Hurricanes and child health: lessons from Cuba

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HURRICANES
A hurricane is a large rotating storm with a central area of very low pressure and strong winds greater than 74 mph (118 km/h).1 The hurricane is graded 1–5 in relation to the strength of the winds, which can be greater than 155 mph (249 km/h, category 5). Hurricanes arise from warm, moist air from tropical oceans, and with global warming, hurricanes are occurring more frequently and with greater severity.3 Tropical storms originating in the Atlantic Ocean or the Eastern North Pacific Ocean (ie, the Northern hemisphere) are termed hurricanes, whereas those that originate from the Pacific Ocean are known as typhoons and those from the Indian Ocean as cyclones.2 Hurricanes are a major problem for countries in the Caribbean and Central and Latin America. The word ‘hurricane’ is thought to be derived from either the Carib god ‘Hurican’ or the Mayan god ‘Hurakan,’ who caused a great storm and flood by blowing his breath across the ocean.4

HEALTH EFFECTS
It has been estimated that almost two million people worldwide have died from tropical storms (hurricanes, typhoons and cyclones) in the last two centuries.1 In the 20th century alone, there have been 75 000 deaths from hurricanes in North America and the Caribbean, including almost 10 000 deaths from hurricane Mitch, which affected Central America in 1998.5

The impact of hurricanes on health can be divided into immediate and during the recovery phase. Drowning during the hurricane used to account for the majority of the deaths. The use of warning systems combined with evacuation has, however, dramatically reduced drowning deaths.1 3 During hurricane Katrina, however, two-thirds of the fatalities were thought to be due to the direct physical effects of the flood, and the majority of the deaths were thought to be due to drowning.6 The high number of deaths due to drowning following hurricane Katrina was probably associated with the inadequate evacuation and preparation of the population.7 Hurricanes also cause death by physical damage to buildings and trees, which may result in direct trauma. The most frequent injuries following hurricanes are cuts, lacerations, puncture wounds and blunt trauma caused by flying glass and other debris.1

There are significant health effects after the hurricane when there may be a lack of clean water, food and housing as well as access to healthcare. The lack of provision of these essential items undoubtedly contributed to the significant mortality following hurricane Katrina.9 10 Infectious diseases may increase dramatically following a tropical storm. This increase in infectious diseases is more likely to occur in low- and lower-middle income countries. Damage to water and sanitation networks, alongside pools of stagnant water following flooding, may result in a significant increase in cases of gastroenteritis and other infectious diseases. Hurricane Mitch resulted in increases in the number of cases of cholera, leptospirosis, dengue and malaria in several of the affected countries.5 Shelter for families who have been evacuated or whose homes have been destroyed is critical for survival. Fatalities following the cyclone in Bangladesh in 1991 were significantly higher in areas where shelter was not provided.11

There is increasing recognition that following hurricanes and other natural disasters, there may be significant mental health problems.12 The most frequent psychological disorder following natural disasters is post-traumatic stress disorder (PTSD).13 Children appear to be more prone to PTSD than adults following natural disasters.12 The prevalence of PTSD appears to be related to the severity of the natural disaster and the proximity of the child or adolescent to the event.12 Studies in children following hurricanes have shown the prevalence rate of PTSD has ranged from 7% to 90% in severely affected regions in Nicaragua following hurricane Mitch.14 The symptoms of PTSD can be present for a long period after the hurricane; 12% children had severe symptoms of PTSD 10 months after hurricane Andrew.15 It is important therefore to recognise that the health effects of hurricanes can last well beyond the initial period of impact.

CUBA
In the summer of 2008, over a period of 3 weeks, two category 4 hurricanes (Gustav and Ike) caused over 200 deaths in the Caribbean and the USA.16 17 The two hurricanes were at their greatest intensity (category 4) in Cuba and caused widespread destruction to buildings, livestock and crops. Hurricane Ike alone damaged over 300 000 homes in Cuba.17 Extensive damage to crops has been reported, and the economic cost to Cuba has been estimated as US$3–4 billion.17 The two hurricanes were of far lower intensity (categories 1 and 2) when they passed through Haiti and the USA. Despite the fact that Cuba experienced the hurricanes at their greatest intensity, there were only seven deaths throughout Cuba.16 In contrast, there were over 100 deaths in Haiti and over 30 in the USA.16 Over the last 50 years, Cuba has managed to reduce significantly the number of deaths following hurricanes.18 19 Hurricane Flora in 1963 resulted in the deaths of over 1200 people in Cuba.18 Since then, Cuba has introduced early warning systems alongside evacuation. Hurricane Ike passed directly through the Province of Camaguey, and the steps taken to protect the health of children and adults are important for other countries.

WARNING AND PREPARATION
Because hurricanes originate in the middle of oceans, it is several days before the hurricane reaches land, and this allows governments to take action to protect human life. Cuba has an excellent meteorological institute which, in conjunction with US scientists, projects...
the likely paths of hurricanes. The ben-
fits of universal education and eradic-
ation of illiteracy are that the popula-
tion is aware of the risks associated with
hurricanes and understands government
warnings. The importance of issuing early
warnings to the population cannot
be overemphasised and has been shown
to be effective in reducing deaths for a
variety of extreme weather events.3 It
is important to recognise that Cuba has a
population with a very high level of civil
participation. The majority of the popu-
lation are members of different mass
organisations, and there is a strong sense
of community spirit.

Hurricane awareness is taught in
schools, and 72 h prior to a hurricane,
national media issue alerts are given while
civil protection committees check evacu-
ation plans and shelters.20 Following hur-
icane Dennis in 2005, which resulted in
17 deaths within Cuba, a greater aware-
ness of the risks associated with hur-
icanes has been emphasised to the Cuban
population.19 Forty-eight hours prior to
the hurricane, authorities inform high-
risk areas and evacuation commences.
Prior to hurricane Ike, 2.6 million people
(23% of the population of Cuba) were
evacuated and housed in shelters.17

PREPARATION IN CAMAGÜEY

PROVINCE

Prior to the hurricane reaching Camagüey province, which has a
population of just under 800 000, senior health professionals identified
groups that were at the greatest risk. This included approximately 300 chil-
dren with significant medical problems, 8000 infants and 4000 pregnant
women. Children were discharged from the hospital where appropriate, and
the emergency departments were prepared for admissions. Paediatric health
professionals were allocated to each of the evacuation centres. In the 24 h fol-
lowing hurricane Ike, there were over 500 emergency cases presenting to
the Children’s Hospital in Camagüey. Ninety-six of these children required
admission, and four required surgery.

RECOVERY STAGE

Healthcare following the hurricane is essential. In particular, the importance
of hygiene and sanitation was emphas-
sised to minimise the increase in acute
gastroenteritis. Following the hurricane,
there was a 10% increase in gastroenteri-
itis. Within a week of the hurricane, all
8000 infants in Camagüey Province were
visited in their homes by the family doc-
tor, nurse or other health professional.
This was only possible because Cuba has
one of the best primary healthcare sys-
tems in the world with the highest ratio
of doctors per capita worldwide.21 22 Each
family doctor and nurse is responsible for
between 120 and 160 families. Health
professionals kept a special lookout for
mental health problems in children fol-
lowing the hurricane, as it is recognised that these are significant problems.23

CONCLUSIONS

The economic damage caused by hur-
icanes Gustav and Ike (two category
four hurricanes) to Cuba was substan-
tial. However, by a combination of early
warnings and preparation alongside the
evacuation of almost a quarter of the popu-
lation of Cuba, only seven lives were
lost (box 1). Both Jamaica and the
Dominican Republic have used the mass
media in a similar manner to Cuba to
try and increase awareness among indi-

References

1. Shultz JM, Russell J, Espinol Z. Epidemiology

tropical cyclones: the dynamics of disaster,
disease, and development. Epidemiol Rev


noaa.gov/pdf/NWS-TPC-5.pdf (Accessed 15

December 2009).

3. Ebi KL, Schmier JK. A stitch in time: improving

public health early warning systems for extreme


4. National Oceanic and Atmospheric


www.aoml.noaa.gov/hrd/tcfaq/84.html (Accessed

27 January 2010).

5. Pan American Health Organization. Impact of

hurricane Mitch on Central America. Epidemiol Bull


life caused by the flooding of New Orleans after

Hurricane Katrina: analysis of the relationship

between flood characteristics and mortality. Risk

Anal 2008; 29: 678 – 86.

7. Susman J. A case that’s black and white: the

price of being poor and African American in New


8. Linscott AJ. Natural disasters—a microbe’s


9. Ferdinand KC. Public health and Hurricane Katrina:

lessons learned and what we can do now. J Natl Med Assoc


10. Atkins D, Moy EM. Left behind: the legacy of


Psychosocial responses to disaster: an Asian


disaster victims speak: Part I. An empirical review


Posttraumatic stress and depressive reactions

among Nicaraguan adolescents after hurricane


Symptoms of posttraumatic stress in children after

hurricane Andrew: a prospective study. J Consult Clin


nhc.noaa.gov/pdf/TCR-AL072008_Gustav.pdf


noaa.gov/pdf/TCR-AL092008_Ike.pdf (Accessed

14 December 2009).

18. Mesa G. The Cuban health sector and disaster


19. Reed G. You can’t stop the rain: José Betancourt,


20. International Federation of Red Cross and

Red Crescent Societies. World Disasters Report

2005. Chapter Two: Run, Tell Your Neighbour!

http://www.ifrc.org/publicat/wdr2005/chapter2.asp

(Accessed 11 February 2010).

21. Rodriguez FV, Lopez NB, Choonaar I. Child health


22. Lopez NB, Choonaar I. Can we reduce the number

of low-birth-weight babies? The Cuban experience.


Posttraumatic stress symptoms in children after

hurricane Katrina: predicting the need for mental

health services. Am J Orthopsychiatry 2009; 79:

212 – 20.

Box 1 Measures to minimise casualties for hurricanes

Before the hurricane

▶ Early warning and preparation of population

▶ Organised evacuation

▶ Identification of groups at risk

After the hurricane

▶ Provision of shelter, food and water

▶ Provision of healthcare, especially to groups at risk

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