



NYNGAN FLOOD LESSON

In April this year, heavy rains fell throughout northern and western New South Wales, causing flooding of the NSW and Queensland inland river systems. The town of Nyngan (population approx. 2,500), located on the Bogan River 165 kilometres north west of Dubbo, was particularly affected because of its flat terrain. Previous flooding of the town occurred in the 1950s but the construction of levee banks prevented this from recurring, even after heavy rains in 1976.

However, a massive local effort to prevent submersion of the town failed when the levees broke on April 23, 1990. Water up to one metre deep entered over 95% of houses, forcing helicopter evacuation of the entire population to Dubbo; only emergency workers and a handful of residents who refused to leave remained in Nyngan. We estimated that 1,500 residents of Nyngan were accommodated mostly in private houses and motels in Dubbo (population 30,135).

The flood waters, containing mud and silt, submerged pumps at the sewage treatment works and the town's reticulated water supply depot, disrupted pipes and cut power and communication lines. Apart from rainwater tanks, the town was left without potable water, sewage or other services. Food and organic matter remained unrefrigerated in both commercial and residential premises. Houses and shops sustained extensive damage to their contents. The flood waters dislodged large freezers in commercial premises, causing them to spill their contents. A large number of animals, including dogs, horses and pigs, were left untended. There were early reports of animal carcasses and sewage littering the streets.

Emergency relief and restoration efforts were rapidly implemented. A group of police, ambulance officers and Bogan Shire staff who had remained in Nyngan started salvage operations. A town co-ordinating committee was formed to establish priorities. On April 28 the Orana and Far West Regional Director of Health directed that adequate potable water and sewage and waste disposal systems be provided to the town, putrescible material be removed from shops and houses, houses and public places be cleaned, birds and animals removed, and insects controlled. A temporary garbage depot was established

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several kilometres from the town. A Public Health Medicine Registrar (JM) was despatched to Nyngan by the Department of Health on April 28 to assist with the maintenance of public health. Finally, an Administrator, appointed by the Premier on May 1, arrived to direct reconstruction efforts.

Measures were rapidly implemented to restore essential services and supplies. By May 3, a fleet of buses was organised to bring back most of the townspeople during daylight over four days, so that they could assess damage to their property and remove personal effects for cleaning and safekeeping. Nyngan residents were asked to indicate their needs so that donated aid materials could be appropriately distributed. All Nyngan residents returning to the town were offered tetanus immunisation by the Department of Health's Orana and Far West Regional Office at the Disaster Recovery Centre in Dubbo, and by staff at Nyngan Hospital. Emergency workers were encouraged to update their tetanus immunisation.

The Regional Office of the Department monitored the mosquito population in the district, setting mosquito traps in Nyngan, nearby towns and the Macquarie Marshes to the north-west. Initial tests on May 7 did not find significant numbers of potential arbovirus vectors.

Citizens of NSW were quick to offer assistance. Donated items of all kinds, ranging from clothes to toys, streamed into Dubbo for the flood victims. Citizens from a nearby town offered to wash all the dirty linen in the town and to provide 1,000 pairs of rubber gloves. A group of electrical technicians volunteered to check the safety of electrical appliances in houses free of charge.

Before residents were permitted to return permanently to their homes, the houses were inspected by health surveyors to assess suitability for human habitation.

FLOOD-RELATED ILLNESS

Anecdotal reports of skin infections in Nyngan residents prompted us to study whether these were increased among flood victims. We examined Dubbo Base Hospital Casualty Department attendance records for the period April 24 to May 5. We selected people with infections of skin, and for comparison people with infections of the gastro-intestinal tract (including abdominal pain), and the upper respiratory tract (including 'viral illnesses'). The distribution of casualty attendances for these conditions by place of residence is given in Table 1.

TABLE 1

PLACE OF RESIDENCE OF PEOPLE ATTENDING DUBBO BASE HOSPITAL CASUALTY WITH SYMPTOMS OF SKIN, RESPIRATORY AND GASTRO-INTESTINAL INFECTIONS: April 24 to May 5, 1990

TOWN	SI (rate)	RI (rate)	GI (rate)	Total (rate)
Dubbo	4 (0.1)	17 (0.6)	21 (0.7)	42 (1.4)
Nyngan	8 (5.3)	2 (1.3)	3 (2.0)	13 (8.7)
Other/Unknown	2	6	9	17
Total	14	25	33	72

SI = symptoms of skin infection
 RI = symptoms of respiratory tract infection or "viral illness"
 GI = symptoms of gastro-intestinal infection or abdominal pain
 rate = cases per 1000 based on estimated population of Nyngan residents in Dubbo and of Dubbo residents in Dubbo.

People with skin infections were more likely to have lived in Nyngan than Dubbo compared with people with respiratory infections (odds ratio 17.0, 95% CL 2.0 to 199.3) or people with gastro-intestinal infections (odds ratio 14.0, 95% CL 2.0 to 110.4). People with respiratory infection were just as likely to have lived in Nyngan or Dubbo as people with gastro-intestinal infections (odds ratio 0.8, 95% CL 0.1 to 8.1).

These results suggest that people living in Nyngan at the time of the floods were more likely to suffer skin infections than people living away from the flooded areas. The data, however, should be interpreted cautiously, as Nyngan residents were dislocated from their usual general practitioners, and they were therefore more likely to seek care from the hospital than were Dubbo residents. Nevertheless, the data support the view that the prompt evacuation of the population from the flooded town and the rapid implementation of public health measures prevented further flood-related infections.

Continuing surveillance of diseases in people normally living in Nyngan continued until May 31. A report on these data will appear in a forthcoming issue of the Bulletin.

EDITORIAL NOTE

Flooding is estimated to cause 40 per cent of the world's natural disasters. As more people occupy flood-prone areas, we can continue to expect flood-related disasters. Worldwide, the major cause of death from flooding is drowning. In non-industrialised countries, outbreaks of certain infectious diseases have been documented following floods, including leptospirosis, malaria, yellow fever and typhoid fever. Environmental contamination from chemical stores affected by floods has occurred. In addition psychological illness has been found among flood victims up to five years after the event¹.

Illness can be prevented in these circumstances by ensuring contamination-free food and water supplies, by providing facilities for the safe disposal of waste, and if necessary, by controlling insect vectors.

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1. French JG and Holt KW. Floods, in: *The Public Health Consequences of Disasters 1989*. CDC Monograph. US Department of Health and Human Services, Public Health Service, Centres for Disease Control, Atlanta, Georgia.