

# The Influence of Community Demographics on New Public Library Facilities

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## ABSTRACT

The location of a public library is critical to information access. Previous research suggests that public library closures disproportionately affect poor and ethnic communities, thus limiting their access to information. Using GIS technology, library location, and county-level Census data, we examine where libraries open facilities, in order to determine whether libraries make equitable opening decisions. Our results suggest that public library outlet openings also occur in locations that are accessible to poor and ethnic communities. After isolating rural libraries, however, we find that new library outlets tend to go in less diverse areas. This suggests that access to resources is limited, and deliberate choices may be made about who ultimately benefits from tax-funded services.

## Keywords

GIS, public libraries, demographics, rural locations

## INTRODUCTION

Geographic Information Systems (GIS) are tools to analyze spatial data. GIS is often used to study public libraries, from looking at patterns of library circulation (Ottensman, 1996), patron adoption of library space (Mandel, 2010), and library siting (Koontz, 1996; Bishop, 2008). The library's location can make a difference in who has access to it and who does not. As a result, siting decisions enfranchise and disenfranchise various populations. The question then becomes, "Are facilities placed equitably?" (Koontz, Jue, &

Bishop, 2008, p. 32).

Unfortunately, research by Koontz and colleagues suggests that facilities are not placed equitably. Koontz (2005) finds that libraries with majority-minority populations are more likely to be used by the population in non-traditional ways that do not count for as much as traditional uses like circulation. Koontz, Jue, & Bishop (2008, 2009) explored public library closures from 1999 to 2003. They found that public library closures tended to happen in neighborhoods with higher percentages of poverty, increased numbers of rental units, and increased percentages of African American residents (p. 20-21).

Building off Koontz, Jue, & Bishop (2008), we explore a continued data set from 1999-2009. We additionally look at the years of the "Great Recession" of 2008-09, looking particularly at what demographic characteristics are found in the market areas for libraries that opened during this time period, and whether there is any change in patterns of library openings and closures for those years.

## Research Questions

- Where do libraries open new locations?
- What are the demographic characteristics of the locations of new libraries?
- Are library closures continuing to disproportionately affect poor and ethnic communities?

## THEORIES OF ACCESS

Ribot & Peluso (2003) elaborate on a theory of access that, while situated in sociology, has implications for library and information science. Access, "the ability to benefit from things," is separate from ownership, as it is primarily concerned with potential rather than possession (p.154). Some agents, such as libraries and library directors, have access control, "the ability to mediate others' access" (p. 158). Libraries and patrons share responsibility for access maintenance, wherein agents expend "resources or power to keep a particular sort of resource access open" (p. 159).

However, the library's overseeing bodies (municipalities, boards of directors) are in a position to decide what sorts of resource expenditures will be devoted to the preservation or closure of a library facility.

Access issues are also discussed in LIS scholarship and norms. The American Library Association posits equitable access to library and information services as one of its key action areas (American, 2014).

Koontz (1997) notes library location theory had not been studied extensively, but also that library location is a prime consideration for users, particularly in regard to encouraging regular use. Library location decisions have implications for who can and cannot use the library, and the lack of library access obviously discourages use.

Oltmann (2009) provides an extensive review of the concept of information access in LIS scholarship. She sums up information access as "poorly conceptualized in both abstract, theoretical evaluations and in practical, working contexts ... [and] overlooked as a legitimate, central research domain in LIS" (p. 69). While her focus is on information access at a more conceptual level, her work still has implications for library decision-makers thinking about library placement.

Burnett, Jaeger, & Thompson (2008) discuss three components of information access: physical, intellectual, and social access. A public library outlet provides a physical space that is either accessible to a user or not. Public library staff work to make sure that resources are intellectually accessible to their clientele, either by purchasing accessible materials or providing explanations of the works. And critically, public libraries provide a "social context," within which information seeking is seen as a normative behavior (p. 58).

A public library building has the potential of providing a public gathering space, rooms for presentations or group meetings, and study or reading space. Public libraries are often the only places in their communities where poor citizens can use computers and the Internet for free (Bertot, McClure, & Jaeger, 2008). Public library facilities often provide access to trained personnel who can assist novice information users, and who can help people find and fill out forms to access social services or job applications. The people we refer to as the "information poor" will need additional guidance as they learn to become "information bicultural," that is, as they learn to transfer their skills between two (or more) information cultures. Libraries have traditionally provided this support.

Public library location, where public libraries choose to open new facilities or close existing facilities, forms a critical component of the information access theory that is developing within LIS. Studies of public library location, combined with regional demographics, permits us to look at

whether we provide equity in access to public libraries and all the benefits inherent in that access.

## **METHODOLOGY**

### **Library Definitions**

The researchers for this project classified all libraries in the United States into three categories: Closed, Opened and New. Closed libraries were defined as libraries that were closed down between 2000 and 2010 and a new library was not built in the same area during that time period. Opened libraries were libraries that were open in 2000 and 2010 and include libraries that initially closed but a library was rebuilt in the same area. New libraries were defined as a library that opened during the time period and did not replace a closed library in the same area.

### **Tools**

This research used a combination of Microsoft Excel, Microsoft Access and ArcGIS 10.2.2 to develop a list of opened, closed and new libraries in the United States. The researchers obtained the original list of public libraries from 2000 and 2010 from the Public Libraries section of the Institute of Museum and Library Services website under data files, which were in .xls format.

#### *Microsoft Excel*

The data were originally opened and examined in Microsoft Excel 2010. After initially assessing the fields in the 2000 and 2010 datasets it became apparent that there were inconsistencies in library ID values due to library name, address, and city name differences between 2000 and 2010. This being the case the researchers created a concatenated value based on the "FSCSKEY" and "FSCS\_SEQ" fields within the two excel data files called FSCSKEY+FSCS\_SEQ\_00 for the year 2000 and FSCSKEY+FSCS\_SEQ\_10 for 2010. After these fields were created the original and new excel files with the concatenated fields were transferred to Microsoft Access where queries could be developed.

#### *Microsoft Access*

Using the concatenated value to join the 2000 and 2010 tables, the researchers created queries in order to identify closed and new libraries. These queries checked for similarities and differences between library name, addresses, phone number and cities. After an initial list of new and closed libraries was developed, the researchers manually checked both lists against the original 2000 and 2010 datasets. The purpose of double checking was to validate the new and closed list and make decisions on what constituted a new or closed library. For example, there were several misspellings between the 2000 and 2010 datasets and often there were address changes to a library in 2010 that were very close in distance to the library in 2000. When this was the case, we considered the library from 2000 the same library as the 2010 library with the new address. It was only when there were major differences in several categories such as library name, phone number and

address that we considered the 2010 library a new library. The researchers validated the data separately and then compared the results to confirm a final list of closed and new libraries.

**ArcGIS**

After developing a list of closed and new libraries the researchers obtained the longitude and latitude of each library in order to develop an initial library map. These coordinates were acquired from the Texas A & M Geoservices website, which provides free geocoding services. Using the coordinates the library data for both the new and closed library sets were joined with a county map using a FIPS value. This value was used because it was present in both our data sets and a county map shapefile. After creating a county map with all the new and opened libraries in the United States the researchers began the process of choosing which explanatory variables would be included so analysis could be conducted.

**Variables**

Variables were divided into three categories: demographic, socioeconomic and political. Demographic factors include percent change in a variety of populations including populations of color. Socioeconomic factors include the percent of the population with a college degree and median household income. Political factors include both Democratic and Republican voters from the 2004 and 2008 presidential elections. These correlational variables do not explain why libraries open and close, but they do present some insight into the conditions that are present when libraries open or close.

All data was obtained from the government sponsored websites factfinder2.census.gov, <http://www.ers.usda.gov>, and the Missouri Census Data Center. Once the proper Excel files were chosen they were imported into ArcMap and transformed into shapefiles.

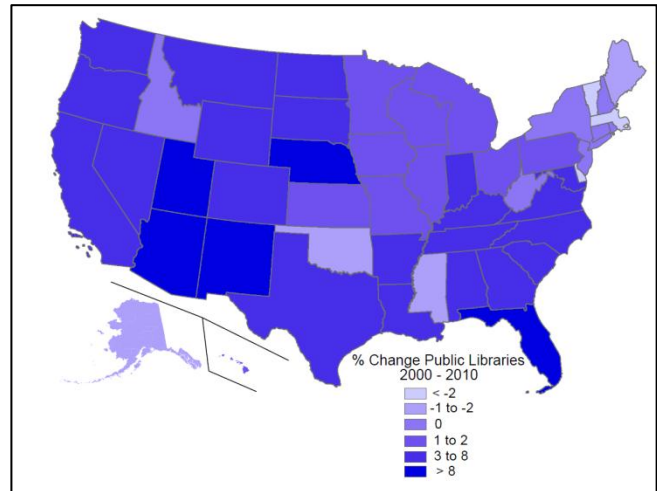
**RESULTS**

**Where do libraries open new locations?**

As shown in Figure 1, most states had a net library gain, but several states saw a net library loss (e.g., more public library outlets closed than opened between 2000 and 2010). The net library losers were Washington DC, Alaska, Delaware, Idaho, Massachusetts, Maine, Mississippi, New Hampshire, New Jersey, New York, Oklahoma, Vermont, and West Virginia. Connecticut and Rhode Island saw no difference. All other states had a gain of at least one library. Florida, California, Texas, and Arizona all saw the additions of over 50 library outlets.

Of the 3,138 counties and county equivalents in the United States, 3,090 (98%) have public libraries. Libraries opened service outlets in 616 counties, with brand new outlets established in 531 counties. Table 1 shows that urban and

highly-populated counties were more likely to add new library facilities than non-metro and less populated areas.



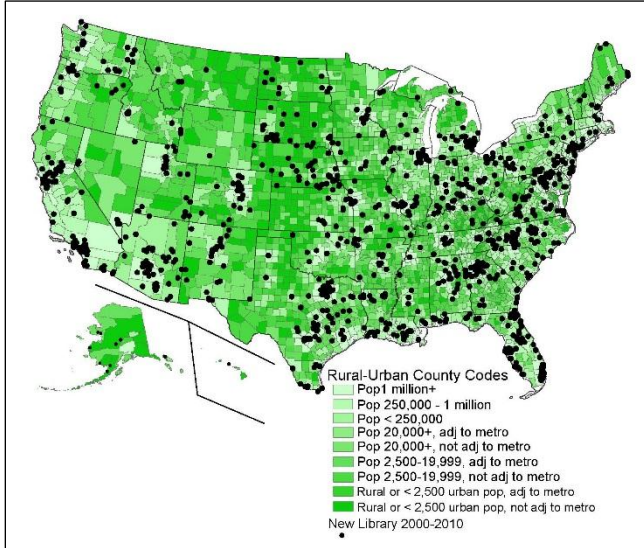
**Figure 1. Percent change in number of public library facilities by state.**

Counties opening the largest number of new libraries were Miami-Dade County, FL (22), Maricopa County, AZ (16), Pima County, AZ (11), Riverside County, CA (11), Los Angeles County, CA (10), and Cook County, IL (9). Of the 59 counties that had a net library gain of three or more new libraries, only six (10%) were classified by the Census Bureau as being in Non-Metro areas, and only two (3%) of those were in "completely rural" areas. In the 616 counties where a library facility opened, 98 (23%) of those counties were "not adjacent to a metro area." Figure 2 shows a general overview of library openings in rural and urban counties.

Variable	Counties with New Library Facilities (n=616)	Counties without New Library Facilities (n=2522)
Metro areas, pop. 1 million plus	28%	10%
Metro, pop. 250,000 to 1 million	22%	10%
Metro, pop. Less than 250,000	14%	11%
Nonmetro urban, pop. 20,000 or more, adjacent to a metro area	6%	7%
Nonmetro urban, pop. 20,000 or more, not adjacent to a metro area	3%	3%
Nonmetro urban, pop. 2,500-19,999, adjacent to a metro area	10%	21%
Nonmetro, urban, pop. 2,500-19,999, not adjacent to a metro area	7%	15%
Nonmetro, pop. Less than 2,500, adjacent to a metro area	4%	8%

Nonmetro, pop. less than 2,500, not adjacent to a metro area	6%	15%
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**Table 1. Types of counties with and without new library facility openings.**



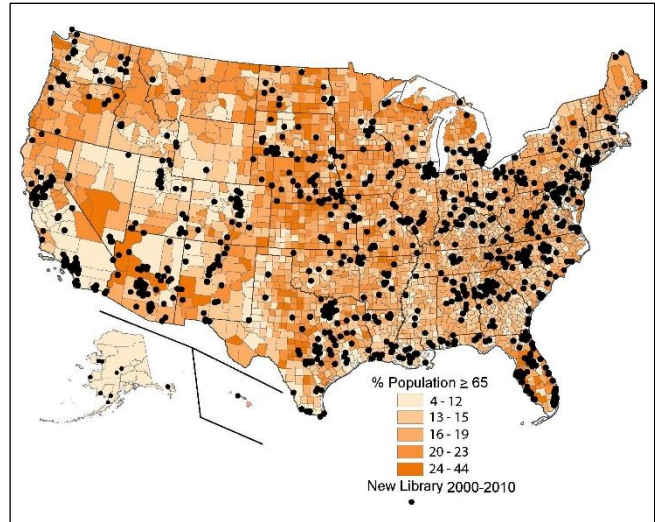
**Figure 2. New library openings in rural and urban counties.**

However, the same general rule holds true for library facility closures. Thirty-nine counties closed three or more library outlets. Some of the closures (7, or 18%) were in non-metro areas, but most were in metro areas. Counties closing the largest number of libraries were Erie County, NY (15), Middlesex County, MA (9), Los Angeles County, CA (6), Baltimore, MD (6), and Bingham County, ID (6). Of the 373 counties that experienced a library facility closure, 70 (19%) were "not adjacent to a metro area," which suggests library options were greatly restricted in those counties.

**What are the demographic characteristics of new library locations?**

Between 2000 and 2010, 1,052 new libraries opened in 616 counties. Looking at demographics from those 616 counties with new libraries, we find an average county population size of 256,318 in 2000, increasing to 286,681 in 2010.

Libraries were predominantly opened in urban spaces with a high number of persons per square mile in both 2000 and 2010 (610 and 652 respectively). The average median age in counties with new libraries was 38.7 years old in 2010, with 13.3 percent of the population aged 65 and older.



**Figure 3. New library openings and percent of people over 65 years of age.**

In counties without new libraries, the average county population was 48,676 in 2000 and 52,113 in 2010, with a lower population per square mile of 163 in 2010. The average median age in counties without new libraries was 40.7 years old in 2010, with 16.2 percent of the population aged 65 or older.

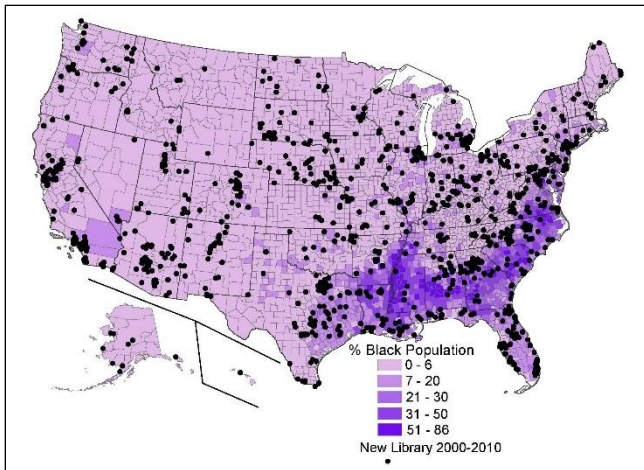
Variable	Counties with New Libraries (n=616)	Counties without New Libraries (n=2522)
Public Libraries per Capita, 2010	0.00004 (1 library for every 25,057 people)	0.00008 (1 library for every 12,767 people)
Percent White, 2000	80.9%	85.2%
Percent White, 2010	78.6%	84.0%
Percent Non-White, 2000	19.1%	14.7%
Percent Non-White, 2010	21.4%	16.0%
Percent Black, 2000	9.3%	8.6%
Percent Black, 2010	9.8%	8.7%
Percent Hispanic, 2000	8.2%	5.7%
Percent Hispanic, 2010	10.8%	7.7%
High School Education, 2006-2010	85.1%	82.6%
Bachelor's Degree, 2010	23.7%	17.9%
Percent Poverty,	15.87%	17.0%

2010		
Median Household Income, 2010	\$47,648	\$42,024
2008 Presidential Election Results	45% D, 53% R	41% D, 58% R
2004 Presidential Election Results	41% D, 58% R	38% D, 61% R

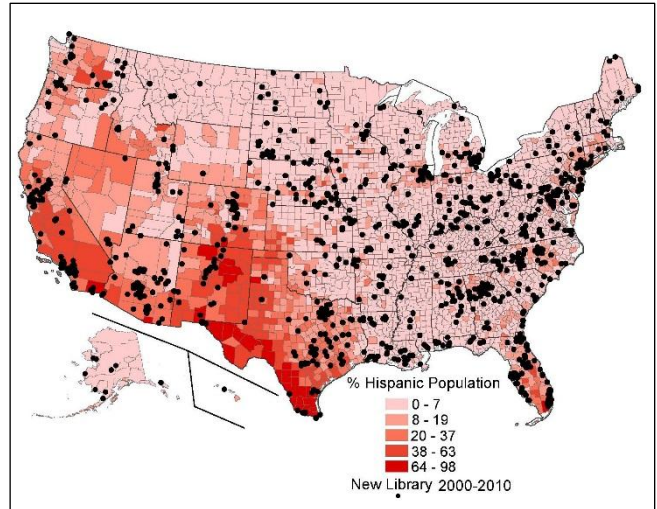
**Table 2. Demographic characteristics of counties with new public libraries and counties without new facilities.**

In keeping with the urban nature of the libraries with new branch openings, the county populations in these areas are slightly younger and slightly more racially diverse than the counties without new library facilities (see Figures 2, 3, and 4). These counties had better educated populations, slightly lower unemployment rates, and higher household income, though they also had slightly higher poverty rates as well.

Figures 4 and 5 show the geographic dispersion of the African American and Hispanic populations in the U.S. Some of these areas have experienced clusters of new library growth, as in Southern California, Arizona, and Southern Louisiana. However, areas of particularly high population of African American or Hispanic populations do not appear to benefit from new libraries.

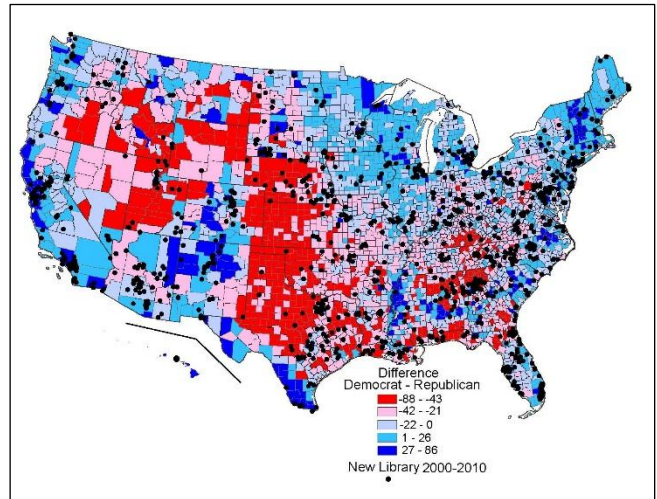


**Figure 4. New library openings and 2010 African American county population.**



**Figure 5. New library openings and 2010 Hispanic county population.**

As shown in Figure 6, people in counties with new library openings were more inclined to vote for Democrats than were counties with no new library openings. This may be a function of rural and urban voting patterns, since more new libraries opened in urban areas than in rural areas.



**Figure 6. New library openings and 2008 presidential election voting trends.**

**Are library closures continuing to disproportionately affect the poor and populations of color?**

As indicated by Table 3, counties with large metropolitan areas and populations of greater than 250,000 are more likely to have library closures than smaller or rural counties. This is similar to the results seen for counties that had library facility openings, where metropolitan counties were more likely to open facilities.

Variable	Counties with Library Facility Closures (n=373)	Counties without Library Facility Closures (n=2702)
Metro areas, pop. 1 million plus	28%	12%
Metro, pop. 250,000 to 1 million	21%	11%
Metro, pop. Less than 250,000	11%	11%
Nonmetro urban, pop. 20,000 or more, adjacent to a metro area	7%	7%
Nonmetro urban, pop. 20,000 or more, not adjacent to a metro area	3%	3%
Nonmetro urban, pop. 2,500-19,999, adjacent to a metro area	10%	20%
Nonmetro, urban, pop. 2,500-19,999, not adjacent to a metro area	6%	15%
Nonmetro, pop. Less than 2,500, adjacent to a metro area	3%	7%
Nonmetro, pop. less than 2,500, not adjacent to a metro area	9%	13%

**Table 3. Types of counties with and without library facility closures.**

Table 4 compares the demographics of counties with and without library facility closures. Counties with library closures tend to have greater populations of color than counties with no library closures. Non-white populations, Black populations, and Hispanic populations are notably higher in the communities with library closures. However, counties with library closures also tend to have better educated populations, a slightly lower poverty rate, and higher household incomes, though they also have an increased rate of unemployment.

Variable	Counties with Library Facility Closures (n=377)	Counties without Library Facility Closures (n=2764)
Percent White, 2000	80.5%	85.0%
Percent White, 2010	78.2%	83.6%
Percent Non-White, 2000	19.5%	15.0%
Percent Non-White, 2010	21.8%	16.4%
Percent Black, 2000	10.0%	8.7%
Percent Black, 2010	10.6%	8.7%
Percent Hispanic, 2000	7.6%	6.0%

Percent Hispanic, 2010	10.2%	8.0%
High School Education, 2006-2010	84.6%	82.9%
Bachelor's Degree, 2010	22.9%	18.5%
Percent Poverty, 2010	16.1%	16.8%
Median Household Income, 2010	\$46,245	\$42,736
2008 Presidential Election Results	48% D, 51% R	41% D, 58% R
2004 Presidential Election Results	44% D, 55% R	38% D, 61% R

**Table 4. Demographic characteristics of counties with and without library facility closures.**

Some counties both opened and closed libraries. Of these 161 counties, there were 244 library closures and 378 facility openings. Twenty-seven percent of the time, this was a one-to-one situation: for each library that closed, another library opened. Eighteen counties had a net library loss, with Middlesex County (MA) closing nine facilities and opening one, and Baltimore City (MD) closing six facilities and opening one. Forty-seven percent of counties opened more library facilities than they closed, with Miami-Dade (FL) opening 22 and closing 5, Maricopa County (AZ) opening 16 and closing 1, Cook County (IL) opening 9 and closing 3, and Yavapai County (AZ), Duval County (FL), Hillsborough County (FL), and Clark County (NV) opening six and closing one.

#### **Rural Communities and Public Library Facility Openings and Closures**

Looking at public library facilities by community type, we find that 119 libraries opened and 82 closed in rural areas (non-metro, not adjacent to a metro area), 162 libraries opened and 102 closed in suburbs (non-metro, adjacent to a metro area), and 772 libraries opened and 374 closed in metro areas. Library openings affected only 3% of rural libraries, 4% of suburban libraries, and 7% of metro libraries. Closures affected just 2.5% of rural libraries, 2.2% of suburban libraries and 3% of metro libraries.

This project used county-level statistical data. In some cases (e.g., rural libraries,) county-level data is appropriate, as one library often serves a whole county. However, for urban libraries, tract or block-level data would be a better indicator of the specific community demographics for the affected libraries. Because of this limitation, we limit our discussion here to rural counties, and compare counties that experienced library closures to those that experienced openings. We eliminated counties that had both a library closure and a library opening, resulting in 71 rural counties with library closures and 139 rural counties with library

openings. Table 5 compares the demographics of those two categories of county.

Variable	Counties with Library Facility Closures (n=71)	Counties with Library Facility Openings (n=139)
Percent White, 2000	84.7%	85.5%
Percent White, 2010	83.3%	84.2%
Percent Non-White, 2000	15.3%	14.5%
Percent Non-White, 2010	16.7%	15.7%
Percent Black, 2000	8.6%	5.3%
Percent Black, 2010	8.7%	5.2%
Percent Hispanic, 2000	5.5%	6.3%
Percent Hispanic, 2010	7.8%	8.2%
High School Education, 2010	82.3%	83.9%
Bachelor's Degree, 2010	18.5%	18.1%
Percent Poverty, 2010	18.3%	17.8%

**Table 5. Demographic characteristics of rural counties where libraries closed and rural counties where libraries opened.**

Rural counties with library openings are located in counties that have a greater population of white and Hispanic people, and slightly more impoverished people. However, unemployment, educational attainment, and household income are similar among counties with library closures and counties with library openings. African Americans in particular seem underserved by rural libraries' new locations.

**DISCUSSION**

Our findings suggest that public libraries open new outlets most frequently in metropolitan areas. When we look at county-level demographic data, we do find that library closures are more likely to affect the poor and populations of color, based on county demographics. However library openings are also more likely to affect the poor and people of color. This suggests that total population growth is motivating public library openings, rather than a specific attempt to serve some groups at the expense of others.

When we focus solely on rural counties, however, we find that rural libraries are closing in areas with greater

population of color, and opening in areas with less population of color. This may be due to patterns of migration within the United States. People of color might feel less support and have fewer opportunities for employment in a rural community, and so choose to move to larger cities with more resources.

**Can digital library resources make a difference?**

The information that public libraries make available digitally (databases and ebooks) may have some potential to smooth over the negative effects of a library closure for a local audience. Being able to access needed information electronically may help to ensure that a library's patrons do not lose access to information when one branch of a larger system closes. This does effectively provide physical access to materials for those households with a computer and Internet access.

However, when an entire library system closes, such as a rural library that has no other outlets, that often eliminates easy access to digital materials. The people who are most likely to benefit from the public library, poor people and rural residents, are those who are least likely to have Internet subscriptions. In 2010, fewer than 50 percent of households with incomes of \$10,000-\$12,499 had Internet subscriptions (USDA, 2013, p.5). While 73 percent of urban households had Internet subscriptions in 2010, only 62 percent of rural households did (USDA, 2013, p. 1).

The provision of digital materials in lieu of a library facility is more likely to be effective in urban areas than in rural areas. Given poor urban families' potential lack of Internet and computer access, though, this suggests that urban public library should work in concert with schools to ensure that children have access to public library materials at school and learn how they might be able to access those materials through their phones or mobile devices when away from school. Teachers and librarians might work together in showing students appropriate resources to use, to provide for appropriate intellectual access. When public librarians work with schools, this may also partially alleviate the lack of "social access" to information, by providing students with role models and resources for information access.

**CONCLUSION**

This paper contributes to the field by focusing on access to information, mediated through access to public libraries, as a key tenet for professional research. Through an analysis of public library openings in the United States, we frame decision-making about library location as an act by access controllers that influences information access for others.

Public library facility openings and library closures do affect their users, and some users are more likely to be impacted than others. It behooves public library planners and administrators to know whom they are benefitting when

they open new facilities, to ensure that those new facilities meet the library's goals. It also behooves citizens to know how these library location decisions are made and what might influence future decisions.

This paper builds off previous researchers' discussions of library location and information access, and provides a focused discussion of public library location as a subject for study and research. Koontz (1997) points out that decisions of library location are often made without thoughtful consideration of their influence on potential users. This is an area that has considerable potential for local library research.

Future research plans involve looking at census tract-level data to determine whether metro and suburban libraries open in areas that are less accessible to the poor and people of color. Other plans involve looking at public library locations during and immediately after the 2008 recession, to determine whether the effects of library cuts were felt equally or again distributed to those with the greatest information needs.

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