [-.708]	--- –	--- --
Race	-.246 (-.061)	.233 [-1.055]	— –	--- --
Age	.026** (.167)	.010 [2.647]	.002*** (.158)	.010 [2.565]
Education	-.383*** (-.207)	.122 [-3.137]	-.399*** (-.218)	.118 [-3.375]
Total household income	.277*** (.246)	.085 [3.255]	.326*** (.291)	.082 [3.976]
R^2	.741		.861	
Adj. R^2	.711		.742	
F	24.579***		30.901***	
n	96		106	

Note: ***p < .01. **p < .05, *p < .10 significance respectively.

Table 13

African-Americans-Caucasian Means
Differentials in Sources of Reliefs/Coping, Insurance, and Base-Flood Elevation

Item(s)	Mean Difference
Sources of Relief:	
Relatives/kinship networks	-.79*
Friends and acquaintances	.11
Church/religious organizations	-3.14**
Local civic associations	-.87*
Charitable organizations	-1.57*
Government agencies	-2.05**
Community & Neighborhood residents	.64
R's received emergency relief	.31
How often R's think about TSA flood	.02
Had flood insurance prior to TSA	.12
Base-Flood elevation level of community	.56**
How many times home has been flooded	-.40

N = 106; **p < .05, *p < .10 significance.

APPENDIX B

Tropical Storm Allison Complete Survey Frequency Tables

Values	Frequency (n)	Percent (%)
Q1. How much TSA affected your family?		
0 - Not at all	8	5.7
1 - A little	19	13.5
2 - Not very much	15	10.6
3 - A fair amount	41	29.1
4 - A great deal	56	39.7
9 - Don't Know(DK)/Not Applicable(NA)/Missing(M)	2	1.4
Q2. How long live in present house?		
1 - Less than 1 year	8	5.7
2 - 1 year to 3 years	25	17.7
3 - 4 years to 6 years	32	22.7
4 - 7 years to 10 years	11	7.8
5 - More than 10 years	65	46.1
9 - DK/NA/M	0	0.0
Q3. Flood elevation of community?		
1 - Extremely low elevation	22	15.6
2 - Somewhat low elevation	51	36.2
3 - Average elevation	52	36.9
4 - High elevation	11	7.8
5 - Extremely high elevation	0	0.0
9 - DK/NA/M	5	3.5
Q4. Required or not to carry flood insurance?		
1 - Required to carry flood insurance, got one	56	39.7
2 - Flood insurance not required but got one anyway	58	41.1
3 - Flood insurance not required, did not get one	23	16.3
4 - Flood insurance required, did not get one	0	0.0
9 - DK/NA/M	4	2.8
Q5. Rate community as a place to live?		
1 - Extremely poor	0	0.0
2 - Poor	6	4.3
3 - Fair	16	11.3
4 - Good	70	49.6
5 - Excellent	49	34.8
9 - DK/NA/M	0	0.0

Values	Frequency (n)	Percent (%)
Q6. How far away from home is nearest bayou, river, lake, or sea?		
1 - Less than 100 yards	9	6.4
2 - 100 yards to 1/4 of a mile	10	7.1
3 - 1/4 of a mile to 1 and a half miles	18	12.8
4 - 1 and a half miles to 5 miles	44	31.2
5 - More than 5 miles	41	29.1
9 - DK/NA/M	19	13.5
Q7. How many times has flooding occurred in home?		
1 - Never	47	33.3
2 - At least one time	48	34.0
3 - At least two times	27	19.1
4 - At least three times	7	5.0
5 - More than three times	5	3.5
9 - DK/NA/M	7	5.0
Q8. In what specific years was home flooded?		
0 - None	46	32.6
1 - 1995	37	26.2
2 - 1997	1	.7
3 - 1994	1	.7
4 - 2001	17	12.1
14 - 1995 and 2001	36	25.5
16 - 1995 and 1998	1	.7
89 - 1989 and 1993	1	.7
146 - 1995, 1998 and 2001	1	.7
Q9. How likely will it be that you will live in present home 5 years from now?		
1 - Very unlikely	20	14.2
2 - Unlikely	16	11.3
3 - Not sure	23	16.3
4 - Likely	20	14.2
5 - Most likely	62	44.0
9 - DK/NA/M	0.0	0.0
Q10. Do you plan to relocate as a result of the flood of 2001?		
1 - Yes	24	17.0
2 - No	104	73.8
9 - DK/NA/M	13	9.2

Values	Frequency (n)	Percent (%)
Q11. Amount of damage to home as a result of TSA?		
1 - No damage at all	21	14.9
2 - Very minimal damage	15	10.6
3 - Slight damage	23	16.3
4 - Moderate damage	64	45.4
5 - Severe damage	18	12.8
9 - DK/NA/M	0	0.0
Q12. Amount of damage to automobile as a result of TSA?		
1 - No damage at all	78	55.3
2 - Very minimal damage	17	12.1
3 - Slight damage	17	12.1
4 - Moderate damage	20	14.2
5 - Severe damage	4	2.8
6 - Total loss	4	2.8
9 - DK/NA/M	1	.7
Q13A. Damage to floor coverings?		
0 - No destruction	26	18.4
1	4	2.8
2	1	.7
3	3	2.1
4	3	2.1
5	2	1.4
6	1	.7
7	1	.7
8	4	2.8
9	4	2.8
10 - Maximum destruction	92	65.2
Q13B. Damage to furniture, beds and mattresses?		
0 - No destruction	57	40.4
1	4	2.8
2	5	3.5
3	3	2.1
4	5	3.5
5	18	12.8
6	2	1.4
7	10	7.1
8	13	9.2
9	5	3.5
10 - Maximum destruction	16	11.3
99 - DK/NA/M	3	2.1

Values	Frequency (n)	Percent (%)
Q13C. Damage to appliances: refrigerators, stoves?		
0 - No destruction	74	52.5
1	10	7.1
2	5	3.5
3	2	1.4
4	3	2.1
5	14	9.9
6	3	2.1
7	5	3.5
8	7	5.0
9	5	3.5
10 - Maximum destruction	10	7.1
99 - DK/NA/M	3	2.1
Q13D. Damage to stereos and television?		
0 - No destruction	102	72.3
1	4	2.8
2	2	1.4
3	2	1.4
4	4	2.8
5	4	2.8
6	5	3.5
7	1	.7
8	6	4.3
9	2	1.4
10 - Maximum destruction	6	4.3
99 - DK/NA/M	3	2.1
Q13E. Damage to draperies?		
0 - No destruction	91	64.5
1	5	3.5
2	3	2.1
3	4	2.8
4	9	6.4
5	6	4.3
6	1	.7
8	4	2.8
10 - Maximum destruction	15	10.6
99 - DK/NA/M	3	2.1

Values	Frequency (n)	Percent (%)
Q13F. Damage to clothes, towels, etc.		
0 - No destruction	76	53.9
1	7	5.0
2	2	1.4
3	6	4.3
4	9	6.4
5	11	7.8
6	5	3.5
7	1	.7
8	6	4.3
10 - Maximum destruction	15	10.6
99 - DK/NA/M	3	2.1
Q13G. Damage to electrical devices/wiring?		
0 - No destruction	91	64.5
1	6	4.3
2	4	2.8
3	1	.7
4	4	2.8
5	9	6.4
6	4	2.8
8	7	5.0
9	2	1.4
10 - Maximum destruction	11	7.8
99 - DK/NA/M	2	1.4
Q13H. Damage to other household materials?		
0 - No destruction	37	26.2
1	1	.7
2	2	1.4
3	1	.7
4	2	1.4
5	6	4.3
6	2	1.4
7	2	1.4
8	2	1.4
9	3	2.1
10 - Maximum destruction	17	12.1
99 - DK/NA/M	66	46.8

Values	Frequency (n)	Percent (%)
Q14. Total dollar loss due to TSA?		
1 - None	20	14.2
2 - Less than $1,000	7	5.0
3 - $1,000 to $4,999	22	15.6
4 - $5,000 to $9,999	22	15.6
5 - $10,000 to $14,999	16	11.3
6 - $15,000 to $19,999	11	7.8
7 - $20,000 to $24,999	8	5.7
8 - $25,000 or more	31	22.0
9 - DK/NA/M	4	2.8
Q15. Had flood insurance prior to flooding of TSA?		
1 - Yes	110	78.0
2 - No	30	21.3
9 - DK/NA/M	1	.7
Q16. Receive any emergency relief assistance after TSA?		
1 - Yes	55	39.0
2 - No	81	57.4
9 - DK/NA/M	5	3.5
Q17. What was primary relief agency?		
1 - FEMA	44	31.2
2 - The Red Cross	11	7.8
3 - State Government	2	1.4
4 - City Government	1	.7
5 - Non-Gov't agency	2	1.4
6 - Others	11	7.8
12 - FEMA and The Red Cross	10	7.1
125 - FEMA, The Red Cross and Non-Gov't agency	1	.7
9 - DK/NA/M	59	41.8
Q18. Did any member of family have trouble getting enough food and drink during the flood?		
1 - Yes	4	2.8
2 - No	127	90.1
9 - DK/NA/M	10	7.1

Values	Frequency (n)	Percent (%)
Q19. Did any member of household lose their job because of the flood?		
1 - Yes	2	1.4
2 - No	137	97.2
9 - DK/NA/M	2	1.4
Q20. Did any member of household experience any health problems due to the flood?		
1 - Yes	18	12.8
2 - No	115	81.6
9 - DK/NA/M	8	5.7
Q21. What was the biggest obstacle to solving flood problems in neighborhood?		
Q21A. Llack of money?		
0 - Least obstacle	6	4.3
1	29	20.6
2	8	5.7
3	6	4.3
4	6	4.3
5	9	6.4
6	11	7.8
7	14	9.9
8 - Biggest obstacle	43	30.5
9 - DK/NA/M	9	6.4
Q21B. Lack of government intervention?		
0 - Least obstacle	10	7.1
1	30	21.3
2	6	4.3
3	7	5.0
4	8	5.7
5	17	12.1
6	16	11.3
7	10	7.1
8 - Biggest obstacle	28	79.9
9 - DK/NA/M	9	6.4

Values	Frequency (n)	Percent (%)
Q21C. Lack of homeowners' initiative?		
0 - Least obstacle	10	7.1
1	46	32.6
2	10	7.1
3	14	9.9
4	10	7.1
5	12	8.5
6	9	6.4
7	8	5.7
8 - Biggest obstacle	11	7.8
9 - DK/NA/M	11	7.8
Q21D. Lack of adequate flood protection?		
0 - Least obstacle	13	9.2
1	46	32.6
2	10	7.1
3	8	5.7
4	10	7.1
5	11	7.8
6	9	6.4
7	11	7.8
8 - Biggest obstacle	12	8.5
9 - DK/NA/M	11	7.8
Q21E. Inadequate levee system?		
0 - Least obstacle	9	6.4
1	40	28.4
2	8	5.7
3	6	4.3
4	8	5.7
5	11	7.8
6	7	5.0
7	7	5.0
8 - Biggest obstacle	34	24.1
9 - DK/NA/M	11	7.8

Values	Frequency (n)	Percent (%)
Q21F. Inadequate drainage system?		
0 - Least obstacle	5	3.5
1	16	11.3
2	2	1.4
3	4	2.8
4	5	3.5
5	3	2.1
6	8	5.7
7	3	2.1
8 - Biggest obstacle	89	63.1
9 - DK/NA/M	6	4.3
Q21G. Inadequate emergency preparedness and warning system?		
0 - Least obstacle	9	6.4
1	47	33.3
2	10	7.1
3	11	7.8
4	10	7.1
5	8	5.7
6	3	2.1
7	10	7.1
8 - Biggest obstacle	20	14.2
9 - DK/NA/M	13	9.2
Q21H. Others?		
0 - Least obstacle	5	3.5
1	13	9.2
2	1	.7
4	1	.7
5	3	2.1
7	1	.7
8 - Biggest obstacle	19	13.5
9 - DK/NA/M	98	69.5
Q22. How often think about flood of June 2001?		
1- Don't think about it at all	24	17.0
2 - Seldom	35	24.8
3 - Sometimes	45	31.9
4 - Always	37	26.2
9 - DK/NA/M	0	0.0

Values	Frequency (n)	Percent (%)
Q23. Did you investigate flooding problems in community before purchasing home?		
1 - Yes	65	46.1
2 - No	75	53.2
9 - DK/NA/M	1	.7
Q24. Have you implemented any flood control measures since you bought your home?		
1 - Yes	51	36.2
2 - No	83	58.9
9 - DK/NA/M	7	5.0
Q25. Describe emergency preparations for TSA?		
1 - Extremely inadequate	17	12.1
2 - Inadequate	41	2931
3 - Adequate	65	46.1
4 - Extremely adequate	6	4.3
9 - DK/NA/M	12	8.5
Q26A. Floods are the work of nature and cannot be totally prevented?		
1 - Strongly disagree	17	12.1
2 - Disagree	18	12.8
3 - Undecided	14	9.9
4 - Agree	48	34.0
5 - Strongly Agree	41	29.1
9 - DK/NA/M	3	2.1
Q26B. Compared to my other concerns, flooding has my top priority?		
1 - Strongly disagree	15	10.6
2 - Disagree	26	18.4
3 - Undecided	22	15.6
4 - Agree	29	20.6
5 - Strongly Agree	41	29.1
9 - DK/NA/M	8	5.7

Values	Frequency (n)	Percent (%)
Q26C. Homeowners should be responsible for protecting their homes from flooding?		
1 - Strongly disagree	32	22.7
2 - Disagree	27	19.1
3 - Undecided	34	24.1
4 - Agree	27	19.1
5 - Strongly Agree	14	9.9
9 - DK/NA/M	7	5.0
Q26D. The gov't should bear the responsibility of protecting citizens' homes from flooding?		
1 - Strongly disagree	10	7.1
2 - Disagree	22	15.6
3 - Undecided	17	12.1
4 - Agree	48	34.0
5 - Strongly Agree	36	25.5
9 - DK/NA/M	8	5.7
Q26E. People are partly to blame for some of the damages caused by flooding?		
1 - Strongly disagree	18	12.8
2 - Disagree	15	10.6
3 - Undecided	18	12.8
4 - Agree	49	34.9
5 - Strongly Agree	33	23.4
9 - DK/NA/M	8	5.7
Q26F. With the power of science and technology, flooding is totally preventable?		
1 - Strongly disagree	25	17.7
2 - Disagree	53	37.6
3 - Undecided	26	18.4
4 - Agree	18	12.8
5 - Strongly Agree	13	9.2
9 - DK/NA/M	6	4.3

Values	Frequency (n)	Percent (%)
Q27. Did you implement any of the following temporary flood prevention measures prior to TSA?		
Q27A. Purchased flood insurance?		
1 - Yes	76	53.9
2 - No	56	39.7
9 - DK/NA/M	9	6.4
Q27B. Stockpile sandbags?		
1 - Yes	31	22.0
2 - No	101	71.6
9 - DK/NA/M	9	6.4
Q27C. Stockpile cinder blocks?		
1 - Yes	13	9.2
2 - No	118	83.7
9 - DK/NA/M	10	7.1
Q27D. Purchased water pump?		
1 - Yes	4	2.8
2 - No	125	88.7
9 - DK/NA/M	12	8.5
Q27E. Temporary water diversion paths?		
1 - Yes	21	14.9
2 - No	110	78.0
9 - DK/NA/M	10	
Q27F. Evacuate ground floor?		
1 - Yes	12	8.5
2 - No	115	81.6
9 - DK/NA/M	14	9.9
Q27G. Other measures?		
1 - Yes	12	8.5
2 - No	28	19.9
9 - DK/NA/M	101	71.6

Values	Frequency (n)	Percent (%)
Q28. Given your experience with TSA floods, how effective would the following be in protecting your home/neighborhood from future flooding?		
Q28A. Improved drainage?		
1 - Very ineffective	3	2.1
2 - Ineffective	2	1.4
3 - Not sure	5	3.5
4 - Effective	25	17.7
5 - Very Effective	104	73.8
9 - DK/NA/M	2	1.4
Q28B. Building flood walls around the house?		
1 - Very ineffective	30	21.3
2 - Ineffective	20	14.2
3 - Not sure	40	28.4
4 - Effective	22	15.6
5 - Very Effective	16	11.3
9 - DK/NA/M	13	9.2
Q28C. Build more levees?		
1 - Very ineffective	24	17.0
2 - Ineffective	20	14.2
3 - Not sure	40	28.4
4 - Effective	22	15.6
5 - Very Effective	26	18.4
9 - DK/NA/M	9	6.4
Q28D. Install more sump pumps?		
1 - Very ineffective	17	12.1
2 - Ineffective	10	7.1
3 - Not sure	33	23.4
4 - Effective	28	19.9
5 - Very Effective	45	31.9
9 - DK/NA/M	8	5.7

Values	Frequency (n)	Percent (%)
Q28E. Add sand fill next to house?		
1 - Very ineffective	28	19.9
2 - Ineffective	28	19.9
3 - Not sure	38	27.0
4 - Effective	19	13.5
5 - Very Effective	16	11.3
9 - DK/NA/M	12	8.5
Q28F. Establishment of permanent sand bag depot in each neighborhood?		
1 - Very ineffective	16	11.3
2 - Ineffective	23	16.3
3 - Not sure	23	16.3
4 - Effective	39	27.7
5 - Very Effective	29	20.6
9 - DK/NA/M	11	7.8
Q28G. Making funds available to home owners for flood control prevention projects?		
1 - Very ineffective	9	6.4
2 - Ineffective	9	6.4
3 - Not sure	28	19.9
4 - Effective	39	27.7
5 - Very Effective	48	34.0
9 - DK/NA/M	8	5.7
Q28H. Restricting type of land use in neighborhoods?		
1 - Very ineffective	7	5.0
2 - Ineffective	8	5.7
3 - Not sure	24	17.0
4 - Effective	36	25.5
5 - Very Effective	61	43.3
9 - DK/NA/M	5	3.5
Q28I. Increased government enforcement of flood elevation?		
1 - Very ineffective	11	7.8
2 - Ineffective	6	4.3
3 - Not sure	12	8.5
4 - Effective	38	27.0
5 - Very Effective	68	48.2
9 - DK/NA/M	6	4.3

Values	Frequency (n)	Percent (%)
Q28J. Government subsidizing flood insurance for home owners.		
1 - Very ineffective	10	7.1
2 - Ineffective	12	8.5
3 - Not sure	24	17.0
4 - Effective	31	22.0
5 - Very Effective	57	40.4
9 - DK/NA/M	7	5.0
Q29. Which of the following have you participated in to help address the flooding problem in your community?		
Q29A. Organized or joined grassroots interest group concerned with flooding problem?		
1 - Never	82	58.2
2 - Seldom	17	12.1
3 - Occasionally	11	7.8
4 - Frequently	9	6.4
5 - Most frequently	13	9.2
9 - DK/NA/M	9	6.4
Q29B. Contacted elected officials concerning flooding problem?		
1 - Never	57	40.4
2 - Seldom	12	8.5
3 - Occasionally	25	17.7
4 - Frequently	16	11.3
5 - Most frequently	25	17.7
9 - DK/NA/M	6	4.3
Q29C. Signed petition concerning flooding in your neighborhood?		
1 - Never	80	56.7
2 - Seldom	5	3.5
3 - Occasionally	10	7.1
4 - Frequently	18	12.8
5 - Most frequently	19	13.5
9 - DK/NA/M	9	6.4

Values	Frequency (n)	Percent (%)
Q29D. Contacted government agency to complain about flooding?		
1 - Never	70	49.6
2 - Seldom	8	5.7
3 - Occasionally	16	11.3
4 - Frequently	10	7.1
5 - Most frequently	28	19.9
9 - DK/NA/M	9	6.4
Q29E. Voted for candidate based on their views on flood control?		
1 - Never	50	35.5
2 - Seldom	8	5.7
3 - Occasionally	18	12.8
4 - Frequently	25	17.7
5 - Most frequently	31	22.0
9 - DK/NA/M	9	6.4
Q29F. Attended government meeting addressing flooding problem?		
1 - Never	62	44.0
2 - Seldom	14	9.9
3 - Occasionally	11	7.8
4 - Frequently	19	13.5
5 - Most frequently	25	17.7
9 - DK/NA/M	10	7.1
Q29G. Participation at local grassroots self-help efforts to prevent flooding?		
1 - Never	86	61.0
2 - Seldom	13	9.2
3 - Occasionally	14	9.9
4 - Frequently	6	4.3
5 - Most frequently	12	8.5
9 - DK/NA/M	10	7.1

Values	Frequency (n)	Percent (%)
Q29H. Contributed money to a joint initiative to prevent flooding?		
1 - Never	96	68.1
2 - Seldom	8	5.7
3 - Occasionally	11	7.8
4 - Frequently	5	3.5
5 - Most frequently	5	3.5
9 - DK/NA/M	16	11.3
Q29I. Other?		
1 - Never	10	7.1
2 - Seldom	1	.7
3 - Occasionally	1	.7
4 - Frequently	3	2.1
5 - Most frequently	3	2.1
9 - DK/NA/M	123	87.2
Q30. To what degree was each of the following helpful in coping with the impact of TSA?		
Q30A. Relatives/kinship networks?		
0 - No help	24	17.0
1	5	3.5
2	5	3.5
3	3	2.1
4	4	2.8
5	7	5.0
6	8	5.7
7 - Most help	73	51.8
9 - DK/NA/M	12	8.5
Q30B. Friends and acquaintances?		
0 - No help	15	10.6
1	4	2.8
2	3	2.1
3	4	2.8
4	6	4.3
5	17	12.1
6	19	13.5
7 - Most help	61	43.3
9 - DK/NA/M	12	8.5

Values	Frequency (n)	Percent (%)
Q30C. Church/religious groups?		
0 - No help	60	42.6
1	9	6.4
2	5	3.5
3	6	4.3
4	1	.7
5	15	10.6
6	4	2.8
7 - Most help	27	19.1
9 - DK/NA/M	14	9.9
Q30D. Local civic associations?		
0 - No help	92	65.2
1	10	7.1
2	8	5.7
3	3	2.1
4	6	4.3
5	4	2.8
6	2	1.4
7 - Most help	3	2.1
9 - DK/NA/M	13	9.2
Q30E. Charitable organization(s)?		
0 - No help	69	48.9
1	5	3.5
2	8	5.7
3	10	7.1
4	5	3.5
5	8	5.7
6	10	7.1
7 - Most help	13	9.2
9 - DK/NA/M	13	9.2

Values	Frequency (n)	Percent (%)
Q30F. Government agencies?		
0 - No help	51	36.2
1	6	4.3
2	11	7.8
3	6	4.3
4	8	5.7
5	14	9.9
6	6	4.3
7 - Most help	26	18.4
9 - DK/NA/M	13	9.2
Q30G. Other community/neighborhood residents?		
0 - No help	58	41.1
1	8	5.7
2	5	3.5
3	7	5.0
4	11	7.8
5	13	9.2
6	7	5.0
7 - Most help	20	14.2
9 - DK/NA/M	12	8.5
Q30H. Others?		
0 - No help	23	16.3
1	1	.7
9 - DK/NA/M	117	83.0
Q31. What is your sex?		
1 - Male	63	44.7
2 - Female	74	52.5
9 - DK/NA/M	4	2.8
Q32. What is your race or ethnicity?		
1 - White/Caucasian	119	84.4
2 - Black/African-American	13	9.2
3 - Hispanic	4	2.8
4 - Native American	1	.7
5 - Asian American	1	.7
9 - DK/NA/M	3	2.1

Values	Frequency (n)	Percent (%)
Q33. What was you age on your last birthday?		
20 - 29	17	12.1
30 - 39	29	20.7
40 - 49	30	21.4
50 - 59	23	16.3
60 - 69	13	9.2
70 and above	25	17.8
DK/NA/M	4	2.8
Q34. Own or rent current home?		
1 - Own home	122	86.5
2 - Renting/Leasing home	16	11.3
9 - DK/NA/M	3	2.1
Q35. Approximate value of home?		
1 - Less than $50,000	5	3.5
2 - $50,000 - $99,999	71	50.4
3 - $100,000 - $149,999	51	36.2
4 - $150,000 - $199,999	2	1.4
5 - $200,000 or more	3	2.1
9 - DK/NA/M	9	6.4
Q36. Highest level of education completed?		
1 - 8th grade or less	4	2.8
2 - Some high school	3	2.1
3 - High School or GED	27	19.1
4 - Some college/vocational school	55	39.0
5 - Completed four year college	29	20.6
6 - Some graduate program	10	7.1
7 - Completed graduate school	6	4.3
8 - Completed PH.D. or professional degree	4	2.8
9 - DK/NA/M	3	2.1

Values	Frequency (n)	Percent (%)
Q37. Marital status?		
1 - Married	102	72.3
2 - Divorced	13	9.2
3 - Widowed	11	7.8
4 - Separated	4	2.8
5 - Living together	2	1.4
6 - Single, never married	7	5.0
7 - Others	0	0.0
9 - DK/NA/M	2	1.4
Q38. Employment status?		
1 - Employed full-time	71	50.4
2 - Employed part-time	11	7.8
3 - Self-employed	11	7.8
4 - Homemaker	6	4.3
5 - Unemployed	5	3.5
6 - Retired	34	24.1
7 - Student	0	0.0
8. Other	1	.7
9 - DK/NA/M	2	1.4
Q39. Total household income from all sources for 2000?		
0 - Less than $5,000	2	1.4
1 - $5,000 - $9,999	4	2.8
2 - $10,000 - $14,999	6	4.3
3 - $15,000 - $19,999	11	7.8
4 - $20,000 - $29,999	18	12.8
5 - $30,000 - $39,999	17	12.1
6 - $40,000 - $49,999	11	7.8
7 - $50,000 - $59,999	14	9.9
8 - $60,000 or more	41	29.1
9 - DK/NA/M	17	12.1
Q40. Political beliefs?		
1 - Very liberal	8	5.7
2 - Somewhat liberal	21	14.9
3 - Moderate of middle of the road	35	24.8
4 - Somewhat conservative	37	26.2
5 - Very conservative	25	17.7
9 - DK/NA/M	15	10.6