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Public Health Consequences of a Flood Disaster— Iowa, 1993

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UNPRECEDENTED amounts of rain in the spring and summer of 1993 led to disastrous flooding and crop damage in nine Midwestern states. In Iowa (1990 population: 2 777 000), extensive flood damage occurred in all 99 counties. On July 11, 1993, the Iowa Department of Public Health (IDPH) requested assistance from CDC to assess the adverse public health impact of the flooding and to plan the public health response to the disaster. CDC assisted IDPH in performing an initial rapid statewide public health assessment and establishing weekly surveillance to monitor ongoing or anticipated flood-related health problems. This report summarizes the methods of the assessment and surveillance and preliminary findings.

On July 15 and 16, IDPH conducted a telephone survey of all 99 county public health officers to assess the impact of the flood on the state's public health infrastructure. Interviewers used a standardized questionnaire to gather information regarding the availability of medical, pharmaceutical, and public health services; operations of public water, sewer, and solid-waste disposal systems; presence of toxic hazards; and increases in the presence of vectors (e.g., rodents or biting insects).

Five of the 99 counties, representing 14% of Iowa's population, reported closures of primary-care physician offices. Closures per county ranged from one office in Van Buren County (1990 population: 7676) to approximately 200 offices in Polk County (1990 population: 324 140). Eight counties (24% of the state population) reported interruptions in public health services (e.g., vaccination clinics; Special Supplemental Food Program for Women, Infants, and Children; and sexually transmitted diseases clinics). Every county had at least one operating pharmacy. Des Moines, in Polk County, was the only community without an operating public water system; the loss of this system affected more

than 250 000 persons (9% of the population). Ten counties (15% of the population) reported at least one nonoperational public sewer system, and 45 counties (53% of the population) reported vector problems.

Because flood-related public health problems were expected to continue into the recovery phase of this disaster, IDPH established a special statewide public health surveillance system. In this system, county public health officers complete weekly questionnaires, based on information obtained from area medical, mental health, and substance-abuse facilities, and county sanitation departments. The questionnaires ask whether, since the last report, the availability of medical or public health services has deteriorated and whether increases above baseline have occurred in reported cases of diarrheal illnesses, admissions for flood-related illnesses or injuries, or admissions to substance-abuse or mental health programs. Other information obtained includes the number of public or private water or sewer systems in need of rehabilitation, whether solid-waste collection or disposal efforts have been hampered, and whether vectors are a problem.

For the week of July 18-24, the number of counties reporting limitations in availability of medical or public health services decreased from eight (24% of the population) during the July 15-16 assessment to four (3% of the population). No outbreaks of diarrheal disease were identified. Seven counties (14% of the population) reported persons hospitalized for the following flood-related illnesses or injuries: carbon monoxide poisoning (related to the indoor use of gasoline-powered generators), hypothermia, electrocution, wound infections, and exacerbation of chronic illnesses. Two counties (2% of the population) reported increases in admissions to substance-abuse programs, and nine counties (16% of the population) reported increases in admissions to mental health

facilities. Twenty-nine counties (37% of the population) reported flood damage to water systems, and 31 counties (35% of the population) reported flood damage to sewer systems. The number of damaged systems (mostly private) per county ranged from one to 1000.

Twelve counties (12% of the population) reported problems with solid-waste disposal; 35 counties (33% of the population) reported increased complaints about mosquitoes and rats—a decrease from 45 counties on July 16. These surveillance results were validated and other local concerns were identified on July 27-28 when multidisciplinary IDPH teams (medical, environmental, and social services) met with local officials (government, emergency preparedness, hospital, public health, and social services) in the 12 most severely affected counties.

To ensure detection of possible waterborne infectious disease outbreaks and flood-related injuries, on July 16, IDPH established an ad hoc surveillance system employing 17 outpatient facilities to monitor the daily number of visits for diarrheal illnesses and flood-related injuries (i.e., heat, musculoskeletal, puncture/laceration, head, animal bite, poisoning, and electrical). As of August 6, when this surveillance was discontinued, no outbreaks of waterborne diseases were identified. In addition to one death from electrocution, five nonfatal cases of carbon monoxide poisoning were reported.

The entomology department at Iowa State University and the University State Hygienic Laboratory at the University of Iowa have maintained an ongoing statewide arbovirus surveillance program since 1968. Mosquitoes are collected daily from New Jersey traps in six major Iowa cities. Carbon dioxide-baited CDC light traps are used periodically to monitor virus activity in vector populations in these cities, and sentinel chicken flocks are located in eastern, western, and central Iowa. On July