USING A GEOGRAPHIC INFORMATION SYSTEM TO ANALYZE PUBLIC LIBRARY PERFORMANCE MEASURES

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ABSTRACT

This exploratory study analyzed the spatial distribution of selected measures from the 2003 public library statistics for the province of Ontario, Canada, using the geographic information system (GIS) ArcGIS Desktop. The data consisted of performance indicators covering the broad categories of general information, staff, collections, service transactions, and expenditures. Selected key ratios that normalized the data for the population served among the 303 Ontario public libraries in the data set were examined to try and identify spatial patterns and regional differences, and analyses were also performed after categorizing the public libraries into intervals based on the size of the population served. As well, an additional goal of this study was to make an assessment regarding the utility of using geographic information systems to analyze public library performance measures. The results indicated that for certain performance measures there are differences in normalized values both regionally as well as among population served categories, and that visualizing library performance measure data is a powerful technique for revealing statistical patterns. Consequently, geographic information systems have the potential to reveal hidden dimensions within library performance measure data, and they can be effectively used to analyze and better understand library metrics in the quest to articulate the value and importance of public libraries.

OBJECTIVES

The objectives of this study were to investigate if there were any spatial patterns in selected library performance measures for Ontario public libraries, and to determine the usefulness of using geographic information systems to analyze public library statistics. Specifically, the study sought to answer the following questions:
- Are there regional patterns or differences exhibited for various Ontario public library performance measures?
- Can geographic information systems be used as effective visualization tools to explore, analyze, and better understand public library performance measures?

To answer these questions, an exploratory study was designed to analyze selected Ontario public library measures using the geographic information system ArcGIS Desktop (ArcView 9.1).

LITERATURE REVIEW

Libraries—academic, public, and special (for-profit, government, and not-for-profit)—collect a variety of statistics (or performance measures) to assess library use and the effectiveness of library services. Library performance measures also give an indication of the cultural and economic benefits libraries and librarians provide to their patrons and communities. Although there have been some studies examining georeferenced demographic data with respect to the point locations of main libraries and branch public library outlets, and other studies that use geographic information systems in library facilities planning, a thorough review of the literature indicates that there have been very few studies devoted to analyzing the possible spatial patterns in public library statistical data. In fact, only one study, by McConnaughy and Wilson (2006), was found that explicitly incorporated spatial analyses of public library performance measures. The literature that informed this study came from three areas: GIS use in

library planning and operations, public library performance measures research and statistical reports, and geovisualization studies.

Much of the literature relating to geographic information systems in the context of libraries (other than the use of GIS in reference services) has to do with patron use studies and library location analyses. For example, geographic information systems have been used to examine library market areas and user characteristics (Jue et al., 1999; Koontz, 1996; Koontz & Jue, 2002; Ottensmann, 1997), and Koontz and Jue (2001) discuss using GIS for new library location analyses. As mentioned above, McConnaughy and Wilson (2006) analyzed aggregated county-level library statistics with a GIS to identify prospective marketing areas for a library. A study combining library user characteristics and branch location planning was reported by Kinikin (2004). Another library-related use of GIS and library market demographic data has been in facilitating collection development (LaRue, 2004).

A series of interesting studies using geographic information systems to examine activities and space management issues within libraries has been carried out by Xia. Xia used GIS to investigate in-library book use patterns (2004a, 2004c), space management studies (2004b, 2005b), and enhancing the OPAC (online public access catalog) with GIS-created maps that indicate where in the library items are located (2005a). Finally, national georeferenced databases of public library statistics include South Africa's Public and Community Libraries Inventory of South Africa (PaCLISA) project (Lor et al., 2005); the United States' Public Library Geographic Database (PLGDB), a project of the GeoLib Program (Florida, 2004; Koontz, 2005; Koontz et al., 2004); and the U.S.-based Normative Data Project for Libraries (Library, 2006).

Library performance measures that were useful and appropriate to use in this study were selected after consulting various public library performance measures manuals and statistical reports. The literature on public library performance measures and standards is quite extensive. Classic manuals include works by DeProspo et al. (1973), Van House et al. (1987), and Smith (1996). Other monographs have discussed the importance of establishing dimensions of public library effectiveness (Matthews, 2004; Van House & Childers, 1993). Two influential manuals that are commonly consulted in the library assessment process are by Bertot et al. (2001) and Hennen (2004): Bertot et al. examine the topic of electronic performance measures, and they establish a core set of electronic resources and services measures; Hennen provides a comprehensive treatment of public library planning topics, and his manual contains much useful information on comparative public library analyses and effective performance indicators. Finally, a U.S. national study by Koontz et al. (2005) developed new in-library use performance measures using data collected from personal digital data collectors.

There are a number of American and Canadian annual public library statistical reports, at both the state- and provincial-level as well as the national-level—various national statistical reports were examined to help guide the present study in the selection, formulation, and analysis of public library performance measures. The National Center for Education Statistics produces an annual report summarizing U.S. state public library data, which includes numerous tables of performance indicators as well as key findings—Chute et al. (2005) authored the latest report covering fiscal year 2004. The Public Library Association, a division of the American Library Association, produces a similar annual statistical report chronicling various aggregated output measures for American public libraries (Public, 2004). Schrader and Brundin (2002) analyzed the data collected from the 1999 survey of the National Core Library Statistics Program, a Library and Archives Canada national program to periodically analyze core statistics collected from public, academic, and special libraries.

Techniques and concepts associated with visualizing geospatial data were useful in helping to shape the presentation of the project geodatabase layers, and in finalizing the format and display of the generated maps. MacEachren and Kraak (2001) outline some of the important themes and research challenges in geovisualization, and they include recommendations for future research activities in geovisualization. Monographs by Kraak and Ormeling (2003) and Slocum et al. (2005) provide a good introduction to various concepts in cartography and geovisualization, and the broader subject of information visualization is thoroughly explored by Spence (2001). Finally, and with particular relevance to this study, Tufte (1990, 2001) examines data graphics and the design of statistical graphics.

METHODS

Data Preparation Procedures

The principal data preparation tasks were data collection, data processing, and geodatabase creation. As with most GIS projects, it was a very iterative process, with various data revisions taking place as the study progressed, and thus many of the steps were repeated.

Data collection. The first step was to collect the necessary data. The data for the study consist of two primary types: base map spatial data, and library statistics (or performance measures) attribute data. The base map spatial data are the Ontario subset of DMTI Spatial's Canadian Atlas Map Bundle (DMTI Spatial, 2006), which is compiled from Natural Resources Canada's National Atlas Information Service (NAIS) digital maps and Populated Placenames and Landmarks files. The spatial data are two-dimensional layered vector data, in ArcView format, and at a scale of 1:2,000,000.

The library statistics attribute data consist of selected performance measures from the 2003 Ontario public library statistics. These data are collected and made available by the Heritage and Libraries Branch of the Ontario Ministry of Culture (Ontario, 2005), and cover the broad categories of general, financial, holdings, activities, and personnel information.

Data processing. There were a number of tasks that needed to be performed to process the data (i.e., geoprocessing) so that the data were in a proper form for data analysis. The processing of the spatial data was rather straightforward—the spatial data were in zipped format in 20 files, so ArcCatalog (one of the primary applications in ArcGIS, the other being ArcMap) was used to unzip the spatial data files. The library statistics data consisted of 320 records and 104 variables in a Microsoft Excel spreadsheet. From these variables, and after reviewing the literature, 6 core variables of interest were selected that covered the broad categories of general information, staff, collections, service transactions, and expenditures: service points, paid staff FTE, volumes, reference transactions, circulation transactions, and operating expenditures. Five other variables that provided important information were also selected: library ID number, library name, city name (city that the library is situated in), population served (service area population, or library service territory), and library service region (OLS-N [Ontario Library Service— North], or SOLS [Southern Ontario Library Service]). These data were then imported into the statistical program SPSS for Windows for further data processing.

In SPSS, a 12th variable was created that categorized the population served variable into the 8 population served intervals that are used by the Ontario Heritage and Libraries Branch: Under 2,500 (actually treated as ≤ 2,500); 2,501–5,000; 5,001–15,000; 15,001–30,000; 30,001–50,000; 50,001–100,000; 100,001–250,000; Over 250,000. Various summation operations were then performed, such as adding up the additive component variables to get the total service points and total volumes figures. Various calculations needed to be carried out to determine the staff FTE figures. Error checking and data validation routines were also conducted, such as performing outlier range checks. The 6 selected performance measures variables were then normalized for library comparative purposes by dividing each metric of interest by the population served, and service points and staff FTE were also then multiplied by 1,000. The final performance measure ratios were as follows:

- service points per 1,000
- staff FTE per 1,000
- volumes per capita
- reference transactions per capita
- circulation transactions per capita
- operating expenditures per capita

The revised SPSS data file was then imported into a Microsoft Access database so that it could later be imported into the ArcGIS geodatabase as feature attribute data.

Geodatabase creation. A geodatabase is a geospatial data framework model for ArcGIS that has at its core a Microsoft Access relational database. ArcCatalog was used in the following operations to create the geodatabase. First, an empty geodatabase was created, and then the unzipped vector format feature classes from the DMTI Spatial Canadian Atlas Map Bundle were imported into the geodatabase. The spatial data populated place name feature classes (Microsoft Access tables) were contained in 3 different classes (Communities, Hamlets, and Settlements— 5,381 records; Towns and Villages—298 records; and Cities—50 records), so a merge operation was performed to create 1 populated place name feature class that contained 5,729 records. Next, the processed Ontario library statistics data were imported into the geodatabase as a non-spatial table from the Microsoft Access database that was created earlier. It was necessary to link the spatial data with the library statistics data, so a one-to-one join operation was performed on a common field: the "name" field in the merged populated place name table, and the "city" field in the library statistics table. The join operation on the two tables was done using Microsoft Access, although the more common approach is to create the join using ArcMap.

Because there were a number of duplicate names in the populated place name table (i.e., place names that were the same), the Canadian Geographical Names Database (CGNDB) (Canada, 2007) was used to determine the correct record in the populated place name table that should be linked to the corresponding record in the library statistics

table. The CGNDB was also used to resolve discrepancies in the naming of a particular place between the populated place names table and the library statistics table. The final library statistics table contained 303 records:

- Libraries serving under 2,500 people: 102 records
- Libraries serving 2,501–5000 people: 42 records
- Libraries serving 5,001–15,000 people: 72 records
- Libraries serving 15,001–30,000 people: 29 records
- Libraries serving 30,001–50,000 people: 17 records
- Libraries serving 50,001–100,000 people: 19 records
- Libraries serving:100,001–250,000 people: 16 records
- Libraries serving over 250,000 people: 6 records

Data Analysis

The primary data analysis tasks were layers creation and maps creation. All of the operations in the data analysis phase of the study were performed using ArcMap, except for some additional statistical analyses that were performed using SPSS (calculation of percentiles and means, and the generation of various bar graphs).

Layers creation. In addition to the merged populated place names layer that also contained joined library statistics attribute data, the other layers that were used from the Canadian Atlas spatial data set were the Ontario land area, political boundary, and lakes layers; these were used to provide spatial context for the populated place names layers. These layers were referenced from the geodatabase and added to a map document created in ArcMap. Before new layers could be created, some decisions had to be made regarding the classification method and symbolization approach that would be used. Following the practice of many library manuals and statistical reports which commonly employ 25th, 50th, and 75th percentiles (and after experimenting with different classification methods and numbers of classes), it was decided that the most effective classification approach for the analysis layers was to use a quantile classification method using 4 classes, otherwise known as quartiles (the frequency distribution is divided into 4 classes of equal frequency counts). For greater clarity and comprehension, graduated symbols were used to differentiate between the 4 class intervals, and then different contrasting colors were then manually associated with each of the 4 symbols, producing a hybrid graduated symbols, different colors, effect. Experiments in varying the symbol shape revealed that this was not as effective as varying the size and the color. Employing both symbol size and symbol color judiciously allowed up to 3 different dimensions to be represented in a single map.

Using various attribute definition queries, and the established classification method and symbolization technique, an additional 68 layers were created for the analyses and saved to the map document. These layers were then carefully examined to try and identify patterns and relationships using a variety of techniques: zooming in to layers to differentiate tightly packed clusters of symbols; combining layers using transparent overlays; and combining layers using "select by attributes" queries. Layers creation and analyses were done not only for the aggregate performance measures data for all libraries, but also for each population served category, so that meaningful comparisons among libraries of a similar size could be made.

Maps creation. The final task in the data analysis process was to create a series of maps that effectively illustrated the insights and findings that had been obtained from the earlier layer analyses. This required adding the map elements of "title" and "legend" to the layer in "layout view" (as opposed to "data view"), reconfiguring the sub-elements of the title and legend elements, and then adjusting the layout design of the map elements to achieve the desired effect. The finished maps were then exported as TIFF files, and then incorporated into the study report.

FINDINGS

Regional Patterns for Performance Measures

Some interesting findings emerged from the GIS analyses and the supporting SPSS analyses. Table 1 shows the median values for the 6 performance measures by the population served, as well as the number of libraries reporting each figure. Tabular data formats are how library performance measures are commonly reported in statistical reports. Although this is an effective format for communicating both individual library statistics as well as summary statistics, there are some inherent limitations with this approach. For example, in Table 1 it is rather difficult to discern any patterns for the 6 performance measures among the 8 population categories, and it is impossible to determine any possible regional patterns.

Table 1. Selected Performance Measures by Population Served Category*

Performance Measure	Population Served Category								
	Under 2,500	2,501–5,000	5,001–15,000	15,001–30,000	30,001–50,000	50,001–100,000	100,001–250,000	Over 250,000	All libraries
Median Serv. Pts. Per 1,000	1.2800	0.3350	0.1600	0.0700	0.0400	0.0400	0.0400	0.0500	0.2800
Libraries reporting	*102*	*42*	*72*	*29*	*17*	*19*	*16*	*6*	*303*
Median Staff FTE Per 1,000	0.8650	0.5050	0.4000	0.4400	0.5200	0.4800	0.5700	0.6400	0.5100
Libraries reporting	*102*	*42*	*72*	*29*	*17*	*19*	*16*	*6*	*303*
Median Volumes Per Capita	8.7300	5.0150	3.7500	3.3200	2.9800	2.6200	2.8400	2.6150	4.0900
Libraries reporting	*102*	*42*	*72*	*29*	*17*	*19*	*16*	*6*	*303*
Median Ref. Tran. Per Capita	0.8500	0.6150	0.5100	0.4700	0.7800	0.8600	0.8500	1.0550	0.6900
Libraries reporting	*102*	*42*	*72*	*29*	*17*	*19*	*16*	*6*	*303*
Median Cir. Tran. Per Capita	5.9450	5.5700	6.4500	7.8600	6.8600	8.5900	9.6700	11.8450	6.8000
Libraries reporting	*102*	*42*	*72*	*29*	*17*	*19*	*16*	*6*	*303*
Median Op. Exp. Per Capita	$40.9300	$24.8000	$24.6200	$30.2300	$32.0400	$33.1500	$38.3000	$43.7300	$31.1300
Libraries reporting	*102*	*42*	*72*	*29*	*17*	*19*	*16*	*6*	*303*

* Note: there are very slight differences in some of the median values listed in this table, which were calculated using SPSS, and the corresponding median values that accompany the performance measure maps that follow, which were calculated using ArcGIS—this is due to the different algorithms that the two programs use in determining these median values.

Figure 1 and Figure 2 show SPSS-generated bar charts for the median values by the 8 population served categories for the 2 performance measures volumes per capita and operating expenditures per capita.
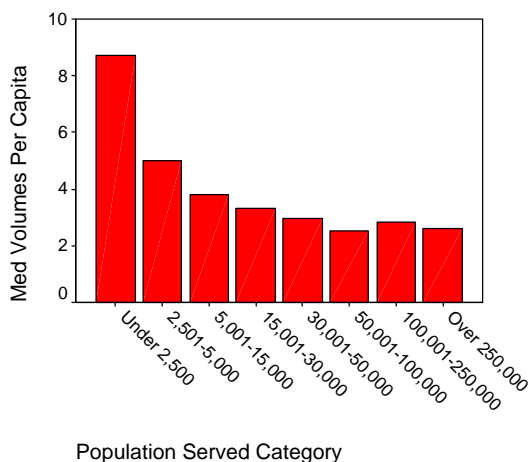

Figure 1. Bar chart of median volumes per capita by population served category.
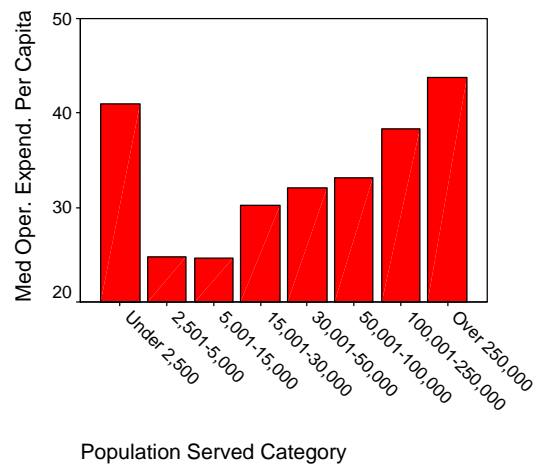
Figure 2. Bar chart of median operating expenditures per capita by population served category.

It is immediately apparent that there are certain patterns in the data: median volumes per capita decreases as the population served category increases; and median operating expenditures per capita (except for the anomalous "Under 2,500" category) increases as the population served category increases. The bar charts for the other 4 performance measures showed the following patterns: median service points per 1,000 decreased as the population served category increased; median circulation transactions per capita increased as the population served category increased; and median staff FTE per 1,000 and median reference transactions per capita exhibited U-shaped patterns, wherein the median values first decreased and then increased as the population served category increased. Although it is possible to discern these distribution patterns in tabular form if the tabular data are carefully examined, it is

clear that the visualization of the data in graphical form greatly aids in discovering these hitherto hidden patterns. However, it is still not possible to discover any regional patterns using this approach.

Using ArcGIS to generate the maps, the map in Figure 3 shows the 303 Ontario public libraries in the data set categorized by population served category, and it is immediately clear how the libraries are distributed throughout the province, with libraries in the north relatively far apart, and libraries in the south more closely situated. It is also apparent that libraries in the north are relatively small in terms of population served, whereas in the south there is a range of library sizes.

The maps represented in Figure 4 and Figure 5 show the performance measures volumes per capita and operating expenditures per capita classified into quartiles. Both maps reveal a similar pattern, that, in general, there are higher intervallic values in the north and smaller intervallic values in the south; this same pattern is also present in the quartile classification maps that were generated for the other 4 performance measures. Given what we now know from the SPSS analyses and the relationships between the median performance measure values and
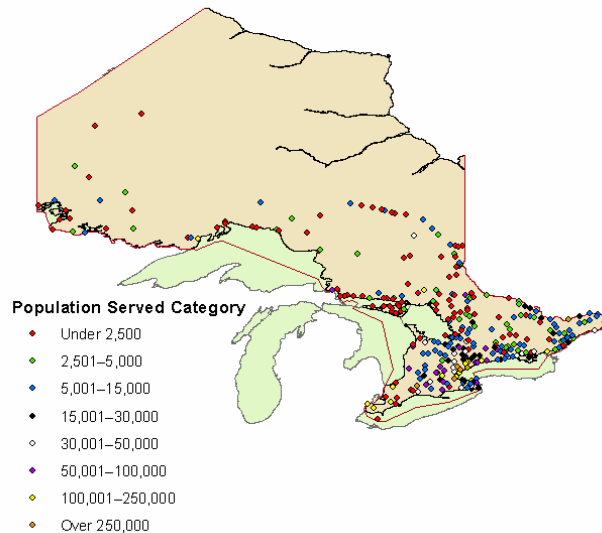

Figure 3. Map of 303 Ontario public libraries showing population served category, and classified into categories using different colors.
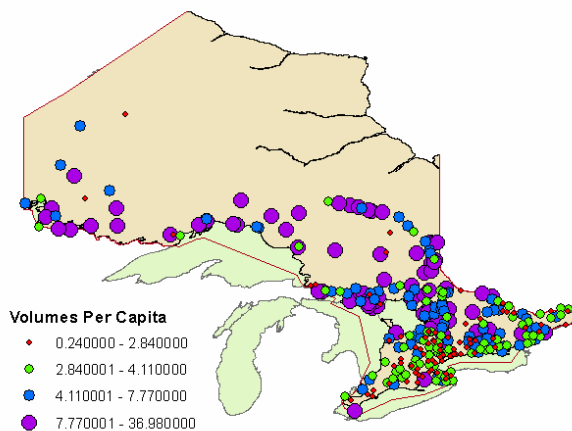

Figure 4. Map of 303 Ontario public libraries showing volumes per capita, and classified into quartile categories using different colors and graduated symbols.
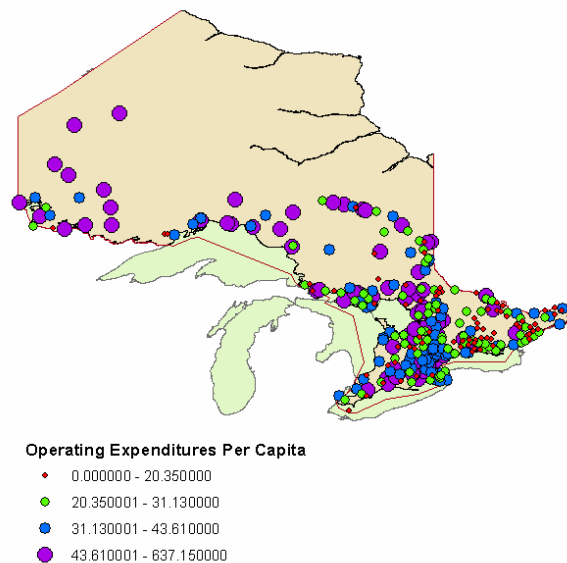

Figure 5. Map of 303 Ontario public libraries showing operating expenditures per capita, and classified into quartile categories using different colors and graduated symbols.

the population served category size, this makes sense for the service points per 1,000 and volumes per capita performance measures (the SPSS analysis showing measure values decreasing as the population served category increases), but not as much sense for the staff FTE per 1,000 and reference transactions per capita measures (the SPSS analysis showing measure values exhibiting a parabolic pattern from the lowest population served category to the highest population served category), and definitely not making sense for the circulation per capita

and operating expenditures per capita measures (the SPSS analysis showing measure values *increasing* as the population served category increases).

There are also various micro-regional patterns, such as the uniformly low category interval values in the southeast region of Ontario. Figure 6 is a zoomed-in perspective (relative to Figure 5) on the southeast region of the province, and it reveals that the region in the middle-right portion of the map has a majority of libraries that have relatively low operating expenditures per capita, irrespective of the population served. This suggests that this is a region of the province that warrants increased public library funding.

The Figures 7 through 9 reveal that the hidden pattern uncovered earlier, that performance measure values were lower in the south than in the north of Ontario for the entire population of Ontario public libraries, is also true *within* population categories; this same pattern was also exhibited by the other 5 performance measures for these 3 population categories. This accounts for the seeming contradiction discussed earlier (i.e., between the SPSS analyses and the ArcGIS analyses), in that operating expenditures per capita do *increase* as population served increases, but operating expenditures per capita are also *higher* in northern Ontario
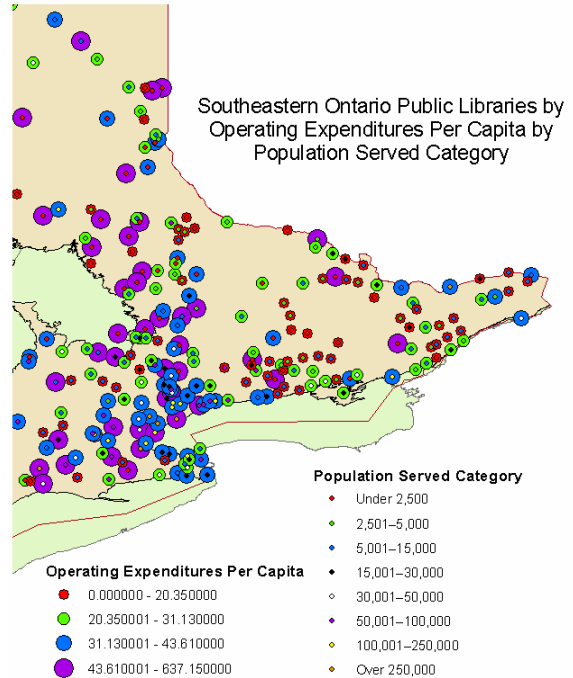

Figure 6. Multivariate overlay map zoomed in on 222 southeastern Ontario public libraries showing operating expenditures per capita on the bottom layer, and classified into quartile categories using different colors and oversized graduated symbols; and population served category on the top layer, and classified into categories using different colors.

than in southern Ontario. Thus the latter phenomenon offsets the former phenomenon, resulting in the pattern outlined above. This illustrates the deeper analysis that is possible when using geographic information systems to examine public library performance measures.

Finally, a number of map overlays were produced to probe associations and correlations between variables. For example, Figure 10 is a map of southern Ontario showing the relatively strong association between staff FTE per 1,000 and reference transactions per capita; libraries that had identical percentile interval categories for the two variables have symbols the same size, and the semitransparent staffing layer allows the lower reference layer symbols to be visible. SPSS analysis revealed that the Pearson correlation coefficient between staff FTE per 1,000 and reference transactions per capita for all 303 libraries is a relatively high 0.553.
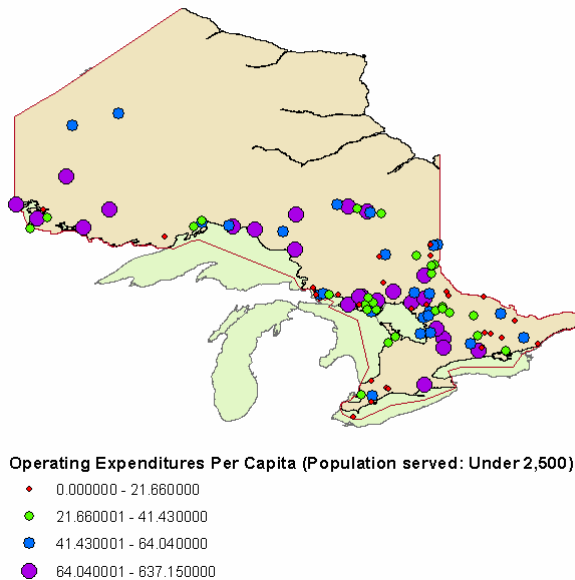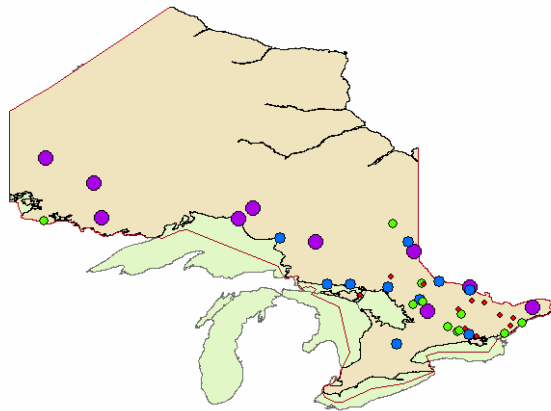

Figure 7. Map of 102 Ontario public libraries serving populations under 2,500 and showing operating expenditures per capita, and classified into quartile categories using different colors and graduated symbols.

Ontario Public Libraries by
Operating Expenditures Per Capita by
Population Served Category—2,501–5,000

Operating Expenditures Per Capita (Population served: 2,501–5,000)
- 6.970000 - 15.470000
- 15.470001 - 24.950000
- 24.950001 - 31.250000
- 31.250001 - 66.160000

Figure 8. Map of 42 Ontario public libraries serving populations from 2,501 to 5,000 and showing operating expenditures per capita, and classified into quartile categories using different colors and graduated symbols.

Ontario Public Libraries by
Operating Expenditures Per Capita by
Population Served Category—5,001–15,000
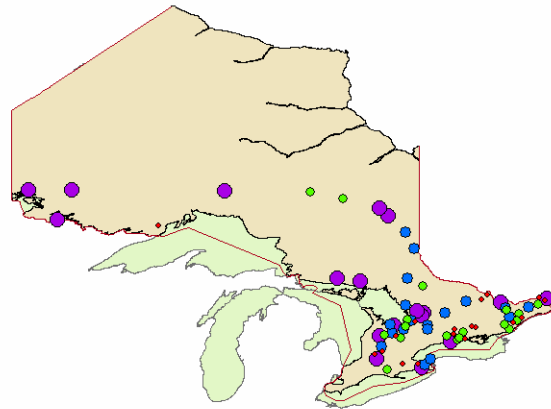
Operating Expenditures Per Capita (Population served: 5,001–15,000)
- 4.470000 - 16.560000
- 16.560001 - 24.310000
- 24.310001 - 31.120000
- 31.120001 - 62.830000

Figure 9. Map of 72 Ontario public libraries serving populations from 5,001 to 15,000 and showing operating expenditures per capita, and classified into quartile categories using different colors and graduated symbols.

Utility of Using GIS to Analyze Public Library Performance Measures

The foregoing section provides an indication of the truly illuminating insights that are possible when using a geographic information system to analyze public library performance measures. GIS can reveal hidden patterns in statistical data that can be difficult, if not impossible, to discover using other data analysis applications.

It should be noted that in addition to GIS's strengths in analyzing statistical data in the aggregate, GIS has powerful querying and presentation capabilities that can display the available performance measures data for a particular library in a single screen, and the GIS can also generate various comparison analyses between that particular library and other libraries in the same population served category. This has great utility for library workers seeking to collect data about their library, as well as conduct comparative analyses for benchmarking purposes.

Study Limitations

There were a few potential sources of error in the study. The accuracy of both the spatial data and the library measures data might be suspect for a very small number of records. For example, in the library statistics data set, 12 libraries reported 0 reference transactions, 7 libraries reported 0 staff FTE, and 1 library reported 0 circulation transactions. However, it is entirely possible that these figures are correct.

Another possible confounding factor is introduced by normalizing the performance measure variables—for example, it is assumed that a smaller library and a larger library that have the same volumes per capita figure are equivalent, but this metric does not take into account the larger library's larger (and presumably more diverse) collection. A similar issue exists with staff FTE, and is further compounded by the failure to differentiate between library clerks, library technicians, paraprofessionals, and professional librarians, in this performance measure. Finally, 17 libraries had to be omitted from the original library statistics data set of 320 because either (a) there was not a record for that place name in the spatial data set, or (b) there were 2 libraries listed for a particular city (e.g., a public library, and a county library), in which case the smaller library was omitted from the data set—this resulted in the final library statistics data set total of 303 records.

Future Research

There are a number of possible future areas of inquiry that might advance this study. It would be useful to try

and determine what might be influencing or accounting for the observed Ontario public library regional patterns; for example, they might be due to demographic characteristics, targeted provincial funding, or library programming and marketing initiatives. More sophisticated analyses, such as pattern analysis, could be performed using Geostatistical Analyst, an ArcGIS extension available from within ArcToolbox. Another type of analysis would be to aggregate library performance measures data to the county-level and conduct county-level analyses; this would transform the GIS analyses from point-based analyses to polygon-based analyses, and thereby make possible different spatial analysis approaches and techniques.

Other research possibilities include analyzing different performance measures, such as collections turnover rate (circulation ÷ collections), interlibrary loan borrowing fill rate (filled requests ÷ total requests x 100), interlibrary loan lending fill rate (filled requests ÷ total requests x 100), librarians as a percentage of the total staff FTE, and collections expenditures as a percentage of operating expenditures. With the growing number of electronic resources in the collections of public libraries, it is becoming increasingly important to report electronic performance measures. Analyzing electronic measures could include geocoding electronic visitors and tracking resource usage patterns (for example, the GeoIP program could be used to geolocate electronic visitors). Another interesting possibility is using StatViz with GraphViz to perform graphical clickstream and path analyses of library Web site traffic. Finally, researchers could explore using virtual globes like Google Earth and NASA World Wind as a way to spatially examine and disseminate library statistics.
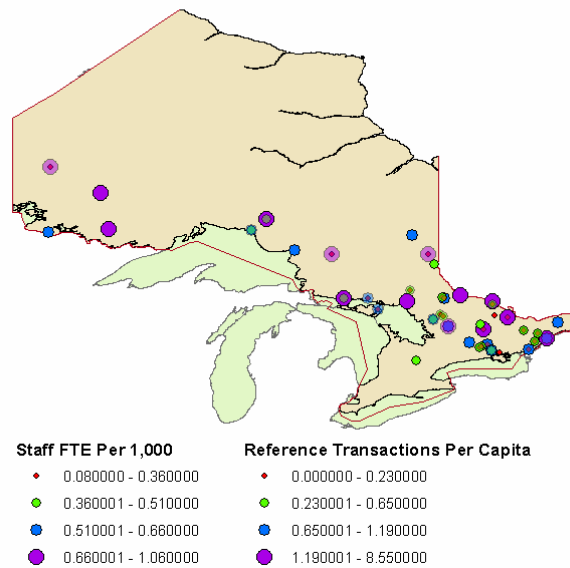

Figure 10. Multivariate overlay map of 42 Ontario public libraries serving populations from 2,501 to 5,000 and showing the relationship between staff FTE per 1,000 on the top layer, and classified into quartile categories using different transparent colors and graduated symbols; and reference transactions per capita on the bottom layer, and classified into quartile categories using different colors and graduate symbols. Note: for the 42 libraries in this category, the Pearson correlation coefficient measuring the association between these two variables is 0.287.

CONCLUSION

After analyzing a subset of the 2003 Ontario public library statistics, it is evident that there are regional patterns in the selected library performance measures. For all 6 performance measures examined, it was discovered that the measure ratios were higher in northern Ontario than in southern Ontario, that only some of this was attributable to population served size, and that some of the performance measure values were particularly low in a region of southeastern Ontario. It was also found that using a geographic information system to analyze and visualize public library performance measures is an effective way of clarifying certain data patterns—for some phenomena, it is much easier to discern patterns on a map than it is in either tabular or graphical format.

Because public libraries exist in geographic space, it is important to investigate if there are any spatial patterns in public library statistics for a given geographic region. In the quest to articulate library value and provide a richer description of library benefits, a spatial analysis of public library performance measures has the potential to reveal important and hidden dimensions concerning the activities and impacts of the public library sector, as well as to identify regional disparities which can then be addressed by changing local and regional funding priorities to improve the targeted libraries' collections and services. Finally, similar to the initiatives being advanced by the GeoLib Program (Florida, 2004) and the Normative Data Project for Libraries (Library, 2006), it is also important to develop publicly-available GIS databases of public library statistics, so that they can be used for benchmarking and comparative analyses by library managers and decision makers.

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