

" Celebrando 100 Años de Salud "



" Celebrating 100 Years of Health "

Organización Panamericana de la Salud

Pan American Health Organization

" 60 Años Comprometidos
por la Salud Fronteriza "



" 60 Years Committed
with Border Health "

Environmental Health Indicators Workshop U.S. – Mexico Border

Mc Allen, Texas
August 28 - 30, 2002



BACKGROUND

Several efforts have been made on the United States – Mexico border to learn about the effects of the environmental damage on health and quality of life in the community, specifically affecting the most vulnerable groups such as the poor, children, women, and the elderly.

The United States– Mexico border is characterized by conditions that have an impact on the health of the border communities such as: fast urbanization, increased industrial and manufacturing development, and occupational hazards; an increased number of working adults and children as a result of migration; high poverty rate; lack of an adequate drinking water supply and poor water quality; deficiency in the treatment and disposal of waste waters of a domestic and industrial origin, solid wastes and industrial hazardous waste; as well as deficiencies in handling and storage of pesticides; among others.

To recognize the environmental factors that are harmful to health within different environment components (air, water, soil, food, occupational environment, etc.) it is important to gather information from different areas and agencies to exchange information that could be of interest to generate policies and to define environmental health surveillance actions, as well as to promote health and prevention of risk that will help achieve a healthy and productive environment.

To respond to such challenges, the PAHO Field Office/United States–Mexico Border, prepared a concept paper in 2001 “Environmental and Public Health Indicators”, jointly by experts from the United States and Mexico in collaboration with the Environmental and Occupational Health Center of Canada, establishing a concept framework for gathering, exchanging, interpreting and using indicators that will direct environmental and health policies among the border communities which will also help evaluate the effectiveness of the interventions that will be developed in the future in the border counties.

In addition, the document presents the DPSEEA model from WHO used in the two Health Indicators Workshops held by the PAHO Field Office, the first one in Ciudad Juarez, Chihuahua in June 2000, and the second one in El Paso in July 2001. The two workshops had participants from both countries at the local, State and Federal levels. A basic group of environmental health indicators was proposed then for local officers to select those of interest, or to include others not specified. It is not intended for the sister cities to approach all the indicators the document contains from the beginning, but to adopt those that are of interest or concern and that the cities have the ability and resources to handle. The workshop held in McAllen was the first of a series of meetings that the PAHO Field Office intends to carry out between the sister cities to select the environmental health indicators.

GOALS

To implement an environmental health indicators program for the sister cities on the United States–Mexico border.

PARTICIPANTS

Health and environmental authorities from the states and counties and municipalities of Texas, Tamaulipas, and Nuevo Leon Border Areas. .

ORGANIZERS

- PAHO Field Office/US–Mexico.
- Texas Health Department – Office of Border Health
- General Division of Environmental Health, Secretariat of Health of Mexico

AGENDA

August 28

- 14:00 p.m. – 14:15 p.m. **Welcome and Introduction**
- 14:15 p.m. – 14:45 p.m. **Environmental health indicators, concepts and criteria for the selection and handling**
FO/USMB = ELP
- 14:45 p.m. – 15:45 p.m. **Health problems and their relation to environmental factors in the United States – Mexico border**
US Representative
Mexico's Representative
- 15:45 p.m. – 16:00 p.m. **Methodology of selection of the indicators and environmental health data gathering**
FO/USMB = ELP
- 16:00 p.m. – 17:00 p.m. **Review of basic indicators list for the United States – Mexico border**
Discussion

August 29

- 8:30 a.m. – 10:30 a.m. Working Groups
Initial selection of the environmental health indicators for the sister cities of Texas/US, Tamaulipas and Nuevo Leon/MX
- Methodology:**
Establish binational groups including professionals from the health and environmental sectors from each border city of the two countries.
- 10:30 a.m. – 10:45 a.m. Break
- 10:45 a.m. – 12:30 p.m. Working Groups
Endorse selected environmental health indicators
- 12:30 p.m. – 13:30 p.m. Lunch
- 13:30 p.m. – 15:30 p.m. Working Group
Define process for data gathering (collection?), analysis and evaluation related to the environmental health indicators
- 15:30 p.m. – 15:45 p.m. Break

15:45 p.m. – 17:30 p.m. Working Group
Define actions to implement environmental health indicators

August 30

8:30 a.m. – 10:30 a.m. **Working Groups**

10:30 a.m. – 11:00 a.m. Break

11:00 a.m. – 12:30 p.m. **Conclusions and Recommendations:**
Presentation of Groups' conclusions
Future activities
Final comments and adjournment of the workshop

METODOLOGY

The workshop consisted of a series of presentations and discussion of the working groups to identify environmental health indicators and to establish priorities. Dr. Brian Smith, Regional Director of the Texas Department of Health in the United States, and Dr. Raul Terrazas Barraza, Chief of the Department of Environmental Health in the State of Tamaulipas, Mexico, presented health problems and their relationship to environmental factors in the United States–Mexico border. A copy of a Power Point presentation is included in Appendix 1.

Next, the technical staff of the PAHO Field Office presented the concepts and criteria for selection and handling of environmental health indicators and the methodology used by the PAHO/WHO for selecting indicators and gathering environmental health data.

The model developed by the World Health Organization was presented, which seeks a broader approach, including power and pressure forces, which affect the health and the environment. This plan was called “Driving Forces, Pressure, State, Exposure, Effect, Action (DPSEEA)” and is used to cover the entire range of potential forces and resulting actions, gathering professionals and personnel who work in the implementation and management of the environmental and public health areas, aimed at providing them with a better perspective of the problem.

For the process of scoring and selecting the indicators for the sister cities, the basic environmental health indicators applicable to the United States-Mexico Border area were used. These were selected at the El Paso meeting, where indicators from renowned organizations were used (PAHO/WHO, CDC, USEPA, and USDHHS).

Reviewing different categories (water, air, food, waste and multiple exposures) the participants analyzed the indicators presented in Table A (Appendix 2) of the PAHO Field Office/US-Mexico Border concept paper.

Then, all the indicators were scored by each one of the participants taking as a basis the three criteria (Appendix 3), which are:

- Catalyst for action in public health programs within the Border XXI initiative.
- Resonance with public health and environment practitioners and managers.
- Resonance with public officials and public needs and concerns.

Then, these indicators were entered in Table B (Appendix 4) and submitted to the same scoring system taking as a basis a second list of 3 criteria:

- Feasibility and manageability of collection and integration for the United States – Mexico border area.
- Easy to implement throughout time.
- Synergy and complementarity for Border XXI Program and/or other Border initiatives and National/Federal Surveillance Systems.

Then the scores corresponding to each of the indicators were calculated by the participants and those indicators that received the highest score and which corresponded to each one of the objectives for each one of the environmental health categories (air, water, etc.) were kept. The final list was 32 basic indicators.

From the selected indicators, 2 were general, 6 were water, 8 were air, 7 were waste, 3 were food and 6 were multiple exposures.

At the end, Table C (Appendix 5) was prepared for each one of the selected indicators with the definition of the environmental health indicators and specifications, data sources (Appendix 6), processes for their compilation, analysis and evaluation, in addition to the uses and definition of actions for implementing the environmental health indicators on the area.

The working groups were made up of professionals from the health and the environmental sectors from the border cities of both countries.

CONCLUSIONS AND RECOMMENDATIONS:

The workshop was attended by 38 persons from the sister cities' local public health services, from the State Departments of Public Health and Border Health Offices from both countries. The list of participants is included in Appendix 7.

The recommendations of the participants for actions to be carried out were:

- That the PAHO Field Office/us-Mexico Border prepares a preliminary report with all the indicators selected and send it to the participants for their final review.
- That a final report be prepared and distributed to all officials.
- To begin an integration of all indicators with the Geographic Information Systems and that on Geographic Information Systems (GIS) be given to all persons involved in work related to environmental health indicators.
- That the indicators should be published on a website.
- To define in each locality the best way to implement the data collection and monitoring between sister cities.

The recommendations for the definition of environmental health indicators for the border were:

- Seek indicators that will allow measuring the impact of the education actions or, that will help measure the efficiency of the communications programs. For example, measure the percentage of the population that is aware of the levels of water quality, the basic hygiene steps or that is aware of the risks of hazardous wastes).
- Include in the water definition, indicators of the concept of drinking water.
- Develop specific studies to determine the age limit among teenagers that smoke, since the age groups from 12 to 18 years old are not included in the current statistics.
- Establish between both countries the most important data and rules for reporting air quality surveillance. For example, asthma is a disease that must be reported in Mexico, but not in the United States.
- To promote among Mexican officials the installation of complete air quality monitoring stations (not only PM10) in the border cities. To date, Mexico defines population criteria in order to have a station, that is, one for each 500,000 persons, and the border cities do not meet the criteria. However, there are other important

criteria such as the number of non-paved roads, old vehicles, or the number of *maquiladoras* per person. Many of the United States cities on the border have monitoring equipment.

- Establish an adequate frequency parameter for periodic waste collection.
- Establish a concept or quantity limit (gallons) for spills of chemical substances that are important to monitor.
- Establish a parameter for the number of Poison Control Centers adequate for the border cities.
- Establish indicators that will measure the risk levels to the population and multiple exposures considering natural disasters (such as hurricanes, floods, earthquakes) in addition to man-made disasters (chemical substances spills, fires, explosions and others)

APPENDIXES:

- 1. Presentations**
- 2. Table A**
- 3. Criteria applied for scoring the list of indicators**
- 4. Table B**
- 5. Table C**
- 6. Abbreviations list**
- 7. Participants list**

APPENDIX 2

Table A. Indicators held after initial analysis and evaluation by participants in the Mc Allen TX workshop the days of August 28-30, 2002. First score and revision round.

	WATER	AIR	FOOD	WASTES	MULTIPLE EXPOSURE
1st. OBJECTIVE	Percentage of population with access to drinking water (disinfected, connection, water quality standards, access only to public source in rural/urban areas)	Environment air concentrations of contaminants controlled in each of the sister cities	Available calories per capita	Number of chemical substance spills (either in transport or at a fixed source)	Percentage of workers exposed to unsafe, unsanitary or high risk occupational conditions
EVALUATE EXPOSURE AND RISK LEVELS (INCLUDING PERCEPTIONS AND BEHAVIORS)	Percentage of population with access to sewage services (elimination of excreta)	Number of days that the corresponding air standard levels were exceeded	Percentage of fruits, vegetables, grains, dairy products and processed food with detected levels of pesticide wastes	Percentage of urban population with periodic waste collection	
	Percentage of water samples with total coliform levels that exceed acceptable limits.	Percentage of teenagers from the ages of 12 - 18 years old that smoke		Number of waste tires that cause vector-borne diseases	
		Percentages of homes that utilize coal, firewood or petroleum as fuel mainly for heating and in the kitchen			
		Number of vehicles that cross the border daily			
		% of non paved routes in the county			
2nd. OBJECTIVE					
EVALUATE BIOLOGICAL EXPOSURE AND LEVELS OF RELATED DISEASES (MORTALITY, MORBIDITY, PERCEPTION)	Mortality rate due to diarrhea in children under the age of 5 years	Morbidity rate due to acute respiratory infections in children under 5 years of age	Number of outbreaks of food-borne diseases	Percentage of injuries and intoxications related to chemical spills	incidence of occupational mortality
	Estimated number of deaths due to infectious intestinal diseases in children under 5 years of age	Morbidity rate in children and teenagers under the age of 18 years with asthma and chronic bronchitis	Morbidity rate due to diarrhea in children under the 5 years		Number of intoxication cases registered in a year in all the population
	Outbreaks of water-borne diseases		Cases of food-borne diseases in children under 5 years		Mortality rate due to intoxications
					Number of occupational accidents

Table A. Indicators held after initial analysis and evaluation by participants in the Mc Allen TX workshop the days of August 28-30, 2002. First score and revision round.

	WATER	AIR	FOOD	WASTES	MULTIPLE EXPOSURE
OBJECTIVE 3A. IDENTIFY GROUPS FOR PRIORITY INTERVENTION (VULNERABLE)	Percentage of population under the international poverty line Population access to health services Weight at birth				
OBJECTIVE 3B. IDENTIFY GROUPS FOR PRIORITY INTERVENTION (ELEVATED EXPOSURE)	Percentage of children living in areas where the public service has exceeded applicable drinking water standards or has violated treatment standards		Percentage of children whose diet contains high levels of contaminants in their food	Percentage of women in child-bearing age and children that live near hazardous wastes facilities	Risk awareness level concerning chemicals, and pesticides at home and at work Adequate storage of chemicals at home and at the work place Percentage of children exposed to tobacco in households with smokers
OBJECTIVE 4 REDUCE DISEASE EXPOSURE BY: ~Support for information on adaptation ~Protection and control steps ~Prevention and correction steps (in the industry, community, state wide) ~Promote adaptation behavior and institutional answers	Percentage of population that is aware of the quality levels of the drinking water Notices to boil water	Schools with interior air rules that approach environmental risks (smoking prohibited) Jurisdictions with laws related to interior air - smoke free air Interior air inspections (due to complaints)	Notice of contaminated food Percentage of population that is aware of the quality level in their food supplies Percentage of population reached by a public health program that promotes basic hygiene steps in the preparation of food	Percentage of people that live in areas with hazardous wastes, that are aware of the risks associated and know the preventive and protection steps Knowledge of public health personnel of the contamination levels in the soil in places identified for development projects	Number of active toxic control centers Level of knowledge of risks from chemical substances and pesticides at home Number of organizations related to the exchange of information related with health alerts and disease outbreaks

APPENDIX 3

Criteria applied to score the initial indicators list:

Catalyst for action in public health programs within the Border XXI initiative.

- 3- If the impact associated or its consequences may lead to immediate death or in the short-term;
- 2- If the impact associated is potentially harmful and/or a large population is affected;
- 1- If the impact associated can be reversed or benign (small? Little?).

Resonance with public health and environment practitioners and managers.

- 3- If the disease rate is high and the attributed risk level is high;
- 2- If it is moderate;
- 1- If it is low.

Resonance with public officials and public needs and concerns.

- 3- If in the public's mentality is estimated of greater importance;
- 2- If it is somewhat important;
- 1- If probably it is not deemed important.

Criteria applied to score basic indicators held on Table 1 (after first round review):

Feasibility and manageability of collection and integration for the United States – Mexico border area.

- 3- If these are already collected;
- 2- If there is need for an important improvement for their collection or the need of a special survey;
- 1- If there is also need for laboratory data and/or a specific epidemiological investigation.

Easy to implement throughout time.

- 3- Probability to implement in the short term;
- 2- Probability to implement in the medium term (2-3 years);
- 1- Needs long-term implementation (more than 3 years).

Synergy and complementarity for Border XXI Program and/or other Border initiatives and National/Federal Surveillance Systems.

- 3- if it strongly helps the achievement of three objectives or more;
- 2- if it helps achieve one or two objectives;
- 1- other.

ANNEX 4

Table B. Basic environmental health indicators for the United States - Mexico Border. Second score and revision round.
Mc Allen, TX Workshop, August 28-30, 2002

	WATER	AIR	FOOD	WASTES	MULTIPLE EXPOSURE
1st. OBJECTIVE EVALUATE EXPOSURE AND RISK LEVELS (INCLUDING PERCEPTIONS AND BEHAVIORS)	Percentage of population with access to drinking water. Percentage of population with access to sanitary services (sewage and excreta elimination) Percentage of water samples with total coliform levels that exceed acceptable limits.	Percentage of teenagers from the ages of 12 - 18 years old that smoke Number of days that the corresponding air standard levels were exceeded		Number of chemical substance spills (either during transport or in permanent plants) Percentage of urban population with periodic garbage collection Number of accumulated waste tires	
2nd. OBJECTIVE EVALUATE BIOLOGICAL EXPOSURE AND LEVELS OF RELATED DISEASES (MORTALITY, MORBIDITY, PERCEPTIONS)	Mortality rate due to diarrhea in children under the age of 5 years Outbreaks of water-borne diseases	Morbidity rate due to acute respiratory infections in children under the age of 5 years Morbidity rate in persons under the age of 18 years with asthma and chronic bronchitis Morbidity rate due to acute respiratory infections in children under the age of 5 years	Number of food-borne disease outbreaks Food-borne disease cases in children under the 5 years of age	Percentage of injuries and intoxications related to chemical spills	Intoxication cases registered in a year in all the population (rural and urban) Mortality rate due to intoxications Number of work accidents

Table B. Basic environmental health indicators for the United States - Mexico Border. Second score and revision round.
Mc Allen, TX workshop, August 28 - 30, 2002

	WATER	AIR	FOOD	WASTES	MULTIPLE EXPOSURE
OBJECTIVE 3A. IDENTIFY GROUPS FOR PRIORITY INTERVENTION (VULNERABLE)	Population access to health services - general indicator % of population living under the international line of poverty - general indicator				
OBJECTIVE 3B. IDENTIFY GROUPS FOR PRIORITY INTERVENTION (HIGH EXPOSURE)		Percentage of children exposed to tobacco in a house with a smoker		Percentage of women in child-bearing age and children that live in areas near hazardous wastes	
OBJECTIVE 4 REDUCE DISEASE EXPOSURE BY: -Support for information on adaptation -Protection and control steps -Prevention and correction steps (in the industry, community, state wide) -Promote adaptation behavior and institutional answers	Percentage of population that is aware of the quality levels of the drinking water for human consumption	Number of inspections related to complaints about air quality in an interior environment Number of jurisdictions with laws related to interior air - smoke free air	Percentage of population that is aware of the basic hygiene steps in food preparation	Percentage of people that live in areas with hazardous wastes risk, knowing the risks associated and the preventive and protection steps awareness of public health personnel of the contamination levels in the soil in places identified for development projects	Number of active poison control centers population awareness of risk to household chemicals and pesticides Number of organizations related to the exchange of information in relation with health alerts and disease outbreaks

APPENDIX 5

Appendix 5 – United States – Mexico Border
Environmental Health Basic Indicators
Mc Allen, Texas, August 28 – 30, 2002

Chart C – Definition of the indicators – General

Indicator: Population rate with access to health services.	
Definition of indicators	Percentage of the population with access to health services, in a given region.
Specifications	Number of people admitted in health services / Total population in a specific region
Measurement Unit	Percentage
Data sources (availability and quality)	Public and private medical institutions MX: Secretary of Health, IMSS, ISSSTE, DIF USA: Local, state and federal health departments
Frequency	Annually
Other sources of information	MX: INEGI USA: UNESCO, PAHO/WHO
Use of information and actions to be taken	Identify groups for priority intervention. Extend service coverage. Population's health Diagnostics. Extend coverage. Implement regional programs. Define actions.
Indicator: Population Rate Under the international Poverty Level.	
Definition of indicators	Percentage of population living under the international poverty level for a specific country, territory or geographic area, for a specific period of time. The World Bank defines the poverty level.
Specifications	Population under the international poverty level / Total population in the region under study.
Measurement Unit	Percentage
Data sources (availability and quality)	World Bank Institutions of Higher Education and Research Institutions USA: Department of Commerce MX: SEDESOL FEDERAL, SECOFI, INEGI
Frequency	Annually
Other sources of information	MX: Secretary of Social Development USA: HUD – Development Department International Banks International Monetary Fund
Use of information and actions to be taken	Identify groups for priority intervention. Diagnosis between poverty and health levels. Diagnosis of the health sector. Implementation of actions to reduce morbidity and mortality in poverty areas.

Chart C – Definition of indicators – Water

Indicator: Proportion of population with Access to Drinking Water Services.

Definition of indicators	Population size (rural and urban) with access to drinking water (home connection to drinking water systems and/or reasonable access thru public sources of drinking water.) Drinking water (disinfected, according to standards)
Specifications	Number of people with access to drinking water/ Total population (rural and urban) in a geographic area
Measurement Unit	Percentages
Data sources (availability and quality)	Water Departments, local and municipal services MX: COMAPA, INEGI US: EPA
Frequency	Quarterly
Other sources of information	National and state wide surveys TCEQ Border Health Offices
Use of information and actions to be taken	Availability and demand of water. Evaluate exposure and risk levels. Inventory of existing water sources according to their type. Extend chlorination, access to piped water and treated water. Plan actions for education and monitoring of water quality. Equipment availability. Comparison with other indicators: diarrheic diseases, number of outbreaks, poverty, etc. Plan new resources needed for the medium and long term. Evaluate the effectiveness of urban development policies.

Indicator: Proportion of population (rural and urban) with access to Sanitation Services (sewage and waste disposal).

Definition of indicators	Population size with direct access to sanitary services in different social economic and population levels (urban, rural and sub rural).
Specifications	Number of people with access to a sewage and waste disposal system / Total population (rural and urban) in a geographic area.
Measurement Unit	Percentages
Data sources (availability and quality)	MX: COMAPA; INEGI USA: Waste Water; Utility Department, Census
Frequency	Quarterly
Other sources of information	National and state wide surveys Border Health Offices MX: National Bank of Public Works and Services USA: TCEQ, BID
Use of information and actions to be taken	Evaluate exposure and risk levels. Identify groups exposed to risks. Illness prevention. Education. Comparison with other indicators: diarrheic diseases, poverty, etc. Plan new resources needed at the medium and long term. Evaluate the effectiveness of policies on urban development.

Chart C – Definition of indicators – Water

Indicator: Percentage of water samples with coliforms (bacteriological parameters exceeding standards).

Definition of indicators	Number of samples collected and tested with bacterial parameters (Total coliforms and fecal) exceeding standards.
Specifications	Number of samples exceeding standards/ Total number of samples collected and tested
Unit of measurement	Percentages
Data sources (availability and quality)	MX: COMAPA, Public Health Services USA: Utility Department, Waste and Water Department
Frequency	Monthly
Other sources of information	USA: EPA, TCEQ, TDH MX: Secretary of Health, DGSA
Use of information and actions to be taken	Uses for epidemiological reports such as MMD or TDH and SSA. Evaluate exposure and risk levels. Disease prevention. Plan education and monitoring actions for the water quality. Report and eliminate causes. Prevention of outbreaks.

Indicator: Child Mortality Rate in children under 5 years of age due to chronic diarrheic diseases.

Definition of indicators	Child mortality under the age of 5, whose basic cause of death was an intestinal infectious disease (CIE-9, 001-009; CIE-10, A01-A09), in a given year, in a specific country, territory or geographic area.
Specifications	Number of deaths of children under the age of 5 due to diarrhea in a given period of time/ total number of children under the age of 5.
Measurement Unit	Rate: 1,000 children under the age of 5.
Data sources (availability and quality)	Civil Registry
Frequency	Annually
Other sources of information	USA: TDH, CDC MX: Secretary of Health, DGE
Use of information and actions to be taken	Evaluate biological exposures and related disease levels. Training mothers. Prevention and control of how to handle diarrhea at home. Alarm signal to avoid complications and death. Extend education campaigns. Compare with other indicators: access to drinking water services, water quality, poverty, etc.

Chart C – Definition of indicators – Water

Indicator: Outbreaks of Waterborne Diseases.	
Definition of indicators	Annual number of waterborne outbreaks.
Specifications	Number of outbreaks of waterborne diseases taking place in a given year in a specific region.
Measurement Unit	Absolute magnitude- number of outbreaks
Data sources (availability and quality)	MX: Secretariat of Health in Mexico, General Division of Epidemiology (DGE in Spanish), local public health services, USA: Epidemiology Departments – Local health services Texas Department of Health (TDH)
Frequency	Annually or monthly
Other sources of information	Epidemiological bulletin from the Offices of the countries USA: CDC PAHO/WHO
Use of information and actions to be taken	Preventive and educational steps. Locate and eliminate contamination source. Correlation with poverty indicators and access to drinking water. Evaluate biological exposures and related disease levels.

Indicator: Percentage of population aware of quality levels in drinking water for human use.	
Definition of indicators	Population size that is aware of quality levels in the water according to the official standards of each country.
Specifications	Number of people who are aware of quality levels in water according to the official standards of each country / Total of the population in a given year in a specific geographic area.
Measurement Unit	Percentages
Data sources (availability and quality)	USA: Local departments of Water and Waste MX: COMAPA
Frequency	Annually
Other sources of information	Specific surveys.
Use of information and actions to be taken	That the population be aware of the quantity and quality of the water that it uses. To be aware of the level of perception and knowledge of the population, and establish a strategy to modify it. Reduce exposure and diseases.

Chart C – Definition of indicators – Air

Indicator: Percentage of teenagers between the ages of 12 to 18 years old that smoke.

Definition of indicators	Percentage of teenagers between 12 and 18 years old that smoke in the same age group population.
Specifications	Number of teenagers between 12 and 18 years old who smoke / total of teenagers between 12 and 18 years old in a specific geographic area.
Measurement Unit	Percentages
Data sources (availability and quality)	Specific surveys such as national drug use and abuse survey, and the border cigarette smoking survey.
Frequency	Cohort study on a specific period of time.
Other sources of information	USA: CDC, National and state wide surveys, National Health and Nutrition Evaluation Survey – NHANES Behavioral Risk Factor Survey
Use of information and actions to be taken	Preventive education and promotion activities. Regulatory actions. Programs for helping people to stop smoking. Evaluate exposure and risk levels (perception and behavior)

Indicator: Morbidity rate due to asthma and bronchitis in the age group.

Definition of indicators	Number of cases of people under the age of 18 years with asthma in the same age group population.
Specifications	Number of teenagers under the age of 18 years with asthma / total number of people under the age of 18 years in a geographic area.
Unit of measurement	Rate: per 100,000 population
Data sources (availability and quality)	USA: CDC, MX: Secretary of Health, ALA Vital statistics, specific surveys.
Frequency	To be determinate by specific studies
Other sources of information	Specific studies Cohort Studies Hospital admissions
Use of information and actions to be taken	Estimate probabilities. Evaluate biological exposure and disease levels. Plan education actions. Promote surveillance actions and improvement of air quality. Develop actions to reduce the number of people admitted to a hospital due to asthma and bronchitis. Identify possible environmental risks.

Chart C – Definition of indicators – Air

Indicator: Morbidity rate due to chronic respiratory infections in children under five years old.	
Definition of indicators	Number of children under five years of age with diseases due to chronic respiratory infections / total number of children under five years of age in a given time.
Specifications	Number of cases of children under five years of age who have an illness due to chronic respiratory infections/ total number of children under the age of 5 years old during a specific period of time.
Measurement Unit	Morbidity rate per 10,000 children under the age of 5 years old.
Data sources (availability and quality)	USA: TDH, Local Public Health Services MX: Secretary of Health, DGE
Frequency	Weekly, Annually
Other sources of information	Epidemiological bulletin of the Offices of the countries USA; CDC PAHO/WHO
Use of information and actions to be taken	Air Quality Improvement Programs. Preventive programs and educational steps. Compare with the air quality monitoring data. Evaluate biological exposure and related diseases levels.

Indicator: Mortality rates due to chronic respiratory infections in children under five years old.	
Definition of indicators	Ratio between the number of children under the age of 5 years who die due to chronic respiratory infections to the total number of children under five years.
Specifications	Number of deaths due to chronic respiratory infections in children under the five years of age / total number of children under five years of age for a specific period of time.
Measurement Unit	Mortality rate per 100,000 population.
Data sources (availability and quality)	Civil Registry MX: death certificates
Frequency	Monthly and Annually
Other sources of information	USA: TDH, CDC MX: Secretary of Health, DGE
Use of information and actions to be taken	Air quality improvement program in critical places. Evaluate biological exposure and related disease levels. Preventive steps, widespread coverage. Training for mothers of children under five years of age on alarm signs. Surveillance actions.

Chart C – Definition of indicators – Air

Indicator: Percentage of children exposed to tobacco in houses with smokers.	
Definition of indicators	Percentage of children under the age of 18 years old exposed to tobacco in a house with a smoker(s) in relation to the total number of children under the age of 18 years.
Specifications	Number of children under the age of 18 years old in a house with a smoker (s) (active smokers) / total number of children under the age of 18 years old in a specific region.
Measurement Unit	Percentages
Data sources (availability and quality)	MX: INEGI USA: United States Census Specific surveys
Frequency	Annually
Other sources of information	SISVEA Cancer Society
Use of information and actions to be taken	Develop education and communication actions. Health Promotion (specially on under age children). Identify groups for priority intervention.
Indicator: Number of days that the air quality standards are exceeded.	
Definition of indicators/ Specifications	Number of days in a year in which the air quality's monitoring station report concentrations of environmental pollution above the national standards of the air quality for USA and Mexico.
Measurement Unit	Quantity: number of days per year.
Data sources (availability and quality)	USA: Air's quality reports from EPA, AIRS (Aerometric Information Retrieval System) MX: The annual air quality report from SEMARNAT
Frequency	Daily, in annual reports and/or every four months.
Other sources of information	USA: TCEQ EPA
Use of information and actions to be taken	Emergency care. Evaluate exposure and risk levels (perception and behavior). Control strategies for exposure and risks. Communication, education, and vehicle inspection programs. Compare with other epidemiological indicators, such as morbidity indicators due to asthma and bronchitis.

Chart C – Definition of indicators – Air

Indicator: Number of jurisdictions with laws related to smoke free on an inside environment.	
Definition of indicators	Number of jurisdictions with laws related to the smoke-free of tobacco on an interior environment.
Specifications	Number of jurisdictions in the state with laws related to the smoke-free in an inside environment.
Measurement Unit	Absolute number
Data sources (availability and quality)	USA: CDC, NIOSH, TCEQ State and local health departments
Frequency	Annually
Other sources of information	Census information.
Use of information and actions to be taken	Promote surveillance actions and the improvement of air quality. Evaluate the effectiveness of air quality and no-smoking policies. Reduce exposure to diseases.

Indicator: Number of inspections related to inside air quality.	
Definition of indicators	Number of inspections related to complaints about air quality in the inside environment.
Specifications	Number of inspections related to air quality in the inside environment in a given year.
Measurement Unit	Absolute number.
Data sources (availability and quality)	USA: CDC (NIOSH) OSHA MX: SEMARNAT
Frequency	Annually
Other sources of information	USA: EPA; TCEQ
Use of information and actions to be taken	Air quality improvement program. Preventive programs. Plan actions to educate and monitor air quality.

Chart C – Definition of indicators – Food

Indicator: Number of food-borne disease outbreaks.

Definition of indicators	Annual number of food-borne disease outbreaks in a specific location
Specifications	Number of food-borne disease outbreaks registered by cause in a given year on a specific region.
Measurement Unit	Absolute magnitude- s number of outbreak
Data sources (availability and quality)	MX: Secretariats of Health of Mexico; General Division of Epidemiology (DGE) USA: Epidemiology Department – local health services TDH
Frequency	Monthly
Other sources of information	Epidemiological bulletin from the Offices of the countries USA: CDC PAHO/WHO
Use of information and actions to be taken	Preventive and educational steps. Evaluate biological exposure and related disease levels. Locate and eliminate contamination source. Correlation with poverty and access to drinking water and sanitary indicators.

Indicator: Percentage of population that is aware of the basic hygienic food handling steps for food preparation.

Definition of indicators	Percentage of the population that has received orientation in relation to the basic hygiene steps for food preparation.
Specifications	Number of people that attend food handling seminars / total number of the population of a specific region.
Measurement Unit	Percentages
Data sources (availability and quality)	Department of Health in Mexico Municipal Sanitary Standards SUIVE
Frequency	Monthly or Annually
Other sources of information	Specific surveys
Use of information and actions to be taken	Prevention and educational steps related to food handling. That the population is aware of the hygiene steps and food conservation. To learn the level perception and population awareness, and establish a strategy to modify it.

Chart C – Definition of indicators – Food

Indicator: Cases of food-borne diseases in children under 5 years of age (hospital admissions due to diarrhea)	
Definition of indicators	Number of cases of diarrhea in the population under five years of age admitted to the hospital on a given year.
Specifications	Number of cases of diarrhea in the population under five years old admitted to the during a specific year on a specific region.
Measurement Unit	Absolute magnitude
Data sources (availability and quality)	MX: Health Department in Mexico SUIVE and SISPA USA: Local Health Department Statistics of local health services
Frequency	Weekly
Other sources of information	Epidemiological bulletin
Use of information and actions to be taken	Preventive and educational steps. Administration of oral electrolytes Direct action over the source and origin of contamination. Correlation with water quality indicators, sewage and poverty.

Chart C – Definition of indicators – Solid and hazardous wastes

Indicator: Percentage of urban population with periodic garbage collection (solid wastes).	
Definition of indicators	Size of urban population with access to permanent garbage (solid wastes) periodic collection systems (at least once a week) in a year.
Specifications	% of urban population with permanent periodic collection (at least once a week) of solid wastes / total population of the region.
Measurement Unit	Percentage
Data sources (availability and quality)	Mexico: Secretariat of Social Development and Ecology Town's council Social workers INEGI USA: TCEQ EPA Municipal and state entities
Frequency	Biannually and annually
Other sources of information	Institutions of Higher Education – Mexico, USA Research Institutions– Mexico, USA Environmental board meetings – USA SEMARNAP – Mexico
Use of information and actions to be taken	Evaluate exposure and risk levels. Measure the impact of wastes collection action on public health. Justification of funds for environmental and health projects. Prepare projects proposal for the entire management of garbage (solid wastes).

Indicator: Number of waste tires.	
Definition of indicators	Number of accumulated tires that are a breeding place for mosquitoes (as a risk factor in the population) in a specific region.
Specifications	Number of waste or risk tires accumulated in a given year in a specific region.
Unit of measurement	Tires accumulated in a specific region.
Data sources (availability and quality)	Mexico: Secretary of Development and Ecology Town's council Social workers INEGI USA: TCEQ EPA Municipal and state entities
Frequency	Annually
Other sources of information	Research studies – Mexico, USA Environmental board meetings – USA SEMARNAP – Mexico
Use of information and actions to be taken	Evaluate exposure and risk levels. Submit legislation proposals. To promote basic sanitation Reuse and alternative source of energy. Prepare projects proposal for alternative use.

Chart C – Definition of indicators – Solid and hazardous wastes

Indicator: Incidences of chemical spills during transportation.	
Definition of indicators	Percentage of transportation of chemical substances with spills accidents in relation to the total transportation handling chemical substances.
Specifications	Number of chemical spills / total number of transportations
Measurement Unit	Percentages
Data sources (availability and quality)	Civil Protection Counties Town Councils USA: EPA Mexico: INEGI PROFEPA
Frequency	Annually
Other sources of information	USA: DOT MX: SCT – Secretary of Communication and Transportation
Use of information and actions to be taken	Evaluate exposure and risk levels. Prevent health risk. Contingency programs. Action and equipment definition.

Indicator: Percentage of chemical substance spills in permanent plants.	
Definition of indicators	Percentage of plants with spills accidents in relation to the total number of plants that handle chemical substances.
Specifications	Incidences of chemical substance spills / total number of plants that handle chemical substances.
Measurement Unit	Percentages
Data sources (availability and quality)	Civil Protection Counties Town Councils USA: EPA Mexico: INEGI PROFEPA
Frequency	Annually
Other sources of information	Hospitals DOT - USA SCT - MX
Use of information and actions to be taken	Evaluate exposure and risk levels. Prevent health risk. Contingency programs. Sewage plans. Action and equipment definition.

Chart C – Definition of indicators – Solid and hazardous wastes

Indicator: Percentage of injuries and intoxications related to chemical spills.	
Definition of indicators	Percentage of persons injured and intoxicated due to chemical spills in relation to those injured and intoxicated that are admitted to hospitals due to all causes.
Specifications	Number of persons injured and intoxicated by chemical spills / number of persons injured and intoxicated by cause.
Measurement Unit	Percentages
Data sources (availability and quality)	Mexico: Civil Protection; Counties; PROFEPA; Secretary of Health; SEDENA USA: Local Emergency Planning Committee; EPA
Frequency	Annually
Other sources of information	Public and private hospitals DOT – USA Town councils Counties Secretary of Communication and Transportation
Use of information and actions to be taken	Evaluate biological exposure and disease levels. Diagnostic. Prevention to health risks. Contingency programs. Preventive actions. Application of the legislation and regulation.

Indicator: Percentage of women of child-bearing age and children who live near establishments, which handle hazardous wastes (potentially exposed in relation to a public health evaluation).

Definition of indicators	Percentage of women of child-bearing age and children (vulnerable population) who live near establishments that handle hazardous wastes <i>and that are potentially exposed according to the public health evaluation.</i>
Specifications	Population of women of child-bearing age and children at risk / Total population of the region under study.
Measurement Unit	Percentages
Data sources (availability and quality)	MX: SEDUE, Civil Protection, SEMANAT, SECOPI, INEGI, PROFEPA. USA: TCEQ, Health Departments, EPA, Human Services Departments.
Frequency	Annually
Other sources of information	PAHO UN Town Councils Counties Non Governmental Organizations
Use of information and actions to be taken	Identify priority groups for interventions. Preventive, education and communication steps. Impact evaluation. Epidemiological assessment.

Chart C – Definition of indicators - Solid and hazardous wastes

Indicator: Percentage of people that live in risk areas which handle hazardous materials and wastes, knowing the risks associated and the preventive and protection steps.

Definition of indicators	Percentage of people (potentially exposed) who live in areas or nearby areas that have hazardous materials and wastes and that are aware of the risk and know what to do in case of an accident in a specific region.
Specifications	People in risk areas that know what to do in case of an accident / Risk area population
Measurement Unit	Percentages
Data sources (availability and quality)	MX: SEDUE, Civil Protection, SEMANAT, SECOPI, INEGI, PROFEPA USA: TCEQ, Health Department, EPA, Department of Human Services.
Frequency	Annually
Other sources of information	PAHO UN Town Council Counties Non Governmental Organizations
Use of information and actions to be taken	Identify risk factors. Reduce exposures. Evaluate morbidity and mortality. Develop preventive and protection measures. Develop education and communication actions.

Indicator: Awareness of public health personnel of contamination levels of the soil in places identified for development projects.

Definition of indicators	Percentage of the health personnel who is aware of pollutant dangers that may be found on the soil, mostly in project development areas.
Specifications	Number of health personnel aware of levels of hazardous substances that may be found on the soil / total number of personnel in the health area.
Measurement Unit	Percentages
Data sources (availability and quality)	MX: Secretary of Health, SEMARNAT, SEDUE, PROFEPA, USA: TCEQ, Health Department, EPA, Research Institutions (USA and MX)
Frequency	Annually
Other sources of information	Hospitals Town councils Counties
Use of information and actions to be taken	Diagnostic on the knowledge level on the subject among health personnel. Projects analysis and their relation with health. Actions: personnel training, supervision and control. Promote adaptation behavior and institutional answers.

Chart C – Definition of indicators – Multiple exposure

Indicator: Number of work accidents.	
Definition of indicators	Number of work accidents in a year relative to the economically active population during the same period.
Specifications	Number of work accidents annually / Economically active population.
Measurement Unit	Rate per 10,000 population
Data sources (availability and quality)	MX: INEGI, Secretary of Health, Secretariat of Labor and Social Promotion; IMSS USA: OSHA, Texas Department of Labor
Frequency	Annually
Other sources of information	Census data National and state wide surveys
Use of information and actions to be taken	To carry out training related to safety and hygiene. To prevent future events. Preventive programs and educational steps.

Indicator: Organizations related to the exchange of information related to health alerts and disease outbreak awareness.	
Definition of indicators	Number of organizations related to the exchange of information related to health and disease outbreak awareness.
Specifications	Public and private organizations for the exchange of information on health and environment that exist in the border community.
Measurement Unit	Number of active agencies
Data sources (availability and quality)	Medical network communication, PAHO; USMBHA
Frequency	Annually
Other sources of information	Census data National surveys
Use of information and actions to be taken	To build alliances. Information and communication dissemination. Program development between different institutions. Information support.

Chart C – Definition of indicators – Multiple exposures

Indicator: Population awareness of risks due to household chemicals and pesticides.	
Definition of indicators	Percentage of the community awareness of risks from household chemicals and pesticides that may be harmful to health.
Specifications	Number of people aware of risks from household chemical products and pesticides / total number of people surveyed.
Measurement unit	Percentages
Data sources (availability and quality)	Surveys applied to the population in general Surveys applied at the work place
Frequency	Every two to three years
Other sources of information	Poison control centers
Use of information and actions to be taken	Prevention and control measures of household chemical products and pesticides. Public information and health promotion in relation to the use and storage of chemical substances and pesticides.

Indicator: Mortality rate due to intoxications	
Definition of indicators	Number of deaths per 100,000 population by intoxication (heavy metals, drugs, chemical substances).
Specifications	Mortality rate: number of deaths by intoxication (excess of harmful substances to the body) in a given year/ total population.
Measurement Unit	Rate: per 100,000 population
Data sources (availability and quality)	MX: Secretary of Health – Epidemiology Office USA: Texas Disease Statistics Unit ; ATSDR
Frequency	The indicator is annually, however if it would present itself in many cases the report ought to be daily or immediate.
Other sources of information	Poison control centers Hospitals Private practice doctors MX: IMSS. ISSSTE
Use of information and actions to be taken	Preventive steps in relation to how to handle specific substances harmful to the body. Safety and hygiene programs for the information system of a Risk Information Center. Contingency plan on how to handle specific substances. Evaluate exposures and related disease levels.

Chart C – Definition of indicators – Multiple exposures

Indicator: Intoxication cases occurring in a year in the entire urban and rural population.	
Definition of indicators	Intoxication cases registered in a year in a specific location.
Specifications	Annual number of cases of people intoxicated occurring in a specific region.
Measurement Unit	Absolute number
Data sources (availability and quality)	MX: Secretary of Health ISSSTE IMSS Hospitals USA: TDH
Frequency	Texas reports monthly IMSS, ISSSTE, hospitals – every week
Other sources of information	Toxicology centers
Use of information and actions to be taken	Follow up and use the information to prevent and control the existing cases in the population (alert the population). Risk prevention. Develop educational actions.

Indicator: Number of working intoxication control centers.	
Definition of indicators	Number of centers that offer information, counseling and consultation services on the diagnosis and treatment of intoxications in a specific region.
Specifications	Poison Control Centers: where information is available up to 24 hours a day, 365 days a year through a phone number with access for all the population, doctors and hospitals.
Measurement Unit	Number of centers in the twin cities area.
Data sources (availability and quality)	MX: Secretaries of Health in Mexico USA: TDH ATSDR
Frequency	Annually
Other sources of information	ATSDR PAHO/WHO
Use of information and actions to be taken	Service improvement for intoxications. Give information and educate the community in relation with toxic control.

APPENDIX 6 – LIST OF ABBREVIATIONS

MEXICO:

USMBHA – United States-Mexico Border Health Association - <http://www.usmbha.org/>;

BID – Inter American Development Bank - <http://www.iadb.org/>;
http://www.iadb.org/exr/ESPAÑOL/index_espanol.htm;

COMAPA: Comisión Municipal de Agua Potable y Alcantarillado/

IBWC: International Boundary and Water Commission

DGSA/SSA – División General de Salud Ambiental- Secretaría de Salud de Mexico
<http://www.salud.gob.mx/unidades/digsa/index.htm>;

DGE/SSA –Dirección General de Epidemiología – Secretaria de Salud de México
<http://www.epi.org.mx/>;

DIF–Sistema Nacional para el Desarrollo Integral de la Familia - <http://www.dif.gob.mx/>;

PROFEPA- Procuraduría Federal de Protección del Medio Ambiente –
<http://www.profepa.gob.mx>

INEGI: Instituto Nacional de Estadística, Geografía e Informática – <http://www.inegi.gob.mx>

IMSS –Instituto Mexicano del Seguro Social - <http://www.imss.gob.mx>

ISSSTE – Instituto de Seguridad y Servicios Sociales de los trabajadores del Estado –
[http://www.issste.gob.mx](http://www.issste.gob.mx;);

PAHO – Pan American Health Organization - <http://www.paho.org/>

Field Office/US -Mexico Border PAHO - <http://www.fep.paho.org/>;

SEMARNAT –Secretaría de Medio Ambiente y Recursos Naturales <http://www.semarnat.gob.mx/>

SEDENA – Secretaria de Defensa Nacional - <http://www.sedena.gob.mx/>;

SEDUE -Secretaría de Desarrollo Urbano y Ecología - <http://www.tamaulipas.gob.mx/SEDUE>;

SEDESOL FEDERAL -Secretaria de Desarrollo Social – <http://www.sedesol.gob.mx/>;

SECOFI – Secretaria de Comercio y Fomento Industrial –
<http://www.economia-ssci.gob.mx/np/006-EM-SCFI.htm>;

SUIVE -Sistema Único de Información y Vigilancia Epidemiológica -
<http://www.salud.gob.mx/index.htm>;

SISPA -Sistema de Información Básica en Salud para población abierta -
<http://www.salud.gob.mx/index.htm>;

SINAIS: Sistema Nacional de Información en Salud - <http://www.salud.gob.mx/index.htm>;

SISVEA -Sistema de Vigilancia Epidemiológica de las Adicciones -
<http://www.salud.gob.mx/index.htm>;

SINAVE: Sistema Nacional de Vigilancia Epidemiológica - <http://www.salud.gob.mx/index.html>;

UNITED STATES:

ALA: American Lung Association - <http://www.lungusa.org/>;

CDC: Center for Diseases Control and Prevention – <http://www.cdc.gov>

ATSDR: Agency for Toxic Substance and Diseases Registry – <http://www.atsdr.cdc.gov>

EEHS: Emergency and Environmental Health Services -

<http://www.cdc.gov/nceh/globalhealth/GHAR/divisions/eehs.htm>;

EHHE: Emergency Hazards and Health Effects -

<http://www.cdc.gov/nceh/globalhealth/GHAR/divisions/ehhe.htm>;

EHSB: Environmental Health Services Branch - <http://www.cdc.gov/nceh/ehs/default.htm>;

EHLs: Environmental Health Laboratory Sciences -

<http://www.cdc.gov/nceh/dls/programs.htm>;

APRHB: Air Pollution and Respiratory Health Branch -

<http://www.cdc.gov/nceh/airpollution/>;

HSB: Health Studies Branch - <http://www.cdc.gov/nceh/hsb/>;

LPPB: Lead Poisoning Prevention Branch - <http://www.cdc.gov/nceh/lead/lead.htm>;

NCHS: National Center for Health Statistics - <http://www.cdc.gov/nchs/>;

NCEH: National Center for Environmental Health -

<http://www.cdc.gov/nceh/indicators/acronyms.htm>;

NIOSH – National Institute for Occupational Safety and Health -

<http://www.cdc.gov/niosh/homepage.htm>;

NHANES: National Health and Nutrition Examination Survey -

<http://www.cdc.gov/nchs/nhanes.htm>;

NCBDDD: National Center on Birth Defects and Developmental Disability -

<http://www.cdc.gov/ncbddd/>;

CB: Census Bureau <http://www.census.gov/>

DOT, FHA: Department of Transportation, Federal Highway Administration -

<http://www.fwha.dot.gov/pubstats.html>

EPA: Environmental Protection Agency – <http://www.epa.gov>

AIRS: Aerometric Information Retrieval System – <http://www.epa.gov/ttn/airs/>

AIR NOW: <http://www.epa.gov/airnow/>

Information clearinghouse: <http://www.epa.gov/iaq/iqqinfo.html>

OAR: Office of Air and Radiation – <http://www.epa.gov/oar/>

OAQPS: Office of Air Quality and Performance Standards -

OPP: Office of Pesticides Programs – <http://www.epa.gov/pesticides/>

ORIA: Office of Radiation and Indoor Air - <http://www.epa.gov/oar/oria.htm>;

UATP: Urban Air Toxics Program - <http://www.epa.gov/ttn/atw/urban/urbanpg.htm>;

IRIS: Integrated Risk Information System- <http://www.epa.gov/iriswebp/iris/index.html>;

FDA: Food and Drug Administration - <http://www.fda.gov/>

HUD – Housing and Urban Development – <http://www.hud.gov/library/index.cfm>

PAHO – Pan American Health Organization

PAHO – FEP: Pan American Health Organization / Field Office in El Paso, Texas - <http://www.fep.paho.org/>;

NIEHS: National Institute of Environmental Health Sciences - <http://www.niehs.nih.gov/>;

OSHA: Occupational Safety and Health Administration – <http://www.osha.gov/oshstats/index.html>

USDA: United States Department of Agriculture

PDP: Pesticide Data Program – <http://www.ams.usda.gov/science/pdp/index.htm>

TNRCC Texas Natural Resource Conservation Commission

TCEQ: Texas Commission on Environmental Quality – <http://www.tceq.us>

TDH: Texas Department of Health – <http://www.tdh.us>

APPENDIX 7 -

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