

# Capacity and transparency of potable water regulation in Tijuana, Mexico: challenges for ensuring water quality at community level

KAYA TOWNSEND<sup>1</sup> and JOHN EYLES<sup>2</sup>

<sup>1</sup>University of South Florida, St Petersburg, FL, USA and <sup>2</sup>School of Geography and Geology, McMaster University, 1280 Main St, Hamilton, ON L8S 4K1 Canada

---

## SUMMARY

*The ability of public institutions to provide efficient and equitable potable water services is key to reducing water-borne diseases, one of the leading causes of morbidity and mortality in the developing world. In this article, a case study of potable water and public health programs in Tijuana, Mexico, is used to direct attention to practical examples of policy and institutional incapacities. A qualitative methodology was used to gain access to local context and the formal and informal actions of the key*

*informants. This paper concludes that public health agencies are creating the illusion of program action through disease surveillance, however capacity gaps demonstrate that institutional policy is not pragmatically reflected on the local community level. Political client-patron relationships are used to circumvent bureaucratic barriers and distribute resources at the local level. This raises the question of whether further accountability will bring the much-expected equitable distribution of public goods in the developing world.*

*Key words:* institutional capacity; task networks; Tijuana; transparency; water quality

---

## INTRODUCTION

More than 1 billion people throughout the world lack access to clean drinking water, contributing to the prevalence of water-borne diseases such as diarrheas, dysenteries, hepatitis A, cholera and typhoid (Cosgrove and Rijsberman, 2000). Many children under 5 years of age are critically affected by poor drinking water, and diarrheas continue to be a leading cause of infant mortality throughout the developing world. These illnesses can be prevented by improved access to clean water that is fit for drinking, otherwise known as potable water. The continuation of water-borne diseases may be the result of the failure of potable water public health policies to transcend political rhetoric and become implemented on the community level. A case study of potable water and public health programs in Tijuana,

Mexico, is used to direct attention to examples of policy and institutional inadequacies, and strengthen the ability of these institutions to provide efficient and equitable potable water services to promote the health status of populations.

### Context

Tijuana is a rapidly growing city. In 1990, the city's population was estimated to be 2.4 million (Castro-Ruiz, 1997). Most of this growth came in the later part of the 20th century, as Tijuana steadily experienced a 5–14% annual growth rate between 1940 and 1990. The ground water in Tijuana is contaminated by fecal coliforms and enterococcus, the presence of which indicates

sewage contamination and human fecal matter in the water (Metzner, 1989; Brown and Lopez, 1996). Fecal contamination from untreated sewage discharges is particularly high during the dry, summer season when rain water cannot dilute the human waste in the groundwater. In 1995, gastrointestinal diseases, after respiratory infections, were the second leading cause of mortality in Tijuana, while other water-borne diseases such as amoebiasis, hepatitis A and skin infections are also important public health issues [INEGI (National Institution of Statistics, Geography, and Information), 1998].

Two public agencies, the Ministry of Public Health and the State Commission of Public Services of Tijuana (hereafter referred to as CESPT), grapple with the policy problem of water-borne disease in Tijuana. CESPT is responsible for Tijuana's water and sanitation services and has five general duties: (i) operation and maintenance of the water and sewage systems; (ii) service administration; (iii) billing and collection; (iv) development and expansion of systems; and (v) development of other activities that promote the attainment of the previous four tasks.

Communities with no tap water must rely upon groundwater or private water trucks for their drinking supply. The Ministry of Public Health labels these communities, without either water or sanitation facilities, as 'high risk' (del Real Mora *et al.*, 1997). For these high-risk communities, official policy is to: (i) monitor environmental health; (ii) test municipal water sources; (iii) expand health services; and (iv) promote health and education (del Real Mora *et al.*, 1997). Within the Ministry of Public Health, three departments—Epidemiology, Environmental Health, and Health Education—focus on water-borne disease and implement the Ministry's agenda.

## METHODS

Originally, this research focused on the means by which communities in Tijuana sought to reduce the incidence of water-borne diseases and how the public sector responded to these local demands. These questions emerged from the recognition that the installation of water and sanitation infrastructure is a basic preventative measure against water-borne disease. Research was conducted through the McMaster University

Department of Geography and Geology, with support from the university's Institute of Environment and Health.

Three communities, Mariano Matamoros Sur, La Morita 1 and Terrazas Del Valle, were selected based upon local public health advice on impoverished areas with heavy burdens of water-borne disease compared with other areas of the city. The communities are at different stages of development, new settlements to urban incorporation, and allow for comparisons: Mariano Matamoros Sur has electricity, piped water and a sanitation system, La Morita 1 has electricity and water, and Terrazas Del Valle has neither water nor sanitation infrastructure.

In-depth interviews were needed to gain access to locally constructed meanings of health, priorities, and personal and institutional responsibilities. Qualitative research methods were useful within a foreign environment to gain access to local understandings and actions. Qualitative research provided access to, understanding of, and explanation for the social world [(Eyles, 1988), p. 1], which was then interpreted and ordered to reconstruct and represent the informants' manner of acting and knowing. Furthermore, this research adopted Gilchrist's definition of key informants as 'individuals who are able to teach the researcher' [(Gilchrist, 1992), p. 74]. Gilchrist also defines key informants as 'individuals who are willing to share their knowledge and skills with the researcher and who have access to perspectives or observations denied to the researcher' [(Gilchrist, 1992), p. 75].

A checklist of questions was developed and used as the framework to probe informants about their positions and understandings. For example, questions probed on the type of services provided, institutional goals, how communities accessed public services and resources, and how the agencies were trying to meet the needs of Tijuana's growing population. As such, the interviews were theoretically driven based upon the research interests of the authors and the previous literature reviews (Gilchrist, 1992). This checklist was reviewed by a local expert, a doctor at the Autonomous University of Baja California (UABC), for comments on its relevance within the context of Tijuana, Mexico.

Fieldwork was undertaken during the summer of 1999. In total, 30 respondents (13 women and 17 men) were interviewed. Purposeful sampling

was used to recruit key informants. Equally, half of the informants were from the community level and governmental/political organizations. Respondents at the community level were selected based upon their knowledge and participation in community organizations and politically active groups. Community health workers were selected for their knowledge of locally available health care services. Politicians responsible for community relations and development from the three major political parties (PAN, PRI and PRD) were interviewed. Key informants were sought from the three water agencies (the State Water Commission, CESPT and Public Health) and from the departments of interest (Epidemiology, Environmental Health and Health Education). Reports were collected from political and civil servant sources, and the Mexican Census Agency (INEGI).

New informants were selected until a series of recurring themes emerged (Baxter and Eyles, 1997). Once redundancy emerged from the narratives of multiple informants, the researchers stopped searching for new informants from the same organization or with similar perspectives. Sample size was also limited by several constraints, such as time, finance, and access to informants.

Most interviews were conducted in Spanish through a translator. Interviews were not taped, because of technical and financial constraints involving translation. Therefore, there are no direct quotations from sources. Both the translator and the primary researcher (K.T.) took notes during each interview. If there were any discrepancies between the researcher's and translator's understandings of the informants' responses, these discrepancies were checked in subsequent interviews with the same informant. Most key informants were interviewed twice. Pseudonyms were used for all informants and water companies during data collection, throughout the analysis, and within this article. Interview notes were typed into a computer, and coded for theme and according to context of 'community', 'political group', 'public health', and 'water and sanitation services'. These themes became the basis for examining issues of water quality and regulations; they provided a lens through which the activities of the players in the provision of water to the three neighborhoods could be seen, so that the programs, capacity and effectiveness of agencies could be explored.

## RESULTS

### Public sector capacity

First, we will examine the institutional capacity to provide potable water and protect health. Important in these task networks are the departments of public health, the municipal water agency and the water companies. Within the Ministry of Public Health there are two departments, Epidemiology and Environmental Health, with programs that address water-borne diseases in high-risk areas of Tijuana. Each of these programs is considered a success. However, our results show that these programs and policy goals have significant capacity gaps that inhibit the development and implementation of efficient potable water/public health programs. These gaps may be perceived depending upon how environmental health is monitored and how water quality is assessed.

With respect to monitoring, the Department of Epidemiology routinely measures disease rates in Tijuana. The weekly disease rates are compared with the maximum and minimum disease rates from the past 5 years (Ilena, Public Health Official). These measurements are then regularly presented in reports to the Federal Department of Statistics. Officially, the Department of Epidemiology is expected to monitor some water-borne diseases, such as cholera, and deaths from gastrointestinal diseases. However, department officials feel that tracking non-fatal water-borne diseases is a drain on departmental resources (Ilena, Public Health Official). As the quality of these 'disease rate data' is not high, the description of epidemiological conditions in the high-risk communities seems to be erroneous. For example, incidents of illness and diseases are only reported when a doctor fills out a formal epidemiological report. While the health clinic in Mariano Matamoros Sur does submit this information, two informants, community doctors in Terrazas Del Valle and La Morita 1, stated that they had never filled out an epidemiology report. Furthermore, the doctors believed that many sick community members did not visit them when they became ill. Instead, inhabitants turned to local pharmacies for health advice. Indeed, a pharmacist in Mariano Matamoros Sur estimated that only 30% of her patients would consult a doctor. A study on pharmacies and self-medication in Mexico (Calva, 1996) supports these observations. None of Elsa's cases were ever reported to the Epidemiology Department.

This lack of communication between community health care providers and the Department of Epidemiology hinders the Ministry of Public Health in attaining a comprehensive account of morbidity rates, and seems to point to a partial understanding of health conditions in these communities.

The Department of Epidemiology does not conduct any statistical analyses to connect contaminated water to the incidences of water-borne diseases (Ilena, Public Health Official; Francisco, Public Health Official). In fact, it does not record the location of where the incidents of water-borne illnesses have occurred. Ilena believed that analyzing the spatial incidence of disease, thereby identifying high-risk sites, would be too difficult for her department because treatment at Tijuana's central hospitals would confound the true disease location.

Thus, the burden of disease in the three communities is not a part of official bureaucratic discourse. The pervasive water-borne diseases are not tracked by the Department of Epidemiology, and the health care practitioners in peripheral areas do not report it. The lack of bureaucratic interest in the disease rates from the community field sites hides the actual burden of disease that could provide evidence for the provision of water and sanitation resources for these communities. The lack of local reports to the Department of Epidemiology further compound the issue and may prevent programs from being initiated to address the need for potable water. The statistics appear to be kept artificially low, meaning that there is no basis for arguing for potable water/public health programs.

The Department of Environmental Health monitors water quality, and serves as the focal point for communication with CESPT. CESPT is responsible for water and sanitation services in the city, with its main responsibilities being the operation, maintenance and administration of the municipal potable water and sewage system (Castro-Ruiz, 1997). The basic task of the Department of Environmental Health is to routinely conduct water quality tests throughout Tijuana. The water is tested for its chlorine levels and the presence of microorganisms and fecal matter. The water quality tests are conducted approximately once a week at random locations throughout the city and at fixed points in community water tanks (Francisco, Public Health Official; Estaban, CESPT Official). CESPT also

performs water quality tests at 30 fixed testing sites located in community distribution tanks and watering holes (Esteban, CESPT Official; Francisco, Public Health Official). CESPT checks the chlorine levels, performs bacterial analyses and conducts physical analysis of the pH levels, temperature, and the level of heavy metals in the water (Esteban, CESPT Official; Francisco, Public Health Official).

Institutional integration and communication between the two agencies is based upon weekly reports that outline water quality and levels of chlorination. Based upon these reports, the Department of Environmental Health regulates how much chlorine CESPT needs to add to the water. This integration successfully illustrates that these departments are monitoring the public's health.

### **Private sector capacity**

The public system is only part of the story. With many communities not yet connected to the city's water system, a vibrant private water industry exists in Tijuana. At first glance, the private water industry seems to be regulated by the Ministry of Public Health. Private water companies use a federally certified, reverse osmosis water purification process and the Ministry of Public Health conducts routine water quality tests on them (Miguel, Private Water Distributor). Water companies distribute their water through two retail methods: in local shops, selling 5-gallon refillable water bottles, and through a fleet of water trucks that peddle water in barrel quantities.

The Department of Environmental Health must initially register each store that sells water, after which it is supposed to conduct water quality tests and a site inspection every 6 months. The water companies are responsible for the quality of the water sold in these local shops. Should any impurities be found with the water or the sanitary quality of the distribution system, the companies must quickly rectify the situation. If after 5 days the store still does not pass inspection, it is closed down (Miguel, Private Water Distributor). Hence, theoretically, regulatory capacity is in place. But these official water quality procedures are not consistently applied at the local level. According to Jose, a shop owner and water dealer in Terrazas Del Valle, his store has never been registered with Ministry of Public Health and the Department of

Environmental Health water quality inspectors have never visited him. Furthermore, when the water tank and distribution system were first installed in his store, the representatives from the water company told him that an inspector from Public Health might come and try to inspect the store. Should this happen, Jose was instructed to call the head office and tell the water inspector that everything had already been approved by federal certification.

Although the water companies are responsible for the stores that distribute their water, they are not responsible for the quality of the water sold in the water trucks. These water trucks are classified as independent businesses and should Environmental Health find something wrong with the water in the trucks, this discovery would not be the concern of the private water companies (Miguel, Private Water Distributor). Despite this claim that the water trucks are not the company's responsibility, the water companies regulate where the trucks can sell their water to prevent territorial disputes between trucks that sell the same company's product (Miguel).

It is easy to understand why private companies do not wish to be responsible for the quality of the water sold by the trucks. The trucks have a hole on the top, where new water is added. This hole usually does not have a cover, and the water is constantly exposed to the environment, especially dust floating in the air. When filling a barrel, the water flows from the truck tank through a hose to an open barrel. No indication is posted of when the hose was last cleaned and no regulations exist to enforce any basic sanitary standards. When delivered, the water is put into a big barrel supplied to households by the municipal government. These barrels usually do not have a lid but can often be seen with a plywood board covering the top.

Furthermore, there is no guarantee that the water in the water trucks comes from the private water companies. Water trucks also obtain water from field pumps that tap groundwater. The groundwater in Tijuana is heavily contaminated with human and animal fecal matter. The private water companies thus have no control over the sources of the water sold by the contract water trucks. This private distribution is also outside all governmental control. In fact, Francisco (Public Health Official) said that the Department of Environmental Health is not responsible for monitoring the quality of the water sold by these

trucks. Instead, the water sold by the private water trucks falls under the jurisdiction of the Ministry of Goods and Services. Thus, the water sold by the water trucks is not officially categorized as a public health concern. The classification under the Ministry of Goods and Services removes the truck water further from the realm and responsibility of the Ministry of Public Health. Accordingly, the water from the private trucks is a consumer product where individuals can decide whether they want to buy it or not. Thus 'individual choice' and 'the voluntary nature of the exposure' is emphasized [(McMullan and Eyles, 1999), p. 301], and a capacity gap is 'explained away' in terms of consumer choice and 'buyer beware'.

### **Informal activities and institutional incapacity**

We have seen that the Ministry of Public Health has many formal capacity gaps preventing the effective regulation of potable water. This is compounded by informal patron-client actions. Clientelism is an exchange relationship of goods and services, favors or information between individuals of differing power and status, whereby a person of low status becomes personally dependent upon, and subservient to the support from a higher status individual (Kaufman, 1977). Some authors (Carlos and Anderson, 1981; Ward, 1989) argue that clientelism is one of Mexico's main political features. Clientelism is alive and active in the Tijuana political system and affects actions undertaken by government bureaucracies like CESPT, legitimizing political favoritism, compounding inequalities in access to potable water, and contributing to public institutional incapacity. For example, Ricardo, a PAN (political party) official, negotiated an informal favor from CESPT to reduce the water bill for a family in Mariano Matamoros Sur. This family, as clients of the PAN party, received preferential treatment from CESPT (Ricardo, PAN party member). To make these informal political requests institutionally acceptable, CESPT undertook a 'socio-economic study' of the Mariano Matamoros Sur family and had their CESPT water bill reduced (Ricardo, PAN party member). The socio-economic study was needed to determine the level of assistance. A CESPT representative interviewed the family and their water bill was reduced by \$100. Researchers could not find any numerical indication of how

common this practice is; however, Ricardo described this community 'organizational help' as an integral part of his political position.

## DISCUSSION

The institutional goals of the Public Health programs serve to create an image that the Ministry of Public Health is effectively addressing this health issue by monitoring the morbidity and mortality rates, and through managing water quality and delivery. According to a report by the Ministry of Public Health, the total annual mortality rates for children <5 years old have declined from a high of 70 deaths in 1990 to a low of 15 in 1999 (Ministry of Public Health, 1999). The number of diarrhea deaths prevented also increased during the 1990s, from a low of 0 deaths averted in 1990 to its present level of 140 deaths avoided in 1999 (Ministry of Public Health, 1999). In addition, the public health officials interviewed for this research pointed out that they were fulfilling their institutional duties and that their departments regularly produced and shared reports on the current water quality and health situation in Tijuana (Ilena, Francisco, Esmerelda). The reality, however, is somewhat different.

This disjuncture between official policy and local reality merits explanation. Merton theorized that the creation of paperwork and reports is often a negative side-effect of the desire for institutional integration, despite being the official means of communication within the hierarchical structure and between departments (Merton, 1968). The production of water quality reports signifies that the Departments of Environmental Health and Epidemiology are working according to their official responsibilities. Paperwork and files create a façade of action, apparently fulfilling the bureaucratic mission. The reports are symbols that the standards of Tijuana's water quality are under control and that the government is aware of the state of the public's health.

Furthermore, the integration and communication between the Departments of Environmental Health and Epidemiology are potentially an effective means to monitor environmental health risk, transmit institutional knowledge, and improve local ability to prevent the incidence of water-borne diseases in the communities most in jeopardy. But these bureaucratic goals are fractured by institutional capacity gaps and

political favoritism. As the results from the water quality measurements are not related to the primary health programs, no practical dissemination of the knowledge of poor water quality occurs. The lack of communication between departments prevents the community health specialists from being aware of the health hazards within the community.

The gathering of municipal statistical information on morbidity and mortality is of course important, but must be collected for a purpose. The failure to connect geographical location to disease rates causes the Department of Epidemiology to lose a powerful, quantitative tool to emphasize disproportionate burden of disease. The Department of Epidemiology does a disservice to itself and its clients by not communicating its statistical findings. The lack of communication downplays the potential importance of epidemiology in setting institutional priorities. It also downplays the original goal of the Ministry of Public Health, which does not warn communities about polluted water. Nor does it appear to raise institutional awareness that water-borne diseases are highly pervasive in marginalized communities. Therefore, health programs may be officially sanctioned but they do not reach the communities that need them.

There is generally a lack of integration between the various departments in Public Health, CESPT, private doctors and water companies that diminishes capacity further. Coordination is limited and there are huge gaps in institutional responsibility over the public's health. Instead of an effective integrated system that covers many factors associated with health and potable water, institutional responsibility is defined in such a limited fashion that the primary means through which communities unconnected to the municipal service system get water is unregulated by the government's water or health agencies, and individuals may only rely upon political favoritism to gain access to resources. The creation of an officially sanctioned 'need' for access is political patronage. The socio-economic study makes the granting of assistance seem like a rational response to bureaucratically sanctioned need rather than a political favor. In this instance, the socio-economic study lends legitimacy to the informal actions of the bureaucrats. It creates the façade that all public clients are equal before the institutional procedures, alongside an image of institutional transparency through the production

of a report to legitimize preferential treatment. As the rules through which the bureaucracy operates are thus inconsistently applied, the fairness of the institution's public service is limited and efficiency is compromised (Ward, 1989; Grindle, 1997). Its capacity may be invented for the case—it provides a solution for the favoritism—but is diminished in the long term. Indeed, if water quality and provision are to improve and promote health commitment, applying these bureaucratic rules may be a crucial first step.

## CONCLUSION

Increased institutional transparency and accountability are commonly cited as a possible solution to the institutional incapacity found in many public sector agencies within developing countries (Ward, 1986; Ward, 1989; Grindle, 1997). Calls for transparency and accountability are made to counteract more traditional forms of 'corruption' stemming from the manipulation of public goods for personal and political purposes. But as our case study illustrates, CESPT, the municipal organization responsible for water and sanitation services and infrastructure, is already extremely transparent. Yet this 'transparency' may only be a veneer, creating legitimacy through reports and paperwork that justify all formal and informal institutional actions. Such transparency must make clear that the capacity gaps exist between and within task networks. This recognition is a first step towards improving the coordination of actions to provide potable water and human health protection. In fact, the reorientation of task networks towards concrete goals, for example the provision of potable water to neighborhoods, may be a small step towards increased capacity and better integration. It would seem too that a task network focused on the health and the promotion of this health may engage citizens, and through them reshape political, bureaucratic resources to providing potable water in challenging circumstances.

### Address for correspondence:

John Eyles  
School of Geography and Geology  
McMaster University  
1280 Main St  
Hamilton  
ON, Canada L8S 4K1  
E-mail: eyles@mcmaster.ca

## REFERENCES

- Baxter, J. and Eyles, J. (1997) Evaluating qualitative research in social geography. *Transactions of the Institute of British Geographers*, **22**, 505–525.
- Brown, C. and Lopez, C. (1996) *Characterizing Water Contamination in the Tijuana River Watershed*. Paper presented at the Association of Borderland Scholars Annual Meeting, Reno, Nevada.
- Calva, J. (1996) Antibiotic use in a peri-urban community in Mexico: a household and drugstore survey. *Social Science and Medicine*, **42**, 1121–1129.
- Carlos, M. and Anderson, B. (1981) Political brokerage and network politics in Mexico: the case of a dominance system. In *Networks, Exchange and Coercion*. Elsevier, New York, pp. 169–187.
- Castro-Ruiz, J. L. (1997) *The Institutional Context of Water Provision in Mexico's Northern Border Cities: A Case Study*. PhD dissertation, University of Southern California, CA.
- Cosgrove, W. J. and Rijsberman, F. R. (2000) *Making Water Everybody's Business*. Earthscan Publications Ltd, London.
- del Real Mora, O., Navarro Valle, E., Martinez Andrade, M. E., Mendez Ibarro, S., Magallanes Cortes, G., Ornelas Guzman, B. et al. (eds) (1997) *Diagnostico de Salud Sectorial Del Estado de Baja California, 1997*. Instituto de Servicios de Salud Publica Del Estado de Baja California, Baja California, CA.
- Eyles, J. (1988) Interpreting the geographical world. In Eyles, J. and Smith, D. (eds) *Qualitative Approaches in Geographical Research*. Policy Press, Cambridge, pp. 1–16.
- Gilchrist, V. J. (1992) Key informant interviews. In Crabtree, B. F. and Miller, W. L. (eds) *Doing Qualitative Research*. Sage Publications, Newbury Park, CA, pp. 70–89.
- Grindle, M. S. (ed.) (1997) *Getting Good Government: Capacity Building in the Public Sectors of Developing Countries*. Harvard Institute for International Development/Harvard University Press, MA.
- Hoy, W. R. and Miskel, C. G. (1996) *Educational Administration: Theory, Research, and Practice*. 5th edition. McGraw-Hill, Toronto.
- INEGI (1998) *Municipal Statistics of Tijuana, Baja California: 1998 Edition*. Government of the State of Baja California, Tijuana.
- Kaufman, R. (1977) Corporatism, clientalism, and partisan conflict: a study of seven Latin American countries. In Malloy, J. M. (ed.) *Authoritarianism and Corporatism in Latin America*. Feffer and Simon, Inc., London, pp. 190–148.
- McMullen, C. and Eyles, J. (1999) Risky business: an analysis of claimsmaking in the development of an Ontario drinking water objective for tritium. *Social Problems*, **46**, 294–311.
- Merton, R. (1968) Bureaucratic structure and personality. In (eds) *Social Theory and Social Structure*. The Free Press, New York, pp. 249–260.
- Metzner, C. G. (ed.) (1989) *Water Quality issues of the California-Baja California Border Region*. Institute for Regional Studies of the Californias, San Diego, CA.
- Ministry of Public Health (1999) *Direction of Health Services, Advances: October 1998 to June 1999*. Ministry of Public Health, Baja California.
- Ward, P. (1986) *Welfare Politics In Mexico: Papering Over The Cracks*. Allen and Unwin, London.
- Ward, P. (ed.) (1989) *Corruption, Development, and Inequality: Soft Touch or Hard Graft?* Routledge, London.