

ANNEX I

MOH/PAHO KEITH HEALTH ASSESSMENT/SURVEILLANCE TEAM

The MOH Disaster Plan was activated on Friday, September 29, 2000 at 2:00 p.m.

The MOH/PAHO Keith Assessment/Surveillance Team was established on the third of October 2000, at 2:00 p.m.

The KHAS Team is comprised of the following members:

Mr. Cortez Nurse, Health Advisor
Dr. Jorge Polanco, Deputy Director of Health Services
Mr. Godswel Flores, Principal Public Health Inspector
Nurse Malva Allen, Supervisor Public Health Nurse
Dr. Michael Pitts, Epidemiologist
Dr. Amalia Del Riego, PAHO/WHO Consultant Health Services/Epidemiology
Mr. Rony Maza, PAHO/WHO Environmental Health Consultant

Terms of Reference

1. To conduct Post Hurricane Keith Rapid Health Assessment
2. To implement Post Hurricane Keith Surveillance System
3. To provide MOH with daily updated reports on the impact of Hurricane Keith on the Health Situation.
4. To recommend actions to prevent and/or control potential outbreaks.
5. To identify areas in need of assistance.

BACKGROUND

As part of the MOH disaster plan, the MOH develop three forms for data collection.

1. Shelter Surveillance Form: to collect daily information on disease pattern in shelters.
2. Shelter Environmental Health Status to collect daily information as it relates to the environment (water supply, sanitary facilities, solid waste, food safety, and vector control). To be filled out by the Shelter Managers.
3. Shelter Environmental Health Status to collect daily information as it relates to the environment (water supply, sanitary facilities, solid waste and food safety) to be filled out by the public health inspector.

Forms were reproduced and personnel trained (Public Health Inspectors and identified Shelter Managers) in its use. However a surveillance protocol was not provided and forms distributed were not used.

On Monday 2nd, October, forms for surveillance were distributed to all the districts. Reports have been received at MOH Command Center every three hours from the DMOs, or the Sister in Charge, however this is not being standardized.

ANNEX II

RAPID DAMAGE ASSESSTMENT FORM (Immediate Post-Disaster)

Country _____	Reporting Area _____			
Disaster _____	Name & designation of contact person _____			
Impact date & time _____				
Communication lines open? Yes No Phone _____ VIIF _____ Ham Radio _____ Other _____				
Population _____ Homeless _____ Injured (1) _____ (2) _____ (3) _____ Total _____ Dead _____ Missing _____				
Health Personnel: Affected _____ Available _____ Required _____				
	DESTROYED	DAMAGED	DISRUPTED	NO DAMAGE
FACILITIES: Hospitals Health Centres Bi-medical Equipment Homes Shelters Airport Roads Bridges Schools Government Building				
WATER: Source Storage Treatment Distribution				
UTILITIES: Telephone Electricity Radio Sewage Television Fuel Storage Solid Waste				
FOOD PROTECTION: Wholesale and Retail Food Stores Distribution System				
CRITICAL EQUIPMENT/SUPPLIES	ADEQUATE	INADEQUATE	REQUIREMENTS	
Drugs Dressings Medical Equipment Chlorination Equipment Other				
Name: _____ Designation: _____				

ENVIRONMENTAL HEALTH RAPID ASSESSMENT

Place _____ Date _____ Person Reporting _____

Total Population: _____

SERVICE	IMPACT/ CODE	REMARKS
Water Supply Damage to treatment plant Broken lines Service Interruption (include estimated amount of persons without services in Remarks) Interruption of water quality monitoring Biological Contamination Chemical Contamination Equipment, parts & Supply Availability of treatment equipment/reagents (specify in remarks)		
Sanitation (Excreta disposal/Sewerage System) Treatment Plant affected <i>Broken Lines</i> Destruction of Septic Tanks Destruction of Latrines Flooding of facilities Over flowing into residential areas		
Solid Waste Flooding of dump site Management/Collection interruption		
Food Handling Damage to food preparation facilities Transportation failure Power interruptions Flooding of facilities Contamination/degradation of relief supplies		
Vector Control Proliferation of Vector breeding sites Increase in Human Vector Contact Disruption of vector control programme <ul style="list-style-type: none"> ▪ Availability of spraying equipment ▪ Insecticides and pesticides ▪ Personal Safety Equipment 		
Toxic Substances (i.e. gasoline, oils, pesticides, caustics, acids) Damage to storage facilities Flooding of facilities Intoxicated persons		
Home Sanitation Destruction or damage to housing Interrupted water supply Flooding Overcrowding		
Dead animals		

IMPACT: If code does not apply, describe the situation. CODES: 0 Limited 1 Moderate 2 Severe

PAHO DISASTER RESPONSE TEAM GUIDELINES

APPENDIX 1 (b)

Post Disaster Health Facilities/Services Damage Assessment

Event _____ Assessment Date _____ Assessor Name _____

Health Facility Name _____ No. of Beds: Pre Event _____ Now _____

	Service Status	Staffing	Supplies	Equipment	Buildings	Comments
General Medicine						
General Surgery						
Obstetrics/Gynaecology						
Paediatrics						
Operating Theatres						
Out-Patient Clinics						
Casualty/emergency						
Pharmacy						
X-Ray						
Laboratory						
Physiotherapy						
Laundry						
C.S.S D.						
Dietary Service						
Transport Service						
Morgue						
Electricity		Not App	Not App			
Water Supply		Not App	Not App			
Telephone		Not App	Not App			
Wireless Radio						

Key for Table

Code	Service Status	Staffing	Supplies	Equipment	Buildings	Code
0	No Service	No Staff	No Supplies	Non Funct	Non Funct.	0
1	Emergency Service Only	Emergency Staff only	Emergency Supplies	Moderate Damage Limited Function	Moderate Damage Limited Function	1
2	Limited Service	Limited Staffing	Limited Supplies	Minor Damage Functional	Minor Damage Functional	2
3	Normal Service	Normal Staff	Normal Supplies	No Damage	No Damage	3
X	Service no Normally Available	Service not Normally Available	Supplies not Normally Available	Equipt. Not Normally Available		X

ANNEX III

POST DISASTER SURVEILLANCE PROTOCOL DRAFT DOCUMENT

The objective of the MOH Post Disaster Surveillance system is to obtain accurate daily information on the impact on Health of Hurricane Keith.

STRUCTURE AND ORGANIZATION

1. The Ministry of Health established a MOH/PAHO Keith Health Assessment/Surveillance Team on October 3, 2000, at 2:00 p.m. The main objectives of the team are:
 - a. To conduct Post Hurricane Keith Rapid Health Assessment
 - b. To implement Post Hurricane Keith Surveillance System
 - c. To provide MOH with daily updated reports on the impact of Hurricane Keith on the Health Situation.
 - d. To recommend actions to prevent and/or control potential outbreaks.
 - e. To identify areas in need of assistance.
2. The team reviewed the existing formats and procedures for post-disaster surveillance and adjusted the same.
3. In each District and or affected area, a surveillance focal point is appointed, who is responsible for the collection of data in the formats provided by the KHAS Team, and for daily reporting of those forms to the National Epidemiologist. The surveillance focal point could be a PHI or a Public Health Nurse, who will work in close coordination with the DMO (where available).

CONDITIONS UNDER SURVEILLANCE

The following are conditions under daily surveillance during four weeks after the Hurricane:

Casualties (daily)

Communicable Diseases (daily)

Number of dog bites (daily)

Number of snakebites (daily)

Water Quality (daily)

Availability and condition of sanitation facilities in shelters (daily)

Condition of sewage systems (weekly)

Death animals (daily)

INSTRUMENTS

Health Facilities Daily Surveillance Form

Shelters Daily Surveillance Form

Environmental Health Daily Surveillance Form

Environmental Health Weekly Surveillance Form

PROCEDURES

The Shelter daily Surveillance Form is to be filled out by the Shelter Manager, collect and review by the Public Health Inspector or the Health Provider responsible to monitor health shelter conditions. Ministry of Health will assign at least one health provider to monitor health shelter conditions by geographical area. The Public Health Inspector or health provider, will provide the Surveillance focal point with all forms and the Surveillance Focal point will fax the same to the National Epidemiology, every day.

A health provider (public health nurse, or practical nurse) will be responsible to fill out every day the Health Facility Post Disaster Surveillance Form. The Surveillance Focal Point will collect daily the forms from all the health facilities, and will fax them to the National Epidemiologist.

The National Epidemiologist will compile all forms and will ensure that daily data processing is conducted. The KHAS will conduct daily analysis of surveillance reports and will provide updated information to the DHS, PS, and Minister accordingly.

The KHAS will monitor the situation and will decide when daily reporting will be discontinued. At that moment specific procedures will be provided.

MINISTRY OF HEALTH DAILY SHELTER SURVEILLANCE FORM

SHELTER: _____
 NAME LOCATION/VILLAGE/TOWN

SHELTER MANAGER: _____ DATE _____
 TELEPHONE: _____

DEMOGRAPHICS AND HEALTH CONDITIONS:

Demographics and Health Conditions	Under 5		Over 5		TOTAL	
	Males	Females	Males	Females	Males	Females
Total persons in Shelter						
Fever (100F or 38C)						
Fever and Cough						
Fever and Diarrhea						
Vomiting and/or Diarrhea						
Jaundice						
Fever and Rash						
Conjunctivitis (pink eye)						
Skin infections						
Injuries						
Deaths						
Snake Bite						
Dog bite						
Other (Specify)						
Total						

ENVIRONMENTAL HEALTH CONDITONS

WATER SUPPLY:

Available Yes _____ Quantity _____ gallons No _____
 Source: Public System (Pipe) _____ Rain _____ Surface _____ Ground _____ Other(specify) _____
 Treatment: Chlorinated _____ Filtered _____ Boiled _____ Other(specify) _____
 Water Storage Available: Yes _____ Volume _____ gallons

SANITARY FACILITIES.

Toilets _____ Latrines _____ Other _____
 Conditions: adequate _____ inadequate _____

SOLID WASTE MANAGEMENT

Solid waste collected/removed daily Yes _____ No _____
 Are plastic bags and bins available? Yes _____ No _____

VECTORS

Mosquitoes _____ Rodents _____ Flies _____ Bats _____

	LIST OF SHELTER NEEDS
Number of persons requiring prepared meals	
Number of persons requiring basic medication (specify)	
For Water Supply	
For Sanitary Facilities	
Plastic Bags	

HOSPITAL/HEALTH CENTER: _____
NAME _____ VILLAGE/TOWN _____

HEALTH CONDITIONS:

[illegible]

MOH POST DISASTER SURVEILLANCE PERSONNEL

DISTRICT/LOCATION: _____

SURVEILLANCE FOCAL POINT: _____

TELEPHONE: _____

[illegible]

[illegible]

ANNEX IV

ESTIMATED AFFECTED POPULATION*, BELIZE DISTRICT, as of 11 October, 2000

Location	Total Population As Per Census 2000	Total Population As Per PHI Or Key Informant	Living In Flooded Areas	Living in Flooded Houses**	Living in Shelters	Homeless	Displaced	Isolated (No access by road)	At high risk of Health Impairment
Caye Caulker	742	1,300				279	279		1,300
San Pedro	4,499	10,000				3,000	3,000		10,000
Belize City	49,059	N/A	14,717	2,943					14,711
Maskall/ Corozalito	600	766	600	120				600	600
Bomba	170	84	170	34				170	170
Santana		170	170	34				170	170
Crooked Tree	693	800	693	138				693	693
Rancho Dolores	171	167	171	34				171	171
Maypen		71	71	71				71	71
Flowers	455	235	455	91				455	455
Bank/Lemonal									
Isabela Bank	N/A	130	130	26				130	130
Burrell Boom	1,093	911	1,093	218				1,093	1,093
Bermuda Landing	728	168	728	146				168	728
Double Head	N/A	365	365	73				365	365
Cabbage									
Willows Bank	351	120	351	70				351	351
St. Pauls	N/A	114	114	23				114	114
Big Falls	N/A	4	4	4				4	4
Ladyville	3,435	4,009	3,455	691					3,455
Hattieville	733	1,301	733	147					733
SUBTOTAL	62,729	20,715	24,029	4,863		3,279	3,279	4,555	35,314

*Utilizing Census 2000 information except for the Islands (Caye Caulker and Ambergris Caye) and Villages not listed in the Census 2000 report

**Estimate, 20% of persons living in flooded areas

ESTIMATED AFFECTED POPULATION, ORANGE WALK DISTRICT, as of 10 October, 2000.

Location	Total Population As Per Census 2000	Total Population As Per PHF Or Key Informant	Living In Flooded Areas	Living In Flooded Houses	Living In Shelters	Homeless	Displaced	Isolated (No access by road)	At high risk of Health Impairment
Orange Walk Town	13,483	10,410	2435	487			420		2,855
San Antonio	N/A	395	395	48	35		155	240	395
San Estevan	1,573	1,450	1,450	290			123	1450	1,573
San Roman	469	461	469	94			58	411	469
Santa Cruz	627	462	627	125			165	422	627
Santa Martha	N/A	260	215	43			45	215	260
Carmelita	1,269	N/A	1,269	253			0	1,269	1,269
Campechito	N/A	N/A	0	0			0		0
Guinea Grass	2,510	N/A	2,282	456			228	2,054	2,510
Douglas	787	570	0	0	30		757		787
San Pablo	926	877	0	0			0		0
Nuevo San Juan	N/A	215	215	43			0	215	215
Indian Creek	722	354	722	144			0	722	722
Indian Church	435	250	435	87			0	435	435
San Carlos	N/A	76	76	15			0	76	76
Trial Farm	3,443	2,208	3,238	647			105		3,343
SUBTOTAL	26,244	17,988	13,673	2,732	65		2,056	7,509	15,536

**ESTIMATED AFFECTED POPULATION, COROZAL DISTRICT, as of 10 October,
2000.**

Location	Total Population As Per Census	Total Population As Per PHI Or Key Informant	Living In Flooded Areas	Living In Flooded Houses	Living in Shelters	Homeless	Displaced	Isolated (No access by road)	At high risk of Health Impairment
Libertad*	1226	1,440	1,226	0					234
Caledonia*	1,276	1,275	1,266	10				1,276	1,276
San Narciso/San Victor*	1,600	1,643	1,600	70				70	1,324
San Roman/Santa Clara/Buena Vista*	1,922	1,027	1,872	50				50	1,922
Louiseville*	655	N/A	635	20					655
Concepcion*	939	993	929	10					939
San Joaquin Calcutta Ranchito	2,112	2,733	2082	30					597
Paraíso	885	730	0	0					0
San Andres	751	609	0	0					0
Xaibe	1,254	N/A	1,239	15					1,254
Pachacan	1,142	1,098	1,127	15					1,142
Chan Chen/San Antonio	858	530	0						0
San Pedro Cristo Rey Yo Chen	1,225	1,217	1135	90					1,225
Sarteneja	1,648	1,395	1,648	115					1,648
Chunox/Copper Bank	1,143	803	1,143	110					1,143
Progreso	1,165	1,121	1,165	50					0
Little Belize	2,059	N/A	2,059	25					2,059
Corozal Town	7,888	7,174	0	0					0
SUBTOTAL	26,748	23,788	19,126	610				1396	15,419

*Areas that have history of flooding, water was rising and more flooding is expected

**Estimated based on number of houses flooded. Assuming and average of 5 inhabitants/household based on census data.

ESTIMATED AFFECTED POPULATION, CAYO DISTRICT, as per 10 October, 2000

Location	Total Population As Per Census	Total Population As Per Phi Or Key Informant	Living In Flooded Areas	Living in Flooded Houses	Living in Shelters	Homeless	Displaced	Isolated (No access by road)	At high risk of Health Impairment
Belmopan	3,991		0						
Salvapan	1,751		1,751	350					1,751
Las Flores	453	893	453	91					453
Oasis	241		241	48					241
San Martin/ Salvapan	1,694	1,021	1,694	339					1,694
Roaring Creek	1,684	1,193	1,684	337					1,684
SUBTOTAL	9,814	3,107	5,823	1,165					5,823

HEALTH STATUS OF THE POPULATION* AS OF OCTOBER 10, 2000

Reported Health Conditions	Total
Fever (100 F+ 38 C+)	177
Fever and cough	153
Fever and diarrhea	32
Vomiting and/or diarrhea	76
Fever and rash	
Conjunctivitis	16
Dermatitis (skin infection)	30
Asthma	2
Dog bites	2
Chicken Pox	6
Others	98
Diarrhea and blood	10
TOTAL	666
Total people injured (as reported by the health facilities/personnel)	
Mild	**119
Moderate	17
Severe	***6
Total Deaths	****6
Total Missing	2

*The figures are very conservative due to the magnitude of under reporting. The regular reporting mechanisms have been disrupted due to the emergency, including isolation of health centers and communication problems

** Includes 31 Mild injuries from RTA on the day that the "All Clear" phase was declared.

***Includes 5 severe injuries from RTA on the day that the "All Clear" phase was declared.

**** Includes 4 deaths on the day that the "All Clear" phase was declared.

ANNEX V

Rapid Damage Assessment Post Disaster Stress Management Mental Health Program

Assessment Team: Dr. Claudina Cayetano; Joann Griffith
Reporting Areas: San Pedro, Ambergris Caye; Caye Caulker
Date: 7-11 October 2000

The objectives were:

- To provide effective counseling for individuals affected directly or indirectly by a disaster in order to prevent or alleviate any psychological problems.
- To be psychologically equipped to cope in the healthiest way possible.
- To conduct an assessment of the mental health needs of post-disaster survivors.

♦SAN PEDRO

Staff Assessment:

On arrival to the island, we realized that the staff was overworked and stressed. A debriefing session was immediately conducted. The staff was put in a reception room of the Sun Breeze Hotel where the emergencies were being managed. This meeting was unusual for the staff as it was the first time and the instructions were that:

- we were not going to talk about patients
- they were to talk about their family and their reaction to what was happening and of the impact of the disaster
- the issues discussed in the groups were to be kept confidential and were not to be discussed after the session

Group meetings were held with the staff that was present who were mostly medical personnel from Belize City and some volunteer, except for one occasion when one member of staff from San Pedro participated. These meetings were repeated again during the psychiatrist's visits on Monday and Tuesday.

The meetings brought cohesiveness to the group and reinforced the importance of listening to each other's reactions and to their own emotions.

Assessment of Shelters:

• San Pedro R C Primary School

This was a very devastating scene. We did not do a head count but there was an estimated 130 people there. A group meeting was held with persons over age 30, who shared their reactions during the storm and about what it was like living in a shelter. Most people felt that they had been unprepared. They had not thought that the hurricane would have been so devastating. Most lost everything. Some were renting and had no place to which to return. Some are foreigners with small children and have no other relatives in Belize to whom to turn. When they were conscious of their

emotions of sadness they said, “importante es que estamos vivos” (the most important thing is that we are still alive). Their experiences during the storm were another issue.

The shelter is a two-story school building. People began to use both floors as shelter. However, the roof of the first floor began to lift in the wind forcing the people to go down to the first floor, which was already overcrowded. In the middle of the hurricane when they decided that the room could not take anymore, the men went back on the second floor and the women and children stayed on the ground floor. Since they were not prepared, two days passed without meals. Access to the toilet was a tremendous issue that began to cause fights and arguments. No shelter manager was available and none had been identified up to October 11th.

By October 11th there were 98 people staying at the school who were worrying about their houses and finding food, since the school was to reopen the next week.

A small meeting was conducted for “conflict resolution”. The living conditions make some people more cooperative while increasing the stress and decreasing the frustration tolerance for others, resulting in arguments over minor concerns. For example, before my arrival two families were about to fight for clothesline space and another fight had broken out over a tin of Milo.

Other Activities:

- A visit to the only radio station on the island: Public service announcements were made that counseling and psychiatric consultation services were available; also a talk was given on reactions to stress and stress management.
- A visit with NEMO personnel to remind them of the importance of stress management for themselves, to take time out, and to be aware of the negative impact of stress.
- Individual meetings with all the MDs on the island in order to discuss their experiences and reactions, and to explore their methods of coping.
- Individual counselling sessions were held at the Sun Breeze Hotel. Most people were self-referred, but some were referred by physicians.

Assessment of Mental Health Status:

Common Mental Symptoms included great sadness and emotionality; anger that this happened to them; feeling helpless and hopeless; increased irritability; flashbacks of vivid images and nightmares.

Common Diagnoses: Generalized Anxiety Disorder (GAD), PTSD, Panic Attack and Depression.

Common Physical Symptoms:

- headaches
- palpitations
- breathlessness
- feeling sick
- upset stomach/diarrhea
- fainting spells
- chest pains and discomfort

Most people had somatic symptoms that they did not necessarily connect to their reaction to stress.

Plan of Action:

- Continue the presence of PNP on the island for now.
- Conduct public education on stress management and the expected reactions to disasters in order for people to better handle their emotions and behavioural responses.
- Conduct similar intervention on Caye Caulker.

♦CAYE CAULKER

Assessment Interviewees:

- Caye Caulker Health Center: Nurse, Public Health Inspector, Medical Doctors
- Caye Caulker Police Station: Police Corporal
- Caye Caulker Village Council: Chairperson
- Other: Businessperson, Shelter Inhabitant

Assessment of Mental Health Status:

Upon arrival at the airstrip in Caye Caulker, one is met by the picture of an island devastated: trees destroyed and piled high everywhere, debris from houses on every corner and along the streets, and water flowing into mud wherever one looks. The other major impression is that there are few inhabitants remaining here, and the hive of activity is focused in a few specific areas, such as near the offices of the Health Center and the Village Council, which are housed in the same building. What strengthens this impression of a village deserted is the presence of a group of Mennonites, Red Cross, BDF, and other such workers from the mainland, who are clearly occupied with the clearing of the land and restoring of order. Yet despite this, the general picture is that of “hope” and “optimism” according to the persons interviewed, especially the health personnel.

In assessing the mental health of the residents of the island, the health personnel agree that incidences of poor mental health are few. The clinical picture is one of relative well-being, within the normal parameters of human reactions to a disaster. They reported a total of two families who are clearly distressed by the loss of their homes, and of one other case of a person presenting with symptoms of trauma, specifically depression, during this period. While some people were obviously “broken-hearted” at the loss of their homes, the sentiment expressed was that of stoicism; that is, people were glad to be alive and were more concerned with daily survival, such as finding food and safe water. In addition, the persons who were observed to be more traumatized by the situation were those who were not Belizeans per se but foreigners who had relocated to Belize and had not experienced such conditions previously. According to the health personnel, many such persons have left the island. Others who have left have been sent away by their families because they also were unable to handle the aftermath of the hurricane. These include some of the elderly, who were seen as having some difficulties coping as well.

Assessment of Drug Use/Abuse:

Factors of risk for the islanders include drug use/abuse, specifically alcohol. The island, however, is currently still under curfew, and no alcohol is allowed to be for sale at any time on the island. This has served to curb the normally greater amount of drinking and drunkenness that the islanders are said to experience on weekends or during holidays. The Chairperson of the Village Council noted that he was aware that the biggest problem for them would have been alcohol consumption, and that

Caye Caulker presented a unique case in this regard. As such, upon advisement, he advocated for the prohibition of the sale of alcohol. Nevertheless, the patrol for the curfew has picked up several (approx. 4-5) persons severely under the influence of alcohol. Drug use is otherwise reported as minimal.

The Chair also reported that people were certainly dealing with highly stressful conditions, and those who have lost their homes are particularly vulnerable at this time. He described a sense of “worry” regarding their water situation, the debris and garbage remaining, and the rebuilding effort, but felt that other issues were not dominant at this time. The general picture is that, while many islanders have pulled together with others coming in to provide assistance to address the needs of the community, some are still involved in individual or personal efforts at rehabilitation of property and the like. A health interviewee suggested that a factor of resilience in their sense of “calmness” is the relatively high religiosity of the community.

Assessment of Level of Violence:

This tranquil atmosphere is noted as well in the absence of public violence. The general report was that “people are tending to their own business”, respecting the curfew regulations, and otherwise being concerned about life on a personal level. No reports of fights, looting or other forms of robbery have been made since the curfew went into effect immediately after the hurricane. Most interviewees noted that the problems found, such as with loitering or alcoholism, were with those who were prone to such behaviour before the storm. The Police suggested that the increased monitoring activity on their part, with assistance from the BDF and others, has perhaps moderated this situation. This relatively ‘laid back’ and individualistic orientation, however, appears to be the norm for these island inhabitants.

In *summary*, the interviewees report a relative tranquility of atmosphere, and very few incidences of mental illness or reactions to stress. This may be attributed to factors such as the imposition of the curfew, the departure of persons who were having greater difficulties coping with the situation, and the original ‘island personality’, which has been described touristically as a ‘sleepy fishing village’.

Recommendations:

Nevertheless, the recommendation is for continued monitoring of the mental health situation among the inhabitants of Caye Caulker. This suggestion is made on the basis of the comments made by the health personnel regarding the nature of the situation: specifically, the current unusual conditions have geared people to survival mode but have not provided them with time to assess the personal nature of the damage. Reactions to traumatic experiences, such as natural disasters, vary widely, and are part of a process of integration of the new circumstances and feelings. Such feelings range from denial and anger to acceptance, among others. As such, the stage in the process in which people find themselves at any given time must be taken into consideration in assessing the needs of the islanders now as compared to the future. Furthermore, the more individualistic orientation of the islanders may prove an obstacle in terms of facilitating support on other levels. Another concern is that the externally imposed order will be removed and the islanders will be lacking the support this provides at this time in dealing with the long-term consequences of the hurricane. The socioeconomic conditions will be of particular importance in this respect as they move from ‘survival’ to ‘normal’ modes of functioning. How they will react to their drastically changed circumstances, once the ‘crisis’ is over is yet to be determined.

ANNEX VI

Hurricane Keith, Belize: Report on the Karl Heusner Memorial Hospital, Belize City.

1. Karl Heusner Memorial Hospital

The Karl Heusner Memorial Hospital is the national referral hospital in Belize, receiving patients from the City and all the Districts as well as being the Accident and Emergency Centre for Belize City and the rest of the country. As such it is essential that this Hospital is able to function during and immediately after a Hurricane.

The Hospital normally provides a 24-hour Accident and Emergency service and inpatient services as follows:

General Medicine	25 beds	General Surgery	25 beds
Paeiatrics	25 beds	Obstetrics/Gynaecology	25 beds
A&E	10 beds	Special Care Baby Unit	9 beds

Immediately before and during Keith, some patients were discharged home from the Hospital and some transferred to the District Hospitals in Belmopan and San Ignacio. From a patient count of about 40 early on Saturday, the number fell to a low of around 9 on Sunday rising again to about 20 by Tuesday afternoon.

The mains supply of electricity shut down at approximately 2.00 p.m. on Sunday, eventually being restored at noon on Tuesday. The Hospital's stand-by generator functioned throughout this period for about 48 continuous hours, although the generator room was flooded to within two inches of the base of the equipment.

Unfortunately the Central Laboratory and Blood Bank were not served by the generator and this resulted in losses of reagents and blood supplies.

The supply of medical gases and suction was not interrupted and water was available throughout the event pumped from the Hospital's storage tank.

The Hospital therefore remained functional throughout the storm and this is undoubtedly a tribute to the determination and resilience of the staff as a large amount of water entered the buildings through the roof, windows and doors and also up through the floor. Fortunately no serious damage was done to equipment although the immediate and longer-term effects of the water seepage on the floor and ceiling tiles will undoubtedly be a problem. Much of this was from known "chronic" building problems that were exacerbated by the Hurricane (e.g. roof drainage system, window and doorframe leaks etc.).

2. European Union/Government of Belize Rehabilitation Project

A Rehabilitation Project funded by the European Union (EU) and the Government of Belize (GoB) is planned for the Hospital and contracts under this, including waterproofing the roof, are currently being tendered. The original estimate for this was approximately Bz\$2.8 million, which was split between physical works (Bz\$1.8 million) and equipment (Bz\$1 million). The latest estimate for the works alone is Bz\$3.2 million so that already there has

been a process of prioritizing in selecting the areas to be addressed. It is expected that work will commence on this in November 2000.

The Government of Belize is responsible for correcting the problems with the roof drainage system and replacing floor tiles in many areas of the Hospital.

3. Overall Assessment and Recommendations.

Hurricane Keith has provided a good and timely test of the capability of the Karl Heusner Hospital to withstand Hurricanes. While not exactly failing this test, it cannot be said that it passed. Previous disaster management plans for the institution have included total evacuation but at least this event has showed that it can withstand some measure of wind and rain. However there are some important lessons from Keith's exploitation of the weaknesses of the building.

There are signs that the buildings were designed or have subsequently been retrofitted to withstand hurricanes. All the windows are double-glazed (even in areas that are not air-conditioned) and there are rails for wooden shutters, which were originally provided. These shutters have proved difficult and time consuming to put in place as there are many windows some of which are high or otherwise inaccessible. In addition the shutters have in the past become swollen when wet making them difficult to remove without causing damage. They have also deteriorated during storage.

Defects to the building may have arisen during construction or because of unexpected deterioration of the materials used (e.g. the silicone sealant around the windows).

The roof itself is flat, with a membrane covered with loose large pebbles. In higher winds than those experienced in Keith, these might become missiles and cause significant damage.

The generator is tested and maintained regularly and this must have contributed to its good condition and ability to function for a long period. There are proposals to deal with the flooding of the generator and other heavy plant rooms although these may not be in the first phase of the EU/GOB Rehabilitation.

It is essential that the Hospital continues to function on this site during and immediately after a hurricane. Setting up an emergency hospital in a "safe" building in another part of Belize City should be considered a last resort and only if the Hospital is almost totally destroyed.

Following are the recommendations:

- 3.1 Although the contracts for the first phase of the EU/GOB Rehabilitation are close to being awarded, the priorities selected for attention should be reviewed in light of the experience of Hurricane Keith.**
- 3.2 The tender proposals themselves should also be reviewed with a view to ensuring that the solutions identified will lead to improved protection of the building itself and the staff and patients occupying it. . Special technical assistance should be provided for this review.**

- 3.3 A specific vulnerability analysis, including costs, should be conducted on the departments and areas critical to the functioning of the Hospital during and immediately after a hurricane. This should focus on the following:**

**Accident and Emergency Department
Operating Theatres
Wards (to provide 50 “safe” beds)
Maternity
Pharmacy**

And the following services:

**Water
Electricity
Medical gases**

- 3.4 It is estimated that the technical assistance and the works outlined above could be completed for around US\$250,000. This will provide a group of safe areas to maintain the critical services. The estimate is based on costs of other retrofitting Projects with an allowance for the expected expenditure through the EU/GoB Project.**

4. Acknowledgements

Although the final responsibility for this Report lies with the author, inevitably it reflects discussions with (and the ideas of) some of those persons who lived with the Hospital through Hurricane Keith.

Mr. John Waight, Medical Superintendent, generously shared his time and views; Engs. Dimitra Savvidou (EU Project Coordinator) and Hector Martinez (Hospital Engineer) and Architect Sue Courtenay were kind enough to tour the Hospital literally from top to bottom. Dr. Jo Ann Griffith (PAHO) was also present throughout and “anchored” the visit from the PAHO Office.

Although all the hospital staff who worked through the Hurricane deserve commendation (and reward!), it was obvious that Hector’s efforts to maintain the services throughout the four days were outstanding.

David Taylor,
Disaster Response Team,
PAHO/WHO

6 October 2000
Belize City, Belize.

ANNEX VII

LIST OF HEALTH TEAMS

Name	Title	Areas Visited
Michael Pitts	Medical officer	Belize Rural (Lemonal; Crooked Tree)
Michelle Smith	Public health inspector	
Byron Marshall	Vector control officer	
Nadia Avila	Vector control officer	
Social Worker		
Amalia Del Riego	Medical officer	Belize Rural (Isabela Bank, Flowers Bank, Maypen, Crooked Tree, Double Head Cabbage)
Haylock	Public health nurse	
Flowers	Public health nurse	
Valerie Ariola	Public health inspector	
Frank Cain	Vector control officer	
Cardo Martinez	Medical officer	Belize Rural (Maskall, Bomba, Sta. Marta, Sta. Ana)
Lorraine Thompson	PAHO personnel	
Esperanza Moh	Rural health nurse	
Henry Anderson	Permanent Secretary	San Pedro and Caye Caulker
Anthony Nicasio	Public health inspector	
Michael Pitts	Medical officer	
Cortez Nurse	Health advisor	
Jorge Polanco	Epidemiologist	
Godswell Flores	Principal public health inspector	
Claudina Cayetano	Psychiatrist	San Pedro and Caye Caulker
Joann Griffith	Psychologist	
Margaret Bradley	Psychiatric Nurse	
Roy Lopez	Psychiatrist	
Mateo Jones	Public Health Inspector	Orange Walk Town
Sebastian Mendez	Vector control personnel	
Lorna Perez	Staff nurse (BFLA)	
Louis Villa	Medical Doctor	
Elizabeth Enriquez	PHN	
Louis McGregor	PHI	
Karl Meggs	Dental Surgeon	
Michael Alvarez	Vector Control Officer	
Angelita Sanchez	Health Educator	
Felipe Magaña	Vector Control Officer	
Gerald Williams	Public Health Inspector	
Ricardo Fabro	Medical Doctor	

Name	Title	Areas Visited
Javier Alpuche	Public health inspector	Corozal District
Sylvia Gillette	Media personnel	
Raul Alcocer	Lands officer	
Guillermina Heredia	Public Health Nurse	
Juan Martinez	Rural development officer	
Armando Cassanova	Civilian	
Donninger Duhanney	Vector control officer	
Ernesto Heinz	Vector control officer	
Carlos Vasquez	Vector control officer	
Wendell Allen	Vector control officer	
Ruby Magaña	Health Educator	
Dr. Gil Paiz	Medical officer	Cayo District (Bullet Tree, Santa Familia, Billy White, Selena, San Marcos, Spanish Lookout)
Nurse Martha Sosa	Public health nurse	
Mr. Arzu	Public health inspector	
Mr. Escalante	Vector control officer	
Carmen Dacak	Health educator	