# A Preliminary Comparison Between Local Public Health Units in the Canadian Province of Ontario and in the United States

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## Synopsis

*This comparison between public health departments in the United States and in the Canadian Province of Ontario addresses the funding and staffing and the size and program content of local health departments after Canada's national health reform provided universal access to personal health services.*

*Ontario's local health departments are required to provide a uniform set of public health services. In the United States, there is substantial variation among jurisdictions in kinds and amounts of services delivered. Ontario health units have staff sizes and budget levels that increase in proportion to population served, like those in the United States. But in Ontario, per capita expenditures increase with decreasing population, while the reverse is true in the United States. This anomaly may be attributed to lack of critical staff or elimination of key programs in small U.S. departments. Medical care of indigents probably accounts for the increased per capita costs seen in very large U.S. health departments.*

*An estimated price for uniform public health services meeting the Ontario requirements in all U.S. jurisdictions as they were organized in 1989 is $5.8 billion per annum (not adjusted for inflation). If smaller health departments were consolidated, a savings of more than $1 billion could be realized. Even with this reorganization, average expenditures in smaller U.S. health departments would need to be doubled, and staff sizes increased by about 50 percent to meet Ontario's uniform public health program standards.*

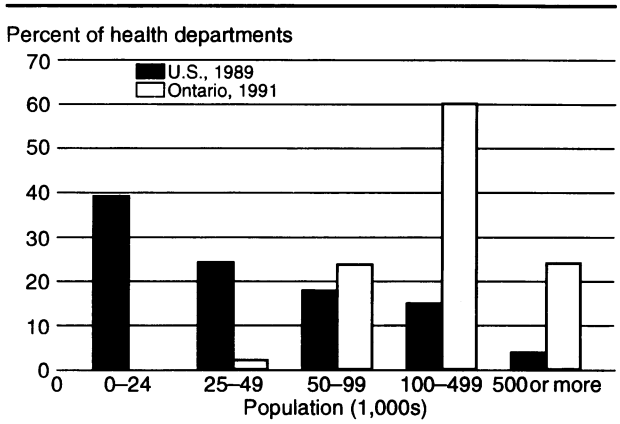
ONE NAGGING QUESTION for public health officials is "how much is enough?" to operate local public health agencies that provide essential community prevention programs. Because of the heterogeneity of health departments in the United States, there has been no simple answer to this question; indeed, some public health experts argue persuasively that the question cannot be answered because of the dispersal of health programs into agencies that aren't recognized as official health departments, such as environmental health and protection entities and departments of agriculture (*1*).

The most recent attempt to answer this question in the United States was a small survey conducted informally by the Centers for Disease Control and Prevention (CDC) that was used to estimate the current actual expenditures for population-based services administered by State and local health departments. It was described in a draft executive summary of a paper entitled "Health Care Reform and Public Health" that I received as a personal communication, July 6, 1993, from the CDC Office of Disease Prevention and Health Promotion.

A possible source of comparative data that would be germane to the post-national health reform scene in the United States is Canada, which adopted universal, comprehensive publicly funded health insurance in 1971. According to Stachenko (*2*), most Canadian public health departments now deliver few personal health services. Except in the Province of Quebec, health departments concern themselves principally with community prevention programs and what U. S. officials would identify as assurance functions. They provide clinical services only when cost is not the primary barrier to care (for example, family planning and tuberculosis treatment) (*3*).

The Province of Ontario is a particularly good example of this development. In 1983, the Province's public health laws were modernized. At that time, Ontario adopted a list of mandatory health programs, and each public health unit is required to adhere to a set of guidelines promulgated by the Provincial

Figure 1. Populations served by 1,960 (out of 2,932) local health departments in the United States, 1989, and 42 in the Province of Ontario, 1991




Ministry of Health (*4*). The Province funds most public health activities in the local health units. The 20 mandatory programs for which standards were established include the following:

- Healthy children,
- Healthy adolescents,
- Healthy adults,
- Healthy elderly,
- Tobacco use prevention,
- Substance abuse prevention,
- Nutrition promotion,
- Physical activity promotion,
- Reproductive health,
- Sexual health,
- Sexually transmitted diseases,
- Vaccine preventable diseases,
- Tuberculosis control,
- Outbreak control,
- Infection control in institutions,
- Food safety,
- Water quality,
- Rabies control,
- Emergency response, and
- Non-communicable disease investigation.

In comparing budget and personnel data from Ontario's local health units with similar information on health departments in the United States, I attempt to address two questions:

1. What are expected personnel and funding levels for local health agencies in a democracy similar to the United States where personal health services are available to all in the private sector?
2. Are there structural lessons that the U.S. health agencies should learn from Canadian experience in implementing a national program of medical care for all citizens, specifically with regard to optimal size and program content?

## Data Sources

The Ontario Ministry of Health provided tabulations showing 1991 approved budgets, populations, and 1992 personnel levels for each of the 42 health units in the Province in a personal communication in January 1993. Data for local health departments in the United States were obtained from the National Association of County Health Officials (NACHO), reflecting the results of a survey of the nearly 3,000 local health departments conducted in 1989 (*5*). Some compiled data may actually relate to previous years, but NACHO researchers did not distinguish them in the published report.

There are other data sources on local governmental activities in the United States. Some States produce statewide comparisons of local public health agency budgets and activities. The Public Health Foundation (PHF) produces summary reports on State expenditures for public health each year (*6*). This publication describes the variation in responsibilities of official health agencies in different States, but it does not attempt to account or adjust for it. Nor does the PHF produce data to the level of the individual local health agency.

The Census of Governments (*7*) reports data on health expenditures by State and local governments but uses a definition of health that includes outpatient medical services, research, and education. It also includes some, but not all, environmental health and protection services. Air and water pollution control are included, but food safety is not. There are at least two other categories in which the Census of Governments may count public health functions—protective inspection and regulation and sanitation.

The Census of Governments treats health departments accurately to the extent that they are functions of individual counties. It attributes expenses of multicounty districts to the headquarters county and aggregates local health agencies' data where multiple agencies serve a single county. It does not provide information on services or personnel in health departments. Since the purpose of this study is to compare health departments and not counties, the Census of Governments was not well suited. Its State and national aggregated figures were used as a check on the other data sources.

Neither cost per capita data nor the distribution of expenditures per capita by jurisdiction size is

available for the United States as a whole. The NACHO report only contains aggregates, presenting mean, median, and frequency statistics for discrete sizes of populations served in health jurisdictions.

## Methods

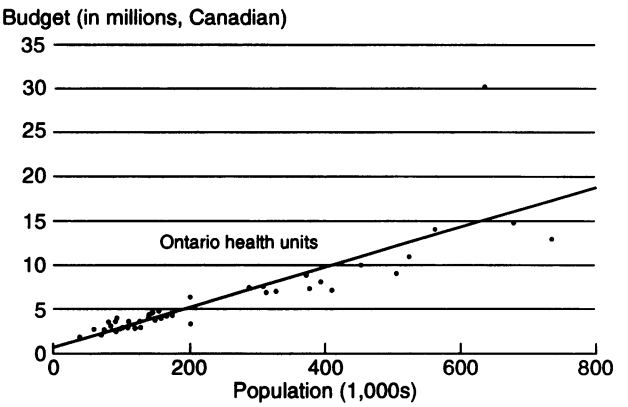
Ontario data were stratified into the same population ranges as the NACHO data for most analyses. For two-way comparisons requiring continuous values of population, Ontario data were used as presented. The means of the dependent variables (for example, budget) and the estimated mean population served by local health departments in each group defined by NACHO were used for U.S. health departments.

Group population means were estimated by assuming that the population distribution of health departments in the United States could be represented graphically by a set of triangular and trapezoidal regions. Once these regions were constructed, the mean population of each group was calculated by integration.

The number of health departments in each group was first corrected for underreporting by dividing by the proportion that responded to the NACHO survey. The probability density function that represented health department frequency as a function of population served was assumed to satisfy simple boundary conditions—(*a*) it was obviously zero at a population of zero; (*b*) its mode lay within the first population group (0–24,999); (*c*) it was assumed continuous at interval boundaries; and (*d*) it was obviously zero for some unknown upper limit. The total population served by all health departments except the largest ones was then estimated by integrating the curve thus constructed. The population served by the group of largest health departments was estimated by subtracting this result from the 1990 U.S. population. Finally, the right-hand limit of the largest group was calculated so that the area under this triangular region was equal to the estimated population served. This assumed that each person in the United States is served by exactly one local health agency.

The per capita cost of providing public health services in Ontario was modeled using linear regression with population served as the independent variable. This regression model was used, in turn, to estimate the cost of providing a similar mix of services in the United States under two alternative arrangements. The first assumed that the current local health agencies were funded at the per capita level required for the mean population size agency in their population group. In the second, the number and size

Figure 2. Annual budgets of Ontario's local health units plotted against the size of the population served




of local health departments was adjusted so that the proportion of local health departments in each population stratum was the same as in Ontario, while the total population served remained constant.

No correction was made for inflation or program changes during the periods compared. There may be 2 years or more difference between the Ontario data and the U.S. data. Anecdotal reports suggest that correcting for this difference would, if anything, accentuate differences between the two countries. Comparison between U.S. and Canadian costs were expressed in U.S. dollars at an approximate conversion rate of $6 Canadian = $5 U.S.

The data may not be comparable between the two countries. In the United States, the programs and responsibilities of local health departments vary from State to State as well as within States. Particularly in the area of environmental health and protection programs, it is possible that work not done by U.S. local health agencies is nonetheless carried out by another public agency at the local level.

## Results

Figure 1 shows the distribution of the 42 Ontario health units by size, compared with the same information for the 1,960 (out of about 2,932) U.S. local health departments that reported population served. According to NACHO, the most underreporting in the survey occurred in smaller health jurisdictions; therefore figure 1 probably minimizes the differences between Ontario and the United States, although the differences are striking.

Most U.S. local health agencies serve populations of less that 50,000; in Ontario, most serve populations greater than 100,000. Like the United States, Ontario is geographically and culturally diverse,

Figure 3. Comparison of local health unit budgets for Ontario and the United States plotted against the size of the population served

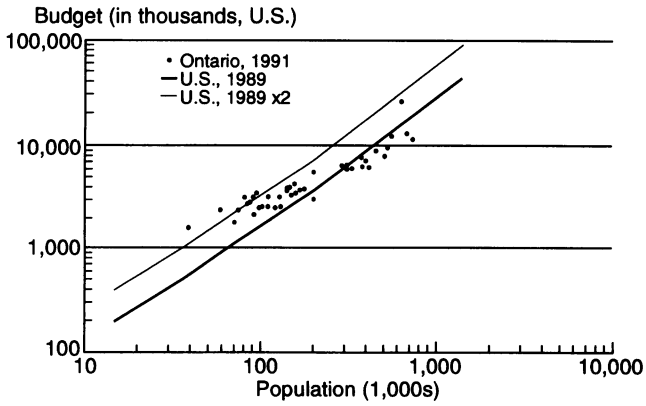



Figure 4. Per capita expenditures by local health departments in Ontario and the United States

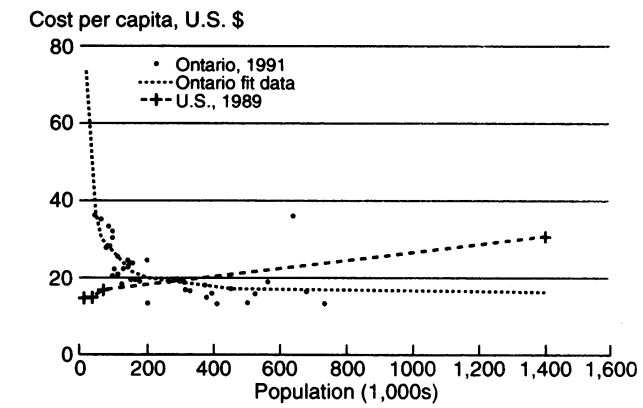
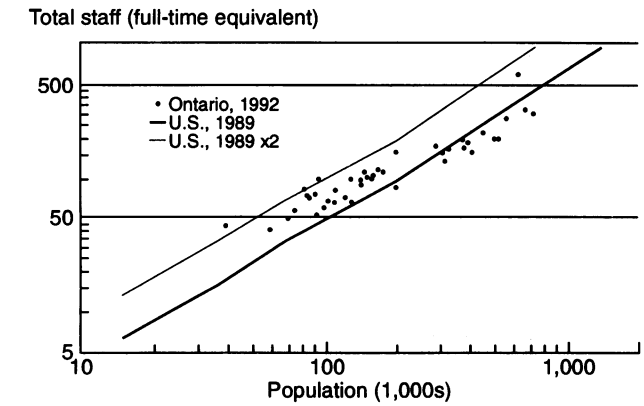



Figure 5. Total full-time staff of local health departments in Ontario and the United States by population served




containing major cities, suburbs, and rural areas as well as multiple ethnic groups and wide variations in occupation and industry throughout the Province. Yet Ontario has a much narrower distribution of health unit sizes. Because of grouping, the U.S. data shown do not illustrate well the extremes. The range of population served by U.S. health departments is from a few thousand to more than 7 million persons. This approximate three order of magnitude range is far greater than Ontario's 1.5 order of magnitude spread from 39,000 to more than 700,000.

Figure 2 is a plot of Ontario annual public health expenditures against health unit population (each in thousands). With one outlier (the city of Toronto, the largest urban area in the Province), the budget for each unit is highly correlated with that unit's size ($r^2$ = 0.713). The linear regression suggests that the incremental cost for providing public health services in the Province was $22.63 Canadian per capita for 1991.

Figure 3 shows U.S. and Ontario data on the same axes, comparing annual expenditures in U.S. dollars. The dotted line shows twice the average expenditures for the U.S. departments. Except for the largest jurisdictions, Ontario health departments spent substantially more for public health services than did those in the United States that served similar size populations.

Figure 1 showed that the majority of U.S. local health departments serve less than 100,000 persons. At that end of the population distribution, all but one Ontario health unit spent at least twice the amount of its U.S. counterpart.

Figure 4 provides further comparison of the differences in expenditures. In this figure, the actual per capita expenditures for each Ontario health unit are compared with estimated U.S. per capita amounts (both expressed as U.S. dollars). Ontario health unit per capita expenditures appear to have exceeded those of the United States except in the largest health jurisdictions. More importantly, the apparent correlation between population served and per capita expenditures was negative in Ontario but positive in the United States.

The dotted line in the figure is a linear least squares fit of the reciprocal of the jurisdictional population in Ontario to per capita expenditures ($r^2$ = 0.492). The model predicts expenditures of U.S. $37.32 per capita per year to supply the mandated public health services in a health department that serves 50,000 people in Ontario in 1991, and steadily diminishing per capita costs in areas with larger populations. But in the United States, per capita expenditures for local public health increased with

Cost of local public health services in the United States by size of local health department, using the Ontario per Capita Cost Model

| Department characteristics | Size of jurisdiction (1,000s) | | | | | Total |
|---|---|---|---|---|---|---|
| | 0–24 | 25–49 | 50–99 | 100–499 | 500 or more | |
| *Current departments* | | | | | | |
| Estimated number | 1,068 | 577 | 422 | 328 | 82 | 3,014 |
| Population served (millions) | 15.7 | 20.8 | 29.0 | 66.4 | 114.5 | 246.4 |
| Average cost per capita | $74 | $39 | $28 | $19 | $16 | . . . |
| Total cost (millions of dollars) | $1,162 | $811 | $801 | $1,277 | $1,784 | $5,835 |
| *Consolidated departments* | | | | | | |
| Number | . . . | 24 | 245 | 612 | 147 | 1,028 |
| Population served (millions) | . . . | 1.0 | 20.3 | 136.2 | 89.0 | 246.4 |
| Average cost per capita | . . . | $37 | $25 | $19 | $16 | . . . |
| Total cost (millions of dollars) | . . . | $35 | $517 | $2,567 | $1,458 | $4,577 |

increasing population served, from less than $13 per capita in departments serving fewer than 25,000 people, to more than $30 per capita in the largest departments.

Figure 5 compares staffing at local health departments in both countries. On this log-log plot, the Ontario units' staffing levels tightly cluster around a line with a slope of 0.73 ($r^2$ = 0.886). On average, it appears that Ontario health units had at least 1½ times the full-time equivalent staffing as U.S. departments that are the same size, except for the largest U.S. jurisdictions.

The table illustrates the results of applying the linear regression model to U.S. health departments. In 1989, it would have cost more than $1 billion to fund the 1,000 smallest health departments to deliver the Ontario public health services at $74 per capita. Total system cost would have been $5.8 billion. If health departments were generally consolidated to achieve a total service population distribution comparable to Ontario's, the total system cost would have declined by more than $1.3 billion. Even if the $74 per capita estimated cost in the smallest departments were twice the actual cost, this organizational model would have cost $500 million more than the alternative, consolidated model.

## Discussion

In Ontario there was a pronounced tendency for increased costs in smaller population areas, probably explainable by sparse populations in certain districts requiring a larger per capita expenditure to meet the mandatory service requirements. The NACHO data reflect substantially smaller mean expenditures, but only present averages and do not show the variations of practice in the United States. Nevertheless, the regression in figure 4 clearly shows that, on average, smaller health departments here spent far less per capita in 1989 than their counterparts did in Ontario 2 years later.

*'. . . most Canadian public health departments now deliver few personal health services. Except in the Province of Quebec, health departments concern themselves principally with community prevention programs and what U. S. officials would identify as assurance functions.'*

At the opposite end of the spectrum, it appears that U.S. departments outspent large Ontario units. This observation does not seem reasonable in view of the chronic complaints of deteriorating urban public health infrastructure, with less traditional public health services provided to fewer people, resulting in disease outbreaks and public health hazards. The most likely explanation for this discrepancy is the burden of medical care services for medically indigent people.

Ontario health agencies did not need to provide these services, but in the United States there has been heavy political pressure for large urban health departments to be medical providers. The question NACHO asked health agencies was about total budget, not expenditures for specific public health programs. If the medical care costs could be subtracted, it is probable that the per capita figure for large urban health agencies would be no greater than $15, based on comparison between services provided in the largest (500,000 or more population)—with reported per capita costs of about $31—and second

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largest (100,000–499,999 population) jurisdictions in the United States with reported costs of $18.

NACHO's report notes that primary care was provided by 59 percent of the largest departments, but by just 34 percent of those in the second largest group. Other clinical services show similar patterns, for example, prenatal care (83 percent versus 73), mental health (34 percent versus 12), drug abuse (40 percent versus 18) and especially hospitals (15 percent versus 3).

Although the NACHO data support an important contribution of individual medical care service expenditures to the difference in per capita spending between small and large U.S. health departments, another possible cause is the Federal Women, Infants, and Children (WIC) Nutrition Program. WIC comprises a substantial portion of most State health departments' budgets, and WIC eligibility depends on both income and health status. Urban health departments will have disproportionately large WIC caseloads. Ontario does not have a comparable program in its mandated health services. Since WIC is not labor intensive (by law), its existence cannot explain differences in staffing observed between small and large U.S. health departments, though it can affect budget differences.

Why do small health departments in Ontario spend so much more per capita than U.S. departments? One explanation may be population density. Canada is a less densely populated country than the United States, but Ontario is the most densely populated province in Canada. A more likely explanation can be found in the NACHO data. The smallest health agencies in the United States provided far fewer services than larger ones. Only five out of six of the smallest health departments collect communicable disease data, compared with virtually all of the largest ones. Less than half did health planning, one out of three did not provide health education, and slightly more than half offered vector and animal control services, compared with more than 80 percent of the largest agencies in each service area.

One factor contributing to the discrepancy is that the smallest departments also were far less likely to have the range of personnel necessary to cover the breadth of contemporary public health practice. Epidemiologists or statisticians were found in only 4 percent of the smallest departments but 5/6ths of the largest. There were also large differences among planners, health educators, and sanitarians.

It is possible that some of the difference in per capita spending is due to the diversion of environmental health and protection activities from smaller health departments in the United States to other units of government. Although this could account for part of the difference, it could not be responsible for a twofold change, since these programs do not account for half of the Ontario agencies' budgets, and since not all of even the smallest U.S. health departments lack environmental health programs (nor do the largest ones necessarily have them).

It may be that all of the public health functions not performed by local health departments in the United States are assumed by State agencies. Ultimately, States have the responsibility for assuring public health and safety. However, there is good anecdotal evidence suggesting this is not the case. Many of the services previously noted are, in any event, most appropriately delivered at a local level. Recognizing this, the State of Washington has recently proposed doubling statewide expenditures for public health services, with much of the increase devoted to strengthening local health agencies (*8*).

It is possible that U.S. health departments are spending more for public health than is apparent and that data are systematically underreported. One observation that supports this view is the discrepancy between the Census of Governments and the NACHO-PHF findings. In the Census of Governments it was found that in 1987, State governments spent $9.2 billion for health, and local governments spent $7.7 billion. The PHF figures for 1988 were $6.6 billion by States and $4.0 billion by locals. The NACHO total for local expenditures in 1989 was $5.7 billion. These NACHO-PHF numbers exclude intergovernmental transfers.

Ignoring the effect of single year changes, we see that the broadest definition of health yields the largest estimated total expenditure, and voluntary reporting produces the smallest. It is important to note, however, that the census total almost certainly includes even more indigent health care than does NACHO's, since many States mandate local govern-

ment provision of such services, even in smaller counties. Considering the staffing and budgetary reports of very small health departments, NACHO's data cannot reflect very much indigent care in those jurisdictions.

The probable, and not-very-surprising explanation for observed differences is that smaller health agencies in the United States provided less of the core public health services than larger ones. Generally, U.S. agencies do not have to adhere to a strict set of program guidelines as they do in Ontario. The extrapolated Ontario data suggest that providing services at a comparable level to that Province in the smallest U.S. health agencies would be prohibitively expensive. It could approach $74 per capita in health departments with service populations of less than 25,000.

Once the burden of medical care service is removed from larger health agencies, their need for public health funds may decline, because these moneys may no longer be paying for personal health services. Then, a distribution of public health funding that accounts for the population size that the agency serves may be appropriate. If it were accompanied by consolidation of small local health departments, substantial savings might be realized.

The relative affluence of Ontario's local health units compared with U.S. local health departments of the same size provides little empirical support for fears that a universal system of personal health services resulted in curtailment of public health department services. Time series data from Ontario around the time of implementation of universal health coverage would provide a better record of the impact of universal health care on public health than these cross-national comparisons.

The apparent strengths of the Ontario system may be related to intensive Provincial supervision, assured funding, and mandated program content. Further study would be needed to determine if Ontario is unique within Canada or within countries that have established national programs of personal health service delivery. Comparative field audits would be required to see if the service delivered by Ontario agencies are of similar or higher quality and efficacy as those delivered in the United States. It would be particularly useful to do this before changes are made in the U.S. health system.

This preliminary study does not answer the question "How much is enough?" that was posed at the outset. Most observers of small U.S. local health departments would probably say that their services are generally "not enough" to meet their service population's public health needs. About 50 years ago, the American Public Health Association suggested that local health units should have a minimum population base of 50,000, as well as specific staff ratios including one public health nurse per 5,000 population (*9*).

This report reinforces the notion of a minimum viable size for local health departments. It also suggests a need for extra financial and administrative support for smaller agencies in sparsely populated areas. This will be critical in meeting Healthy People 2000 objective 8.14, assuring that citizens will have access to a local public health department that is effectively carrying out the core functions of public health (*10*).

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