

MEXICALI

7.2

A LATENT THREAT

- ✓ experiences from the workshop on lessons learned from the earthquake of April 4, 2010



Pan American
Health
Organization



World Health
Organization

REGIONAL OFFICE FOR THE Americas

MEXICALI 7.2 **A latent threat**

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from the earthquake of April 4, 2010



**Pan American
Health
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REGIONAL OFFICE FOR THE **Americas**

El Paso, TX. 2013

Also published in Spanish (2013) with the title:
Mexicali 7.2: una amenaza latente. Experiencias del taller de lecciones aprendidas acerca del terremoto del
4 de abril del 2010.
ISBN: 978-92-75-07450-3

PAHO HQ Library Cataloguing-in-Publication Data

Pan American Health Organization.

Mexicali 7.2: a latent threat. Experiences from the workshop on lessons learned from the earthquake of April 4, 2010 = Mexicali 7.2: una amenaza latente. Experiencias del taller de lecciones aprendidas acerca del terremoto del 4 de abril del 2010. El Paso, TX: PAHO, 2013.

1. Disaster Emergencies. 2. Disaster Warning. 3. Earthquakes. 4. Natural Disasters. 5. Health Effects of Disasters. 6. Mexico. I. Title.

ISBN: 978-92-75-07450-3

(NLM Classification: WA 295)

ISBN: 978-92-75-11826-9 (English version – ebook)

ISBN: 978-92-75-31826-3 (Spanish version – ebook)

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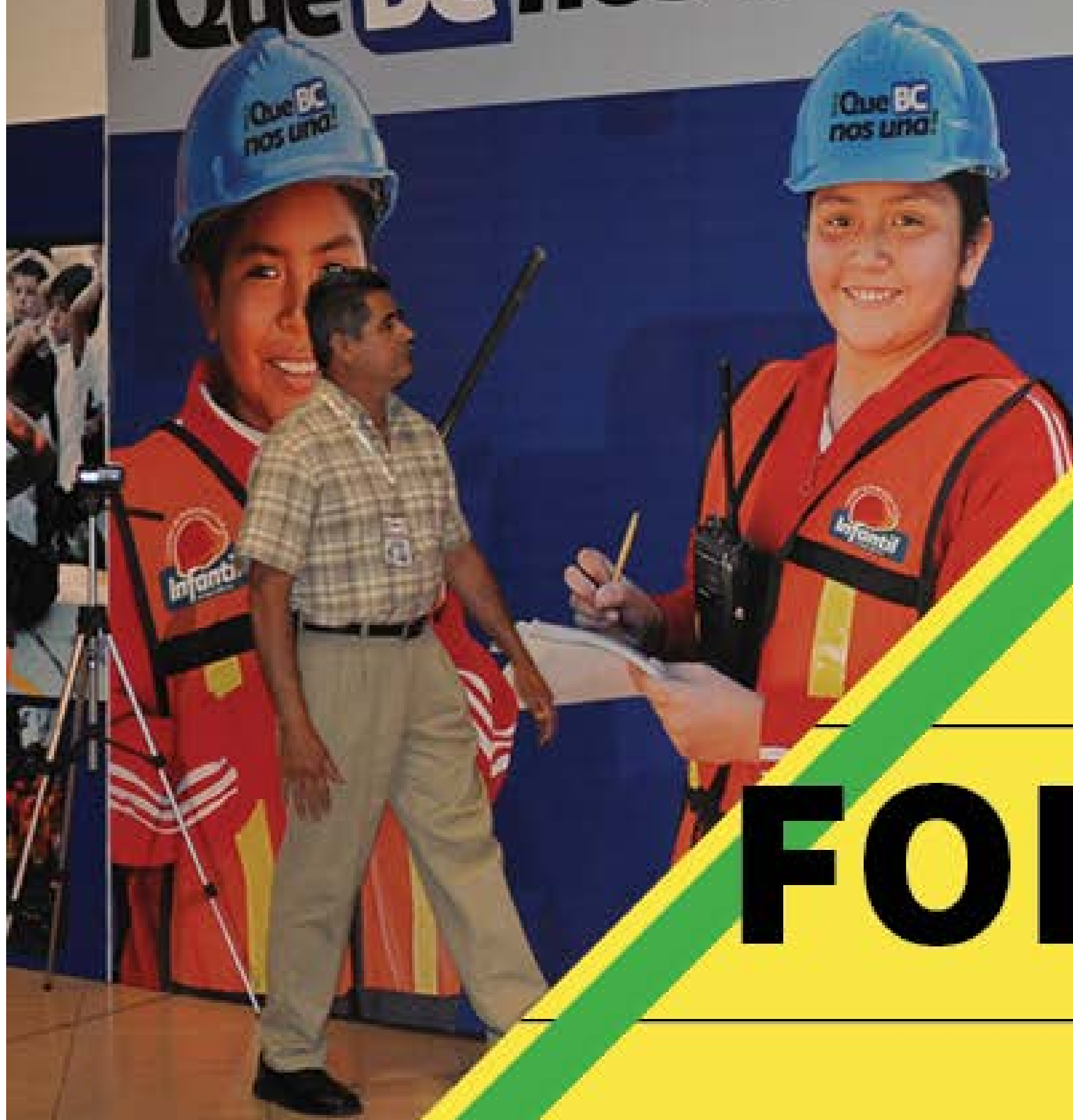
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Por una Cultura
de la Prevención

¡Que BC nos una!



FOREWORD >

Foreword

Any adverse event—whether an emergency or a disaster—tests a community’s response plans. At the same time, an adverse event provides an opportunity to measure the response and to propose changes with a view to future events by assessing interventions and lessons learned, especially in regard to technical response, safety of health workers, choice of communication model, and flow of information to the public. All of this should be geared to providing a coordinated and harmonious response by all institutions and organizations involved, while ensuring community participation in an orderly and coherent manner.

The PAHO/WHO, as technical adviser in coordination with the ten states on the Mexico/USA border, collects and disseminates lessons learned and information based on reliable and convincing data with a view to risk reduction and better disaster preparedness.

This document is the result of a study on the earthquake that affected Mexicali, in the state of Baja California (Mexico), and its area of influence on April 4, 2010. This study was carried out by public institutions and civil society organizations in Mexicali and Baja California, led by the General Secretariat of Government and the Department of Health and Civil Defense of Baja California, with the technical coordination of the PAHO/WHO.

This document outlines the main successes as well as the gaps in the response to the earthquake; but more importantly, it presents the recommendations that the involved institutions have indicated as being priorities for an improved response to an adverse event in the future.

We consider this process of reflection to be of utmost importance both for Baja California and for the entire Mexico/ U.S. border area, since it can help us improve the services provided to people, be better prepared for another such challenge and, above all, save people’s lives.

DR. MARÍA T. CERQUEIRA

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States of America.*

(September 2006 - October 2013)



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INTRODUCTION >

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Introduction

On Sunday, April 4, 2010 an earthquake measuring 7.2 on the Richter scale hit the city of Mexicali and its surrounding valley. It also affected the state of Baja California (Mexico) and had an impact in other places on both sides of the border with California.

Despite its considerable magnitude, the earthquake caused less damage than expected: two deaths, 200 persons injured, 25 000 victims (*Information provided by Captain René Salvador Rosado, Technical Secretary of the Municipal Civil Defense Unit of Mexicali, Baja California*), and material losses valued at over \$7 581 million Mexican pesos (*according to José Guadalupe Osuna Millán. Third Government Report. Mexicali: Government of Baja California; 2010. (<http://www.elvigia.net/noticia/mensaje-completo-del-tercer-informe-de-gobierno-de-jos-guadalupe-osuna-mill-n>), equivalent to US\$92 962.77 (At an exchange rate of US\$1.00 = \$12.26260 (Mexican pesos) in April 2010 (<http://www.banxico.org.mx/portal-mercado-cambiarior/>)).*

This event mobilized the citizens and authorities of Baja California, who immediately launched operations and positive actions, such as quickly establishing an emergency operations center. The top state and city authorities took part and the involvement of health workers and of aid and rescue institutions and agencies was especially important, making it possible to immediately serve the people of Mexicali.

It should also be emphasized that despite the eagerness to help and the efforts made by the authorities and the organized community, the earthquake revealed special features and characteristics of the community that should be taken into account and addressed with a view to future events. The commitment, participation, and efforts of the authorities, agencies, citizens, and community in general should be reaffirmed.

In order to assess these actions and make recommendations in case of a similar event in the future, the General Secretariat of Government of Baja California, the state Civil Defense office, the state Department of Health, and the PAHO/WHO held a workshop on the lessons learned from the earthquake of April 4, 2010. This workshop was held on March 31, 2011 at the Baja California State Center for Arts, in Mexicali, to objectively and constructively assess the interventions and actions carried out, and to determine what remains to be done. The study covered the institutions and agencies that took part in the response to the earthquake, not only in the Valley of Mexicali, where the earthquake had the greatest impact, but also in other, less affected suburban areas.

One year after the earthquake, 97 delegates from the Baja California public sector and organized civil society participated in the workshop, where the characteristics of the seismic event and the region's vulnerability were studied. They assessed the response of official agencies in terms of the organization and coordination of actions, medical response and care, public order, the functioning of strategic core services, and the work done by the communications media and nongovernmental organizations, which jointly provided aid and assistance to those affected by the quake.

At the workshop, which included keynote presentations and teamwork, it was confirmed that, in some ways, the earthquake of April 4, 2010 was gentler with the community of Mexicali than could have been expected. It was also demonstrated that areas of opportunity exist that should be taken into account with a view to using greater preparedness capacity to design better programs, strategies, and actions that will produce a more effective response to similar events in the area.

The most important lesson that the earthquake has taught the people of Mexicali, and Baja California in general, is that greater preparedness is needed to tackle adverse events of this kind in a more effective, timely, and decisive manner, and that all relevant institutions and agencies, and especially, the population, should be involved with joint responsibility.



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CHAPTER 1

Description of the
earthquake of April 4, 2010



Chapter 1

Description of the earthquake of April 4, 2010

M.C. Luis H. Mendoza Garcilazo
Capt. René Salvador Rosado

The municipality of Mexicali covers approximately 13 700 km² and borders to the north with the United States of America, to the east with the state of Sonora and the Gulf of California, to the south with the municipality of Ensenada, and to the west with the municipalities of Ensenada and Tecate. Mexicali municipality accounts for 18.39% of the area of the state of Baja California and has a population of 764 602 (2010 census), according to the National Statistics and Geography Institute.

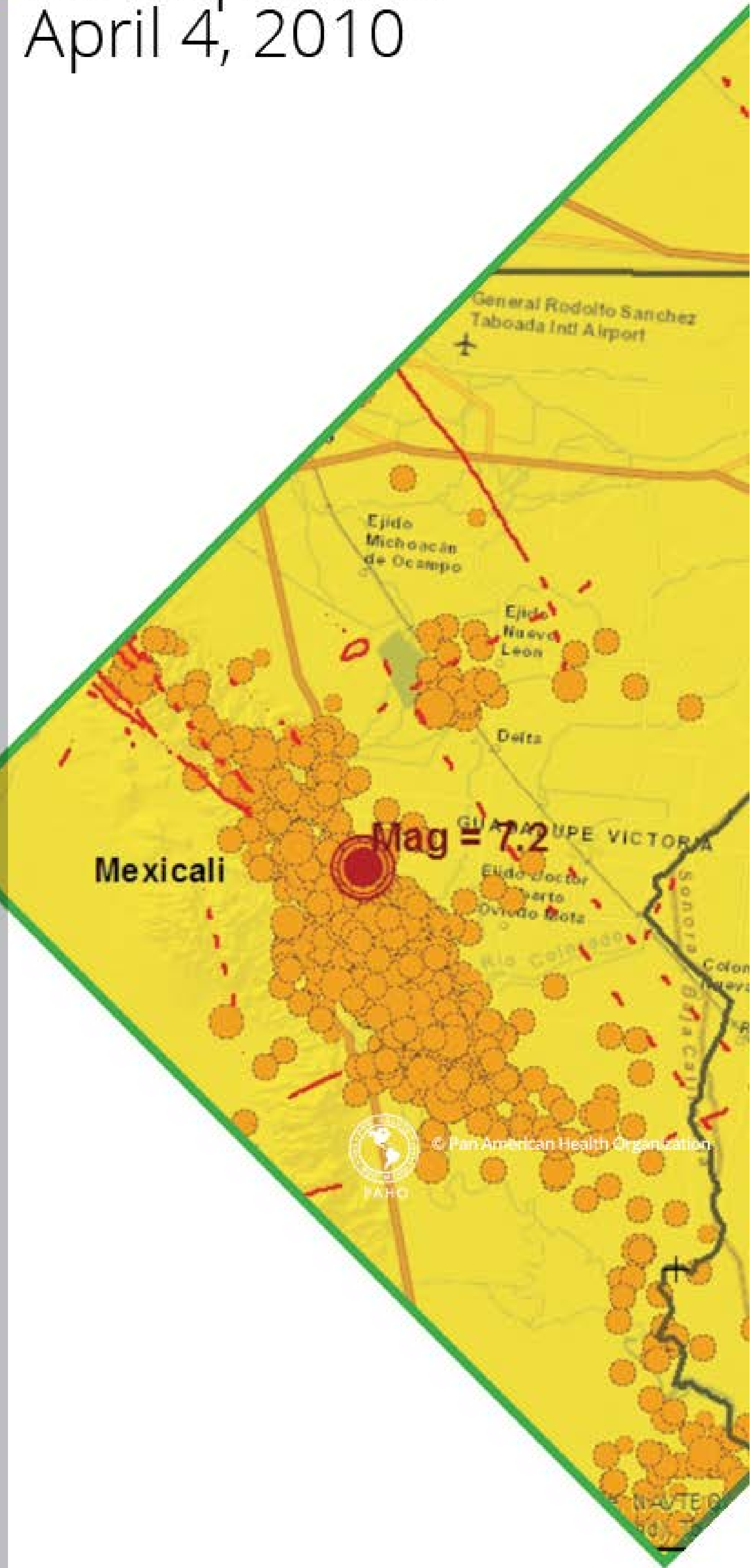
The municipality of Mexicali includes Mexicali Valley, which is made up of several rural communities (ejidos) and farmland, and the city of Mexicali, where most of the population is concentrated.

The city and the valley of Mexicali fall within the tectonic pattern of the Gulf of California-San Andrés fault system, which forms the border between the North American plate and the northern Pacific plate. This system of faults separates southwestern California and the Baja California peninsula from the rest of North America.

On Sunday, April 4, 2010, just at the end of the Easter holidays, most residents of Mexicali were either at the state's various tourist spots or visiting family in southern California. That Sunday also marked the end of a special operation in which professional and volunteer emergency services were working outside the city at the most popular vacation places.

One day earlier, on Saturday, April 3, a magnitude 4.3 earthquake (on the Richter Scale) occurred at 23:03:47 local time, surrounded by 31 events with magnitudes of 1.5–3.0 between April 1–4, all in the area where the epicenter of the bigger earthquake would then be located. These events did not appear to be a precursor of a bigger earthquake.

However, on April 4, 2010 at 15:40:40, local time, a magnitude 7.2 earthquake occurred—a major earthquake according to the international classification. It lasted 90 seconds, with an epicenter located 40 km to the south of the city of Mexicali.



Chapter 1

Description of the earthquake of April 4, 2010



During the first seconds of the quake, compressional waves (known as P-waves), were felt, followed by shear waves (S-waves) and, a few seconds later, superficial Love waves (with a snake-like horizontal movement), and Rayleigh waves (with vertical and horizontal movements, rolling like an ocean surface wave); the latter most likely caused the greatest damage.

That day, there were no seismograms in the field in the city of Mexicali: the purchase order for 11 instruments to be acquired with joint (private sector, state, and municipal) funds had been sent in early April 2010 to the supplier in Geneva, Switzerland. In the Mexicali Valley, six accelerometer stations operated by the Center for Scientific Research and Higher Education of Ensenada (Baja California), recorded movement less than 35 km from the area of rupture. What was known concerning the acceleration of the earthquake came from the stations located in the neighboring city of Calexico (California) and from an instrument installed in the basement of the City Hall building in the Civic Center. The horizontal components of ground acceleration at the Civic Center were measured at approximately 25%.

The earthquake affected several cities, both on the U.S. side of the border (San Diego, Los Angeles, Calexico, and El Centro, in California; and Las Vegas, Nevada) and in Mexico (Mexicali, Tecate, Tijuana, and Ensenada, in Baja California; and San Luis Río Colorado, Sonora).

A few minutes after the earthquake ended, the governor of Baja California, José Guadalupe Osuna Millán, the mayor of Mexicali, Rodolfo Valdez Gutiérrez, and other Baja California authorities met in the Emergency Operations Center for a preliminary assessment of the situation in the city and valley of Mexicali, in order to make decisions and take action as quickly as possible to reestablish services, assist the affected population, and restore public calm.



Damage to the electricity infrastructure, affecting the transmission lines from Tijuana and the lines connecting to the Imperial Valley and the United States, interrupted the electrical supply to the city and its vicinity.

The road from Tijuana to Mexicali suffered damages at kilometer 21 due to from a horizontal (lateral) shift to the right at the point where it crosses the Laguna Salada fault, but workers responsible for the El Centinela-La Rumorosa section managed to restore traffic in a matter of hours.



Chapter 1

Description of the earthquake of April 4, 2010

In total, 41 towns in the Mexicali Valley were affected by the quake and by floods due to breaks along more than 675 km of irrigation canals caused by earthquake damage, including the Nuevo Delta and Reforma canals. In addition to damaging more than 60 000 hectares of crops and a considerable number of dwellings and commercial structures, the floods affected the state highway system, leaving the inhabitants of the Mexicali Valley temporarily isolated.

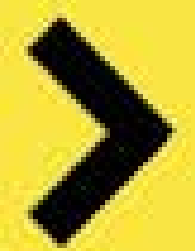
According to the preliminary information received from Damage Assessment and Needs Analysis Group teams, extensive damage of different degrees of severity affected 2 000 houses, 284 schools, six colleges of the Autonomous University of Baja California (partial collapses), seven cultural spaces, and 13 sports installations in the city, in addition to severe damage to five main roads, among other destruction.





CHAPTER 2

Pre-hospital response



Chapter 2 Pre-hospital response



Mr. Alfredo Escobedo Ortiz
Capt. René Salvador Rosado

The three most important immediate actions taken by the Director of Civil Defense of the State of Baja California after the earthquake on April 4 were the following:

1. The Municipal Civil Defense Council was immediately established: its members took charge of the team responsible for responding to the earthquake only 20 minutes after it happened. The council was headed by the governor of the state, José Guadalupe Osuna Millán, and the mayor of Mexicali, Rodolfo Valdez Gutiérrez.
2. A reconnaissance flight was immediately carried out over the city and valley of Mexicali, as well as the area's rural highway system, supported and coordinated by the Mexicali public safety and civil defense authorities.
3. Local authorities, directed by the technical secretary of the Mexicali municipal civil defense unit and

the municipal fire department, Capt. René Salvador Rosado, assessed the extent of the damages in the urban and suburban areas of the city, while Civil Defense did the same in the Mexicali Valley area.

These joint efforts provided an immediate pre-appraisal of the damages.

The following day, when a more accurate and detailed assessment of the damage throughout the area was available, the decision was made to establish the State Civil Defense Council, chaired by the Governor. A search was immediately launched for people living in remote locations, while emergency services were activated in bordering municipalities: Ensenada, Tijuana, Tecate, and Rosarito.

It should be emphasized that, thanks to the cooperation of government representatives from municipalities bordering on the disaster zone, a more accurate assessment of the damages could be made, enabling the State Civil Defense Council to better deploy its organization and response capacity.



Pre-hospital response

A large number of buildings were affected and, along with immediate response operations, the State Civil Defense Office deployed operations and joint actions to more precisely assess which areas of the Mexicali Valley were most affected. To that end, over 5 000 inspections were carried out in the Mexicali Valley and some 400 in the urban area of the city, mainly in public buildings.

The municipal government was in charge of local inspections, supported by the Center for Scientific Research and Higher Education of Ensenada, which participated in the work to evaluate the damages and situation in the Mexicali Valley, particularly in regard to cracks in the ground, fissures, and flaws.

Another important task was land damage assessment, since severe ground cracking endangered nearby buildings. For several days, brigades inspected and assessed damaged land on foot, reaching the conclusion that much of it was unsuitable for habitation. Also, during this process, dwellings were provided to the people most affected.

Places designated as unsuitable for habitation were immediately evacuated. However, it is important to note that despite the heavy damage to the land on which their homes were located, some people decided to stay in them due to their emotional attachments.

Weeks after the main earthquake, new structural damages continued to appear in places that had already been inspected, mainly due to aftershocks. Even three months after the earthquake, structural damage continued to increase considerably. It should be emphasized that between April 4, 2010, when the main earthquake occurred, and March 2011, some 15 000 aftershocks were recorded.

Chapter 2 Pre-hospital response

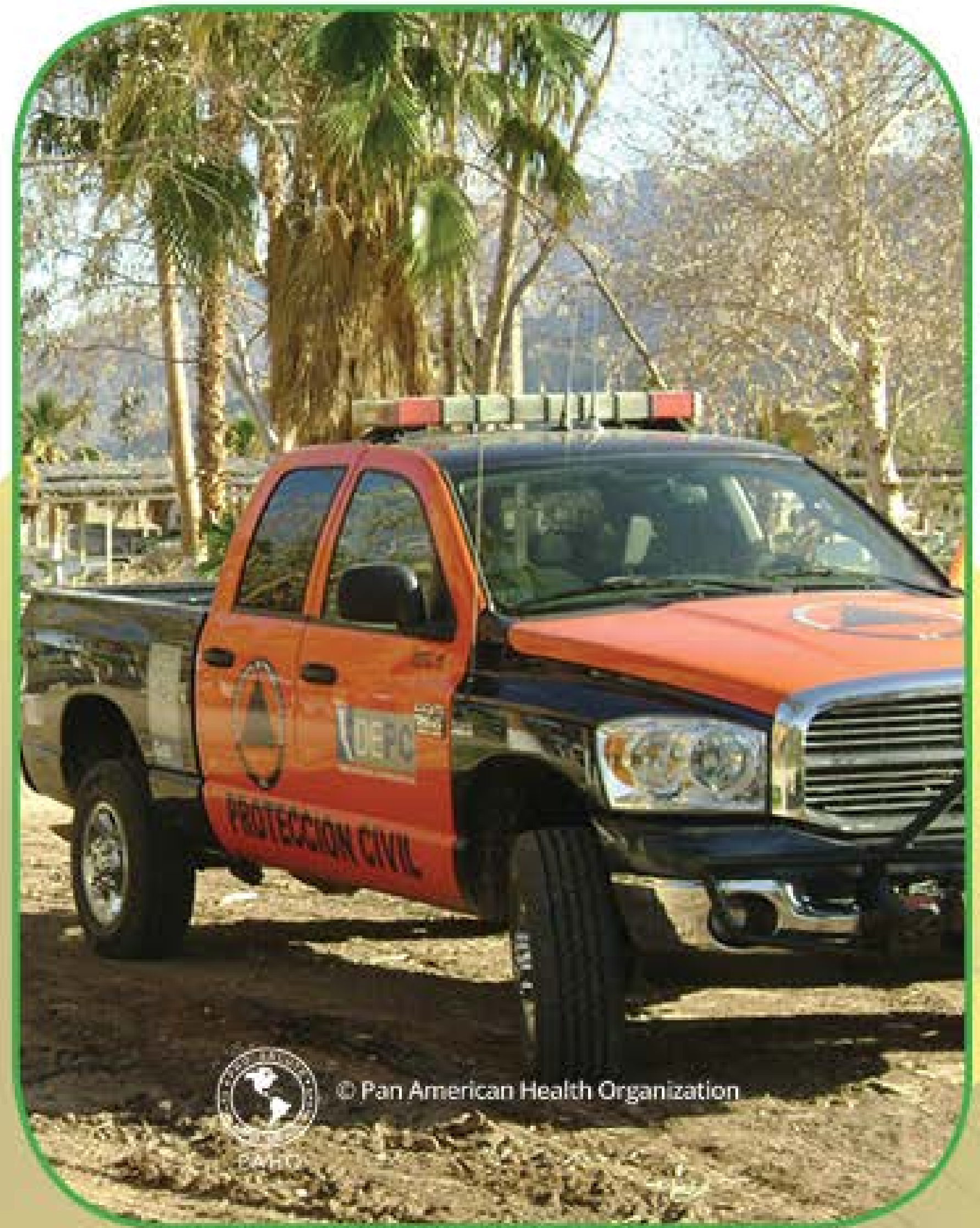
The Mexicali earthquake also caused several fires due to damaged gas tanks. This collateral damage could have been avoided by simple preventive action such as securing the tanks.

Since the earthquake, work has been done to implement preventive actions. This has encouraged the population to embrace a culture of prevention and civil defense, through dissemination, promotion, and education around the Family Contingency Plan.

Since the earthquake occurred during a school vacation period, most emergency services were located at the country's main tourist centers, less than half of them in urban areas: these were precisely the services that responded to the alert in the immediate aftermath of the earthquake.

The immediate activation of the Civil Protection Council—with the personal participation of the Governor and the Mayor, who were in the city at the time of the earthquake—enabled quicker initial decision-making and more timely disaster response. Once the Governor took charge of the emergency response work, the State Civil Defense Plan was implemented to deploy units from the state's other municipalities to assist in Mexicali.

During the event, only the MVS radio station remained in operation, on a stand-alone basis: this was how the public was informed about the situation. As a result of this lesson learned, the city of Mexicali decided to invest in providing the local fire department with its own radio station, which is now operating and referred to as the “early warning system”.





CHAPTER 3

Hospital response



Chapter 3 Hospital response



Response of the Mexicali General Hospital **Dr. Caleb Cienfuegos Rascón**

The Mexicali General Hospital is a comprehensive hospital institution that provides basic and specialized care. It has 293 beds, some of them for adult and newborn intensive care; five operating rooms, and four delivery rooms. At the time of the earthquake it was completely full.

The personnel working there during the earthquake had a certain degree of training as a result of the experience gained in the earthquakes of February 2008 and November 1987. Evacuation and contingency plans were also in place for different scenarios. For the hospital management, the earthquake on Sunday, April 4, put all these contingency plans to the test.

The earthquake caused structural damage, such as cracks in the walls and floors of the building; in the central stairs, material released by the movement of joints was visible. Also, damage to containers filled with formalin and acids caused these chemicals to mix, forming a noxious cloud that further hindered evacuation and contingency operations.

Other problems included failures in the primary and back-up electric systems; cracked water pipes on all floors, causing leaks that hindered patient exit and evacuation; leaked medical gases; and a loss of communication, both internally (between sections of the hospital) and with the outside world. Several pieces of equipment, shelves, and refrigerators were attached to the floor, but the strength of the earthquake literally collapsed them or shook them free, causing chemical spills.

Chapter 3 Hospital response

Response measures after the quake included the vertical and selective horizontal evacuation of the building and the designation of spaces to relocate the patients. The hospital staff also prepared to receive possible victims of the earthquake from the city and from rural communities in the Mexicali Valley.

The immediate concerns of the Contingency Committee were to:



1. restore vital lines and prepare spaces to admit patients
2. reestablish electric power
3. identify all oxygen leaks to prevent fires
4. restore critical services, such as intensive care units and operating rooms
5. collect and protect drugs and treatment materials
6. collect life support equipment, food, and water



These tasks were carried out simultaneously by different working groups.

Unlike public buildings, hospitals are not evacuated. The hospital staff kept their spirits up and continued admitting and treating the earthquake victims as well as caring for the patients already admitted: the medical students in the building at the time of the earthquake followed suit. This attitude helped a great deal to reestablish operations in the hospital.

Outside the hospital, treatment areas were prepared, including gynecology, obstetrics, internal medicine, and pediatrics. With assistance of the Mexican army—which had been sent in to keep order and provide logistical support—three tents were set up to admit, triage, and hospitalize patients, and for storage.

When electric power was restored, staff began occupying the areas free from chemical contamination and the places that did not show serious structural damage. Useable areas were redistributed and the delivery rooms were used as operating rooms; the neonatal intensive care units were placed in the gynecological recovery area, and outpatient chemotherapy was set up outside the building.

By the fourth week after the earthquake, two trucks had been equipped with oxygen, aspirators, and other key devices for patient care, and equipment was being provided to the different treatment units in various areas of the building as each one was set up.

It took five months to restore the hospital's operations: three months of work were required to completely re-equip one of the operating rooms, while more time was needed for the others, given the structural repairs required. It is important to emphasize that the hospital did not interrupt its attention to the public during this period.

The reconstruction and renovation stage required soil mechanics studies and other technical research to determine what could be done with the building before recommencing operations. One year after the earthquake, the hospital had seen over 40 000 outpatients and 48 000 emergency room patients; approximately 12 000 patients were hospitalized and nearly 6 000 surgeries were performed.

Chapter 3 Hospital response

Response of the Institute for Safety and Social Services for State Workers (ISSSTE)

Dr. Elba Cornejo Arminio

The Institute for Safety and Social Services for State Workers (ISSSTE) provides services to 7% of the population of Mexicali. The 5th of December General Hospital suffered severe structural damage that led to the evacuation of the building; it was the only hospital in the city that had to be evacuated and that, from day one, had to care for its patients in tents set up in the parking lots. In addition to the hospital unit, the earthquake left the two child welfare rooms unusable.

Currently, hospital-based services are provided to eligible users in rented medical units: the Rosario clinic, a 23-bed medical unit that treats internal medicine and surgery patients; and the Marlef clinic, a 10-bed facility with gynecological/obstetric and pediatric services.

For consultations on family general medicine, an 860 m² medical unit was set up with eight physician's offices; oncology, dentistry, gerontology, pharmacy, record-keeping, patient eligibility-tracking, and preventive medicine services are also offered.

With regard to reconstruction work, by March 2011, 51% progress had been made in the overall reinforcement of the hospital structure, to which a total of 2 200 tons of steel bracing will be added to strengthen all the walls. Safety requirements have been updated for public buildings, since this is considered a high seismic risk area.

Response of the Mexican Social Security Institute

Ing. Javier Márquez Herrán

The Mexican Social Security Institute (IMSS) has clinics in Baja California and in San Luis Río Colorado (Sonora), serving 1 700 000 beneficiaries in three hospitals, 16 family medicine units, and day-care centers for about 4 300 children. This entire population was affected by the earthquake.

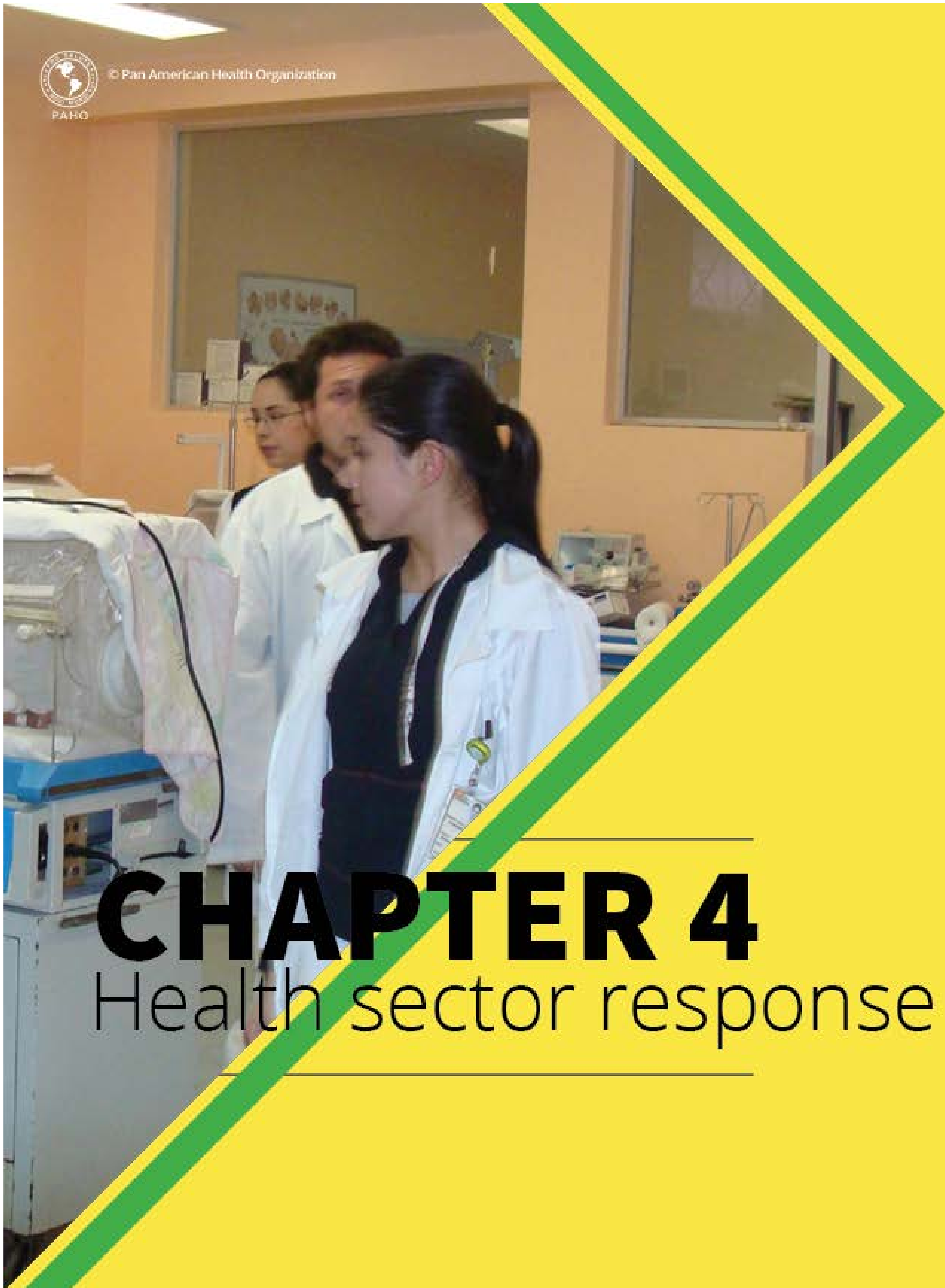
In order to keep the services in operation, inspection brigades were formed to determine which clinics could be used to treat regular patients or as emergency areas. Clinic No. 4, located in the rural community of Durango, was the hardest hit: due to the conditions of the land and its proximity to the epicenter (2-3 km), it had to be totally demolished and its patients were transferred to Hospital No. 30 in the rural community of Nuevo León, and to Hospital No. 31 in Mexicali, which suffered only minor damage.

One of the main lessons learned by the IMSS delegation after the earthquake was to recognize that the Institute's staff, equipment, and supplies were insufficient to respond to an emergency of this magnitude. However, staff leadership and participation made it possible to overcome the emergency in collaboration with other health institutions.

Another lesson learned was that, since the procedures for this type of event are not entirely standardized, it was difficult to carry out actions and assign duties after the earthquake. It was also confirmed that there is a lack of properly trained staff to implement directives within the institution, to rebuild damaged facilities, and to build new clinics.

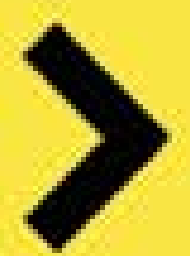
The IMSS clinics were evaluated and it was found that the oldest of them, built according to old building regulations, do not meet proper construction standards. Corrective action is therefore needed.





CHAPTER 4

Health sector response



Chapter 4 Health sector response

Health Promotion

Dr. Laurencia Gurrola Córdoba

Lic. Delia Padilla González

Lic. Patricia Serena Rosas

Dr. Martha Lorena Nava Martínez

The mission of the Health Promotion Department of the Baja California Department of Health is to work with the population (organized grassroots society) in preventive actions and during natural disasters such as this one, taking action that helps mitigate damage through organized and informed community work.

After the earthquake of April 4, 2010, the task of informing the population was facilitated by the active participation of the communications media in the response. Organized social groups, previously prepared by other events such as the influenza pandemic, were very active and willing to provide assistance; however, some actions were counterproductive due to a lack of proper linkage with other departments, as is described below.

The earthquake caused water pollution, overflowing canals, and damage to latrines, leaving the population exposed to polluted waters. As a result, it became necessary to take stronger action to inform the public about how to treat and disinfect water for human consumption; a prevention kit was created, containing pamphlets on hygienic food handling, disinfection of water for human consumption, proper disposal of garbage and excreta, and lice (pediculosis) control and treatment. The kit also contained envelopes of alcohol gel, colloidal silver (with indications for its use, especially when no stove or gas is available to boil water), bags of lime, antiparasitic drugs, and shampoo for lice control.

Garbage collection services were also disrupted, in addition to receiving a heavier workload. For lack of proper service, people began to burn refuse to keep it from accumulating, further polluting the environment.

The Health Promotion Department acted on epidemiological reports that indicated the locations of diarrhea outbreaks originating in food or water, regardless of the cause (poor handling during food preparation, improper storage, or the suspension of basic services).

Actions were focused on giving advice and recommendations on how to prepare the food hygienically in homes and camps, and on how to safely treat water, dispose of

solid waste, and meet basic hygiene standards during an emergency.

These joint activities carried out by the epidemiology and health promotion areas showed that the success of health promotion interventions in risk situations depends to a great extent on good communication among the different agencies. For example, exchanging information on the needs of certain segments of the population and making joint efforts helped to strengthen the response and avoid counterproductive actions.

This work confirmed the need to produce information pamphlets—and add new ones—on garbage disposal, and to provide packages of lime with instructions on how to bury organic and paper refuse with lime (after separating plastics, diapers, and metals) in order to prevent the growth of organisms harmful to human health.





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Health sector response

With a view to future events, it is important to continue strengthening actions of this kind through a family- and community-based contingency plan, in collaboration with social organizations so as to take better advantage of social participation, which has been of great value in emergencies such as the earthquake of April 4, 2010.

Work was also done to identify communities that should be visited and the main problems to which they are exposed in order to train the population in basic sanitation (proper disposal of garbage and excreta, control of harmful organisms, proper food pre-paration and preservation, and disinfection of drinking water). Activities to promote personal hygiene should be carried out by encouraging and promoting correct hand washing and the prevention of lice, nits, and other parasites and pathogens.

Between April 4 and 29, assistance was provided to the rural communities of Caiman (the earthquake blocked access routes, causing shortages of food, medicines, and services), Guerrero, Marítimo, Carrancita, Mazón Guerrero, Zacamoto, Cucapah, El Faro-La Puerta, Plan de Ayala, Oaxaca, and El Polvorín.

A total of 83 brigades went door-to-door to assess the problems facing the communities. The task of these brigades was not to see patients, but was aimed at preventive action involving the health authorities and other agencies. Together with student associations, the brigades helped train community leaders in hygienic measures and the role they can play in defending health in their communities, and reported to the Department of Health on the anomalies and risks they observed. With the help of civil society organizations, cleaning supplies were delivered, including brooms, mops, bottles of chlorine, soap, and detergents.

These actions made it possible to create a directory of leaders who supported health-related work.

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The situational assessment also confirmed the following positive elements: the population had almost immediate access to health services, both before and after the emergency; 98% of the population were covered by a health system or had access to a health care center; and, with the exception of one rural community, the vast majority of the population were aware of the basic sanitation measures that have to be strengthened in disaster situations.

Negative effects of the earthquake were also confirmed, among them the complete or partial loss of homes, overflowing canals and latrines that left fecal material and polluted water in the open, and the suspension of water service (for a long time in some places) and of electrical service. The complete or partial suspension of garbage collection led people to burn garbage, with the resulting environmental damage, and to resort to new and existing illegal dumps.

Furthermore, it was observed that abandoned pets were proliferating or making their dens in evacuated houses; the amount of stagnant water and breeding mosquitoes increased at sites where water emerged from the subsoil; there were delays in the arrival of assistance and information from institutions; the number of nervous breakdowns rose; and sources of employment were lost, among other problems.

In total, 24 health promoters were commissioned to serve in the emergency. Their actions included giving 402 educational sessions, 1 572 personalized consultations, and 65 training sessions to community leaders aimed at spreading health information among the population.

Situation of the Shelter System: Role of the National Army

Col. David Chávez García

In the immediate aftermath of the earthquake of April 4, 2010, the Department of National Defense activated the civilian disaster relief plan known as Plan DN-III-E, and patrols were deployed in the city and valley of Mexicali in order to precisely determine the extent of the damages and the location of the most affected areas. This information, complemented by data issued by the State Civil Defense Council, constituted the basis for determining the population's most pressing needs and for planning shelters, warehouses, collection centers, and the deployment of troops.

As its top priority, the National Army focused on protecting people's lives; therefore, its initial task consisted of evacuating the buildings that posed the greatest risk of collapse. One of the first of these was the General Hospital, which evacuated its patients outdoors so that it could continue to care for them and treat other earthquake victims. Some rural communities in the Mexicali Valley were also evacuated.



Chapter 4 Health sector response

The second priority was to guarantee the safety of people and their property until the affected public services were reestablished. In coordination with the Director of Municipal Public Safety, the Army set up a patrol system in all the affected areas to protect victims and their property against crime and looting. Through these activities, order was maintained at all times.

At kilometer 5.5 on the road to San Felipe and on the concourse of the Mexicali city hall, collection centers were set up under the responsibility of the State Secretariat for Social Development and military personnel. Seven military trucks were used to transfer the articles donated to the warehouses installed in shelters in the rural communities of La Puerta and Oaxaca: over 300 000 liters of water, cleaning equipment, provisions, mats, blankets, boxes of clothing, menstrual pads, diapers, and tents were mobilized, among other articles.



Two shelters were set up in rural communities, operating 24 hours a day to serve the affected population. These shelters had bedrooms for men, women, and families, food distribution areas, a medical unit operated by IMSS physicians and nursing staff, and by the Red Cross and military health personnel; and mobile health facilities and showers.

Other state and municipal institutions offered vocational programs such as handicraft and computer classes; held sports events, film projections, recreational activities, and cultural presentations; and provided psychological counseling and medical care. Between April 4 and June 19, 2010, approximately 2 500 people were served in these shelters.

Between April 10 and June 19, a community kitchen operated in the rural community of Oaxaca, with the capacity to prepare 7 000 daily meals. A storage system was developed to deliver meals from a food warehouse next to the community kitchen; this involved establishing a nearby distribution point to transport products in military vehicles to other distribution points in the communities of La Puerta, Zacamoto, and Nayarit, among others.

Military personnel also helped supply water, providing a tank truck in Oaxaca, Cucapah Mayor, Adolfo López Mateos, and Durango del Valley. The army also participated in the demolition of 89 m² of fences and walls that constituted a hazard, and helped evacuate 145 homes and a school, making it possible to salvage useful furniture and transfer it to safe places. Throughout the period of these operations, the army provided the assistance of one general, two commanders, 14 officers, 501 soldiers, and 53 official vehicles.

Department of Health of the State of Baja California Dr. Fernando Díaz García-Alonzo

After the earthquake, Health Caravans Program teams carried out some 13 500 consultations in the city and valley of Mexicali, following pre-established routes. These caravans gave considerable support to the health work carried out in the Mexicali Valley, focusing on primary health care and the control of prevalent diseases.

Some 7 000 health education talks were given to affected people living in shelters and rural communities in the Mexicali Valley. The talks focused on disease prevention and health promotion, hygiene, food handling, and vector control. Also, approximately 100 000 envelopes of Vida (oral serum) and antibacterial gel were distributed, about 7 000 people were vaccinated, and psychological counseling and anti-parasite treatment were offered to more than 2 000 people.



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Sprays were used to fumigate over 4 000 hectares; another 15 000 hectares of residential land was sprayed from the air, while stagnant water received anti-larval treatment. Also, some 812 kg of chlorine was used to sanitize pools, cisterns, reservoirs and other water; nearly 20 000 cases of colloidal silver were distributed, and water samples from various storage sites were analyzed.

All these measures helped protect the health of the affected populations and, in fact, served as unplanned



health promotion activities. As a result, no changes were observed in the epidemiological indicators of prevalent diseases in the area.

Mutual Assistance

Lic. Francisco Echeverría Verdugo
Lic. Alejandra Benítez Gómez

During the period in which operations were underway to collect and distribute donations, the state government offices—which had been evacuated due to safety concerns—were located in tents outside the Sol del Niño Museum.

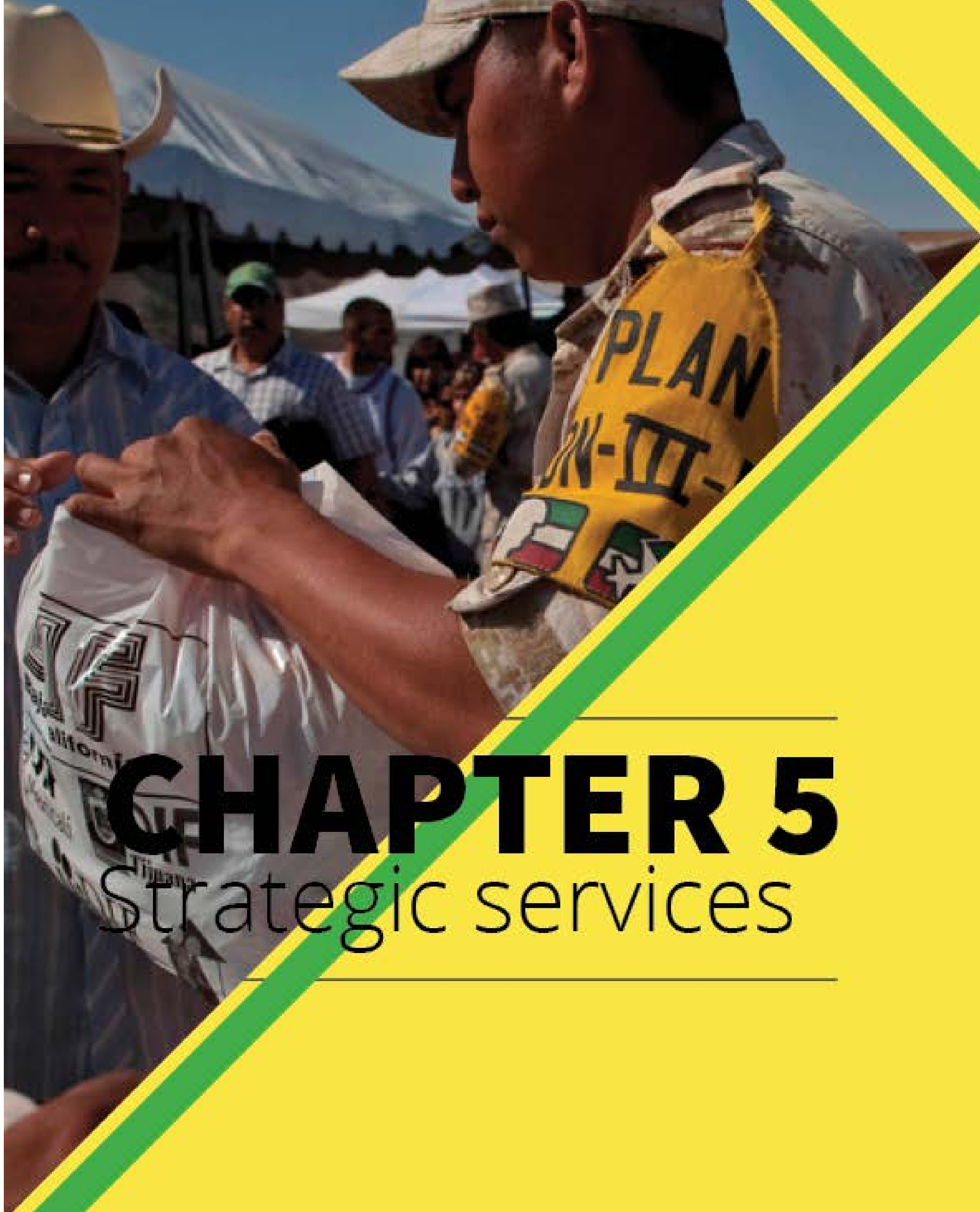
Between April 5 and September 8, about 100 donations were received from foundations, private companies, and associations in the United States; many of the donors acted spontaneously without having been contacted. Over 90 tons of supplies were received, including blankets, tents, new clothes, and food, as well as 2.5 million pesos in cash.

The administrative office of the state government was in charge of customs arrangements, while the Mutual Assistance office took charge of public relations; it also helped channel the donations and facilitated the necessary documentation for border crossings.

Donors were also given information about current needs at the supply centers and affected areas, so that the donated products could be distributed equitably where they were most needed.

All these actions resulted in closer collaboration with the federal agencies and with institutions, agencies, and foundations in both countries.





CHAPTER 5

Strategic services



Chapter 5 Strategic services

Public services in Mexicali are dependent on three levels of government: the Federal Electricity Commission; CESP, the state-owned water utility that deals with drinking water and wastewater treatment systems; and the municipal government, which is in charge of garbage collection. Finally, a private company, Teléfonos del Noroeste, provides telecommunications services.

Municipality of Mexicali
Ing. Alberto Ibarra Ojeda
Ing. Luis Manuel Villalobos

On April 4, the people of the city and valley of Mexicali faced shortages and problems caused by the earthquake: in particular the lack of electric power, shortages of drinking water, accumulations of garbage in the streets, no traffic lights, and the collapse of some structures.

One of the problems that most affected the population was insufficient garbage collection, due mainly to damages on the access route to the city dump. However, this problem was quickly solved: 75% service was restored the day after the earthquake, and full service returned a few days later.

Several public lampposts fell and some traffic lights remained flashing or completely out of order. Teams from the Public Services department worked to restore services as quickly as possible and managed to have everything totally back to normal within five days after the earthquake.

Fences, walls, billboards, trees, and other objects fell onto public thoroughfares. During and after the emergency, damaged and collapsed structures were demolished and rubble was removed from 10 dwellings in the communities of El Vidrio, Agualeguas, Pro-Hogar, Pueblo Nuevo, and Baja California.

The Public Works department, in collaboration with other municipal entities and coordinated by Civil Defense, took charge of assessing the damage to dwellings, general infrastructure, and roadways in the urban areas of Mexicali to determine the average cost of reconstruction, among other things.



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Strategic services

During this assessment, the victims expressed uncertainty with regard to who would pay for their damaged or completely destroyed homes, reflecting a lack of familiarity with insurance coverage and how it works. It is therefore necessary for the residents of Mexicali to become better informed and educated with respect to insurance policies that cover and protect property against this type of event, particularly since they are living in an earthquake zone.

One of the difficulties in carrying out this work was the city's lack of organized regional divisions, a result of this event was to establish regions and sectors in Mexicali, making supervisory tasks much easier.

Eight million pesos were invested to rebuild public thoroughfares in the city and valley of Mexicali, and the work was completed on schedule.

State Water Commission **Ing. Efraín Muñoz Martín**

The State Water Commission is in charge of coordinating the activities of the different suppliers of water throughout the state of Baja California in order to guarantee drinking water and sewage services; it is also responsible for providing bulk water supply to different communities in the state and making the reuse of treated wastewater more efficient.

After the earthquake of April 4, 2010, the most important task was to reestablish water service. The back-up pump at drinking water treatment plant No. 1 was damaged; also, since there was no electric power, water could not be pumped to the city and to the Mexicali Valley. When electricity was restored the following day, it was possible to restore drinking water delivery to the city, although other places experienced greater disruptions.

The southern part of the Mexicali Valley was already served by the Commission; meanwhile, assessments were carried out in 17 communities where the Commission did not operate, but that needed its help to receive drinking water.

Chapter 5 Strategic services

The main line of the Río Colorado water supply system, in the state of Sonora, also suffered structural damage. This system is important, since it supplies the cities of Tijuana, Tecate, and Rosarito, and provides water to the El Hongo prison and community. Although it took nearly 10 days to repair the water supply system, residents in these areas had other sources of water.

CESPM (Mexicali water and sewage utility)

C.P. Carlos Flores Vásquez

Ing. José Carlos Robles Valenzuela

CESPM focused its response mainly on the valley, where many people were without water after damages to the feeder canals that carry the water to treatment facilities or to local systems in the settlements. Although some of these systems are not part of the State Water Commission structure, the entire population was served on an equal basis.

In total, between April 5 and August 30, 2010, 33 towns were served and 63 255 m³ of water was delivered at a cost of 87.4 million pesos (equivalent to US\$7.13 million) through resources from the Natural Disasters Fund, CESPM, and other state funds. Drinking water lines were also replaced for a population of 39 326 in 19 towns, through an investment of 448 758 000 pesos (US\$36 595 670.80) by the Natural Disasters Fund.

Support was also provided to the Baja California State Institute for Real Estate Development and Housing, through technical supervision of the installation of potable water mains and sewage lines in the new settlements created for the earthquake victims. In Mexicali, repairs were made to several drinking water lines, pumping equipment, wastewater sumps, and technical buildings, and other necessary jobs were done in the wastewater pumping plants.





CHAPTER 6



Role of the communication media

Chapter 6

Role of the communication media

Lic. Antonio Magaña González
Lic. Víctor Martínez Ceniceros

The magnitude 7.2 earthquake on April 4, 2010 provided several lessons to reporters, editors, and commentators in the different communications media. One lesson is that we did not have the technology or human resources needed to cover a disaster of that nature and, as a result, could not provide proper reporting or information to the population. The city was isolated that afternoon, due to the loss of electric power, cell phone services, and the Internet. After the earthquake, it was impossible to maintain contact with the affected population through the electronic media.

Another lesson is that the reporters and editors were not familiar enough with the terminology to cover a disaster of this nature and did not understand concepts such as magnitude, intensity, epicenter, depth, faults, and aftershocks.

This was a major earthquake with financial, political, labor, social, health, and environmental impacts (including the flooding and pollution of thousands of hectares of agricultural valley land) that the communications media did not cover. The information offered by the state and municipal authorities flowed slowly and was disorganized, causing widespread alarm and uncertainty following the earthquake and its aftershocks. Because of the tremors, the state of alert lasted several days. The economic, political, social, and ecological damage caused by the earthquake was assessed and announced too slowly, especially regarding the water infrastructure in the Mexicali Valley.

The communications media—in particular the electronic media—did not standardize their criteria for covering the disaster and for the content of alert and prevention bulletins aimed at informing the victims. Society was not prepared to deal with this kind of event and the media did little to help the most affected communities to organize more quickly to cope with the emergency.

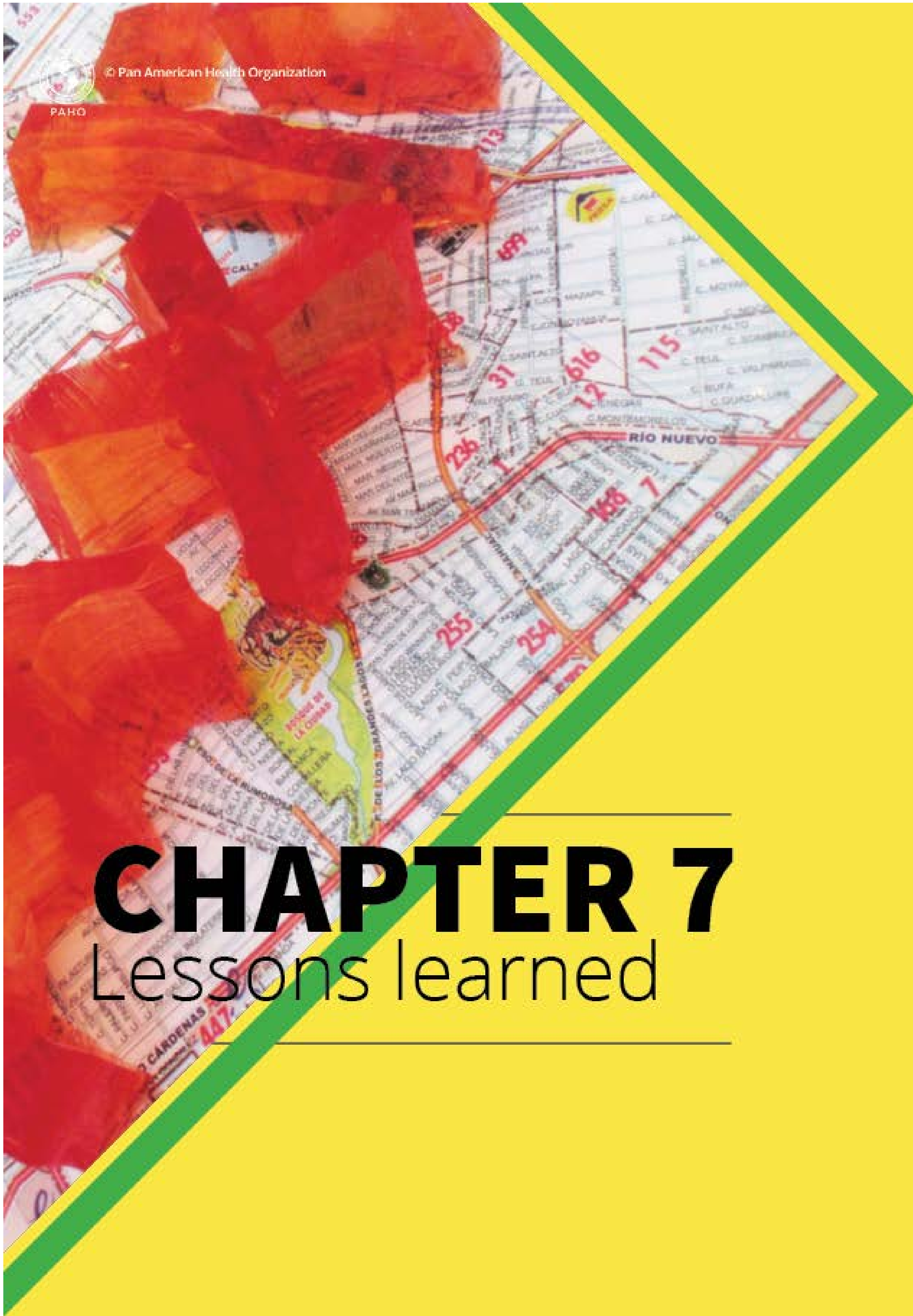
Community organization was lacking in the immediate aftermath of the earthquake. Community leaders and communities themselves took a long time to react, perhaps due to the lack of information; some hoped that all the problems would be solved by the government, which they blamed for the consequences of the quake.

Another lesson was how difficult it was for technical personnel and scientific specialists to provide the public with simple, understandable information on what was happening. A few hours after the earthquake it became clear that there was a lack of coordination among the communications media, disaster experts, and society.

As a final thought, a close look should be taken at what journalists, reporters, the news media, and other information sources are doing, in order to achieve better coverage in the event of another disaster of similar magnitude. What work has been done so that Baja California will remain in permanent contact with the rest of the world in a future natural disaster?

The Mexicali 7.2 blog (<http://mexicalisietepuntodos.blogspot.com>) was created to help strengthen a culture of prevention and to raise awareness of the situation in Mexicali.





CHAPTER 7

Lessons learned



Chapter 7 Lessons learned

This chapter deals with the main successes and lessons learned from the earthquake of April 4, 2010, based on the consensus reached by the working groups that met during a workshop on this subject on March 31, 2011.



Civil Defense and Emergency Response

- An hour after the earthquake, the technical secretary of the Municipal Civil Defense Unit, Capt. René Salvador Rosado, began receiving official reports on its magnitude and the location of its epicenter.
- Given the strategic location of the No. 1 Fire Station in Mexicali, it was decided that the command post for monitoring the quake would be established there. However, when it became clear that the station did not have the necessary communications facilities, and because of its poor seismic resistance, the decision was made to transfer the command post to the Sol del Niño Museum building.
- Ninety minutes after the earthquake, 60% of the members of the State Council for Civil Defense had already met, including the state governor, José Guadalupe Osuna Millán, and the mayor of Mexicali, Rodolfo Valdez Gutiérrez. This meant that initial decisions could be made almost immediately after the event occurred. It should be pointed out that the remaining 40% of the members of the State Council for Civil Defense were outside the city on operations related to the popular Easter week activities.
- A helicopter was available: with this highly valuable tool it was possible to inspect large areas in a short time and to immediately assess the damages.
- Failures in the communications systems hindered the exchange of information with the State Civil Defense Office in the first two hours after the quake.
- At the time of the earthquake, no staff had been trained in damage assessment and needs analysis, and there was very limited support from schools and professional associations in the construction field. The damages were assessed by a team trained by the State Civil Defense Office, after receiving only a few minutes of basic information and instruction on how to fill out the forms.
- With regard to the assessment of material damages, no educational centers were visited since this was a vacation period; instead, efforts were focused on determining the condition of homes and workplaces.
- The earthquake knocked out cell phone and radio communication, which was restored only partially in the urban area five hours after the quake.
- There was a shortage of fuel for vehicles: four hours after the earthquake, patrols had to stop for lack of gasoline. The Red Cross supported the emergency work, but was also hindered by the lack of fuel.
- The strategic utilities (water, electricity, and telephone companies) had contingency plans that were inadequate for an event of this nature; however, they acted quickly to restore services.
- In order to receive financial assistance from the federal government, damage assessment forms were required; however, since no specific forms existed at

Chapter 7

Lessons learned

the time for the assessment of earthquake damage, the form for cyclone damage had to be used. Furthermore, the staff had not been trained to fill out these forms, although civil defense workers from the Department of the Interior came to assist them in this task.

The following are lessons learned with regard to civil defense and emergency response:

- The emergency command post should have the right technical equipment to ensure quick, timely, and complete operations.
- Back-up communications equipment and plans are necessary in case the communications equipment fails, as well as a back-up power supply, fuel tanks, etc.
- Training for the staff in charge of damage assessment should be adapted to the specific features of the area and the events most likely to occur; these workers have to accept the commitment involved in this difficult task.
- These subjects should be included in construction-related college curricula; and professional schools should be involved in contingency planning.
- All public and private institutions should prepare, evaluate, and update their contingency plans in order to deal with the events most likely to occur in Mexicali and its area of influence.
- It is essential to reconsider how to strengthen a culture of prevention, not only in regard to emergency response, but also in terms of everything related to long-term strategic plans.

Media and Society

- There were difficulties with transmitting information from the different levels of government to citizens.
- As a result of this event, it was determined that radio communication is essential in order to alert and inform citizens in emergencies and to ensure an open flow of communication to society.

- The fact that only one radio station (the only one with back-up power) was available to report to citizens after the earthquake resulted in the municipality of Mexicali now having its own radio station; this is considered great progress.
- A disconnect was also observed between the media, the experts, and society, since messages did not reach the public in a convincing manner, either because of how they were communicated, their excessively technical content, or public skepticism.
- The people in charge of the communications media had not received any training on events that could affect the region or on risk communication. As a result of this weakness, Civil Defense has begun giving training courses to communications professionals.



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Chapter 7 Lessons learned

The working group at the workshop agreed that the lessons learned were:

- The social responsibility of the communications media requires that they be in a position to properly inform the public at all times. It is recommended that they have back-up systems that enable them to continue working after an adverse event like the one on April 4, 2010.
- There should be better coordination among the three levels of government and the communications media, through sufficient and timely communication, and fully accredited official spokespersons. Similarly, the communications media should support society with objective, reliable information and should be attentive to the information generated by institutions.
- A culture of prevention should be strengthened among communicators and journalists, since the media are multipliers of information: accurate and proactive messages, especially in emergencies, produce greater benefits than alarmist, out-of-context, unconfirmed, or outdated information. It is crucial that objective and accurate communications are maintained among decision-makers, experts, scientists, and those who transmit the messages.
- It is necessary to provide training to schools, natural and social leaders, neighborhood committees, churches, and civic organizations.

Health Promotion

- A document containing all relevant initiatives should be prepared in order to clearly state what has to be done and how to serve the population during and after an earthquake.

The main lessons learned on this subject were:

- It is important to raise public awareness of the biological, psychological, and social determinants that can destabilize health. This understanding should be based on key messages: information on the determinants of health should be transmitted responsibly and accurately to the communications media through official spokespersons.



Chapter 7 Lessons learned

- The public should be instructed as to how and when to collaborate, so that their contributions are useful.
- With regard to epidemiological surveillance, there should be specific monitoring of easily communicable diseases. It is necessary to standardize the criteria for reporting cases to the different health institutions, such as the Department of Health, Integrated Family Development, Social Development, the Red Cross, IMSS, and ISSSTE, among others, with a view to earlier and more specific documentation of the locations and types of outbreaks that could appear.
- It is necessary to specify when an epidemiological barrier should be established and to educate the population and institutions about what this means and how it benefits the population, and the importance of participating in this type of actions.



Hospitals and Epidemiological Surveillance

- Hospitals have contingency plans that are not well suited to the needs of the city of Mexicali and its vicinity. Certain variables are not included in the current models.

- After the earthquake of April 4, 2010, the chain of command at the Mexicali General Hospital revealed limitations, since the planned operation could not be carried out due to the absence of many committee members; furthermore, telephones failed as a means of communication, being the first system to go down.
- When the earthquake occurred, most of the Mexicali General Hospital staff exited the building immediately and did not want to go back in, meaning that the facilities could not be inspected. At present, after the modifications made to the building, it is expected that both internal and external users will feel safer about the building's structure and its earthquake resistance.
- There were discrepancies in the instructions that the different emergency organizations gave to personnel and patients, causing confusion in the population. Furthermore, from the highest levels down to operational personnel, information flowed and was received in a partial, fragmented way.

The following lessons were learned with regard to the operation of hospitals and epidemiological surveillance:

- Contingency plans to address both internal risks and external threats should be updated along with the variables of current models, based on the characteristics of the area and the hospitals.
- At the Mexicali General Hospital, one of the tasks stipulated for a similar event is for the head nurse to check all facilities and ensure that staff remain calm.



Chapter 7 Lessons learned

- A unified command system should be developed to deal with possible future emergencies like the one on April 4, 2010.
- The epidemiological surveillance system should pay special attention to zoonotic outbreaks and to the pollution of drinking water and of the water table.
- In hospital inspections, it is of the utmost importance to properly monitor food, drinking water sources, and the disposal of excreta and refuse; closer attention should also be paid to screening patients as they arrive, since they could be carrying infectious diseases and cause outbreaks inside the hospital.
- The highest possible level of hygiene should be maintained in hospitals and there should be a specific area for the storage of corpses.

Shelters

- In Mexicali, there were no previously selected and equipped sites to house the population in an adverse event of this kind.
- Once the shelters were set up, the Mexican Army took charge of their administration and supply.
- The government of Baja California, in collaboration with the Red Cross, was in charge of the storage and distribution of medical supplies, food, clothing, blankets, and other items, through the Pan American Health Organization's Supply Management Program.
- The supply of drinking water was handled correctly, as was the disposal of excreta and solid waste. The Mexican Army, in coordination with the State Water Commission, took charge of supplying drinking water through pipes to the shelters, camps, and temporary refuges.

With regard to the establishment and operation of shelters for victims, the main lessons learned were:

- It is important to officially designate the spaces that will serve as emergency shelters. For example, the municipality could make use of the Comprehensive Family Development building, which is traditionally used as a shelter when temperatures are very low during the winter.
- The exact location of shelters should be announced in advance, so that people can identify them as a possible family meeting point during emergencies like the one on April 4, 2010.





CONCLUSIONS AND RECOMMENDATIONS



Conclusions and Recommendations

The workshop on lessons learned from the earthquake of April 4, 2010 enabled all the institutions directly or indirectly involved in the response to the event to meet and objectively assess what they did, what they failed to do, and the joint effort they made on behalf of the affected population.

Preventive measures are indispensable to prevent infrastructure damage, material losses, and above all, the loss of human lives. The first recommendation, therefore, is to train new engineers and architects in the design and construction of earthquake-resistant structures—especially, safe hospitals.

Those who have already graduated and those in charge of public services—including the National Water Commission, the Federal Electricity Commission, and urban development offices—should also update their knowledge of disaster preparedness and response in order to guarantee the continuity of services and minimize infrastructure damage.

All the systems responsible for dealing with the consequences of disasters (local, state, and federal government, Departments of health, and civil defense units, among others) should have community training plans in place so that every family knows exactly what to do and how to react to an emergency—especially earthquakes, given the region's seismic characteristics.

It is essential to improve the communications systems between the different levels of government by establishing a unified command system and an emergency operations committee in order to bring together all authorities and issue directives to everyone involved.

Contingency plans should contain a special section on maintaining public services, especially drinking water,

electric power, telecommunications, and basic sanitation. The assistance provided to the communities required the use of heavy machinery that, in many cases, damaged roads already affected by the quake. In light of this, new roads should be built wider and stronger, with a more durable asphalt surface.

During the earthquake of April 4, 2010, the community showed a great capacity for organization and solidarity, and steps have since been taken to develop a greater culture of prevention. However, sufficient progress has not been made and work should be continued for greater community involvement and more and better access to accurate, reliable, and timely information. An educated society is a society better prepared to face major, unexpected, adverse events.

We will indisputably have greater success in coping with future emergencies if we are able to achieve coordinated efforts among the different agencies and levels of government, an organized community that is better educated with regard to civil defense, and better-planned and more efficiently implemented actions. Achieving these conditions will help reduce material damage and losses, but above all, will help safeguard public health and the physical safety of citizens.

The results obtained in the workshop on lessons learned from the earthquake of April 4, 2010 will help strengthen and correct the actions taken in the future to deal with similar events or others affecting Mexicali and the region.

The challenge now is to use this document to increase the preparedness of the organizations responsible for emergency response, and to initiate an intense process of training and educating the community to deal more effectively with emergencies and reduce the negative effects of natural disasters.





MEXICALI

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