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LIMA DISASTER PREPAREDNESS REPORT

VOLUME X

Emergency Medical Care

by

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in collaboration with

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for

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FOREWORD

This is one section of a fifteen volume report concerning disaster preparedness in Lima, Peru. It was researched in Lima by a team of disaster specialists during the period July - November, 1981, for the Agency for International Development's Office of U. S. Foreign Disaster Assistance and USAID Mission in Peru. The report is supplemented by a considerable number of maps, charts and resource documents which are located in the USAID/ Peru Disaster Preparedness Resource Library in Lima and, in some cases, in the office of the Disaster Preparedness Coordinator [Dr. Miguel Gueri], Pan-American Health Organization, Lima.

November 1982

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The Lima Disaster Preparedness Report has 15 sections:

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Volume II	Port of Callao Infrastructure Security and Emergency Evacuation Needs
Volume III	Electricity
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Volume V	Heavy Equipment Rehabilitation and Maintenance
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INTRODUCTION/EXECUTIVE SUMMARY

Peru's Civil Defense authorities have projected that a severe (8.4+ Richter) earthquake in Lima would cause approximately 60,000 deaths and 700,000 serious injuries. The overwhelming majority of these casualties would occur in the extremely crowded central city slums, called tugurios, whose buildings are two to three storeys high and constructed of adobe or a combination of adobe and quincha (cane and mud). Many of the buildings have been structurally weakened through deterioration over time, lack of inspection and maintenance, and previous relatively milder earthquakes. Tugurio residents are in danger of being struck by collapsing adobe walls inside their buildings and in the streets, and by injuries sustained from collapsing interior hallways and staircases, by trampling and panic, and by other structural failures. About 20% of primary schools -- especially in tugurios -- are projected to collapse in such an earthquake.

A second principal cause of casualties would be the relatively newer settlements on precarious sites such as steep hillsides and the edges of cliffs over river banks. Electrocution from falling wires during and after an earthquake, as survivors plunge into building rubble to rescue the victims; and burns suffered in fires provoked by an earthquake could also be considerable.

In all, this study suggests for illustrative purposes that between 37,500 and 62,500 dwelling units would collapse in an earthquake. If an average of one to two persons perished in each case, Civil Defense's

projection of 60,000 fatalities (equal to 1.2% of Lima's population) would be realized. The worst case would occur if the event took place during normal night-time sleeping hours, when the tugurio buildings are full.

There would probably be serious differences among specialists concerning the number of serious injuries which would be generated if 60,000 persons were killed. Most would suggest a ratio of 1:2 or 1:3 for deaths:serious injuries. The 700,000 projection (equal to 14% of Lima's population) yields a ratio of 1:12.

Local residents of tugurios and other vulnerable areas indicate in their overwhelming majority that they would bring injured victims directly to major hospitals, and not to local health posts or health centers. This would be especially true in the tugurios. Depending on the time of day of the earthquake, hospital staff behavior would vary: in daytime, many staff would rush home to verify the condition of their families, become caught for hours in paralyzing traffic jams, but would later return to their hospitals to handle emergency cases. In the evening, most hospital staff would be at home with their families, could promptly verify their condition and proceed to the hospital with relatively few traffic jams, subject to transitibility of the roads.

There are 25 hospitals in Lima which have more than one-hundred beds each, and three key hospitals with less than one-hundred beds each, as follows:

Ministry of Health	17 hospitals	7,574 beds	60% of all beds
Social Security Inst.	4	2,342	19%
Armed Forces	4	2,145	17%
Private Sector	3	539	4%
Total	28 hospitals	12,600 beds	100% of all beds

The Ministry has designated seven of its hospitals as primary emergency facilities, though two of them have been judged by some experts to be vulnerable to collapse or severe damage requiring their immediate evacuation. In order to begin to develop a plan for provision after an earthquake of emergency services by the 28 hospitals, a hospital questionnaire was developed and completed for eight hospitals. The questionnaire solicits data on power, water, waste removal, personnel, services, emergency plans, and other key elements.

This study recommends that questionnaires for the remaining hospitals be completed and that based on their analysis the city power, water and other authorities develop prioritized plans for provision of emergency services to the hospitals. Contingency plans should be made for evacuation and alternate siting of principal hospitals which may themselves be severely affected. A plan for decentralizing emergency out-patient care outside of the major hospitals is vital, as is a strategy for evacuation of serious cases to the large number of hospitals outside Lima in areas which would be unaffected by an earthquake.

Because of a continuing national fiscal crisis, Ministry and individual hospital inventory levels for medicines and related supplies

are extremely low. This study has initiated the development by some members of the Peruvian medical community of a list of essential medicines and supplies which would be required after a severe disaster. It is recommended that this list be completed and widely distributed, and that external donors should be encouraged to provide considerable quantities of the listed supplies, properly marked and packaged, as emergency relief resources after an earthquake.

Striking differences of opinion emerged among medical experts concerning the necessity, feasibility and desirability of the external provision of non-Peruvian -- especially U. S. -- medical personnel to Lima after a severe earthquake. After detailed review of the arguments on both sides of this issue, this study concludes that small numbers of experienced para-medics and rescue squad workers could be useful, if the number of casualties is reasonably estimated to exceed 100,000. Such personnel must be accustomed to handling milder burns and injuries and immobilizing fractures under difficult emergency conditions and should focus on decentralized out-patient care only, or on relieving Peruvian personnel to permit rest periods. Such personnel must have Spanish speaking capability and bring its own supplies and support system; and could include X-Ray technicians with Polaroid equipment and supplies to support medical operations by Peruvian staff. Uninvited foreign doctors who arrive can be directed to evacuation sites in unaffected areas outside Lima whose hospital staff may require supplementation. Externally provided technical assistance experts have been used successfully

in the fields of epidemiology (especially the Center for Disease Control, Atlanta); bacteriological decontamination (U. S. military have such standby resources); and veterinary medicine. They could probably be most useful in Lima if they are promptly mobilized and deployed there after an earthquake.

Distribution of blankets to most affected disaster victims would be useful for their health and minimal comfort as the night-time climate in Lima is cold.

But the dispatch of field hospitals -- even though they will undoubtedly be requested -- is probably the least useful way in which external resources can be employed in Lima. They will arrive after the real need for them has diminished if not disappeared; cost great sums of money to transport; and detract from higher priority national operations. With the number of major hospitals in Lima; two Peruvian field hospitals permanently stored in Lima; and considerable hospital resources throughout the country which can provide backup support, provision of field hospitals would be poor use of external resources.

A brief overview of the health delivery system of Peru is included as an annex to this report, as are three articles concerning lessons learned in epidemiology and emergency medical care operations in Peru after the 1970 earthquake and in Guatemala after the 1976 earthquake.

A good contact point for disaster preparedness discussions and activities in Lima is Dr. Miguel Gueri, PAHO/Lima's Disaster Preparedness

Specialist, and on whom this study relied for technical guidance.

The USAID/Peru Family Health Office, and particularly Helene Kaufman, its Chief during the time of this study, provided substantial and invaluable assistance in the conduct of the work described herein.

Emergency Medical Care

PROJECTED CAUSES OF DEATHS AND INJURIES

Peru's Civil Defense authorities have projected that a severe (8.4+ Richter) earthquake in Lima would cause 60,000 deaths and 700,000 serious injuries. Other volumes of this report describe in detail the sectors of the city where the population is at greatest risk, which can be summarized as follows:

Precarious Structures: Tugurios

Civil Defense authorities expect that the majority of deaths and serious injuries will occur in the central city slum areas, called tugurios. The tugurios are characterized by poor, overcrowded living conditions, principally large buildings originally designed to accommodate two or three families which have been converted into an average of 20 - 25 individual one-room dwellings. Each one-room dwelling is occupied by up to ten family members. It is estimated that there are about 175,000 such single-room family dwellings in the tugurios of Lima.

Tugurio buildings, which are usually two to three storeys high, are constructed of adobe or a combination of adobe and quincha (cane and mud). Recent relatively milder earthquakes, for example in 1970 and 1974, accelerated the natural deterioration of the already weakened buildings, many of which are over one hundred years old. Since the buildings produce little income, they receive little or no structural inspection or maintenance. As a result, the collapse of individual tugurio buildings -- even in the absence of seismic provocation occurs routinely.

The buildings also tend to have only one extremely long and narrow exit or "escapeway". In a severe earthquake, these "escapeways", surrounded by tall adobe walls, may be the most precarious features of the buildings. The interior stairways and hallways also tend to be narrow and precarious. Volume IX of this report, Low-Income Housing, describes tugurio buildings and elaborates on the problems summarized here.

The principal dangers to tugurio residents include: being struck by collapsing adobe walls in the narrow passageways as they try to escape their buildings; by outwardly collapsing walls after exiting from the buildings; by collapsing staircases and hallways within the buildings; by trampling and panic as the building population attempt to escape; and by complete structural collapse of the buildings.

If the earthquake occurs during the day, two additional dangers are faced:

(a) Because they have no access to affordable day-care facilities, some parents are forced to lock their young children into their dwelling room in the tugurios while the parents go to work. This precludes the escape of such children in any emergency. [Medical specialists in burn treatment in Lima report that such children often account for the most severe burn cases after fires in tugurio areas.]

(b) A severe earthquake during the 25% of the week when schools are in session could heighten mortality of school-age children. One study, described in detail in Volume VII, Education, suggests that 20% of the primary schools and 5% of the secondary schools -- principally

those located in tugurio areas -- would collapse immediately in such an event.

Precarious Siting

A second principal cause of deaths and injuries could be the relatively newer settlements on extremely steep hillsides in and around Lima. Such sites are located in the pueblos jovenes, relatively newer housing areas on the outskirts of Lima, and in the central city. The proximity of each house to the next; the steepness of the hillsides; and the possible inadequacy of siting and foundations, could contribute to a large proportion of fatalities and injuries in such areas as houses tumble against and over each other.

In addition, houses built along the extreme edges of the Rimac River are subject -- even in the absence of earthquakes -- to deaths and injuries due to mass failure along the cliffs on each side of the River.

Electrocution/Fires

In many areas of the city, but especially in tugurios, there could be a high incidence of electrocution from falling wires. If there is surface flooding, water could act as a conductor, multiplying this danger. These could combine to create more victims immediately after the earthquake as relatives and friends plunge into the collapsed buildings and rubble to rescue trapped victims or to recover valuables. In some areas, considerable numbers of fires could be generated by overturned cooking stoves and by short circuits. These matters are elaborated upon in Volume III of this report, Electricity.

Tsunamis

A severe earthquake, depending on its character and location, could generate Tsunami waves which could reach the La Punta area of El Callao in 20 - 30 minutes. In 1746, Tsunamis which reached La Punta ninety minutes after an offshore earthquake killed 4,800 or the area's 5,000 residents.

PROJECTED CITY-WIDE NUMBERS OF DEATHS AND INJURIES

Based on the foregoing, it is anticipated that a substantial population of the city, especially in the tugurio areas, will require emergency medical care.

Civil Defense authorities have made the only known projection of deaths and injuries in a severe earthquake. This projection -- 60,000 deaths and 700,000 severe injuries (equal to 1.2% and 14% of Lima's population, respectively) --is based on its review of the earth structure beneath the city and its likely reaction to seismic activity; and surface and aerial studies of the building structures of some of the city's most vulnerable districts.

In considering these projections, it should be noted that:

(a) The number of deaths and injuries may depend on the time of day at which such a severe earthquake could occur. If it occurs at 3 a.m., the most dangerous buildings -- tugurio and steep hillside dwellings -- will be fully occupied by a sleeping population. Injuries generated by panic, trampling and electrocution, would also be at their greatest.

If, on the other hand, the earthquake were to occur at 3 p.m., the tugurio buildings would be much less densely occupied, because most people would be at work, on the street, etc., and daylight would help to ameliorate some problems. But school children in the tugurios would be an exception to this relatively improved condition.

(b) This study assumes the population of the tugurios to be about one million people and that in tugurio areas the dwelling units of 30,000 - 50,000 families would collapse in a worst case.

To these should be added, for illustrative purposes, another 25,000 families who reside in homes located on steep hillsides, river's edge, in dangerous pueblo joven construction, and in other vulnerable environments. If they suffered a similar rate of collapse (30% - 50%), it could be expected that 7,500 - 12,500 of these families' housing units would collapse.

The city-wide total number of families with collapsed dwelling units would be 37,500 - 62,500. Thus, the Civil Defense projection of 60,000 deaths would mean that an average of one to two persons in each famlily so affected would perish.

(c) There probably would be some differences among specialists concerning the number of serious injuries which could be caused by such a number of deaths. In general, based on previous experience, it has been the view of experts in this Hemisphere that the ratio of deaths to serious injuries in earthquakes is about 1:2 or maximum 1:3. Their projections, based on 60,000 deaths would be a maximum of 180,000 serious injuries.

Civil Defense authorities have arrived at a projection which

would imply a 1:1.2 ratio, i.e., 700,000 injuries.

It would probably be useful for these various groups to exchange ideas on these ratios and their derivations.

In the meantime, this study will assume only that serious injuries will number in the hundreds of thousands.

PROJECTED BEHAVIOR OF AFFECTED POPULATION

In field surveys in tugurios and pueblos jovenes, local residents were asked what actions they take in normal times if a member of the family or neighbor suffers a fracture, and what they would do in such a case after an earthquake. The answers were overwhelmingly that they would bring the injured person directly to a major hospital. They would not seek assistance at health posts, health centers, or other secondary facilities.

Ministry of Health and other officials also predict that disaster victims would be brought by their families directly to major hospitals for treatment.

Because there are so many hospitals located in and immediately around the tugurio areas, it seems even more certain that this customary pattern would be followed by the affected population after an earthquake. Thus, within hours of a major earthquake, hospitals can expect to be besieged by many thousands of cases.

PROJECTED BEHAVIOR OF HOSPITAL STAFFS

Before proceeding to a description of the hospital resources of Lima, the probable behavior of hospital staff during these same emergency hours after a disaster should be considered.

The behavior of hospital staff would be different depending on whether the emergency were to occur during the daytime working hours or at night. If the earthquake occurs during the day, many on-duty staff need to verify the condition of their immediate families and homes, and this is their top priority. Typically, the phone system becomes inoperable after even milder earthquakes in Lima because so many people try to use it at the same time. Hospital staff who try to rush home are caught in chaotic traffic (which could be aggravated by road blockages caused by rubble, water, etc) and in which main streets and highways are paralyzed for hours. After verifying the condition of their families, and making arrangements for their care, most staff would return to their hospital.

The situation is simplified if the disaster strikes during the night. Most hospital staff (except on-duty personnel) are already with their families, can verify the situation, arrange for their welfare and proceed without traffic jams (if the roads are transitable) to their hospitals.

The above over-simplifies anticipated staff behavior, but it reflects much of such behavior which occurred after the last few -- considerably milder -- earthquakes in Lima.

LIMA'S HOSPITALS

There are twenty-five individual hospitals which have more than one-hundred beds each in Lima and three key hospitals with less than one-hundred beds. Of these, 17 are managed by the Ministry of Health; they account for 7,574 beds, about 60% of those located in Lima. The Peruvian Social Security Institute (IPSS), with its four hospitals, has 2,342 beds, about 19% of all beds in Lima. The four Armed Forces hospitals, with 2,145 beds, account for about 17% of all beds in Lima. The three private sector hospitals have about 539 beds among them, accounting for 4% of all city hospital beds. The total number of hospital beds in Lima is 12,600. Chart A, developed by this study based on best available information, is a list of the 28 hospitals, their institutional affiliations, addresses, telephone numbers, and number of beds, as well as some other data, discussed later. It is supplemented by Map A, a wall map developed as part of this report which could not be reproduced here and which is available at the Ministry of Health Planning Office, OFDA/Washington, USAID/Peru, and PAHO/Peru disaster preparedness offices. It shows the geographical distribution of the hospitals and health centers around Lima, by institutional affiliation.

It is to these hospitals that the overwhelming majority of injured persons will be brought.

Ministry of Health Designation of Emergency Facilities

Chart A also indicates the hospitals which have been designated by the Ministry of Health as primary emergency service facilities in a

Chart A

RELACION DE HOSPITALES EN EL AREA DE LIMA (con por lo menos 100 camas), Setiembre 1981

LIST OF HOSPITALS IN THE LIMA AREA (with at least 100 beds)*, September 1981

+ = Ministry of Health's designated Primary Post-Disaster Emergency Medical Facilities

	NOMBRE NAME	DIRECCION ADDRESS	DISTRITO DISTRICT	TELEFONO TELEPHONE	N° CAMAS N° BEDS	% DE CAMAS % OF BEDS	ENTIDAD ADMINISTRADOPA AFFILIATION
A	Hospital Nacional Guillermo Almenara Irigoyen (No. 1 - Obrero)	Av. Grau 800	La Victoria	31-4345	885		Instituto Peruano de Seguridad Social (IPSS) Peruvian Social Security Institute (S.S.)
B	Hospital Zonal del Callao	Av. Argentina 551	Callao	29-7757	54		Instituto Peruano de Seguridad Social (IPSS) Peruvian Social Security Institute (S.S.)
C	Hospital Zonal de Vitarte	Av. Santa María s/n	Vitarte	35-2837	70		" " "
D	Hospital Nacional Edgardo Rebagliati (No. 2 - Empleado)	Jr. Edgardo Rebagliati s/n	Jesus María	71-0277	1,333		" " "
					2,342	19%	
E	Hospital Maternidad de Lima	Jr. Miro Quesada s/n	Barrios Altos	28-3840	433		Ministerio de Salud Ministry of Health
F	Hospital Materno-Infantil San Bartolomé	Jr. Miro Quesada 490	Barrios Altos	38-2468	265		" " "
G	Instituto Nacional de Enfermedades Neoplásticas	Av. Alfonso Ugarte	Lima	23-6979 28-9660	139		" " "
H	Hospital Dos de Mayo +	Parque de la Medicina s/n	Barrios Altos	27-6030	608		" " "
I	Hospital Santo Toribio de Mogrovejo	Ancash 1271	Barrios Altos	27-2128 27-8453	244		" " "

* includes three hospitals with less than one-hundred beds

	NOMBRE NAME	DIRECCION ADDRESS	DISTRITO DISTRICT	TELEFONO TELEPHONE	N° CAMAS N° BEDS	% DE CAMAS % OF BEDS	ENTIDAD ADMINISTRATIVA AFFILIATION
J	Hospital Arzobispo Loayza +	Av. Alfonso Ugarte 848	Lima	32-2990 32-3990	752		Ministerio de Salud Ministry of Health
K	Hospital General Base Hipólito Unanue +	Av. La Atarjea s/n	El Agustino	28-3870	876		" " "
L	Clínica Hogar San Juan de Dios	Carretera Central Km. 1	San Luis	31-8005	200		" " "
N	Clínica Santa Clara	Carretera Central Km.4	Ate	35-3547	170		" " "
O	Hospital Hermilio Valdizán	Carretera Central Km. 6.5	Ate	35-0550	415		" " "
P	Hospital Materno-Infantil Sta. Rosa	Esq. Av. Bolivar y Av. San Martín	Pueblo Libre	24-1285	157		" " "
Q	Hospital Víctor Larco Herrera	Av. Perez Aranibar 600	Magdalena	61-5541	1,221		" " "
R	Hospital San Juan Daniel Alcides Carrion +	Av. Guardia Chalaca 1868	Callao	29-9048	848		" " "
S	Hospital del Niño	Av. Brasil 600	Breña	24-6045	588		" " "
T	Hospital Cayetano Heredia (Hospital del Rimac) +	Panamericana Norte Km. 3.5	San Martin de Porres	81-5130	268		" " "
U	Hospital General Base Collique +	Av. Tupac Amaru Km. 14.5	Collique	81-3420	210		" " "
V	Hospital de Emergencia José Casimiro Ulloa + (Asistencia Pública)	Av. Panamá 6331-35	Miraflores	47-9758	67 7,574	60%	" " "
W	Centro Médico Naval	Av. Venezuela Km. 7	Callao	51-2070	521		Ministerio de Marina NAVY

	NOMBRE NAME	DIRECCION ADDRESS	DISTRITO DISTRICT	TELEFONO TELEPHONE	N° CAMAS N° BEDS	% DE CAMAS % OF BEDS	ENTIDAD ADMINISTRADORA AFFILIATION
X	Hospital Sanidad Policial	Cdra. 26 Av. Brasil	Jesus Maria	61-2041	552		Ministerio del Interior Ministry of Interios
Y	Hospital Militar Central - Guerra	Av. Gral. Pershing s/n	Jesus Maria	61-6541	772		Ministerio de Guerra Ministry of War
Z	Hospital Central de Aeronaútica	Cdra. 39 Petit Thouars	Miraflores	40-7000	300		Ministerio de Aeronaútica Air Force
					2,145	17%	

	NOMBRE NAME	DIRECCION ADDRESS	DISTRITO DISTRICT	TELEFONO TELEPHONE	N° CAMAS N° BEDS	% DE CAMAS % OF BEDS	ENTIDAD ADMINISTRATIVA AFFILIATION
AA	Clínica Maison de Santé	Jr. Miguel Aljovin 208	Barrios Altos	28-3630	123		Particular Private
BB	Clínica Anglo-Americana	Alfredo Salazar 3ra. Cuadra	San Isidro	40-9100	116		"
CC	Clínica San Borja	Av. Guardia Civil 337	San Borja	31-2883 41-3141	300		"
					539	4%	
	GRAN TOTAL GRAND TOTAL				12,600	100%	

severe earthquake. These seven hospitals are:

Hospital Dos de Mayo

Hospital Arzobispo Loayza

Hospital General Base Hipolito Unanue

Hospital (San Juan) Daniel Alcides Carrio

Hospital General Base Collique

Hospital Cayetano Heredia (AKA Hospital Rimac)

Hospital de Emergencia Jose Casimiro Ulloa

These seven hospitals are so designated in the Ministry's Emergency Plan for Metropolitan Lima, Oficio No. 0729-DHE-81 of April, 1981.*

Vulnerability of Hospital Infrastructure

Some experts in Lima consider some of these seven hospitals to be vulnerable to collapse or to damage requiring their evacuation and rendering them unusable after a severe earthquake. Based on the assessments in Proteccion de Lima Metropolitana Ante Sismos Destructivos by Ing. Julio Koroiwa H., a professor of the National Engineering University (UNI), and consultation with experts in hospital buildings, it has been concluded that the Hospital Dos de Mayo and the Hospital Arzobispo Loayza are in danger of such serious damage in an earthquake. The degree of possible damage to some or all of the infrastructure of

* The plan also indicates that special services for mothers, children, the elderly and patients with mental disorders will be provided by Hospital Maternidad de Lima, Hospital Materno-Infantil Santa Rosa, Hospital Materno-Infantil San Bartolome, Hospital del Nino (Pediatrics), Hospital Victor Larco Herrera, Instituto Nacional de Enfermedades Neoplasticas, and Hospital Santo Toribio de Mogrovejo.

these hospitals and the impact on bed-ridden patients raise the possibility of a disaster-within-a-disaster in these hospitals and the generation of considerable injuries to resident patients and staff. Hospital Maternidad de Lima and Hospital Materno-Infantil San Bartolome may have similar vulnerability.

In-depth, systematic study of the vulnerability of hospital infrastructure and assessment of individual hospitals' ability to provide emergency health care after a severe earthquake, have not been conducted. PAHO proposed the conduct of such a study on 3 November 1981 in a letter (see Annex B) to then-Minister of Health Uriel Garcia Caceres. [The letter expresses the hope that such a study could be the basis for acquiring extra-budgetary funds which would permit the implementation of the recommendations of such a study, which could involve unrealistically high costs.]

SYSTEMATIC INFORMATION ABOUT HOSPITALS

There is no single, systematic information resource document about the twenty-eight major hospitals in Lima. Throughout the conduct of this study, officials of the Ministry of Health and other health providers, PAHO, electrical power, water and other city authorities inquired for such information but it did not exist. What are the stand-by power facilities of the hospitals? Which should receive priority attention for connection of emergency power or water supply after an earthquake? What numbers of personnel are

assigned to each hospital? What type of construction do different wings of the hospitals have? What types of service are normally provided? Do the hospitals have their own emergency plans? To develop a single document which could answer such questions and to begin to develop an information base upon which a post-disaster preparedness plan could be elaborated, a questionnaire (Annex C) was developed with assistance from the following individuals:

Arq. Enrique Garcia	Ministry of Health
Ing. Luis Ganoza	ELECTRO-LIMA
Ing. Max Rabines Spelucin	ESAL (Water Authority)
Dr. Miguel Gueri	PAHO
Ing. Carlos Cuneo	PAHO
Dr. Juan Kester Johansson	Peruvian Air Force

Of the 28 questionnaires which were distributed to all providers, eight were completed and returned during the brief period of the OFDA Disaster Preparedness Team fieldwork. Copies of the completed documents are located at the office of Arq. Garcia; at USAID/Peru and at PAHO/Peru's disaster preparedness office.

The Division del Medio Ambiente (Environmental Division) of the Ministry of Health, under Dr. Javier Bacigalupo, independently collected information on water and waste removal services for Ministry and IPSS major hospitals. The results of the survey appear on Chart B. The identification letter in the left-hand column of the chart is a cross-reference to the identification letter of the corresponding hospital on Chart A.

Water and Waste Removal Systems for Principal Ministry of Health Hospitals in Lima

Chart B

MINISTERIO DE SALUD

Chart B

DIRECCION DE SANEAMIENTO DEL MEDIO AMBIENTE

DIVISION DE SANEAMIENTO DEL MEDIO AMBIENTE

Información sobre la capacidad de almacenamiento de Agua Potable y sistema de eliminación de los desagües de los Centros Hospitalarios del Ministerio de Salud.

Identification Letter/Chart A	CENTRO HOSPITALARIO	Fuente de Abastecimiento	No.Cisternas	Capac. en m3	No.Bomb. Hidron.	Capac. en m3	No.tanq. elevado	Capac M3.	Cap tot almac.	Sistema de elimina ción de desagües
[E]	Maternidad de Lima Cap. 452 Camas	De la red pública. 2 entradas de 2.5" c/u.	2	1,062	-	-	2	10	1,072	Emisor a red pub.8 1 trampa de grasa de 3 m3
[Q]	Víctor Larco Herrera Cap. 1,260 camas	De la red pública. 4 entradas de 2" c/u	7	189	1	1.20	1	24.80	217	Emisor a red públi ca de 8"
[G]	Inst.Nac.Enf. Neoplási cas - Cap. 142 Camas	De la red pública 2 ingresos de 2.1/2"y 1.1/4"	2	35	-	-	1	45	80	3 emisores a red p blica - Un pozo d bombeo de 12 m3.
[O]	Ermilio Valdizán Cap. 415 Camas	Tiene un pozo tubular con bomba electroneumática	-	-	-	-	1	60	60	Emisor a red públi ca, 8"
	Inst.Nac.de Rehabilita ción - Cap.	De la red pública Ø 8"	1	18	-	-	1	7	25	Emisor a red públi ca de 8"
[J]	Arzobispo Loayza Cap. 800 Camas	De la Red Pública 1 pozo tubular para rie go y limpieza	4	315.80	-	-	2	23.60	339	Tiene un pozo de b beo de 8 m3 Emisor a red Pub.8
	Hosp. San José Cap. 50 Camas	De la red Pública	1	15	4	3	-	-	.18	Emisor a red públi ca 8"
[F]	San Bartolomé Cap. 265 Camas	De la red pública 3 entradas (2 de 3/4" y 1 de 2" de Ø)	1	45	-	-	1	21.5	66.5	Emisor a red públi ca de 8"
[I]	Sto.Toribio de Mogrovejo Cap. 292 Camas	5 ingresos de red públi ca de 3/4"	-	-	-	-	-	-	-	Emisor a red públi ca de 8"
[S]	Hospital del Niño Cap. 700 Camas	2 ingresos de red públi ca de 2"	6	247.2	-	-	6	32	279.2	4 salidas de 4", u trampa de grasa y pozo de bombeo
[P]	Hosp. Santa Rosa Cap. 180 Camas	3 ingresos de red públi ca de 1.1/2"	4	302	4	36	-	-	338	2 salidas a red PÚ- blica de 6"
[K]	Hipólito Unánue Cap. 794 Camas	1 ingreso de la red pú- blica de 4 Ø	2	134	-	-	2	41	175	1 Trampa de grasa de 1 m3, salida 6"
[T]	Cayetano Heredia Cap. 276 Camas	1 ingreso de 2.1/2" de red pública	2	160	-	-	2	80	240	Directo a la red pública
[U]	Mat.Inf. de Collique Cap. 300 Camas	1 ingreso de 2.1/2" de red pública	1	100	-	-	1	53.8	153.8	Directo a la red pública
[R?]	San Juan de Dios Cap. 1,000 Camas	Pozo (ESAL)	-	-	2	8	3	60	68	Directo a la red pública
[V?]	Asist.Púb.de Miraflores Cap.	1 ingreso de 1.1/4"	1	71.5	2	3.06	1	22.05	96.16	1 salida de 6" 1 pozo bombeo 7.6 m 1 tramp.grasa 1 m3
	Asist.Pub.Chorrillos	1 ingreso de 1"	1	1	-	-	-	-	1	1 salida directa de 4"
[H]	Hosp.Dos de Mayo Cap. 1,100 Camas	De la red pública	2	51.8	-	-	1	35.53	87.33	1 emisor de 8" a la red pública
[A]	Hosp. Central No. 1 Cap. 875 Camas	3 ingresos de la red pub. de 4", 2" y 2"	4	5,211	4	12	-	-	5,223	1 emisor de 12" a l red pública
[D]	Hosp. Central No. 2 Cap. 1,333 Camas	1 entrada de 6" de la red pública 3 pozos profundos	10	4,642	2	7.6	-	-	4,649	1 emisor de 12" a l red pub.;sistema co montantes en edif.; Red de grasas con - trampa; sistema de bombeo agua de re- torno.

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Recommendations for Hospital Preparedness

As first steps, it is recommended that the process of systematic collection, analysis and use of data concerning hospitals in Lima be continued, as follows:

1. The remaining hospital surveys should be completed, and a full set of 25 questionnaires collected and shared for analysis with all concerned parties.

2. Based on analysis of the surveys, priorities for provision or re-establishment after a disaster of power, water, waste removal, and other emergency services should be established jointly among Civil Defense, Ministry of Health, and utility authorities. Public utility authorities should prepare emergency plans for provision of resources to the hospitals, especially those in and around tugurio areas.

3. Hospital plans should be reassessed in view of the results of the survey and other studies and reports concerning vulnerability of Lima's hospitals. Contingency plans should be made for hospitals which may have to be evacuated or which are not likely to be usable after a disaster.

4. A plan for decentralization of out-patient care, at logical cutoff points (such as key intersections) between Lima's outskirts and its center, and within central Lima adjacent to and outside of hospitals, should be developed as a top priority. The Peruvian Red Cross and international donors who might provide medical personnel should be integrated into this strategy.

5. Individual hospitals should develop their own plans -- including personnel assignments -- for post-earthquake operations. Priority attention should be given to those in and around tugurio areas.

6. A plan for implementation and management of evacuation operations from Lima to hospitals in unaffected cities (see Chart K for a recapitulation of such facilities) should be developed jointly by the Ministry of Health, Civil Defense, and the Armed Forces -- especially the Peruvian Air Force. The Ministry's Planning Director was personally involved in the direct management of evacuation operations after the 1970 earthquake.

AVAILABILITY OF MEDICINES AND MEDICAL SUPPLIES

Current Ministry of Health inventory levels for medicines and related supplies are minimal at both the central warehouse and area hospital levels. After a severe earthquake there would be major shortages of most supplies and medicines required for post-disaster emergency medical care. The normal supply system is based on a rotating fund concept at each level of the delivery system, with patients purchasing supplies whenever possible. Low-income patients unable to afford such purchases are theoretically subsidized, especially in emergencies, maternal-child health, and other designated categories. But supplies are routinely unavailable at the service site or when available can be provided only at cost. The rotating fund has not kept pace with the inflationary price spiral for pharmaceuticals and because of the national economic crisis, Government subsidies have not been available in the required amounts. [Social Security and Armed Forces hospitals are in a better, but still inadequate condition to meet the type of severe earthquake disaster contemplated here.]

To initiate the process of consideration of this problem, a list of the specific supplies required to handle this type of disaster -- first for fractures and then, as a contingency, for large numbers of cases of burns -- was developed. Input for development of the list was received from:

Ministry of Health, Hospital de Emergencias "Jose Casimiro Ulloa"

Hospital Militar Central

Fuerza Aerea Peruana Health Services

Pan-American Health Organization

Association of Pharmaceutical Manufacturers - ALAFARPE

Dr. Miguel Gueri, PAHO's disaster preparedness specialist in Lima, provided technical assistance in sorting out the data which was received. The list which appears on the following pages includes only supplies (as opposed to medicines) required to treat fractures. The "streamlined" supply describes highest priority requirements; the "second priority" and other categories describe varieties and sizes which would be desirable but which are not absolutely essential.

A draft list of medicines per se, for fractures and burns, is in the process of development and when completed in collaboration with Dr. Gueri will be synthesized with the list of supplies and distributed more widely.

Emergency Medical Supplies for Fractures After a Severe Earthquake in Lima

1. X-RAY SUPPLIES

Known Brands (Prioritized): KODAK
(AGFA)

KODAK Specifications: X-OMAT-S, Interleaved, alternate folders, packed 50 or 100 leaves per carton

Dimensions:

Measurement (Inches)	Streamlined Supply*	Priority #2	Most Variety
8 x 10	-	-	10%
11 x 14	-	-	10%
14 x 14	-	25%	5%
14 x 17	60%	50%	50%
24 x 30	40%	25%	25%
	100%	100%	100%

Back-up Materials:

Fixer	Fijador
Developer	Revelador

* This assumes that X-Ray technicians can cut the sheets to suit their needs. It sacrifices convenience for a smaller, easier to handle number of items. Therefore, all three options are presented.

2. BANDAGES AND PLASTER

A. Plaster of Paris — Vendas de Yeso de Paris/Escayola

Quality: Standard — Calidad: estandard

Dimensions: 3 yards length — Medidas: largo de tres yardas

Width/Ancho	Streamlined List Prioridad Máxima	Second Priority Segunda Prioridad
1 inch/pulgada	-	2%
3 "	-	2%
4 "	-	10%
6 "	50%	38%
8 "	50%	38%
12 "	-	10%

B. Pressed Cotton — Algodón Prensado

Quality: Standard — Calidad: Estandard

Dimensions: — Medidas:

Standard Length: 2 yards — Largo Estandard: 2 yardas

Width/Ancho	Streamlined List Prioridad Máxima	Second Priority Segunda Prioridad
6 cm.	-	33%
10 cm.	100%	33%
15 cm.	-	34%

C. Gauze — Gaza

Specifications: Minimum 20 x 20 threads per square inch — Especificaciones: Mínimo 20 x 20 hilos por pulgada cuadrada

Dimensions: 36 inches wide X 100 yards long — Medidas: ancho de 36 pulgadas X largo de 100 yardas

or other standard — u otro estandard

D. Adhesive Tape

Quality: Standard

Dimensions (suggested):

3 inch width: 30%
1 inch width: 70%

or also: tubes containing assortment of sizes

Esparadrapo

Calidad: Estandard

Medidas (sujeridas):

ancho 3 pulgadas: 30%
ancho 1 pulgada: 70%

o también: tubos con medidas sorteadas

E. Non-Adhesive Elastic Bandages (ACE Type) — Vendas Elásticas No-Adhesivas (Tipo "ACE")

Width/Ancho	Streamlined List	Second Priority
4 inches/pulgadas		25%
6 inches/pulgadas		50%
8 inches/pulgadas	100%	25%

F. Gauze Bandages (Any Length) — Vendas de Gaza (Cualquier Largo)

Width/Ancho	Streamlined List
4 inches/pulgadas	50%
	50%

G. Sterile Gauze — Gaza Esteril

Dimensions: 75 mm. x 100 mm. — Medidas: 75 mm. x 100 mm.

H. Litters (Straight, Military Type) — Camillas (Tipo Militar)

Essential for back, pelvis and femural fractures — Esential para fracturas de columna, pelvis y femur

I. Thomas Splints

Specifications: Metal
Semi-Circular
Right & Left Units

Férulas de Thómas

Especificaciones: Metal
Semi-circulares
Unidades para Derecho/
Izqierdo

J. Skin Traction Kits

Sizes: Large (Adults)
Small (Children)

With Cord

Known Brand: Smith & Nephew Ltd.
Code 7477
Welwyn, Garden City
& Hull

Tracción Cutánea - Equipos

Medidas: Grandes (Adultos)
Pequeños (Children)

Con su Cuerda

Marca Conocida:

K. Splints (Metal)

Arms & Legs

Férulas (Metales)

Brazos & Piernas

Recommendations:

Preparedness

1. Completion of a bilingual streamlined list of emergency medical supplies for fractures and burns which would be required in such a case, with principal technical input of PAHO disaster specialist Dr. Miguel Gueri.

2. Distribution of the completed list in draft form to the parties who contributed ideas toward its development, and incorporation of improvements which can be suggested by such specialists.

3. Distribution of a final list of emergency medical supplies to the wider concerned community, including not only medical specialists but also donor agencies and governments.

Disaster Relief

1. Provision by donors after a severe earthquake in Lima of the emergency medical supplies which appear on the list, properly packaged and labeled.

EXTERNAL PROVISION OF MEDICAL PERSONNEL: INDIVIDUAL PATIENT CARE

Striking differences of opinion emerged among medical experts with respect to the necessity, feasibility, and desirability of external provision of non-Peruvian -- especially U. S. -- medical personnel to Lima in the event of a severe earthquake. Some of the debate is rooted in earthquake experiences in Peru, Nicaragua and Guatemala during the

past dozen years; another part is based on the realities of the Peruvian medical scene today, particularly in Lima. The positions can be summarized as follows:

Opposing Use of Foreign Personnel

(a) Necessity - There is no need in Lima for foreign medical personnel.

Peru has 13,000 medical doctors (and corresponding numbers of nurses and support staff throughout the country). Lima alone has 8,500 doctors, of which nearly 1,500 are in the Ministry of Health's employ, and the other providers have a similar number.

As a function of the low (180,000) and high (700,000) numbers of projected injuries, the 8,500 doctors yield a ratio of between 1:20 and 1:80 physicians:injured patients.

In addition, there remain outside Lima 4,500 physicians plus corresponding support personnel to treat patients evacuated from Lima to other cities (see Chart L for Ministry of Health personnel by type and region).

The critical time for administration of emergency care is 72 hours. Patients who survive that period will in their overwhelming majority not become fatalities as a result of the earthquake. External personnel in significant numbers, cannot arrive and become operational during the first 72 hours and are not needed thereafter.

(b) Feasibility - It is not possible for foreign medical personnel, whose dispatch to Peru is initiated after reports concerning an earthquake's impact have reached foreign decision-centers, to arrive in time to make a difference for critical patients. The management, communications,

transport, arrival, organization, distribution and support systems required for such an operation are complex in the best of times and near impossible in post-disaster environments.

Most U. S. personnel are not Spanish speakers. Communication is vital in emergency operations. Even native Spanish speakers will have problems communicating with seriously injured patients. U. S. personnel are also not familiar with local technical and cultural conditions.

(c) Desirability - Organization of distribution and support of foreign medical personnel will utilize resources which will have to be subtracted from those supporting national medical personnel. Support staff, equipment, housing, food, medical supplies and other resources will be diverted from Peruvian doctors to U. S. or other foreign doctors.

Maintaining motivation among national personnel, and insuring their direct, intensive involvement in relief operations could also suffer if it is perceived that external resources are coming in to relieve local personnel of these responsibilities. This could diminish the commitment of national personnel to the medical rehabilitation process which will continue in many cases for years after the earthquake.

In particular, U. S. military personnel -- however efficient and dedicated -- symbolize U. S. military involvement in the region, perceived by some as a negative feature of U. S. foreign policy.

Supporting the Use of Foreign Personnel

Those favoring provision of foreign personnel for individual patient care in Lima base their arguments on necessity, not on desirability. Both sides agree that it would be more desirable for medical emergencies

to be handled by national personnel.

The argument for the necessity of foreign personnel is based on the following:

(a) Low-Income Patient Care in Normal Times is highly inadequate in quantity and quality. The ratio of physicians and staff to patients is the same in normal times as it would be in emergency conditions. Yet even without the added constraints of post-disaster chaos, poorer people cannot get adequate medical care. While a certain amount of disaster-generated medical service delivery is anticipated, there are serious reservations about the volume of such assistance and the time during which it will be sustained in relation to the needs of the low-income population. This concern is heightened by the knowledge that the overwhelming majority of injured victims will be low-income tugurio and other persons who live in precarious, low-income related sites.

(b) National Organization is viewed as deficient. In the absence of a vigorous planning process through which the mobilization of the Lima medical community is provided, it is believed that national medical services will not effectively reach the injured population and that ad hoc outside resources -- properly managed -- would be important supplements to the system.

(c) Volume of Assistance Required - It is believed that even in the minimum injury estimate -- 180,000 -- the volume of work and services, and thus the number of fulltime personnel required for it, in the short- and medium-term is under-estimated. Although many Peruvian doctors will offer their round-the-clock services, they will need relief teams.

(d) External Staff Have No Other Obligations - National physicians may feel required to attend to their own housing damages, family security, and normal clients. Well organized external relief personnel can pick up the emergency and medium-term workload even after the first 72 hours, by which time national personnel will have exhausted itself (but at which time there will remain considerable service to be provided). As foreign personnel have no families, friends and on-going responsibilities, they can dedicate themselves fulltime without other worries to the task.

(e) Solidarity/Political Expression - Some argue that it is important for other nations to express humanitarian solidarity with the victims of disasters and that the provision of human resources for the emergency is an effective way of doing so. A Brazilian, Belgian, Cuban, or U. S. medical team providing medical treatment to a disaster victim is perceived as an expression of concern, support and solidarity by one nation toward another. In other words, there is an important political dimension to the dispatch of disaster personnel.

(f) In the field, foreign medical personnel -- despite language and cultural difficulties -- work efficiently, usefully and productively alongside their Peruvian counterparts. While conceding that language, culture and logistics are constraints, proponents of the use of external personnel suggest that these problems pale in the perspective of the volume of cases that must be handled.

Both sides in this argument have the benefit of the injured disaster victim at heart, although there is some tendency for advocates of each side to describe the other side as lacking in this sentiment.

Recommendations:

Disaster Relief

The conclusion of this study is that if the number of injuries can be reasonably estimated not to exceed 200,000, large numbers of foreign medical personnel ought not to be dispatched to Lima. If a significantly larger number of persons were severely injured, it would be in the case of an earthquake so devastating that a major section of the West Coast of South America would be affected, adding a dimension to the disaster which radically changes all previous assumptions.

But if casualties are between 100,000 - 200,000, a small number medical teams could be useful, in the following conditions:

(a) If they are para-medics or rescue squad personnel accustomed to providing emergency care for milder burns and injuries, and immobilizing fractures under difficult emergency conditions.

(b) If they handle only out-patient services, attempting to diminish the burden on the hospitals and major health centers -- preferably reaching patients before they reach the hospitals; or reaching them outside the hospitals in cases where patients not requiring hospitalization have already arrived there.

(c) If they relieve Peruvian personnel who are working intensive shifts of long-hours in order to permit rest periods.

(d) If personnel speak Spanish or are dispatched in teams of two or three where at least one person is fully bilingual.

(e) If personnel have their own support system, or this is arranged without burdening national health authorities. The support

system must include a complete range of fracture and burn medical supplies and medicines.

(f) If they are X-ray technicians with portable Polaroid X-ray units and complete film and other supplies and if they can be used to support Peruvian physicians and staff.

(g) Consideration should be given to channeling foreign doctors and medical volunteers to evacuation centers in other Peruvian cities. The supply of physicians outside Lima is relatively limited, and Lima-based doctors will not wish to leave their families in this period. U. S. doctors who will arrive but who are not needed in Lima could provide valuable services in evacuation hospitals -- especially if they have special skills lacking there.

(h) Such personnel should be prepared to provide not only emergency assistance but also medium-term rehabilitative assistance in orthopedics, etc.

Annex D, After the Earthquake, an account of the post-disaster experiences of Scottish physician Drummond Rennie in Peru in 1970, would be a useful reference document for donors considering the provision of external medical personnel.

EXTERNAL PROVISION OF MEDICAL PERSONNEL: TECHNICAL ASSISTANCE EXPERTS

The provision of technical assistance experts in several disciplines has been useful after previous disasters in Peru, Nicaragua and Guatemala. Three types of experts upon which the USAID Missions have drawn are:

1. Epidemiologists: Center for Disease Control
Atlanta, Georgia

After the 1970 earthquake in Peru, two Center for Disease Control (CDC) specialists, Dr. Paul A. Blake and Dr. David Sencer, assisted the Government of Peru in the establishment of an epidemiological surveillance system. Dr. Blake's impressions are documented in a manuscript article, Establishing the Epidemiologic Approach After an Earthquake in Peru, dated November, 1973, which is Annex E.

Some of the work to which Dr. Blake's article has reference is elaborated upon in After the Earthquake, Annex C, by Dr. Drummond, referred to earlier.

The CDC played an important role in the Guatemala (1976) earthquake, again in epidemiological surveillance efforts. In Disease Surveillance and Decision-Making After the 1974 Guatemala Earthquake (Annex F) CDC experts join locally-based health specialists such as Dr. E. Croft Long in describing their efforts in Guatemala.

CDC has Spanish-speaking experts in many public health aspects of disaster management -- including experts in the working experience in Peru -- and can usually tailor a team to the needs of special situations. It is important to call on them as early as possible after a disaster so that they can arrive in time to use their skills to maximum advantage.

2. Biological Decontamination Team

In a major disaster, a fully trained and equipped externally provided biological decontamination unit may be useful. Such a unit can assist in facilitating the recovery of corpses -- both

human and animal -- where the odor of decomposition makes such work difficult for local workers, and in dealing with special vector problems which may emerge. The experience of a U. S. military unit in Managua, Nicaragua shortly after the 1972 earthquake, is described in a U. S. Southern Command (USSOUTHCOM) After Action Report dated March 6, 1973:

> On 28 December 1972, the Howard Air Force Base Civil Engineering Decontamination Team traveled to Managua with a vehicle and driver from Fort Kobbe. The equipment used was the M12A1 Decontamination Apparatus; the chemicals used were Super Tropical Bleach (STB) and Calcium Hypocloride (HTH).
>
> The original reason for requesting the Decontamination Team was the fear of disease outbreak. It was discovered that the biological decontamination also killed the bacteria causing flesh decomposition and, thus, reduced the odor.
>
> The team was requested to spray bodies trapped beneath buildings. Although the rubble depth handicapped the operation, it did reduce the odor to a level which permitted cleanup work to continue.
>
> The Decontamination Team was requested to spray a meat canning factory containing several tons of decaying meat. Because of the odor, the owner could not hire personnel to enter the building to remove processing equipment before the building was demolished. After the area was sprayed, the odor was reduced to a level which allowed personnel to remove the equipment.
>
> Other tasks included spraying the Post Office basement with a lime solution to neutralize a large quantity of battery acid, disinfecting shower areas, and spraying for dust control. It was also found that strong solutions of agent aided in insect control.
>
> The team returned to Howard Air Force Base on January 11, 1973.

3. Veterinary Experts

After the 1970 earthquake in Peru, the U. S. military provided the services of a veterinary corpsman as part of the USSOUTHCOM DAST team. At the conclusion of his after-action report, the veterinarian concludes that while there was no extreme need for his services, he was utilized in some useful ways and could provide needed advice, at times. For example:

> The medical doctors in Huaraz were very concerned about a superstition that dogs who ate human flesh were apt to develop rabies. After some discussions, they were partially convinced that dogs can only contact rabies from an infected animal. However, they still wanted to kill all the dogs because they insisted that rabies were enzootic in the area. They were reminded that this was true not only of this area but of practically every other large land mass in the world.
>
> Many problems would have arisen if it had been decided to destroy the dogs. If poison were to be used to kill the dogs, the children could possibly contact the poison. Moreover, if poisoned, the dogs would have crawled into an inaccessible area to die and have added to the decaying flesh. Shooting of the dogs would have been dangerous and the dead animals still would have had to be burned or buried.

Concern about other veterinary-related health issues arose after the Guatemala earthquake (see description of the fear of a rabies epidemic which arose in Guatemala in Annex F, Disease Surveillance and Decision-Making After the 1976 Guatemalan Earthquake).

Recommendation:

Disaster Relief

Based on a review of previous earthquakes in the Hemisphere, and on the suggestions of experts consulted in connection with this study, it appears that experienced, Spanish-speaking specialists

in fields such as the three described here could be most useful. However, timing is an important element of their participation; thus, efforts should be made to establish whether or not they will be needed and to set the process for their arrival in motion at the earliest possible opportunity.

PROVISION OF BLANKETS: POSITIVE RECOMMENDATION

The provision of warm blankets provided in large numbers by external donors would be useful to disaster victims during the emergency period and thereafter. Lima's climate is dry, and it rains only during a few days of the year. But the nights are cold, and the large, homeless population will require warmth and minimal comfort to maintain its health even though it may not require cold-weather shelter which would be required in a climate. See Annex G for customary local specifications and sources of supply for blankets.

PROVISION OF FIELD HOSPITALS: NEGATIVE RECOMMENDATION

With 28 major hospitals in Lima, and numerous smaller clinics which have such facilities, it seems unlikely that field hospitals will be required. There are several field hospitals in Lima at present: one larger unit has been consolidated by the Armed Forces from two smaller field hospitals donated to Peru after the 1970 earthquake; and the Social Security Institute has a mobile field hospital designed especially for Peruvian conditions. Field hospitals are very

costly to the donor; in AID's case their cost is ultimately deducted from funds available for higher priorities; and by the time they arrived in Lima, they would probably be largely superfluous. [These hospitals tend to be, and will probably be, requested in the immediate aftermath of a disaster, but in the number of days required to make a decision and deploy the hospital in the field, the need which prompted the request will have largely diminished.] Of all the possible assistance resources which could be provided to Lima for the health sector, this appears to be the least advisable. In addition to the large number of hospitals in Lima, there are hospitals throughout Peru which could absorb evacuated cases from Lima. Peruvian Armed Forces aircraft resources (see Volume VI, Airport and Aircraft Resources) are most adequate for both local (helicopter) and long-distance air evacuations.

ANNEX A

A Brief Overview of Peru's Health Delivery System

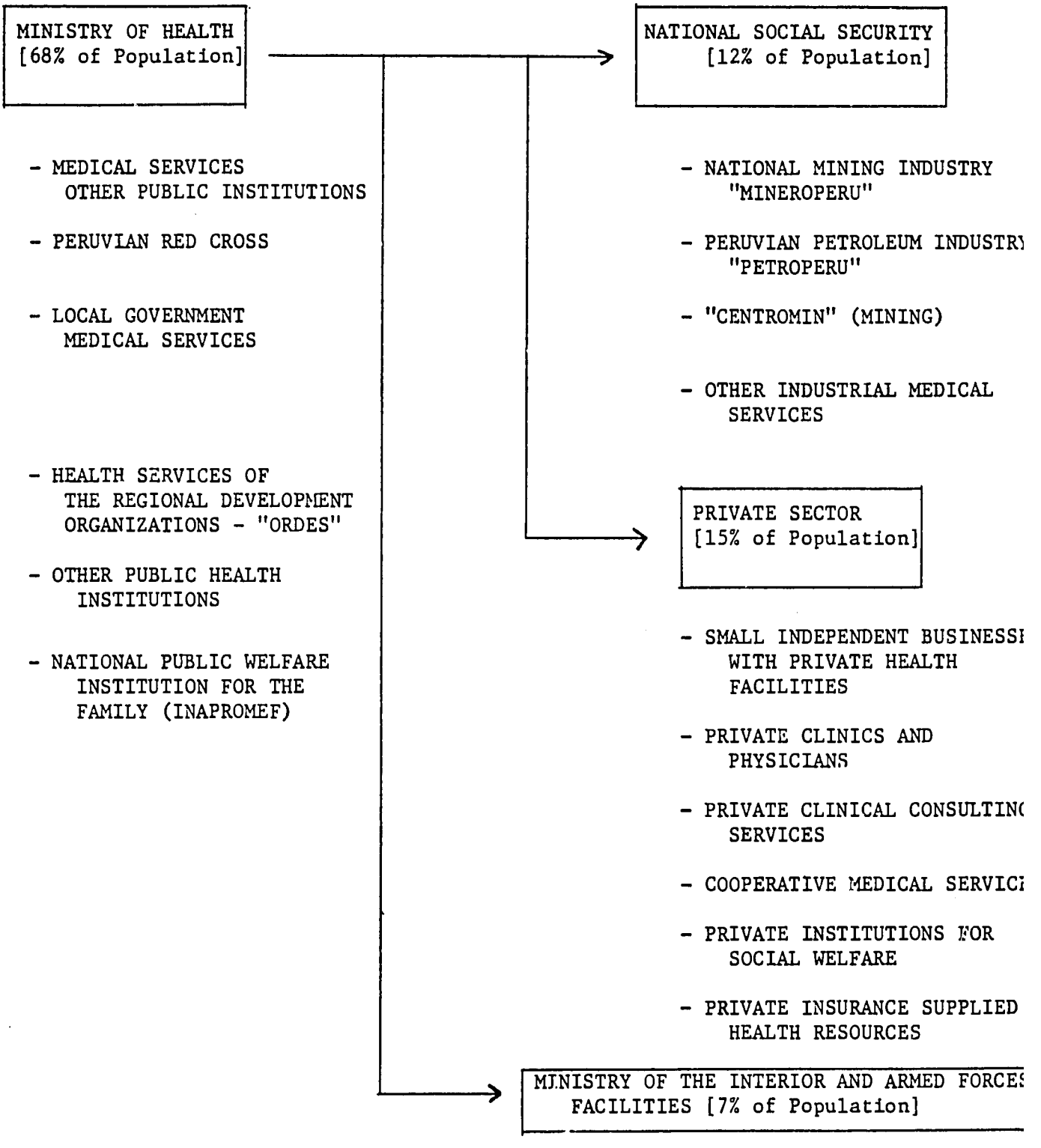
ANNEX A

A Brief Overview of Peru's Health Delivery System

The delivery of health services in Peru falls within the responsibility of the Ministry of Health, which itself is also directly responsible for the provision of health services to the roughly 66% of the population who are not covered by other health services or delivery programs. The Social Security Institute (IPSS) provides services to insured workers and their families, accounting for about 12% of the population; the Armed Forces serve its members and families, about 7% of the population; and the remaining 15% are served by the private sector. Chart C illustrates the functional institutional distribution of health service responsibilities among these organizations.

During 1981, the operations of these groups continued to be affected by a severe fiscal crisis including a high rate of inflation (about 75%), and chronic fiscal deficits. Rapid population growth, especially in Lima during the last decade, have further overburdened health delivery in that city.

INSTITUTIONAL ORGANIZATION OF THE HEALTH SECTOR - CHART C*



* Percentage figure in each box indicates percentage of population served directly by the respective entity.

- Roughly 52% of the urban population of Peru, versus 58% of the rural population, is under the age of 19 (see Chart D, Age Distribution of Population). [For 1981 population data by district in Lima, see Volume X of this report, Low-Income Housing.]

- Life expectancy in Lima is 64.1 years, versus 55.2 years in the rest of Peru.

- The general mortality rate has declined from 14.7 per 1,000 inhabitants in 1940, to 5.9 in 1972.

- Gastrointestinal and respiratory diseases are the major causes of illness and death in the entire population (see Chart E, Five Principal Causes of Death).

- Approximately 42% of all deaths are attributed to children under five years of age. Among children, the two principal causes of death are infectious and parasitic diseases (see Chart F, Primary Causes of Mortality for Children).

- Chart G illustrates proportionate trends in Lima of communicable diseases by year, 1976 - 1980.

AGE DISTRIBUTION OF POPULATION IN PERU - CHART D

(In Thousands) - 1979

Age Groups	Total	Percent of Total	Urban Area	Percent of Total
0-4 years	2,824	16.3	1,682	14.6
5-9 years	2,433	14.1	1,491	12.9
10-14 years	2,183	12.6	1,463	12.7
15-19 years	1,873	10.8	1,330	11.5
20-29 years	2,860	16.5	2,116	18.4
30-39 years	1,913	11.1	1,367	11.9
40-59 years	2,294	13.3	1,528	13.2
60 and over	913	5.3	553	4.8
Total	17,293	100.	11,530	100.

Source: Boletin Analisis Demografico No. 20, Oficina Nacional de Estadistica.

CHART E

FIVE PRINCIPAL CAUSES OF DEATH WITH RATES BY SEX, 1970 (For All Age Groups)

Principal Causes	Sex Group: Males — Rank Order	Males — Rate (per 100,000 Population)	Females — Rank Order	Females — Rate (per 100,000 Population)
Influenza and Pneumonia	1	171.7	1	163.4
Enteritis and Other Diarrheal Diseases	2	77.0	2	73.6
Measles	4	60.8	3	61.9
Accidents	3	63.1	-	26.3
Bronchitis, Emphysema and Asthma	-	41.3	5	39.5
Tuberculosis	5	41.7	-	33.0
Malignant Neoplasms	-	33.2	4	41.6

Source: World Health Organization, Pan American Health Organization, Health Conditions in the Americas, 1969-1972, Scientific Publication No. 287, Washington, D.C.: Pan American Health Organization, Table II-3, 1974, p. 177.

CHART F

PRIMARY CAUSES OF MORTALITY FOR CHILDREN UNDER ONE YEAR AND 1-4 YEARS IN PERU, 1970

Principal Causes	Age Group: Less than 1 year — Rank Order	Less than 1 year — Mortality Rate (per 100,000 Population)	1-4 years — Rank Order	1-4 years — Mortality Rate (per 100,000 Population)
Measles	5	411.6	1	285.3
Influenza and Pneumonia	1	1820.6	2	278.7
Enteritis and Other Diarrhea Diseases	2	1106.7	3	182.3
Bronchitis, Emphysema and Asthma	4	572.3	4	87.8
Avitaminoses and Other Nutritional Deficiencies	-	-	5	43.0
Causes of Perinatal Mortality	3	746.3	-	-

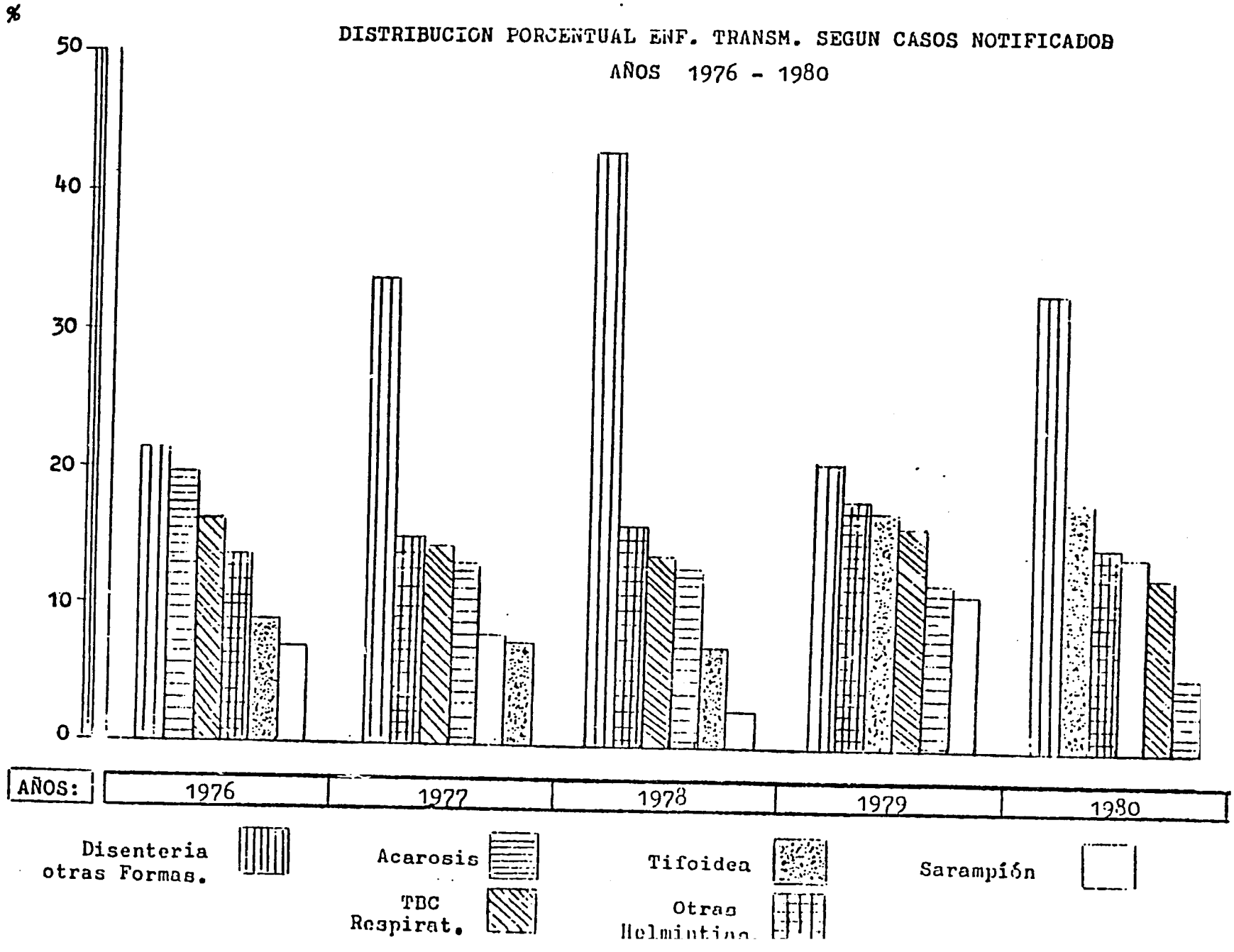
Source: World Health Organization, Pan American Health Organization, Health Conditions in the Americas, 1969-1972, Scientific Publication No. 297, Washington, D.C.: Pan American Health Organization, Table II-5, 1974 pp. 181-185.

CHART G.

REGION DE SALUD DE LIMA

DISTRIBUCION PORCENTUAL ENF. TRANSM. SEGUN CASOS NOTIFICADOS

AÑOS 1976 - 1980



Ministry of Health Operations

The Ministry of Health is the largest health provider in Lima. It has been affected not only by the fiscal crisis and population growth which affect other providers, but also by a decline from 4.1% in 1963 to 3% in 1981 in the share of GNP dedicated to its work. Chart H illustrates the amount of the Ministry's 1979 budget and its distribution -- exclusive of central administration and special program costs -- between Lima and the rest of Peru. Lima, with roughly a quarter of the national population receives about 50% of the budget.

Approximately 85% - 90 % of the Ministry's budget is used for personnel costs, leaving no more than 15% for program operations and affecting the Ministry's ability to maintain even minimal stocks of supplies, medicines and equipment at its centers. Frequent reorganization within the Ministry and extended periods of relative indifference to it, coupled with problems already mentioned, have helped to maintain an emphasis on curative health services, high-cost in-patient hospital services, and other strategies which the Ministry has, from time to time, committed itself to alter.

Ministry of Health Management

Management of health services is decentralized in seventeen health regions, which are further subdivided as illustrated on Chart I, into one to four areas which are directly responsible for implementing health programs. The area level service delivery units are primarily Ministry hospitals. The third level of the pyramid are the health centers, of which there are

now about 500, and which are relatively large clinics situated in urban areas, usually serving 20,000 - 50,000 people each. Chart J elaborates further on the organization of a health region.

CHART H

Distribution of Financial Resources Designated for Recurring Costs of the Ministry of Health (1) and Regional Administrative Units (Ordes), at the Level of Lima and the Rest of the Country - 1979

Administrative Unit	Budget		Expenditures		Percent of Expenditures
	Thousands of Soles	%	Thousands of Soles	%	
LIMA	10,174,339	49.5	10,272,173	49.7	101.0
Rest of the Country	10,384,290	50.5	10,380,096	50.3	100.0
Total for the Country	20,558,629	100.0	20,652,269	100.0	100.5

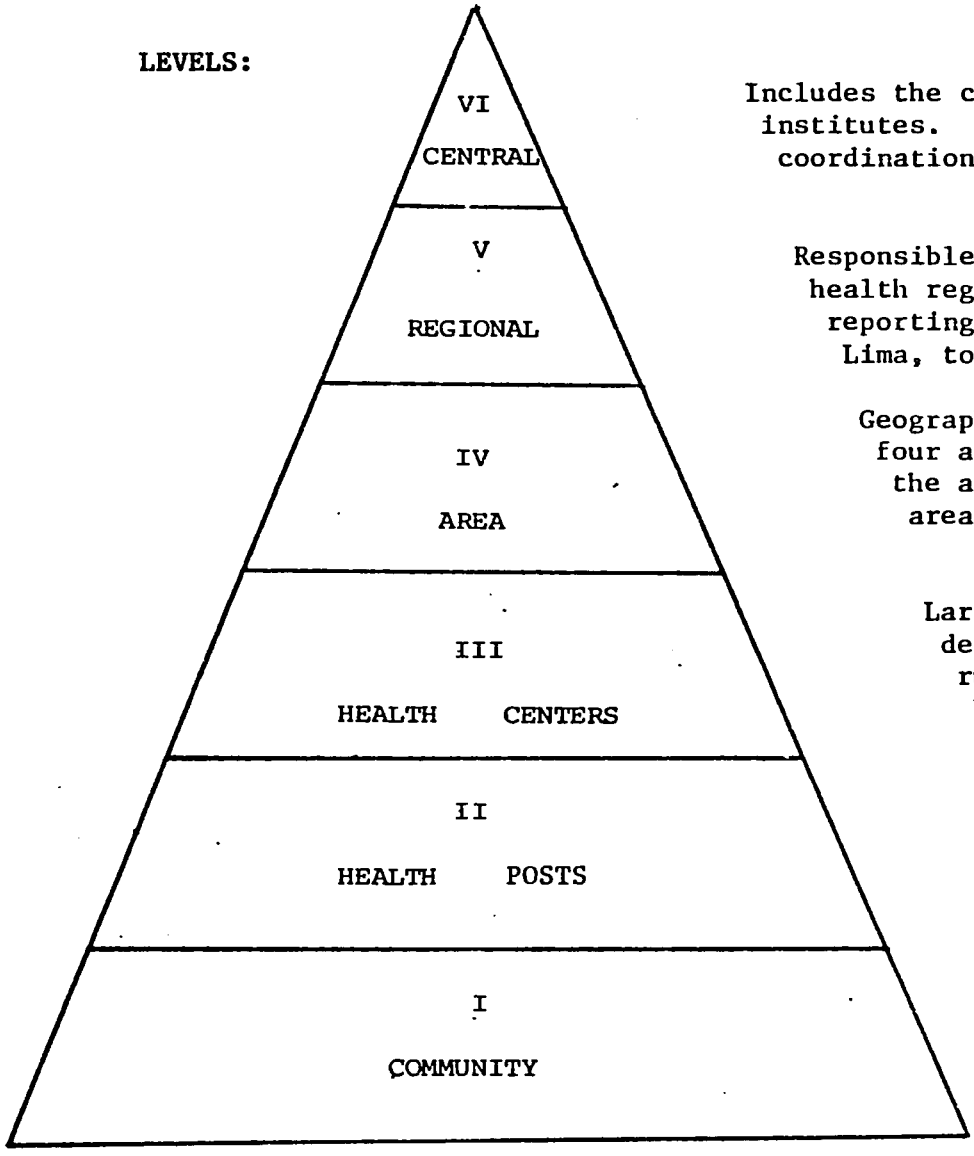
(1) Does not include recurring costs designated for Central Administration and Special Programs.

Source: General Ledger for the MOH Budget

CHART I

PUBLIC HEALTH CARE DELIVERY SYSTEM: Ministry of Health and Social Security

LEVELS:



Includes the central Ministry of Health and specialized centers and research institutes. The Central level is concerned with program development, management, coordination, evaluation, and support activities for the other levels.

Responsible for the overall management and planning of defined geographical health regions (17). Each region office has a director and support staff reporting to the local administrative unit (ORDE), or in the case of Lima, to the Ministry of Health.

Geographical subdivision of the health regions, each of which has one to four areas, principally responsible for implementation. By tradition, the area director is also the director of the largest hospital in the area, with other directors of smaller hospitals reporting to him.

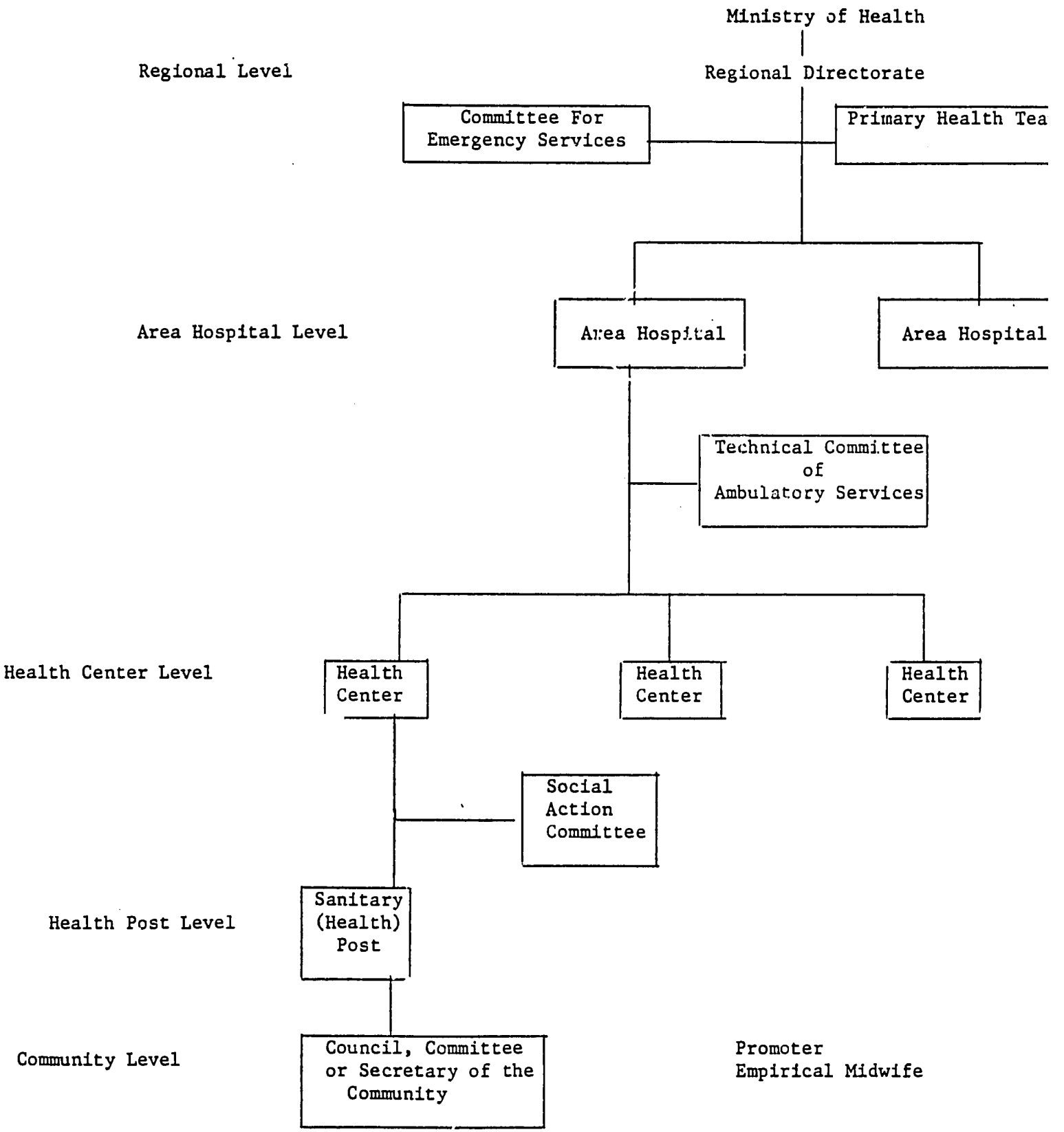
Large clinics staffed with part-time and full-time physicians, dentists and other staff which are located in urban and semi-rural areas. Frequently, health centers serve as a link between the hospitals and the lower levels.

Small health delivery unit normally staffed by an auxiliary nurse and located in semi-rural to rural communities. This is the link between the community and the rest of the health system.

Smallest communities served by promoters and other community based health workers. Preventive services and some emergency care, including distribution of a limited number of medical supplies.

CHART J

Organizational Chart of a Ministry of Health Region



Ministry of Health Infrastructure

In all, the Ministry operates 107 hospitals, 500 health centers, and 1,200 health posts, although in practice the staffing, equipment, and supplies for these units vary considerably from region to region. Chart K, at the following page, illustrates the inventory of these types of structures in 1978, showing the number of such units and beds in such units by health region. Lima is shown to have 25 hospitals with about 7,200 beds; 108 health centers with 94 beds; and 31 sanitary stations (or health posts) with no beds.

Ministry of Health Personnel

Chart L provides a similar breakdown for 1976 of health personnel, broken into five categories: physicians, obstetricians, nurses, nurses aides, and others. Lima, at that time, had about 13,000 personnel, nearly 50% of the Ministry's nation-wide personnel, including nearly 1,100 physicians and about 320 obstetricians.

Ministry of Health - Peru 1978

Health Care Infrastructure and Effective Beds by Type and Region

HEALTH REGIONS	HOSPITALS N°	HOSPITALS BEDS	HEALTH CENTERS N°	HEALTH CENTERS BEDS	SANITARY STATIONS N°	OTHERS N°
NORTH WESTERN	11	797	70	58	232	1
MID NORTHERN	23	1,610	55	74	107	2
ORDELORETO	3	411	10	49	78	
MID EASTERN	3	350	6	36	57	
CENTER	10	916	58	76	150	
MID SOUTH	7	613	20	-	58	1
SOUTH WESTERN	8	1,767	26	51	98	
SOUTH EASTERN	8	1,131	25	63	155	
SOUTHERN PLATEAU	5	344	15	124	90	
SAN MARTIN	4	216	10	-	98	
LIMA	25	7,172	108	94	31	
TOTALS	107	15,327	403	625	1,154	6

SOURCE: BASIC INFORMATION ON HEALTH INFRASTRUCTURE 1978
PLANNING SECTORIAL OFFICE M.H.

CHART L

Personnel by Health Region According to Function

Ministry of Health - Peru 1976

HEALTH REGIONS	TOTAL	PHYSICIANS	OBSTETRICIANS	NURSES	NURSE-AIDES	OTHERS
NORTH WESTERN	2,264	151	37	93	828	1,155
MID NORTHERN	2,627	153	46	147	795	1,485
CENTER	1,653	86	31	113	523	900
MID EASTERN	574	29	9	25	194	317
MID SOUTH	1,137	100	25	92	320	600
SOUTH WESTERN	2,604	216	39	225	827	1,297
SOUTH EASTERN	1,472	93	15	62	356	746
SOUTHERN PLATEAU	780	33	11	45	303	388
EAST	1,461	68	12	35	563	783
LIMA	13,110	1,084	321	1,327	3,435	6,943
TOTALS	27,682	2,013	546	2,164	8,344	14,615

The Peruvian Social Security Institute

The Peruvian Social Security Institute (IPSS) is organized through central management policy development office (supported by eight General Directorate support offices) and eight regional executive offices, which are responsible for developing and implementing health programs in their respective geographical areas.

IPSS has about 19,500 employees, of which roughly 30% are professionals, 7% are technicians, 35% are health auxiliaries, and 27% are maintenance/ administrative support staff. About 65% of IPSS' personnel are located in Lima; the balance are distributed around the country.

Among its eight regions, the system has 18 hospitals, 17 medical centers, 6 polyclinics, 40 sanitary posts and 91 factory posts.

Armed Forces Medical Services

The military and police health infrastructure, which provides a relatively better quality of service to its clients, includes a full range of preventive and curative services for the various branches of the Armed Forces and the Ministry of Interior. These groups have specialized units to treat burns, advanced emergency and intensive care equipment, and specialist professional services. They have 2,145 beds for the police and military in the Metropolitan Lima area.

The Association of Pharmaceutical Companies routinely offers consultant and pharmaceutical information services to all public and private health providers and, in fact, assisted in gathering data concerning medical supplies for this study.

ANNEX B

PAHO Letter of November, 1981 to Ministry of Health

re: Hospital Infrastructure

PAN AMERICAN SANITARY BUREAU

A5171

AIV-5288-81

3 de Noviembre de 1981

Señor Doctor
Uriel García Cáceres
Ministro de Salud
Lima

Estimado señor Ministro:

Asunto: Vulnerabilidad de los Centros Hospitalarios en el Area Andina

Como parte de las actividades derivadas de la Resolución XXXVI de la Reunión XLVI del Consejo Directivo de la OPS (1979) relacionado con Preparativos para Emergencias y Coordinación de Socorros en Casos de Desastres en las Américas, nuestra Oficina ha considerado la conveniencia de realizar un estudio en los países representados por los Ministerios de Salud del Area Andina, para determinar la vulnerabilidad de los hospitales ante situaciones de desastre.

Un trabajo de este tipo en el área de Lima Metropolitana indicaría en detalle las condiciones de los hospitales en cuanto a su capacidad física de sobrevivir un desastre natural o causado por el hombre. También se esperaría información acerca de las limitaciones para enfrentarse con un influjo masivo de víctimas, desde un punto de vista estructural y logístico.

Es de esperar que un estudio detallado como el que se propone facilitaría la posibilidad de adquirir fondos extrapresupuestarios que permitiesen llevar a cabo las recomendaciones pertinentes.

Naturalmente sería indispensable la colaboración de una entidad tal como la Universidad Nacional de Ingeniería que cuenta con expertos en estudios de vulnerabilidad. De hecho como usted sabe en 1977 se llevó a cabo el trabajo "Protección de Lima Metropolitana ante Sismos Destructivos" sin embargo, la sección 3.3. que trata sobre los hospitales es bastante incompleta.

/ / / . . .

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PAHO 108
5-58

Estimamos que este trabajo colaborativo entre el Ministerio de Salud, la Universidad Nacional de Ingeniería y la OPS llevaría de 6 a 8 meses.

Si usted considera que este proyecto sería de utilidad dentro de los planes de su Ministerio, tendríamos mucho agrado en discutirlo con más detalle con usted o con los funcionarios que usted designe.

La ocasión nos es propicia para reiterar a usted los sentimientos de nuestra más alta consideración.

Muy atentamente,

Dr. Luis A. Cervantes
Representante Area IV, a.i.

cc: Dr. Juan Ponce de León
Oficina Intercambios Internacionales
Ministerio de Salud

ADE

MG/nrr.

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ANNEX C

Carilla de Encuesta - Hospital Questionnaire

BORRADOR

CARTILLA DE ENCUESTA

Nombre Oficial Completo del Hospital: _____

Dirección Completa: _____

Persona Responsable de la Cartilla: _____

Cargo Oficial: _____

Fecha: _____

ENERGIA

1. La alimentación eléctrica de ELECTRO-LIMA, es en un circuito independiente o un circuito que sirve a varios usuarios?

2. Indicar la tensión (voltíos) del suministro:

3. Indicar el número de suministro de ELECTRO-LIMA:

4. Indicar el número de la SUB-ESTACION de ELECTRO-LIMA que lo sirve:

5. Indicar las tres SUB-ESTACIONES de ELECTRO-LIMA más cercanas al hospital, para poderlo alimentar con linea especial directa en caso de emergencia:

(a) SUB-ESTACION N° Dirección:

(b) SUB-ESTACION N° Dirección

(c) SUB-ESTACION N° Dirección

6. Cuánto corriente consume el hospital diariamente en condiciones normales (en KWH):

7. Tiene cada edificio en su complejo de edificios la posibilidad de alimentarse independientemente? Explique el sistema:

8. Aaemas del sistema normal, tiene circuitos especiales de emergencia para:

Sala de Emergencia	SI	NO	Cámaras Frigoríficas	SI	NO
Unidades Rayos-X	SI	NO	Sala de Operaciones	SI	NO
Ascensor(es)	SI	NO	Laboratorio	SI	NO
Esterilizadores	SI	NO	Unidades de Cuidado Intensivo	SI	NO
Cada Piso de Cada Edificio	SI	NO	Sistema Bombeo/Agua	SI	NO

9. Con cuántos grupos electrogenos cuenta el hospital:

10. Descripción de cada unidad de grupo electrógeno:

	Marca	KVA	Año	Tipo de Combustible	Reserva de Combustible	Arranque (Automát Manual
(a)						
(b)						
(c)						

11. Es adecuado el grupo electrógeno para funcionamiento del hospital bajo condiciones de emergencia? Si no lo es, cuál es la potencia mínima en KVA que se necesita:

(ENERGIA: Continua)

12. Póngase el grupo electrógeno en uso por una hora. Cómo funcionó:

13. Tiene algún sistema de alumbrado de emergencia (de baterias o linternas fijas, etc.)? Si lo tiene, explique:

14. Nombre del funcionario del hospital responsable por el sistema eléctrico:

Número de teléfono:

AGUA

1. Cantidad de agua que consume el hospital por mes: _____ m^3

2. Fuente Normal de Agua:

   (a) Red Pública: Codigo de Contrata/ESAL: _____

   Dimensión de Tubería:

   (b) Pozo Propio: Producción Mensual: _____

   (c) Otro:

3. Tiene el hospital un sistema de bombeo de agua?

   Número de bombas: Capacidad Cada uno:

4. Capacidad de almacenimiento de agua en el hospital:

   (a) Tanque CISTERNA (Subterranea):

   Capacidad: _____litros

   Material de construcción del tanque:

   (b) Tanque ELEVADO:

   Capacidad: _____litros

   Material de construcción del tanque:

   (c) Otros:

   Capacidad: _____litros

   Material de construcción:

5. Bajo condiciones de emergencia, por cuántos días podría funcionar el hospital dependiente exclusivamente del total de agua en los almacenes de agua ahorita:

6. Cuántos litros de agua están en los tanques indicados en 4(a), 4(b), y 4(c) hoy día?

7. Fuentes alternas de emergencia para abastecimiento de agua:

   Tiene el hospital pozo propio: SI NO

   Capacidad de rendimiento de cada pozo: _____litros por segundo

   Ultima vez que ha servido para abastecer agua: Mes: Año:

   Podría utilizarse en caso de emergencia? (Si no, explique):

Está conectado el pozo al sistema normal de corriente eléctrico del hospital?

Tiene grupo electrógeno: (En caso que sí tiene, indique:)

KVA: Marca:

Año: Arranque: Automático? Manual?

Tipo de Combustible: Reserva de Combustible: _____días

Funcionan bien el motor y la bomba?

Póngalo en función por una hora. Cómo funcionó? Explique:

8. En caso de emergencia, en su opinión, cuál sería la forma más efectiva de abastecer agua al hospital, y para su distribución:

9. Nombre del encargado del sistema de agua:

Número de teléfono:

10. Describir sistema de desague:

INVENTARIO

Indique el inventario total de los siguientes insumos y la fecha de la toma del inventario:

Fecha de Inventario: _____de_____de 1981

1. PELICULA RAYOS-X

	Medida	No. de Paquetes	No. Hojas por Paquete	Marca
(a)				
(b)				
(c)				
(d)				
(e)				
(f)				
(g)				

2. VENDAS DE YESO DE PARIS (ESCAYOLA)

	Medida	No. de Paquetes	No. Unidades Por Paquete	Marca
(a)				
(b)				
(c)				
(d)				
(e)				

3. ALGODON:

	Medidas	No. de Unidades	Contenido de Cada Unidad
(a)			
(b)			

4. GASA

Especificaciones: _____hilos por pulgada cuadrada

No. de Paquetes: No. de Rollos por Paquete:

No. de Yardas en Cada Rollo:

4. ESPARADRAPO

_____unidades de _____pulgadas

_____unidades de _____pulgadas

_____unidades de _____pulgadas

_____unidades de _____pulgadas

5. VENDAS ADHESIVAS ELASTICAS

	Medida (cm o pulgadas) indicar	Marca	No. de Paquetes	No. de Vendas C
(a)				
(b)				
(c)				
(d)				

6. COBERTURAS (APOSITOS) ESTERILES PARA QUEMADOS

	Medida	Marca	No. de Cajas	No. de Unidades por Caja
(a)				
(b)				
(c)				
(d)				

7. FERULAS (Indicar No. de Unidades, Medidas, Marcas, Tipo - Pneumáticas, otra que sea especifico)

8. MEDICINAS (indicar cantidad, empaque, orígen):

(a) Penicilina:

(b) Gentamicina:

(c) Lidocaina - 1% Lidocaina - 2%

(d) Pentothal

9. NOMBRE DEL ENCARGADO DE ALMACENES DE LOS ARRIBA DESCRITOS: _____

Número de Teléfono: _____

COMUNICACIONES

1. Teléfono

Números de Teléfono:

Servicio Normal:

Servicio de Emergencia:

Departamento de Mantenimiento:

Departamento de Seguridad:

Residencia del (de la) Director(a) del Hospital:

Cuantos numeros telefónicos utilizables tiene el hospital?

2. Telecomunicaciones

Tiene el hospital algún sistema de comunicación por radio? Explique la red de comunicaciones: (incluir frecuencias)(notar si el sistema está interconectado con otros hospitales, agencias nacionales dentro de su propia institución, con otras instituciones)

Unidades de radio-comunicación que componen el sistema:

	Marca	Año	Modelo N°	Voltíos	Típo (VHF, UHF, etc.)
(a)					
(b)					
(c)					
(d)					

Está la radio atendido durante las 24 horas? SI NO

3. Nombre del encargado de sistema de comunicaciones:

Número de teléfono:

PLANTA

1. Lista de edificios que componen la planta del hospital (incluir talleres de mantenimiento, mecánica, garages, etc.)

EDIFICIO (Nombre/Número de Identificación)	N° de Pisos	N° Entradas/ Salidas	Año de Construcción	Tipo de Construcción (Adobe, Quincha, Concreto Armado)	Probable Comportamiento Ante Sismo 8.5+ Richter*	Número de Camas en el Edificio	Servicios Médicos Ubicados en el Edificio (Cuidado Intensivo, Pediatría, Sala Emergencia, etc.
(a)							
(b)							
(c)							
(d)							
(e)							
(f)							
(g)							
(h)							

(OTROS: Sigue en página aparte)

2. Cuenta el hospital con terrenos amplios y despejados en su cercanía donde podría ubicarse hospitales de campaña y/o servicios de emergencia? Incluir áreas utilizados para parqueos, áreas verdes, y otros. Por cada área, incluir las medidas en metros (Ejemplo: Parqueo, 90 metros por 30 metros):

(a)

(b)

(c)

* reconoce que se está solicitando una opinión subjetiva.

SERVICIOS MEDICOS

1. Servicios Normales

(a) Cuantas camas están dedicadas a las siguientes especialidades:

Cuidado Intensivo: _____camas

Pediatría: _____camas

Sala de Emergencia: _____camas

(NOTA: AGREGAR OTROS SERVICIOS PRINCIPALES CUANDO DE PREPARA CARTILLA FINAL)

(b) A cuántas personas se atiende durante un día normal en la Sala de Emergencia?

(c) Cuántos casos de fracturas simples son tratados en el hospital cada día?

(d) Cuántos casos de quemaduras serias están tratados cada día:

(e) Cuántos casos de fracturas abiertas atienden cada día?

(f) Durante cúantas horas cada día está un médico de tiempo completo en la Sala de Emergencia?

(g) Tiene el hospital su propio laboratorio? SI NO
(En caso de "no", a donde mandan el trabajo de laboratorio?:)

(h) Unidades RAYOS-X en el hospital:

Marca	Potencia	Año	Voltaje	Modelo N°

2. AMBULANCIAS (Describir ambulancias con que cuenta el hospital):

Marca	Año	Tipo de Radio Comunicaciones
(a)		
(b)		

(c)

(d)

(e)

3. PERSONAL MEDICO

Tipo de Personal	Número Total	Número Tiempo Completo (8 horas+/día)	Número de Medio Tiempo (4 horas por día o menos)
Médicos			
Enfermeras			
Técnicos RAYOS-X			
Asistentes			
Administrativo			
TOTAL			

4. PLANES PARA EMERGENCIAS

Tiene el hospital un Plan de Emergencia elaborado para cases de:

(a) Emergencia en el Mismo Hospital:

Incendio SI NO

Sismo SI NO

Otro SI NO

(b) Emergencia Afuera del Hospital: SI NO

(c) Desastres (Emergencias Colectivas):

SISMO FUERTE SI NO

INCENDIO GRANDE SI NO

5. Corre el hospital un peligro de incendio en caso de un sismo 8.5+ Richter? A qué se debe?

ANNEX D

After the Earthquake

Dr. Drummond Rennie

2: 704-707 .1970

The Wider World

AFTER THE EARTHQUAKE

DRUMMOND RENNIE
Renal and Nutrition Unit,
Rush-Presbyterian-St. Luke's Medical School,
Chicago, Illinois 60612

AFTER the gigantic earthquake that shook northern Peru on May 31, many thousands of people from dozens of nations, and chiefly from Peru herself, made herculean efforts to help the injured and repair the damage. The response to this crisis was heart-warming, sluggish, enthusiastic, political, humanitarian, smooth, or chaotic. I became part of the response only because, by chance, I was uniquely qualified to help. I give here a personal-view.

LIMA

I already knew both Lima and the devastated area well, after three visits spent working with Prof. Carlos Monge and his group at the Universidad Peruana "Cayetano Heredia", studying renal physiology in Quechua Indians living at high altitudes. As a mountaineer, I had a much more detailed and intimate knowledge of the Callejon de Huaylas than all but a few educated Peruvians. Professor Monge sent a cable urging me to come, and the Disaster Relief Office of A.I.D. in Washington arranged my transport. I went, however, principally to see whether a team of 20 doctors from my hospital (who, answering my appeal, had all volunteered to come) would be able to work effectively in Peru—something it was impossible to determine from Chicago, despite days of frenetic telephoning.

I left six days after the earthquake. When I arrived in Lima, I went with Professor Monge to the university to find classes suspended and the place in ferment. Blocked roads were preventing any of the students and doctors from getting north to the damaged areas, and the atmosphere was of mounting and sometimes angry frustration. Rumours of up to 300,000 injured were flying around, yet, so far, they had scarcely seen a dozen. At the same time there was escalating confusion in the American Embassy, where more experts in every field, from geology to sanitation, were arriving hourly and adding to the chaos.

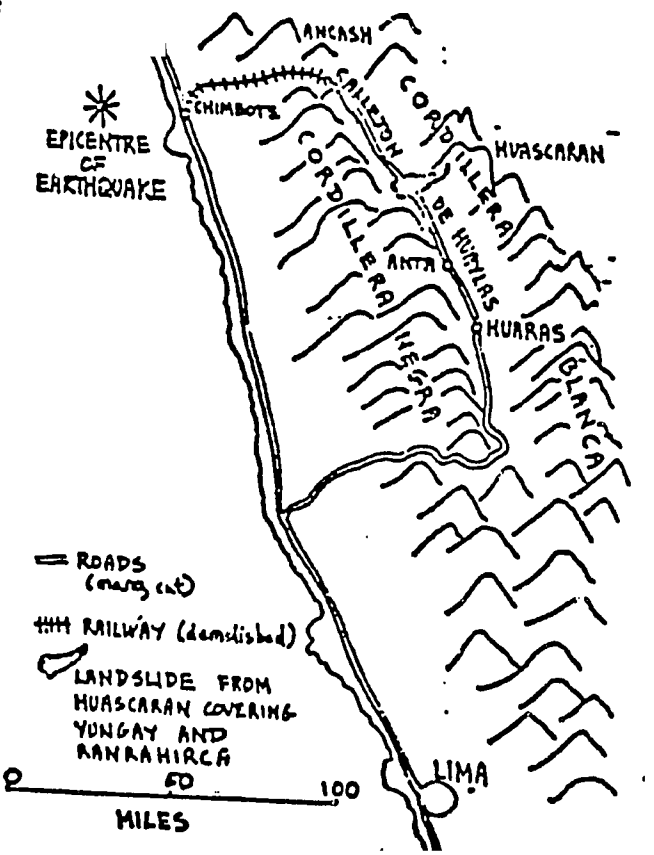
AFTER THE EARTHQUAKE

The epicentre of the earthquake had been off Chimbote, a large fishing port 230 miles north of Lima. There, and along the coast, shrouded in constant cloud and mist at that time of year, the situation was rapidly assessed and help of every sort was sent by road and by ship from Lima. Inland, because all the precipitous roads over the 14,000-foot passes through the mountains of the Cordillera Negra had been destroyed (and with them the few telephone lines), the situation was obscure. The densely populated valley of the Rio Santa, between the Cordillera Negra and the immense Cordillera Blanca, was covered with huge clouds of dust which prevented even parachutists from getting in for two days. A ham radio in Huaras, the chief town of the valley, and now totally collapsed, was sending out frantic calls for help. Aerial photographs showed that the glacier on Huascaran had avalanched down 10,000 feet and 9 miles (at what was later calculated as a speed of 250 miles an hour) demolishing Yungay and Ranrahirca and therefore burying about 20,000 people.

A huge area, the size of Belgium, Holland, and half of Denmark, containing about 700,000 people, was largely cut off and inaccessible. It was several days before C-47 cargo planes could land at Anta, a hastily scraped-out airstrip in the valley, 200 miles from Lima; and the Canadian Caribou aircraft, which, with the Peruvian planes, were to operate a daring and efficient air-lift, had only just now arrived in Lima. German water-purification units, American tents, mountains of blankets, were all waiting in Lima for transport up over the mountains. Nearly a week, then, after the earthquake, there was an impressive confusion. It was a natural consequence of a sudden, widespread, overwhelming catastrophe, and of a series of difficulties—geographical, human, and political.

Nature was dominant. There were almost no helicopters, and of these several crashed, including a large CH-47 Chinook, the crashes being due to a combination of pilot fatigue and inexperience, the heat and altitude, long distances, dust clouds, inadequate maps, and landmarks demolished by the earthquake. The roads, when reopened, were shifting, narrow, and tortuous. Radio communication was intermittent and incoherent.

Early on, the full extent of the disaster had not



een realised, and later, when appreciated, was probbly deliberately concealed to prevent panic. The U.S. as the only country near enough and with adequate esources to provide immediate, large-scale assistance, ut diplomatic relations between the two countries ad been strained since the Revolutionary Governent of President Juan Velasco Alvarado had seized he assets of the International Petroleum Company.

For America there was an immediate propaganda dvantage to be gained, but also the delicate problem f subordinating its huge resources to Peruvian irection; moreover, the very fact of its vast potential ometimes led to a resentment that the U.S. had not orked instant miracles everywhere. By June 15 the Americans had spent $2·6 million on relief, whilst the Russians had sent 1000 blankets and some medicine.

Knowing the normal easy-going, inefficient, and somewhat cynical ways of Lima, I was considerably impressed by the liaison and cooperation between Embassy and Palace, where an emergency committee had taken over all control from the separate ministries. What other foreigners regarded as tedious inefficiency or obstructionism seemed to me merely normal for Peru, and the difficulties experienced by foreigners were as much imposed by their own mental or philosophical bias as by geography. For them, Lima was strange, and the medical set-up unfamiliar. Telephones produced misinformation or angry frustration. Eager enthusiasm bogged down in bewildered incomprehension—inability to grasp the fact that there literally was no transport available, and that the terrain posed insoluble logistic problems—mixed with bursts of overcaution. It was hard for newcomers to accept that people actually lived in these mountains. Early on there had been an eerie reluctance to use old-fashioned methods—such as trekking on foot and with mules—on the part of the Peruvians, who were bemused by the concept of helicopters or C-130 transports, though as yet there were none available. Now both were being conjured up. The worse the confusion, the harder everyone worked, and the more everyone's thinking was confounded by exhaustion. The stuffy operations room in the U.S. Embassy was crowded with people coming and going all night long.

This was Peru. Peruvians had suffered, and they were doing more than anyone to bring relief to the victims. It was hard for the self-confident foreigner to keep remembering not only that the Peruvians had to be in command but also that this was appropriate. More than this, it was the most effective and efficient system. Peruvian doctors, for example, would have the local medical expertise, as well as rapport with the patients; they could not merely initiate care, but also continue it long-term.

The problem was simple: to bring immediate succour to the injured, the homeless, and the hungry—but how many, where, and how? The very completeness of the catastrophe, and the obviousness of the problem, highlighted the fact that almost every proposed solution was arguable on medical, logistic, or humanitarian grounds, using arguments often, if not usually, based on faulty information. Should field hospitals (if they could be found) be set up in the Callejon or in Lima? Where should the injured be treated? If they were evacuated to Lima, where would they be housed, and how and to what would they return? Or would they filter into the slums of the capital? Was there starvation in the mountains, and what were the equipment shortages in the Lima hospitals? Were blankets higher priority than tents, or medicines, or food? And where would the transport come from anyway?

Only information would unwind the confusion. I bustled officiously around Lima, and, relying on Professor Monge and his colleagues (but not the telephone), could soon produce a credible estimate of at least 1000 available beds in Lima, as well as lists of equipment needs in the hospitals. By posting a student rota at the airport, we obtained an idea of incoming injuries—not enough to require the setting up of new disaster hospitals in Lima.

There were also large numbers of well trained, skilled Peruvian doctors awaiting any influx of patients, as well as random teams of foreign doctors (112 Argentinians, for example) looking for work. In Lima there was clearly no need for any of my team from Chicago, but the situation in the valley was completely obscure. I needed to get up there to find out, but there was still no transport.

FIELD HOSPITAL IN THE CALLEJON

The impasse was broken, for me, by Mr. Carson O. Crocker, just appointed American coordinator in the Callejon, who, in the first available flight up, because of my familiarity with the Callejon, took me with him. We flew up in a huge double-rotor Chinook transport helicopter, leaving the coastal clouds and mist, flying low over the rocky escarpments and crags of the Cordillera Negra (and a crashed Huey helicopter), to the bright sunshine of the valley. We landed near the tiny hamlet of Anta on a dirt airstrip which was being hurriedly flattened by bulldozers.

The camp lay on a gentle hillside—lines of khaki and blue tents. There were queues of campesinos carrying stretchers to the planes and unloading supplies; parachutists patrolled past the tents and the piles of boxes and bundles. American soldiers of the Disaster Assessment Survey Team were awaiting evacuation, lying on the grass. High above us, glinting icily against the sun, floated the huge bulk of Huascaran.

At once I felt I was on my home ground, confident, in these familiar surroundings so outlandish to the other foreigners around me. Brigadier-General Augusto Freyre, a brisk, humorous man, obviously had firm control of the situation in the floor of the valley. Panic, looting, and hoarding had been rapidly stopped, and the wounded were being funnelled efficiently into the field hospital at Anta and thence to the C-47, DC-3, and Caribou aircraft for evacuation. Blankets, tents, and food were all being distributed up and down the valley, along the newly opened but treacherous and weakened road. The few helicopters, however, were being withdrawn from the Callejon, because of the crashes, which was serious because the towns and villages in the side valleys and high up in the hills were still cut off, and the main valley road itself because of the mile-wide landslide (still a rocky quicksand crossed by streams and stinking of rotting bodies) was impassable. The whole of the northern Callejon was therefore cut off, since the railway curving up to its northern end from Chimbote on the coast had been completely demolished.

The field hospital, set up and manned very efficiently by Peruvian Army doctors, consisted of a series of tents, old and new, arranged in a wide crescent. Patients entered at one end, were sorted out and taken to the relevant tents for first aid, injections, anaesthesia, plastering, and so on. At the other end of the crescent, patients awaiting evacuation by air lay in their tents, on stretchers or the bare earth, with perhaps a blanket against the freezing night air. Nursing sisters, dressed in jeans, moved about adjusting infusions, checking plasters, and giving injections. I joined them on their night rounds, crawling through the dark tents.

The next day I borrowed a jeep from a Peruvian friend living in Huaras, and with him drove up and down the main valley. Everywhere, collapsed adobe houses, the people crouching in the fields under crude shelters of eucalyptus branches and cardboard. It was soon clear that the injured in the towns had all died or had been treated at Anta, or the undamaged hospital at Huaras. Bloated bodies were still being recovered from the rubble and the stench of death was everywhere.

MOUNTAIN VILLAGES

In the valleys and mountains away from the road, the situation was unknown, and as there were no roads and no helicopters the only way up was on foot. I spent several hot, thirsty days, fording rivers and climbing with commandeered burros from village to village, partly to seek out and treat the injured, but more importantly to find out what the problems were, to assess the injuries, the likely evacuations, the water and food, crops and livestock, houses and shelter, so that the necessity for helicopters could be gauged, and air-drops from C-130s flying from the coast could be arranged, and epidemics treated (or rumours of epidemics squashed). Above all, I felt that these isolated people should be shown that help was coming, to prevent their migrating down to the valleys, abandoning their crops, and enormously increasing the food, water, health, and housing problems in the destroyed towns.

Though the structural damage was, in most villages, almost total (the adobe houses being neither solid nor flexible enough to withstand the earthquake), so that often I could not get my burro through the blocked streets, the people had been able to get into the open before the increasing earth tremors collapsed the buildings. There had been incredibly few injuries and deaths—for example, in one side valley with a population of about six thousand people, there were only 10 or so dead, though every house had been razed. Irrigation ditches (and so water-supplies) had been patched up, the crops and livestock were unharmed, and though there were many rumours of plague, smallpox, measles, and typhoid, no such epidemics appeared. The people were cut off, had no shelter, light or heat, and no cooking utensils. Everywhere they lacked salt, sugar, and cooking oil; but everywhere they fed me with fruit.

In each village, hemmed in by the Indians and mestizos, sitting on a chair out in a field, I would examine an endless stream of patients, and as I dished out cough medicine, eye ointment, penicillin, and aspirin, I reflected that medically I was scarcely an improvement on their folk-doctors (curiosos) with their snake-oil. Ignoring the marasmus, the tuberculosis, the leishmaniasis, the fungal infections, I was treating their perennial sores, their coughs, their skin and eye infections, and above all their "susto"—their anxiety, terror, and shock.

MEDICAL SURVEY

After a few days I flew back down to Lima and put in my report at the U.S. Embassy. A full survey had to be done, and, with hundreds of villages at altitudes between 10,000 and 14,000 feet scattered over an area of thousands of square miles, helicopters were essential. I drew up a plan for carrying out such a survey and delivering medical treatment on the spot, avoiding the need for evacuation. I envisaged each helicopter being responsible for five two-man teams who would be dropped in successive villages in the area. There was no need for my colleagues in Chicago, and, my task completed, I booked my flight back to Chicago and went to get some sleep.

The next day, however, I was called back to the valley by Mr. Crocker to put the plan into action, since it had been suddenly decided that helicopters should be sent up to the Callejon. When I arrived back at the camp, there was no time (and no transport) to get medical personnel from Lima. I took an Army jeep and spent a few hours frantically pressing, browbeating and wheedling into service some 30 volunteers, of various nationalities, who had medical or nursing experience, and whom I found in a sweep up and down the Callejon. I divided them into teams of two, each being given a box of simple medicines and first-aid equipment. The teams were then flown in helicopters to the area beginning 60 or more miles to the north which was made the responsibility of the U.S., to be dropped in tiny villages perched on the sides of dizzy cañons. Each team would, with the alcalde of the village, make a quick assessment, and then hold a crowded outdoor clinic until the helicopter returned. Then, running and crouching beneath the rotors, we would leap on board and the helicopter would lift off and take us to the next village, or, with the severely wounded, back to Anta.

On my return to camp each night there would be endless, good-humoured, multilingual debriefings with the general, his aides, and Carson Crocker, to collate the information, decide on where air-drops of supplies should be made, and so on. The message was unchanged: except where the huge landslide had come (where there were terrible compound fractures and gangrene), there were few injuries and no hunger, but tremendous damage and total isolation. Medically, their diseases were as neglected as before. Those self-sufficient mountain people were better off than the people in the towns of the valley who had been buried as they rushed frantically out into the narrow streets.

The first need at this time, was for roads and bulldozers, engineers, water-purifiers, tools, corrugated iron, fuel, pick-up trucks—not for doctors. These had always been lacking; the earthquake's permanent damage had been far more to buildings and communications than to any system of health care.

After another week of this, my job was done; and so, completely exhausted, I left the valley, flying on take-off over a nice, brand-new French disaster hospital just opened three weeks after the earthquake and already essentially redundant. Down I went to the Embassy in Lima, put in more reports, had more discussions, and this time flew back home to Chicago.

LESSONS

I learnt much from the experience: how peculiar the devastation of this earthquake, the dead far outnumbering the wounded; the absence of epidemics; the lingering shock; and the vast, hopeless disruption of communication. I had seen the seemingly shiftless, sly, and hostile peasants show a moving fortitude and stern self-reliance. I had learnt about the rigidity and

ignorance of experts who could not credit, for example, the logistic limitations imposed by Nature, or the possibility of good work being done in shabby, ill-equipped, and haphazard tents when back at home were gleaming disaster hospitals (too bulky, too heavy, and too remote to be brought to Anta). I had witnessed the courage of the helicopter pilots in that awe-inspiring terrain; I had been amazed at the skill and sheer size of the American effort and humbled by the grinding, persistent effectiveness of the large volunteer organisations.

There were duplications and omissions. Everyone else complains that it could have been handled better. Perhaps; but it went so much better than I could ever have imagined. Muddle and incomprehension are the condition of man; on earth, man fails miserably to dispose the best-laid plans. We stagger from pillar to post, unprepared for disaster; gloriously eager to put it right; hopelessly frustrated by our inability to do this instantaneously; beautifully self-sacrificing and hideously ready to apportion blame.

In a disaster, crisis harshly delineates our humanity. This particular disaster will be with Peru for a decade. It is sad that the emotional and spiritual energy we put into dealing with the crisis should be so easily dissipated into querulous invective against Nature, and particularly against the nature of Man.

ANNEX E

Establishing the Epidemiological Approach After an Earthquake in Peru

by

Dr. Paul Blake, M.D.
Center for Disease Control

Disaster File

[illegible] Branch

Paul A. Blake, M.D.
Enteric Diseases Branch

ESTABLISHING THE EPIDEMIOLOGIC APPROACH AFTER AN EARTHQUAKE IN PERU

Paul Blake, M. D.

Bureau of Epidemiology
Center for Disease Control

Oral presentation before the Epidemiology Section of the APHA annual meeting in San Francisco, November 7, 1973, at 2 PM.

The epidemiologic approach to a disaster is the systematic collection and analysis of information about the disaster, with feedback to those who are running the relief effort. Unfortunately, the authorities usually do not resort to the epidemiologic approach until the relief effort is well under way; this means that they must make decisions about the type, quantity and distribution of the aid before they know what is really needed and where it is needed. The result, of course, is the waste of much of the time, money, and effort invested in the relief program, and delay in getting appropriate aid to the victims.

This presentation depicts one disaster in which the epidemiologic approach was not used until more than 2 weeks after the disaster occurred.

At 3:23 PM on May 31, 1970, an earthquake measuring 7.7 on the Richter scale occurred in Peru. It lasted only 45 seconds, but killed 70,000 people and left half a million homeless. This was the highest death toll from a natural disaster ever recorded in the Western Hemisphere. The earthquake affected an area north of Lima that includes portions of 4 departments, but most of the death and destruction occurred in the Department of Ancash.

Ancash extends inland from the coast roughly 125 miles. Most of its surface area is occupied by part of the Andes mountain chain, including 22,190 foot Mt. Huascaran. South to north through the mountains runs the densely populated valley of the Santa River, more commonly known as the Callejon de Huaylas. To the east of the Callejon is the Cordillera Blanca, or White Range, with glaciers, perpetual snow cover, and many peaks higher than 18,000 feet. To the west is the Cordillera Negra, or Black Range, which is lower and less rugged, with a height of about 14,000 feet and no snow cover.

Prior to the earthquake, Ancash had about 700,000 inhabitants, mostly Indian, in 14,000 square miles. The largest cities are Chimbote on the coast, with 200,000 people, and Huaraz and Yungay in the Callejon which had about 65,000 and 23,000 inhabitants, respectively, before the disaster. The majority of the people live in villages on the valley floor or scattered through the mountains. Most are farmers, raising crops and livestock on every available patch of land, including steeply sloping mountainsides at over 12,000 feet. Their houses are almost all of adobe construction. Even in the urban areas, sanitation is poor, with less than a third having running water or sewage disposal systems. Permanent health services are available t

only 21 per cent of the people.[2]

Incredible destruction occurred throughout most of this populous area. Several days passed before the magnitude of the disaster was apparent. The earthquake destroyed the railroad, blocked roads, and knocked down telephone lines, delaying news from the interior. Rescuers reached the coastal towns first, and attention was focused on Chimbote, where 700 had died. Only later that night and over the next several days did reports from radio operators in the Callejon de Huaylas and aircraft overflights reveal the much greater disaster that lay inland.

The greatest numbers died in Huaraz and Yungay. In Huaraz, approximately 16,000 people, or 25 per cent of the population, were killed; the adobe houses collapsed inward onto the occupants or fell outward onto the people running through the narrow streets towards the safety of the plaza and other open spaces. Two American Peace Corps girls were killed just before they reached the plaza. It was a Sunday afternoon and many people would ordinarily have been outside. Unfortunately, a world soccor championship game was being broadcast from Mexico City that afternoon, so many stayed indoors to listen to their radios. This undoubtedly raised the death toll substantially.

A massive landslide almost completely covered Yungay. The slide began when the earthquake dislodged a slab of ice and rock about half a mile wide from the north face of Mt. Huascaran. It gathered further debris as it hurtled at over 200 miles per hour towards Yungay, where it buried about 90 per cent of the 23,000 inhabitants and several thousand visitors to the Sunday market. Ironically, most of the 2500 survivors were saved by a cemetary built on a small hill at the edge of town; it is estimated that they had 5 to 10 minutes to reach the cemetary from the time that the chunk fell away from Mt. Huascaran until it hit Yungay.[3]

A relief program was begun. It was feared that there would be incredible numbers of wounded people throughout the disaster area, that there would be widespread starvation, and that epidemics would occur. Accordingly, the relief effort was directed at meeting these apparent needs. A Peruvian general was made the coordinator of all relief operations within a few days after the disaster. His headquarters were established near Anta, a small village at 9000 feet on the floor of the Callejon. Besides being strategically located in the center of the disaster area. Anta

had a dirt airstrip large enough to handle small aircraft.

Anta rapidly became the center of the relief effort. In addition to the Peruvian headquarters, the clusters of tents soon contained American, Brazilian, and French relief workers. A field became a helicopter pad, with over a dozen helicopters from these four countries. Progressively larger aircraft brought in supplies from Lima and Chimbote, while crews worked far into the night to enlarge the airstrip.

Hundreds of medical and paramedical volunteers flocked in from all over the world. Unfortunately, only a few of these volunteers could be useful because there were relatively few severely wounded victims, with fewer than 5000 hospitalized; most of the wounded were cared for soon after the disaster by Peruvian health personnel, or died before foreign relief workers could reach them.

Aid valued at 44 million dollars from 69 foreign countries and from international agencies poured into Lima and piled up at the airport waiting for transportation to the disaster zone. Some of the supplies, such as water purifiers and blankets, were appropriate. Unfortunately, some of the aid was useless. Half a million doses of typhoid vaccine for jet injector use arrived in Lima without jet injectors and without any evidence of a typhoid outbreak. There were huge piles of unsorted medicines of dubious quality. The United States donated two packaged disaster hospitals, only to find that the Peruvian hospitals had many empty beds. For example, in Lima, which had expected an overwhelming flood of wounded evacuees from the interior, a survey 2 weeks after the disaster found that 25% of the hospital beds were empty. The French insisted on setting up a tent hospital at Anta almost three weeks after the earthquake, and it remained practically empty. Finally, more than six weeks after the disaster, yet another unneeded field hospital arrived in Peru; this one came from the USSR.

The undisciplined flow of inappropriate supplies and unneeded volunteers wasted time, money, and transport. The principal flaw in the relief effort was that everyone responded to the disaster by leaping in blindly and trying to help. In retrospect, the most urgent need was for systematic collection and analysis of information about the disaster, and feedback to those who were directing the relief program. In other words, an epidemiologic approach was needed. This approach to the disaster could have been pursued by the 40 men and 2 helicopters of the American Disaster/and Survey Assistance

Team which arrived in Lima 2 days after the earthquake. Unfortunately, the team devoted most of its time to rescue and supply operations rather than to carrying out a disaster survey.[4]

A survey of the more remote villages was finally begun more than 2 weeks after the earthquake. It was planned and initiated by Dr. Drummond Rennie, a Scottish volunteer who knew the area well from earlier mountain climbing expeditions.[5] When he arrived in Anta 10 days after the disaster, the immediate needs of the towns in the Callejon were being met, but the fate of the villages in the mountains above the Callejon was almost totally unknown. He proposed that helicopters carry as many 2-man teams as they could hold into the mountains, dropping a team into each village they came to. Each team would determine the number of wounded and killed, the amount of destruction, the people's needs, the population, and the status of communicable diseases. After 2 to 3 hours, the helicopter would return to take the team on to another village.

The plan was adopted and the operation began 16 days after the earthquake. Within a week, most of the survey was complete, and the results were being used to establish priorities for the relief effort. Complete data was obtained for 97 of the mountain villages visited by the survey teams. These villages had a combined population of 113,000 people; of these, 880 died and 468 were injured; only 95 had to be evacuated. Thus, the mortality rate was only 8 per thousand inhabitants in these 97 towns, and only 6 per thousand suffered non-fatal injuries. About 80% of the houses were destroyed. In contrast, the disaster area as a whole, which also had a house destruction rate of 80%, had a mortality rate of almost 100 per thousand inhabitants. Apparently the small mountain villages suffered less than the larger towns in the Callejon because their small size allowed the people to get away from their houses before they collapsed. The livestock, crops, and water supplies were largely intact, and there was no starvation. The people needed roofing material, blankets, and commodities that normally came from outside their villages, such as sugar, salt, and kerosene. There were no epidemics. The main complaint of the people was "susto," or fright; in Llapo, when a team composed of a physician and a priest arrived, the physician was largely ignored while the villagers begged the priest to celebrate an impromptu Mass.

I will turn now to the communicable disease aspects of the disaster. Soon after the earthquake, rumors of

outbreaks of typhus, plague, and other diseases began to circulate. Fearing that the rumors might be true, the authorities contemplated launching a massive campaign to immunize hundreds of thousands of people against smallpox, measles, typhoid, typhus, and other diseases. Such a campaign would have meant diverting effort, transport, and money from other relief activities, overcoming tremendous logistical problems, and endangering the lives of the immunization teams.

At this juncture, the director of the Center for Disease Control was sent to Peru by the United States government to assist the Peruvian government in health matters related to the disaster. He arrived 8 days after the earthquake; he visited the disaster zone, squelched a report of smallpox, and gave his assessment of the public health situation to the Peruvian Ministry of Health. He felt that epidemics were unlikely for a variety of reasons: the area had been free of plague and smallpox for over a decade, most of the people would have natural immunity to the endemic diseases, the isolation of the villages protected them from unusual pathogens, and the cold weather slowed the reproduction of flies. The chief dangers lay in crowded refugee camps and in possibly contaminated municipal water supplies. He suggested that an epidemiologist was needed to establish temporary disease surveillance in the Callejon; the Ministry of Health agreed, so I was sent to Peru and arrived in Anta 17 days after the disaster.

I interviewed the four national groups at Anta daily to find out which villages they had visited and what diseases or rumors of disease they had encountered. I also had access to the information collected by what remained of the official disease reporting system based in Huaraz. I went by Jeep or helicopter to investigate all unusual reports, and sent my findings by radio to the Ministry of Health in Lima. There the information was used by the medical authorities to quash rumors of epidemics and to refute demands that mass immunization programs be carried out.

There were only a few reports of significant disease. Three towns were reported to have up to 50% of their children ill with measles, but visits to all three revealed no cases. There were a few typhoid fever suspects, but less than the usual number for that time of year. An American physician reported a typhus epidemic, and requested a huge amount of typhus vaccine; however, investigation revealed that the doc-

tor was merely passing along a rumor. and there was no typhus epidemic.

Despite the reports and rumors of disease outbreaks, I found no communicable disease that could be attributed to the earthquake. No mass immunization campaign was necessary in the Callejon, and none was carried out.

In summary, I do not want to leave the impression that the relief effort was hopelessly bungled. It did help many of the victims. However, the authorities failed to give top priority to the collection, analysis, and feedback of information that would have enabled them to develop a more efficient and effective relief program; the result was wasted time, effort, and money, and the delay of appropriate action. Hopefully, the day will come when governments will accept the epidemiologic approach to disasters and will turn to it immediately when disasters occur.

Paul A. [illegible], M.D.
[illegible] Branch

References

1. May 31, 1970 Peru earthquake case study. Tenth Report, Fiscal Year 1970, Foreign Disaster Emergency Relief, Agency for International Development, pp. 182-3.

2. Area de Salud de Ancash: Informacion General. Oficina Sectorial de Planificacion de Salud, Lima, Peru, 1967, p. 6.

3. Op. cit., p. 189

4. Ibid., pp. 210-1

5. Rennie D: After the earthquake. Lancet 2:704-707, 1970.

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ANNEX F

Disease Surveillance and Decision-Making After the 1976 Guatemala Earthquake

by

Harrison Spencer *et al*

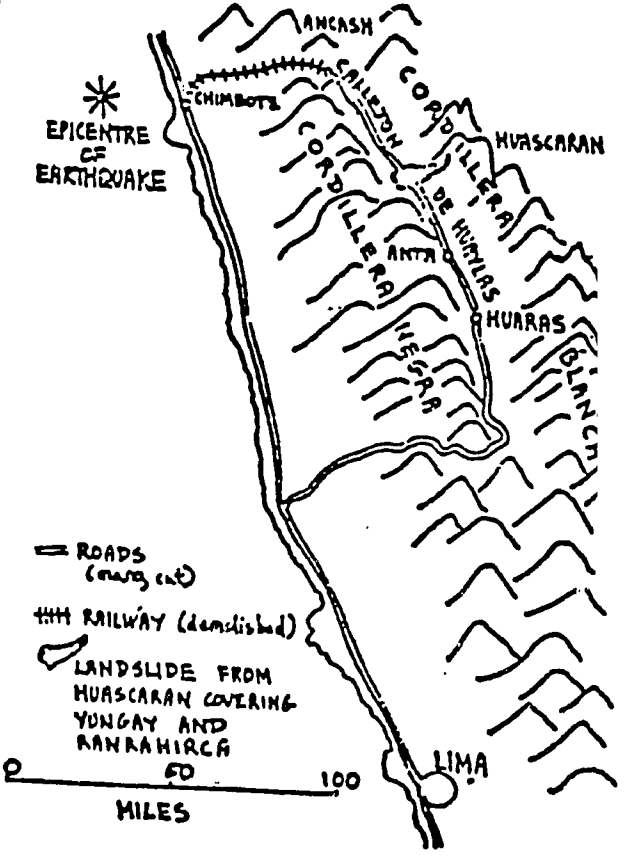
work effectively in Peru—something it was impossible to determine from Chicago, despite days of frenetic telephoning.

I left six days after the earthquake. When I arrived in Lima, I went with Professor Monge to the university to find classes suspended and the place in ferment. Blocked roads were preventing any of the students and doctors from getting north to the damaged areas, and the atmosphere was of mounting and sometimes angry frustration. Rumours of up to 300,000 injured were flying around, yet, so far, they had scarcely seen a dozen. At the same time there was escalating confusion in the American Embassy, where more experts in every field, from geology to sanitation, were arriving hourly and adding to the chaos.

AFTER THE EARTHQUAKE

The epicentre of the earthquake had been off Chimbote, a large fishing port 230 miles north of Lima. There, and along the coast, shrouded in constant cloud and mist at that time of year, the situation was rapidly assessed and help of every sort was sent by road and by ship from Lima. Inland, because all the precipitous roads over the 14,000-foot passes through the mountains of the Cordillera Negra had been destroyed (and with them the few telephone lines), the situation was obscure. The densely populated valley of the Rio Santa, between the Cordillera Negra and the immense Cordillera Blanca, was covered with huge clouds of dust which prevented even parachutists

only the full extent of the disaster had not



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from THE LANCET, July 23, 1977, pp 181-184

Dealing with Disaster

DISEASE SURVEILLANCE AND DECISION-MAKING AFTER THE 1976 GUATEMALA EARTHQUAKE

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Summary In the first 3 weeks after the 1976 earthquake in Guatemala a system for collecting, analysing, and disseminating information of medical importance was instituted in the disaster area. Data on cases of selected diseases, number of available hospital beds, and medical supplies were collected, and reported epidemics were investigated. The system functioned well despite the limited numbers of trained personnel. Collection and analysis were quick enough for data to be used immediately in decision-making. No epidemics of communicable diseases were observed in the affected area. The number of dog bites in Guatemala City increased but no cases of rabies were reported. The success of the surveillance system in Guatemala suggests that immediate use of epidemiological methods should be an integral part of disaster relief.

INTRODUCTION

As epidemiologists working in Guatemala during the first 3 weeks after the February 1976, earthquake, we faced the problem of trying to collect data rapidly, analyse them, and disseminate the information quickly enough to assist in decision-making. The area affected was large. Communications were impeded and many major roads were impassable. Data on health facilities, on numbers and types of injuries, and on the occurrence of communicable diseases were needed immediately. Incoming medical supplies had to be classified, sorted and distributed, and those already in the country had to be determined. Resources for most of our tasks were scarce, and there were few guidelines available from experience of other disasters. We were not sure whether reliable data could be gathered quickly enough to be useful, or that such data, if available, could or would be used in decision-making.

The need for surveillance was demonstrated in the first 2 days after the earthquake when it became obvious that important health-related decisions were being made without sufficient data.

1. Field hospitals and other types of mobile health facilities were sent immediately by some countries despite little knowledge about Guatemala's health delivery system. Information was not available on who was receiving medical assistance, where, and from whom it was coming. Data were needed on number of injuries requiring admission to hospital and/or immediate care.

2. Vaccination campaigns were initiated by volunteer organisations. The Ministry of Health (M.O.H.) began the third phase of its national immunisation programme early. The general feeling of "wanting to do something", coupled with the arrival of large amounts of medical supplies and vaccines, resulted in a tendency for materials rather than demonstrated needs to dictate actions.

3. Rumours of epidemics began to circulate by day 2 and were given credence by many health workers. The disease surveillance network of the M.O.H. was severely affected by destruction of health facilities, blockage of roads, and loss of communications. There were no data to verify or refute reports of epidemics, and these reports helped stimulate vaccination campaigns &c. and resulted in official and unofficial pleas for more medical supplies.

Background

Guatemala is the 2nd largest country in Central America with a population of approximately 5.5 million. Most of the population is concentrated in the central mountainous zone of the country through which runs the Motagua fault. At 3.04 A.M., Feb. 4, 1976, an earthquake registering 7.5 on the Richter scale and lasting 35 seconds occurred along the Motagua fault. A zone of intense physical destruction spread 25–50 miles out along a 145-mile segment of the fault, involving an area of about 10 000 square miles, about 23% of the country. Most of the population affected by the earthquake was in the mountainous departments of Chimaltenango, Sacatepéquez, and Guatemala. Guatemala City was at the southern periphery of the zone of greatest damage. The earthquake and its aftermath caused more than 23 000 deaths and approximately 77 000 injuries (6000 classified as severe) and left 21·1% of the population homeless. As has been reported after other earthquakes, deaths exceeded serious injuries by 3·8 to 1.[1]

MATERIALS AND METHODS

Implementation of a Surveillance System

A surveillance system—defined as the systematic collection, analysis, and interpretation of data and dissemination of the results to those responsible for decision-making—was initiated in the areas of major earthquake damage on the second day after the earthquake continued through day 19. Retrospective data were collected for the day before the earthquake and day 1, the day of the earthquake. The initial data generated by the surveillance system became available on day 3. By day 20, daily information was no longer required. The surveillance system was confined to Guatemala City and the departments of Chimaltenango and Sacatepéquez. No equivalent effort was made to collect data from the other two departments in the major-disaster area, Zacapa and El Progreso, because the coordinating committee of the Government of Guatemala wished to concentrate these efforts in the zones of greatest population and destruction.

In Guatemala City, the 3 major hospitals, the 3 largest of

on foot and with mules—on the part of the Peruvians, who were bemused by the concept of helicopters or C-130 transports, though as yet there were none available. Now both were being conjured up. The worse the confusion, the harder everyone worked, and the more everyone's thinking was confounded by exhaustion. The stuffy operations room in the U.S. Embassy was crowded with people coming and going all night long.

This was Peru. Peruvians had suffered, and they were doing more than anyone to bring relief to the victims. It was hard for the self-confident foreigner to keep remembering not only that the Peruvians had to be in command but also that this was appropriate. More than this, it was the most effective and efficient system. Peruvian doctors, for example, would have the local medical expertise, as well as rapport with the patients; they could not merely initiate care, but also continue it long-term.

The problem was simple: to bring immediate succour to the injured, the homeless, and the hungry—but how many, where, and how? The very completeness of the catastrophe, and the obviousness of the problem, highlighted the fact that almost every proposed solution was arguable on medical, logistic, or humanitarian grounds, using arguments often, if not usually, based on faulty information. Should field hospitals (if they could be found) be set up in the Callejon or in Lima? Where should the injured be treated? If they were evacuated to Lima, where would they be housed, and how and to what would they return? Or would they filter into the slums of the capital? Was there starvation in the mountains, and what were the equipment shortages in the Lima hospitals? Were blankets higher priority than tents, or medicines, or food? And where would the transport come from anyway?

Only information would unwind the confusion. I bustled officiously around Lima, and, relying on Professor Monge

At once I felt I was on my home ground, confident, in these familiar surroundings so outlandish to the other foreigners around me. Brigadier-General Augusto Freire, a brisk, humorous man, obviously had firm control of the situation in the floor of the valley. Panic, looting, and hoarding had been rapidly stopped, and the wounded were being tunnelled efficiently into the field hospital at Anta, and thence to the C-47, DC-3, and Caribou aircraft for evacuation. Blankets, tents, and food were all being distributed up and down the valley, along the newly opened but treacherous and weakened road. The few helicopters, however, were being withdrawn from the Callejon, because of the crashes, which was serious because the towns and villages in the side valleys and high up in the hills were still cut off, and the main valley road itself, because of the mile-wide landslide (still a rocky quicksand, crossed by streams and stinking of rotting bodies) was impassable. The whole of the northern Callejon was therefore cut off, since the railway curving up to its northern end from Chimbote on the coast had been completely demolished.

The field hospital, set up and manned very efficiently by Peruvian Army doctors, consisted of a series of tents, old and new, arranged in a wide crescent. Patients entered at one end, were sorted out and taken to the relevant tents for first aid, injections, anaesthesia, plastering, and so on. At the other end of the crescent, patients awaiting evacuation by air lay in their tents, on stretchers or the bare earth, with perhaps a blanket against the freezing night air. Nursing sisters, dressed in jeans, moved about adjusting infusions, checking plasters, and giving injections. I joined them on their night rounds, crawling through the dark tents.

4 public-health clinics, and the largest clinic of the social security system were visited each morning by a team of volunteer nurses who collected the age, sex, address, and diagnosis from the registration forms for each patient seen during the previous 24 hours. Diagnoses were recorded by the nurses as trauma, upper-respiratory-tract illness, fever without rash or cough, diarrhœa, and "others". Such data were regarded as important by those planning health programmes after the earthquake. The nurses also examined the records for cases of typhoid fever, measles, dog bites, rabies, meningitis, and tetanus, but for simplification these specific diseases were counted as "others". In most health facilities, the data sheet was used as the registration form. A similar system was instituted in hospitals and public-health centres in the departments of Chimaltenango and Sacatepéquez. In the absence of other denominator data, the magnitude of each "disease" was measured as a percentage of the total consultations on a particular day. Available hospital beds were counted daily.

Each morning, data from the admissions of the previous day were analysed and the results communicated to all official decision-making groups in the city and by cable to those responsible for coordination of the United States Government relief effort.

In the departments of Chimaltenango and Sacatepéquez, 12 public health centres and hospitals were surveyed from days 5 to 19. Surveillance forms were used in the posts for a variable number of days; completed forms were collected at the health centres in Chimaltenango and Antigua. Most of the health posts were temporary facilities with frequent staff changes. In addition, blocked roads and lack of communications were major difficulties. As a result, we had to rely on periodic site visits to these areas and there was often a 2 to 3 day lag between collection of the information and transmission to the city. Since most Guatemalans had overwhelming personal or administrative problems, the use of international volunteers improved data collection.

Investigation of Rumours of Epidemic Diseases

Rumours of epidemics were rife by the 2nd and 3rd weeks after the earthquake. At various times, outbreaks of measles, typhoid fever, typhus, anthrax, rabies, hepatitis, influenza, and dysentery were reported in the disaster area. More than 30 reports of outbreaks were investigated and proved to be without foundation. Bacteriological laboratories were functioning in Guatemala City, and faecal cultures were used to follow up reports of typhoid fever and shigellosis in the city.

Rumours of epidemic disease came from both Guatemala City and the rural areas but most often concerned the more inaccessible rural areas. Almost all of the reports investigated derived from non-medical staff and seemed to be based on the conviction that epidemics were bound to occur.

Status of Medical Supplies

During the first 3 weeks after the earthquake, the 2 U.S. Public Health Service pharmacists working with the National Emergency Committee estimated that unsorted medicines and vaccines in excess of 100 tons had arrived. Several warehouses had to be used, making it difficult to package similar drugs at the same site. There was not sufficient manpower to sort and distribute the supplies. Most of medicines sent were inappropriate (e.g., diet pills, birth-control pills), outdated, or partially used. Potentially useful medicines were often unclassified or poorly packed.

RESULTS

In the 24 hours after the earthquake the hospitals were deluged with injured people and dead bodies. As expected, in the 2–3 days after the earthquake actual numbers and the proportion of trauma cases increased (fig. 1). The influx of patients from rural areas produced a second wave of trauma cases on day 4 in Guatemala City.

By day 3, the acute demand for admission to hospital was decreasing; as patients were transferred from rural areas, others were being discharged. More than 100 hospital beds were available in Guatemala City on day 4. No data were available on the total number of patients treated by fixed health facilities or volunteers in the rural areas. Medical facilities were supplemented by field hospitals, and by day 5 beds were available. In those centres being monitored the number of patients began to decrease on day 5.

The assessment of damage to hospital facilities in the city and rural areas was used in planning for deployment of field hospitals. By day 5, when it was demonstrated that adequate numbers of beds were available and that the number of injured people being admitted to hospital was decreasing, this information was used by the M.O.H. and other decision-making groups to discourage shipment of unnecessary field-hospital units and in early planning for permanent and convalescent facilities. The consultations seen in the clinics paralleled those in the hospital, with a large number of trauma patients seen on days 1 and 2 (fig. 2). By day 4 the patient burden had lessened and by Feb. 21, (day 18) all clinics had returned to normal.

By day 5, the Guatemalan medical community and foreign medical personnel who had arrived on days 1 and 2 had the medical situation under control. This information was disseminated in the local and international press, but volunteers continued to arrive often un-

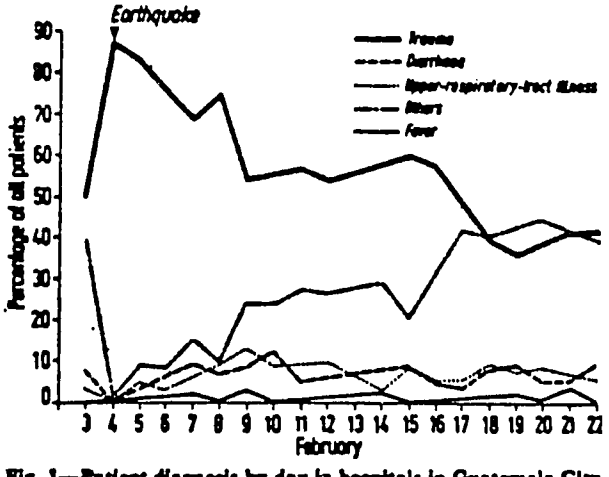

Fig. 1—Patient diagnosis by day in hospitals in Guatemala City in February 1976.

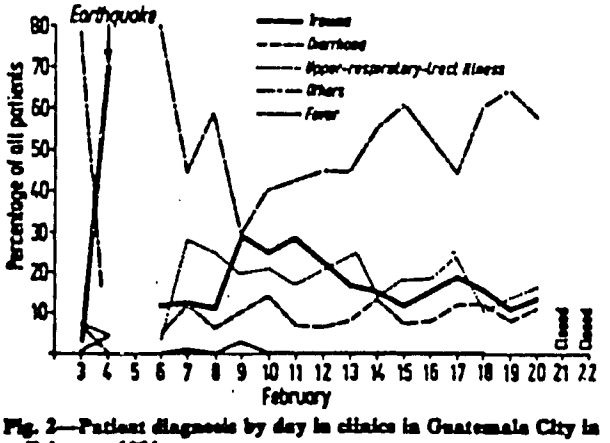

Fig. 2—Patient diagnosis by day in clinics in Guatemala City in February 1976.

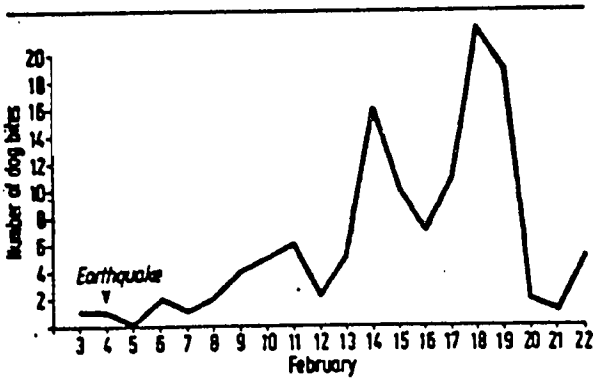

Fig. 3—Dog bites in Guatemala City in February 1976.

able to speak Spanish and without food, water, and camping equipment.

No increase in actual number or proportion of diagnoses of diarrhœa, upper-respiratory-tract illness, or fever without rash or cough was seen in the city hospitals during this period (fig. 1). A similar pattern was seen in urban clinics (fig. 2). The percentage of cases of upper-respiratory-tract illness in the clinics increased but discussions with the medical directors indicated that an increase was not uncommon in February and March and the pattern was similar in areas not affected by the earthquake. There was no outbreak of influenza in any area.

The only epidemic noted was an increase in number of dog bites that occurred during the second post-earthquake week in all areas of Guatemala City (fig. 3). When the increase in dog bites was noted, the M.O.H. instituted a combined programme of canine vaccination and elimination of stray dogs. There was immediate concern that an epidemic of rabies could occur. No cases of rabies were reported in the surveillance data. Dog rabies was prevalent in Guatemala before the earthquake despite dog vaccination programmes in Guatemala City during 1974–1975 that reportedly had reached 70% of the street dog population (data from M.O.H.). However, human rabies was rarely reported; 8 cases reported country-wide in 1975, with 1 in Guatemala City. An increased incidence of dog bites beginning in the second post-earthquake week has occurred following previous earthquakes in Latin America, but Dr J. Escalante, the PAHO veterinarian in Guatemala, tells us that no concomitant increase in human rabies has ever been observed.

Because of the 2 to 3 day lag in the transmission of data from the departments of Chimaltenango and Sacatepéquez, the data on disease incidence from these areas could not be used to follow daily disease trends. However, the data were useful in establishing the absence of epidemics of communicable diseases in these areas.

Almost all reports of epidemics reflected the fear and apprehension in residents within the disaster area, although a few appeared to have been initiated by a desire for political and personal gain. Site visits were sufficient to alleviate the anxiety which often accompanied these reports. However, because a site investigation of each report proved very inefficient, it was extremely helpful to have a data base from the surveillance system to respond to rumour.

The successful implementation of the surveillance system showed that data could be gathered quickly. Data on cases of infectious diseases were used to demonstrate that, in fact, epidemics were not occurring and to ensure that responses to reported epidemics would be based on verified cases rather than rumour. An attempt to limit vaccination campaigns not based on demonstrated need was only moderately successful. As part of their post-earthquake aid, many countries, volunteer agencies, and private organisations sent vaccines. Typhoid vaccine was regarded as being of high priority but D.P.T. (diphtheria, tetanus, and pertussis vaccine), measles, tetanus, B.C.G., and polio vaccines were also sent. Because of the rumours and expectations that epidemics would occur, and because of the availability of the vaccines there was considerable pressure to initiate vaccination campaigns. The M.O.H. and many voluntary organisations began to administer vaccines. However, vaccination campaigns may have been inappropriate for the following reasons: (1) all of the bacterial vaccines, including typhoid, require 2 or more spaced injections and some give short-lived protection;[1] (2) such campaigns monopolise scarce resources that are needed elsewhere; and (3) the Indian population, the group with lowest vaccination levels, was least likely to be reached by such campaigns. Despite the strong arguments against massive vaccine campaigns many volunteer organisations continued vaccinations. The M.O.H., however, stopped emphasising vaccination programmes after data indicating the absence of epidemics became available.

DISCUSSION

This experience in Guatemala demonstrated that even with the inherent disorganisation after a disaster epidemiological analysis of medically important, reputable information could be achieved quickly, and effectively, and that such data could be used in making decisions.

The data generated by the surveillance system were relevant to the response to reported epidemics, deployment and planning for mobile health facilities, and distribution of vaccines and medical supplies. Even in these 3 areas of decision-making, the data available could have been more effectively used, or decisions postponed until data were available. The data were most often used to support decisions that had already been made.

Many officials were not aware of the possibilities of using data in decision-making and were not confident that adequate information could be collected quickly enough. Earlier reliance on the analysis of collected data would probably have led to better use of scarce resources.

There have been no reported epidemics of communicable diseases after several recent natural disasters.[1-4] The endemicity of serious communicable diseases in disaster-prone developing countries such as Guatemala however, means there is always a potential for rapid spread of infectious diseases. Disease surveillance such as was developed in Guatemala provides baseline data ensuring prompt recognition of an outbreak and preventing unnecessary response to rumour.

The data generated by surveillance seemed to be accurate, although there was no attempt to verify them since they were needed immediately. However, in the 6 months after the earthquake, continued surveillance has not demonstrated that epidemics occurred in these areas or that the system failed to detect problems.

Certain responses occur routinely in the first hours and days after natural disasters.[1-3,7-11] Most of these re-

sponses occur regardless of the existence of prior planning and without taking into account data indicating what is needed, how much, and where. The responses themselves often dictate decisions. Most reports of the medical problems associated with disasters have dealt with acute medical care delivery.[1-3,12-14] Only lately has it been recognised that data on medical needs can and should be an integral part of disaster relief.[1-2,15,16] In the immediate post-disaster period emotions and political necessities strongly affect decisions. Certain key decisions, however, could reasonably be postponed until basic data are available, assuming that a reliable data-gathering operation can be implemented rapidly. If the role of epidemiologists in disaster relief is clearly established, appropriate public-health decisions are more likely to be reached.

We thank the following Peace Corps volunteer nurses who assisted in the collection of data and without whose help the surveillance system could not have been done: Jo Marie Bell, R.N., Nancy Columbus, R.N., Ruth Costello, R.N., Isabel Good, R.N., Stephanie Jones, R.N., and Fran Longo, R.N. We also thank Dr William H. Foege, for invaluable direction while we were working in Guatemala.

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REFERENCES

1. Western, K. Dissertation for D.T.P.H., London School of Tropical Medicine and Hygiene, 1972.
2. Lechat, M. F. *Int. J. Epidem.* 1975, 4, 5.
3. Coultrip, R. L. *Milit. Med.* 1974, 139, 879.
4. Sommer, A., Mosley, W. H. *Lancet*, 1972, i, 1029.
5. Western, K. A., Ville de Goyet, C., Hayat, C. U. Medical Report of Field Visit to Accessible Flood-affected Districts in Punjab. 31 Aug.—4 Sept., 1973. U.S.A.I.D./Pakistan.
6. USAID Foreign Disaster Relief Report no. 10, USAID, Washington, D.C.
7. Ville de Goyet, C., del Cid, E., Jeannée, E., Lechat, M. *Bull. PAHO.*, 1976, 10, 95.
8. Arsouki, M., Bourkamp, J., Cismigiu, A., Izumi, M. UNESCO report no. 1919.
9. USAID Report on Western Sicily Earthquake, Washington, D.C.
10. Ville de Goyet, C. *Louvain Méd.* 1970, 95, 145.
11. Coolidge, T. T. *Archs Surg.* 1973, 106, 770.
12. Saidi, F. *New Engl. J. Med.* 1963, 268, 929.
13. Baesiou, J. F. J. *Wld med. J.* 1955, 2, 351.
14. Hight, D., Blodgett, J. T., Croce, E. J., Horne, E. O., McKoan, J. W., Whelan, C. S. *New Engl. J. Med.* 1956, 254, 267.
15. Foege, W. H. *in* Famine: A Symposium Dealing with Nutrition and Relief Operations in Time of Disaster (edited by G. Blix); p. 64. Swedish Nutrition Foundation, Uppsala, 1971.
16. Sommer, A., Mosley, W. H. *in* Disaster in Bangladesh: Health Crisis in a Developing Nation (edited by L. C. Chen); p. 119. New York, 1973.

ANNEX G

Technical Information: Blankets

ANNEX G

September 19, 1981

Technical Information: Blankets

The following information was provided by Sr. Hector Lora, Dirección General de Abastecimiento, Ministerio de Salúd. Teléfono 323535.

1. Principal Vendors of Blankets

Fábrica Textil Biella
Manzana H, Lote 7
Industria Santa Rosa
Phone: 321396

Fábrica de Tejidos Santa Catalina
Avenida Faucett 271
Phone: 516772

BONANZA Textil
Phone: 456448?

Artesania Textil
Sepita 268
El Callao
Phone: 297448

Textil CONDOR
Girón Sullana 238
313404

2. Ministry of Health Sizes:

(a) Regular Size: 1 metro 15 centimetros X 85 centimetros

(b) 1-1/2 size: 2 metros 20 centimetros X 1 metro 65 centimetros

(c) Double Size: 2 meters 20 centimetros X 2 meters 50 centimetros

The Ministry usually takes the 1-1/2 size.

3. The three major qualities are: (a) wool and alpaca; (b) wool; (c) wool and cotton. They usually get the latter.

4. Blankets are not packed in plastic - just bundled, as they are for immediate use.

5. They do not have specifications on number of threads per square inch, etc

To get information on what is produced, we could contact: Instituto Nacional de Tecnología (INANTEC), Sector de Tejidos.

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