U.S.-Mexican Border Air Data Search (BADS)

Dear Reader,

This document and the data contained within are the property of EPA, prepared by SCERP under contract number 05D000903. The assignment was intended to be a "quick turnaround" snapshot of data availability related to air quality and respiratory diseases along the US-Mexico border. The documents have been reviewed and accepted by EPA; however, because this was intended to be a very preliminary assessment of available data, EPA has accepted the reports and data therein on face value. This project arose from binational discussion by the Border 2012 Environmental Health Workgroup during the 2005 National Coordinators Meeting and will provide important background information for the Air Environmental Public Health Indicators team that has been set up. More information about this task may be found at www.epa.gov/ehwg.

U.S.-Mexican Border Air Data Search (BADS)

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For
Border 2012 Environmental Health Working Group (EHWG)
National Health and Environmental Effects Research Laboratory

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ABSTRACT

The Southwest Consortium for Environmental Research and Policy (SCERP) was asked, due to its long familiarity with border environmental issues and recent work in transboundary air pollution, to search and identify sources of data about air quality and human health at risk from air-borne pollutants. A preliminary electronic, email, and telephone search/survey was conducted and matrices of available air and health data were constructed and compared. **Thus the first centralized, regional, and "living" air and air-associated health database was created**. Recent and relatively comprehensive air quality data were found at the expected locations, some air health data were revealed, but little more. Data across most jurisdiction boundaries had comparability issues. Researchers ultimately offer recommendations relative to next steps.

INTRODUCTION

Air quality management (AQM) requires sufficient data to understand the sources, pollutants, their chemistry, trajectories, human exposures, and health effects. Over the last couple decades, an extensive monitoring system of both emissions and ambient air for certain criteria pollutants and air-associated epidemiology has developed sufficient data to make the first attempts at ensuring pubic health.

AQM at the border with Mexico has been frustrated until more recently by a lack of monitoring and therefore data and by a lack of effective binational regulatory and enforcement infrastructure. Additionally the transboundary nature of air pollution has confounded action on both sides.

Since 1990 SCERP has worked with the EPA, SEMARNAT, HHS, Salud, Border XXI and Border 2012 teams on:

- understanding air quality issues,
- informing and bettering air health,
- developing environmental and health indicators,
- recommending development of effective AQM policy.

After SCERP's 2005 annual policy conference (Border Institute VII) was dedicated to the issue of Transboundary Air Pollution and Binational AQM, the Border 2012 Environmental Health Working Group (EHWG) asked SCERP to conduct an "initial scoping exercise" or preliminary survey of basic air quality and air health data extant and available in the border region:

> "[SCERP] will be provided with an initial set of contacts and references to facilitate the identification of available data and databases. Using the monitoring and health indicators provided above, the contractor will begin to solicit access to and information about various databases. Specifically, the contractor shall gather the quality assurance parameters provided in the attached excel spreadsheet, and assess the databases for deficits."

Compatibility and comparability of data is believed to be a major challenge not only across the international but all other jurisdictional barriers. The border air data search (BADS) was pre-determined by EHWG and focused on criteria pollutants (NOx, SOx, O3, CO, PM10, PM2.5, and Pb) and a handful of health parameters (childhood asthma, childhood and mortality from acute respiratory infection including lower, upper and general respiratory [ARI], and chronic obstructive pulmonary disease [COPD] mortality. Toxics, birth defects, and cancer were added by the researchers as those data were often associated.

METHODOLOGY

The border air data search effort was aimed at capturing the breadth and availability of databases containing health information related to diseases caused or contributed to by air pollution. The objectives were to:

- Assess the current state of the NAAQS monitoring system along the border
- Identify temporal, geographic, chemical, and other gaps in the data sets
- Discuss issues of data quality, availability, comparability, etc., and
- Begin the process of correlating air quality with health impacts

A strict delineation of the border region was difficult to define for this study (as in so much border research). While the La Paz Agreement identified and many following programs (such as Border 2012) honor the 200-km wide zone, air and health data from both nations are delineated mostly by the twin cities, by counties/*municipios*, and by states.

A border air data search was executed using the web, email and phone calls to individual people, and attendance at health and air meetings including:

- Border Health Association meeting in Laredo in June,
- Border 2012 Air Task Force meetings in Tijuana and the Imperial Valley
- California-Baja California environment update meeting in Ensenada also in June.

Using the contacts provided by the EHWG as a starting point, three researchers divided the search accordingly: one sought out U.S. air monitoring databases; one searched for air health data in the U.S.; and the third looked for both kinds of data from Mexican sources. Calls to people and attendance at meetings were not as helpful as hoped and yielded less data per unit effort than email and internet surveys. Focused searches or air quality data, air health data, and Mexican data are described below.

Air quality data

The collection and storage for display of environmental data have always been heavily influenced by geography. U.S. and Mexican monitoring stations' results are listed according to their location, so a user can view criteria pollutant data for a city, county, state and so on. However, when one is looking for data along the border – where political boundaries confound the traditional display of data – the search cannot rely on geography alone. Without recognition of binational airsheds, air quality data for the San Diego-Tijuana airshed, for example, is scattered across local, county, state and federal sources. The same data will appear in different formats in different databases; and one cannot always be sure that two sets of data will be quality controlled in the same manner.

In this context of data decentralization and poor data coverage, researchers made the most use of the internet to scour for data sources. That this information be accessible on a border-wide basis necessitated such a universal tool. Moreover, few better venues exist for the expedited display of information, specifically real-time data. Therefore, researchers pursued data sources primarily via the web. To locate data sources not centralized in state or federal agencies, they made use of standard search engines as well as more academically-tuned ones such as Google Scholar. Where dead-ends existed, researchers contacted the responsible hosting agencies to notify them and to determine whether the data actually exist. The final database includes null results in an effort to reduce chasing dead ends. The actual database administrators proved to be quite valuable, as they were often able to unearth the lesser-known data sources. Since two critical search prerequisites called for border-wide accessibility and near real-time updating, air quality studies that were heavily localized or those that have been terminated were not included in the final spreadsheet.

Expecting that most air quality data, on either side of the border, will be housed in federal databases, researchers focused on data collected by other entities. Especially helpful in this regard were the local and regional air pollution districts on the U.S. side. A number of border experts offered invaluable assistance to air data compilers, especially those at the state level, as they proved to be effective liaisons between their local and federal counterparts. With all air quality data collected at the state level passed onto the federal air data systems, researchers turned to local data, which could be updated more frequently.

The following people deserve special mention and thanks for assisting the air quality data search: Enrique Rebolledo, Michele Kimpel-Guzman, Mike Hadrick, Victor Valenzuela, Bob Currey, Craig Forster, and Air Task Force Co-Chairs.

The air quality data matrix put together by the EHWG asked for the following information:

Database organization
Data description: *which parameter is being measured?*
Indicator: *which hazard from the pre-identified list?*
Units: *what are the units of the data being measured?*
Sampling type: *how is the data collected?*
Analysis method: *pH meter, filtration, etc.*
Collection frequency: *how often is data collected?*
Collection start date: *when did data collection begin?*
Collection end date: *when did data collection end? Or, is data still being collected?*
Collection area: *what sized area is data being collected in?*
Collection location: *what are the geospatial coordinates of the monitoring station?*
Collection region: *county? State?*
Collection season: *during which season (fall, winter, etc) was data collected*
Total number of data points: *total number of samples, etc.*
Time between collection and addition to database: *how long between sampling and updating?*
Does QA/QC exist?: *explain and how can QA/QC procedures be accessed?*
Software platform: *what is the database management system?*
Hardware platform
Name of database manager
Database manager contact information

Air health data

The diseases addressed by this project were limited to those associated with poor air quality. An internet search was performed using a number of search engines including Google®, Google Scholar®, MSN® and Yahoo®. Phrases used for internet searching included names of states, counties and cities within the border region. Additional searches were conducted using geographical names in conjunction with names of diseases, the words “health”, “air quality” and various other related terms.

Databases identified by the search were evaluated for credibility. The evaluation was conducted at the discretion of each researcher involved in the project. In general, the evaluation process involved identification of the source (federal, state, county, city or private). Databases affiliated with a widely accepted health, environmental and/or academic organizations were selected for use in this report. Databases without any affiliation were further evaluated for sources of data and credentials of researchers. In cases where further evaluation yielded an incomplete or questionable result, the database was omitted from this report to avoid publication of a biased or inaccurate data set.

As databases were identified, data were reviewed and described by the researcher. The following matrix provided by the EHWG was used to consistently describe the data contained in the database:

Database Name: *Name of database*
Organization where the database is located: *The system resides in which organization?*
Health related event under surveillance: *Include ICD code or case definition for each condition. Mortality or morbidity?*
Indicator: *Which health outcome from the pre-identified list?*
Units: *what are the units of the data being measured? Incidence or rates?*
Population under surveillance: *Is the entire population surveyed or just a subset (age, gender, race, region)?*
Reporting of sources of data: *Who does surveillance data come from? (physicians, health-care providers, vets, survey respondents, etc)*
Collection Method*: How is data collected?*
Collection frequency: *how often is data collected?*
Collection Start Date: *When did data begin to be collected?*
Collect end data: *When did data stop being collected? Is it still being collected currently*
Do Collection location (coordinates) exist? *What are the geospatial coordinates of the reporting site? State if not collected.*
Collection region: *is data reported by County? State? National?*
Does QA/QC exist: *Explain, and how can QA/QC procedures be accessed?*
Time between collection and addition to database: *How long between sampling and updating*
Software platform: *What is the database management system? (Oracle, Access, etc)*
Hardware platform: *Ex. PC/Windows or Mac/Tiger*
Data Access: *Who has access to this database? Patient privacy, confidentiality, security or access issues?*
Name of database manager: *Or who is the contact person for the database*
Database manager contact information: *Address, e-mail, phone number*

Mexican data

To obtain Mexican health data researchers used a combination of the following methodologies. After attending the United States-Mexico Border Health Association (USMBHA) meeting in Laredo in June, contacts were emailed to elicit information. Additionally, the border health organizations as well as the universities located in the region (Universidad Autónoma de Baja California [UACB] and Universidad Autónoma de Ciudad Juarez [UACJ]) were contacted. Researchers received replies for most of the emails sent; however, not all responses brought forth new data.

RESULTS

Data from dozens of sources were found and are provided in the attached air quality and air health matrices (appendices). Much data were found repeatedly and redundantly or through "back doors" (i.e. the same data under a different address), a problem common to both U.S. and Mexican data. Redundancy in the health data is due to data coming from the same Mexican government institutions and this information is placed on different web pages. The same air quality data are also reported in different web sites. Also reported in the appendices are the numerous "dead ends", locations where data were expected but not found. Overall, data suspected to exist did in fact exist.

The approach taken by the SCERP team was to create a centralized and electronic database that was widely available and automatically updating. Placing the URL of data sources in the far left-hand column of the matrix makes the Excel database a window to real-time – a living document – as well as historical data in myriad locations across the border region.

Air quality data

The following figure summarizes air quality data by state and year.

	SOx	NOx	O3	CO	PM10	PM2.5	toxics ^
Arizona^^			1990-pres*	1990-pres*			
Baja California Norte	1994-pres*	1994-pres*	1994-pres*	1994-pres*	1994-pres*	1999-pres*	1994-pres*
California	1972-pres*	1963-pres*	1973-pres*	1963-pres*	1983-pres*	1999-pres*	1980s-pres*
Chihuahua			2002-pres	2002-pres			
Coahuila							
New Mexico	1995-pres*	1995-pres*	1995-pres*	1995-pres*	1995-pres*	1999-pres*	1995-pres*
Nuevo Leon							
Sonora	1995-pres*	1995-pres*	1995-pres*	1995-pres*	1995-pres*	1999-pres*	1995-pres*
Tamaulipas	1995-pres*	1995-pres*	1995-pres*	1995-pres*	1995-pres*	1999-pres*	1995-pres*
Texas	1973-pres*	1972-pres*	1972-pres*	1972-pres*	1972-pres*	2001-pres*	n/a

^ records of some toxic emissions may have started earlier than others.

^^ as this table shows state-by-state publication of monitoring data, AZ makes no emissions data public (though it does report to EPA under CAA requirements; information gleaned from county air department sites)

*****denotes real-time data

nb: 1) with SINAICA not currently functioning up to capacity; much Mexican real time data is derived from US state or federal sites

2) US data from state sources, Mexican data from state and (bi)national sources

The cataloguing of environmental data, in this case air pollutant emissions and public health information will vary according to geography, economics and socio-politics. An apt comparative example is California – for which a plethora of air quality data may be

found – and New Mexico, where fewer data sources exist. Monitoring results from the large, relatively wealthy and more environmentally progressive California outnumber those of smaller, less affluent and more politically conservative New Mexico. However, this characteristic is expressed in Mexican data as well, with monitoring capacity centered on the more populous and economically vibrant cities of Tijuana, Baja California Norte and Ciudad Juárez, Chihuahua. Another key comparison is the data coverage and availability in the U.S. and in Mexico. Since the American air quality system (AQS) has been in place, to some degree, since the early 1970s, the U.S. has enjoyed a head-start in monitoring emissions. It is significant to note that the social infrastructure in Mexico – the network of governmental, non-governmental, and citizen groups that supply the economic and political capital/will to implement a system like AQS – was not substantially developed early enough for there to exist parity between the U.S. and Mexican air quality data systems. However, a combination of Mexican catch-up and investment from federal and state governments in the U.S. has increased the number of monitoring stations recording Mexican ambient air quality.

Easily the most developed monitoring system of the four major systems (environmental monitoring and public health monitoring in the U.S. and Mexico) is the U.S. AQS, which measures ambient air quality data. Although there do exist disparities in coverage from state to state, border residents in any of the four U.S. border states can get a good picture of their air quality. Most state sites will document criteria pollution emissions and some toxics. The exception is New Mexico where most data reveals only a few – or even just one – criteria pollutants.

By law, states must report to the EPA criteria pollutant (SOx, NOx, CO, PM10, PM2.5, and O3) and air toxics levels. That data are quality controlled and entered into the Air Quality System (AQS). The EPA's AirNow program uses real-time updating software to show the air quality index, and ozone and particulate matter concentrations on an hourly basis. While this constant uploading of information makes the data readily available, the coverage is not as extensive as that of the AQS. AirNow focuses on major cities and towns, leaving major portions of the border region unmonitored.

Air health data

The following figure summarizes air health data by state and year.

	Health	Mortality*	Morbidity*	Mortality and	Asthma	Hospital	Birth Defects	Cancer	Heart	Respiratory	Hospital
Arizona	1990-1997	2003		2002	2000-2003						
California		1994-2001		1999-2003	1997-2003		1997-2001	1980-2001	2001	2002	
New Mexico		2000		1991-2001							1994
Texas	1995-2001		1997-2003	1995-2001		2001				1995	
United States		1998-2000	1960-2003								

* may include statistics for asthma, cancer, heart disease and respiratory illnesses

It is perhaps best and easiest to describe health data by source.

PAHO: The Pan American Health Organization (PAHO) website was searched for health data related to air quality, no current databases were found. One document titled "Leading Causes of Mortality on the U.S. – Mexico Border" was found in PAHO's Epidemiological Bulletin, Vol. 20, No.2 1999. It contains mortality statistics for the U.S.-Mexican border region. This study occurred between the years of 1992 and 1994.

WHO: The World Health organization website was also searched for health data related to air quality, no specific database or information was found.

EPA: There are two health databases maintained by the United States Environmental Protection Agency (EPA): HEDS (Human Exposure Database System) and CHADNET (Consolidated Human Activity Database). Both databases require registration and password. The EPA also runs the U.S.-Mexican Border Asthma Surveillance program, which delivers data collected through interviews and surveys.

CDC: The Centers for Disease Control (CDC), Behavioral Risk Factor Surveillance System (BRFSS) maintains national-level data regarding asthma. The National Health Survey is another source of health data information for diseases related to air quality maintained by the CDC. The National Health Survey and the BRFSS focus on a wide variety of health indicators, including asthma and other indicators related to air quality. The CDC maintains more detailed studies and databases specific to asthma.

NCHS: The National Center for Health Statistics monitors asthma mortality rates, incidence rates and hospitalization rates.

Texas: Texas Department of Health, State Health Services maintains a large variety of health data. The Protect Texas project is among the data management programs within the Texas Department of Health. Protect Texas is a database of health statistics, primarily mortality, categorized by cause of death. Data are available by county from 1995 through 2001. In addition to the Protect Texas program, several reports on chronic illness, asthma, birth defect and cancer surveillance programs were also noted on the Texas Department of Health website. The Texas Institute for Health Policy Research maintains the Landscape Project, which brings together a number of social, economic and health indicators to determine the overall public health of Texas counties.

California: The California Department of Health Services maintains data on asthma prevalence, cancer incidence and birth defects in addition to vital statistics and general health indicators. California maintains a cancer registry and a medical information reporting system. Although a Binational Border Office exists within the California Department of Health Services, there is no online data regarding health indicators. The California Health Interview Survey is administered through the UCLA Center for Health Policy Research. Data for 2001 is available online. Other data maintained through the UCLA include prevalence of asthma attacks, medication, and heart disease. San Diego

County Department of Epidemiology maintains data on asthma, leading causes of death, and general health indicators.

Arizona: The Arizona Department of Health operates the Healthy Border 2010 Program. The Arizona Department of Health Services, Division of Public Health Services, Office of Border Health has a website detailing the Sonora – Arizona Health Indicators which includes mortality and cases of cancer by city, including sister cities across the boarder. The Arizona Department of Health also maintains statistics on mortality, hospital discharge rates, asthma patient days, asthma length of hospital stay, asthma rate of patient days, and asthma emergency department visits.

New Mexico: The New Mexico Department of Health, County Profile Programs detail statistics on mortality and morbidity. The New Mexico Border Health Office does not maintain any health statistic on-line. The individual county websites did not maintain any health statistics on-line. The University of New Mexico Institute of Applied Research, Division of Government Research maintains county health profiles detailing hospitalization rates for respiratory ailments and cancer.

The following websites did not contain health data or statistics, related to the U.S. – Mexican border region, and should be considered dead ends:

- County websites in Texas, Arizona, and New Mexico
- California Department of Health Services, Office of Border Health
- Texas Department of Health Services, Office of Border Health
- National Institute for Environmental Health
- United States – Mexico Border Commission

Mexican health data

The best data for health in Mexico are from Secretaria de Salud - Dirección General de Epidemiología (http://www.dgepi.salud.gob.mx/infoepi/index.htm).

DATA DISCUSSION

For the most part, the Border Air Data search (BADS) effort confirmed the general sense the researchers and others had that patchy (both spatially and temporally) data were indeed available - primarily in U.S. population centers - and that while some health data were available correlations between air quality and air health were not possible due to incompatibility issues. Researchers expected to find more information about health surveillance from the institutions that work in the border region (e.g. the Border Health Association) as well as universities located in the border region (e.g. UACJ), but all the Mexican information that was found corresponds to data reported by the Mexican government's official web sites. So, despite the possibility of searching redundant data, unlike the U.S., Mexican health data is a "one-stop" process.

Availability

While not intended to be intensive, researchers conducted a preliminary analysis which indicated some trends in data availability. Not surprisingly, data on the Mexican side lagged data on the U.S. side. For example data on the U.S. side date as far back as 1973 (some national morbidity data date back to 1960) while most Mexican monitoring began in 1997 with Pb data on the Mexican side dating back to 1994. The same difference in availability is true of the overall number of pollutants monitored. Toxics were included in Mexican monitoring only recently and a number of cities still have no toxics monitoring stations.

U.S. and Mexican databases had varying levels of access, utility, and "friendliness." The most available sites were searchable by community members and could be interactive resulting in meeting specific location and user needs. Some even interpreted the data indicating the health condition or risk and provided maps or summary reports (for example by year, month, or day). At the other extreme were sites requiring registration and/or authority to access. In the middle were sites with automatic, set-format downloads that provided little access for specific or searchable data needs.

Air quality data: AQS data availability depends almost completely upon density and capacity of monitoring stations. Where monitoring stations have existed for a long time, longitudinal data are generally available. These tend to be in metropolitan areas of the border region. It should be noted that monitoring is intended to report compliance with the federal Clean Air Act (CAA) and not meant to monitor population health risk so stations are not placed ideally relative to population density or levels.

The health information for the border region was proportional to availability for the rest of the Mexican states. However the border remains somewhat marginalized for air quality data. For example San Diego is the seventh-largest city in the nation and with Tijuana has a population over 4 million but has fewer stations (11 in the county and five in the *municipio* and not every one collects all six criteria emissions data) than comparably-sized U.S. cities. There is only one San Diego monitor at a border crossing. This population growth is endemic of the border region: the Paso del Norte sub-region of Doña Ana County, NM, El Paso, TX, and Ciudad Juárez, CH has over 2 million people; Ambos Nogales (AZ and SO) has over a million; McAllen, TX and Reynosa, TA joined the million population club this year; and Calexico, CA and Mexicali, BC will join in 2010, along with Dos Laredo (TX and TA) in 2030. Ensuring they get representative monitoring may be the first recognition and recommendation.

SCERP has recognized for years that the border is a marginalized and under-served population. However, even inside this area, some areas receive less attention than other. Although native tribes live on reservations covering large swaths of the border region, researchers found no air quality or health data specific for those many peoples or areas. Such data may be included within overall state databases.

Finally, and not unexpectedly, researchers could find no border region specific air health data at regional health agencies (PAHO, BHC, BHA, BECC, etc.). They often did report

national morbidity and mortality data but not for the border region. The real possibility exists that web searches, email requests, and phone communications did not reveal internal databases, documents, or raw data. In other **words what's apparent is not always all that might be available.** Nearly all evaluated websites visited had search engines to explore for specific air or health data but an agency may still choose not to make some valuable and relevant data available to the web.

On the other hand, it is suspected that while agencies may be engaged in border environmental indicators development and may be identifying and refining parameters, they have not actively solicited for data nor populated their databases. The PAHO border indicators effort is a cited example. However, despite data gaps and inequalities in monitoring coverage, states and even county air quality departments are making more information available more quickly. Indeed, the summary matrix indicating real-time updates would look very different just five years ago, as better and cheaper technology has enabled more entities to report on air quality. With increased real-time updating, and expanded monitoring coverage, the air quality picture of the border will become apparent. Importantly, the continued transition of authority over monitoring programs (as in the Californias, where the U.S. state is transferring its monitors to BC authorities) to local monitors will expedite data reporting and ensure a more effective Mexican monitoring system.

Air health data: Overall, health data are widely available from a variety of government sources throughout the United States. Mortality is the most popular form of health data, since these statistics are relatively easy to obtain through death certificates. Statistics on infectious diseases were found more often than the chronic diseases associated with poor air quality. Infectious diseases tend to spread quickly with acute effects and may be viewed as a greater public health threat than the slower moving, non-contagious chronic diseases associated with poor air quality. Of the chronic diseases identified by this search, diabetes and heart disease were most common. Cancers were also widely tracked through individual states' cancer registry programs.

Large-scale survey programs such as the CDC's Behavioral Risk Factor Surveillance System (BRFSS) and the California Health Interview feed a number of databases and reports on health at the city, county, state, and national level. Such programs appear to be beneficial for centralization of information and availability for use by other organizations. Specific studies published through universities, non-governmental organizations, or peer-reviewed journals were difficult to include in this study for lack of web-based publication. A number of these studies were outlined on the funding organization's website, yet specific data could not be retrieved.

The air quality data are generally sufficient to determine if the Border 2012 reaches its air and health objectives and to populate its air and environmental health indicators database with a few calculations and tweaks. Most of the 14 sister-city pairs have monitoring stations with ozone and PM10 data so that daily ARI/IMECA, number of days in exceedance of air quality standards for criteria pollutants, and average annual and average maximum for ozone and PM10 can all be calculated. Calculating the portion of

the population exposed to criteria and toxic pollutant exceedances is confounded by the irregular distribution of monitoring stations. However some meshing of metropolitan population and average air quality might produce such a percentage. None of the above calculations are readily available in the databases nor is a standardized binational air index defined. Health data to meet Border 2012 data needs are confounded by cohort (groups of population with same years of age) definitions. The objectives define terms unavailable in the databases. See discussion of cohorts below.

Comparability and compatibility

As has been pointed out by SCERP for years the most significant issue with indicators and environmental data is comparability (different data that are analyzable enough to make comparisons) and compatibility (different data that do not lend themselves to comparison). Exactly the same data rarely exist across international, state, county or city boundaries. For example, a congressman once asked SCERP to report data to him on the *incidence* of *childhood asthma* by *county* as determined by *hospital admittance* for the all other border locations. Researchers found lots of data about *asthma prevalence and adult asthma* by *cities* or *states*, and then by *emergency room* or *personal physician diagnoses*, but no data that could be faithfully compared with his data across the many jurisdictions. It is therefore hard to say which area in the border region is the worst, should be prioritized highest, or get funding first.

Additionally, more issues exist with data that is marginally or even completely incompatible. For example, much cohort information in Mexico is in irregular increments of infant (0 to 1), child (1 to 4), youth (5 to 14), adult (variously delineated), and elderly (over 60 or 65) while the U.S. divides data into 5-year and 10-year increments. Border 2012 requires data on asthma prevalence in under-18 year-olds and childhood ARI morbidity in under-five year-olds.

When data are not comparable or compatible, surrogates or preliminary data are suggested. For example, the number of monitoring stations or the number of the 14 sister-city pairs with adequate monitoring is a suggested indicator until sufficient monitoring and attainment data are available to serve as the actual air quality and air health risk indicators, respectively.

Periodicity and permanence

Data seemed to be published or uploaded with expected regularity after first collection. Hourly air quality data were generally available where expected though they were not always real-time. Monthly health data were also available but usually not until the year had passed (i.e. only annual updates).

Most air quality data have existed for a long time, will continue to be available, and are improving (i.e. adding criteria pollutants, toxics, more stations, and reporting). Air health data are more recent. For air quality data, the most readily available are from local sources (i.e. the air quality control districts) with lags as they flow to the state and then

the federal levels. Real-time data may be available near real-time (i.e. hourly) with a slight lag in reporting by the state (i.e. daily) and another by the federal data sites (i.e. weekly). It was sensed but not proven that quality may improve with the delays (i.e. that time is needed for proper quality control/assurance).

Much research data were excluded from the search as raw data, collected solely for the specific science question studied, and unlikely to be repeated. This was the case for much SCERP data. That is, while large amounts of data were collected, they were analyzed and reported in different forms for publication, policy development, and public use. More often than not, these studies focused on localized issues or events; considered the border only peripherally; or addressed a single criteria pollutant or health concern.

The regularity of data indicates how permanent they probably are. Even though responsibility for operation of monitoring stations is being shifted from one jurisdiction to another (i.e. from CA to BC for stations in Tijuana and from TX to CH and CO for Paso del Norte) and reporting of data is being transferred from one system jurisdiction to another, there is still more progress toward harmonization to be made. EPA regulations under the CAA requires that states report criteria pollution emissions as part of the NAAQS system. States will update federal information periodically with the AQS system. For the most recent information, researchers found that county-sized air pollution control districts – where they exist – have developed real-time emissions reports for most pollutants that rival state reporting. San Diego Air Pollution Control district (www.sdapcd.org) and Pima County Air Quality District (www.deq.co.pima.az.us/air/monitoring.htm) both display real-time data for their respective counties.

Data gaps

The SCERP team found the following general and specific gaps in the database. On the air quality side there is generally good air quality data with the best and most current data available in California (where the population density is the highest) and the least in New Mexico (again where the population density is lowest). Criteria pollutants were generally all monitored at U.S. sites with some supplemental VOC, toxic, and aromatic and halogenated compound and oxygenates data available at scattered sites. One of the biggest, but not unexpected gaps was PM2.5 in Mexico. Since Mexico has no fine PM rules it does not monitor PM2.5 except at a few of the newer stations installed by CARB in greater Tijuana and Mexicali. The second obvious gap is geographic in nature. Smaller towns, especially in Mexico, lack any air monitoring stations. The accompanying map shows the location of all air monitoring stations found in the search. On the health data side, Mexican data has more starts and stops than the U.S. side and most data are current only up through 2001 or 2003 while on the U.S. side more recent and "ongoing" data are available.

Quality

The researchers did not examine data quality or metadata beyond verifying existing QC/QA mechanisms; this is the next obvious step for the sponsor. However only

government, academic and some trusted NGO data were included. Methodology of data collection was described for large-scale efforts such as the BRFSS and the California Health Interview survey. This allows researchers to determine the quality of the data presented. In other presentations of data, methodology used to calculate age-adjusted rates is typically described in a foot note. Data from organizations known to be hyperbolic in their claims were not considered. An air quality data quality contractor should review the database for accuracy, precision, and reliability.

Expense

While this initial effort was hurried and somewhat cursory, it did find much of the data that had been identified in the past and little new data. A contrast of the results of this search and that of the other contractor should indicate, by the difference, if large amounts of other data remain to be tapped.

What may be worth examining is the scale of data and if it is fine-grained enough to indicate air quality of and health risk to communities and if it can be aggregated to the regional level with enough precision to compare the border to other regions. It does not seem to the researchers that use of this gross county or state data to inform decisions at the border is legitimate nor that any real transboundary transport information is provided that guides binational remedial activities.

Linkages

The biggest disappointment was the continuing disconnect between air quality and health information. Most air quality data is collected, analyzed, and reported hourly at monitoring stations and can only grossly be related to county-wide health information. Monitoring stations are less than optimally located (and in some cases are located only where they can be secured yet accessed by official personnel) to extrapolate for general distribution information, as they are intended to monitor compliance with regulations and not to inform public health decisions. Health data may be collected by clinics and hospitals but is only made available by county and by month. The lag between a health event and data availability is also distressing.

When researchers drew comparisons to public health data, the three-parameter approach (geography, economics, and socio-politics) is especially instructive. It is commonplace in Mexico for residents to seek medical attention not from the hospitals - where asthma admission rates and other data are collected - but rather from neighborhood pharmacists. Indeed, the collection of public health data as they relate to air quality has never been standardized. For example, some American agencies responsible for compiling environmental impact statements (EIS) will only record expected increases in asthma admission rates in area hospitals for young children. However, research has shown links between air pollution and many other forms of lung disease in many different segments of the population as well as less definitive links to heart disease and cancer. Clearly, there is a need to standardize how air pollution affects individual and public health and which parameters to follow in classification.

RECOMMENDATIONS

When asked to identify the vital environmental hurdles the border region must overcome, UTEP researcher and Joint Advisory Committee member Bob Currey answers “the three D’s: Data, Driving, and Dust.” Compared to the rest of the nation, there is a paucity of environmental data from the border region. Air quality researchers need to better understand the meteorology of the border region, the extent to which emissions flow across the border, and their peak seasons for doing so. A first step would be demarcation of airsheds without regard to political boundaries, particularly the international border. The need to search multiple times and in multiple places for data on a single airshed hampers not only research but also air quality improvements, as experts cannot always be sure exactly which pollutants and which sources are the most significant for their airshed.

Next steps by the EHWG should be conducted in consultation with:

- Border Indicators Task Force (BITF) which is devising a Data Management Plan
- Various air and water data search contractors
- Data management experts in EPA, SEMARNAT, HHS and Salud

A data management flow chart would identify not only next steps but the flow of data both to decision makers as well as community users.

An immense help to the researchers was the provision by the EHWG of thoughtful data matrices (one for air quality and one for health) complete with a preliminary dictionary. It not only relieved the researchers from having to devise matrices that might prove incompatible with past and ongoing efforts, but it effectively guided the search. The EHWG is encouraged to share those matrices with the BITF and others.

Regardless, a quality survey of the data should be conducted next. A gap analysis to indicate geographic/spatial, temporal/annual, and chemical/criteria pollutant holes and overlaps is recommended. Contrastingly, sufficient data may have been found to enable an actual “cross tabulation” of air quality and health data in some locations. However, greater standardization in collection, categorization and reporting of data must be achieved.

It is also recommended that SCERP be allowed to circulate and obtain comments on this draft report. While 30 days was sufficient time to conduct a data search it was not adequate to analyze and solicit comments on these findings

APPENDIX

U.S.-Mexican border air data map

In an attempt to make the border air data more easily understood, SCERP created a visualization that portrayed:

1. Commonality of airsheds as determined topographically (hatched lower-lying areas within the bowl of mountain ranges or proximate to cities of higher population density, note most border some airsheds are binational and several cross more than one state boundary and therefore many county borders)
2. Transborder nature of air pollution by presenting two seasonal wind roses that show how much and approximately when plumes of pollution from sources on one side cross to the other
3. Locations of air quality monitoring stations and thus the limited ability to interpolate among the sites and especially to rural locations
4. Sizes of counties and *municipios* illustrating that when health data is collected and provided at the county level (or even worse the state level), correlation with air quality data is difficult

Air and health data contact list

Included below is a full list of the people and institutions the SCERP team contacted as a part of the data search process.

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