

Health and Social Problems of a Primary Care Clinic Population After a Disaster

The Hurricane Floyd Flood

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On September 15th, 1999, Hurricane Floyd made landfall on the North Carolina coast. It added 21 inches of rain to the eastern region of a state already drenched by an earlier tropical storm. Together these storms led to the worst flood disaster in North Carolina's history, affecting 66 counties. Fifty-two lives were lost. More than 7,000 homes were destroyed, 17,000 left uninhabitable, and 55,000 damaged. During the height of the disaster, an estimated 50,000 people sought refuge in shelters.¹ In Pitt County, one of the hardest hit areas, the flood structurally damaged 4,200 homes and left 1,600 unusable.² Many businesses were shut down or destroyed because of the flooding, resulting in major economic setbacks for employees and employers. The disaster caused at least \$6 billion in damages,¹ \$280 million in Pitt County alone.² One year after the flood, eastern North Carolina is still struggling to recover.

Several reports have described medical and public health responses during and immediately after the disaster,³⁻⁵ but long-term health effects are still unknown.⁴ A survey of 18 emergency departments in eastern North Carolina found an increase in dog and spider bites, dermatitis, diarrhea, asthma, febrile illness, suicide attempts, and violence in the seven weeks following the disaster.³ Similar patterns of morbidity have followed other severe floods.⁶⁻⁸ Transient emotional problems are common, but they may also experience more somatic illnesses and begin to use health services more frequently.⁹⁻¹² Higher than expected rates of lymphoma, leukemia, and spontaneous abortion,¹³ and mortality have also been documented among survivors of flood disasters.¹² These studies point to a need for long-term health surveillance after flood disasters.

While it is reasonable to assume that health care providers can help prevent or alleviate many health and social problems of flood victims, there is scant documentation of the long-term needs of clinic patients after such disasters.¹¹ On the other hand, we do know a lot about pre-existing medical and social problems in eastern North Carolina. Before the flood, the poverty rate there was 40% higher than the national average. The ratio of primary care doctors per resident was half the national average,¹⁴ and the region ranked worst among the 50 states in terms of premature mortality (unpublished data from Mansfield et al¹⁵). We therefore surveyed patients coming to a primary care clinic in order to learn more about the well-being of the population in a county that experienced major flooding. This paper describes socioeconomic problems, barriers to medical care, and the perception of health problems that followed the Floyd flood.

Methods

We surveyed patients attending the Family Practice Center at the Brody School of Medicine at East Carolina University. The clinic serves a multi-county region in eastern North Carolina, but most of the patients live in Pitt County, one of the counties hardest hit by major flooding. The clinic cares for adults and, to a lesser extent, children. Many of the patients live in poverty, have multiple health problems, and have insufficient health insurance coverage.

The survey was conducted from January 10-16, 2000. Front desk personnel invited patients to participate in the

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Table 1. Demographic characteristics of 539 adult survey respondents

Age	
18-44	54%
45-64	28%
≥65	10%
NR*	7%
Gender	
Women	64%
Men	27%
NR	9%
Race	
African-American	58%
Caucasian	30%
Other	<2%
NR	11%

*NR=Not Recorded

Table 2. Proportion of 539 respondents reporting property loss or damage

	Lost		Damaged		Total	
Home	14%	74	17%	94	31%	168
Home furnishings & appliances	18%	98	7%	37	25%	135
Automobile	13%	64	8%	41	21%	110
Personal belongings	20%	106	8%	45	28%	151
Lost everything except car	6%	30				
Lost everything including car	6%	33				

study and distributed the survey instrument. Patients completed the form in the lobby while waiting to be seen by their health-care provider. Nurses helped patients as needed, responded to questions and concerns, and collected the survey forms after placing patients in examination rooms. Clinical leaders and the hospital's Institutional Review Board approved the study.

The survey included a statement of purpose, demographic questions, and multiple-choice questions pertaining to patients' flood experiences. The multiple choice questions asked about damage to and loss of property (home, home furnishings, personal belongings, automobile, or other property); economic losses (two or more weeks of lost work or loss of employment); taking persons displaced by the flood into their home; barriers to medical care (finding time for clinic visits; paying for care; loss of medicines or medical devices); and any perceived changes in health status of any family members due to the flood (new or worsening health problems). A Spanish version of the survey was used for Hispanic patients.

For purposes of analysis, we classified respondents into three groups on the basis of their flood experiences: (1) Patients who reported damaged or lost property were classified as being directly affected by the flood. (2) Those who suffered only economic losses or who took others into their home were classified as indirectly affected. (3) Those who experienced no problems during the flood were classified as unaffected.

Results

During the week of the study, 1,056 patients came to the clinic, and 626 (59%) of them returned surveys. We report here on data provided by 539 adult patients. The demographic characteristics of this group (Table 1) reflect the demographics of the clinic population as a whole.

Three hundred and twenty-five of the 539 respondents (60%) reported being affected by the flood (222 directly and 103 indirectly). About 31% of respondents reported that

their homes were flooded; 14% lost their homes and 17% sustained damage to their homes (Table 2). One in four reported damage to or loss of home furnishings, and more than one quarter (28%) lost personal belongings. One respondent in five (21%) reported flooding of an automobile, and more than half of these patients lost their cars. Six percent of patients lost ev-

erything, and another 6% lost everything except their car.

Socioeconomic problems created by the flood are shown in Table 3. A third of the respondents (34%) reported that a member of their household lost two or more weeks of work because of the flood. Additionally, almost one in every ten patients (9%) reported that a member of the household lost a job permanently. Interestingly, only about half of households (51%) directly affected by the flood (that is, sustaining property loss or damage) reported loss of employment, compared to more than two-thirds (69%) of those who were indirectly affected. A larger proportion of households directly affected by the flood (19%) reported permanent job loss compared to those indirectly affected (5%), possibly reflecting the magnitude of the economic impact in areas suffering greater property damage. Over 100 respondents reported taking flood victims into their home. Not surprisingly, a smaller percentage (23%) of respondents who were directly affected by the flood were able to accommodate others, compared to 49% of those who were indirectly affected.

Table 3. Socioeconomic impact of Hurricane Floyd flooding

	All respondents (n=539)	Respondents affected by the flood		
		Directly (n=222)	Indirectly (n=103)	Total (n=325)
Lost ≥2 weeks of work	184 (34%)	113 (51%)	71 (69%)	184 (57%)
Lost job	48 (9%)	43 (19%)	5 (5%)	48 (15%)
Took someone into home	102 (19%)	51 (23%)	51 (49%)	102 (31%)

Table 4. Self-reported barriers to health care and changes in family health status by family flood exposure

Barriers to care and health problems	Directly affected (n=222)	Indirectly affected (n=103)	All (n=325)
Loss of medication or medical devices	58 (26%)	7 (7%)	65 (20%)
Paying for medical care	49 (22%)	16 (16%)	65 (20%)
Finding time for clinic visits	53 (24%)	5 (5%)	58 (18%)
A worsening health problem	51 (23%)	8 (8%)	59 (18%)
Finding transportation to clinic visits	47 (21%)	7 (7%)	54 (17%)
A new health problem	44 (20%)	7 (7%)	51 (16%)

The proportion of patients who reported barriers to care or a change in health status of a family member because of the flood is shown in Table 4. Patients who were directly affected by the flood were more likely to report barriers to care than those indirectly affected; 26% of patients directly affected reported loss of medicines or medical devices; 24% had difficulty finding time and 21%, trouble finding transportation to the clinic. About 1 in 5 (22%) had trouble paying for medical care because of the flood. A small percentage of families who were indirectly affected by the flood reported problems with finding time for (5%) or transportation to clinic visits (7%), but one in six (16%) had problems paying for care. Some problems may have arisen from the efforts of indirectly affected flood victims to care for others who suffered greater losses. The seven indirectly affected patients who claimed loss of medications or medical devices because of the disaster apparently misunderstood or misread the question.

Patients who were directly affected by the flood reported more family health problems than those indirectly affected; 20% of those directly affected reported that they or someone in their household had developed a new health problem, and 23% said that pre-existing health problems were worsened "because of the flood." In contrast, 7% of those who were indirectly affected reported that a family member developed a new health problem because of the flood, and 8% said that old health problems had worsened.

Discussion

This report documents some of the ways a flood disaster impacts an adult primary care population. The findings are worrisome in their own right, but are even more troubling when considered in light of the pre-existing health and socioeconomic problems of the region.¹⁴ Social problems (poverty; unemployment; family stress) are well known determinants of population health.¹⁶ The devastating losses that followed Hurricane Floyd compounded the already poor socioeconomic conditions in eastern North Carolina.¹⁴ The lack of economic resources will make recovery extremely difficult, if not impossible, for many residents of the area. The stress and strain associated with recovery efforts may explain some of the health problems reported by flood victims. Many of those families who were not directly flooded still faced burdens such as the temporary loss of income and the stress of caring for flood victims. The perceived health problems of flood victims might have been worsened by barriers to care created by the flood, as reported by a large proportion of respondents in this study. During clinical encounters, health care providers should consider whether the psychosocial stress of disaster survival is an underlying cause of health complaints and should attempt to address these issues. Our findings suggest that primary care providers should assess post-disaster needs, conduct long-term health surveillance, and offer referral to sources of social support after natural disasters.

There are several points to consider in interpreting a study such as ours. We used a convenience sample derived from clinic attendees. Convenience sampling is a quick, low-cost, and simple way to gather preliminary data, but the findings may not be representative of the larger population. Our data should not be generalized to other clinical or disaster sites without comparing demographic profiles of affected populations, and the circumstances surrounding different natural disasters. Another point is that our response rate was somewhat low (59%). We have no way of knowing whether respondents and non-respondents differed in terms of their experiences during the flood. However, the impact of the disaster on patients seen in the clinic during the study period would still be substantial even if none of the non-respondents had been affected by the flood. Finally, we relied on respondents' subjective assessments of property damage and losses rather than a standard definition, but we have no reason to suspect that respondents reported trivial damages. We also relied on respondents' perceptions of barriers to health care and health problems caused by the flood, so it is possible that health problems attributed to the flood were unrelated to the disaster. Nevertheless, recognizing a patient's perspective on causes of an illness helps ensure that relevant health concerns and needs are addressed. Despite these limitations, our study provides useful information about the impact of major flooding on a primary care population.

Conclusions

The eastern North Carolina flood of 1999 caused significant social, economic, and health problems for the clinic patients who participated in our study. The long-term consequences of the disaster are unknown, but are likely to be far-reaching. Given the frequency of hurricanes and other adverse weather events in North Carolina, health care providers across the state need to help their communities prepare for such events. In the aftermath of a disaster, providers need to be ready to monitor and respond to both immediate and long-term health and social needs of their patients.

Our findings suggest that clinicians should consider the exceptional stresses associated with survival and recovery from disaster when making diagnostic and therapeutic decisions for flood victims. Immediately after a flood, patients will need to replace lost prescription medications and devices like oxygen tanks and wheelchairs. Patients will certainly have problems keeping appointments during the height of a disaster, but loss of automobiles means that transportation problems may persist long after. Many will have problems paying for care, especially those who were poor and uninsured before the disaster. Some patients will report new health problems or worsening of pre-existing conditions because of the disaster, and these perceptions are certainly worthy of attention. Providers who take time to assess their

patients' needs and concerns after a disaster, and who keep these problems in mind during clinical encounters, will be in a better position to identify, prevent, and respond to flood-related health problems.

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