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RURAL PUBLIC LIBRARY ASSETS AND SOCIOECONOMIC DEMOGRAPHICS: A MULTI-CLASSIFICATION STUDY

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DEDICATION

To Louis and Kathy, and in memory of Harry, Frances, and Reta, in celebration of all the rural libraries enriching their communities with access to knowledge, hope, and wonder.

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ACKNOWLEDGEMENTS

Very special thanks are due to Committee Chair Jennifer Arns and committee members David Lankes, Paul Solomon, and Michael Seaman for their continuing advice and support. I would also like to thank Samantha Hastings and Steven Liu for their guidance during the proposal stage, Amir Karami for introducing me to WEKA, and my mentor and friend, David Owen, for regularly reminding me to finish. Dr. Robert V. Williams' longstanding support and guidance remain sorely missed. Lastly, this work would not have been completed without the steadfast support, encouragement, and patience of my husband, Louis. Thank you, Louis, for always being there for me.

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ABSTRACT

Rural public libraries hold economic, cultural, and social capital assets in trust for the benefit of their communities. Filling a gap in the study of those assets, 2012 through 2015 rural library statistics from the Institute of Museum and Library Services were combined with public data from the United States Departments of Agriculture and Health and Human Services to: (1) reveal interrelationships between rural public library assets and socioeconomic factors, (2) explore the implications of those relationships in terms of potential community services and asset strengths, (3) investigate differences in those relationships over time, and (4) consider rural library asset sustainability. Exploring asset structures through supervised classification data mining of four rural library classes (distance from urban areas and urban clusters, governance structure, service area size, and geographic region) revealed that, with the exception of non-librarian staff, rural public library median per capita assets did not generally decrease as distances from urban areas and urban clusters increased; there were no clear asset demarcations between governance structures; the smallest rural libraries generally had the highest median per capita assets, including revenue from non-local sources; and rural library asset variations between and within regions were largely explained by socioeconomic factors. Furthermore, rural-urban boundaries continued to blur during the period, state revenue constraints decreased the likelihood of small rural library sustainability, volunteers appeared to substitute for paid staff in the smallest rural libraries and supplemented staff in larger rural libraries, and persistent deep child poverty was found in many of the

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counties served by rural public libraries. Recommendations for facilitating rural public libraries' leadership in building community and library sustainability include: (1) revised reporting of rural-urban designations to increase awareness of government programs and benefits available to the library's community, (2) increased advocacy for rural library sustainability through effective messaging of community engagement successes and cost-benefit study of rural libraries as access providers for government benefits and services, (3) revised reporting or targeted studies to capture the public value created by rural library volunteers, and (4) the design of national, fiscally sustainable programs supporting public library leadership in measurably decreasing child poverty rates.

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LIST OF ABBREVIATIONS

ABCD ..... Asset-Based Community Development

AHRF ..... Area Health Resource File

APRN ..... Advanced Practice Registered Nurse

BEA ..... Bureau of Economic Analysis

CCI ..... Comprehensive Community Initiatives for Children and Families

CCF ..... Community Capitals Framework

CV ..... Contingent Valuation

E-Rate ..... Universal Service Schools and Libraries Program

ERS ..... Economic Research Service

FAR ..... Frontier and Remote

FCC ..... Federal Communications Commission

FEMA ..... Federal Emergency Management Agency

FORHP ..... Federal Office of Rural Health Policy

FSCS ..... Federal State Cooperative System

GED ..... General Equivalency Diploma

HRSA ..... Health Resources & Services Administration

IMLS ..... Institute of Museum and Library Services

IQR ..... Interquartile Range

MAD ..... Median Absolute Deviation

MLIS ..... Master of Library Science

NASW ..... National Association of Social Workers

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NCES .....National Center for Education Statistics

OMB .....Office of Management and Budget

PLA ..... Public Library Association

REAP ..... Rural Education Achievement Program

RN.....Registered Nurse

RUCA ..... Rural-Urban Commuting Area

RUCC..... Rural-Urban Continuum Codes

TIGER.....Topologically Integrated Geographic Encoding and Referencing

UA.....Urban Area

UC.....Urban Cluster

UIC..... Urban Influence Codes

USDA..... United States Department of Agriculture

WTA .....Willingness to Accept

WTP ..... Willingness to Pay

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The Institute of Library & Museum Services (IMLS) recognizes over 4,100 rural public libraries (Swan, Grimes, & Owens, 2013, p. 5). Those libraries are scattered throughout all regions of the United States and serve populations that range in size from as few as eleven, to as many as 250,000 residents. Approximately forty percent of those libraries are located more than twenty-five miles from an urban area, while twelve percent are so close to urban areas and urban clusters that some may lose their rural status after the 2020 census. The majority of rural libraries are governed by municipalities, but all governance structures recognized by the IMLS, including library districts, are represented among rural libraries. Regardless of their size, location, or governance structure, all rural libraries hold assets in trust for their community's benefit (Alemanne, Mandel, & McClure, 2011, pp. 26–26; Hildreth & Sullivan, 2015, pp. 650–651; Moxley & Abbas, 2016, pp. 311–312; Whitacre & Rhinesmith, 2015, p. 165; 47 U.S.C. § 1305(b)(3)(A)).

Research in the fields of community development, public health, social work, and public policy affirms that local assets are pivotal factors in strengthening and growing communities (see sections 2.3 and 2.4, below). Collaborations between libraries, other community associations and organizations, and individual citizens use and build assets to

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increase “quality of life[,] the capacity to act in the future,” and the likelihood of community sustainability (Green & Haines, 2012, pp. 3, 7–9). Complementing the study of public libraries from the perspectives of *outputs* and *outcomes*, this study’s focus on rural public library *assets* in the context of socioeconomic factors explores the potential of even the smallest, most remote rural public library to fuel solutions to community issues, ignite the creation of new local assets, and bridge the community to external economic and other resources (see, e.g., Kretzmann & McKnight, 1993, pp. 191–205).

1.2 Research Problem, Research Questions, Study Significance

Research Problem and Research Questions

Rural public libraries hold economic, cultural, and social capital assets in trust for the benefit of their communities. Research studies of those assets highlight broadband availability (Alemanne, Mandel, & McClure, 2011; Bertot, Real, Lee, McDermott, & Jaeger, 2015; Whitacre & Rhinesmith, 2015); education, health and wellness, and civic engagement services (Real & Rose, 2017; 2018); small business development services (Bishop, Mehra, & Partee, 2016; Hancks, 2011; Mehra, Bishop, & Partee, 2017a, 2017b); services to older adults (Hughes, 2017); or present case studies of specific libraries or geographic locations (Heuertz, 2009; Hancks, 2011; Majekodunmi, 2011). However, while some researchers have analyzed rural public library assets and asset utilization by distance from urban areas and urban centers (see, e.g., Real & Rose, 2017; Swan, Grimes, & Owens, 2013), rural public library assets have not been studied comprehensively within their broader socioeconomic landscape. Filling that gap by combining rural library statistics from the Institute of Museum and Library Services (IMLS) with United States Department of Agriculture (USDA) and United States Department of Health and Human

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Services public data, this study: (1) reveals interrelationships between rural public library assets and socioeconomic factors, (2) explores the implications of those relationships in terms of potential community services and asset strengths, (3) investigates differences in those relationships over time, and (4) considers rural library asset sustainability. Exploring rural public library assets categorized by four classes (distance from urban areas and urban clusters, governance structure, service area size, and geographic region), this research seeks to answer the following questions:

Q1: Are the economic, cultural, and social capital assets of remote rural public libraries generally lower than those of fringe and distant libraries—that is, do rural public library assets generally decrease as distances from urban areas and urban clusters increase, and how are those decreases, if any, explained by socioeconomic factors?

Q2: Are some rural library governance structures more likely to be associated with higher levels of economic, cultural, and social capital assets than others, and what, if any, socioeconomic factors might explain those differences?

Q3: Are the economic, cultural, and social capital assets of small rural libraries (those serving fewer than 2,500 residents) generally lower than larger rural libraries, and do socioeconomic factors explain asset differences between small and larger rural libraries?

Q4: Do rural public library economic, cultural, and social capital assets differ by Bureau of Economic Analysis region, and do regional socioeconomic factors explain those differences?

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Q5: How did rural public library economic, cultural, and social capital assets change over time, and what are the implications of those changes on asset sustainability policies?

Study Significance

This study of rural public library assets adopts a multiple classification approach to identify and explain rural public library asset strengths and suggest community services within the broader socioeconomic context. Recognizing that "human information behavior does not occur in isolation; it is shaped by multiple facets, or factors" (Sonnenwald & Iivonen, 1999, p. 433), combining IMLS Public Library Survey data with select economic, demographic, and public health variables over multiple periods extends the study of rural libraries into Sonnenwald and Iivonen's "space" and "time" research framework facets (p. 434). For example, rural public library assets can be studied within the various urban-rural classifications guiding federal rural policy and programs, and the sustainability of rural public library assets can be evaluated within their demographic contexts. Furthermore, because "[p]olicies and programs can be targeted when rural definitions are combined with key demographic, economic, or health care provider characteristics" (Coburn et al., 2007, p. 1), synchronously studying rural library assets and socioeconomic factors can facilitate planning and advocacy for targeted community engagement activities. Researching the interrelationships between rural public library assets and socioeconomic factors over time:

(1) Highlights rural public library asset strengths within the context of their socioeconomic environment,

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(2) Identifies likely rural public library sub-classes for further quantitative or qualitative study, and

(3) Suggests public policy directions for strengthening and sustaining rural public library asset holdings for the benefit of their communities.

Additionally, this research may assist other qualitative and quantitative researchers in explaining unexpected findings or statistical outliers. As rural and urban boundaries continue to blur (Wunderlich, 2016, p. 4), the multi-dimensional approach adopted in this study provides a dynamic addition to the study of rural libraries and complements existing research approaches to the economic value and positive community outcomes created by rural public library assets.

1.3 Defining "Rural" in America

There is no singular standard for defining "rural" America, partly because "rural and urban are multidimensional concepts [and] many people live in areas that are not clearly rural or urban" (*USDA*, 2017d, paras. 1–2; Wunderlich, 2016, p. 124). Furthermore, "[r]ural designations can change with shifts in population distribution or commuting patterns, or as a result of changes in geographic boundaries" (Coburn et al., 2007, p. 1). The commingling of rural and urban areas, an increasing number of low-density populations located within metropolitan areas, and "a decline of the rural population in nonmetropolitan areas," present serious challenges to "rationalizing rural-urban classifications" (Wunderlich, 2016, p. 2). Ultimately, those complexities present both "[r]esearchers and policymakers [with] the task of choosing appropriately from among alternate rural definitions currently available or creating their own unique definitions" (*USDA*, 2017d, para. 2). The predominant American statistical designations

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of rurality currently available to researchers and policymakers are discussed in this section, including those from the United States Census Bureau, the Office of Management & Budget (OMB), and the Department of Agriculture's Economic Research Service (ERS). The National Center for Education Statistics (NCES) rural designations, which were adopted by the IMLS, are described in section 1.4, below.

Census Bureau Urban Areas, Urban Clusters, and Everything Else

The Census Bureau defines "two types of urban areas: 'urbanized areas' of 50,000 or more people and 'urban clusters' of at least 2,500 and less than 50,000 people. 'Rural' encompasses all population, housing and territory not included within an urban area" (U.S. Census Bureau, 2012). Under these definitions, rural areas are unevenly distributed across states and regions, and 19.3% of all U.S. residents reside in rural areas (U.S. Census Bureau, 2015, Urban Area Delineation Results).

Even though the current Census Bureau definitions classify "quite a bit of suburban area as rural" (*HRSA*, 2017a, para. 5), the Federal Communications Commission (FCC) caused a public outcry in late 2014 after adopting the new Census Bureau urban designations in the proposed E-Rate Modernization Order. The FCC order would have resulted in telecommunication and Internet rate increases for 1,500 schools and libraries previously classified as "rural" (Molnar, 2014). In response to complaints, the FCC issued the Second E-Rate Modernization Order retaining the original FCC definition of "rural" schools and libraries as serving areas with population sizes under 25,000 (FCC, 2014). Contrastingly, the U.S. Department of Education's Rural Education Achievement Program (REAP) benefitting rural schools does incorporate the current

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Census Bureau urban/rural definitions (Gerverdt, 2015, p. 10). The two rural REAP locales are:

> **(1) Rural, Outside Metropolitan Area:** Any incorporated place, Census-designated place, or non-place territory not within a metropolitan area and defined as rural by the Census Bureau; and
>
> **(2) Rural, Inside Metropolitan Area:** Any incorporated place, Census-designated place, or non-place territory within a metropolitan area and defined as rural by the Census Bureau (p. 11).

Authorized legislatively in 2001, REAP locales are maintained for program analysis and administration despite the fact that the National Center for Education Statistics (NCES) implemented a revised standard for urban-centric locale code criteria in 2006 (p. 10). The revised NCES locale standard, adopted by the IMLS, is discussed in section 1.4, below.

Office of Management and Budget (OMB) Areas

Recognizing that "[c]ounties are the standard building block for publishing economic data[,] for conducting research to track and explain regional population and economic trends[, and for] defining areas of economic and social integration, such as labor-market areas," the Office of Management and Budget (OMB) delineates metropolitan and nonmetropolitan areas on the basis of county or county-equivalent units, such as parishes or boroughs (*USDA*, 2017d, para. 3). Although based on counties, OMB areas are drawn from the Census Bureau definitions of urbanized areas and urban clusters, which "form the urban cores of [the OMB] statistical areas" (U.S. Census Bureau, 2015, Urban and Rural Definition). OMB *metropolitan* areas are "broad labor-market areas" including: (1) core counties or "densely-settled urban entities with 50,000

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or more people" containing at least one census-defined urban area, and (2) "[o]utlying counties that are economically tied to the core counties as measured by labor-force commuting" or "reverse" commuting patterns (*USDA*, 2017d, paras. 5–6). All counties outside metropolitan areas are designated *nonmetropolitan.* As with metropolitan areas, there are two nonmetropolitan designations: (1) micropolitan areas or "nonmetro labor-market areas centered on urban clusters of 10,000-49,999 persons and defined with the same criteria used to define metro areas," and (2) "noncore" counties outside any "core-based" metropolitan or micropolitan area (*USDA*, 2017d, paras. 5–6).

OMB metropolitan designations were last updated in 2013 based on the 2010 census. In 2016, 14% of the U.S. population and 72% of the land area fell into the nonmetro OMB designation (*USDA*, 2016g, p. 1). While Census Bureau definitions may arguably overcount rural populations, there is some criticism that OMB definitions undercount those populations (*HRSA*, 2017a, para. 5).

Economic Research Service Designations

Economic Research Service (ERS) "rural" designations, which adopt the 2013 OMB delineations of metropolitan and nonmetropolitan areas, are comprehensively described in *Rationalizing Rural Area Classifications for the Economic Research Service: A Workshop Summary* (Wunderlich, 2016). At their highest levels, ERS rural designations fall into two categories: (1) multi-level designations based on counties, as in the Rural-Urban Continuum Codes and the Urban Influence Codes; and (2) sub-county designations based on census tracts (Rural-Urban Commuting Areas) or smaller grid cells aggregated to zip codes (Frontier and Remote codes).

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The 2013 Rural-Urban Continuum Codes (RUCC) subdivide OMB metropolitan (metro) and nonmetropolitan (nonmetro) areas into three metro and six nonmetro categories. Two of the nonmetro categories include "rural" areas. RUCC category 8 is assigned to "completely rural counties" or counties with "less than 2,500 in urban population adjacent to a metro area," and category 9 counties are "completely rural" or "less than 2,500 in urban population not adjacent to a metro area" (*USDA*, 2013, Documentation). Adjacency is defined for nonmetro counties as physically adjoining one or more metro areas with at least 2% of the employed labor force commuting to central metro counties. Nonmetro counties that do not meet that definition are "nonadjacent" to metro areas (*USDA*, 2017e, para. 6).

The Urban Influence Codes (UIC) reflect the central place theory, which is "a set of assumptions and propositions that explain why hierarchically tiered centers are found at certain preferred locations on the economic landscape" (Mulligan, Partridge, & Carruthers, 2012, p. 406). As such, the UIC subdivision of OMB metro and nonmetro counties differs from the RUCC categories. The 2013 UIC revision subdivides OMB metro and nonmetro counties into two metro and ten nonmetro categories. The ten UIC nonmetro categories are comprised of three micropolitan and seven noncore categories (*USDA*, 2017c, para.1). The seven nonmetro, noncore counties are "distinguished by their adjacency to metro or micro areas and whether or not they contain a town of at least 2,500 residents" (para. 6). A county is "adjacent" to a metro or micro area if it abuts a metro or micro area or has a commuting pattern of at least 2% of the population into core areas for work (para. 7). The most "rural" noncore counties (category 12) are not

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adjacent to metro or micro areas and do not "contain a town of at least 2,500 residents" (*USDA*, 2017c, table, 2013 Urban Influence Codes).

Recognizing that "[m]ost counties, whether metro or nonmetro, contain a combination of urban and rural populations" (*USDA*, 2016h, paras. 1–3), the ERS Rural-Urban Commuting Area (RUCA) and Frontier and Remote (FAR) "sub-county" classifications "more accurately delineate different levels of rurality and address program eligibility concerns" (para. 4). The development of RUCA codes was partially funded by the Office of Rural Health Policy based on the 1990s "Goldsmith Modification" that expanded Rural Health Grant programs to "isolated rural populations in large metropolitan counties" (RHIhub, 2015, Goldsmith Modification; Goldsmith, Puskin, & Stiles, 1993; Morrill, Cromartie, & Hart, 1999, p. 729). RUCA codes classify U.S. census tracts based on "population density, urbanization, and daily commuting" patterns in order to identify rural census tracts within OMB-designated metropolitan counties (*USDA*, 2016b, para.1).

RUCA codes guide the administration of Health Resources & Services Administration (HRSA) rural grants (see the Rural Health Grants Eligibility Analyzer at https://datawarehouse.hrsa.gov/tools/analyzers/geo/Rural.aspx). Based largely on RUCA codes, the Federal Office of Rural Health Policy (FORHP) designates 18% of the U.S. population and 84% of the land area as rural (*HRSA*, 2017a). The Veterans Health Administration uses RUCA codes to identify the "rural" and "highly rural" census tracts eligible for telemedicine, tele-video, and other targeted services (*U.S. Veterans Affairs*, n.d., Rural Definition; Wunderlich, 2016, p. 84). Finally, the Centers for Medicare &

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Medicaid Service use RUCA codes to guide payment administration (Wunderlich, 2016, p. 84).

The four Frontier and Remote (FAR) areas incorporate concepts of low populations and high geographical remoteness at the zip code level. Based on automotive travel time to nearby urban areas, persons living in FAR level one must travel to "advanced medical procedures, stores selling major household appliances, regional airport hubs, or professional sports franchises," while persons residing in the fourth or most remote level "find it hard to access 'low order' goods and services, such as grocery stores, gas stations, and basic health-care services" (*USDA*, 2016d, para. 2). In terms of population size and travel times to urban areas, the four FAR code levels are defined as:

- Level 1: "rural areas and urban areas up to 50,000 people that are 60 minutes or more from an urban area of 50,000 or more people";
- Level 2: "rural areas and urban areas up to 25,000 people that are: 45 minutes or more from an urban area of 25,000-49,999 people; and 60 minutes or more from an urban area of 50,000 or more people";
- Level 3: rural areas and urban areas up to 10,000 people that are: 30 minutes or more from an urban area of 10,000-24,999; 45 minutes or more from an urban area of 25,000-49,999 people; and 60 minutes or more from an urban area of 50,000 or more people"; and
- Level 4: "rural areas that are: 15 minutes or more from an urban area of 2,500-9,999 people; 30 minutes or more from an urban area

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> of 10,000-24,999 people; 45 minutes or more from an urban area of 25,000-49,999 people; and 60 minutes or more from an urban area of 50,000 or more people" (*USDA*, 2017h, *Criteria*).

FAR codes were last updated in April 2015 using the results of the 2010 Census.

1.4 Defining Rural Public Libraries

Introduced in 2005 and adopted statutorily in the America Competes Act of 2007 (Geverdt, 2015, p. 17), the National Center for Education Statistics (NCES) locale codes consist of four main types of areas—City, Suburban, Town, and Rural. Each type is further divided into "three subtypes based on population size (in the case of City and Suburban assignments) and proximity to urban areas (in the case of Town and Rural assignments)" (*IES/NCES*, n.d., para. 2). As mentioned above, the older version of locale codes authorized legislatively in 2001 are still used to identify the "rural" schools eligible for REAP programs. The more recent NCES locale code framework is used to construct NCES administrative and school-based surveys (Geverdt, 2015, p. 18). NCES locale codes are updated annually based on Census Bureau population estimates and Topologically Integrated Geographic Encoding and Referencing (TIGER) geocoding boundaries (p. 7).

The IMLS adopted the NCES locale codes in 2010 (Geverdt, 2015, p. 18), and introduced the codes with the 2008 IMLS Public Library Survey in order to allow "users to quickly identify whether or not library outlets and administrative entities are located in cities, suburbs, towns or rural areas" (*IMLS*, 2010, pp. 14–15). Grounded in the current Census Bureau definitions of urban areas and urban clusters, the three rural public library IMLS LOCALE or NCES urban-centric codes are (*IMLS*, 2016, pp. 18–19):

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(1) Fringe (locale code 41): less than or equal to 5 miles from urbanized area, or less than or equal to 2.5 miles from urban cluster;

(2) Distant (locale code 42): greater than 5 miles but less than or equal to 25 miles from urbanized area, or greater than 2.5 miles but less than or equal to 10 miles from urban cluster; and

(3) Remote (locale code 43): greater than 25 miles from urbanized area and greater than 10 miles from urban cluster.

Of the 4,137 IMLS-defined rural public libraries in 2015, 49% fell within the distant rural category, followed by 39% in the remote rural category, and 12% in the fringe rural category. The IMLS locale field is used in this study as the class or dependent variable analyzed to answer research question one.

1.5 Defining a Rural Public Library's "Community"

The community served by a public library is equivalent to its population service area, which is the "geographic area for which a public library has been established to offer services and from which (or on behalf of which) the library derives revenue," and areas "served under contract for which the library is the primary service provider" (*IMLS*, 2016a, F-61). The public library communities included in this study are geographically located outside "'urbanized areas' of 50,000 or more people and 'urban clusters' of at least 2,500 and less than 50,000 people" (U.S. Census Bureau, 2012), and vary in their distance from urban areas and urban clusters.

A rural library's service area or community is comprised of "an interacting population of various kinds of individuals" (Merriam-Webster, n.d.). Although those individuals are diverse to varying degrees, as members of the library's service area, they

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are a community or "a group of people sharing [the library's] possessions and responsibilities" (Lankes, 2016, p. 9). The group invests assets in the library, and the library stewards those assets for the group's benefit (p. 67). A library fulfilling its stewardship role maintains a universalistic stance to ensure that the library's assets are "open to all" and benefit all community members (Vårheim, 2009, pp. 373–374).

1.6 Defining Rural Public Library Assets

Each rural public library holds economic, cultural, and social capital assets in trust for their community. Those assets drive the library's operating outputs and the library's power within the community to fuel positive community outcomes (see Bourdieu, 1985, p. 242; Lankes, 2016, pp. 67–69). The economic, cultural, and social capital rural library assets highlighted in this study are generally described in this section. A specific description of those assets, mapped to the IMLS Public Library Survey fields used in this study, appears in Table 4.1, below.

The economic or monetary assets held by a library consist of total annual operating and capital revenue. Approximately 74% of the median total revenue of all IMLS-identified rural libraries in 2015 was derived from local taxes. Much of that revenue is returned to the community through its conversion to non-monetary cultural and social capital assets that benefit the community. The local economy benefits from a library's purchases of local goods and services and the payment of salaries and wages to community residents. A library also contributes to the local economy when it connects the community to state, federal, or other external revenue sources, such as private grants. The library's total contributions to the local economy are enhanced by an economic

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multiplier effect (Arns, 2013, pp. 21–22; citing economic benefits of a $1.00 library expenditure ranging from $1.46 to $1.91).

The cultural assets held by a library may be categorized using Bourdieu's (1985) cultural capital taxonomy: (1) embodied, (2) objectified, and (3) institutional assets (p. 242). A librarian's skills and expertise exemplify embodied cultural capital. The library's tangible cultural assets range from physical buildings and bookmobiles, to the analog and digital materials available for loan, to the public access computer terminals linking users to tangible cultural assets in electronic form. Bourdieu's concept of institutional cultural assets is represented in the library by the higher education degrees held by library staff—particularly Master of Library Science (MLIS) degrees. Cultural assets also give rise to symbolic capital. For example, the title of "librarian" is a symbol that the title holder is deserving of respect and holds some measure of power within the library, and, potentially, the community at large. Indeed, Lankes (2016) points out: "Credibility is one of the key assets of librarians[, they] start with the benefit of the doubt—people tend to trust librarians" (p. 33). Some critics describe a misuse of symbolic power within libraries to perpetuate the dominant culture (Black, 2017, p. 70; Budd, 2003, p. 22; Knox, 2014, p. 10); however, as noted above, the prevailing view is that libraries should be universalistic public institutions embracing diversity.

Social capital assets are "investment[s] in social relations with expected returns in the marketplace" (Lin, 2001, p. 19). A library's cultural capital assets are instrumental in building social capital, as demonstrated by Hildreth's (2007, p. 9) description of rural library buildings and bookmobiles:

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> Library buildings are huge rural assets. They are often the only governmental presence in rural communities and may be a point position for a variety of public services. They serve as community centers and the town gathering place. Bookmobiles that travel throughout the rural landscape are also very visible assets when visitors are few and far between.

Hildreth's description demonstrates that rural libraries build their social capital by opening their doors for public use and connecting individuals through their services.

Oldenburg (1999) describes a "third place"—an inclusive place accessible to the general public that exists on neutral ground "to level their guests to a condition of social equality" (pp. 24, 42). Furthermore, Oldenburg states that third places "are essential to the political processes of a democracy" (p. 67). Coppola (2010) identifies public libraries as third places and "great equalizers" serving as "civic information centers[,] partners in public service," public forums, enablers of civic literacy, and "a public advocate" (pp. 14–15; see also Anthony, 2013, para. 5; Garmer, 2014, p. 17; Griffis & Johnson, 2014, p. 98, citing supporting studies; Fialkoff, 2010; Smith, 2014, p. 85). Kranich (2005) connects the library's role as a third place to the creation of social capital:

> Libraries abet social capital by providing a space, or commons, where citizens can turn to solve personal and community problems. . . . When libraries provide civic and government information to the community, they build social capital and encourage civic involvement (pp. 95–96).

Hillenbrand (2005) agrees that public libraries build social capital by breaking down barriers between diverse populations and fostering tolerance, promoting democracy and

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information literacy to "create an informed citizenry," partnering with other community organizations, providing an environment of trust and inclusion, "facilitating local dialogue" and information exchange, and providing a public space where citizens can participate in solving personal and community problems (p. 9; see also Aabø, Audunson, & Vårheim, 2010, p. 25; Audunson, Vårheim, Aabø, & Holm, 2007; Ferguson, 2012, p. 31; Vårheim, 2009, pp. 373–374).

In contrast, while Griffis and Johnson (2014) agreed in their study of five Southwestern Ontario rural libraries that rural libraries can exercise their social capital to generate community social capital (p. 102), they concluded that those rural communities had "a noticeable redundancy among relationships in the community," so the libraries did not significantly contribute to additional community capital (pp. 106, 187). Echoing Portes' (1998, pp. 15–18) warning of the negative effects of social capital, Griffis and Johnson noted that a library's social capital could negatively affect inclusion if the library failed to maintain a universalistic stance (p. 108).

In terms of this study, in addition to those social capital effects attributed to cultural assets, rural public library social capital assets include public service hours, programs, and the numbers of staff serving the public. Library buildings, bookmobiles, open hours, programs, and staff are all assets that can be used to generate opportunities for the social interactions that build the library's social capital, and, perhaps, contribute to the community's social capital.

1.7 Study Organization

The descriptive and prescriptive theoretical foundations of asset- or resource-based research are presented in Chapter 2. Chapter 3 begins with a review of two

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approaches to public library valuation: (1) economic valuation of direct and indirect public library benefits, and (2) outcomes measurement of public library activities. The chapter concludes with a discussion of twenty-first century approaches to public library community engagement and a literature review of public library assets mobilized for community engagement. The methodology used in this study, including data collection and data analysis, is described in Chapter 4. The results of data analysis related to each research question are presented in Chapter 5. Those results are synthesized and discussed in Chapter 6, which also contains a review of study limitations, suggestions for future study, and a final conclusion.

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CHAPTER 2

CAPITAL ASSETS: THE THEORETICAL FOUNDATIONS

The capital asset framework for this study draws from theorists within the fields of sociology, political science, and public policy. This chapter begins with a review of sociologist Pierre Bourdieu's descriptive socio-economic theories with an emphasis on the definitions of capital assets that are adopted in this study. Criticism of Bourdieu's theories is then presented along with a review of the alternative cultural and social capital theories of James Coleman, Robert Putnam, and Nan Lin, among others. The focus shifts to prescriptive capital asset theory in section 2.3 with a presentation of the Kretzmann-McKnight Asset-Based Community Development (ABCD) approach, including a comparison of ABCD to alternative community development typologies and a discussion of the sustainability and measurement of asset-based initiatives. The chapter concludes with a review of prescriptive asset-based approaches within the fields of public health, social work, and public policy.

2.1 Bourdieu's Capital Asset Theory

French sociologist Pierre Bourdieu is perhaps best known for *Distinction: A Social Critique of the Judgement of Taste* (1984), in which he identified the shared tastes or lifestyle that characterize a class (*habitus*) as "a set of actually usable resources and powers" consisting of economic, cultural, social, and symbolic capital (pp. 114, 170, 172; see also Bourdieu, 1985). Capital, in all its forms, represents an actor's exercisable "force" or power within a social topography or field. Because a field or social sphere,

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such as art, higher education, or politics, encompasses the sum total of all the capital exchanges between individual and organizational actors within the field, an individual actor's current and potential access to capital, in its varied forms, determines that actor's position or power within the field (Bourdieu, 1985, p. 242).

"Capital" in the classic Marxian sense is the accumulation of labor in the form of money or property rights (p. 241). By expanding the notion of capital to include cultural and social forms (p. 242), Bourdieu moved beyond Karl Marx's focus on property rights to produce a more complex view of the determinants of social class (Anheier, Gerhards, & Romo, 1995, p. 860). Indeed, Bourdieu criticized traditional capitalist theory for dismissing the importance of all but economic or mercantile transactions as determinants of social structures (Bourdieu, 1985, p. 242). He also criticized the rational-choice economic theory that inspired sociologist James Coleman's social capital theories (described below). Instead, Bourdieu adopted the stance that all "forms and types of rationality have to be explained sociologically" (Lebaron, 2003, p. 559). While his socio-economic theory, where material and non-material capital operate "at the same level," is sometimes referred to as "Bourdieuconomics" (Waldstrøm & Svendsen, 2008, p. 1497; G. L. Svendsen & G. T. Svendsen, 2003, p. 615), it is best described as a movement from Marxian macro-analytics towards the micro-analytics of neo-capital theorists that "account for the structure and functioning of the social world [through] capital in all its forms and not solely in the one form recognized by economic theory" (Bourdieu, 1985, p. 242; Lin, 2001, p. 17). The four linchpins of Bourdieu's socio-economic theories—economic, cultural, social, and symbolic capital—are discussed individually below.

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Bourdieu defines economic capital as "capital, which is immediately and directly convertible into money and may be institutionalized in the form of property rights" (p. 243). As the most liquid form of capital, economic capital can be converted, given time or other costs, into cultural or social capital (p. 243). For example, money can be used to pay for a college degree—a form of cultural capital from which symbolic capital may also arise. While Bourdieu's definition of economic capital parallels classic Marxian economics, his interest in the exchange of economic capital for other forms of capital reflects his neo-capital stance (Lin, 2001, pp. 16–17).

According to Bourdieu (1985, p. 242), there are three related forms of cultural capital:

(1) Embodied: characterized by personal knowledge, tastes, and social skills;

(2) Objectified: cultural objects, such as art or literature; and

(3) Institutionalized: higher education degrees.

Embodied cultural capital in its inherited form descends from an individual's familial environment. Economic capital that is invested over time in "self-improvement" also creates embodied cultural capital (p. 242). Objectified cultural capital is obtained through the conversion of economic capital or symbolic social capital. It exists both materially and symbolically, and yields potential profits to its holder. Those potential profits are proportionate to the amount of objectified cultural capital, but limited by the holder's embodied cultural capital (p. 247). Bourdieu equates the third, institutionalized, form of cultural capital with academic qualifications (p. 247). Finally, cultural capital, such as competence or authority, may be "misrecognized" as symbolic capital (discussed

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below) or may be converted to economic capital (p. 243). While the exercise of cultural capital, and its recognition as symbolic capital, varies within social fields, the relative scarcity of embodied or symbolic capital "secures material and symbolic profits for the possessors," yielding "profits of distinction [or power] for its owner" (pp. 244, 255 n. 3).

The third foundation of Bourdieu's socioeconomic theory is social capital. He defines social capital as the "aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition," as in "membership in a group" (Bourdieu, 1985, p. 248). Those relationships are maintained through the material and symbolic capital exchanges that take place within physical, economic, or social spaces or "fields." Symbolic capital may derive from social capital, as in the example of "symbolic profits . . . derived from association with a rare, prestigious group" (p. 249). The amount of social capital possessed by an individual depends on two factors: (1) the size of the network (group) that can act in the interest of the individual, and (2) the aggregate capital (economic, cultural, and social) possessed by the individual and available to the individual through network connections. Analogous to an economic multiplier, the capital available through network connections exerts a multiplier effect on the social capital possessed individually (p. 249). Maintenance of social capital requires a "continuous series of exchanges in which recognition is endlessly affirmed and reaffirmed," requiring investments of time, energy, and, often, economic capital (p. 250).

Symbolic capital arises from the "misrecognition" of cultural and social capital. In other words, symbolic capital is created when the cultural and social forms of capital are "apprehended symbolically, in a relationship of knowledge or, more precisely, of

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misrecognition and recognition, [presupposing] the intervention of the habitus, as a socially constituted cognitive capacity" (p. 255 n.3). That recognition (or "misrecognition") of the symbols of cultural and social capital leads to what Bourdieu calls "symbolic violence"—the norms of one field are imposed on other fields without conscious recognition that this is taking place (Bourdieu, 1989, p. 20). Thus, the norms of a dominant social structure or field are perpetuated, and the dominant structure preserved, through symbols of authority such as titles, educational degrees, and policies.

As discussed above, capital can be exchanged from one form to another, but conversion costs may be high in terms of time, energy, and repetitious material and symbolic exchanges. Bourdieu analogizes capital conversion to "the principle of the conservation of energy"—since profits from one form of capital arise from the costs of another form of capital, there cannot be "wasted" capital; therefore, the "labor-time" invested in conversion is "a solid investment" (Bourdieu, 1985, p. 253). While conversion costs are not wasted, their amount depends upon the social field or topography in which an actor actively participates or exercises power (p. 252).

2.2 Criticism and Alternative Conceptualizations

Cultural Capital

Bourdieu's conceptualization of cultural capital is not without criticism. For example, the generalizability of Bourdieu's concepts that inherited cultural and social capital influence academic success and contribute to the maintenance of a privileged social class have been questioned. DiMaggio (1982) found "a low correlation between parental education and cultural capital" and concluded that "cultural capital is less strongly tied to parental background traits than Bourdieu's theory or similar discussions

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of class and culture in the United States would predict" (pp. 198–199). Kingston (2001) noted that America lacked the distinctive class cultures that were evident in Bourdieu's French society (p. 90). However, in their review of education research, Lareau and Weininger (2003) concluded that researchers such as DiMaggio and Kingston had reformulated Bourdieu's definition of cultural capital by limiting it to "knowledge of or competence with 'highbrow' cultural activities" exclusive of skill or technical abilities, and argued for a return to a definition that did not restrict cultural capital to "'elite status cultures,' [or] partition it . . . from 'human capital' or 'technical skill'" (p. 597). Yosso (2005) applied critical race theory to challenge the efficacy of Bourdieu's cultural capital theories in studies of students of color and suggested that a "community cultural wealth" perspective could "transform the process of schooling" (p. 70).

David Throsby rejected Bourdieu's neo-capital, micro-level view of cultural capital. Instead, Throsby's "cultural economics" conceptualized cultural capital at a "macrolevel of societal accumulation" (Phillips & Shockley, 2010, pp. 96–97). In Throsby's view, tangible capital (such as buildings, art work, and geographic locations) and intangible capital (ideas, practices, traditions, and values) are "long-lasting stores of value and providers of benefits for individuals and groups" (Throsby, 2001, p. 44; Phillips & Shockley, 2010, pp. 94–95). The *stock*, or extant quantity of cultural capital, facilitates a *flow* of "services which may be consumed or may be used to produce further goods and services" (Throsby, 2001, p. 46). Unlike Bourdieu's view, where an individual can "create" cultural capital through capital exchanges, Throsby's cultural capital "is an exogenous stock whose flow originates upstream, far above and beyond individual, or micro-level, social interaction" (Phillips & Shockley, 2010, pp. 94–95).

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Social Capital

Alternative conceptualizations of cultural and social capital were presented by James Coleman, a neo-capital sociologist, who developed human- and social-capital theories grounded in actors' purposive actions within a rational choice economic theory framework (Coleman, 1990, p. 13)—a framework criticized by Bourdieu (discussed above). Under rational choice economic theory, individuals make decisions that are in their best interest, so Coleman faced the dilemma of explaining why individuals would choose to work together. To resolve that dilemma, Coleman developed his views of social capital or "relations among persons" (p. 316), which he deconstructed into three components:

(1) Obligations and expectations (grounded in trustworthiness);

(2) Information channels; and

(3) Social norms.

(Coleman, 1988, pp. S102–S104; Coleman, 1990, pp 309–310). In Coleman's view, the creation of social capital is not a conscious activity. Instead, it develops as individuals interact within an environment of trust. Describing social capital as an inalienable public good (Coleman, 1988, pp. S116–S118; 1990, pp. 315–318), Coleman departed from Bourdieu's view that individuals could purposely exchange social capital for other capital forms. While individuals create social capital, they do not do so purposely since, as a public good, the benefits of social capital may be enjoyed by others (Coleman, 1990, p. 318). Instead, social capital arises from and is used as a "byproduct of other activities" (p. 318). As with any public good, there is both underinvestment in social capital within a social group and the presence of "free riders" within the group. Just as Bourdieu viewed

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the exercise and exchange of capital as occurring within a closed group or "field," Coleman's view of social capital depended on the existence of a closed group. In a closed group, such as a Parent Teacher Association, some members are very active while other members do not actively contribute. The social benefits of the active members devolve to all members, and the loss of an active member not only causes the loss of the social capital accruing to the active member, but decreases the social capital available to the group (Coleman, 1988, pp. S117). Like Bourdieu, Coleman recognized that social capital required continued investment: "Social relationships die out if not maintained; expectations and obligations wither over time; and norms depend on regular communication" (Coleman, 1990, p. 321). Coleman viewed social capital as a critical link in the education of children. His research indicated that social capital provided the nurturing, trustworthy environment within which children thrive and he was concerned by the decreases in social capital precipitated by smaller family units and declining participation in religious organizations (Coleman, 1988, pp. S117–S119).

Mirroring Coleman's concern about the general modern decline of social capital, Robert Putnam, a political scientist, quantitatively demonstrated a significant decline in American participation in social groups. In *Bowling Alone* (1995; 2000), Putnam cited statistics from a wide variety of sources to demonstrate a decline of social capital in America. Although increasing time demands and women in the workforce were contributing factors, Putnam (2000) identified home entertainment and generational change as the major factors in the decline (p. 284). Putnam argued that social capital, developed through interaction within social groups, is necessary for the well-being of communities and individuals, noting that "civic virtue is most powerful when embedded

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in a dense network of reciprocal social relations" (p. 19). Indeed, networks, norms, and the reciprocity and trust that arise from networks and norms were the primary components of Putnam's view of social capital (Field, 2003, p. 32). Both Portes (1998, p. 19) and Field (2003, p. 38) described Putnam's functional interpretation of social capital as a focus on the macro, community level as opposed to the individual, purposive action focus of Bourdieu's and Coleman's social capital theories.

Nan Lin (2001) brought a social network context to the study of social capital, which he defined as "*investment in social relations with expected returns in the marketplace*" (p. 19; emphasis in original). Lin observed that Bourdieu, Coleman, and Putnam grounded their approach to social capital within the context of closed or dense groups (p. 26, Table 2.1)—Bourdieu stated that capital, in whatever form, was exercised within a field, and Coleman's view of social capital depended upon a closed group and the development of trust within that group. In contrast to Bourdieu and Coleman, Lin argued that extending the context of social capital to a network structure enabled actors to exploit network weak ties (Granovetter, 1973; introducing the concept of the strength of weak ties in networks) and structural holes (Burt, 1992; exploring the strategic advantage of controlling links to outlying network structures). Both weak ties and structural holes act as bridges or information channels between actors in otherwise unconnected social networks, thereby extending the advantages of social capital beyond otherwise closed or dense clusters (Lin, 2001, pp. 70–71).

Within a social network context, social capital can be described by one of three distinct forms: bonding, bridging, or linking. Bonding social capital, characteristic of dense networks and strong ties (Granovetter, 1973, p. 1362), looks "inward . . . and tends

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to reinforce exclusive identities and homogeneous groups" (Putnam, 2000, p. 22; Agnitsch, Flora, & Vern, 2006, p. 39). Bridging social capital "connects people or groups who are different from each other" (Agnitsch, Flora, & Vern, 2006, p. 39), and those heterogeneous connections or weak ties (Granovetter, 1973) enhance "the normative and informational functions of social capital" by extending access to multiple networks (Green & Haines, 2012, p. 149; Agnitsch, Flora, & Vern, 2006, p. 39). Within communities, both bridging and bonding social capital are "essential for mobilizing resources, creating inclusive and diverse social networks, and considering and accepting alternative viewpoints in development efforts" (Fey, Bregendahl, & Flora, 2006, p. 13; see also Kim, Subramanian, & Kawachi, 2006; Svendsen, 2013). "Linking" social capital theory was introduced by Szreter and Woolcock (2004), who defined it as the "norms of respect and networks of trusting relationships between people who are interacting across explicit, formal or institutionalized power or authority gradients in society" (p. 655). As such, linking social capital provides "an explicit recognition of vertical power differentials in social relations" (Kawachi, Kim, Coutts, & Subramanian, 2004, p. 682).

Social capital theorists are not without their critics. Portes (1998) bemoaned the "unusual baggage of policy implications [that] has been heaped on [social capital]," noting that the positioning of social capital theory as a bridge between sociology and economics "engages the attention of policy-makers seeking less costly, non-economic solutions to social problems" (pp. 2–3). Instead, Portes praised Bourdieu's "instrumental" approach to cultural capital that did not rely on the formation on social networks but, instead, focused on *individual* social relationships and the amount and forms of capital available to individual actors through those relationships (pp. 3–4). Portes also

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appreciated Coleman's "more refined analysis of . . . the role of social capital in the creation of human capital" (p. 5). Edwards, Foley, and Diani (2001) agreed: "we find much that is promising in the context-dependent and social structural/relational approaches of Bourdieu and Coleman" (p. 274).

Field (2003) noted that "Putnam's work has been enormously controversial" (p. 27; see, e.g., Arneil, 2006; Diers, 2004, pp. 5–7; Edwards, Foley, & Diani, 2001a; McLean, Schultz, & Steger, 2002; Sobel, 2002, pp. 140–143), and Portes (1998) offered a scathing macro-level criticism of Putnam's work (p. 19):

> [The] fundamental problem with Putnam's argument [is] namely its logical circularity. As a property of communities and nations rather than individuals, social capital is simultaneously a cause and an effect. It leads to positive outcomes, such as economic development and less crime, and its existence is inferred from the same outcomes.

Putnam was also criticized for "underestimating the importance of politics" (Field, 2003, p. 39). For example, McLean, Schultz, and Steger (2002) present a collection of scholarly criticism questioning Putnam's light treatment of political structures, noting that "Putnam's analysis misses the fact that civil society is historically amorphous and has an ambiguous relationship with order, revolution, and democratic politics" (p. 9). More broadly, Edwards, Foley, and Diani (2001b) criticized social capital research focused on "trust" and "reciprocity" as yielding "little new insight" when measured on the macro-levels evident in Putnam's work (pp. 279–280). They also questioned Lin's use of network attributes as "direct measures of social capital [rather than] as indirect indicators of social capital" (p. 289).

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Field (2003) criticized Bourdieu's social capital theory as "short on depth [and] one-dimensional—only acknowledging the social capital of the privileged" (p. 21), and identified Coleman's weaknesses as over-emphasizing close ties and relying on the "decidedly shaky basis" of rational choice to determine skill distribution (p. 26). Field also criticized Bourdieu, Coleman, and Putnam for gender-blindness (p. 41). Finally, Field criticized Bourdieu, Coleman, and Putnam for "downplaying" the *dark* or negative aspects of social capital (Field, 2003, p. 41). Portes (1998) also commented on the negative aspect of social capital and identified the following negative consequences during his review of social capital literature: (1) "exclusion of outsiders," (2) "excess claims on group members," (3) "restrictions on individual freedoms," and (4) "downward leveling norms operating to maintain a "downtrodden" group and forcing "the more ambitious to escape from it" (pp. 15–18; see also Waldstrøm & Svendsen, 2008, p.1504). Echoing the "dark" aspects of social capital, feminist theorist Barbara Arneil (2006, pp. 3, 8, 14) suggested that declines in social capital were necessary for the correction of "past injustices":

> [T]he emphasis on shared norms, trust and unity within a functional theory of social capital may prove to be in tension not only with liberal notions of individual rights but simultaneously with multicultural commitments to diversity and difference. . . . [S]ocial capitalism as much as economic capitalism is an ideology of inclusion and exclusion; a means by which the powerful may protect and further their interests against the less powerful.

2.3 Prescriptive Capital Asset Theories

Since the 1990s, community development theorists have increasingly recognized the efficacy of mobilizing local capital assets to address local issues. Prescriptive

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community-focused capital asset theories, variously labeled “asset-based,” “asset building,” “resource-based,” or “strengths-based,” have informed the praxis of a wide range of sociologists, political scientists, public health and social work practitioners, and public policy makers. Those prescriptive theories, beginning with the Asset-Based Community Development approach developed by John Kretzmann and John McKnight, are reviewed in this section.

Asset-Based Community Development (ABCD)

While researching factors related to well-being in urban neighborhoods during the early 1990s, John Kretzmann and John McKnight of the Center of Urban Affairs and Policy Research at Northwestern University realized that:

> The scientific evidence seemed to support the general proposition that the primary determinants of social and economic well-being, safety and justice, wisdom and knowledge, as well as health, were summarized by what happens in terms of individual behavior, social relationships, the physical environment, and economic status (McKnight, 2003, p. 2).

Prior to that realization, their research was grounded in the assumption that individual and community well-being derived from institutional systems (such as welfare) and the management, technologies, and funding mechanisms that fueled those institutions. Within that *institutional* assumption, local residents were classified as clients whose well-being was determined by the consumption of institutional services. The agency and interrelationships of citizens and community associations were omitted from the social map under the institutional assumption. Therefore, a new map was required to recognize the agency of citizens in effecting social change (McKnight, 1996, p. 16). In the new

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map, individuals and their families were the central actors. They were surrounded by the local associations and enterprises that provided additional resources "for change in individual behavior, social relations, the physical environment, and economic status" (McKnight, 2003, p. 3). Institutional systems remained at the periphery of the new map, indicating that the consumption of institutional resources should be directed by *citizens* rather than by *clients* (McKnight, 1996, p. 16). To implement the new map, McKnight called for a "paradigm shift" where "policymakers will have to move in different directions [outward from the individual and community rather than inward] . . . . enhanc[ing] community power while diminishing system authority" (p. 20). Such a paradigm shift would require: (1) adjusting funding priorities, (2) removing barriers to associational space, and (3) adopting "a legislative and planning focus that sees the community territory as the principle asset for investment"—in short, a shift from "needs based" to asset-based community development (ABCD) (p. 22). ABCD initiatives "become the shared arena in which the disenfranchised [and marginalized residents] can obtain political power [as] development decisions [are allocated] to the local level, where relationships between economic development, the environment, and social needs are most visible" (Green & Haines, 2012, pp. 6–7).

Translated to Bourdieu's lexicon, the ABCD paradigm requires community development actors to enter a new *field* or social sphere grounded in a *habitus* of shared values created through the agency of local citizens rather than through the values of dominant institutions. The accumulated economic, cultural, and social capital assets of actors within the new field are mobilized for ABCD initiatives, and leaders emerge as individual or organizational actor's positions of power are determined within the field.

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Detailed in the Kretzmann-McKnight ground-breaking work, *Building Communities from the Inside Out* (1993), the ABCD approach was adopted by a variety of domestic and international communities (see, e.g., Green, 2010, p. 4; Kretzmann & McKnight, 1993, p. 355; Mathie & Cunningham, 2008, describing thirteen ABCD initiatives in twelve countries; Rans & Altman, 2002; Snow, 2001, pp. 72–75); and recognized as an effective community development model in the fields of philanthropy (see, e.g., *Episcopal*, n.d., Episcopal Relief & Development; O'Leary, 2007, Carnegie UK Trust; Russell & Nurture Development, 2009, Carnegie UK Trust; Snow, 2001, Blandin Foundation), social work (see, e.g., Healy, 2005, pp. 165–66; Scales, Streeter, & Cooper, 2014, pp. xvi–xvii), public health (Brooks & Kendall, 2013; Lindau, Vickery, Choi, Makelarski, Matthews, & Davis, 2016, p. 1873; Morgan, Ziglio, & Davies, 2010), social policy and economic development (Blackman, Buick, & O'Flynn, 2016; Ford Foundation, 2002), and higher education service-learning initiatives (Hamerlinck & Plaut, 2014). Despite wide acceptance, ABCD has been criticized as "a beginning, but not an end" to the solution of systemic social issues (Fisher & DeFilippis, 2015, p. 368) and accused of ignoring the broader social forces operating beyond the local community (Hyatt, 2008, pp. 23–25). However, "mobilizing local resources in new ways is more likely to create a climate for successfully addressing more difficult structural issues" (C. Flora, J. Flora, & Gasteyer, 2016, p. 462).

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ABCD and Capital Assets

In the ABCD paradigm, "Successful communities use the talents of people, the web of associations, the strength of institutions, and their available land, property, and economic power to create new opportunities for themselves" (Snow, 2001, p. 2). From Bourdieu's perspective, those assets can be categorized as economic, cultural, or social capital assets

ABCD initiatives inventory and mobilize local economic assets. Often, new economic assets are created during ABCD initiatives through the cooperative efforts of community individuals, local associations, local institutions (businesses, libraries, and schools, among others), and, where appropriate, outside institutions. The ABCD list of economic assets includes: individuals' skills and work experience, natural resources available for production or tourism, consumer economic power and spending patterns, and business opportunities (Green & Haines, 2012, p. 12)—any abilities of citizens, local associations, and local institutions "to produce, not just consume" (Snow, 2001, p. 3). While Bourdieu would categorize skills and work experience as embodied cultural capital, all the other economic assets on the ABCD list are consistent with Bourdieu's classic definition of economic capital. As in Bourdieu's socio-economic theory, ABCD recognizes the convertibility of economic assets to other forms of capital that may be mobilized to strengthen communities.

Cultural capital assets are critical components of ABCD initiatives. Phillips and Shockley (2010) value cultural capital's "nature and influence as forces of creativity and innovation" (p. 98), which holds "much potential to influence the broad sphere of community development" (p. 92). As previously mentioned, Bourdieu's "embodied"

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cultural capital in the form of individual skill or competence is mapped and utilized in ABCD initiatives. Objectified cultural capital is particularly important in ABCD initiatives to establish arts-based communities or colonies (Blejwas, 2010; Phillips & Shockley, 2010, 98–104). In successful arts-based initiatives, cultural capital generates economic capital that can be mobilized for further initiatives, whether in a purely monetary form or as exchanged for cultural or social forms. Institutional cultural capital—the academic degrees held by individuals—is an asset available to be inventoried and mobilized in ABCD initiatives. Applying Bourdieu's theory of cultural capital, the symbolic capital (misrecognized cultural capital) created by successful ABCD initiatives serves to enforce and sustain the norms of the ABCD paradigm.

Social capital assets—the relationships or network of connections between individuals, local associations, and local organizations—are inventoried during the early stages of ABCD initiatives. As those initiatives progress, new connections or links are formed within and between community networks. Those new connections mobilize assets in ways that could not have been previously foreseen, including new opportunities to utilize weak ties (Granovetter, 1973) or exploit structural holes (Burt, 1992). ABCD literature invoking terms like "connect the dots" or "build bridges between assets" describes purposeful efforts to extend existing social networks (see, e.g., Snow, 2001, pp. 78, 86; Dewar, 1997, p. 23). In Bourdieu's terms, relationships within the ABCD field comprise the social capital available to be mobilized in achieving ABCD goals. Green and Haines (2012) summarize the importance of social capital to ABCD initiatives: "Collective action . . . is often built on social networks and trust, which are generated through social capital" (p. 151). Social relationships "enhance the ability of residents to

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act collectively to address local concerns" (p. 11). Finally, as in Bourdieu's recognition of capital exchanges, "[s]ocial capital becomes the basis for building other community assets, such as human and financial capital" that can be used in further ABCD initiatives (p. 13).

In summary, grounded in a new map of social policy centering on individuals, families, local associations, and local institutions, ABCD initiatives mobilize economic, cultural, and social capital to solve local problems and strengthen communities. From the perspective of Bourdieu's socio-economic theories, the ABCD paradigm shifts actors into a new social *field*. Within that field, ABCD initiatives promote purposive agency (individual and corporate) through the creation and exchange of economic, cultural, and social capital.

Rural America: The ABCD Perspective

Although Kretzmann and McKnight first developed their model in an urban Chicago context, ABCD initiatives quickly spread to rural communities: "There's something very rural about ABCD. . . . rural areas have always had to 'use what we've got, to get what we want.' [ABCD is] a 'building from within' cycle that rural communities have always used and understood" (Snow, 2001, p. 3–4). The asset- or resource-based perspective on rural America is also described by Scales, Street, and Cooper (2014, pp. xv–xvi):

> By viewing the glass as half-full, we begin to see the depth of human spirit and the richness of the creative potential that exist in rural communities. We see people who are talented and experienced in a variety of areas. We see strong social networks and associations. We see that with rural

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> services the lines are short, the hassles are few, and our business is easy to take care of. We see beautiful landscapes where we can easily enjoy nature. We see people getting things done that need to be done by using what is available. In other words, we see the capacity for strengths and assets rather than only problems and deficiencies.

In *The Organization of Hope: A Workbook For Rural Asset-Based Community Development*, Snow (2001) lists the following assets available for use in ABCD initiatives: (1) the talents and skills of individual citizens and their relationships; (2) local associations and their relationships; (3) local institutions (religious, business, and government) committed to locally directed, "from within" community development; (4) tangible physical assets (including buildings and natural resources); and (5) economic assets, including monetary assets, consumer spending power, and the experience, training, and skill of individuals (pp. 80–83). As demonstrated by Snow's (2001) review of ABCD initiatives in such diverse rural communities as Newton County, Arkansas; Greene County, Tennessee; Trinity County, California; the Gullah community in South Carolina; Camptonville, Cal; Pelican Rapids, Minnesota; Marvell, Arkansas; Todd County, Minnesota; and Colonias, New Mexico, asset-based community development can improve rural quality of life, create new jobs and business opportunities, and provide infrastructure improvements.

Rural ABCD initiatives can also help unify diverse communities. Blejwas (2010) describes an ABCD initiative in Alabama's "black belt" that led to a unifying community arts project. The initiative involved the individual assets of minority community leaders and community artists, the local institutional assets of a school, and physical assets that

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included a neutral space or commons area (2010, pp. 59–65). Villalobos (2014, p. 87) and Raffaelli and Wiley (2013, p. 363) recognize the "strong family ties" held by most rural Hispanics. Once mapped and mobilized, those social assets can contribute to successful ABCD initiatives in predominantly Hispanic communities. Russell (2014) addresses ABCD initiatives encompassing rural GLBT communities, recommending that an important first step is to acknowledge discrimination against the GLBT community, then initiatives can move forward to build "positive attitudes toward GLBT persons" by extending social network connections and facilitating "families of choice" (pp. 100, 107).

Alternative Community Development Typologies and ABCD

Christenson (1989) provides a tripartite typology of community organizing models: (1) self-help, (2) technical assistance, and (3) conflict. In the *self-help* typology, there is an expectation among participants that efforts will have an impact, and shared interests are identified within a democratic environment guided by a facilitator. Self-help efforts tend to have long-lasting effects because they arise from shared interests. The *technical assistance* typology is grounded in rational planning with a consultant supplying information to the participants. The *conflict* typology is led by an organizer or advocate who chooses a problem and works through existing organizations (pp. 32–38; see also Green & Haines, 2012, pp. 17–19). Within Christenson's typology, the ABCD approach most closely aligns with the self-help community organizing model. In the ABCD approach, local citizens and their associations and organizations identify shared interests and inventory the assets available for mobilization in addressing those interests. Facilitators take the form of local leaders who emerge during the ABCD initiative.

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Green and Haines (2012) present three alternative models of community organization: (1) power, (2) development, and (3) information. In the *power* model, the poor are mobilized to act "collectively in their common interest" and build a community organization with "sufficient power to achieve individual member interests" (p. 245). Examples of the power model are Saul Alinsky's establishment of the Industrial Area Foundation (IAF) in 1941 (an institutionalized approach) and the 1970s Association of Community Organizations for Reform Now (ACORN) (an individual-based approach) that was part of the National Welfare Rights Organization (NWRO) (pp. 246–247; Diers, 2004, p. 11; Stoecker, 2001, p. 386). Like Christenson's self-help model, the *development* model brings together individuals with shared interests to help themselves, as when locally organized Community Development Corporations are formed to develop properties (Green & Haines, 2012, p. 245; Stoecker, 2001, pp. 383–388). Aligned with John Dewey's theories, the *information* model emphasizes education as a force for social change. An example of the information model is the Highlander Center in Monteagle, Tennessee (http://highlandercenter.org/), which is dedicated to educating Appalachian and other southern citizens to improve their communities (Green & Haines, 2012, p. 249). Although John McKnight initially trained in community organizing under Alinsky (Diers, 2004, p. 14; Russell, 2015, p. 262), the ABCD approach rejects Alinsky's (1971, p. 91) power model of community organizing directed by the organizer, rather than the community, against "community pathologies" (Fisher & DeFilippis, 2015, p. 367). Instead, by identifying and mobilizing community assets to address the shared interests of local citizens, ABCD aligns with the development model of community organization.

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In 1997, Paul Mattessich and Barbara Monsey of the Amherst H. Wilder Foundation conducted a literature review of 525 community development studies to determine the factors influencing the success of community building and other efforts to "increase community social capacity" or "a community's ability to work together in concert" (Mattessich & Monsey, 1997, pp. 8, 65, App. B, *Methodology*). Those factors are summarized below in Table 2.1 (constructed based on Mattessich & Monsey, 1997, pp. 14–17; McCook, 2000, pp. 44–54). The ABCD approach incorporates the community building process characteristics highlighted in Table 2.1. Among other factors listed in the table, ABCD begins with the systematic gathering of community assets, encourages widespread participation, facilitates communication by building new relationships, involves community associations, and revolves around community decision-making. The characteristics of community building organizers in Table 2.1 are also evident in ABCD initiatives. The organizers of ABCD initiatives come from within the community, so they understand the community, are committed to the effort, and bring to the effort their social capital that was formed through prior trust relationships. Flexibility and adaptability are inherent ABCD characteristics. ABCD emphasizes the discovery of previously unforeseen patterns and links in community assets that can be mobilized for the benefit of the community. While emerging ABCD leaders may not have prior organizing experience, such experience is the type of asset that would be inventoried for mobilization during the first stage of an ABCD initiative.

ABCD Sustainability and Measurement

Community sustainability is a desired outcome of ABCD-styled, placed-based community development initiatives (Green & Haines, 2012, p. 7). Community

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Table 2.1 Factors for Successful Community Building

Characteristics of the Community	Characteristics of the Community Building Process	Characteristics of Community Building Organizers
Community Awareness of an Issue	Widespread Participation	Understanding the Community
Motivation From Within Community	Good System of Communication	Sincerity of Commitment
Small Geographic Area	Minimal Competition in Pursuit of Goals	Relationship of Trust
Flexibility and Adaptability	Develop Self-Understanding (Group Identity)	Flexibility and Adaptability
Preexisting Social Cohesion	Benefits to Many Residents	Organizing Experience
Ability to Discuss, Reach Consensus, and Cooperate	Focus on Product and Process Concurrently	
Prior Success with Community Building	Linkage to Organizations Outside the Community	
	Progression from Simple to Complex Activities	
	Systematic Gathering of Information and Analysis of Community Issues	
	Training to Gain Community Building Skills	
	Early Involvement and Support from Existing, Indigenous Organizations	
	Use of Technical Assistance	
	Continual Emergence of Leaders as Needed	
	Community Control Over Decision Making	
	The Right Mix of Resources	

sustainability may be defined as the ability of the economy, society, and ecology of the community system "to respond to and adapt to disturbance or change" (pp. 47–48). An example of a sustainability outcome is the development of natural resources for tourism

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instead of agriculture. In general, ABCD promotes sustainability by identifying and mobilizing new connections between, and uses for, community assets.

Aligned with, and drawing from, the Kretzmann-McKnight ABCD approach, Cornelia Flora and Jan Flora developed the Community Capitals Framework (CCF) for analyzing community sustainability, which they define as economic security for all residents, a healthy ecosystem, social inclusion, and economic development (C. Flora, J. Flora, & Gasteyer, 2016, p. 15). In the CCF model, seven capital assets support sustainable communities—natural, cultural, human, social, political, financial, and built capital (pp. 15–16; Emery & Flora, 2006).

Community sustainability requires a balanced approach to capital investment because emphasizing one capital may "decapitalize" others while creating economic, environmental, or social inequities (C. Flora, J. Flora, & Gasteyer, 2016, p. 15; Gutierrez-Montes, Emery, & Fernandez-Baca, 2009, p. 109). As balanced capital investment reinforces capital interactions, a "spiraling up" process or "self-reinforcing cycle" emerges—a capital multiplier effect where increases in one asset leads to increases in other assets (Emery & Flora, 2006, pp. 22–23). By leveraging assets, communities "become strategically ready to take advantage of new opportunities[,] and . . . achieve greater self-determination" (Richardson & London, 2007, p. 94), which increase the likelihood of community sustainability.

As community development initiatives progress, changes in the seven capitals and their interactions indicate changes in community sustainability (Flora, Emery, Fey, & Bregendahl, 2005; Fey, Bregendahl, & Flora, 2006). In their study of the effects of external funding of 57 rural community development projects, Fey, Bregendahl, and

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Flora (2006) offer a frank discussion of the difficulties and grey areas surrounding the measurement of community capitals, including the need for careful definition of each capital asset to avoid overlap between them and to develop the proxies or metrics used to measure their changes over time (p. 3). Applying the CCF framework in their analysis, the authors established metrics for each capital asset, scored each asset, and constructed a composite capital outcome score indicating the degree to which all capitals were strengthened during the community development initiatives. In a study of the effectiveness of HomeTown Competitiveness projects to reverse population and income declines in rural Nebraska, Emery and Flora (2006) applied the CCF approach to map changes in capital assets (pp. 29–30), and concluded that the increases in the seven capital assets over the course of the projects increased community sustainability (p. 33).

Prescriptive Capital Asset Theories In Public Health, Social Work, and Public Policy

By the late 1990s, Gittell and Vidal (1998) recognized "the long-standing preference of practitioners and prominent national foundations for framing their community development activities in asset-based terms, that is, in terms of 'the capacity of communities to act' rather than of 'need.'" (p. 14). As reviewed in this section, whether labeled "asset-based," "the strengths perspective," or "resource-based," asset-based approaches in community development and community engagement frameworks permeate the fields of public health, social work, and public policy for economic development.

Public Health

The asset-based approach to community engagement is a recurring theme in the public health field. For example, the seventh principle of community engagement from

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the Clinical and Translational Science Awards Consortium Community Engagement Key Function Committee Task Force on the Principles of Community Engagement (2011, p. 51) closely aligns with the Kretzmann/McKnight ABCD approach:

> Community engagement can only be sustained by identifying and mobilizing community assets and strengths and by developing the community's capacity and resources to make decisions and take action. Community assets include the interests, skills, and experiences of individuals and local organizations as well as the networks of relationships that connect them. Individual and institutional resources such as facilities, materials, skills, and economic power all can be mobilized for community health decision making and action. In brief, community members and institutions should be viewed as resources to bring about change and take action.

Similarly echoing the ABCD approach are Brooks and Kendall (2013); de Andrade (2016); and Lindau, Vickery, Choi, Makelarski, Matthews, and Davis (2016), among others (see, e.g., Morgan, Ziglio, & Davies, 2010; World Health Organization, 2002, pp. 12–13).

In the public health field, assets can be defined as "any factor (or resource), which enhances the ability of individuals, groups, communities, populations, social systems and/or institutions to maintain and sustain health and well-being and to help reduce health inequities," including social, financial, physical, environmental, or human resources (Morgan & Ziglio, 2010, p. 5). Asset mapping to identify individual and community strengths facilitates the implementation of equitable health policies (pp. 6, 10). As in the

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CCF model, discussed above, the asset model as applied in the field of public health provides an evaluation framework for public health initiatives (pp. 11–12).

Social Work

The strengths perspective as applied in social work practice and theory "focuses on the capacities and potentialities of service users" rather than focusing on their deficits (Healy, 2005, pp. 152, 154; see also Saleebey, 1997). In the strengths perspective, the service user's strengths or assets are mobilized for achieving "'a better quality of life on their terms'" (Healy, 2005, pp. 152–153, citing Saleebey, 1997, p. 4). Healy (2005) identifies the following assumptions underlying the strengths perspective: (1) everyone has "strengths, capacities, and resources," (2) resilience is the most common reaction to adversity, (3) individuals have the capacity to decide what is in their best interest and service providers do not need to make those choices for them, (4) service providers tend to focus on deficits while ignoring strengths and resources, and (5) service providers can collaborate with users in the capacity building process (pp. 157–158). The practice principles arising from those assumptions include: adopting an optimistic attitude, focusing on assets, building collaborations with service users, working to empower service users over the long term, and creating community (pp. 158–165). Those principles are sometimes criticized as "naïve in relation" to systemic structural barriers, shifting too much responsibility for change to individuals and communities, and inapplicable or limited in situations such as corrections or child protection services (pp. 168–169). However, the strengths perspective "is a valuable addition to the social work practice literature" (p. 169) and appears particularly well-suited to rural social work praxis (see Scales, Streeter, & Cooper, 2014).

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According to Healy (2005), the strengths perspective is similar to the Kretzmann/McKnight asset-based community development approach (pp. 165–166; see also Locke & Winship, 2005, pp. 7–8; Poole, 2005, pp. 131–133; Scales, Streeter, & Cooper, 2014, pp. xvi–xvii). For example, in rural areas with high poverty, inadequate housing and health care, and scarce professional services, Daley and Avant (2014) advise social workers to draw on service user strengths that include a "sense of community, connection to the land, intimacy among community residents," self-sufficiency, helping networks, and "an abundance of personal space" (p. 13). The 2011 National Association of Social Workers (NASW) Rural Policy Statement (reprinted in Scales, Street, and Cooper, 2014, p. 322) reflects the ABCD perspective by supporting:

1) Advocacy for social work practice and policy that addresses the unique needs of rural clients, particularly those who are vulnerable and oppressed, while recognizing the strengths and assets of rural communities; and
2) Promotion of the effectiveness of professional social workers in helping rural people to capitalize on their strengths, improve their lives, maintain healthy families, and improve their communities.

Acknowledging the strengths and assets of rural communities, the first policy statement is consistent with the ABCD "half-full," resource-based perspective. The second statement equates the abilities of individuals with strengths—as in ABCD, service users are viewed as citizen agents rather than powerless clients.

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Public Policy and Economic Development

Complementary to the Kretzmann-McKnight focus on mobilizing local assets to achieve shared goals, the direct objectives of the asset-based social policy associated with the World Bank are: (1) "the provision of positive opportunities for asset accumulation," and (2) the sustainability of those assets (Moser, 2008, p. 49). Similar to both the ABCD and CCF list of capital assets, poverty researchers at the World Bank identified five capital asset categories: "physical [or man-made productive resources], financial, human [education and health], social, and natural" assets (p. 50). The desired outcome of asset-based social policy emphasizing asset accumulation and asset sustainability is the creation of agency—the empowerment "to act to reproduce, challenge, or change the rules [or structures] that govern the control, use, and transformation of resources" in order to achieve long-term solutions to persistent poverty (pp. 57, 59). The Ford Foundation also adopted an asset-building approach to "empower people and strengthen their political voice [by helping them] gain access to the sources of power[, which are] assets such as skills that are marketable, economic resources, and social supports" (Ford Foundation, 2002, n.p.).

As demonstrated in this chapter, a variety of sociologists, political scientists, economists, and practitioners in the fields of public health and social work have recognized the efficacy of mobilizing local capital assets to address local issues. Prescriptive asset-based theory and praxis in the public library field is reviewed in Chapter 3.

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CHAPTER 3

LITERATURE REVIEW

This synchronous study of rural public assets and socioeconomic factors is intended in part to supplement and complement existing research approaches to the economic value and positive community outcomes created from rural public library assets. Therefore, this chapter begins with a review of those two approaches to public library valuation. Next, twenty-first century asset-based approaches to public library community engagement are discussed. The chapter concludes with a literature review highlighting the active mobilization of rural public library assets for community engagement.

3.1 Public Library Assets Producing Economic Value

Following a rise in the numbers of public library economic valuation studies in the late 1990s and early 2000s (see reviews in Imholz & Arns, 2007; Arns, 2013), the cost-benefit assessment of public library outputs was popularized in 2007 with the American Library Association's (ALA's) publication of a guide to cost-benefit analysis (Elliott, Holt, Hayden, & Holt, 2007). However, the expense and complexity of econometric studies discouraged their use in smaller libraries (p. 4). Cost-benefit or return-on-investment methodologies were never standardized, and the body of public library economic value research represented a variety of library outputs selected for study and varying monetary values assigned to those outputs. Methodological approaches to the study of public library economic value were also varied. The approaches reviewed in this

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section include: direct benefits and return on investment, indirect benefits and return on investment, contingent valuation, and input-output economic modeling.

Direct Benefits and Return on Investment

Many public library economic value studies assign specific monetary values to library "outputs" such as circulation, program attendance, and public terminal access. This process is similar to the library website "benefits calculators" that were based on the Massachusetts Library Association model (*ALA*, 2017a). Those calculators allow library users to explore the direct monetary benefits of borrowing materials, attending programs, using library computers, searching library databases, and receiving reference assistance, among other library services. Comparing the total annual monetary value of outputs (direct benefits) to total library expenses provides a return on investment estimate. For example, a 2005 study concluded that every state and local tax dollar invested in South Carolina public libraries yielded a return on investment of $2.86 in direct benefits (Barron, Williams, Bajjaly, Arns, & Wilson, 2005, p. 60). Arns' (2013) review of twenty-first century public library cost-benefit or return on investment studies found an inflation-adjusted median direct benefit of $5.37 per $1 invested (p. 32, and Table 1, citing seven studies).

Indirect Benefits and Return on Investment

"Externalities" are created when the consumption or production of a good or service by one party creates a positive or negative economic impact on others without a market adjustment for the resulting external costs or benefits (Van House, 1983, pp. 29-31; see also Gell, 1979, 20). The educational benefits of public libraries are examples of positive externalities (Van House, 1983, p. 29), as are the multiplication of economic

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effects when libraries purchase goods from local vendors or when visitors to libraries generate "halo" spending effects in local businesses located near libraries (Steffan, Lietzau, Lance, Rybin, & Molliconi 2009, p. 5). The indirect, external benefits of public libraries are frequently included in public library valuation studies. For example, valuation studies of South Carolina and Vermont public libraries estimated externalities by applying an economic multiplier to in-state library expenditures (Barron, Williams, Bajjaly, Arns, & Wilson, 2005, p. 61, reporting indirect benefits of $1.62 for each $1 expended; State of Vermont, 2007, 2008, 2008a, reporting direct and indirect benefits of $7.26 for each $1 expended). Arns' (2013) review of twelve public library studies found an inflation-adjusted median of $5.77 in direct and indirect benefits for each $1 expended (p. 32, and p. 33, Table 2).

Contingent Valuation

Contingent valuation (CV) is a survey-based methodology for estimating the economic value of environmental, cultural, and other goods in the absence of a market (Aabø & Strand, 2005, p. 354; Hider, 2008b, p. 438; Lee & Chung, 2012, p. 72; Noonan, 2003, pp. 160–161). The methodology received a qualified endorsement from a National Oceanic and Atmospheric Administration panel in 1993 (British Library, 2003, n.p.; Noonan, 2003, pp. 159–161; Hider, 2008a, p. 255), and the panel issued guidelines for quality CV research (Hider, 2008b, p. 443–448). The CV survey presents "respondents with hypothetical markets in which they can express their valuation of a specific improvement or deterioration of a public good" (Aabø & Strand, 2005, p. 354). Survey questions may take the form of open-ended questions, dichotomous (yes/no) answers, multiple choice questions, or referendum bids, among other forms (Breedlove, 1999,

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n.p.). The primary CV methodologies are willingness to pay (WTP), where survey respondents express their willingness to pay for a public good or changes to a public good, and willingness to accept (WTA), where survey respondents are asked what payment they would accept to forego or replace a public good. WTA questions infrequently appear in library valuation studies (see, e.g., Aabø, 2005) as researchers generally favor WTP questions, which produce more conservative valuations (Breedlove, 1999, n.p.; Elliott, Holt, Hayden, & Holt, 2007, p. 36). Elliott, Holt, Hayden, and Holt (2007) restricted WTP questions to users of the largest public libraries after concluding that smaller public libraries neither brought in significant outside sources of funds nor stopped "the leakage of dollars from the local economy" (pp. 14-15).

Respondent answers to CV survey questions are typically averaged to produce the CV estimate, although other methods, such as weighting and statistical modeling, may be used (see Kwak & Yoo, 2012, p. 267–269; Shaikh, Sun, & van Kooten, 2007, 116–18). For example, the Marist Institute for Public Opinion conducted a "stratified random digit dial probability design" CV study of U.S. public libraries using a WTP question in 2003 (*Marist*, 2003). While not distinguishing between library users and nonusers, the average WTP of the 1,004 respondents was a tax increase of $49 to support library services. When 1,050 residents of Victoria, Australia responded to the question, "how much [are you] willing to pay to maintain community access to current library services?," the average WTP of the 708 library users was $72 per year, while the average WTP of the 342 non-users was $55 per year (*SGS*, 2011, p. 50), which is a $17 per year difference between users and non-users. The number of library users responding that they were unwilling to pay anything for library services was eight percentage points lower than the

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number of non-users unwilling to pay (19% and 27%, respectively). Overall, Victoria library users assigned higher WTP values than non-users.

Input-Output Economic Modeling

Input-output economic models are used to trace "linkages among industry purchases and sales" and to "forecast future changes in business costs, prices, wages, [and] taxes," among other factors (Griffiths, King, Tomer, Lynch, & Harrington, 2004, p. Glossary-iii). Econometric input-output models are used in some public library valuation studies to estimate the effects of public library economic activities on other economic sectors. For example, the Bureau of Economic Analysis Regional Input-Output Modeling System was used to estimate the positive externalities generated by New York libraries (Kamer, 2005, 2006, also described by Imholz & Arns, 2007, pp. 18-19, 44-51, reporting benefits ranging from $2.97 to 4.59 for each $1 expended). Griffiths, King, Tomer, Lynch, and Harrington (2004) reported gross regional product increases of $9.08 and wage increases of $12.66 for each $1 of Florida public library support based on a proprietary input-output model developed by Regional Economic Models, Inc. (p. 6). Other econometric models used in public library valuation studies are thoroughly described by Arns (2013, pp. 20–22).

While not using a formal input-output model, a study of the economic impact of the Free Library in Philadelphia quantified an Urban Libraries Council (2007) report that public libraries contributed to economic growth by increasing literacy, promoting workforce development, and supporting business development (Diamond, Gillen, Litman, & Thornburgh, 2010, p. 3). Utilizing a combination of surveys, library and government statistics, and user interviews, researchers concluded that 2010 Free Library services

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resulted in economic value of $21.8 million in increased literacy skills, $6 million in increased workforce skills (including 979 users who found jobs due to library programs), $3.8 million in business development services, and $698 million in home values that produced an additional $18.5 million in property taxes (pp. 3-6).

Economic studies of library value are expensive to conduct and their results can be difficult to explain. While there are few, if any, economic valuation studies of rural public libraries, evidence that rural public library assets produce economic value continues to appear in the library literature (see section 3.4, below).

3.2 Public Library Assets and Outcome-Based Evaluation Frameworks

A library "outcome" is defined as a "specific benefit that results from a library program or service" (Davis & Plagman, 2015, p. 34), such as a decrease in unemployment directly attributable to the use of a library's public access terminals. Outcomes-based approaches to library evaluation were influenced by the Government Performance and Results Act of 1993, which directed federal agencies to demonstrate the impacts of programs and services, including the IMLS' administration of Library Services and Technology Act funds (Bertot, 2006, p. 241; Sin & Vakkari, 2015, p. 209). The 2009 Impact Survey conducted by the University of Washington iSchool for use in the Opportunity for All study, funded by the Bill & Melinda Gates Foundation and the IMLS, is an example of outcomes-based evaluation of library technology services (Becker, 2015, para. 1). The outcomes reported in that study included the hiring success rate for library users submitting job applications through public access terminals (16%) and the percentage of funded grant applications submitted through public access

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terminals for clubs and other nonprofits (68%) (Becker et al., 2010, pp. 81, 137; see also Becker, Crandall, & Fisher, 2009).

Public Library Association (PLA) President Carolyn Anthony endorsed outcome-based evaluation in 2013, identifying the need for:

> [A] set of performance measures that can capture the services public libraries are currently providing in their communities, with guidelines for conducting the measures to ensure consistency and validity. We also need to measure the outcome or impact regarding the difference that some of these services make in the lives of individuals and the well-being of the community (Anthony, 2013, para. 6).

The work of a task force formed under Anthony's leadership; collaboration with ORS Impact, a research consulting firm; and funding by the Bill & Melinda Gates Foundation led to the public launch of "Project Outcome" in 2015 (Davis & Plagman, 2015, pp. 33, 36). Project Outcome is designed to help libraries measure the outcomes of their activities in the areas of civic or community engagement, digital inclusion, early childhood literacy, economic development, education and lifelong learning, job skills, and summer reading programs (p. 33). The Project Outcome process consists of four steps: (1) setting goals; (2) measuring outcomes using field tested surveys consisting of four five-point Likert scale questions and two open-ended questions for general feedback and suggestions (Anthony, 2016, p. 10); (3) reviewing survey data results; and (4) taking action to communicate results and implement results-based plans (Davis & Plagman, 2015, p. 35). The process is designed to quantify the positive impacts of library services and activities, support strategic planning, improve the effective utilization of limited

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resources, and provide outcome data and anecdotal evidence to supplement the output data traditionally used to advocate for library funding (pp. 34–35). The availability of pre-defined, field-tested short surveys is particularly helpful to small rural libraries that might otherwise lack the staff, time, and training to effectively evaluate outcomes. Additionally, project resources, tools, peer data, and affiliate groups are freely available to participating libraries at www.projectoutcome.org. Consistent with Project Outcomes, the ALA's Libraries Transform Campaign's key messages include "Libraries transform lives" and "Libraries transform communities" (*ALA*, 2017c, Key Messages).

The IMLS also endorsed the data-driven, outcome-based evaluation of public library asset utilization:

> Outcomes allow us to know something about the extent to which we have (or haven't) reached our audiences. Information about outcomes allows us to strengthen our services. Equally important, it communicates the value of museums and libraries to the broadest spectrum of those to whom we account. Without data, it's been said, "you're just another guy with an opinion" (*IMLS*, 2017g, para. 2).

Defining outcomes as "benefits to people," such as "achievements or changes in skill, knowledge, attitude, behavior, condition, or life status for program participants" (*IMLS*, n.d., para. 3), outcomes-based planning and evaluation are foundational requirements for IMLS grants (*IMLS*, 2017g, para. 3). Similarly to Project Outcome, the IMLS recommends the use of interviews and surveys to gather the data necessary to measure the outcomes or "observable, intended changes" resulting from library services and activities (*IMLS*, n.d., paras. 6–9).

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Outcome-based evaluation is facilitated by the development of logic models. Logic models provide a clear framework for identifying the inputs (library assets) required for library activities and programs, the outputs representing activity and program utilization, and the outcomes to be measured to determine the change occurring in people or communities that result from the outputs (Becker, 2015; see also Acerro, 2017; Bober, Mumford, Kinney, & Long, 2015). Logic models clarify the connections between library assets and the changes in individuals and communities that are produced as those assets are utilized.

3.3 Twenty-First Century Public Libraries and Community Development

The twenty-first century began with Sarah Ann Long's American Library Association (ALA) presidential theme: "Libraries Build Community." With that theme, Long encouraged libraries to gain "a seat at the table" with a voice in community decision-making and an equal social standing with other community organizations and government representatives. To get that place at the table, libraries needed to become "highly visible . . . integral" community members by "giving and getting assets for the common good of the community" (Long, 2000, pp. vii, ix). During her speech to the Communitarian Summit in February 1999, Long affirmed that libraries had historically promoted civic education, provided open public space, served as openly accessible repositories of community history and culture, emphasized equitable service, and led in the adoption of new technologies (McCook, 2000, pp. 94–95). Those activities positioned libraries to be effective agents within the Communitarian ideal of civic participation and community-driven problem solving.

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In *Civic Librarianship: Renewing the Social Mission of the Public Library*, McCabe (2001) explained that "Communitarian ideas have a clear relationship to the ideas of the republican tradition of the Enlightenment [in which an] informed and productive citizenry fully engaged in the life of the community was viewed as the basic requirement for democracy" (pp. 41–42). Although criticized as "a legitimate political stance [but] not good social science" (Portes, 1998, p. 22), Communitarianism or the "community movement" arose in answer to the 1980s libertarian emphasis on "social and economic individualism unbounded by the biblical and republican traditions of social mobility" (p. 41). Robert Putnam's identification of social capital as a necessary factor in community well-being is sometimes identified with Communitarianism (Field, 2003, p. 38). As in asset-based community development approaches, Communitarianism recognized the need for community involvement in the solution of social problems (p. 63). Referring to the 1950s *Public Library Inquiry*, McCabe traced the historical roots of the public library's civic mission: "'to promote, through guidance and stimulation, an enlightened citizenship and enriched personal lives'" (p. 31, quoting Leigh, 1950, pp. 16–17). McCabe criticized the movement away from the library's historical civic roots during the 1970s and 1980s to a utilitarian emphasis on information-providing customer service, marketing, and strategic planning (p. 37). Tracing Michael Harris' (1973) and Dee Garrison's (2003) "radical critique" of the public library's civic roots to Rousseau's contra-Enlightenment, Romanticist belief that society should not educate or otherwise socialize individuals, McCabe (2001) urged a return to the "Enlightenment perspective of the traditional public library" that encompassed civic leadership (pp. 33–34). A return to the Enlightenment perspective positioned public libraries to participate as effective agents

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in the Communitarian movement: "[by renewing] the public library mission of education for a democratic society and find[ing] new ways to strengthen communities through library service. . . . [libraries] can be powerful tools in this process of institutional and community renewal" (p. 160).

McCook's monograph, *A Place at the Table: Participating in Community Building* (2000), which included a *Foreword* from Sarah Long, supported the Communitarian ideal and highlighted potential links between community builders and libraries. In particular, McCook urged librarians to align with the Aspen Institute's Roundtable on Comprehensive Community Initiatives for Children and Families (CCI). CCI reflected the Communitarian emphasis on community participation in solving social issues "by strengthening the capacity of people, institutions, and associations for enhanced community well-being" (pp. 34–35). McCook provided community participation guidance to librarians by mapping Himmel and Wilson's (1998) *Planning for Results* outputs to a community development framework reflecting Mattessich and Monsey's (1997) community building factors (see Table 2.1, above). She urged libraries to "be at the table" of community development by: (1) restructuring the work of front-line librarians, (2) adopting an administrative commitment to community participation, and (3) developing national leadership support for community participation (McCook, 2000, p. 103).

Writing in response to the September 11, 2001, terrorist attacks, Kranich reiterated McCook's and McCabe's advocacy for libraries as active agents in community renewal (Kranich, 2001, pp. 2–3). Kranich noted that libraries "build social capital as they encourage civic engagement" through educational or other training programs and

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collaborations with other organizations, among other activities. She also identified the provision of openly accessible, neutral public space or "commons" as an important factor in a library's participation in community development (pp. 3–4).

In 2002, Urban Libraries Council Director Eleanor Rodger called for librarians to become "players" rather than "library advocates" in their communities. Library *advocates* talked about library needs. Community *players* listened to community concerns and found ways to respond to those concerns. As players, libraries could participate in community development efforts, including literacy programs, economic development initiatives, and child care (Rodger, 2002, p. 54). The 2005 Urban Libraries Council report of Chicago Public Library involvement with ABCD efforts (Kretzmann & Rans, 2005) provided a practical guide for libraries interested in undertaking similar initiatives.

While serving as the California State Librarian and President of the Public Library Association, Susan Hildreth praised the ABCD approach and urged librarians to become involved in community development projects (Hildreth, 2007). Despite asset inequities with urban libraries, Hildreth (2007) recognized that an asset-based framework could move rural libraries "from a negative, deficient place to a positive, strong position in their communities" (pp. 8–9):

> The assets model starts with the assumption that even though there are issues to be addressed or problems to be solved, everyone in a community—individuals and organizations—has something positive to contribute. In the assets model, the glass is seen as half-full. It assumes that the community can help itself. It also suggests that if assets can be identified, then mutually beneficial connections can be made between

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> those assets. Building on these connections, often scarce resources can be stretched farther, and a greater impact can be made for the benefit of the community. Libraries are . . . viewed as rich local institutional assets.

Hildreth identified the following rural public library assets that could be mobilized for community development: (1) individual staff members, trustees, volunteers, supporters, and users; (2) library buildings that serve as community centers and public spaces as well as portals to government services; and (3) bookmobiles connecting libraries to citizens in more remote areas (p. 9). Just as Kretzmann and McKnight (1993) recognized that ABCD initiatives benefit from "inside out" connections to outside funding sources (pp. 186–288, 335–373), Hildreth suggested that rural library participation in ABCD initiatives would be favorably received by philanthropic organizations, which could help mitigate the nearly $90 per capita gap between metropolitan and rural foundation investment (p. 9). In Hildreth's view, embracing the ABCD approach through strategic partnerships with outside funders provided a sustainability model for rural public libraries (p. 11). During her tenure as IMLS Director, Hildreth's support of library involvement in community development efforts was reflected in the IMLS Building Sustainable Communities initiative (see http://www.imls.gov/about/building_sustainable_communities.aspx).

Taylor Willingham (2008), co-founder with Nancy Kranich of the ALA Membership Initiative Group (MIG) Libraries Foster Community Engagement, repeated Rodger's call for librarians to become community players rather than advocates. Willingham adopted the tripartite community typology developed by Suzanne Morse in *Smart Communities: How Citizens and Local Leaders Can Use Strategic Thinking to*

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Build a Brighter Future (2004), which consisted of: (1) community of place, (2) community of interests, and (3) community of relationships. She then identified the library as a community of place and a community of interests (pp. 104–105). Finally, Willingham challenged libraries to enter the community of relationships in order to participate as a community building agent (p. 105):

> Communities of relationship help people see how they as individuals, members of a community or profession, or actors within the system, can participate in the difficult job of community problem-solving. This is a deep, abiding desire among library constituents.

While Rodger and Willingham echoed the Communitarian and ABCD focus on community self-help in solving social issues, Chrystie Hill (2009) appeared to take a step backwards from community player towards library advocate in *Inside, Outside, and Online: Building Your Library Community.* Aligned with a public relations orientation rather than with ABCD or Communitarian community building initiatives, phrases like "our role as organizers and keeper of information access" (p. 18), and "approaching library services with the intention of building community allows library practitioners to systematically evaluate and iterate library service" (p. 23), demonstrated her utilitarian focus. Although Hill frequently invoked the term "community building," her emphasis remained in the libertarian, information service-providing sphere criticized by McCabe.

Scott's (2011a; 2011b) study of public library community building in Seattle and other northwestern public libraries marked a movement back towards a Communitarian focus. Unlike the ABCD approach, Scott did not place the library in the role of equal

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partner with community citizens. Her five areas of community building activities place the library less in a listener role than in a leadership role (2011a, p. 197):

1) Libraries serve as conduits for accessing information and education;
2) Libraries encourage social inclusion and equity;
3) Libraries foster civic engagement;
4) Libraries create bridges between resources and community involvement; and
5) Libraries promote economic vitality within the community.

Those community building activities aligned both with Green and Haines's (2012, pp. 246–249) *information* model of community organization and the *development* model illustrated by ABCD.

The ALA Libraries Transforming Communities (LTC) partnership with the Harwood Institute (http://www.theharwoodinstitute.org/), funded by a $1.5 million grant from the Bill & Melinda Gates Foundation, is designed to demonstrate "how libraries can turn outward to their communities for input and inspiration" (Brewer, 2015, p. 50). The emphasis of the partnership is on community engagement, but the outcomes of the Harwood process of progressive community conversations may lead to the types of community development projects envisioned by ABCD, such as the establishment of after-school programs (p. 50). However, the Harwood mission to develop "public innovators [to] lead communities forward" (Harwood, 2013) is more closely aligned with the Christenson (1989, p. 33) *technical assistance* typology of community organizing models than with the *self-help* model exemplified by ABCD. Currently, training in

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Harwood's "Turning Outward" approach to helping "libraries strengthen their role as community leaders and bring about positive change in their communities" is available in a step-by-step guide, associated training materials, and through ALA-sponsored workshops and webinars (ALA, 2017b, para. 1).

Both the "New Librarianship" model and the ALA's Libraries Transform campaign also appear to align with Christenson's *technical assistance* typology. Under the New Librarianship model, librarians possess the "power as professionals to facilitate and unleash the creative abilities of our community members. . . . the future of libraries lies in embedding our librarian values in community institutions" (Lankes, 2016, p. 168). Two of the Libraries Transform Campaign's key messages reflect the technical assistance typology by emphasizing that "Libraries transform lives" and "Libraries transform communities" (ALA, 2017c, Key Messages).

This review of twenty-first century public library community engagement campaigns and approaches demonstrates that library assets are central to their implementation. Regardless of whether rural public libraries adopt self-help or technical assistance models of community engagement, the investment of their economic, cultural, and social capital assets in community engagement activities and programs can create positive social change in their communities.

3.4 Rural Public Library Assets Invested in Community Development

Recent studies provide evidence that rural public library assets are being invested in community development activities. For example, in the first IMLS-targeted analysis of rural public libraries, Swan, Grimes, and Owens (2013) commented that rural and small libraries were forming alliances with other educational, community, and economic

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development programs. Heuertz (2009) also noted the formation of community alliances and engagement in community-building work in her case studies of three rural libraries (pp. 104–106). Majekodunmi (2011) identified rural public libraries as "engines for social change and community development" (p. 20). Hancks' (2011) case studies of five rural Illinois public library adult education programming and community outreach efforts concluded that "the libraries had a role in community economic sustainability efforts" although he "was unable to measure success in concrete terms" (pp. 9, 136). Real and Rose (2017, p. 7, Table 3) concluded that, while lagging behind more urban libraries, rural public libraries contributed to economic development by offering training in interviewing and resume writing skills (63% of rural libraries) and by supporting access to employment opportunity (58%) and business information resources (32% of rural libraries). However, the levels of all economic development services generally decreased with increasing distance from urban areas and urban clusters. Additionally, rural libraries were "the most likely of public libraries to provide assistance in accessing online degree courses" (p. 7, citing Bertot, Real, Lee, McDermott, & Jaeger, 2015, p. 41 Figure 8), which is an important service to help bridge the gap between urban and rural educational attainment and increase the potential for economic growth.

Rural libraries also promote community development by offering small business development services. Real and Rose (2017) found that 29% of rural libraries offered small business development services and 34% provided workspaces for mobile workers (p. 7, Table 3). However, small business development services lagged 20% behind city libraries, 18% behind suburban libraries, and 7.4% behind town libraries. Working to decrease those gaps and identifying the "strong potential role" that rural Appalachian

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region public libraries could have "in the economic development and sustainable economic viability" of the region, Mehra, Bishop, and Partee (2017a) describe their IMLS-funded project to promote the development of a small business toolkit in collaboration with those libraries (pp. 18, 30–31; see also Bishop, Mehra, & Partee, 2016; Mehra, Bishop, & Partee, 2017b).

Alemanne, Mandel, and McClure (2011) found that: "The public library is clearly playing a linchpin role in many rural communities" by providing computer training and technical expertise, and by taking the lead in broadband infrastructure (p. 19). By identifying "their successes as community successes," rural libraries have the potential to assume the "anchoring" role in broadband initiatives and take a leadership position among all anchor community institutions—institutions holding "sticky" assets (those assets that remain in the community) (p. 19).

Contrastingly, Hoffman, Bertot, and Davis (2012) found that rural libraries had older computer equipment and slower Internet access speeds than urban and suburban libraries (p. 11). Also, 59.1% of rural libraries applied for Universal Service Schools and Libraries Program (E-Rate) discounts on telecommunication and Internet services compared to 70.1% of urban libraries, and 40.5% of rural libraries received Broadband Technology Opportunity Program (BTOP) or Broadband Initiatives Program (BIP) grants under the American Recovery and Reinvestment Act of 2009 versus 46.2% of urban libraries (pp. 15–16). The negative effects of lower rural participation in those federal programs were compounded by the facts that "70.3% of rural libraries [were] the only free Internet and computer terminal access providers in their service communities, compared to 40.6% of urban and 60.0% of suburban libraries" (Real, Bertot, & Jaeger,

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2014, p. 9), and only 47% of rural Americans had access to adequate broadband speeds (Urban Libraries Council, 2016, p. 2). Likely related to funding and staffing constraints, rural libraries offered fewer technical training classes and less individualized computer training than urban and suburban libraries (p. 12). The researchers noted that technology infrastructure and training disparities between rural and non-rural libraries created "a digital divide" (p. 15) that was particularly disturbing since rural libraries served as the gateway to electronic government and employment services for many rural Americans (p. 12).

More recently, Du (2016, p. 103) noted that rural library users benefitted from the E-Rate subsidized Internet connections available in libraries that were faster than connection speeds generally available to rural households (see also Strover, 2017). Real and Rose (2017) reported some improvement in rural library Internet connection speeds, found that "virtually all" rural libraries offered public WiFi service, and concluded that the gap between urban and rural library basic computer and office productivity software training offerings had narrowed (pp. 4–5). Furthermore:

> A strong majority of rural libraries offer core services that bridge the digital divide and ensure that a lack of access to or prohibitive costs of broadband services do not need to result in the local population being excluded from changing elements of society (p. 9).

Although rural household broadband adoption lags behind urban areas (Perrin, 2017), Whitacre and Rhinesmith (2015) found that "it is residential broadband adoption, and not simply access to the technology, that is truly driving economic development in rural areas" (p. 165). While limited to 2013 data, Whitacre and Rhinesmith (2015),

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reported a “positive association between a higher number of libraries and household broadband adoption rates” in “the most rural counties” when controlling for income, education, age, and broadband infrastructure availability, and concluded that “libraries are the only type of community anchor institution (CAI) that exhibit this relationship” (p. 165).

Noting disparities between rural and urban access to health services, Real and Rose (2017) concluded that “rural libraries that empower patrons by helping them to find and evaluate online health information provide a particularly valuable supplement to regional healthcare systems” (p. 8). While Flaherty (2013) also stated that public libraries can serve an important role in providing health information services, the results of her study of two rural New York cooperative library systems indicated that the libraries lacked formal health information policies, and, even where a system-wide consumer health information support center was available, the quality and accuracy of the health information provided to patrons was “uneven” (p. 164). Contrastingly, a later national study by Bertot, Real, Lee, McDermott, and Jaeger (2015) found that 65.9% of rural libraries offered patrons access to credible health resource databases such as the EBSCO Consumer Health Complete and Gale Health & Wellness Center (p. 10, Figure 15). Real and Rose (2017) reported that nearly 40% of rural libraries assisted users with finding and evaluating freely available health information sources such as MedlinePlus and the Mayo Clinic, and 46% provided assistance in locating health insurance resources (pp. 8–9). However, those services generally decreased as distance from urban areas and urban clusters increased. Flaherty and Miller (2016) described collaboration between a rural North Carolina library and academic researchers to provide patrons with pedometers and

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an individualized online health self-assessment program. The researchers concluded that the patrons were "receptive to engaging in library-sponsored health promotion activities" (p. 150).

Rural libraries are also engaging with senior residents in their communities. Hughes (2017) found that 49% of the rural libraries surveyed offered home services for older adults and 57% conducted outreach efforts to residents who were physically hindered from visiting the library (p. 54). Ford and Hughes (2017) describe the services provided by an IMLS-funded "tribal aide to elders" rural librarian on the Winnebago Reservation in northeastern Nebraska.

Real and Rose (2017) found that rural libraries provided opportunities for civic and social engagement services. Those services included "book discussions and other social events for adults" (61% of all rural libraries), events for young adults (43% of libraries), and candidate forums (30% of libraries) (p. 10, Table 6). However, the most remote rural libraries lagged behind the civic engagement activities of fringe and distant rural libraries.

Describing public libraries as important "third place" or welcoming, safe institutions helping "local people figure out the complexities of life," Cabello and Butler (2017, para. 6) promote National Library of Medicine webinars and training sessions designed to teach public librarians "how to navigate social services, aging, mental health, welfare and public assistance, housing resources, health care, and education and employment resources" to help fulfill their expanding roles in local communities (para. 7). The 2010 through 2015 NSF-funded "Pushing The Limits: Building Capacity To Enhance Public Understanding of Math and Science Through Rural Libraries" project

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was designed to leverage rural public libraries' physical and human capital assets to bring Science, Technology, Engineering, and Math (STEM) concepts to an otherwise underserved section of the population (Informal Science, n.d., n.p.).

The literature reviewed above provides evidence that, even where services lag behind those of more urban areas, rural public libraries are investing their assets to bring about positive changes in the lives of their individual patrons and their communities. As noted by the IMLS (2017a), rural public libraries are "well situated as catalysts for positive change: they are embedded in local communities; they have a public service orientation; and they are viewed as community assets" (p. 3).

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CHAPTER 4

METHODOLOGY

Answering the research questions defined in section 1.2, above, involved identifying rural public library asset differences, and differences over time, if any, between the subclasses or categories that comprise each of four rural public library classifications: (1) distance from urban areas and urban clusters or locale, (2) legal basis, (3) population service area size, and (4) region (see also Table 4.3, below). To guide the identification of asset differences, data mining predictive, supervised classification algorithms were developed using the most accurate predictors of asset differences within the four rural library classifications. Data mining prediction is explained by Caffo, Peng, and Leek (2017, pp. 6–7):

> Prediction overlaps quite a bit with inference, but modern prediction tends to have a different mindset. Prediction is the process of trying to guess an outcome given a set of realizations of the outcome and some predictors. . . . In modern prediction, emphasis shifts from building small, parsimonious, interpretable models to focusing on prediction performance, often estimated via cross validation. Generalizability is often given not by a sampling model, as in traditional inference, but by challenging the algorithm on novel datasets.

As described in the quotation, the predictive algorithms for this study were developed from a "training" dataset holding 2014 IMLS and socioeconomic data, and validated

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against the 2012, 2013, and 2015 "test" datasets. Evaluating prediction accuracy, visualizing predictor patterns, and applying nonparametric descriptive statistics to explain prediction results provided the foundation for answering the research questions.

Data collection, including the public data sources used in this study; the operationalization of the predictors (independent variables) and classes (dependent variables); and dataset construction are described in section 4.1. The nonparametric data mining and statistical analysis methodologies applied in this study are described in section 4.2

4.1 Data Collection

The rural public library data selected for this study encompasses the population of rural public libraries as reported in the IMLS Public Library Survey beginning with 2012, which is the year that the United States Census Bureau released the modified list of urban areas based on the 2010 census results (US Census Bureau, 2012), and ending with 2015, which was then the most recently published IMLS Public Library Survey (*IMLS,* 2014b; 2015b, 2016b, 2017e). The annual Public Library Survey is a "universe survey" with information solicited from all public libraries in the United States (*IMLS,* 2017d, p. 2). Therefore, survey results represent the *population* of U.S. public libraries. As noted above in section 1.4, rural libraries are identified in the Public Library Survey by Locale codes 41 (fringe), 42 (distant), and 43 (remote). The predictors or independent variables selected to operationalize rural library economic capital, cultural capital, and social capital are shown in Table 4.1, below. Support for the validity of the constructs selected to operationalize each of the capital variables is detailed in sections 1.6 and 2.1, above.

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Table 4.1 IMLS Public Library Survey Predictors (Independent Variables)

Capital	Asset	IMLS Field	Description
Economic (First Round)	Operating Expenditures	TOTOPEXP	Total annual operating expense
	Capital Expenditures[2]	CAPITAL	Total annual capital expense
Economic (Second Round)	Local Revenue	LOCGVT	Operating revenue from local government
	State Revenue	STGVT	Operating revenue from state government
	Federal Revenue	FEDGVT	Operating revenue from federal government
	Other Revenue	OTHINCM	Other operating revenue (including fines, donations, and grants)
	Operating Revenue	TOTINCM	Total operating revenue
Cultural[1]			
Embodied	Non-MLIS Librarians	LIBRARIA – MASTER	Number of full time equivalent librarians without a MLIS equivalent degree
Objectified	Outlets	CENTLIB + BRANLIB	Number of central libraries and branches
	Bookmobiles[2]	BKMOB	Number of bookmobiles

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Capital	Asset	IMLS Field	Description
	Collection	BKVOL + EBOOK + AUDIO_PH + AUDIO_DL + VIDEO_PH + VIDEO_DL + DATABASE[3] + SUBSCRIP[3]	Total volume of print books, e-books, physical audio units, downloadable audio units, physical video units, downloadable video units, total databases, and total subscriptions
	Terminals	GPTERMS	Number of public access computer terminals
Institutionalized	MLIS Librarians[2]	MASTER	Number of MLIS or equivalent degree full time equivalent staff
Social[1]	Hours	HRS_OPEN	Annual public service hours (total of all outlets)
	Programs	TOTPRO	Number of library programs
	Staff	OTHPAID	Full time equivalent staff that do not hold the "Librarian" title

[1] Symbolic capital may arise from cultural and social capital (Bourdieu, 1985, p. 255 n.3). For example, the title of "Librarian," is recognized symbolically as the "authority" of the title's holder.
[2] Eliminated from the first round predictor list due to median per capita value of zero (MAD undefined).
[3] Replaced by ELECCOLL, total electronic collections, in the 2015 Public Library Survey.
Source: *IMLS* 2014a; 2015a; 2015b; 2015c; 2016a; 2017d

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Rural Socioeconomic Factors

A study of rural library assets would be incomplete without a consideration of the broader "economy, society, and nature of rural areas" (Wunderlich, 2016, p. 3). General descriptions of rural socioeconomics typically include such characteristics as a "lack of transportation; nondiversified economies; poor housing, education, and health care; poverty; shortage of professionals; and lack of services . . . decaying infrastructures, withdrawal of essential services, and a weak communication infrastructure for cellular phones and broadband connections" (Daley & Avant, 2014, pp. 7–8; see also Scales, Street, & Cooper, 2014, p. xv; Snow, 2001, p. 2). However, general descriptions are inadequate to capture the complex range of rural socioeconomic factors. Recent developments in the issues of de-population and out-migration, rural poverty, education levels, under-employment, restricted access to infrastructure and institutional services, and diversity tensions, as well as the factors selected as proxies for those issues, are described in this section. Specific mappings of those factors to United States Department of Agriculture (USDA) Economic Research Service (ERS) and Health Resources & Services Administration's (HRSA) dataset fields appear in Table 4.2, below.

Rural population increased overall in 2015 by .5%, which reversed declines of .3 percent between 2010 and 2014 (*USDA*, 2016g, p. 1). However, declines continued in some rural areas due to out-migration and low natural increases (births minus deaths). The periodic redefinition of higher growth rural areas as urban contributed to the pattern of slow rural population growth (p. 2). The IMLS provides a county population field in the Public Library Survey each year. Changes in the NCES/IMLS locale field designations over time reveal rural-urban designation trends, and the ERS Rural-Urban

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Continuum (RUCC), Urban-Influence (UIC), and Rural-Urban Commuting Area (RUCA) codes are used in this study to investigate the blurring, overlapping boundaries between rural and urban space described by Wunderlich (2016, pp. 45, 74).

While remaining below pre-recession rural and current urban levels, rural employment rose 1.3% between 2013 and 2015 although rural labor force participation rates lagged behind urban rates (*USDA*, 2016g, p. 2). Contributing to the lower rural labor force participation rate, the percentage of persons aged 65 and over was higher in nonmetropolitan areas (p. 2; Wunderlich, 2016, p. 49; Day, Hays, & Smith, 2016, paras. 1–4, Figure 2). County unemployment rates, the percent of persons aged 65 or older living alone, and home ownership rates serve as proxies for those trends.

Employment also varies between rural and urban areas by industrial composition. Service industries are the highest employers in rural and urban areas although rural areas lag 11% behind the numbers of urban managerial and professional jobs. Rural areas are generally more dependent on recreation employment and goods production, including agriculture and mining, than are urban areas (*USDA*, 2016g, pp. 3, 4). The USDA ERS Economic Typology Code is used in this study to represent each county's dominant industrial composition or "economic dependence" (*USDA*, 2017f; delineating primary economic dependence on farming, mining, manufacturing, Federal/State government, recreation, or non-specialization).

The Census Bureau's 2011–2015 American Community Survey results indicated that rural median household income was higher than urban median household income in thirty-two states and that "income inequality, as measured by the Gini index, was lower for rural households than urban households" (Bishaw & Posey, 2016, paras. 1, 6).

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Reflecting those findings, although still above pre-recession levels, the rural poverty rate began declining in 2014 and declined by .9 percent in 2015 (*USDA*, 2016g, p. 3). There are also indications that the gap between rural and urban poverty rates is declining: "Using county data from the five-year American Community Survey (2009–2013)[, p]overty has gone down in more rural counties and up in more urban counties, with little difference across these county groups" (Wunderlich, 2016, pp. 122-123; see also Bishaw & Posey, 2016). Contrastingly, the 2015 "deep poverty" rate, which is defined as "having cash income below half of one's poverty threshold [or] a subsistence level of about $1,000 a month for a family of 4," was .9% higher in nonmetropolitan areas (*USDA*, 2017a, Deep Poverty). Additionally, the poverty rate for rural children in female single-parent households was 52.5% compared to 12.3% for rural children in married-couple households (*USDA*, 2017a, Child Poverty by Family Type). Study proxies for these trends include the overall poverty, deep poverty, and child deep poverty rates as well as the percentage of female heads-of-household for each county.

Higher rural poverty and child poverty rates are related to low educational attainment and high unemployment rates (*USDA*, 2017b, p. 1), and, as in urban areas, median earnings in rural areas are positively related to educational achievement (p. 4). Rural counties comprise seventy-nine percent of the 467 "low-education" counties, which are those counties where twenty percent or more of adults aged 25 to 64 lacked a high school diploma or equivalent in 2015. Forty percent of those rural counties were also "persistent-poverty" counties that had maintained twenty percent or higher poverty rates since 1980 (pp. 5–6). Many of those counties cluster in the rural South, particularly around the Texas border with Mexico, the Mississippi Delta, and Appalachia. While rural

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high school dropout rates are improving overall, “ethnic minorities comprise an increasing share of the rural population without a high school diploma” (pp. 3-4). The study proxy for rural education levels is the percentage of adults without a high school diploma or General Equivalency Diploma (GED) by county.

Home ownership was 21.3% higher in rural than urban areas, partially due to the higher median age of rural residents (51 years) than urban residents (45 years) and the higher percentage of married-couple rural households (58.6%) than married-couple urban households (45.8%) (Mazur, 2016, paras. 4–8). The percentage of owner-occupied housing units per county serves as the proxy for home ownership trends in this study.

Age-adjusted death rates from heart disease, cancer, unintentional injury, chronic lower respiratory disease, and stroke “were higher in rural areas than in urban (metropolitan) areas (Garcia et al., 2017, pp. 1–2). Furthermore, disparities between rural and urban healthcare and other services continued in 2015. For example, only ten percent of U.S. physicians served rural areas, there were twenty fewer dentists per 100,000 rural residents, and twenty percent of rural counties lacked mental health services compared to five percent of urban counties although one-fifth of the U.S. population resided in rural areas (C. Flora, J. Flora, & Gasteyer, 2016, pp. 129–130). Similarly, Spetz, Skillman, and Andrilla (2017, pp. 229–230) found that the per capita numbers of nurse practitioners decreased as geographic rurality increased even though the percentages of nurse practitioners providing primary health care increased as geographic rurality increased.

Transportation issues and lower enrollment in the national health care system exacerbated rural health service disparities with urban areas (C. Flora, J. Flora, & Gasteyer, 2016, p. 139; see also Chavez, Kelleher, Matson, Wickizer, & Chisolm, 2018).

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Recognizing the disparity between rural and urban health care services, the Veterans Administration allocates 32% of its health care expenses to rural veterans although only 25% of veterans reside in rural areas (*US Veterans Affairs*, n.d., Rural Veterans' Health Care Challenges). Numbers of physicians and advanced practitioner nurses by county, the percentage of veterans by county, and the USDA ERS Frontier and Remote (FAR) Codes (*USDA*, 2016d), which reflect distances to a range of services, are used as proxies for health services access in this study.

The percentages of racial and ethnic minorities increased in at least 80 percent of nonmetropolitan counties since 2000 (Wunderlich, 2016, p. 48). This increase can be largely attributed to the "redistribution of Hispanics from the Southwest into other parts of the nonmetropolitan United States" (pp. 48–49). Results of the Census Bureau's American Community Survey (2011–2015) indicated that Texas and western Kansas had the highest percentages of foreign-born residents in "completely rural counties" while foreign-born percentages are highest in "mostly rural" Texas, southern Idaho, and North Carolina counties (Gryn, 2016, para.4). Although generally increasing in rural populations, "ethnic minorities . . . often live in separate social and institutional worlds" and there is evidence of "enduring residential segregation in nonmetro America" (Wunderlich, 2016, p. 49). The percentage of foreign-born residents per county serves as the proxy for ethnic minorities in this study.

The socioeconomic trends just described define the environment in which rural public library assets are created, invested, and sustained or lost. Linking each rural library to their specific community's socioeconomic landscape yields new insights into library asset strengths and sustainability.

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The data sources for the 2012 through 2015 socioeconomic predictors or independent variables selected for this study include: (1) the United States Department of Agriculture (USDA) Economic Research Service (ERS) Atlas of Rural and Small Town America (*USDA*, 2016a); (2) USDA ERS poverty, population, unemployment and median income, and education datasets (*USDA*, 2014a; 2015a; 2014b; 2015b; 2014c; 2015c; 2014d; 2015d; now available only on file); (3) the Health Resources & Services Administration's (HRSA) Health Workforce, Area Health Resource File (*HRSA*, 2014, an Access database now available only on file; U.S. Dpt. Health & Human Services, 2016, and Access database now available only on file; *HRSA*, 2017b, a SAS database); (4) the USDA ERS 2013 Rural-Urban Continuum Codes (RUCC) (*USDA*, 2013); (5) USDA ERS 2013 Urban Influence Codes (UIC) (*USDA*, 2016f); (6) the USDA ERS 2010 Rural-Urban Commuting Area Codes (RUCA) (*USDA*, 2016c); (7) the USDA ERS 2010 Frontier and Remote (FAR) Area Codes Zip-Code-Level FAR Codes and Related Data (*USDA*, 2016e); and (8) USDA ERS County Typology Codes, 2015 Edition (*USDA*, 2017g).

The majority of USDA and all AHRF variables represent county or county equivalent data, which may lead to over- or under-stating demographic and health services statistics for rural libraries located in largely non-rural counties. However, the 2010 USDA ERS RUCA codes based on census tracts and USDA FAR codes, which are aggregated to zip codes, extend the analysis to rural areas located within larger counties. The operationalization of the socioeconomic predictors or independent variables is shown in Table 4.2, below. Support for the validity of the constructs selected to operationalize each of the socioeconomic predictors is detailed above.

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Table 4.2 Socioeconomic Predictors (Independent Variables)

Field Name	Description
ForeignBorn Pct[a]	Percent of foreign-born residents.
Ed1LessThan HSPct[a]	Percent of persons with no high school diploma or GED, adults aged 25 or older.
FemaleHHPct[a]	Percent of female headed family households of total households.
HH65Plus AlonePct[a]	Percent of persons aged 65 or older living alone.
OwnHomePct[a]	Percent of owner occupied housing units.
UnempRate[a]	Unemployment rate.
Deep_Pov_All[a]	Percent of deep poverty, all persons.
Deep_Pov Children[a]	Percent of deep poverty for children.
Vets18OPct[a]	Percent of population that are veterans aged 18 or over.
*RUCC_2013[b]	2013 rural-urban continuum code.
*UIC_2013[c]	2013 urban influence code.
*Primary RUCA code 2010[d]	Primary rural-urban commuting code based on 2010 census.
*far1; far2; far3; far4[e]	Far and remote (FAR) classifications one, two, three, and four based on 2010 census.
*Non-Overlapping Economic Types: Type_2015_Update[f]	Non-overlapping economic dependence county indicator/typology code.
Phys, NF, Prim Care Pat Care Excl Hsp Rsdnts[g]	Count of physicians practicing primary care.
Adv Practice Registered Nurses w/NPI (APRN)[g]	Count of Advanced Practice Registered Nurses (APRNs).

***** Added during the second round.

Data Sources:

[a] *USDA*, 2014a; 2015a; 2014b; 2015b; 2014c; 2015c; 2014d; 2015d; 2016a.
[b] *USDA*, 2016b.
[c] *USDA*, 2016f.
[d] *USDA*, 2016c.
[e] *USDA*, 2016e.
[f] *USDA*, 2017g.
[g] *HRSA*, 2017c.

Rural Library Classes

The four categorical library classes (dependent variables) selected for this exploration of rural public library assets are: (1) distance from urban areas and urban clusters, (2) legal basis, (3) population service area size, and (4) geographic region. The

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IMLS fields operationalizing the four classes appear in Table 4.3, below. The classes are also used in the study as categorical predictors (independent variables) where appropriate to explain the interactions between the classes.

Table 4.3 Rural Library Classes (Dependent Variables, Categorical Predictors)

Class	IMLS Field*	Description
Locale	LOCALE	Distance from urban areas and urban clusters (see section 1.4, above): 41–Fringe 42–Distant 43–Remote
Legal Basis	C_LEGBAS	Legal basis code: CC–City/County CI–Municipal Government (city, town, village) CO–County/Parish LD–Library District MJ–Multi-jurisdictional NL–Native American Tribal Government NP–Non-profit Association or Agency SD–School District OT–Other
Service Area Size	Categories constructed from POPU_UNC	Unduplicated population service area size categories: Under 100 100 – 499 500 – 999 1,000 – 2,499 2,500 – 4,999 5,000 – 9,999 10,000 – 24,999 25,000 – 49,999 50,000 – 99,999 100,000 – 249,999 250,000 – 499,999
Region	OBEREG	Bureau of Economic Analysis region: 01–New England (CT, ME, MA, NH, RI, VT) 02–Mid East (DE, DC, MD, NJ, NY, PA) 03–Great Lakes (IL, IN, MI, OH, WI) 04–Plains (IA, KS, MN, MO, NE, ND, SD) 05–Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV) 06–Southwest (AZ, NM, OK, TX) 07–Rocky Mountains (CO, ID, MT, UT, WY) 08–Far West (AK, CA, HI, NV, OR, WA)

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Class	IMLS Field*	Description
* Data Sources: *IMLS*, 2014a; 2015a; 2016a; 2017d		

Dataset Construction

Dataset construction consisted of the following steps: data cleaning, predictor calculation and standardization, and linking data sources. Few, if any, data issues were found with the USDA ERS and the HRSA files, so data cleaning efforts were concentrated on the IMLS Public Library Survey files. For example, the IMLS populated the data fields for closed and temporarily closed libraries with a value of "-3" (*IMLS*, 2017d, p. 2; *IMLS*, 2016a, p. 2), so those libraries were removed from the files. The 2012 through 2014 Public Library Service files contained Puerto Rican rural libraries with invalid ("-3") data in the unduplicated population and other fields, so those libraries were removed from the files. The IMLS did not include Puerto Rican libraries in the 2015 Public Library Survey. The state and county Federal Information Processing Standard (FIPS) codes and the census tract field were reformatted to simplify matching to USDA ERS and HRSA files. The IMLS did not geocode the 2014 Public Library Survey, so several hundred libraries in the full file were missing the locale code used to identify rural libraries. The missing locale fields of forty-two rural libraries were successfully coded by matching those libraries to the 2012 Public Library Survey. Forty-one rural libraries in the 2014 Public Library Survey had zeroes in their census tract fields, so they were matched to the full 2015 Public Library Survey dataset to recover the census tracts so that the ERS RUCA codes could be added to the 2014 file for those libraries.

While each of the IMLS Public Library Survey files required data cleaning, the 2015 file required the largest efforts. Beginning with the 2015 Public Library Survey, the

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IMLS adopted the Geographic Names Information System (GNIS) codes administered by the American National Standards Institute to replace the Federal Processing Standards (FIPS) codes (*IMLS*, 2017d, p. 15). Since FIPS codes were required to match the IMLS files to HRSA and most USDA ERS files, the FIPS state and county codes were restored from the 2014 Public Library Survey file. Missing FIPS values were obtained from online services, including an online zip to FIPS system (http://www.zip-info.com/cgi-local/zipsrch.exe?cnty=cnty&zip=36509&Go=Go) and the Census Bureau county to FIPS file (https://www2.census.gov/geo/docs/reference/codes/files/national_county.txt). At a later date it was found that two of the new fields in the 2015 Public Library Survey contained unformatted FIPS state and county codes. The IMLS replaced the "database" fields with new electronic collection fields in the 2015 file (see *IMLS*, 2017c). Taking a conservative approach, the total electronic collection field was used in place of the 2012 through 2014 database fields after determining that any imputed local and state electronic collections were not added to the total electronic collection field. The IMLS replaced non-reported fields with the value "-1" in the 2015 file (*IMLS*, 2017d, p. 19). To avoid treating the "-1" fields as numeric values, those fields were replaced with zeroes in the working file used in this study.

Several field calculations were completed for each of the four IMLS Public Library Survey files. Compatible with the public library ranking index approach devised by Lance and Lyons (2008), and controlling for differences in library sizes, per capita transformation of the IMLS capital asset independent variables was produced by dividing each variable by the unduplicated service area population size (IMLS field POPU_UND; see Swan, Grimes, and Owens, 2013, p. 6, n. 6; *IMLS*, 2017d, pp. 6–7). As shown in

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Table 4.1, above, a new "outlets" field was created for each library to combine the central library and branch fields, and a new "collection" field was created to hold the total numbers of materials available for circulation. The "locale" and "region" dependent variables were transformed to the text formats shown in Table 4.3 to simplify analysis. The service area sub-classes were constructed in the categorical, textual format shown in Table 4.3 based on the IMLS POPU_UND field. The service area sizes above 9,999 match the categories used by Lance and Lyons (2008) in the *Library Journal* star rating system. The categories under 10,000 in service area size are consistent with the IMLS designations of "medium" sized libraries serving populations of 2,500 to 9,999 persons and "small" libraries serving less than 2,500 persons (*IMLS*, 2017b, p. 13, Table 1-B). To avoid double counting, the librarian field was adjusted by subtracting the numbers of staff holding a MLIS degree.

Other field calculations involved the HRSA and USDA FAR Code files. The per capita numbers of primary care and advanced practice registered nurses were calculated by dividing those HRSA fields (*HRSA*, 2017c) by the corresponding IMLS county population field (CNTYPOP). Also, the USDA ERS far1, far2, far3, and far4 fields (*USDA*, 2016e) were converted to a categorical, textual format indicating the highest "far" value for each library.

As will be discussed further in chapter 5, a portion of the Alaskan library other income reported to the IMLS included E-Rate subsidies in 2012, 2013, and 2014 (*Alaska* 2012; 2013; 2014). While analyzing the variation in service area size classification accuracy between 2014 and 2015 (see Table 5.24, below), it was discovered that Alaskan E-Rate subsidies were no being longer reported to the IMLS as part of the other income

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field as had been the practice during 2012, 2013, and 2014. Therefore, the Alaskan E-Rate subsidies were subtracted from the other income and total income fields in the 2012, 2013, and 2014 datasets and stored in new fields for economic asset comparisons both with and without the Alaskan E-Rate subsidies.

Microsoft Access was used to match individual libraries in the IMLS files to records in the USDA ERS and HRSA files. While most files were matched using a combined FIPS state and county code in text format, the Rural-Urban Commuting Area (RUCA) codes were matched on census tract and the Frontier and Remote (FAR) codes (FAR) were matched by zip code. There were no failures to match rural libraries in the 2012, 2013, 2014, and 2015 files to USDA ERS Rural Atlas, poverty, population, employment, education, RUCC, RUCA, or economic typology files. Two libraries failed to match HRSA files. FAR codes, matched on 2010 zip codes, had the highest failure rate with 142 unmatched rural libraries in the 2014 dataset.

It should be noted that the IMLS variables comprising the operationalization of rural public library capital assets are available only on a library-wide basis—assets such as programs and terminals are not reported on the branch level by the IMLS. Therefore, approximately 540 rural branches administered by suburban, town, or urban libraries are not included in this study (see *IMLS*, 2016c; 2017f). The lack of branch-level data is mitigated by the fact that ninety percent of all rural libraries do not have branches (see section 5.4, below). Individual library 12-month reporting periods may deviate from a strict January through December schedule (*IMLS*, 2017d, pp. 5– 6); however, reporting schedules remain fairly constant across the 2012–2015 files.

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4.2 Data Analysis

Nonparametric statistical methodologies, including supervised classification, were adopted for this study due to the leptokurtic distributions of the IMLS dataset variables and the large numbers of statistical outliers. Outliers were identified using median absolute deviation (MAD) calculations. An outlier is "an observation so remote from, or out of line with, other observations as to cause surprise" (Sprent & Smeeton, 2007, p. 439). Outliers may arise from measurement errors or may represent valid data anomalies. "When there is no clear indication that an outlier is a measuring or recording error the appropriate action . . . depends on the population of interest and on what questions are being asked about that population" (p. 440). As illustrated in Chapter 5, below, rather than measurement errors, IMLS Public Library Survey data outliers function as information sources in this study. MAD values greater than five are considered outliers (p. 441).

In order to identify otherwise obscured information patterns in the complex datasets, WEKA (http://www.cs.waikato.ac.nz/ml/weka/) open source data mining software was used to identify the best predictor sets (independent variables) for each of the four rural library classes (locale, legal basis, service area size, and region). Supervised classification algorithms are constructed by testing which predictors (independent variables) best identify class membership, so the class (dependent variable) is revealed to the algorithm and the accuracy of the predictor set is calculated during each test.

All numeric predictors were standardized using MAD calculations prior to algorithm construction in order to correct for differences in predictor (independent variable) scales during supervised classification. Following standardization, the best

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classifiers for each of the four classes were developed using the MAD-standardized 2014 set of predictors (independent variables). The 2014 dataset was selected as the training dataset because it was then the most current Public Library Survey. The 2012, 2013, and, later, the 2015 datasets were reserved as test sets to validate the prediction algorithms developed from the training dataset and to test for model overfitting.

The first steps in developing the most accurate classifiers from the training dataset involved a series of classifier tests using predictor sets drawn from the literature review. As testing progressed, the identification of the most accurate classifier predictors was assisted by two WEKA "Select Attributes" functions: CfsSubsetEval and BestFirst. The CfsSubsetEval function assesses "the predictive ability of each attribute individually and the degree of redundancy among them, preferring sets of attributes that are highly correlated with the class but with low intercorrelation" (Witten, Frank, & Hall, 2011, p. 488). The "BestFirst" function is a greedy hill climbing algorithm, and the forward direction from an empty set of attributes with backtracking options was selected to avoid "dead ends" while searching for an optimal solution (p. 492).

Two metrics were used to evaluate and compare classifier results during the selection of the most accurate classifiers: (1) the Kappa statistic, and (2) the receiver operating characteristic (ROC) area. The Kappa statistic measures the agreement between the predicted and observed accuracy of the classification "while correcting for an agreement that occurs by chance" (Witten, Frank, & Hall, 2011, p. 166). Kappa statistics above .8 are "almost perfect" while Kappa statistics below .4 are at best only fair indicators of agreement between predicted and observed accuracy (Landis & Koch, 1977, p. 165). ROC (receiver operating characteristic) curves plot the true positive rate on the

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vertical axis against the false positive rate on the horizontal axis, and the weighted average ROC area is a measure of the accuracy of the classifier in identifying true positives (pp. 172–173). A ROC area of "1 represents a perfect test; an area of .5 represents a worthless test" (Tape, n.d.).

As indicated in Tables 4.1 and 4.2, above, there were two rounds of model building. The results of the first round indicated that library revenue sources might improve the prediction algorithms, so those predictors (independent variables) were added to the predictor list during the second round. In an attempt to improve the accuracy of the locale classifier model, the USDA ERS RUCC, UIC, RUCA, FAR, and economic typology codes were also added to the predictor list during the second round.

The most accurate classifiers of the locale, region, and service area size classes were constructed using 100-tree random forest algorithms. The random forest algorithm was chosen in part because the decision trees in the forest are decorrelated (IMLS documentation indicates that the open hours and outlets predictors are highly correlated, see *IMLS*, 2017d, p. 15, Table 1). Decorrelation of the random forest trees is accomplished by selecting a random subset of predictors, approximately equal to the square root of the total number of predictors, at each tree split. (James, Witten, Hastie, & Tibshirani, 2013, pp. 587–588). One criticism of random forest algorithms is that particularly "strong features can end up with low scores" due to the random selection of split candidates (Saabas, 2014, n.p.). Another criticism is that random forests "can be biased towards variables with many categories" (Saabas, 2014). Despite those criticisms, they "do remarkably well, with very little tuning required" (James, Witten, Hastie, &

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Tibshirani, 2013, p. 590). The most accurate legal basis predictor set, consisting of two categorical predictors, was constructed using the WEKA BayesNet algorithm.

Ten-fold cross-validation was applied in all classifiers to decrease the likelihood of overfitting to the 2014 training dataset. Once identified, the most accurate training set classifier predictors were subsequently validated against the 2012, 2013 and 2015 test sets (see Table 5.1, below).

Further nonparametric analyses and data visualizations, such as comparisons of medians, interquartile ranges, and quartile coefficients of dispersion (calculated by subtracting quartile 1 from quartile 3 then dividing the result by the sum of quartiles 1 and 3), were conducted to explain the best classifier results, interactions between classes, and the changes in predictors over time in order to answer research questions one through five. The software used for those analyses included Microsoft Excel®, the R Project for Statistical Computing (http://www.r-project.org/), and Tableau (https://www.tableau.com/).

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CHAPTER 5

RESULTS

5.1 Introduction to Results

The results related to each research question are presented in sections 5.2 through 5.6, below. Before turning to those results, this section includes a brief review of the search for the most accurate supervised classifiers of the four rural library classes (locale, legal basis, service area size, and region).

Total Annual Revenue, Total Annual Expense

The search for the most accurate supervised classifiers that did not over fit the training dataset began with the assumption that either total annual revenue or total annual expense would be strong predictors of each of the four rural library classes. The validity of that assumption first came into question with the finding that the annual capital revenue and annual capital expense fields had medians equal to zero in each of the four years studied. To further test the validity of the assumption, trials were conducted using operating revenue and operating expense as stand-alone predictors of the four classes. Based on 2014 training data and a random 100-tree algorithm with 10-fold cross-validation, operating revenue was only 41% accurate in predicting locale, 37% accurate in predicting legal basis, 20% accurate in predicting service area size, and 17% accurate in predicting the region. Similarly, operating expense was only 41% accurate in predicting locale, 37% accurate in predicting legal basis, 21% accurate in predicting service area size, and 18% accurate in predicting the region. As testing progressed using

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the Weka best attribute functions described in section 4.2, neither total operating revenue nor total operating expense were selected in the best predictor subsets for the legal basis, service area size, and region classes. Since rural library assets such as staff, computer terminals, and programs, among other assets, are derived from economic revenue, and, correspondingly, from economic expense, it appeared paradoxical that neither of those proxies for total rural public library economic capital played a more important role in classifier construction. However, as will be discussed in sections 5.4 and 5.5, below, the "other" public library revenue source consisting of grants, donations, and fines was one of the predictors of the service area size class, and the revenue from state governments was one of the predictors of the region class.

Interactions between Classes

The predictor sets for the locale, legal basis, and service area size classes summarized in Table 5.1, below, provide evidence of the interactions between the classes. The legal basis class in the training dataset was best predicted when only the service area size and region classes were used as predictors. The best locale classification algorithm for the 2014 training dataset was four percentage points more accurate with the inclusion of the region class as a predictor. The service area size algorithm minimally improved by .4 percentage points when the legal basis class was included as a predictor in the training dataset. As in a parametric statistical analysis of variance, where one factor may influence another factor, the inclusion of a class variable as a predictor, where appropriate, aids in the analysis of rural public library asset patterns. Class interactions will be further discussed in the sections below.

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Reduced Predictor Sets

Occam's razor, the principle that simpler solutions are usually better, generally applied during the development of the most accurate classifier predictor sets. For example, a service area size classification training run using a set of twenty-nine predictors was less accurate by two percentage points and the Kappa statistic smaller by .03 than the nine-predictor set shown in Table 5.1, below (for an explanation of the Kappa and ROC area metrics, see section 4.2, above). Furthermore, the twenty-nine predictor set over-fit the 2014 data as 36% fewer 2015 rural libraries were correctly classified using the twenty-nine predictor set. Two of the reduced predictor sets identified in round one of the classification trials were further reduced in round two. The final six-predictor set of the locale class shown in Table 5.1, below, was seven percentage points more accurate, the Kappa statistic .1219 higher, and the ROC area .078 higher than the eight-predictor set developed during the first round of classifier trials. The final eight-predictor set of the region class (shown in Table 5.1) was 7% more accurate and the Kappa statistic .09 higher than an eleven-predictor set developed early in round two of the classifier trials.

Most Accurate Classifiers

Table 5.1, below, summarizes the most accurate supervised classification algorithms developed using the 2014 training dataset, including their accuracy percentage, Kappa statistic, and average ROC area. The table also contains the tests of those algorithms against the 2012, 2013, and 2015 datasets. It should be noted that the following library assets were excluded from the predictor sets due to their zero medians (see Table 4.1, above): bookmobiles, librarians holding an MLIS degree, and capital

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revenue. While there are variations in accuracy between the training and test datasets, the variations do not indicate that the predictor sets over-fit the training data. The analysis of results presented in sections 5.2 through 5.5 addresses the first four research questions while explaining the accuracy of the supervised classifiers. Section 5.6 addresses the fifth research question while examining the variations in accuracy of the four supervised classifiers over time.

Table 5.1 Most Accurate Supervised Classifiers by Research Question, 2012–2015

	2014 (N = 4,189) Training Data		**2012 (N = 4,200) Test Data**		**2013 (N = 4,202) Test Data**		**2015 (N = 4,137) Test Data**	
Class	**% Accuracy**	**Kappa/ ROC**	**% Accuracy**	**Kappa/ ROC**	**% Accuracy**	**Kappa/ ROC**	**% Accuracy**	**Kappa/ ROC**
Q1: Locale Three categories	**72.6188**	**.525/ .849**	72.0952	.5151/ .841	72.5607	.5248/ .847	71.7912	.5097/ .844
	Predictors: per capita programs and operating income; RUCC, RUCA, and FAR codes; region. 100-tree random forest classifier, 10-fold cross-validation, 3 random predictors at each split.							
Q2: Legal Basis Nine Categories	**64.8365**	**.3785/ .845**	64.8095	.3756/ .847	64.8977	.379/ .847	65.5306	.387/ .845
	Predictors: service area size, region. BayesNet classifier, 10-fold cross-validation, 2 maximum parents.							
Q3: Service Area Size Eleven Categories	**83.9102**	**.8015/ .974**	83.3333	.7942/ .975	83.4127	.7952/ .973	77.2782	.7177/ .955
	Predictors: per capita outlets, hours, other staff, collection, terminals, other revenue, % unemployment, RUCA code, legal basis. 100-tree random forest classifier, 10-fold cross-validation, 4 random predictors at each split.							
Q4: Region Eight Categories	**87.9685**	**.8541/ .983**	87.8333	.8523/ .981	87.3156	.8456/ .981	82.9828	.7868/ .979
	Predictors: per capita state revenue; % foreign, no diploma, female head of household, own home, child deep poverty, veterans; economic typology. 100-tree random forest classifier, 10-fold cross-validation, 4 random predictors at each split.							

5.2 Research Question One

Research question one asks: Are the economic, cultural, and social capital assets of remote rural public libraries generally lower than those of fringe and distant libraries—that is, do rural public library assets generally decrease as distances from

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urban areas and urban clusters increase, and how are those decreases, if any, explained by socioeconomic factors? Although an IMLS report noted that per capita assets such as collections and programs were higher in rural than in the urban, suburban, or town locales (*IMLS*, 2017b, pp. 13, 24), the assumption behind question one was that per capita assets would generally decrease as distance from urban areas and urban clusters increased such that there would be some subset of predictors classifying the three IMLS locale categories (fringe, distant, and remote) with a reasonably high accuracy. However, as discussed in this section, the most accurate set of predictors of the locale class in the 2014 training dataset indicated that variation in rural public library assets by distance from urban areas and urban clusters was more complex than initially assumed. When classified by locale, rural public library asset variations were influenced by the blurring of urban and rural boundaries and by geographic region.

The most accurate set of predictors of the locale class in the 2014 training dataset included per capita programs and total operating revenue; the USDA Economic Research Service (ERS) Rural-Urban Continuum Codes (RUCC), Rural-Urban Commuting Area (RUCA) codes, and Frontier and Remote (FAR) codes; and the region class. The six-predictor algorithm accurately identified the locale of 3,042 or 72.6% of the 4,189 rural public libraries in the dataset. The Kappa statistic of .525 indicated that this was a moderately accurate classifier (Landis & Koch, 1977, p. 165), while the weighted average ROC area of .849 indicated a good test of true versus false conditions (Tape, n.d.). The algorithm correctly classified 42% of the 508 fringe libraries, 79% of the 2,056 distant libraries, and 74% of the 1,625 remote libraries.

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Rural Library Assets by Locale

Predictors

Per capita programs and per capita total operating income were the only two library assets included in the most accurate locale classifier predictor set. When tested as stand-alone predictors of locale, both the per capita programs and per capita total operating income predictors correctly classified approximately 41% of the 4,189 libraries by locale. Those tests, in tandem with the results of the six-predictor locale classifier algorithm, suggested that differences in library assets between fringe, distant, and remote rural libraries provided an incomplete picture of rural libraries when classified by distance from urban areas and urban clusters.

As shown in Table 5.2, below, there were only small differences between median per capita fringe, distant, and remote programs. However, contrary to the assumption that rural library assets generally decrease as distances from urban areas and urban clusters increase, the median per capita number of programs was nearly two programs per thousand persons higher in remote than in distant rural libraries. Also contrary to the assumption, while median per capita total operating revenue decreased by $3.84 between fringe and distant rural libraries, remote median per capita total revenue was $2.23 higher than fringe and $6.07 higher than distant rural libraries. When recalculated without Alaskan E-Rate discounts, median per capita total operating revenue remained the same in the fringe and distant locales and decreased by $0.06 in the remote locale.

As shown in Table 5.3, below, changes in median per capita programs and operating income can be partially explained by the changes in unduplicated service area

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Table 5.2 Median Per Capita Rural Public Library Assets by Locale

Locale	Count	Programs	Operating Income	Operating Income Adjusted for Alaska E-Rate Subsidies	Outlets	Hours	Non-MLIS Librarians	Other Staff	Terminals	Collection
Fringe	508	0.0278	$35.95	$35.95	0.0002	0.4192	0.0002	0.00022	0.0015	8
Distant	2,056	0.0243	$32.11	$32.11	0.0005	0.6970	0.0003	0.00014	0.0024	11
Remote	1,625	0.0259	$38.18	$38.12	0.0007	1.0313	0.0005	0.00008	0.0040	16

Table 5.3 2014 Unduplicated Service Area Population Size by Locale

Locale	Count	Median Unduplicated Service Area Population	Minimum Unduplicated Service Area Population	Maximum Unduplicated Service Area Population	Quartile 1 Unduplicated Population	Quartile 3 Unduplicated Population	IQR	Quartile Coefficient of Dispersion
Fringe	508	4,615	65	196,981	2,280	8,988	6,708	0.60
Distant	2,056	2,176	75	486,990	1,166	4,743	3,577	0.61
Remote	1,625	1,371	10	254,475	654	3,135	2,481	0.65

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population size as the distances from urban areas and urban clusters increase. The quartile coefficients of dispersion for the fringe, distant, and remote sub-classes indicated that there was little difference in the spread of the unduplicated service area sizes within the locale sub-classes. However, the higher median per capita programs and operating income of the remote rural library sub-class can be partially explained by its small median unduplicated service area size and its high percentage of libraries serving fewer than 1,000 persons (58%). Contrastingly, the distant sub-class had the highest maximum unduplicated service area size, and five of the six largest rural libraries (serving between 357,321 and 486,990 persons) were classified as distant libraries in 2014. Furthermore, the distant locale contained 62% of the rural libraries serving between 100,000 and 249,999 persons and 72% of the rural libraries servings between 50,000 and 99,999 persons. The clustering of larger rural libraries within the distant locale helps explain why distant rural library assets are generally lower than fringe and remote rural libraries. As will be addressed in sections 5.4 and 5.5, below, higher levels of non-local revenue sources clustered around the smallest rural libraries provide further explanation of the higher levels of median per capita programs and operating income in the remote rural library sub-class.

Other Assets

Illustrated in Table 5.2, median per capita outlets minimally *increased* with distance from urban areas and urban clusters, as did median per capita hours, the numbers of non-MLIS librarians, terminals, and collections. Only the median per capita numbers of non-librarian (other) staff decreased minimally as distance from urban areas and urban clusters increased. While most asset differences between fringe, distant, and remote

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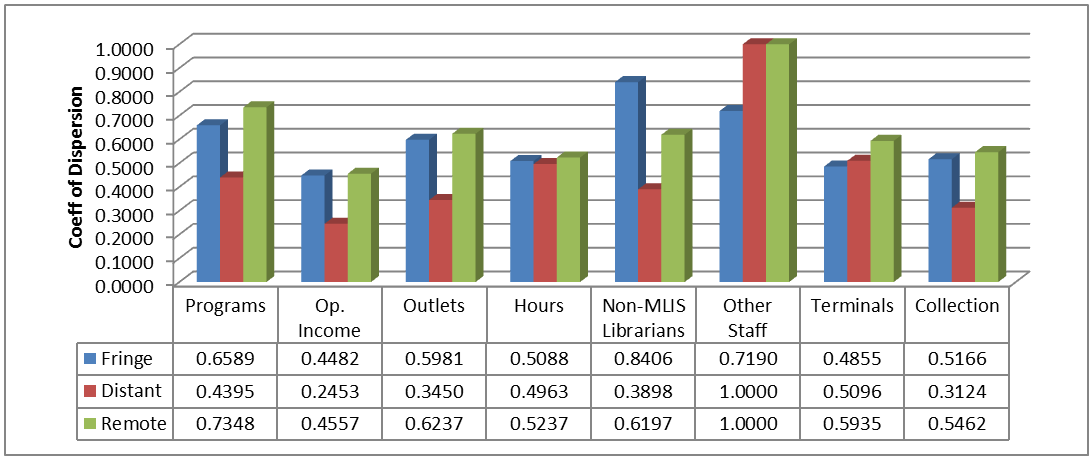
locales were small or minimal, these results indicated that rural library assets did *not* generally decrease as distances from urban areas and urban clusters increased.

The quartile coefficients of dispersion displayed below in Figure 5.1 provide additional evidence that rural library assets did not generally decrease as distances from urban areas and urban clusters increased. With the exception of "other staff," the per capita assets of distant rural libraries were less dispersed around the median than the assets of fringe and remote rural libraries.



	Programs	Op. Income	Outlets	Hours	Non-MLIS Librarians	Other Staff	Terminals	Collection
Fringe	0.6589	0.4482	0.5981	0.5088	0.8406	0.7190	0.4855	0.5166
Distant	0.4395	0.2453	0.3450	0.4963	0.3898	1.0000	0.5096	0.3124
Remote	0.7348	0.4557	0.6237	0.5237	0.6197	1.0000	0.5935	0.5462

Figure 5.1 Rural Library Asset Quartile Coefficients of Dispersion by Locale

MLIS Librarians and Bookmobiles

As noted above in Table 4.1, the per capita number of librarians holding a MLIS degree and the per capita number of bookmobiles had medians equal to zero in the full 2014 training dataset. When computed separately for fringe, distant, and remote public libraries, the median per capita number of MLIS librarians in fringe libraries was approximately equal to 0.00003 while the median per capita number of MLIS librarians in distant and fringe public libraries remained at zero. The median per capita number of bookmobiles remained at zero for fringe, distant, and remote public libraries.

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As reported in the 2014 Public Library Survey, there were 1,956.52 full time equivalent (FTE) MLIS librarians employed by rural libraries. Thirty percent (30%) of those FTE were employed by fringe rural libraries, 55% by distant rural libraries, and 15% by remote rural libraries. The rural MLIS librarians were employed by a total of 1,009 or 24% of the 4,189 rural libraries. Fifty-one percent (51%) of those libraries were located in fringe areas, 25% were in distant areas, and 14% were in remote areas. Of the 1,009 rural libraries employing MLIS-degreed librarians, 364 or 36% of those libraries employed only part-time MLIS-degreed librarians (22% of the fringe, 54% of the distant, and 24% of the remote libraries). While, as a group, distant rural libraries hired the largest numbers of MLIS-degreed FTE, fewer individual distant libraries hired MLIS-degreed librarians, and higher numbers of distant libraries hired only part-time MLIS-degreed librarians. Overall, the total number of MLIS-degreed librarians decreased as distance from urban areas and urban clusters increased.

Only 144 or 3.4% of the 4,189 rural libraries in the 2014 Public Library Survey reported bookmobiles. Of those 144 rural libraries, 13% were located in fringe areas, 51% were in distant areas, and 36% were in remote areas. A total of 152 bookmobiles were operated in rural areas (13% in fringe areas, 52% in distant areas, and 35% in remote areas). One fringe library and eight remote libraries operated as “bookmobile libraries”—libraries without a “brick and mortar” central administrative unit or branch open to the public. The nine bookmobile libraries will be further discussed in section 5.3, below. Unlike the number of libraries employing MLIS-degreed librarians, which decreased with distance from urban centers and urban areas, the number of bookmobiles was highest in distant areas and was higher in remote than in fringe areas.

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Urban-Rural Designations

Three of the five predictors used to construct the best Locale supervised classification algorithm were USDA ERS rural-urban designation codes. The Rural-Urban Continuum Code (RUCC) designation is based on counties. The Rural-Urban Commuting Area (RUCA), based on census tracts, and the Frontier and Remote (FAR) code, aggregated to zip codes, provide insight into rural areas located within larger counties. Analysis of each code indicates that urban-rural boundaries are blurring in a large percentage of the public libraries designated as "rural" by the IMLS.

Rural-Urban Continuum Code (RUCC) Predictor

Since the USDA ERS Rural-Urban Continuum Code (RUCC) is based on counties or county equivalents, it was not unexpected that the RUCC code would be a strong predictor of the IMLS Locale field, which is also based on counties. In fact, when tested as a single predictor of the locale class, the RUCC classification algorithm had an overall accuracy of 67.32% (Kappa = .4329, ROC area = .783) and accurately classified 74% of distant libraries. However, as a standalone predictor, RUCC accurately classified only 31% of fringe and 27% of remote rural libraries.

More fully described in Section 1.3, above, the RUCC "classification scheme . . . distinguishes metropolitan counties by the population size of their metro area, and nonmetropolitan counties by degree of urbanization and adjacency to a metro area" (*USDA*, 2017e, para. 1). Illustrated in Figure 5.2, below, 76.5% of the public libraries designated by the IMLS Locale code as "rural" are located in counties that are *not* categorized in one of the two RUCC "completely rural" or under 2,500 in urban population designations. Only 7.9% of the IMLS-designated rural libraries are located in

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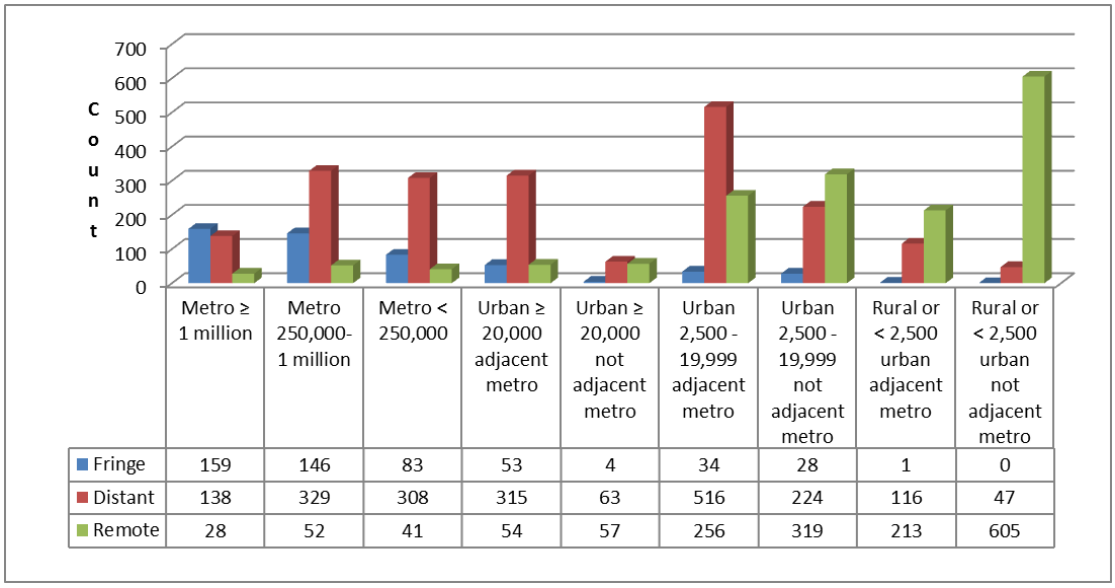
RUCC category 8, described as completely rural or less than a 2,500-person urban population and adjacent to a metro area, and only 15.6% of IMLS-designated rural libraries are located in the most "rural" RUCC category, category 9, which consists of counties that are "completely rural," have less than a 2,500-person urban population, and are *not* adjacent to a metro area. Only one public library designated as a fringe rural library by the IMLS is located in a RUCC-designated rural county and only 7.9% of distant libraries are located in one of the RUCC-designated "rural" counties. However, 50% of IMLS-designated remote public libraries are located in RUCC-designated rural counties.



	Metro ≥ 1 million	Metro 250,000-1 million	Metro < 250,000	Urban ≥ 20,000 adjacent metro	Urban ≥ 20,000 not adjacent metro	Urban 2,500 - 19,999 adjacent metro	Urban 2,500 - 19,999 not adjacent metro	Rural or < 2,500 urban adjacent metro	Rural or < 2,500 urban not adjacent metro
Fringe	159	146	83	53	4	34	28	1	0
Distant	138	329	308	315	63	516	224	116	47
Remote	28	52	41	54	57	256	319	213	605

Figure 5.2 2014 Rural Libraries by RUCC Categories and Locale

Providing further evidence that rural public library assets do not generally decrease as distances from urban areas and urban clusters increase, with the exception of "other staff," the median per capita assets of libraries located in the most remote RUCC category are higher than those IMLS-identified rural libraries located in the most

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Table 5.4 2014 Median Per Capita Rural Library Assets by RUCC Categories

RUCC Category	Programs	Operating Income	Operating Income Less Alaska E-Rate	Outlets	Hours	Non-MLIS Librarians	Other Staff	Terminals	Collection
1 Metro ≥ 1 million	0.0221	$35.16	$35.16	0.0002	0.4321	0.0002	0.0003	0.0015	9
2 Metro 250,000-1 million	0.0256	$31.62	$31.62	0.0004	0.5857	0.0003	0.0001	0.0021	11
3 Metro < 250,000	0.0244	$32.25	$32.25	0.0004	0.6729	0.0003	0.0002	0.0023	9
4 Urban ≥ 20,000 adjacent metro	0.0345	$35.93	$35.93	0.0005	0.7167	0.0003	0.0002	0.0022	12
5 Urban ≥ 20,000 not adjacent metro	0.0262	$36.73	$36.73	0.0007	0.9232	0.0005	0.0001	0.0026	18
6 Urban 2,500 - 19,999 adjacent metro	0.0246	$34.09	$34.09	0.0005	0.7617	0.0004	0.0001	0.0028	13
7 Urban 2,500 - 19,999 not adjacent metro	0.0259	$35.58	$35.58	0.0007	0.9181	0.0004	0.0001	0.0035	13
8 Rural or < 2,500 urban adjacent metro	0.0180	$27.17	$27.17	0.0005	0.7541	0.0004	0.0001	0.0029	13
9 Rural or < 2,500 urban not adjacent metro	0.0269	$42.31	$41.96	0.0008	1.1104	0.0006	0.0001	0.0041	17

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populated RUCC metro area (Metro ≥ 1 million). As shown in Table 5.4, above, public libraries located in the most rural of the RUCC categories, category 9, described as completely rural or an urban population of under 2,500 persons that is not adjacent to a metro area, also have higher median per capita operating income, outlets, hours, numbers of non-MLIS librarians, and terminals than all other RUCC categories (when adjusted to remove Alaskan E-Rate discounts, RUCC category 9 operating income decreased by $0.35). Contrasting with the most rural RUCC category, the median per capita programs and operating income of the IMLS-defined rural public libraries located in RUCC category 8, described as completely rural or an urban population of less than 2,500 persons that is adjacent to a metro area, are lower than all other RUCC categories.

Rural-Urban Commuting Area (RUCA) Predictor

The ERS Rural-Urban Commuting Area (RUCA) "sub-county" classification based on census tracts delineates "different levels of rurality" and guides eligibility for a variety of federal programs providing services to rural residents, including those designed for rural veterans (*USDA*, 2016h; see also section 1.3, above). When tested as a standalone predictor of the locale class, RUCA codes had an overall accuracy rate of 65.34% (Kappa = .3954, ROC area = 0.735), and accurately classified 24.61% of fringe, 64.83% of distant, and 78.71% of remote rural libraries. Compared to the RUCC standalone predictor test, RUCA codes were less accurate predictors of fringe and distant libraries by four and nine percentage points, respectively, but were 52 percentage points higher in accurately classifying remote rural libraries.

As shown in Figure 5.3, below, only 48% of the public libraries designated "rural" by IMLS Locale code are located in rural areas categorized by RUCA code 10.

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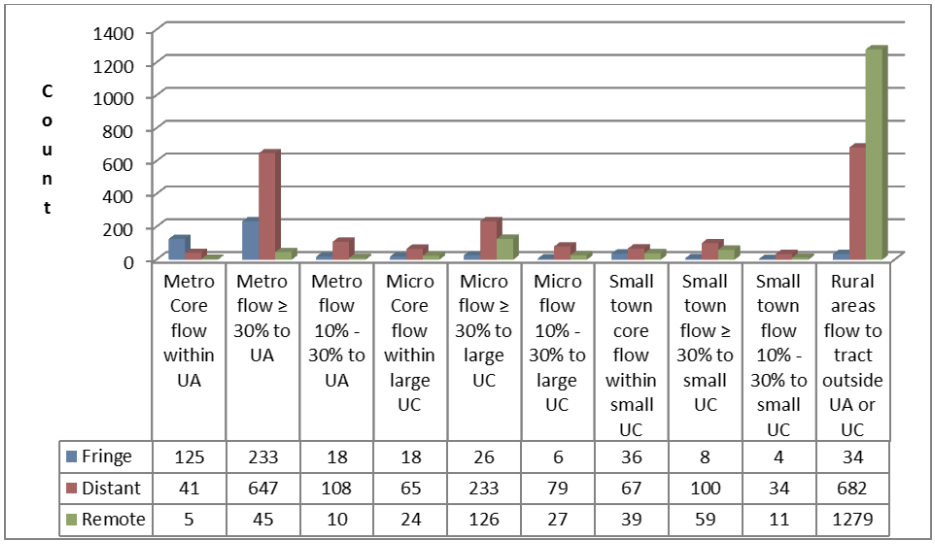
However, this is 25% higher than the numbers of "rural" libraries under the RUCC categories 8 and 9 designations. Compared to the single fringe library designated "rural" under the RUCC, 7% of IMLS fringe libraries are located in RUCA-designated rural areas. Thirty-three percent (33%) of distant and 79% of remote public libraries are also located in RUCA-designated rural areas—an increase of 25% in distant libraries and an increase of 29% in remote libraries when compared to the RUCC designations. The increases reflect the intentional design of RUCA codes to identify rural areas within larger counties based on census tracts (*USDA*, 2016h).

Fifty-two percent (52%) of IMLS-designated rural libraries fell within RUCA metropolitan, micropolitan, or small town designations. The largest numbers of libraries outside the RUCA rural designation, 29% of IMLS-designated rural libraries, were located in metropolitan areas with commuting patterns flowing within or to census-defined urban areas, 14% were located in RUCA micropolitan areas with commuting patterns flowing within or to large urban clusters, and 9% were located in small towns with commuting patterns flowing within or to small urban clusters.



	Metro Core flow within UA	Metro flow ≥ 30% to UA	Metro flow 10% - 30% to UA	Micro Core flow within large UC	Micro flow ≥ 30% to large UC	Micro flow 10% - 30% to large UC	Small town core flow within small UC	Small town flow ≥ 30% to small UC	Small town flow 10% - 30% to small UC	Rural areas flow to tract outside UA or UC
Fringe	125	233	18	18	26	6	36	8	4	34
Distant	41	647	108	65	233	79	67	100	34	682
Remote	5	45	10	24	126	27	39	59	11	1279

Figure 5.3 2014 Rural Libraries by RUCA Categories and Locale

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Describing IMLS-defined rural libraries by RUCA category also provided evidence that rural public library assets did not generally decrease as distances from urban areas and urban centers increased. As shown in Table 5.5, below, the median per capita programs, operating income, numbers of non-MLIS librarians, terminals, and collection materials were higher in the RUCA rural category 10 than in all other RUCA categories (when adjusted to remove Alaska E-Rate subsidies, RUCA category 10 median per capita operating income decreased by $0.09). Median per capita library outlets located in the rural RUCA category tied for first place with the libraries located in RUCA-designated small towns with commuting flows equal to or greater than 30% to small urban clusters. The median per capita number of RUCA rural other staff was lower than four of the more "urban" RUCA categories but tied with three others.

Table 5.5 2014 Median Per Capita Rural Library Assets by RUCA Code

RUCA Category	Programs	Op. Income	Op. Income Less Alaska E-Rate	Outlets	Hours	Non-MLIS Librarians	Other Staff	Term-inals	Collec-tion
1 Metro Core flow within UA	0.0204	$33.55	$33.55	0.0001	0.2315	0.0001	0.0003	0.0011	6
2 Metro flow ≥ 30% to UA	0.0264	$31.74	$31.74	0.0004	0.6386	0.0003	0.0001	0.0022	10
3 Metro flow 10% - 30% to UA	0.0204	$29.21	$29.21	0.0004	0.6227	0.0002	0.0002	0.0019	10
4 Micro Core flow within large UC	0.0147	$29.64	$29.64	0.0001	0.2412	0.0001	0.0002	0.0011	4
5 Micro flow ≥ 30% to large UC	0.0263	$32.31	$32.31	0.0006	0.8425	0.0004	0.0001	0.0028	13
6 Micro flow 10% - 30% to	0.0203	$32.59	$32.59	0.0005	0.7986	0.0003	0.0000	0.0026	13

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RUCA Category	Programs	Op. Income	Op. Income Less Alaska E-Rate	Outlets	Hours	Non-MLIS Librarians	Other Staff	Term-inals	Collec-tion
large UC									
7 Small town core flow within small UC	0.0174	$30.79	$30.79	0.0002	0.3553	0.0001	0.0003	0.0016	6
8 Small town flow ≥ 30% to small UC	0.0238	$32.44	$32.44	0.0007	1.0000	0.0004	0.0001	0.0034	13
9 Small town flow 10% - 30% to small UC	0.0221	$30.17	$30.17	0.0005	0.6615	0.0003	0.0001	0.0027	15
10 Rural areas flow to tract outside UA or UC	0.0289	$38.11	$38.02	0.0007	0.9532	0.0005	0.0001	0.0035	16

Frontier and Remote (FAR) Code Predictor

Aggregated at the zip code level, the ERS Frontier and Remote (FAR) code indicates low populations and high geographical remoteness based on automotive travel time to urban areas. As noted in section 1.3, above, persons living in FAR level 1 areas travel to "high order goods and services, such as advanced medical procedures, stores selling major household appliances, regional airport hubs, or professional sports franchises." FAR levels 2 and 3 represent increasing remoteness from high order goods and services, while persons residing in the fourth, most remote FAR level 4 likely "find it hard to access 'low order' goods and services, such as grocery stores, gas stations, and basic health-care services" (*USDA*, 2016d, para. 2).

Unfortunately, the zip codes of 142 rural libraries in the 2014 Public Library Survey did not match the 2010 Census-based zip codes in the latest FAR file, so FAR

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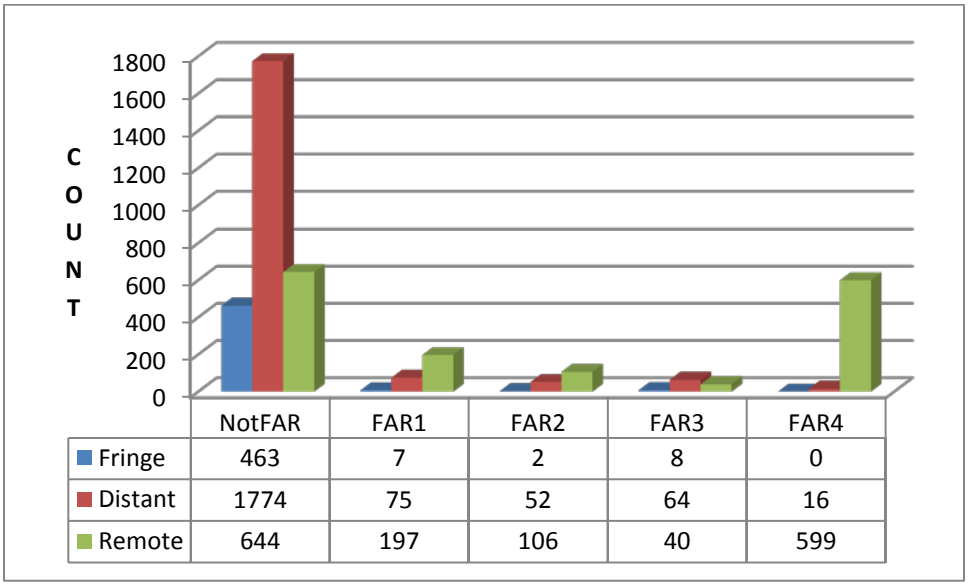
codes were not available for 28 fringe, 75 distant, and 39 remote rural libraries. When tested as a standalone predictor of the locale class, FAR codes produced an overall accuracy rate of 67.20% (Kappa = .387, ROC area = .704), including a 93% accuracy rate in predicting distant libraries and a 55.51% accuracy rate in identifying remote libraries. However, as a standalone predictor, FAR codes failed to identify any fringe libraries and, when inaccurately predicting locales, over-classified fringe and remote libraries as distant.

Illustrated by Figure 5.4, below, the majority or 71% of the 4,047 IMLS-designated rural libraries that could be coded in the 2014 Public Library Survey are not located in FAR areas. No IMLS-designated fringe libraries and fewer than 1% of the distant libraries were located in the most remote, FAR level 4 category. Fifteen percent (15%) of the IMLS-designated remote libraries that could be coded were located in the most sparsely populated, remote FAR level 4 areas.



	NotFAR	FAR1	FAR2	FAR3	FAR4
Fringe	463	7	2	8	0
Distant	1774	75	52	64	16
Remote	644	197	106	40	599

Figure 5.4 2014 Rural Libraries by FAR Codes and Locale

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Table 5.6 2014 Median Per Capita Rural Library Assets by FAR Code

	Programs	Operating Income	Operating Income Less Alaska E-Rate	Outlets	Hours	Non-MLIS Librarians	Other Staff	Terminals	Collection
Not FAR	0.0241	$32.94	$32.94	0.0004	0.6600	0.0003	0.0001	0.0023	11
FAR1	0.0297	$37.59	$37.59	0.0008	1.0088	0.0006	0.0001	0.0035	15
FAR2	0.0225	$31.43	$31.43	0.0006	0.8854	0.0004	0.0001	0.0032	13
FAR3	0.0211	$36.39	$36.39	0.0005	0.7692	0.0004	0.0002	0.0033	12
FAR4	0.0316	$46.23	$46.13	0.0010	1.2381	0.0006	0.0001	0.0050	20

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Table 5.6, above, provides further evidence that rural public library assets do not generally decrease with distances from urban areas and urban clusters. With the exception of "other staff," the median per capita assets of libraries located in the most remote FAR 4 areas are higher than libraries that are not located in ERS-designated FAR areas. While most differences between the ERS non-FAR and FAR designations are minimal, the median per capita operating assets of libraries located in FAR 4 areas are higher than those in all other FAR levels and higher than the assets of libraries located in non-FAR areas (adjustments to remove the Alaska E-Rate subsidies reduced the median per capita operating income in FAR level 4 libraries by $0.10).

Public Libraries and ERS-Designated Rural Areas: A Summary

As discussed above, when categorized by the USDA ERS RUCC, RUCA, or FAR designations, a large percentage of the IMLS-designated rural public libraries reflected the increasing urbanization of "rural" areas. Nearly 77% of the public libraries designated by the IMLS Locale code as "rural" were located in counties that were *not* within one of the two RUCC "completely rural" or under 2,500 in urban population designations. Fifty-two percent (52%) of the public libraries designated "rural" by IMLS Locale code were located outside the RUCA rural category 10. Of the 4,047 libraries in the 2014 Public Library Survey that could be coded by FAR code, 71% were not located in FAR areas.

The variations in median per capita assets when IMLS-designated rural libraries were categorized by the RUCC, RUCA, and FAR designations of rurality provided evidence that the asset structures of the most remote public libraries were stronger than originally assumed. Although the median per capita programs and operating income of the IMLS-defined rural public libraries located in RUCC category 8, described as

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completely rural or an urban population of less than 2,500 persons that is adjacent to a metro area, were lower than all other RUCC categories, the median per capita assets of libraries located in the most remote, rural RUCC category 9 (completely rural or an urban population of less than 2,500 persons that is not adjacent to a metro area) provided evidence that rural public library assets did not generally decrease as distances from urban areas and urban clusters increased. The median per capita assets of IMLS-designated rural libraries located in RUCA rural category 10 and FAR codes 1 through 4 also demonstrated that per capita rural public library assets did not generally decrease as distances from urban areas and urban clusters increased. Contrary to the original assumption informing research question 1, per capita total operating income was highest in the rural RUCC and RUCA categories and the most remote FAR category. The interactions of the region class with the locale variable, discussed below, provide an explanation of this finding.

Regional Interactions

The sixth predictor in the most accurate Locale classification algorithm was the region class. The largest numbers of IMLS-defined rural public libraries were located in the Plains region (28%; IA, KS, MN, MO, NE, ND, SD), followed by the Great Lakes region (19%; IL, IN, MI, OH, WI), New England (16%; CT, ME, MA, NH, RI, VT), the Southeast (10%; AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV), the Mideast (10%; DE, MD, NJ, NY, PA), the Southwest (7%; AZ, NM, OK, TX), the Rocky Mountains (5%; CO, ID, MT, UT, WY), and the Far West (4%; AK, CA, HI, NV, OR, WA). As shown in Figure 5.5, below, the largest numbers of fringe rural libraries were located in the New England region (37%), the largest numbers of distant rural libraries

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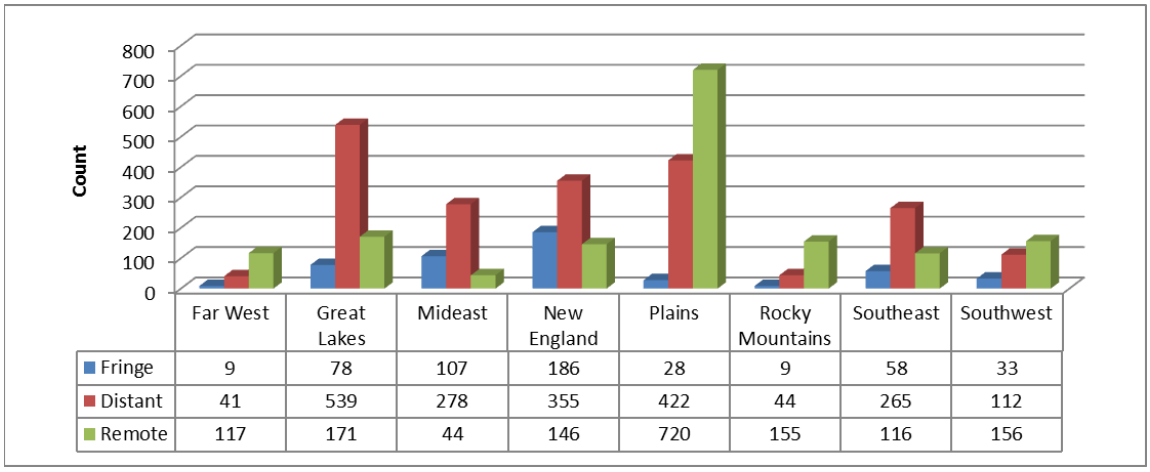
were located in the Great Lakes region (26%), and the largest numbers of remote libraries were located in the Plains region (44%).



	Far West	Great Lakes	Mideast	New England	Plains	Rocky Mountains	Southeast	Southwest
Fringe	9	78	107	186	28	9	58	33
Distant	41	539	278	355	422	44	265	112
Remote	117	171	44	146	720	155	116	156

Figure 5.5 2014 Rural Public Libraries by Region and Locale

The 2014 median per capita library assets are shown by IMLS Locale and Region in Table 5.7, below. The Southeast region had the lowest median per capita numbers of programs and operating income in the IMLS fringe, distant, and remote locales. The Southeast region also had the lowest median per capita numbers of outlets, non-MLIS librarians, public access terminals, and collection materials in the IMLS distant and remote locales.

The median per capita numbers of programs decreased slightly with increasing distances from urban areas and urban clusters in the Great Lakes, New England, and Southeast regions. However, median per capita programs increased as distances from urban areas and urban clusters increased in the Far West and Plains regions. Remote Far West public libraries had a median per capita operating income of $94.09, representing an increase of $55.20 in median per capita operating income between fringe and remote libraries and $54.11 in median per capita operating income between the distant and remote libraries. The $94.09 median per capita operating income in the remote Far West

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Table 5.7 2014 Median Per Capita Rural Library Assets by Region and Locale

Locale	Region	Programs	Op. Income	Op. Income Less Alaska E-Rate	Outlets	Hours	Non-MLIS Librarians	Other Staff	Terminals	Collection
Fringe	**Far West**	0.0210	$38.89	$38.89	0.0001	0.3021	0.0000	0.0002	0.0013	5
	Great Lakes	0.0273	$41.57	$41.57	0.0002	0.4432	0.0002	0.0003	0.0017	7
	Mideast	0.0344	$35.18	$35.18	0.0002	0.3828	0.0002	0.0003	0.0014	7
	New England	0.0361	$40.65	$40.65	0.0002	0.4415	0.0002	0.0002	0.0014	10
	Plains	0.0306	$42.31	$42.31	0.0004	0.7345	0.0003	0.0002	0.0022	11
	Rocky Mountains	0.0283	$28.36	$28.36	0.0002	0.4225	0.0002	0.0004	0.0020	6
	Southeast	0.0100	$18.96	$18.96	0.0001	0.2491	0.0001	0.0001	0.0014	7
	Southwest	0.0208	$32.72	$32.72	0.0002	0.5060	0.0002	0.0001	0.0033	7
Distant	**Far West**	0.0300	$39.98	$39.98	0.0005	0.5186	0.0002	0.0001	0.0019	20
	Great Lakes	0.0223	$37.49	$37.49	0.0004	0.6742	0.0003	0.0003	0.0022	13
	Mideast	0.0344	$30.86	$30.86	0.0004	0.6284	0.0003	0.0002	0.0022	9
	New England	0.0349	$31.29	$31.29	0.0006	0.6771	0.0003	0.0001	0.0022	12
	Plains	0.0315	$35.29	$35.29	0.0009	1.1482	0.0006	0.0000	0.0041	15

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Locale	Region	Programs	Op. Income	Op. Income Less Alaska E-Rate	Outlets	Hours	Non-MLIS Librarians	Other Staff	Terminals	Collection
	Rocky Mountains	0.0234	$31.99	$31.99	0.0004	0.5855	0.0003	0.0003	0.0029	7
	Southeast	0.0094	$19.17	$19.17	0.0001	0.2697	0.0001	0.0001	0.0014	5
	Southwest	0.0123	$24.72	$24.72	0.0005	0.7157	0.0003	0.0000	0.0030	7
Remote	**Far West**	0.0575	**$94.09**	**$88.02**	0.0011	1.3066	0.0004	0.0003	0.0055	24
	Great Lakes	0.0184	$30.58	$30.58	0.0004	0.6535	0.0003	0.0002	0.0028	21
	Mideast	0.0345	$30.99	$30.99	0.0006	0.8683	0.0004	0.0002	0.0026	11
	New England	0.0274	$27.61	$27.61	0.0009	0.8757	0.0004	0.0000	0.0033	12
	Plains	0.0313	$43.79	$43.79	0.0012	1.4337	0.0008	0.0000	0.0058	21
	Rocky Mountains	0.0291	$41.72	$41.72	0.0005	0.8501	0.0004	0.0001	0.0033	12
	Southeast	0.0084	$16.62	$16.62	0.0002	0.3128	0.0002	0.0001	0.0014	6
	Southwest	0.0155	$34.58	$34.58	0.0006	0.8464	0.0004	0.0001	0.0035	9

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region was attributable to high median per capita operating revenue from state, federal, and "other" sources, although the median per capita operating revenue decreased by $6.07 to $88.02 after removing the Alaskan E-Rate subsidies. Median per capita operating income also increased in the Rocky Mountain region as distances from urban areas and urban centers increased, but median per capita operating income decreased with increasing remoteness in the Great Lakes and New England regions. In all of the regions, IMLS-designated remote libraries had minimally higher median per capita numbers of outlets, hours, non-MLIS librarians, terminals, and collections than IMLS-designated fringe libraries. The median per capita numbers of other staff generally decreased or remained the same as distances from urban centers and urban areas increased. While results were mixed, overall, categorizing IMLS-designated rural libraries by geographic region provided evidence that rural library assets did not generally decrease as distances from urban areas and urban centers increased.

Rural FAR Level 4, RUCC Catefories 8 and 9, and RUCA Category 10 by Region

Table 5.8, below, contains a regional summary of the median per capita assets of public libraries within FAR code 4 (the most remote FAR code designation), the two most rural RUCC designations (8 and 9), and the RUCA rural category (category 10). As shown in the table, there were only thirty-six (36) libraries located in RUCC category 8, the least distant of the two RUCC rural categories, and there were fewer than four libraries in all but two of the regions. The unusually high $214.10 median per capita operating income of the Mideast region in the least distant RUCA rural category 8 was due to the CVW Long Lake Public Library in Long Lake, New York. That library was

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Table 5.8 2014 Regional Median Per Capita Rural Library Assets in FAR Code 4, Rural RUCC, and Rural RUCA Categories

		RUCA Rural areas: Primary Flow to a Tract Outside a UA or UC (Category 10)								
FAR 4	**Region**	**Programs**	**Operating Income**	**Operating Income Less Alaska E-Rate**	**Outlets**	**Hours**	**Non-MLIS Librarians**	**Other Staff**	**Terminals**	**Collection**
RUCC Category 8 Rural or < 2,500 urban adjacent metro N = 36	**Far West N = 3**	0.0679	$51.33	$51.33	0.0048	2.2967	0.0012	0.0012	0.0082	79
	Great Lakes N = 3	0.0258	$38.29	$38.29	0.0003	0.5782	0.0001	0.0003	0.0015	44
	Mideast N = 2	0.0703	**$214.10**	**$214.10**	0.0024	2.3274	0.0012	0.0033	0.0126	43
	New England N = 3	0.0293	$47.97	$47.97	0.0017	0.7723	0.0006	0.0002	0.0056	21
	Plains N = 13	0.0334	$47.01	$47.01	0.0026	2.1388	0.0010	0.0000	0.0102	22
	Rocky Mountains N = 10	0.0242	$44.56	$44.56	0.0007	0.9190	0.0005	0.0001	0.0059	10
	Southeast N = 1	0.0238	$13.36	$13.36	0.0003	0.4626	0.0002	0.0002	0.0034	20
	Southwest N = 1	0.0007	$5.87	$5.87	0.0001	0.1933	0.0001	0.0000	0.0009	2
RUCC Category 9 Rural or < 2,500 urban not	**Far West N = 50**	0.0857	**$155.03**	**$126.43**	0.0020	2.1927	0.0008	0.0002	0.0095	36
	Great Lakes N = 23	0.0341	$44.12	$44.12	0.0006	0.9963	0.0004	0.0004	0.0037	42
	Mideast N = 5	0.0360	$32.19	$32.19	0.0005	1.0327	0.0004	0.0002	0.0027	11

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		RUCA Rural areas: Primary Flow to a Tract Outside a UA or UC (Category 10)								
FAR 4	**Region**	**Programs**	**Operating Income**	**Operating Income Less Alaska E-Rate**	**Outlets**	**Hours**	**Non-MLIS Librarians**	**Other Staff**	**Terminals**	**Collection**
adjacent metro N = 369	**New England N = 3**	0.0388	$55.59	$55.59	0.0009	1.6219	0.0008	0.0005	0.0047	14
	Plains N = 202	0.0260	$47.01	$47.01	0.0012	1.4478	0.0008	0.0000	0.0059	22
	Rocky Mountains N = 49	0.0307	$49.18	$49.18	0.0006	0.8741	0.0005	0.0001	0.0033	14
	Southeast N = 14	0.0068	$21.70	$21.70	0.0001	0.2577	0.0001	0.0001	0.0018	7
	Southwest N = 23	0.0175	$26.73	$26.73	0.0005	0.8485	0.0004	0.0002	0.0033	10

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reported in the 2014 Public Library Survey as organized under a municipal governance structure, but the library was actually organized as a school district library serving the town and outlying areas (CVW Long Lake Public Library, n.d.). As such, the library received $147,362 in 2014 tax revenue although its local service area consisted of 429 persons (CVW Long Lake Public Library, 2014, p. 2). While it appeared that the Southeast and Southwest regions had the lowest per capita library assets in RUCC category 8, each of those regions contained only one library.As shown in Table 5.8, above, a total of 369 public libraries among the 4,047 libraries that could be coded by FAR designation were located in areas designated the most remote FAR code (level 4), the most remote RUCC designation (category 9), and the RUCA rural designation (category 10). Based on the fourteen (14) libraries in the Southeast region and twenty-three (23) libraries in the Southwest region, there was evidence that the median per capita assets of libraries in those regions were generally lower than FAR code 4, RUCC category 9, and RUCA category 10 library assets in the other regions.

The highest median per capita library assets in FAR code 4, RUCC category 9, and RUCA category 10 were found in the Far West region. Thirty-seven of the fifty Far West libraries were located in Alaska. In 2014 those libraries received a median of $9,107 in revenue from the Alaska state government and $7,000 in revenue from the federal government. That finding of an unexpectedly high level of federal funding was consistent with a recent IMLS report (*IMLS*, 2017b, p. 17). Alaskan libraries also reported a median of $28,571 in other income, which adjusted to a median of zero with an IQR of $5,540 when E-Rate subsidies were deleted. One of the two Nevada libraries received a $67,199 federal grant and both libraries received a median of $1,188 from the

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Nevada state government. The nine Oregon libraries received a median of $1,000 from the Oregon state government, and four of those libraries received federal grants in the amounts of $158, $952, $6,000, and $8,602, respectively. One Oregon county library had "other" revenue of $23,682, which may indicate receipt of a grant from a nonprofit organization. One of the two Washington libraries received $8,486 from the federal government, and both had high "other income" ranging from $59,031 to $63,613, which also may indicate receipt of grants from nonprofit organizations since they were both organized as library districts. The levels of state, federal, and "other" revenue received by the public libraries located in the most remote Far West region explained both the high median per capita operating income of $155.03 that appears in Table 5.8 and the high median per capita operating income of $94.09 that appears in Table 5.7, above.

The per capita total operating income of thirty-one of the fifty libraries located in FAR 4, RUCC category 9, and RUCA category 10 areas were statistical outliers (median absolute deviation (MAD) greater than 5), ranging in MAD values from a low of 5.25 to a high of 470. Since forty-nine of the fifty libraries located in FAR 4, RUCC category 9, and RUCA category 10 were IMLS Locale "remote" libraries, the statistical outliers in this group of libraries, attributed to non-local revenue sources, appeared to explain the higher levels of median per capita operating income found in the IMLS remote libraries, as illustrated in Table 5.2, and in the most remote libraries as categorized by RUCC, RUCA, or FAR codes, as illustrated in Tables 5.3 through 5.5.

Research Question One Results Summary

In summary, contrary to the original assumption, the results of data analysis related to research question one indicated that, on a median per capita basis, rural public

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library assets do not generally decrease as distances from urban areas and urban clusters increase. In fact, there was evidence that the most remote public libraries may compensate for their low population densities and constrained property tax bases through receipt of revenue from state, federal, and other nonprofit sources.

The USDA ERS RUCC, RUCA, and FAR codes revealed that the majority of the IMLS-designated "rural" libraries operated in areas that are best described as "metropolitan" or "micropolitan" than "rural." The mixture of urban and rural spaces within the IMLS locale "rural" designation contributed to the complex variation in rural public library assets when categorized by distance from urban areas and urban clusters. However, whether categorized by IMLS locale or USDA ERS RUCC, RUCA, or FAR designations, there was evidence that median per capita "rural" public library assets did not generally decrease as distances from urban areas and urban clusters increased.

5.3 Research Question Two

Research question two asks: Are some rural library governance structures more likely to be associated with higher levels of economic, cultural, and social capital assets than others, and what, if any, socioeconomic factors might explain those differences? The assumption behind this question is that library district, school district, multi-jurisdictional, and non-profit libraries—those libraries possessing taxing authority or having access to multiple or endowed revenue streams—produce higher operating income than city/county, municipal, and county/parish libraries such that there would be some set of economic capital predictors to classify rural public libraries by governance structure with reasonable accuracy. Contrary to that assumption, the most accurate classification algorithm for the legal basis (governance structure) class did not include

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any of the economic capital predictors. Furthermore, none of the library asset predictors were selected in the most accurate classifier predictor set. Instead, the most accurate predictor set consisted of a combination of two rural library classes: service area size and region.

Since the most accurate legal basis classification algorithm consisted of two predictors that were both categorical variables representing the service area and region sub-classes, a BayesNet classifier with 10-fold cross-validation and two maximum parents was used to construct the algorithm that accurately identified 65% of the 4,189 rural libraries by legal basis. The Kappa of .3785 indicates that this is a fair classifier (Landis & Koch, 1977, p. 165), while the weighted average ROC area of .845 indicates a good test of true versus false conditions (Tape, n.d.). The two-predictor algorithm accurately classified 91% of the 2,321 municipal (probability = .554), 47% of the 635 nonprofit (probability = .152), 42% of the 356 county (probability = .085), 29% of the 158 multi-jurisdictional (probability = .038), and 21% of the 575 library district rural libraries (probability = .137); however, the algorithm failed to accurately classify any of the 60 school district (probability = .014), 40 Native American (probability = .01), 23 city/county (probability = .006), or 21 "other" (probability = .005) rural libraries.

Explaining why none of the library asset predictors were included in the best legal basis classifier algorithm, Table 5.9, below, provides evidence that asset differences between rural public library governance structures were more complex than originally assumed. For example, in 2014, the lowest median per capita numbers of programs were conducted by city/county and county rural libraries, but municipal libraries tied with non-profit libraries and libraries categorized as "other" governance

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structures in conducting the highest number of median per capita programs.

Native American rural libraries had the highest median per capita operating income ($48.26), which was $27.53 higher than multi-jurisdictional libraries, $19.36 higher than non-profit libraries, $9.90 higher than school district libraries, and $6.88 higher than rural libraries in library districts. After deleting Alaskan E-Rate subsidies from operating income, municipal median per capita operating income decreased by $0.02 and non-profit median per capita operating income decreased by $0.39. The median per capita operating income of city/county, "other," and county rural libraries was $1.98, $5.64, and $5.77 higher than multi-jurisdictional libraries, respectively, although it had been expected that multi-jurisdictional libraries would have higher income.

County, multi-jurisdictional, and school district libraries had the lowest median per capita numbers of outlets, while municipal libraries had the highest median per capita number of outlets. County libraries had the lowest median per capita number of service hours, but "other," Native American, and municipal libraries had the highest median per capita number of service hours. Native American, "other," and municipal libraries also had the highest median per capita numbers of non-MLIS librarians, and Native American libraries tied with library district and school district libraries for the highest median per capita numbers of other staff.

County libraries tied with multi-jurisdictional libraries for the lowest median per capita numbers of public access computer terminals, while Native American, county-city, and municipal rural libraries had the highest median per capita numbers of terminals. The finding that Native American Tribal libraries had the overall highest

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median per capita number of terminals (five terminals per thousand persons) was unexpected as Jorgensen, Morris, and Feller (2014, p. iv) found that only 86% of tribal libraries provided public access terminals. However, the finding of zero median per capita e-books available in Tribal libraries was consistent with reports of inadequate access to broadband services on Tribal lands (p. iv; see also Kruger, 2016).

As expected, rural school district libraries ranked highest in median per capita collections. “Other” and municipal rural libraries had higher median per capita collections than multi-jurisdictional, library district, and non-profit rural libraries.

The preceding review of median per capita library assets by legal basis indicates that in 2014 there was not a clear demarcation between rural library governance structures in terms of library assets. Therefore, it would be inaccurate to conclude that any particular rural public library governance structure was more likely to be associated with overall higher levels of library assets when compared to other governance structures.

As noted in section 5.2, the CVW Long Lake Public Library in Long Lake, New York was reported in the 2014 Public Library Survey as having a municipal governance structure, but the library was actually organized as a school district library serving the town and outlying areas (CVW Long Lake Public Library, n.d.). When rural public library per capita median assets were recalculated after re-classifying that library as a school district library, the median per capita numbers of programs remained the same for municipal libraries but increased by .0002 for school district libraries, municipal operating income decreased by $0.01 but increased in school district libraries by $0.48, and the median per capita number of service hours decreased in municipal libraries by

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Table 5.9 2014 Median Per Capita Rural Library Assets by Legal Basis

Legal Basis	Count	Programs	Op. Income	Op. Income Less Alaska E-Rate	Outlets	Hours	Non-MLIS Librarians	Other Staff	Terminals	Collection
City/County	23	0.0097	$22.61	$22.61	0.0003	0.5480	0.0002	0.0001	0.0026	9
Municipal	2,321	0.0299	$36.79	$36.77	0.0007	0.9938	0.0005	0.0001	0.0034	17
County	356	0.0112	$26.40	$26.40	0.0002	0.3113	0.0001	0.0002	0.0015	6
Library District	575	0.0241	$41.38	$41.38	0.0003	0.5583	0.0003	0.0003	0.0022	8
Multi-Jurisdictional	158	0.0119	$20.63	$20.63	0.0002	0.3164	0.0001	0.0001	0.0015	5
Native American	40	0.0228	$48.26	$48.26	0.0006	0.9081	0.0003	0.0003	0.0045	8
Non-profit	635	0.0299	$28.90	$28.51	0.0005	0.6051	0.0002	0.0001	0.0022	9
Other	21	0.0312	$26.27	$26.27	0.0005	0.7006	0.0003	0.0001	0.0018	10
School District	60	0.0294	$38.36	$38.36	0.0002	0.4633	0.0002	0.0003	0.0018	36

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.0007 but increased in school district libraries by .0028. Median capita outlets, other staff, terminals, and collections were not affected by the re-classification of the New York library, and the overall conclusion that there was not a clear demarcation between rural library governance structures in terms of library assets remained unchanged.

The numbers of rural libraries employing MLIS-degreed libraries and operating bookmobiles also indicated that it would be inaccurate to conclude that there was a clear demarcation between rural public library governance structures in terms of overall library assets. For example, while 54% of multi-jurisdictional libraries reported MLIS-degreed librarian FTE in 2014, 48% of rural county libraries reported MLIS-librarians FTE, which was thirteen (13) percentage points higher than library district libraries, sixteen (16) percentage points higher than school district libraries, and twenty-four (24) percentage points higher than non-profit libraries. City/county libraries reported the highest percentage of libraries operating bookmobiles (26% of all rural city/county libraries), followed by county libraries (17% of all rural county libraries). Libraries organized under the municipal and non-profit structures did not operate any bookmobiles. Mentioned above, nine rural libraries operated bookmobiles in the absence of a central site or branch open to the public. Six of those libraries were county libraries, two were multi-jurisdictional libraries, and one was a Native American library operating two bookmobiles, which was also the only Native American rural library operating a bookmobile. As with rural library per capita assets, the numbers of MLIS-degreed librarians and bookmobiles indicated that there was not a clear demarcation between rural library governance structures in terms of overall library assets.

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Service Area Size and Regional Interactions

The two most accurate predictors of the Legal Basis class were service area size and region. Since 55.4% of all IMLS-defined rural libraries were organized as municipal libraries, it was not surprising that the two-predictor algorithm accurately classified 91% of the municipal libraries, However, that accuracy was partially explained by the higher numbers of municipal libraries in the 1,000 to 2,499 service area category (64% of 1,362 libraries) and in the Plains region (87% of 1,170 rural libraries). The 47% classification accuracy of non-profit libraries was explained by the high numbers of non-profit libraries in the Mideast and New England regions (46% and 39% of all non-profit rural libraries, respectively). Rural county libraries were classified with 42% accuracy, largely based on the large number of Southeastern county libraries (40% of all rural county libraries).

The BayesNet graph displayed in Figure 5.6, below, was constructed with maximum parents equal to two. As illustrated by the graph, the region class was related to both the legal basis and service area size classes; however, the service area size appears to have a higher rank than region in the graph. The somewhat higher influence of the service area size may have contributed to the algorithm's 21% accuracy in classifying the library district category. Although 54% of the rural libraries organized under the library district structure were located in the Great Lakes region, 104 or 33% of rural library districts in the Great Lakes region served 1,000 to 2,499 persons and 84 or 27% of rural library districts in the Great Lakes region served 2,500 to 4,999 persons. The higher influence of the service area size may also have contributed to the classification of multi-jurisdictional libraries with 29% accuracy. Although the highest percentage of multi-jurisdictional libraries were in the Southeast region (47%), twenty-four (24) or 15% of

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those libraries served Southeast region populations of 50,000 to 99,999 persons and fourteen (14) or 8% served Southeast region populations of 25,000 to 49,999 persons.

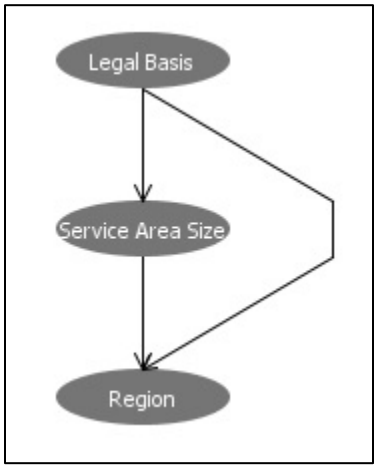

Figure 5.6 BayesNet Graph, Best Legal Basis Classifier

An examination of rural library median per capita assets by service area size, region, and legal basis provided further evidence that there was not a clear demarcation between rural library governance structures in terms of library assets (see Appendix, Table A.1). In general, other than non-MLIS librarians and other staff, the highest median per capita asset values clustered around those libraries serving fewer than 500 persons regardless of region or legal basis. The lowest median per capita numbers of non-MLIS librarians and other staff clustered around libraries serving less than 2,500 persons regardless of region or legal basis, while the lowest median per capita values of programs, operating income, outlets, hours, terminals, and collection materials clustered around the libraries serving population sizes of 25,000 and above. For example, the highest median per capita numbers of programs (1.96) was found in the two Southwestern non-profit libraries serving fewer than 100 persons, followed by a Far West Native American library serving fewer than 100 persons (1.47). Contrastingly, the Southwestern non-profit library in the 25,000 to 49,000 person category reported the

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lowest number of programs per capita (.0002). Reflecting the levels of state and federal funding of small, rural Alaskan libraries that were discussed in section 5.2, the highest per capita operating income ($1,615.92) was reported by a Far Western, Native American library serving fewer than 100 persons, although the library's per capita income was $674.04 after adjusting for the E-Rate discount included in other income. The second highest median per capita operating income, $1,000.00, was reported by five Far West municipal rural libraries serving fewer than 100 persons although adjustment for the E-Rate discounts reduced the median per capita income to $443.29. The lowest median per capita operating incomes were reported by a Southwestern non-profit library in the 25,000 to 49,999 service area category ($0.60) and a Plains region municipal library in the 50,000 to 99,999 service area category ($0.83).

Research Question Two Results Summary

In summary, the results of data analysis related to research question two indicated that there was not a clear demarcation between rural library governance structures in terms of overall library assets, and it appeared that there was not a particular rural library governance structure that was more likely to be generally associated with higher assets levels than other governance structures. Instead, results suggested that differences in library assets were more strongly associated with service area size than they were to their legal basis structure, or even region.

5.4 Research Question Three

Research question three asks: Are the economic, cultural, and social capital assets of small rural libraries (those serving fewer than 2,500 residents) generally lower than larger rural libraries and do socioeconomic factors explain asset differences

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between small and larger rural libraries? The results of research questions one and two suggested that: (1) the assets of small rural libraries were not generally lower than larger rural libraries, and (2) the assets of the smallest libraries were most closely associated with state, federal, and other revenue sources. However, the inclusion of several socioeconomic predictors in the most accurate classifier of rural libraries by service area size appeared to validate the assumption that socioeconomic factors could help explain asset differences by service area size.

The most accurate set of predictors of the service area size class in the 2014 training dataset included per capita outlets, hours, other staff, collection, terminals, and other operating revenue; the 2014 unemployment rate; the USDA ERS RUCA codes; and the legal basis class. The nine-predictor algorithm accurately identified the service area size category of 3,515 or 83.9% of the 4,189 rural public libraries in the dataset. The Kappa statistic of .8015 indicated that this was a substantially accurate classifier (Landis & Koch, 1977, p. 165), while the weighted average ROC area of .974 indicated an excellent test of true versus false conditions (Tape, n.d.). The results of the classifier by service area size appear in Table 5.10, below. Classification accuracy was highest for the smaller libraries and generally decreased, with the exception of libraries serving 100,000 to 249,999 persons, as service area size increased. None of the six largest rural libraries (those libraries serving populations of 250,000 to 499,999 persons) were accurately classified.

Table 5.10 Classification Accuracy by Service Area Size

Service Area Size	Count of Libraries Accurately Classified	Total Count of Libraries	% Accuracy
Under 100	32	34	94.1%
100-499	412	413	99.8%

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Service Area Size	Count of Libraries Accurately Classified	Total Count of Libraries	% Accuracy
500-999	627	630	99.5%
1,000-2,499	1,159	1,362	85.1%
2,500-4,999	649	762	85.2%
5,000-9,999	394	480	82.0%
10,000-24,999	160	271	59.0%
25,000-49,999	35	116	30.2%
50,000-99,999	28	78	35.9%
100,000-249,999	19	37	51.4%
250,000-499,999	0	6	0.0%
Total	3,515	4,189	83.9%

Library Asset Predictors

Providing evidence that rural library assets did not generally decrease as service area size decreased, the per capita medians of the library asset predictors (outlets, hours, other staff, collections, terminals, and other income) are shown by service area size in Table 5.11, below. The associations between median per capita assets and service area size illustrated in the table also helped explain why the inclusion of per capita outlets, hours, other staff, collection, terminals, and other operating revenue in the predictor set improved the accuracy of the service area size classification algorithm.

The per capita medians of the outlets, hours, collection, and terminals were highest in the service area categories serving fewer than 2,500 persons and decreased in all other categories as service area size increased. That observation was affirmed by the negative Spearman rank correlations between increasing service area size and median per capita outlets (rho = -.99), hours (rho = -1.0), collections (-.995), and terminals (rho = -.99). The “other income” asset displayed the same pattern with the exception of the two largest service area categories (rho = -.89). In contrast, the “other staff” asset reflected a

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Table 5.11 2014 Median Per Capita Service Area Size Predictors and Other Assets, and Unemployment Rate

Service Area Size	Count	Outlets	Hours	Other Staff	Collec-tion	Termi-nals	Other Income	Other Income Less Alaska E-Rate	Programs	Operat-ing Income	Operat-ing Income Less Alaska E-Rate	Non-MLIS Librarians	Unemp. Rate
Under 100	34	0.012579	7.7161	0.0000	112	0.0457	$20.37	$3.25	0.2385	$219.13	$219.13	0.0019	6.5%
100-499	413	0.003145	2.7534	0.0000	28	0.0107	$4.94	$4.59	0.0569	$52.18	$52.18	0.0011	4.3%
500-999	630	0.001338	1.6412	0.0000	22	0.0059	$2.60	$2.51	0.0382	$45.46	$45.36	0.0008	4.8%
1000-2499	1,362	0.000616	0.9515	0.0001	15	0.0019	$2.55	$2.54	0.0309	$34.85	$34.85	0.0005	5.3%
2500-4999	762	0.000288	0.5394	0.0002	10	0.0019	$2.08	$2.07	0.0228	$29.59	$29.59	0.0002	5.7%
5000-9999	480	0.000158	0.3346	0.0002	7	0.0014	$1.81	$1.81	0.0173	$27.92	$27.92	0.0002	6.1%
10000-24999	271	0.000094	0.2380	0.0002	5	0.0012	$1.24	$1.24	0.0142	$26.04	$26.04	0.0001	6.7%
25000-49999	116	0.000118	0.2271	0.0003	3	0.0010	$1.25	$1.25	0.0113	$25.43	$25.43	0.0000	6.8%
50000-99999	78	0.000077	0.1566	0.0002	3	0.0008	$0.95	$0.95	0.0099	$20.21	$20.21	0.0000	6.3%
100000-249999	37	0.000062	0.1350	0.0002	2	0.0009	$1.02	$1.02	0.0096	$21.87	$21.87	0.0000	6.4%
250000-499999	6	0.000060	0.1078	0.0004	2	0.0007	$1.33	$1.33	0.0098	$45.32	$45.32	0.0000	7.3%

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negative relationship to decreasing service area size as it was lowest for the libraries serving fewer than 1,000 persons and highest in the largest (250,000 to 499,999) service area category (rho = .89). Library assets that were not included as predictors in the service area classification algorithm displayed similar patterns and provided further evidence that rural public library assets did not generally decrease as service area size decreased. For example, median per capita non-MLIS librarians were highest in the smallest service areas and decreased as service area sizes increased (rho = -.74). Median per capita programs (rho = -.99) and operating income (rho = -.74) were also highest in the smallest service areas and, with the exception of the programs and operating income of the largest (250,000 to 499,999) service area category, decreased as service area sizes increased.

When graphed, as in Figure 5.7, below, it became apparent that the associations between increasing service area size and median per capita assets were not linear. As illustrated in Figure 5.8, below, the high median per capita asset values in the smallest service area categories were attributable to per capita statistical outliers, which clustered around the smallest rural libraries. For example, per capita other income statistical outliers (MAD great than 5) occurred in 19 or 56% of the 34 rural libraries serving fewer than 100 persons, 116 or 28% of the 413 libraries serving between 100 and 499 persons, and 112 or 18% of the 630 libraries serving between 500 and 999 persons. Attributable to the small population size, per capita outlets statistical outliers occurred in all of the rural libraries serving fewer than 100 persons and 363 or 88% of the libraries serving between 100 and 499 persons. However, per capita outlets statistical outliers occurred in only 2 of the libraries serving between 500 and 999 persons.

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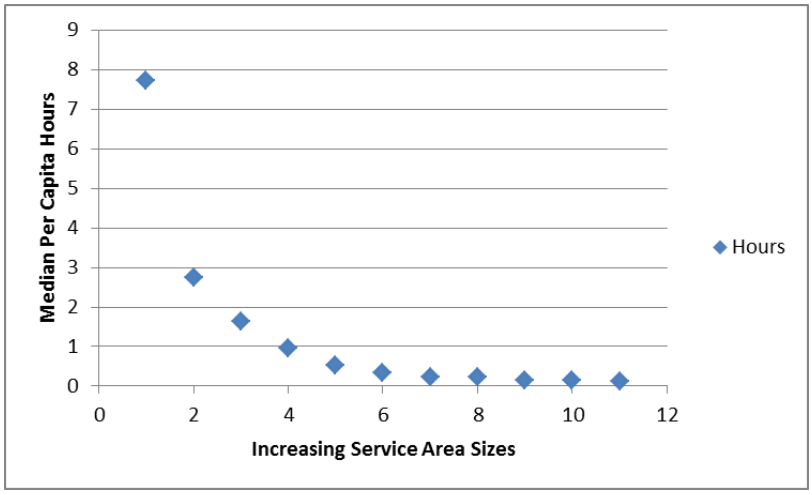
As seen in the analysis of rural library assets by locale, rural library asset statistical outliers clustered around those libraries with the highest per capita levels of



Legend Service Area Size
1 Under 100
2 100-499
3 500-999
4 1,000-2,499
5 2,500-4,999
6 5,000-9,999
7 10,000-24,999
8 25,000-49,999
9 50,000-99,999
10 100,000-249,999

Figure 5.7 Median Per Capita Hours and Increasing Service Area Size

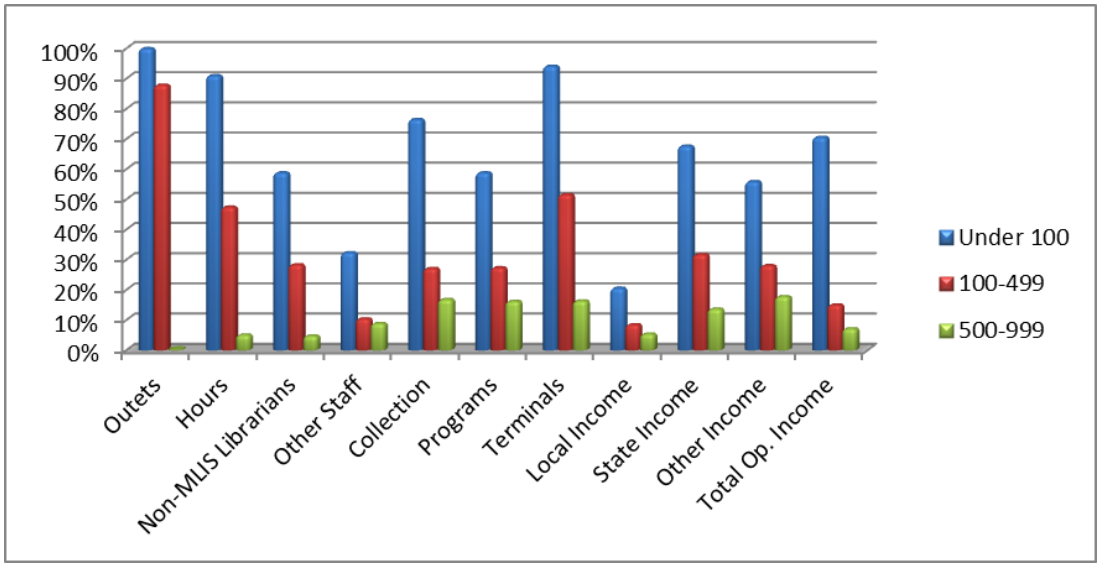


Figure 5.8 2014 Percentages of Statistical Outliers in Smallest Service Areas

state and federal revenue. For example, the 15 Alaskan rural libraries serving fewer than 100 persons had a median per capita state income of $205.45 and median per capita federal income of $88.61. The median per capita other income of those libraries was $566.89; however, when adjusted to subtract the E-Rate discounts, the median per capita

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reduced to zero with an IQR of $16.50. Median per capita state revenue was also high in five Kansas libraries ($39.29) and the New Mexico library ($54.90) serving fewer than 100 persons. The highest amount of other income ($670.57) was reported by a Texan non-profit library serving a population of 93 persons. The twenty-two (22) Alaskan libraries serving between 100 and 499 persons had a median per capita state income of $36.30 and median per capita federal income of $22.54. However, the median per capita other income of those libraries ($56.82) reduced to zero with an IQR of $14.98 when adjusted to remove the E-Rate discount. By comparison, the six rural libraries in the largest service area category, 250,000 to 499,999 persons, had a median per capita state income of $0.97, median per capita federal income below $0.01 without rounding, and median per capita other income of $1.33.

The numbers of bookmobiles and MLIS-degreed librarians were negatively associated with service area size. There were no bookmobiles reported by the rural libraries serving fewer than 500 persons, and only one bookmobile reported by libraries serving 500 to 999 persons. The highest number of bookmobiles, 42 or 28% of all rural library bookmobiles, were operated by libraries serving 10,000 to 24,999 persons. Only .45 FTE MLIS-degreed librarians were reported by rural libraries serving fewer than 100 persons, libraries serving between 100 and 499 persons reported 2.32 FTE librarians holding a MLIS degree, and libraries serving between 500 and 999 persons reported 31.13 MLIS-degreed librarians. The largest number of FTE MLIS-degreed librarians were employed by rural libraries serving 50,000 to 99,999 persons (314.54 FTE or 16% of all rural MLIS-degreed librarians) and rural libraries serving 100,000 to 249,999 persons (310.94 FTE or 16% of all rural MLIS-degree librarians).

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Branches, Total Staff, and Non-FSCS Libraries

As discussed above, the 2014 median per capita numbers of rural library outlets generally decreased as service area size increased. That result was partially explained by the zero median number of branches in all service area size categories lower than 25,000 persons (see Table 5.12, below). Likely due to the small population sizes and the lowest median total staff levels, none of the thirty-four (34) libraries serving fewer than 100 persons and none of the 413 libraries serving between 100 and 499 persons operated branches. Only 1% of the rural libraries serving 1,000 to 2,499 persons and 3.5% of the libraries serving 2,500 to 4,999 persons operated branches, which may be explained by the low median total paid staff of 1.1 and 1.9 persons, respectively. The median number of branches increased in the 25,000 to 49,999 service area size category and continued increasing as service area size increased. Median total staff also increased. However, since the median per capita number of service hours continued to decrease as service area size increased, public access to branches appeared limited by 2014 staffing levels despite the increases in median total paid staff.

Nearly 3% or 107 of the 4,189 rural libraries reported zero paid staff in 2014. In terms of service area size, the highest percentages of libraries reporting zero paid staff were found in those libraries serving fewer than 2,500 persons. Of the 34 libraries serving fewer than 100 persons, 17.6% reported zero staff. While reporting errors may explain the zero paid staffing levels in some of those libraries, others, if not most, are staffed by volunteers (see, e.g., *Pelican*, 2017, Hours). Volunteers are not included in the IMLS Public Library Survey; however, the 2014 Alaska State Library report included a median of nine volunteers in the six Alaska rural libraries that had zero paid staff (*Alaska*, 2014).

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Table 5.12 2014 Branches, Hours, Total Staff, and FSCS Status by Service Area Size

Service Area Size	Count	Total Branches	Median Number of Branches	Libraries Without Branches	% Without Branch	Median Total Staff	Median Total Staff Per Capita	Count With Zero Staff	% With Zero Staff	Non-FSCS Libraries	% Non-FSCS Libraries
Under 100	34	0	0	34	100.0%	0.2	0.0029	6	17.6%	7	20.6%
100-499	413	0	0	413	100.0%	0.4	0.0013	33	8.0%	37	9.0%
500-999	630	6	0	627	99.5%	0.7	0.0010	27	4.3%	33	5.2%
1000-2499	1,362	17	0	1,348	99.0%	1.1	0.0007	31	2.3%	40	2.9%
2500-4999	762	38	0	735	96.5%	1.9	0.0005	8	1.0%	11	1.4%
5000-9999	480	112	0	426	88.8%	3.0	0.0005	1	0.2%	2	0.4%
10000-24999	271	336	0	151	55.7%	5.9	0.0004	1	0.4%	3	1.1%
25000-49999	116	385	3	19	16.4%	16.2	0.0004	0	0.0%	1	0.9%
50000-99999	78	374	4	5	6.4%	20.7	0.0003	0	0.0%	1	1.3%
100000-249999	37	322	8	3	8.1%	47.0	0.0003	0	0.0%	0	0.0%
250000-499999	6	141	25	0	0.0%	179.7	0.0004	0	0.0%	0	0.0%

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Table 5.13 2014 Rural Library Selected Median Per Capita Assets by Service Area Size and FSCS Status

Service Area Size	FSCS	Count	Hours	Outlets	Other Staff	Collec-tion	Term-inals	Total Staff	Other Income	Other Income Less Alaska E-Rate	Op. Income	Op. Income Less Alaska E-Rate*	Unemp. Rate
Under 100	N	7	16.3590	0.0182	0.0000	120	0.0674	0.0000	$116.92	$6.31	$137.69	$137.69	7.0%
	Y	27	7.3043	0.0123	0.0001	101	0.0455	0.0033	$13.35	$2.11	$227.01	$227.01	5.9%
100-499	N	37	2.5679	0.0042	0.0000	22	0.0059	0.0000	$6.17	$6.17	$31.03	$31.03	4.4%
	Y	376	2.7593	0.0031	0.0000	28.	0.0109	0.0014	$4.83	$4.41	$53.52	$53.52	4.3%
500-999	N	33	1.0412	0.0013	0.0000	10	0.0024	0.0000	$1.24	$1.24	$8.46	$8.46	4.9%
	Y	597	1.6657	0.0013	0.0000	22	0.0061	0.0010	$2.68	$2.58	$46.38	$46.38	4.8%
1000-2499	N	40	0.6240	0.0007	0.0000	10	0.0021	0.0000	$0.62	$0.62	$9.36	$9.36	5.9%
	Y	1,322	0.9563	0.0006	0.0001	14	0.0033	0.0007	$2.62	$2.62	$35.50	$35.50	5.3%
2500-4999	N	11	0.2203	0.0003	0.0000	3	0.0008	0.0000	$1.37	$1.37	$2.69	$2.69	5.4%
	Y	751	0.5424	0.0003	0.0002	9	0.0019	0.0005	$2.10	$2.10	$30.07	$30.07	5.7%
5000-9999	N	2	0.1300	0.0001	0.0002	4	0.0008	0.0004	$1.10	$1.10	$25.11	$25.11	5.2%
	Y	478	0.3356	0.0002	0.0002	6	0.0014	0.0005	$1.81	$1.81	$27.92	$27.92	6.1%
10000-24999	N	3	0.1209	0.0001	0.0003	5	0.0010	0.0007	$1.88	$1.88	$49.71	$49.71	5.6%
	Y	268	0.2385	0.0001	0.0002	5	0.0012	0.0004	$1.23	$1.23	$26.01	$26.01	6.7%
25000-49999	N	1	0.0416	0.0000	0.0000	3	0.0000	0.0001	$0.34	$0.34	$3.56	$3.56	8.1%
	Y	115	0.2275	0.0001	0.0003	3	0.0010	0.0004	$1.25	$1.25	$25.69	$25.69	6.7%
50000-99999	N	1	0.0286	0.0000	0.0003	5	0.0011	0.0005	$1.84	$1.84	$47.29	$47.29	6.2%
	Y	77	0.1585	0.0001	0.0002	2	0.0008	0.0003	$0.92	$0.92	$19.93	$19.93	6.3%

* Median per capita total operating income was unchanged due to the small number of Alaskan libraries

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Overall, the number and percent of libraries reporting zero paid staff loosely corresponded to the number and percent of libraries that did not meet the Federal State Cooperative System (FSCS) definition of a public library (*IMLS*, 2017e, p. 4):

> A public library is an entity that is established under state enabling laws or regulations to serve a community, district, or region, and that provides at least the following:
>
> 1. An organized collection of printed or other library materials, or a combination thereof;
> 2. Paid staff;
> 3. An established schedule in which services of the staff are available to the public;
> 4. The facilities necessary to support such a collection, staff, and schedule; and
> 5. Is supported in whole or in part with public funds.

As illustrated in Table 5.13, above, the percentages of rural libraries failing to meet the FSCS library definition were highest in the smaller service area size categories. However, non-FSCS libraries appeared in all but the two largest service area size categories.

Select asset differences between non-FSCS and FSCS libraries by service area size are highlighted in Table 5.13, above. The zero median per capita total staff of the non-FSCS libraries in the service area categories below 5,000 persons was consistent with the numbers of libraries reporting zero staff in each of those categories. Contrary to expectations, in the two smallest service area sizes, the non-FSCS median per capita hours, outlets, collection, terminals, and other income were higher than those of the FSCS

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libraries. That result is partially explained by the smaller median population sizes of the non-FSCS libraries (median populations of 55 persons in the non-FSCS libraries versus 81 persons in the FSCS libraries in the "under 100" category, and 236 versus 327 persons in the "100-499" category). The high ($116.92) median per capita other income of the non-FSCS libraries in the "under 100" service area size was largely attributable to the three Alaskan non-FSCS libraries that received a median of $50,356 other income in the form of E-Rate discounts (*Alaska*, 2014). The median per capita other income of those libraries reduced to $6.31 when adjusted to delete the E-Rate discount. There were two other notable exceptions to the general trend of higher per capita median asset levels in the FSCS libraries. First, the higher per capita other and total income of the non-FSCS libraries in the 10,000 to 24,999 category was attributable to two non-profit New England libraries. Similarly, the higher other and total income of the non-FSCS library in the 50,000 to 99,999 service area size category was attributable to a non-profit New England library. Beyond those exceptions, the median per capita assets of FSCS libraries were generally higher than those of non-FSCS libraries.

Unemployment Rate Predictor

The seventh predictor in the most accurate service area size classification algorithm was the 2014 county unemployment rate. As show above in Table 5.11, the unemployment rate was lowest in the counties where libraries served populations of 100 to 499 and 500 to 999 persons (4.3% and 4.8%, respectively). The lower unemployment rates in those counties may explain the high classification accuracy of those service area size categories (99.8% and 99.5%, respectively). The unemployment rate of counties where libraries served fewer than 100 persons (6.5%) was comparable to counties where

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libraries served between 5,000 and 249,999 persons (ranging from 6.1% to 6.8%). Although none of the libraries serving the largest service area size (250,000 to 499,999 persons) were accurately classified, the counties served by those libraries had the highest unemployment rate (7.3%), which was three percentage points higher than the counties where libraries served 100 to 499 persons and 2.5 percentage points higher than the counties where libraries served 500 to 999 persons.

Table 5.13 reveals that the median unemployment rates of the non-FSCS libraries were higher than the FSCS libraries in the service area sizes under 2,500 persons, with the largest difference in the smallest category, where non-FSCS libraries serving fewer than 100 persons had a 1.1% higher median unemployment rate than FSCS libraries. The non-FSCS unemployment rate was also higher than the FSCS unemployment rate in the 25,000 to 49,999 service area size category by 1.4%. Perhaps due to the decreasing numbers of non-FSCS libraries as service area size increased, the median unemployment rates in the other service area size categories were lower in the non-FSCS libraries than the FSCS libraries.

RUCA Code Predictor

The RUCA code was the eighth predictor in the most accurate service area size classifier. As noted in section 5.2, only 1,995 libraries or 48% of all 2014 IMLS-designated rural libraries were located in RUCA rural category 10. The contribution of the RUCA code to the accuracy of the service area size classification algorithm was partially explained by the generally decreasing percentages of RUCA-designated rural libraries as service area sizes increased (see Table 5.14, below). For example, 88% of the libraries serving fewer than 100 persons were located in the RUCA rural category 10,

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while only 4% of the libraries serving between 50,000 and 99,999 persons and 8% of the libraries serving between 100,000 and 249,999 persons were located in the RUCA rural category 10. In comparison, the RUCA category 2 metropolitan area with high commuting to an urban area contained 22% of the 2014 IMLS-designated rural libraries, and 690 or 75% of those libraries served between 1,000 and 9,999 persons. None of the six largest IMLS-designated rural libraries were located in RUCA rural category 10.

Table 5.14 2014 Rural Libraries by Service Area Size and RUCA Rural Category

Service Area Size	Total Libraries	RUCA Rural Libraries	% RUCA Rural Libraries
Under 100	34	30	88%
100-499	413	274	66%
500-999	630	359	57%
1,000-2,499	1362	713	52%
2,500-4,999	762	342	45%
5,000-9,999	480	173	36%
10,000-24,999	271	82	30%
25,000-49,999	116	16	14%
50,000-99,999	78	3	4%
100,000-249,999	37	3	8%
250,000-499,999	6	0	0%
Total	4189	1995	48%

The 2014 median per capita values of the library asset predictors and the median unemployment rate are shown in Table A.2 by service area size and RUCA code. As expected, the highest median per capita asset values occurred in the smallest, "Under 100" service area size category. The overall highest median per capita other income of $460.45 in RUCA category 8 (small town with at least 30% commuting flow to a small urban cluster) was largely attributable to an Alaska library serving a population of 48 persons. That library received an E-Rate discount as other income in the amount of $44,065 in 2014 (*Alaska*, 2014). The overall highest median per capita hours, outlets,

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other staff, and terminals were also found within the RUCA category 8 libraries serving fewer than 100 persons. Contrastingly, the 7.9% median unemployment rate found in that category was the third highest of all the service area sizes and RUCA categories, which was attributable to an Idaho library serving 87 persons in a county with a 10% unemployment rate in 2014 (the Alaska library in the same category was located in a county with a 5.7% unemployment rate in 2014).

The second largest median per capita other income ($81.78) in the "Under 100" service area category was attributable to the two non-profit libraries located in RUCA category 2 (metropolitan with at least 30% commuting flow to an urban area). Of the two non-profit libraries, the Maine library received all of its 2014 operating income in the form of other income. The third largest median per capita income in the RUCA rural category 10 libraries serving fewer than 100 persons ($13.49) was attributable to the fourteen Alaskan libraries in that group that received a median of $331.03 in per capita other income during 2014, which reduced to a median of zero and an IQR of $16.50 when the E-Rate discounts were subtracted.

Illustrated in table A.2, while per capita asset sizes generally decreased with increasing service area size, the decrease followed an uneven pattern when analyzed by RUCA code. While the median per capita numbers of terminals were generally higher in the RUCA rural category 10 than in the metro, micro, or small town RUCA categories, the median per capita assets of RUCA category 10 were either higher, lower, or equal to the median per capita hours, outlets, other staff, collections, and other income of the more urbanized RUCA categories.

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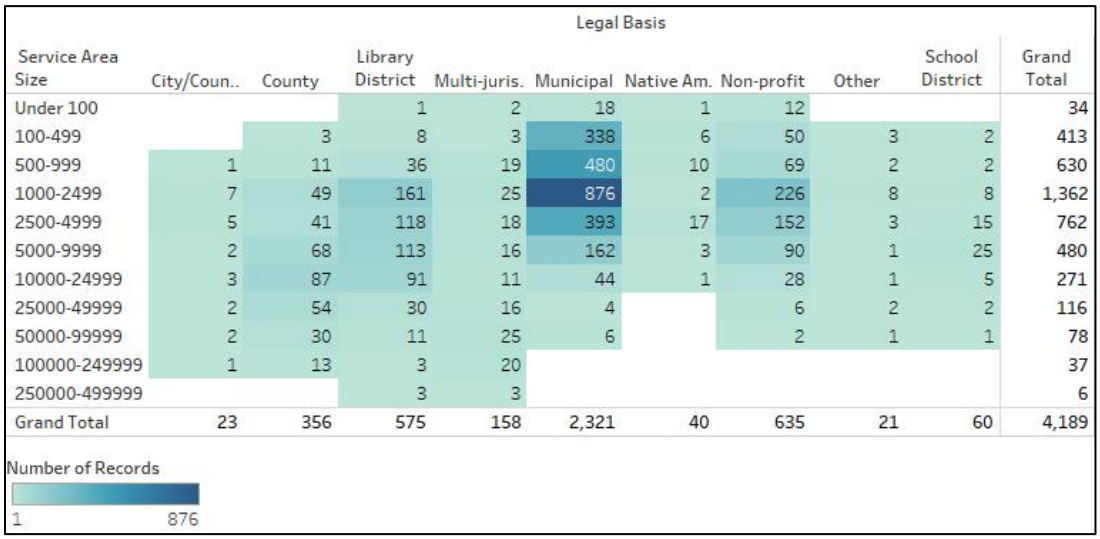
Legal Basis Interactions

The inclusion of the legal basis class as the ninth predictor in the most accurate service area size classification algorithm affirmed the interaction between the two classes that was discussed in section 5.2, above. As shown in Figure 5.9, below, the largest numbers of rural libraries were organized as municipal libraries in 2014, and the largest numbers of municipal libraries served between 100 and 10,000 persons. The libraries in those service area size categories were classified with high accuracy—ranging from a low of 82% accuracy for libraries serving between 5,000 and 9,999 persons to a high of 99.8% accuracy for libraries serving between 100 and 499 persons (see Table 5.10, above). The high classification accuracy for the libraries serving between 1,000 and 9,999 persons (ranging from 82% to 85%) may also be explained by the higher numbers of library district, non-profit, and school district libraries serving those populations.



Service Area Size	Legal Basis									
	City/Coun..	County	Library District	Multi-juris.	Municipal	Native Am.	Non-profit	Other	School District	Grand Total
Under 100			1	2	18	1	12			34
100-499		3	8	3	338	6	50	3	2	413
500-999	1	11	36	19	480	10	69	2	2	630
1000-2499	7	49	161	25	876	2	226	8	8	1,362
2500-4999	5	41	118	18	393	17	152	3	15	762
5000-9999	2	68	113	16	162	3	90	1	25	480
10000-24999	3	87	91	11	44	1	28	1	5	271
25000-49999	2	54	30	16	4		6	2	2	116
50000-99999	2	30	11	25	6		2	1	1	78
100000-249999	1	13	3	20						37
250000-499999			3	3						6
Grand Total	23	356	575	158	2,321	40	635	21	60	4,189

Figure 5.9 2014 Service Area Size by Legal Basis

The 2014 median per capita values of the library asset predictors, total operating income, and the median unemployment rate are shown in Table A.3 by service area size and legal basis for the 1,995 libraries located in RUCA rural category 10. Native

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American libraries in all service sizes were generally located in counties with the highest unemployment rates in 2014 (ranging from a low of 7.2% in the 2,500 to 4,999 and 5,000 to 9,999 service area size categories to a high of 15.4% in the 100 to 499 category). The nine non-profit libraries serving fewer than 100 persons were also located in counties with a high median unemployment rate (13%).

As in the discussion of libraries located in RUCA rural category 10 found above and in section 5.3, the highest median per capita asset values clustered around the smallest libraries regardless of governance structure (legal basis). As expected, due to the statistical outliers attributed to small populations and relatively high levels of revenue from state and federal government sources, the highest median per capita asset values appeared in the libraries serving fewer than 100 persons.

Within the service area size categories of the RUCA-designated rural libraries there were no general patterns of asset strengths between the governance structures. As one of many possible examples, the median per capita numbers of Native American library open hours was 2.7 hours higher than the median per capita hours of the next highest governance structure (library districts) in the 100 to 499 person service area size category, but was .33 median per capita hours lower than median per capita library district hours in the 1,000 to 2,499 service area size category. The high (584) per capita collection volume report by the Alaskan Native American library serving fewer than 100 persons included 184 e-books per capita. Contrastingly, the median e-book collection of the nine non-profit libraries serving fewer than 100 persons was zero (although one Alaskan non-profit library serving 81 persons reported 9,773 e-books). Overall, analysis of the libraries located in RUCA rural category 10 by service area size and legal basis

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affirmed the earlier finding that there was not a clear demarcation between rural library governance structures in terms of library assets.

Research Question Three Results Summary

In summary, in addition to affirming that there was not a clear demarcation between rural library governance structures in terms of library assets, the results of data analysis related to research question three indicated that rural library assets did not generally decrease as service area size decreased. As evidenced by statistical outliers in median per capita library assets such as hours, programs, terminals, and collections, the per capita strength of library assets in the smallest libraries was associated with non-local revenue sources. However, the relatively low levels of median total staff and high levels of non-FSCS libraries in the smallest service areas indicated that the economic capital received from non-local sources was invested in tangible, rather than human, capital assets.

5.5 Research Question Four

Research question four asks: Do rural public library economic, cultural, and social capital assets differ by Bureau of Economic Analysis (BEA) region, and do regional socioeconomic factors explain those differences? The most accurate rural public library classification algorithm by region consisted of a set of eight predictors containing only one library asset variable—per capita revenue from state governments. Therefore, based solely on the composition of the remaining seven predictors it appeared that regional socioeconomic factors were more likely to explain rural library asset differences between BEA-designated regions.

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The most accurate supervised classifier of the 2014 training dataset by region was comprised of the following predictors: per capita state government revenue; county demographics including the percentage of foreign-born residents, adult residents without at least a high school diploma, female head of households, home ownership, children in deep poverty, and veterans aged 18 and over; and the USDA ERS county economic typology. The eight-predictor algorithm accurately identified the region of 3,685 or 88% of the 4,189 rural public libraries in the training dataset. The Kappa statistic of .8541 indicated that this was an "almost perfect" classifier (Landis & Koch, 1977, p. 165), and the weighted average ROC area of .983 indicated an excellent test of true versus false conditions (Tape, n.d.). The classification accuracy of each region appears in Table 5.15, below. Classification accuracy was 90% or higher for the rural libraries located in the New England, Plains, Mideast, and Great Lakes regions. Contrastingly, the 58% classification accuracy rate for libraries in the Rocky Mountain region was only slightly better than the probability of a coin toss.

Table 5.15 Classification Accuracy by Region

Region	Libraries Accurately Classified	Total Libraries	% Accuracy
Far West	114	167	68.3%
Great Lakes	709	788	90.0%
Mideast	392	429	91.4%
New England	681	687	99.1%
Plains	1,083	1,170	92.6%
Rocky Mountains	120	208	57.7%
Southeast	357	439	81.3%
Southwest	229	301	76.1%
Total	3,685	4,189	88.0%

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Per Capita State Revenue

Per capita revenue from state government was the only library asset included in the most accurate classifier predictor set for the region class. The New England region was classified with 99.1% accuracy, which may be partially related to that region's zero median per capita and zero median library revenue from state governments. However, Southwest region libraries, classified with 76% accuracy also had zero median per capita and zero median revenue from state governments. Mideast libraries had the highest median per capita state revenue and were classified with an accuracy of 91%. Southeast libraries, ranked third in median per capita state revenue ($1.47) and highest in median state revenue ($16,999) and state revenue interquartile range ($79,776), were classified with an accuracy of 81.3%. These results indicated that median per capita state revenue improved classifier accuracy but was not the major determinant. Indeed, median per capita state revenue had a weak positive association with median per capita numbers of other staff (rho = 0.20) and had a small negative association with median per capita numbers of non-MLIS librarians (rho = -0.30), open hours (rho = -0.13), and public access terminals (rho = -.05).

Table 5.16 2014 Rural Library Revenue from State Governments by Region

Region	Count	Median Per Capita	Median	Median Quartile 1	Median Quartile 2	IQR	Quartile Coeff. Of Dispersion
Mideast	429	$1.86	$3,900	$1,549	$9,376	$7,827	0.45
Far West	167	$1.69	$6,600	$1,000	$10,208	$9,208	0.47
Southeast	439	$1.47	$16,999	$1,548	$81,324	$79,776	0.50
Plains	1,170	$1.11	$1,243	$363	$3,120	$2,757	0.47
Rocky Mountains	208	$1.07	$3,000	$1,621	$4,880	$3,259	0.40
Great Lakes	788	$1.03	$2,543	$875	$7,623	$6,748	0.47
New England	687	$0.00	$0	$0	$398	$398	0.50
Southwest	301	$0.00	$0	$0	$4,612	$4,612	0.50

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While the quartile coefficients of dispersion displayed in Table 5.16 indicate that median library revenue from state governments did not vary remarkably between regions, library revenue received from state governments varied widely by states within regions. As seen in Table A.4, thirty-eight of the forty-nine states containing IMLS-designated rural libraries provided at least some revenue to those libraries. For example, three Mideast Maryland county libraries had median per capita state revenue of $7.36, while six (6) Mideast New Jersey libraries had median per capita state revenue of $0.45.

Administered under Alaska Stat. §§ 14.56.300–340 and §§ 57.050–099, median per capita library revenue from the Alaskan state government led the Far West region with median per capita state revenue of $18.24 and ranked second highest among all states regardless of region. Ohio stood out as the overall highest 2014 contributor to rural libraries in the Great Lakes and all other regions. Administered under Ohio Rev. Code Ann. §§ 5757.46–47, the median per capita state revenue contributed to Ohio rural libraries was $29.99, and the state revenue median was $236,237.

Other Library Assets

Library Asset Variation Between Regions

The regional median per capita values of selected 2014 rural library assets appear in Table 5.17, below. The Southeast region was lowest in terms of median per capita outlets, hours, non-MLIS degreed librarians, collection, programs, terminals, other income, and total operating income. This affirmed the regional asset variations discussed in section 5.2, including the finding that the Southeast region generally ranked lowest in median per capita assets within rural libraries when grouped by FAR level 4, RUCA category 10, and RUCC category 9 (see section 5.2, text surrounding Table 5.7). The

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Southeast's low median per capita operating income of $18.80, which was $45.41 below the highest-ranked Far West region's per capita operating income and $12.31 below the seventh-ranked Southwest region, provided one explanation of the Southeast's low median per capita non-economic assets. Indeed, while associations between per capita operating income and other library assets varied in terms of strengths, the associations were positive. For example, per capita operating income had a weak, positive association with median per capita numbers of other staff (rho = .20), a moderate positive association with median per capita numbers of non-MLIS librarians (rho = .43), and stronger positive associations with public access terminals (rho = .73) and open hours (.74).

The Southwest region had the second lowest regional median per capita collections, programs, other income, and total operating income. That finding also affirmed the region's generally low rank in median per capita assets within libraries grouped by FAR level 4, RUCA category 10, and RUCC category 9 as discussed above.

The Far West region had the highest median per capita outlets, collection, federal income, and total operating income. When adjusted for Alaska E-Rate discounts, the Far West region median per capita other income reduced by $1.89 to $1.13. After adjustment for the Alaska E-Rate discounts, the Far West median per capita operating income ($61.26) remained the highest of all regions. This affirmed the previous finding of statistical outliers within the revenue contributions from state and federal governments to small Alaskan libraries (see section 5.4).

Plains libraries had the highest median per capita number of open hours and exceeded the lowest ranked Southeast region libraries by one median per capita hour. The Great Lakes region ranked highest in median per capita non-MLIS librarians and

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Table 5.17 2014 Select Median Per Capita Rural Library Assets by Region

Region	Count	Outlets	Hours	Non-MLIS Librarians	Other Staff	Collec-tion	Programs	Term-inals	Federal Income	Other Income	Operating Income
Far West	167	0.0008	0.9278	0.0003	0.0002	22	0.0480	0.0042	$0.29	$3.02	$64.21
Great Lakes	788	0.0004	0.6522	0.0003	0.0003	13	0.0216	0.0022	$0.00	$1.99	$36.27
Mideast	429	0.0004	0.5753	0.0003	0.0002	9	0.0344	0.0020	$0.00	$6.71	$32.44
New England	687	0.0005	0.6312	0.0003	0.0001	11	0.0345	0.0020	$0.00	$2.87	$33.05
Plains	1,170	0.0010	1.2841	0.0007	0.0000	18	0.0313	0.0048	$0.00	$2.37	$40.36
Rocky Mountains	208	0.0005	0.7657	0.0004	0.0002	11	0.0285	0.0032	$0.00	$1.30	$38.16
Southeast	439	**0.0001**	**0.2803**	**0.0001**	0.0001	**6**	**0.0093**	**0.0014**	$0.00	**$0.95**	**$18.80**
Southwest	301	0.0005	0.7821	0.0004	0.0001	8	0.0154	0.0034	$0.00	$0.98	$31.19

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exceeded the Southeast region by a median per capita of six (6) non-MLIS librarians per ten thousand persons. Plains libraries ranked highest in median per capita public access terminals with 4.8 terminals per thousand persons, followed by Far West libraries with 4.2 terminals per thousand. However, Plains libraries had zero median per capita other staff, which was three (3) median per capita staff per ten thousand persons below the highest, Great Lakes region.

Library Asset Variation Within Regions

As with median per capita income from state governments, library assets varied both between and within regions. Within the lowest ranked Southeast region, the 53 Kentucky rural public libraries had the highest median per capita operating income at $38.55. The thirty (30) Arizona rural libraries had the highest median per capita operating income in the seventh-ranked Southwest region ($64.07), which was $42.63 higher than the median per capita operating income of the 166 Texas libraries in the region. In the highest-ranked Far West region, the $162.77 median per capita operating income of the 71 Alaskan libraries ranked first among the five Far West states (reduced to $119.00 when adjusted for E-Rate discounts). In comparison, the sixteen (16) rural California libraries had the lowest median per capita operating income in the Far West region ($24.10). Attributable to higher per capita operating income, the Alaskan libraries also led the Far West region in median per capita outlets, hours, non-MLIS librarians, collection, programs, and terminals.

Bookmobiles and MLIS-Degreed Librarians

Surprisingly, while the Southeast region ranked lowest in the majority of the library assets, the region ranked highest in both the numbers of bookmobiles and MLIS-

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degreed librarians (see Table 5.18, below). While ranked second in the highest number of bookmobiles, the 1,170 rural Plains libraries operated only 19 bookmobiles. Of note, no New England rural libraries operated bookmobiles. Although the Plains region contained the highest number of rural public libraries, the region's number of FTE MLIS-degreed librarians was only 80 FTE above the Rocky Mountain region, which had the lowest numbers of FTE MLIS-degreed librarians in the region.

Within the regions, Kentucky led the Southeast region in bookmobiles with 32 bookmobiles. At 21% of the total number of bookmobiles operated throughout all rural public libraries in 2014 (see also Estep, 2017), the Kentucky bookmobiles explained the Southeast's highest rank in numbers of bookmobiles. In comparison, no bookmobiles were reported in two of the southeastern states—Mississippi and Tennessee. Outside the Southeast region, no bookmobiles were reported in fourteen (14) states, including Arkansas, Connecticut, Kansas, Massachusetts, Maine, Montana, New Hampshire, New Jersey, New Mexico, Oklahoma, Rhode Island, Texas, Vermont, or Wyoming.

As previously mentioned, the Southeast's high rank in numbers of MLIS-degreed librarians was unexpected due to the region's low rank in terms of state revenue and total operating revenue. However, the number of MLIS-degreed librarians by region had a weak positive association with state revenue (Spearman's rho = .18) and a weak negative association with total operating revenue (Spearman's rho = -.19). The 34 IMLS-designated rural Virginia libraries had the highest number of MLIS-degreed librarians in the Southeast region (107.2 FTE or 18% of the Southeastern MLIS-degreed librarians), while the 77 rural Tennessee libraries ranked lowest in the Southeast region with 18.1 FTE MLIS-degreed librarians. The highest number of Plains region MLIS-degreed

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librarian FTE was found in Minnesota (52.2 FTE, 71 libraries), and the highest number of Rocky Mountain MLIS-degreed librarian FTE was found in Colorado (35.3 FTE, 59 libraries). Of note, the 63 North Dakota rural public libraries reported only one (1) MLIS-degreed librarian FTE.

Table 5.18 2014 Bookmobiles and MLIS-Degreed Librarians by Region

Region	Count	Bookmobiles	% of Total Bookmobiles	MLIS-degreed Librarians	% of Total MLIS-degreed Librarians
Far West	167	12	8%	212.57	11%
Great Lakes	788	15	10%	428.59	22%
Mideast	429	7	5%	183.57	9%
New England	687	0	0%	243.22	12%
Plains	1,170	19	13%	145.60	7%
Rocky Mountains	208	18	12%	87.25	4%
Southeast	439	75	49%	590.18	30%
Southwest	301	6	4%	65.54	3%
Total	4,189	152		1,956.52	

Regional Demographics

The most accurate regional classifier predictor set included six (6) demographic predictors: the percentage of foreign-born residents, adult residents without at least a high school diploma, female head of households, home ownership, children in deep poverty, and veterans aged 18 and over. The regional medians of each predictor are displayed in Table 5.19, below. As will be discussed below, the predictors varied between and within regions, as did the associations between individual predictors and classification accuracy.

Table 5.19 Median Demographic Predictors by Region

Region	Foreign Born	No Diploma	Female Head of Household	Own Home	Children in Deep Poverty	Veterans 18 and Older
Far West	4.2%	10.1%	9.6%	67.1%	8.7%	12.3%

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Region	Foreign Born	No Diploma	Female Head of Household	Own Home	Children in Deep Poverty	Veterans 18 and Older
Great Lakes	1.9%	11.3%	9.3%	76.1%	8.2%	10.2%
Mideast	3.6%	11.8%	10.8%	72.3%	8.5%	10.2%
New England	3.6%	8.7%	9.8%	71.1%	6.8%	10.3%
Plains	1.4%	9.4%	7.6%	75.9%	5.9%	10.5%
Rocky Mountains	2.9%	9.4%	7.4%	73.0%	7.1%	11.2%
Southeast	1.4%	20.5%	12.6%	74.7%	12.9%	9.5%
Southwest	5.9%	16.1%	11.6%	74.0%	11.1%	10.6%

Demographic Variation Between Regions

Although the highest median percentages of foreign born residents were served by Southwest and Far West rural libraries, the classification accuracy of those regions was 76.1% and 68.3% respectively. Inversely, the classification accuracy of the two regions with the lowest percentages of foreign born residents, the Plains and Southeast regions, were 92.6% and 81.3%, respectively.

Classified with 81.3% accuracy, the Southeast region had the highest median percentage of residents without a high school diploma (20.5%), the highest percentage of female head of households (12.6%), and the highest percentage of children living in deep poverty (12.9%). As illustrated in Table 5.20, the Spearman rank correlation of those three predictors was positive and fairly strong, so it was not surprising that all three predictors were high in the Southeast region. As discussed in section 4.1 (see *Rural Socioeconomic Factors*), low education levels and female heads of households are also positively associated with high overall poverty rates and unemployment levels. Although not shown in Table 5.19, the Southeast had the highest median overall poverty rate of 20.8% and the second highest unemployment rate (7.65% versus the Far West region's highest unemployment rate of 8.4%). These findings appeared consistent with, and most likely explained, the Southeastern region's low rank in median per capita library assets.

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Table 5.20 Spearman Rank Correlation Matrix: Select Predictors

	% No Diploma	% Female Households	% Children Deep Poverty
% No Diploma	1	0.74	0.86
% Female Head of Households	0.74	1	0.76
% Children Deep Poverty	0.86	0.76	1

Also consistent with the Southwest's low ranking in median per capita other income and total operating income, the Southwest ranked only 4.4 percentage points above the Southeast in the percentage of residents without a diploma, had only one (1) percentage point fewer female heads of household than the Southeast, and had only 1.8 percentage points fewer children living in deep poverty. Not shown in table 5.18, the Southwest had the second highest overall median poverty rate at 17.6%. However, at 5.1%, the Southwest had the fifth lowest median unemployment rate among the eight regions, which may explain why the Southwest classification accuracy was 5.2 percentage points lower than the Southeast region.

The highest median percentage of home ownership was found in the Great Lakes region (76.1%), followed by the Plains region (75.9%). Both of those regions were classified with high accuracy (90% and 92.5%, respectively). Although the Far West region had the lowest median percentage of home ownership (67.1%) among the eight regions, its classification accuracy was the seventh lowest at 68.3%.

The highest median percentages of veterans were found in the Far West (12.3%) and Rocky Mountain (11.2%) regions. The Southeast had the lowest median percentage of veterans (9.5%). However, all of those regions ranked lowest in classification accuracy, so the predictor was not a strong determinant of the differences between regions.

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Demographic Variation Within Regions

As with library assets, demographic predictors varied both between and within regions. For example, within the Southwest region, which had the highest median percentage of foreign-born residents, Arizona had the highest percentage of foreign born residents (10%) while Oklahoma had the lowest percentage (2.4%). At .4%, West Virginia in the Southeast region had the lowest foreign born population of any state.

In the Southeastern states, which had the highest percentage of residents without a diploma, 23% of Kentucky and Louisiana adults lacked a high school education. In comparison, the percentages of both Arkansas and West Virginia adults without a high school diploma were six (6) percentage points lower. The Southeast also ranked highest in the median percentage of female heads of households and children living in deep poverty. Mississippi had the highest percentage of female heads of household (18%) in the Southeast, while West Virginia had the lowest percentage (10.4%). At 19%, South Carolina had the highest median percentage of children living in deep poverty while Virginia had the lowest (8%).

The highest median percentages of veterans resided in Nevada (13.6% in the Far West region), Florida (13.1% in the Southeast region), and Oregon (13.1% in the Far West region). The smallest median percentages of veterans resided in New Jersey (6.4% in the Mideast region) and Mississippi (7.5% in the Southeast region).

Health Services

A first round classification algorithm that predicted the region class with 81% accuracy included the number of general practice physicians in the predictor set. Since that early trial, the median per capita general practice physicians and advanced practice

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RNs health services predictors had not been included in any of the most accurate predictor sets. However, since evidence of the generally lower levels of rural health services was a recurring theme in the literature (see, e.g., Daley & Avant, 2014, pp. 7–8; see also Scales, Street, & Cooper, 2014, p. xv; Snow, 2001, p. 2), the two median per capita health services predictors for the counties containing IMLS-designated rural public libraries are presented by region in Table 5.21, below.

In 2014, the New England region contained the highest median per capita numbers of both general practice physicians and advanced practice nurses. The Southwest region had the lowest median per capita numbers of general practice physicians (.39 per thousand), but was nearly tied with the Southeast region (.4 per thousand). The Great Lakes, Rocky Mountain, and Southwest were tied for the lowest median per capita numbers of advanced practitioner RNs at .35 per thousand.

Within the New England region, Massachusetts had the highest median per capita numbers of general practice physicians (1 per thousand) and advanced practice nurses (.9 per thousand), while Connecticut had the lowest per capita general practice physicians (.6 per thousand) and Rhode Island had the lowest per capita advanced practice nurses (.4 per thousand). Oklahoma in the Southwest and Louisiana in the Southeast had the lowest median per capita general practice physicians (.34 per thousand and .31 per thousand, respectively. The overall smallest median per capita numbers of general practice physicians were found in North Dakota (.29 per thousand), Louisiana (.31 per thousand), and Kentucky (.32 per thousand), while the overall smallest median per capita numbers of general practice advanced practice RNs were found in Virginia

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(.249 per thousand), California (.254 per thousand), Montana (.256 per thousand), and Nevada (.26 per thousand).

Table 5.21 2014 Median Per Capita General Practice Physicians and Advanced Practice RNs by Region

Region	Gen. Prac. Phys.	IQR	Coeff. Of Dispersion	Adv. Prac. RNs	IQR	Coeff. Of Dispersion
Far West	0.00063	0.00048	0.40	0.00049	0.00046	0.47
Great Lakes	0.00045	0.00027	0.29	0.00035	0.00030	0.38
Mideast	0.00052	0.00027	0.24	0.00054	0.00028	0.25
New England	0.00087	0.00043	0.23	0.00082	0.00044	0.26
Plains	0.00050	0.00041	0.40	0.00046	0.00045	0.48
Rocky Mountains	0.00050	0.00047	0.45	0.00035	0.00037	0.46
Southeast	0.00040	0.00031	0.40	0.00046	0.00041	0.42
Southwest	0.00039	0.00031	0.39	0.00035	0.00030	0.40

Rural RUCC Categories 8 and 9, RUCA Category 10, and FAR Level 4 Between Regions

As previously mentioned, research question one findings indicated that the Southeast region generally ranked lowest in median per capita assets within libraries grouped by FAR level 4, RUCA category 10, and RUCC category 9 (see section 5.2, text surrounding Table 5.7). Select regional predictors for the 405 public libraries located in the two RUCC-designated rural categories 8 and 9, RUCA-designated rural category 10, and the most remote FAR level 4 are displayed in Table 5.22, below. While the Southeast and Southwest regions still ranked lowest in median per capita operating income, the median per capita operating income of the fifteen (15) most remote Southeastern rural libraries was $1.44 above the median per capita operating income of all Southeastern IMLS-designated rural libraries. However, the median per capita operating income of the twenty-four (24) most remote Southwestern libraries was $4.87 lower than the median per capita operating income of all Southwestern libraries. At $144.66, the 53 most remote

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Table 5.22 2014 RUCC Categories 8 and 9, RUCA Rural Category 10, and FAR Level 4: Select Predictors by Region

Region	Count	Median Per Capita Operating Income	Median Per Capita Op. Income Less Alaska E-Rate	Median % Foreign Born	Median % Deep Poverty Children	Median % Poverty All Ages	Median % Unemployment	Median % Veterans over 18	Median Per Capita General Practice Physicians	Median Per Capita Advanced Practice RNs
Far West	53	$144.66	$120.44	2.5%	7.7%	15.8%	10.2%	11.5%	0.00036	0.00054
Great Lakes	26	$41.21	$41.21	1.5%	8.8%	14.8%	8.6%	13.9%	0.00044	0.00070
Mideast	7	$38.47	$38.47	1.1%	9.1%	14.3%	7.2%	12.0%	0.00052	0.00052
New England	6	$51.78	$51.78	3.2%	9.8%	19.6%	6.8%	13.7%	0.00063	0.00051
Plains	215	$47.01	$47.01	1.0%	5.7%	12.7%	3.2%	11.2%	0.00048	0.00040
Rocky Mountains	59	$49.18	$49.18	2.1%	7.5%	13.4%	4.6%	11.4%	0.00048	0.00026
Southeast	15	$20.24	$20.24	0.5%	13.5%	27.8%	8.6%	8.1%	0.00038	0.00054
Southwest	24	$26.32	$26.32	8.6%	11.9%	18.9%	4.5%	9.5%	0.00025	0.00000

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Far West rural libraries had the highest median per capita operating income, which was $80.45 higher than the median per capita operating income of all Far West rural libraries due to revenue contributions from state, federal, and other sources. When adjusted for the inclusion of Alaska library E-Rate discounts in other income, the median per capita operating income of the 53 most remote Far West rural libraries was $120.44—still higher than all Far West libraries.

Paralleling Table 5.17, the most remote Southwest region libraries had the highest median percentage of foreign born residents among the eight regions. Again paralleling Table 5.17, the most remote Southeast region libraries had the highest median percentage of children living in deep poverty and the highest median overall poverty rate. The 2014 median unemployment rate was highest in the most remote Far West libraries (10.2%), just as the Far West median unemployment rate (8.4%) was highest when all IMLS-designated rural libraries were grouped by region.

Compared to all rural libraries, the percentage of veterans served by the ERS-designated rural libraries was higher by 5.7 percentage points in the Great Lakes region, 1.8 percentage points in the Mideast, 3.4 percentage points in New England, .7 percentage points in the Plains, .2 percentage points in the Rocky Mountain, and 1.1 percentage points in the Southwest region. However, the percentage of veterans served by the ERS-designated rural libraries was lower by .8 percentage points in the Far West and by 1.4 percentage points in the Southeast.

With the exception of the Mideast region, the regional median per capita numbers of general practice physicians was lower in the RUCA category 10, FAR level 4 libraries than the median per capita general practice physicians of all IMLS-designated rural

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libraries categorized by region. However, the median per capita numbers of Far West, Great Lakes, Plains, and Rocky Mountain advanced practitioner RNs was higher in the most remote rural libraries than in the population of rural public libraries.

Rural RUCC Categories 8 and 9, RUCA Category 10, and FAR Level 4 Within Regions

As expected, demographic predictors also varied within the regions when libraries were grouped by rural RUCC categories 8 and 9, RUCA category 10, and FAR Level 4. For example, within the generally lowest ranked Southeast region, Alabama had the highest median percentage of children living in deep poverty (34.5%), overall poverty rate (33.7%), and unemployment rate (17.4%), while West Virginia had the lowest median percentage of children living in deep poverty (7.9%) and overall poverty rate (17.6%) and Arkansas had the lowest Southeastern region unemployment rate (6.5%). Within the Far West region, which had the highest median per capita total operating income, Alaska and Washington led the region in median per capita total operating income at $190.50 ($147.80 without the Alaska E-Rate subsidies) and $145.50, respectively, while Oregon had the lowest ($57.70). None of the sixteen California IMLS-designated rural public libraries were found within the subset of RUCC categories 8 and 9, RUCA category 10, and FAR Level 4 libraries.

Economic Typology

The ninth predictor in the most accurate classification algorithm of rural libraries by the region class was the USDA ERS 2015 County Typology Codes. Those codes "classify all U.S. counties according to six mutually exclusive categories of economic dependence. . . . [including] farming, mining, manufacturing, Federal/State government, recreation, and nonspecialized counties" (*USDA*, 2017f, para. 2). Table 5.23, below,

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categorizes the 2014 IMLS-designated rural libraries by region and the predominant economic dependence of the counties in which they are located. The largest numbers of rural libraries (1,483 libraries) were located in counties classified as non-specialized. Counties economically dependent on farming and recreation held the second highest numbers of libraries (716 and 711 rural libraries, respectively), following closely by the 655 rural libraries located in counties economically dominated by manufacturing.

Table 5.23 USDA ERS Economic Typology: Predominant Regional Dependence

Region	% Non-specialized	% Farm	% Fed/ State Gov.	% Manufacturing	% Mining	% Recreation
Far West	31%	7%	14%	10%	5%	32%
Great Lakes	36%	6%	9%	34%	1%	15%
Mideast	42%	0%	21%	10%	2%	25%
New England	42%	0%	14%	2%	0%	43%
Plains	30%	46%	3%	15%	3%	2%
Rocky Mountains	25%	23%	13%	2%	12%	25%
Southeast	41%	5%	14%	26%	7%	7%
Southwest	32%	17%	16%	9%	17%	10%
Total	35%	17%	11%	16%	4%	17%

Farming dependence, defined as accounting for "25% or more of the county's earnings or 16% or more of the employment averaged over 2010-2012" (*USDA*, 2017g, Documentation), was highest in the Plains (46%) and Rocky Mountain regions (23%). The dominant federal and/or state government economic type, defined as accounting "for 14% or more of the county's earnings or 9% or more of the employment averaged over 2010-2012" (*USDA*, 2017g, Documentation), was highest in the Mideast (21%) and lowest in the Plains region (3%). Economic dependence on manufacturing, defined as accounting "for 23% or more of the county's earnings or 16% of the employment averaged over 2010-12" (*USDA*, 2017g, Documentation), was highest in the Great Lakes region (34%) and the Southeast region (26%). Dependence on mining, defined as

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accounting “for 13% or more of the county’s earnings or 8% of the employment averaged over 2010-12” (*USDA*, 2017g, Documentation), was highest in the Rocky Mountain region (12%) and lowest in New England, where no rural libraries were located in counties economically dependent on mining. Finally, economic dependence on recreation was highest in the New England region (43%) and the Far West region (32%).

Economic Typology, RUCC Categories 8 and 9, RUCA Category 10, and FAR Level 4 Between Regions

The analysis of RUCC rural categories 8 and 9, RUCA rural category 10, and FAR level 4 libraries presented in Table 5.21 was extended to include the ERS Economic Typology in Table A.5, below. As expected, the median per capita operating income of Southeastern public libraries in counties without an economic specialization and those counties dependent on manufacturing, mining, federal and state government, and recreation were among the lowest of all regions and economic types. The median per capita operating income of Southwestern libraries located in counties dependent on manufacturing, mining, and recreation were also among the lowest of all regions and economic types. As expected due to revenue from state and federal government sources, the libraries in the Far West region had the highest median per capita income in all nonspecialized counties and those counties dependent on farming, mining, federal/state government, and manufacturing. The twenty-two (22) Far West libraries had the second highest median per capita operating income among the libraries located in counties that were economically dependent on recreation ($155.11; reduced to $139.45 when the Alaska E-Rate subsidy was removed). The smallest median percentages of foreign born residents were found in the Southeastern nonspecialized counties (.5%) and those economically dependent on mining (.5%), recreation (.3%), and manufacturing (.1%).

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The highest overall poverty rates were found in the Southeastern counties economically dependent on federal/state government (36.2%), manufacturing (33.7% in one county), and mining (29.6%). Plains counties economically dependent on federal/state government followed closely with a 29.4% median poverty rate. Plains and Southeastern counties economically dependent on federal/state government were second and third highest in the median percentage of children living in deep poverty (29.1% and 20.3%, respectively). Far West counties dependent on manufacturing had the lowest overall median poverty rate (9.9%). At 3.7% and 3.8%, respectively, the Plains counties dependent on manufacturing and the Far West counties economically dependent on recreation had the lowest percentages of children living in deep poverty.

The median unemployment rate was highest in economically nonspecialized Far West counties (18.7%), the Southeastern county dependent on manufacturing (17.4%), and the Far West (15.1%) and Great Lakes (12%) counties economically dependent on federal/state government. The lowest unemployment rates were in the Plains counties dependent on mining (2.7%); the Plains (3.1%) and Rocky Mountain (3.4%) counties dependent on farming; and the Southwest counties dependent on mining (3.5%).

The highest median percentages of veterans were found in Southwest counties specializing in manufacturing (17.1%), economically nonspecialized Rocky Mountain counties (16.9%), and Rocky Mountain counties dependent on federal/state government (16%). In contrast, the lowest median percentages of veterans were found in Southeastern counties dependent on mining (5.2%), manufacturing (one county with 5.8% veterans), and federal/state government (6.8%).

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The median per capita numbers of general practice physicians were highest in New England (1.26 per thousand) and Plains (.96 per thousand) counties economically dependent on recreation, followed by New England counties dependent on manufacturing (.94 per thousand). The median per capita numbers of advanced practitioner RNs were highest in the Far West counties economically dependent on farming (1.45 per thousand), federal/state government (1.44 per thousand). Of note, the median per capita numbers of physicians were equal to zero in those counties. The median per capita numbers of general practice physicians were also equal to zero in the Far West counties dependent on farming; Far West, Mideast, and Southwest counties dependent on federal/state government; and Southwest counties dependent on recreation. The median per capita numbers of advanced practitioner RNs were lowest in Southwest counties dependent on farming (.38 per thousand) and Southwest counties dependent on mining (.3 per thousand).

Economic Typology, RUCC 8 and 9, RUCA 10, and FAR Level 4 Within Regions

As before, rural library assets varied within regions. For example, a Southwestern nonprofit library located in a Texas county dependent on manufacturing with a service area of 9,539 persons had the lowest overall per capita operating income of $5.87 ($2.10 from local taxes and $3.77 from other income sources). The second lowest per capita operating income ($10.88) was a Mideast Pennsylvania library reported as having an "other" governance structure located in a county that was economically dependent on federal/state government. The library belonged to a multi-county library district and, aligned with its county's economic dependence on government sources, the library received 43% of its total revenue from state government. A Southeast library in an

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Alabama county economically dependent on manufacturing had the third lowest per capita income ($13.05). The four (4) Plains libraries located in counties economically dependent on federal/state government had the fourth lowest per capita income ($13.27). One of those libraries was a Native American Plains library located in South Dakota that had the highest per capita income of the four libraries ($28.28), but its service area was located in a county with 30% of the children living in deep poverty, an overall poverty rate of 47%, and an 8.7% unemployment rate. A New England nonprofit library in Maine had the highest per capita operating income overall ($652.25) as well as the highest per capita income among the libraries that served counties economically dependent on recreation. That library had a service area size of 68 persons and received $500 in local revenue. However, the library received $39,940 in "other" revenue, including revenue from summer visitor membership fees (see Ashley, 2008, para. 12). Other examples of variation within regions include the eight (8) Far West Alaskan libraries located in counties that were economically dependent on manufacturing with the highest median percentage of foreign born residents (35.3%), and an Alabama county library with two branches serving 11,431 persons in a Southeast county economically dependent on manufacturing with the highest percentage of children living in deep poverty (34.5%), an overall poverty rate of 33.7%, and an unemployment rate of 17.4%.

Research Question Four Results Summary

In summary, data analysis related to research question four results indicated that library assets did differ by Bureau of Economic Analysis (BEA) region, and that those differences varied both between and within regions. Far West libraries generally received higher levels of per capita operating revenue from state, federal, and other

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sources, which compensated for the constraints on local revenue sources that would otherwise limit library assets. At the regional level, Southeastern, followed by Southwestern, rural libraries generally ranked lowest in median per capita assets.

The regional socioeconomic factors explored in this section did help explain regional differences in rural library assets although, as with median per capita library assets, regional socioeconomic factors varied considerably between and within regions. Both between and within regions, Southeastern and Southwestern demographics, such as high poverty percentages, did appear to explain why those regions ranked lowest in median per capita library assets. Contrastingly, contributions from state, federal, and other revenue sources sustained the assets of Alaskan Far West region rural libraries. Overall, library asset and socioeconomic differences between and within regions were demonstrably more complex when analysis was expanded to include the ERS RUCC, RUCA, FAR, and Economic Typology socioeconomic factors.

5.6 Research Question Five

Research question five asks: How did rural public library economic, cultural, and social capital assets change over time, and what are the implications of those changes on asset sustainability policies? To help answer that question, the variations in classification accuracy between the 2014 training and the 2012, 2013, and 2015 test datasets are detailed below in Table 5.24. Classification accuracy varied somewhat between the 2014 training and the 2012 and 2013 test datasets; however, variations in classification accuracy increased between the 2014 training and 2015 test datasets. That observation gave rise to the assumption that some change or combination of changes in the 2015 library asset and socioeconomic predictors would likely explain the changes in

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Table 5.24 Classification Algorithm Accuracy Comparison: Training versus Test Datasets

	2014 (N = 4,189) Training Data		2012 (N = 4,200) Test Data		2013 (N = 4,202) Test Data		2015 (N = 4,137) Test Data	
Class	**% Accuracy**	**Kappa/ ROC**	**% Accuracy**	**Kappa/ ROC**	**% Accuracy**	**Kappa/ ROC**	**% Accuracy**	**Kappa/ ROC**
Q1: Locale	**72.6188**	**0.525**	(0.5236)	(0.0099)	(0.0581)	(0.0002)	(0.8276)	(1.0347)
		0.849		(0.0080)		(0.0020)		(0.0050)
Q2: Legal Basis	**64.8365**	**0.3785**	(0.0270)	(0.0029)	0.0612	0.0005	0.6941	(0.7655)
		0.845		0.0020		0.0020		0.0000
Q3: Service Area Size	**83.9102**	**0.8015**	(0.5769)	(0.0073)	(0.4975)	(0.0063)	(6.6320)	(1.5192)
		0.974		0.0010		(0.0010)		(0.0190)
Q4: Region	**87.9685**	**0.8541**	(0.1352)	(0.0018)	(0.6529)	(0.0085)	(4.9857)	(1.6409)
		0.983		(0.0020)		(0.0020)		(0.0040)

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classification accuracy between the training and the 2015 test dataset. The validity of that assumption and the implications of those changes on asset sustainability policies are evaluated in this section.

Locale

As discussed in section 5.2, when classified by locale, rural public library asset variations were influenced by the blurring of urban and rural boundaries and by geographic region in 2014. Although the relative percentages of fringe, distant, and remote libraries remained unchanged in 2015, evidence of the continued blurring of urban and rural boundaries arose from the decreasing numbers of IMLS-designated rural libraries between 2013 and 2015 (see Table 5.25, below). The decline of 65 libraries between 2013 and 2015 included the twenty-three (23) libraries closed during the period that were omitted from the datasets due to invalid data (nine libraries closed in 2014 and fourteen closed in 2015). Some portion of the decline was attributable to survey nonresponse. For example, a net of two rural libraries serving fewer than 100 persons did not respond to the 2015 IMLS survey. However, when adjusted for the deletion of Puerto Rico, Virgin Island, and Northern Mariana Islands libraries from the 2015 Public Library Survey frame, the total number of all public libraries increased by six (6) libraries. Therefore, the largest decline in the total number of rural libraries was attributable to the NCES locale code update conducted in 2015 using Census Bureau population estimates and Topologically Integrated Geographic Encoding and Referencing (TIGER) geocoding boundaries (Geverdt, 2015, p. 7). A NCES locale code update was not included in the 2014 IMLS Public Library Survey (*IMLS*, 2016a, p. 16), but locale code updating resumed in the 2015 Survey. The 2015 locale code update resulted in a net

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loss in the numbers of IMLS-designated rural libraries and offsetting net increases in the numbers of IMLS-designated urban, suburban, and town libraries. Additional evidence of the continued blurring of rural and urban areas was provided by the net reclassification of eleven (11) remote libraries as distant and nine (9) distant libraries as fringe. Furthermore, decreases in the unduplicated service area size IQR and quartile coefficients of dispersion in each locale between 2014 and 2015 indicated that the populations served by IMLS-designated rural libraries in 2015 decreased slightly (see Table 5.27, below).

Table 5.25 Locale by Year: 2012–2015

Locale	2012	2013	2014	2015
Fringe	500	509	508	490
Distant	2,061	2,064	2,055	2,032
Remote	1,639	1,629	1,626	1,615
Total	4,200	4,202	4,189	4,137

Small median per capita increases in the two library asset predictors included in the most accurate training set locale classification algorithm, programs and operating income, may have contributed to the 2015 reduction in locale classification accuracy. Table 5.26, below contains the 2015 median per capita values for those assets as well as their increases between 2014 and 2015. As illustrated in Table 5.27, below, the 2015 increases in programs are attributable to small decreases in median unduplicated service area sizes and increases in median programs within all of the rural locales. There were small increases in median operating income in the fringe and distant locales, but median operating income decreased by $1,037 in the remote locale during 2015. That decrease was largely attributable to Alaska libraries, which no longer reported E-Rate subsidies as part of their other income in 2015. Surprisingly, when the 2014 training set was reclassified without the Alaskan E-Rate discounts, locale classification accuracy

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Table 5.26 2015 Median Per Capita Library Predictors and Select Other Assets By Locale

	Count	Programs	2015 Programs Increase	Operating Income	2015 Op. Income Increase	Hours	2015 Hours Increase (Decrease)	Other Staff	2015 Other Staff Increase (Decrease)	Terminals	2015 Terminals Increase (Decrease)
Fringe	490	0.0297	.019	$37.67	$1.72	0.4354	.0162	0.00021	(.00001)	0.0015	0.0000
Distant	2,033	0.0263	.002	$33.44	$1.33	0.6948	(.0022)	0.00013	(.00001)	0.0024	0.0000
Remote	1,614	0.0281	.022	$39.21	$1.03	1.0540	.0227	0.00008	.00000	0.0040	0.0000

Table 5.27 2014–2015 Increases (Decreases) in Median Unduplicated Service Area Size, Programs, and Operating Income

	Median			IQR			Coefficient of Dispersion		
Locale	**Service Area**	**Operating Income**	**Programs**	**Service Area**	**Operating Income**	**Programs**	**Service Area**	**Operating Income**	**Programs**
Fringe	(140.00)	$128.50	11	(258.25)	($6,833.25)	13.5	(0.0012)	0.0017	0.0188
Distant	(9.00)	$2,216.00	4	(113.00)	$5,298.75	2.0	(0.0131)	0.0045	(0.0134)
Remote	(19.00)	($1,037.00)	2.5	(178.25)	$2,078.25	8.8	(0.0131)	0.0187	(0.0102)

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increased by .19 percentage points (Kappa = .528, average ROC area = .85). Federal revenue to rural libraries also decreased in 2015. While the median per capita federal revenue to rural libraries serving fewer than 100 persons was $1.64 in 2014, there was no federal revenue contribution to those libraries in 2015.

The 2014 to 2015 changes in three other library assets are included in Table 5.26, above. Median per capita hours increased during 2015 by .016 hours in fringe libraries and by .023 hours in remote libraries while decreasing slightly by .002 hours in distant libraries. The median per capita numbers of other staff decreased minimally by .00001 in fringe and distant libraries in 2015 while remaining at .00008 in remote libraries. The median per capita numbers of terminals also remained the same between 2014 and 2015 in fringe, distant, and remote libraries (.0015, .0024, and .004, respectively).

Thirty (30) fewer bookmobiles operated in the 2015 IMLS-designated rural libraries. While some number of the bookmobiles may have been moved to urban, suburban, or town locales during geocoding, the total number of bookmobiles among all public libraries responding to the 2015 Public Library Survey decreased by 44 units in 2015. The largest reduction in rural bookmobiles was in the distant locale (21 bookmobiles), followed by the reduction of seven (7) remote bookmobiles and two (2) fringe bookmobiles.

The numbers of MLIS-degreed librarians serving rural populations decreased by 173.3 FTE in 2015. Since the numbers of MLIS-degree librarians increased by 642.8 FTE in all public libraries during 2015, the decrease in rural MLIS-degreed librarians was likely attributable to the reclassification of larger 2014 rural libraries as urban, suburban, or town libraries in 2015. The largest decrease in rural MLIS-degreed librarians was in

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distant libraries (98.44 FTE), followed by a decrease of 69.28 MLIS-degreed librarian FTE in fringe libraries and a decrease of 5.62 MLIS-degreed FTE in remote libraries.

Although the relative percentages of "rural" ERS-designated libraries remained unchanged in 2015, changes in the various ERS RUCC, RUCA, and FAR code categories between 2014 and 2015 likely contributed to the .8% decline in classification accuracy and most likely explained the 2015 decreases in median unduplicated service area size. The number of public libraries in the ERS RUCC "completely rural" categories decreased by only one (1) library in 2015. However, the number of IMLS-designated rural public libraries decreased in the ERS RUCC metro categories by 29 libraries and decreased in the ERS RUCC non-metro but urban categories by 23 libraries. Similarly, IMLS-designated rural libraries in the RUCA rural category 10 decreased by six (6) libraries in 2015 compared to a decrease of thirty-one (31) libraries in the RUCA metropolitan categories, a decrease of twelve (12) libraries in the RUCA micropolitan categories, and a decrease of three (3) libraries in the RUCA small town category. Finally, the numbers of IMLS-designated rural libraries that could be matched to FAR codes increased by nine (9) libraries in 2015, but the number of libraries that were not in a designated FAR level decreased by 46 libraries between 2014 and 2015. In comparison, the IMLS-designated rural libraries located in FAR levels 2, 3, and 4 each decreased by one (1) library and there were no changes in FAR level 1. These changes in the ERS RUCC, RUCA, and FAR codes between 2014 and 2015 indicated that a large portion of the 2015 overall decrease in the numbers of rural public libraries consisted of the most "urban" of the 2014 "rural" libraries. The 2015 decrease in the number of rural public libraries also clustered around the larger libraries. As shown in Table 5.28, below, the numbers of rural

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libraries serving fewer than 2,500 persons decreased by seven (7) libraries in 2015 compared to a decrease of 45 libraries serving larger populations.

In terms of regions, the largest decreases were in the Southeast (14 libraries), Plains (13 libraries), and Mideast (12 libraries). The only increases in the number of rural libraries were found in the Far West (2 libraries) and Southwest (1 library). The largest regional increases in median per capita operating income during 2015 were in fringe Rocky Mountain libraries ($10.41) and fringe Plains libraries ($6.52), and the largest regional decrease in median per capita operating income during 2015 was found in the remote Far West ($23.65), largely due to the removal of E-Rate subsidies from Alaskan other income. Despite that decrease, at $94.09, the remote Far West libraries remained the highest ranked in terms of median per capita operating income. Southeast fringe, distant, and remote libraries continued to rank lowest in median per capita operating income in 2015 and also ranked lowest in median per capita numbers of programs. Remote Far West libraries ranked highest in median per capita numbers of programs.

Table 5.28 2014–2015 Rural Library Service Area Size Increases (Decreases)

Service Area Size	2014 Count	2015 Count	Increase (Decrease)
Under 100	34	31	(3)
100 – 499	413	408	(5)
500 – 999	630	643	13
1,000 - 2,499	1,362	1,350	(12)
2,500 - 4,999	762	767	5
5,000 - 9,999	480	464	(16)
10,000 - 24,999	271	265	(6)
25,000 - 49,999	116	107	(9)
50,000 - 99,999	78	65	(13)
100,000 - 249,999	37	31	(6)
250,000 - 499,999	6	6	0
Total	4,189	4,137	(52)

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In summary, the 2015 NCES locale reclassifications altered the rural library landscape although the relative percentages of libraries within IMLS locale and ERS rural designations remained unchanged and library asset rankings remained largely unchanged between 2014 and 2015. Rural service area sizes decreased overall. Although decreased service area sizes contributed to generally higher median per capita operating income, the Far West remote libraries, including many of the smallest rural libraries, appeared to sustain a median per capita operating income loss of $23.65 during 2015. However, that loss was attributable to the 2015 deduction of E-Rate subsidies from Alaskan other income. While median per capita programs increased in 2015, declines in rural bookmobiles and MLIS-degreed librarians, highest in distant rural libraries, may affect programming levels in 2016 and beyond.

Legal Basis

Unexpectedly, the 2015 classification accuracy of the legal basis (library governance) class increased overall by .69%. As in the 2014 training dataset, no rural libraries organized as city/county, Native American, "other," or school districts were accurately classified. Classification accuracy decreased by approximately .1 percentage point for municipal, .2 percentage points for county, and 2.6 percentage points for multi-jurisdictional rural libraries. Contrastingly, library district classification accuracy increased by 5.9 percentage points although, with a decrease of fourteen libraries during 2015, the library district structure led all other governance structures in terms of declining numbers. The second largest decrease in the number of libraries during 2015 was in the municipal governance structure (twelve libraries), followed by a decrease of nine multi-jurisdictional libraries, eight county and eight non-profit libraries, two Native American

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libraries, and one library categorized as “other.” The city/county and school districts governance structures gained one library each in 2015.

In terms of the region and service area size predictors of the legal basis class, the highest reductions in the numbers of rural libraries during 2015 occurred in Plains municipal libraries serving between 100 and 499 persons (nine libraries), Plains municipal libraries serving between 500 and 999 persons (seven libraries), and Southeast municipal libraries serving between 50,000 and 99,999 persons (seven libraries).

While reduced by only one municipal and one non-profit library in 2015, Far West libraries serving fewer than 100 persons had substantial decreases in median per capita operating income across all governance structures due to the deletion of Alaskan E-Rate subsidies from other income in 2015. For example, the two multi-jurisdictional libraries appeared to have lost $314.90 and the Native American library appeared to have lost $1,282.07 in per capita operating income in 2015 due to the deduction of E-Rate discounts from other income in 2015. While increases and decreases between 2014 and 2015 median per capita operating income were more pronounced in the smallest Far West rural libraries, changes in median per capita operating income between 2014 and 2015 were found across all governance structures in all regions and service area sizes (see Table A.6, below). These results affirmed the earlier finding that there was not a clear demarcation between rural library governance structures in terms of economic assets and indicate that the 2015 NCES locale update altered the rural library economic landscape.

Service Area Size

The largest decrease in classification accuracy between the training and test datasets was the 6.63 percentage point decrease in service area size classification

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accuracy. As previously discussed, between 2014 and 2015, largely due to the 2015 NCES locale code update, there was a reduction in the number of IMLS-designated rural libraries serving fewer than 2,500 persons of seven libraries and a decrease of 45 libraries serving larger populations (see Table 5.28, above). The 2015 increase of thirteen (13) libraries serving between 500 and 999 persons and five (5) libraries serving between 2,500 and 4,999 persons indicated that there were population increases in the counties served by those libraries since the IMLS had last updated Public Library Survey census information in 2013. The classification accuracy of rural libraries serving between 100 and 499 persons remained at 99.8% although the category contained five fewer libraries in 2015. Contrastingly, the 500 to 999 person service area size classification accuracy rate decreased by .6% although thirteen additional libraries were added to that category, and the classification accuracy rate of the 1,000 to 2,499 person service area size decreased 4.7 percentage points after the reduction of twelve libraries in 2015.

While the "under 100" persons service area size had the smallest change between 2014 and 2015 in terms of numbers of rural libraries, it had the largest loss in classification accuracy—only fifteen of the 31 smallest libraries were correctly classified in the 2015 dataset versus a 94% classification accuracy rate for the 34 smallest libraries in the 2014 training dataset. That reduction in classification accuracy appeared likely due to the 2015 decrease of $19.11 in median per capita other income among those libraries. Furthermore, unlike prior years, the 2015 $1.26 median per capita other income of the smallest rural libraries was more closely aligned with the median per capita other income of larger libraries than with those serving fewer than 2,500 persons. That observation led to the discovery that the Alaska State Library stopped including E-Rate discounts in the

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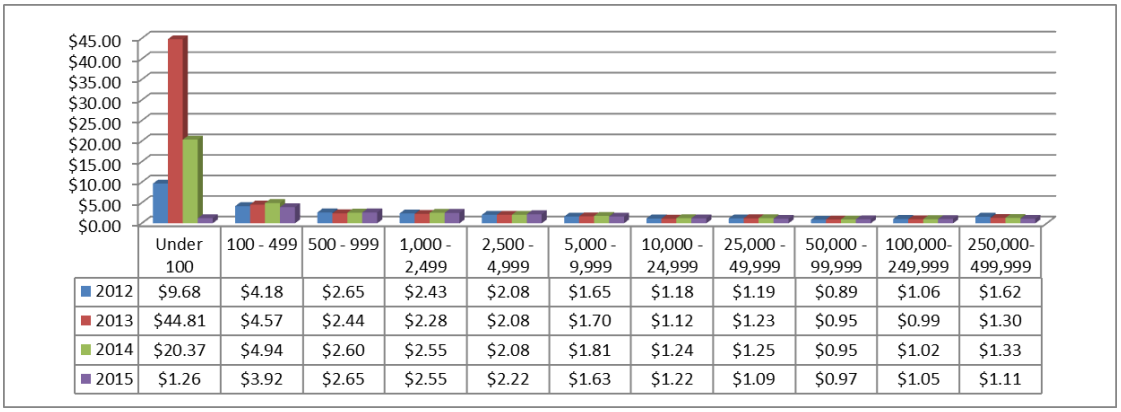
other income reported to the IMLS in 2015. Therefore, the "other income" fields for 2012, 2013, and 2014 were recalculated to remove the Alaska E-Rate discounts for comparison purposes (see Figure 5.11, below; *Alaska*, 2012; 2013; 2014; 2015). When adjusted to remove Alaskan E-Rate discounts, Far West libraries serving fewer than 100 persons had a steady, but more gradual decline in other income between 2012 and 2015. Reclassification of the 2014 training set by service area size using other income without the Alaskan E-Rate discounts had a decreased accuracy of .12 percentage points (Kappa = .8002, average ROC area = .973), which provided additional evidence that the other income field was at least partially responsible for the decline in service size area size classification accuracy between 2014 and 2015. Indeed, as shown in Table 5.28, below, the nonlinear association between increasing service area size and median per capita other income was modified somewhat by the 2015 NCES locale update and the Alaska reporting change, and the Spearman rank correlation between service area size and median per capita other income decreased in 2015 (2015 rho = -.8, 2014 rho = -.89).



	Under 100	100 - 499	500 - 999	1,000 - 2,499	2,500 - 4,999	5,000 - 9,999	10,000 - 24,999	25,000 - 49,999	50,000 - 99,999	100,000- 249,999	250,000- 499,999
2012	$9.68	$4.18	$2.65	$2.43	$2.08	$1.65	$1.18	$1.19	$0.89	$1.06	$1.62
2013	$44.81	$4.57	$2.44	$2.28	$2.08	$1.70	$1.12	$1.23	$0.95	$0.99	$1.30
2014	$20.37	$4.94	$2.60	$2.55	$2.08	$1.81	$1.24	$1.25	$0.95	$1.02	$1.33
2015	$1.26	$3.92	$2.65	$2.55	$2.22	$1.63	$1.22	$1.09	$0.97	$1.05	$1.11

Figure 5.10 2012–2015 Median Per Capita Other Income by Service Area Size

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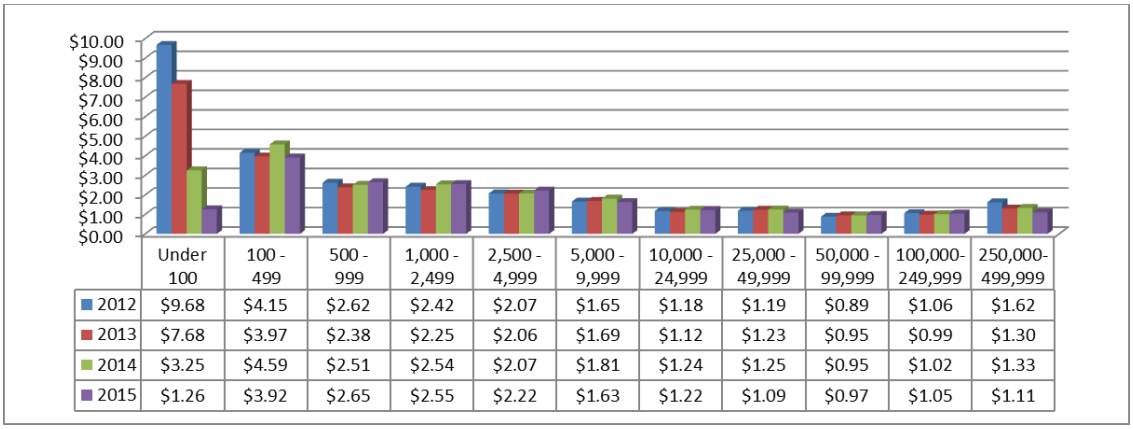

	Under 100	100 - 499	500 - 999	1,000 - 2,499	2,500 - 4,999	5,000 - 9,999	10,000 - 24,999	25,000 - 49,999	50,000 - 99,999	100,000-249,999	250,000-499,999
2012	$9.68	$4.15	$2.62	$2.42	$2.07	$1.65	$1.18	$1.19	$0.89	$1.06	$1.62
2013	$7.68	$3.97	$2.38	$2.25	$2.06	$1.69	$1.12	$1.23	$0.95	$0.99	$1.30
2014	$3.25	$4.59	$2.51	$2.54	$2.07	$1.81	$1.24	$1.25	$0.95	$1.02	$1.33
2015	$1.26	$3.92	$2.65	$2.55	$2.22	$1.63	$1.22	$1.09	$0.97	$1.05	$1.11

Figure 5.11 2012–2015 Median Per Capita Other Income by Service Area Size Adjusted for 2012-2014 Alaska Library E-Rate Other Income

As shown in Table 5.29, below, with the exception of other staff and operating income in the six largest rural libraries, median per capita library assets continued to generally decrease as service area size increased in 2015. While the numbers of non-FSCS libraries increased by only two libraries in 2015, the low staffing levels in the smallest libraries were reflected in the increased percentages of non-FSCS libraries in libraries serving fewer than 500 persons—non-FSCS libraries represented 25.8% of the "under 100" service area category (an increase of 5.2 percentage points over 2014) and 10.8% of the "100 to 499" category during 2015 (an increase of 1.8 percentage points over 2014). While there had been three non-FSCS libraries in the "10,000 to 24,999" category during 2014, there were no non-FSCS libraries in that category during 2015.

The number of bookmobiles operating in all public libraries decreased by 44 units in 2015, and 30 of those units had been operated by rural libraries in 2014. As in 2014, no bookmobiles were operated by rural libraries serving fewer than 500 persons. The highest numbers of rural bookmobiles were operated by libraries serving 10,000 to 24,999 persons (41 or 34% of the 122 rural bookmobiles operated in 2015).

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While the overall numbers of MLIS-degreed librarians in all public libraries increased by 642.8 FTE in 2015, the number of rural MLIS-degreed librarians decreased by 173.3 FTE and decreased in every rural service area size category during 2015 except for the 100 to 499, 10,000 to 24,999, and 250,000 to 499,999 categories. The largest decrease in MLIS-degreed librarians was found in the 50,000 to 99,999 category (a loss of 70.6 FTE) and the 25,000 to 49,999 category (a decrease of 61.9 FTE). Since the overall numbers of MLIS-degreed librarians increased among all libraries, some portion of the 2015 decline in rural MLIS-degreed librarians was likely due to the 2015 locale update that reassigned approximately thirty-six (36) formerly rural libraries to urban, suburban, or town locales.

Table 5.29 Select 2015 Predictors by Service Area Size

Service Area Size	Count	Median Per Capita Hours	Median Per Capita Other Staff	Median Per Capita Terminals	Median Per Capita Other Income	Median Per Capita Op. Income	Median Unemp. Rate	Median Deep Poverty Children
Under 100	31	6.2338	0.00000	0.0435	$1.26	$146.67	4.90	7.3%
100 – 499	408	2.7501	0.00000	0.0107	$3.92	$54.09	3.90	7.2%
500 – 999	643	1.6384	0.00000	0.0057	$2.65	$44.35	4.20	7.4%
1,000 - 2,499	1,350	0.9505	0.00011	0.0032	$2.55	$36.81	4.60	7.6%
2,500 - 4,999	767	0.5490	0.00017	0.0019	$2.22	$29.72	4.80	7.9%
5,000 - 9,999	464	0.3329	0.00019	0.0014	$1.63	$28.38	5.30	8.2%
10,000 - 24,999	265	0.2353	0.00018	0.0012	$1.22	$26.01	5.80	9.7%
25,000 - 49,999	107	0.2255	0.00022	0.0010	$1.09	$24.66	5.80	10.5%
50,000 - 99,999	65	0.1562	0.00020	0.0008	$0.97	$18.23	5.70	9.7%
100,000 - 249,999	31	0.1272	0.00024	0.0009	$1.05	$24.67	5.70	10.4%
250,000 - 499,999	6	0.1082	0.00033	0.0008	$1.11	$46.58	6.15	8.1%

The seventh service area size predictor, the unemployment rate, is included in Table 5.29. Comparison of the 2015 median unemployment rates to the 2014 median unemployment rates shown in Table 5.11, above, provided evidence of the continued economic recovery from the Great Recession. The largest decreases in unemployment

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rates were found in the “Under 100” and “250,000 to 499,999” categories (decreases of 1.6 and 1.2 percentage points, respectively). The unemployment rate gap between non-FSCS and FSCS libraries also changed in 2015. For example, the unemployment rate of non-FSCS libraries in the “Under 100” category was 1.1 percentages points higher than FSCS libraries in 2014, but was .3 percentage point lower than FSCS libraries in 2015. Contrastingly, the unemployment rate gap between non-FSCS and FSCS libraries in the “5,000 to 9,999” category increased by .2 percentage points in 2015.

The eighth service area size predictor, the RUCA code, reflected the 2015 redistribution of approximately 36 of the 2014 IMLS-designated rural libraries between urban, suburban, and town locales in 2015, the closure of fourteen (14) libraries, and the temporary closure of two (2) libraries. In 2015, the RUCA metro area core designation decreased by twelve (12) libraries, the metro high commuting designation decreased by 17 libraries, and the RUCA micro area core designation decrease by nine libraries. In comparison, the RUCA rural category 10 designation decreased by six (6) libraries. Therefore, it appeared that the 2015 locale redistribution generally clustered around the most “urban” of the 2014 IMLS-designated rural libraries.

In terms of the ninth service area size predictor, legal basis, among all service area sizes, the number of rural libraries organized as library districts was reduced by fourteen (14) libraries in 2015, municipal libraries were reduced by twelve (12) libraries, multi-jurisdictional libraries were reduced by nine (9) libraries, county and non-profit libraries were reduced by eight (8) libraries each, Native American libraries were reduced by two (2) libraries, and there was a reduction of one “other” library. City/county and school district libraries each increased by one library in 2015. As discussed in the 5.6 Legal

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Basis section, above, the lack of a clear demarcation between rural library governance structures in terms of economic assets continued in 2015.

Regions

The second largest decline in classification accuracy between the 2014 training and the 2015 test dataset was the approximately five (5) percentage point decline in the classification of IMLS-designated rural libraries by region. The highest reduction in classification accuracy was in the Southeast region, where accuracy decreased by 42.7 percentage points. The Southeast region also had the highest decline in numbers of rural libraries (14) in 2015 (see Table 5.30, below). The Southwest, which gained one library in 2015, had the second highest loss in classification accuracy (20%). Classification accuracy increased by 7% in the Plains region although there was a decline of thirteen (13) Plains libraries in 2015.

Table 5.30 2014–2015 Regional Increases (Decreases) in Rural Libraries

	Region							
Locale	**Far West**	**Great Lakes**	**Mideast**	**New England**	**Plains**	**Rocky Mtn.**	**Southeast**	**Southwest**
Fringe	0	3	(12)	(3)	(4)	(3)	0	1
Distant	0	(5)	(2)	1	(4)	0	(14)	1
Remote	2	(4)	2	(1)	(5)	(4)	0	(1)
Total	2	(6)	(12)	(3)	(13)	(7)	(14)	1

As illustrated in Figure 5.12, below, 2015 changes in median per capita state government income, the first of the eight regional predictors, may have contributed to the decrease in classification accuracy. However, the Southeast decrease of $0.17 in median per capita state income was not large enough to explain the 42.7 percentage point decline in classification accuracy for that region. While not large enough to explain the loss in classification accuracy, the Southeast remained the generally lowest ranked region in

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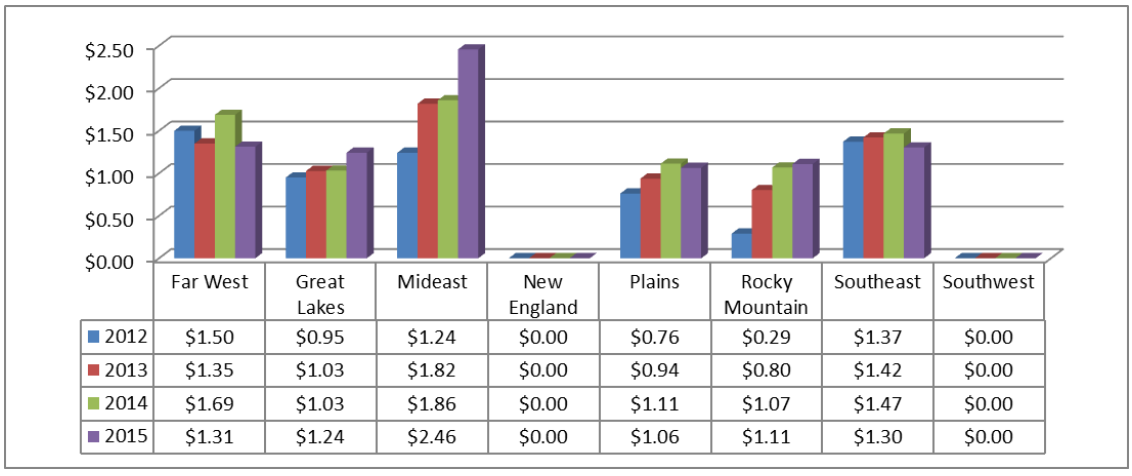
terms of library assets (see Table 5.31, below). However, within the Southeast, the six libraries serving between 100 and 499 persons had a 2015 median per capita state income increase of $1.41. The Southwest region, with a twenty (20) percentage point loss in accuracy, remained unchanged during 2015 at a zero median per capita state income. The largest 2015 decline in median per capita state revenue was found in the Far West region ($0.38). Within that region, the thirteen (13) libraries serving fewer than 100 persons had a decline in median per capita state income of $63.96 while the 36 libraries serving between 100 and 499 persons gained $4.49 in median per capita state income during 2015. It should also be noted that the Far West region libraries serving fewer than 100 persons also experienced a decline in median per capita federal income of $88.61 and Far West libraries serving between 100 and 499 persons had a decline in median per capita federal income of $15.39 in 2015. The largest 2015 increase in median per capita state revenue was found in the Mideast region ($0.60). Within that region, the largest increase in per capita state income ($11.06), was found in the one library serving between 100,000 and 249,999 persons.



	Far West	Great Lakes	Mideast	New England	Plains	Rocky Mountain	Southeast	Southwest
2012	$1.50	$0.95	$1.24	$0.00	$0.76	$0.29	$1.37	$0.00
2013	$1.35	$1.03	$1.82	$0.00	$0.94	$0.80	$1.42	$0.00
2014	$1.69	$1.03	$1.86	$0.00	$1.11	$1.07	$1.47	$0.00
2015	$1.31	$1.24	$2.46	$0.00	$1.06	$1.11	$1.30	$0.00

Figure 5.12 2012–2015 Median Per Capita State Government Income by Region

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Median per capita rural library operating income from 2012 through 2015, adjusted to remove Alaska E-Rate subsidies between 2012 and 2014, is shown by region in Figure 5.13, below. Small, but steady increases were seen in the Great Lakes, Mideast, New England, and Rocky Mountain regions. After a small increase in 2013, Far West median per capita operating income remained fairly constant during 2014 and 2015, but remained the highest ranked region in terms of median per capita operating income. Both the Southeast and Southwest regions reversed the previously increasing trend in median per capita operating income during 2015 with median per capita decreases of $1.39 and $3.11, respectively. Those declines in median per capita operating income were particularly unfortunate as both the Southeast and Southwest libraries remained the lowest ranked in terms of median per capita operating income, the Southeast was the lowest ranked in median per capita hours and terminals, and both regions ranked highest in the median percentages of residents without a diploma, poverty rates, female heads of household, and children in deep poverty (see Table 5.31, below). Within the Southeast region, the twenty-one (21) Louisiana rural libraries had the largest 2015 increase in median per capita operating income ($4.54), while the eighteen (18) rural North Carolina libraries had the largest decrease in median per capita operating income ($2.09). In the Southwest region, the 47 New Mexico rural libraries had the largest median per capita operating income increase ($4.30), and the 169 Texas rural libraries had the largest median per capita operating income decrease ($1.43).

While state revenue was the only library asset among the region classification predictors, 2015 median per capita hours, other staff, terminals, and operating income are shown by region in Table 5.31, below. As in 2014, Southeast region rural libraries ranked

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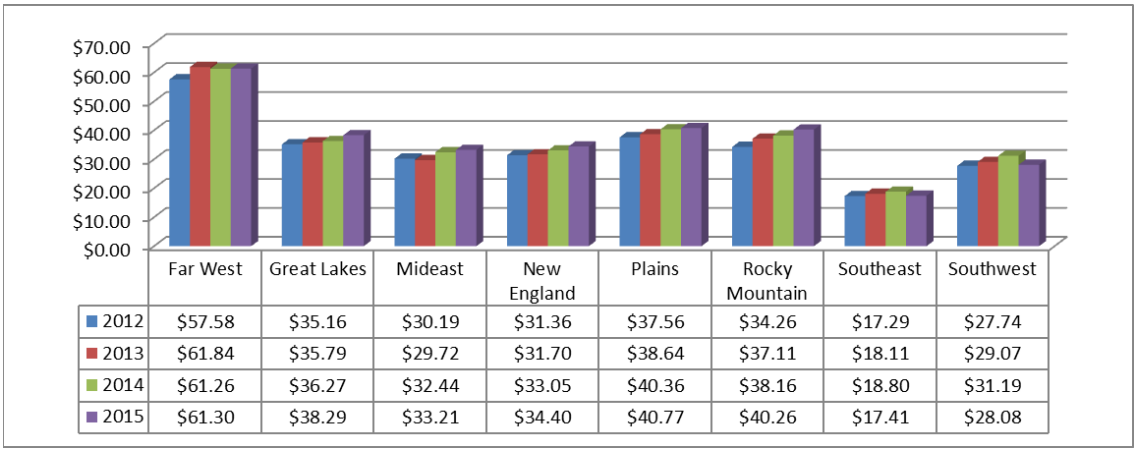

	Far West	Great Lakes	Mideast	New England	Plains	Rocky Mountain	Southeast	Southwest
2012	$57.58	$35.16	$30.19	$31.36	$37.56	$34.26	$17.29	$27.74
2013	$61.84	$35.79	$29.72	$31.70	$38.64	$37.11	$18.11	$29.07
2014	$61.26	$36.27	$32.44	$33.05	$40.36	$38.16	$18.80	$31.19
2015	$61.30	$38.29	$33.21	$34.40	$40.77	$40.26	$17.41	$28.08

Figure 5.13 2012–2015 Median Per Capita Operating Income by Region (Adjusted to Remove 2012–2014 Alaska E-Rate Subsidies)

lowest in median per capita hours and terminals. The Southwest and Plains regions had the lowest median per capita numbers of other staff. Far West region rural libraries had the highest median per capita hours and terminals.

As previously discussed, the numbers of rural bookmobiles and MLIS-degreed librarians declined in 2015 (see *Locale*, section 5.6, above). Contrastingly, while the Southeast continued to be generally ranked lowest in terms of library asset predictors in 2015, the Southeast continued to rank highest in both the numbers of rural bookmobiles (63 bookmobiles) and MLIS-degreed librarian FTEs (525.8 FTE). Within the Southeast region, Kentucky libraries continued to operate the highest number of bookmobiles (31 units). While there were no rural bookmobiles in the New England region during 2014, a Vermont rural library added a bookmobile in 2015. Whereas rural libraries in sixteen (16) states did not operate bookmobiles in 2014, rural libraries in eighteen (18) states did not operate bookmobiles in 2015 (AK, AR, CT, KS, MA, ME, MS, MT, NH, NJ, NM, OK, RI, TN, TX, WI, WV, and WY). As in 2014, within the Southeast region, rural Virginia libraries employed the largest number of MLIS-degreed librarians (98.5 FTE), followed

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closely by rural Florida libraries with 83.2 MLIS-degreed librarian FTE. During 2015, Kentucky and Alabama rural libraries employed the lowest numbers of MLIS-degreed librarians within the Southeast region (20.4 and 20.5 FTE, respectively), followed closely by the 21.8 MLIS-degreed FTE in Tennessee rural libraries, which had ranked lowest in the Southeast region during 2014. In 2014, the 63 North Dakota rural libraries employed only one (1) MLIS-degreed librarian FTE, and in 2015 the 62 North Dakota rural libraries continued to employ only one (1) MLIS-degreed FTE.

Six of the region class predictors were demographic factors, so it was expected that some portion of the 2015 decrease in regional classification would be attributable to changes in those factors (see Table 5.31, below). However, the only change in the median percentage of foreign born residents was found in the Far West region (a decrease of .3 percentage points), there were no changes in the median percent of residents without a diploma or the median percentages of home ownership, the median percentage of female heads of household increased by only .1% in the Far West and Southeast regions while decreasing by .1% in the New England region, and there was only a .1% increase in the 2015 median poverty rate in the Great Lakes region. Contrastingly, the median percentages of children living in deep poverty, defined as "having cash income below half of one's poverty threshold [or] a subsistence level of about $1,000 a month for a family of 4" (*USDA*, 2017a, Deep Poverty), increased in the Far West, Mideast, Rocky Mountain, and Southeast regions (see Figure 5.14, below). The largest increase in the median percent of children in deep poverty occurred in the Southeast region (an increase of .4%). Within the Southeast region, the largest increase in the median percent of children in deep poverty occurred in Florida (an increase of 2.4 percentage points), and

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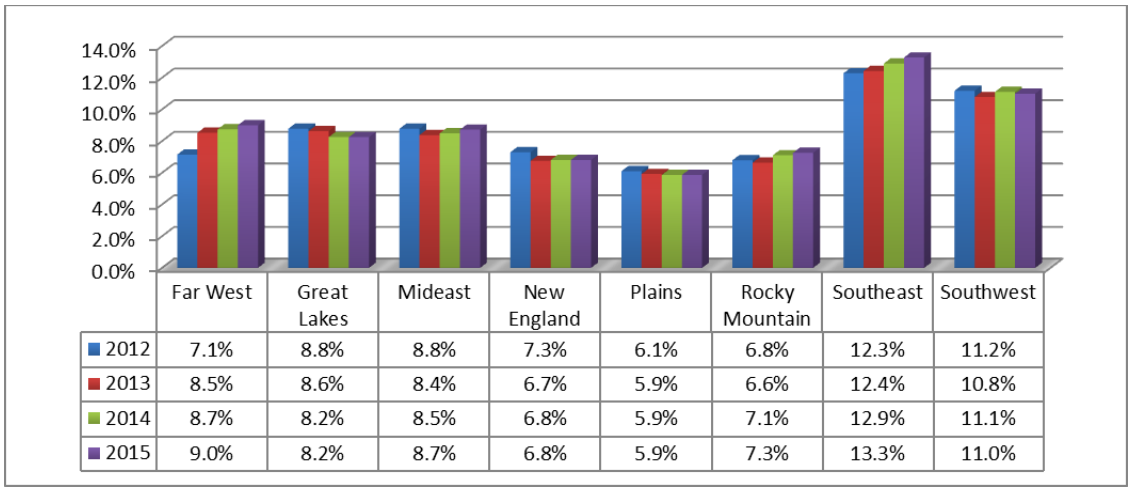
the largest decrease was in South Carolina (a decrease of 2.5 percentage points). The Far West region had the second highest increase in the median percent of children in deep poverty (.3%), which was largely attributable to the .7% increase in Alaskan counties. The largest decrease in the median percent of children living in deep poverty occurred in the Southwest, where median child deep poverty decreased by .1% in Arizona counties.



	Far West	Great Lakes	Mideast	New England	Plains	Rocky Mountain	Southeast	Southwest
2012	7.1%	8.8%	8.8%	7.3%	6.1%	6.8%	12.3%	11.2%
2013	8.5%	8.6%	8.4%	6.7%	5.9%	6.6%	12.4%	10.8%
2014	8.7%	8.2%	8.5%	6.8%	5.9%	7.1%	12.9%	11.1%
2015	9.0%	8.2%	8.7%	6.8%	5.9%	7.3%	13.3%	11.0%

Figure 5.14 2012-2015 Regional Median Percentages of Children in Deep Poverty

The median percentage of veterans, which was one of the regional classification predictors, increased by .1% in the Far West, New England, and Rocky Mountain regions during 2015. The Far West remained the region with the highest median percentage of veterans at 12.4%, followed by the Rocky Mountain region at 11.4%. At 9.5%, the Southeast region had the lowest median percentage of veterans during 2015.

While not one of the regional classification predictors, the 2015 median unemployment rate decreased in all regions as expected due to the continued recovery from the Great Recession. The largest decrease was found in the Great Lakes region (a decrease of 1.1%). The New England and Southeast regions tied for the second largest median unemployment rate decrease at .9%. The Southwest region had the lowest.

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Table 5.31 2015 Select Regional Predictors, Rural Library Assets, and Socioeconomic Factors

Region	Count	Median Per Capita Hours	Median Per Capita Other Staff	Median Per Capita Terminals	Median Per Capita Op. Income	Median % Foreign Born	Median % No Diploma	Median % Poverty	Median Unemp. Rate	Median % Female Head of Household	Median % Deep Poverty Children	Median % Veterans	Median Per Capita Physicians
Far West	169	0.9524	0.0001	0.0043	$61.30	3.9%	10.1%	16.2%	7.8%	9.7%	9.0%	12.4%	0.0007
Great Lakes	782	0.6489	0.0003	0.0022	$38.29	1.9%	11.3%	13.7%	5.4%	9.3%	8.2%	10.2%	0.0004
MidEast	417	0.6024	0.0002	0.0021	$33.21	3.6%	11.8%	14.3%	5.7%	10.8%	8.7%	10.2%	0.0005
New England	684	0.6432	0.0001	0.0020	$34.40	3.6%	8.7%	12.0%	4.4%	9.7%	6.8%	10.4%	0.0009
Plains	1,157	1.2918	0.0000	0.0049	$40.77	1.4%	9.4%	12.1%	3.6%	7.6%	5.9%	10.5%	0.0005
Rocky Mtn.	201	0.7824	0.0001	0.0035	$40.26	2.9%	9.5%	14.4%	4.1%	7.4%	7.3%	11.3%	0.0005
SouthEast	425	0.2877	0.0001	0.0014	$17.41	1.4%	20.5%	20.8%	6.7%	12.7%	13.3%	9.5%	0.0004
SouthWest	302	0.7628	0.0000	0.0032	$28.08	5.9%	16.3%	17.6%	4.7%	11.6%	11.0%	10.6%	0.0004

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decrease in the median unemployment rate (.4%), followed by the Mideast, Plains, and Rocky Mountain regions at decreases of .5%. Finally, the 2015 median unemployment rate decreased by .6% in the Far West region

There were no noteworthy changes in the eighth regional classification predictor, the USDA Economic Typology, in 2015. The 2014 percentages of the various economic types presented in Table 5.22, above, remained unchanged despite the 2015 locale code update. Additionally, there were no changes in the regional median per capita numbers of advanced practice RNs and only negligible changes in the median per capita numbers of Far West, Great Lakes, Mideast, New England, and Southwest general practice physicians.

Research Question Five Results Summary

In summary, the 2015 changes in classification accuracy were due to: (1) the resumption of NCES Locale geocoding in the 2015 Public Library Survey resulting in a decrease in the numbers of rural public libraries and reflecting the increased urbanization of IMLS-designated rural areas during the period, and (2) the Alaska State Library's decision to no longer report E-Rate subsidies as other revenue. While median per capita federal income resulted in operating income statistical outliers within the smallest Far West rural libraries in the 2014 training set, those libraries reported zero federal income in 2015. Median per capita state revenue, associated with the sustainability of the smallest libraries' services, decreased slightly in the Far West, Plains, and Southeast while increasing slightly in the Great Lakes, Mideast, and Rocky Mountain regions. The Southeast remained the generally lowest ranked region in terms of library assets and the median percentages of Southeastern children living in deep poverty increased.

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CHAPTER 6

DISCUSSION

Between 2012 and 2015, with the exception of non-librarian staff, rural public library median per capita assets did not generally decrease as distances from urban areas and urban clusters increased, and no singular rural library governance structure maintained higher overall median per capita assets than any other structure. Also with the exception of non-librarian staff, rural libraries serving the smallest service areas generally had the highest median per capita assets—a finding partially explained by statistically outlying contributions of non-local revenue to the smallest rural libraries. Rural library assets did vary by region, and regional socioeconomic factors, such as poverty indicators, did help explain those differences. Rural public library asset structures were generally maintained between 2012 and 2014. However, the decreases in classification accuracy detected in the 2015 dataset were attributable to overall reduction in the numbers of IMLS-designated rural public libraries, with the reduction clustered in the more urban and larger libraries; the Alaska State Library's decision to follow other states in excluding E-rate discounts from each library's "other" revenue field; and reductions in median per capita federal and state revenue, especially in the smallest rural libraries. Throughout analysis, the complex variability of rural public library assets was highlighted as the interactions between the service area size and region classes and the IMLS and USDA ERS designations of rurality were explored.

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Four issues affecting the sustainability or ability of rural public libraries "to respond to and adapt to disturbance or change" (Green & Haines, 2012, pp. 47–48) emerged from the results: (1) the continued blurring of rural-urban boundaries, (2) state revenue constraints, (3) volunteer services, and (4) deep child poverty in areas served by rural libraries. Those issues are discussed in sections 6.1 through 6.4. A review of study limitations is presented in section 6.5, future research is highlighted in section 6.6, and the conclusion is presented in section 6.7.

6.1 Continued Blurring of Rural-Urban Boundaries

The number of IMLS-designated rural libraries reported in the 2015 Public Library Survey, including closed or temporarily closed libraries, was 65 libraries lower than the numbers reported in 2013 (see section 5.6, above, and Table 6.1, below). Twenty-four (24) rural libraries closed during 2014 and 2015, and two libraries were temporarily closed in 2015 (the library temporarily closed in 2014 reopened in 2015). While some portion of the overall reduction in the number of rural libraries may have been due to survey non-response, the overall increase in the total number of public libraries included in the 2015 Public Library Survey indicated that approximately thirty-nine (39) formerly rural libraries were reclassified into urban, suburban, or town locales as geocodes were updated. The increased blurring of urban and rural boundaries was also reflected in the reclassification of eleven (11) formerly remote libraries as distant and nine (9) distant libraries as fringe. Confirmed by the analysis of ERS RUCC, RUCA, and FAR codes of the remaining IMLS-designated rural libraries, a majority of the 2015 overall decrease in the numbers of rural public libraries consisted of the most "urban" of the 2014 "rural" libraries. Additionally, the 2015 decrease in the number of rural public

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Table 6.1 2011 to 2012 and 2013 to 2015 Changes in the Rural Library Numbers and Median Unduplicated Service Area Population Sizes by Locale

	Number of IMLS-Designated Rural Libraries						Median Unduplicated Service Area Population Sizes					
Locale	**2011**	**2012**	**2011 to 2012 Increase (Decrease)**	**2013**	**2015**	**2013 to 2015 Increase (Decrease)**	**2011**	**2012**	**2011 to 2012 Increase (Decrease)**	**2013**	**2015**	**2013 to 2015 Increase (Decrease)**
Fringe	603	500	(103)	509	490	(19)	5,123	4,704	(420)	4,612	4,475	(138)
Distant	2,086	2,061	(25)	2,065	2,033	(32)	2,297	2,170	(127)	2,161	2,167	6
Remote	1,742	1,639	(103)	1,628	1,614	(14)	1,397	1,366	(31)	1,361	1,352	(9)
Total	4,431	4,200	(231)	4,202	4,137	(65)						

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libraries clustered around the larger libraries. Excluding closed libraries, there was a reduction of seven (7) libraries serving fewer than 2,500 persons compared to a reduction of 45 libraries serving larger populations. The decrease of 138 persons in the fringe locale's median unduplicated service area population size between 2013 and 2015 reflected the 2015 reclassification of a cluster of larger, formerly rural, libraries as urban, suburban, or town libraries (see Table 6.1).

The 2015 reclassification of formerly IMLS-designated rural libraries as urban, suburban, or town libraries, while unexpected, was not without precedent. In 2012, the United States Census Bureau updated the designations of urban areas based on the 2010 census results (US Census Bureau, 2012). The 2012 Public Library Survey was geocoded using the updated urban area list, which resulted in a reduction of 231 IMLS-defined rural libraries between 2011 and 2012 (see Table 6.1, above). Unlike 2015, both the fringe and remote locales had the largest reductions in libraries at 103 libraries each. However, libraries serving fewer than 2,500 persons comprised only 13% of the libraries that were reclassified as urban, suburban, or town libraries. Nearly half of the sixty libraries serving between 100,000 and 249,999 persons and three of the eight rural libraries serving 250,000 or more persons were reclassified in 2012. Similar to the 2015 re-designations, the fringe locale had the largest reduction in median unduplicated service area population size although the median unduplicated service area of distant and remote libraries also decreased.

When considered together, the 2012 and 2015 reductions in the numbers of IMLS-designated rural libraries suggest a trend towards smaller service areas and more remote geographic locations. The trend is likely to be confirmed when updated Public

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Library Surveys are released, and it appears that 2020 census results may further contract the numbers of IMLS-designated rural libraries. If the trend does continue, IMLS-designated rural libraries will increasingly be defined by the smallest service area sizes and the most remote ERS RUCC, RUCA, and FAR codes.

Recommendation

"Classification systems are important because they inform policy making" (Wunderlich, 2016, p. 89). Reflecting that observation, eligibility for various federal programs is determined according to the USDA ERS urban-rural designation codes. For example, rural public libraries located within RUCA codes 4 through 10 serve communities that are eligible for Rural Health Grants administered under the Federal Office of Rural Health Policy (HRSA, 2017a, n.p.), and libraries located in RUCA rural code 10 can serve local veterans by connecting them to the telemedicine and tele-video services available to veterans residing in "highly rural" census tracts (U.S. Veterans Affairs, n.d., Rural Definition). Those examples demonstrate that knowledge of the RUCA designations within their service areas will better prepare rural public libraries to partner in or lead efforts to increase local health services.

The IMLS does not currently include the various USDA ERS urban-rural designation codes in the Public Library Survey datasets. However, one of the IMLS' 2018–2022 strategic goals is to form "effective partnerships with federal leadership and nonprofit and private organizations to promote the public value of museums and libraries" (*IMLS*, 2018, p. 11). Forming a partnership with the USDA ERS to update the Public Library Survey datasets with urban-rural designations and adding those designations to the existing interactive online Public Library Survey applications would

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be an effective first step in increasing the alignment of rural libraries with the array of federal programs designed to improve the lives of rural residents. A collaborative partnership between the IMLS and USDA ERS could also lead to innovative approaches to public library research within the socioeconomic context and provide new evidence of rural library public value. Finally, a stronger collaboration between the IMLS and the USDA could lead to new federal programs capitalizing on rural library assets to increase rural community sustainability.

6.2 State Revenue Constraints

As shown in Figure 5.12, above, median per capita state revenue contributions to rural public libraries increased in the Great Lakes, Mideast, and Rocky Mountain regions in 2015. However, median per capita state revenue decreased in the Far West, Plains, and Southeast regions while remaining at zero in the New England and Southwest regions. Within the Far West region, the nine Nevada libraries, four of which served fewer than 2,500 persons, had the largest decline in state revenue—a median per capita decrease of $1.77 from $2.45 to $0.68. Median per capita state revenues also declined in Alaska by $0.06; however, the thirteen Alaskan libraries serving fewer than 100 persons received median per capita state revenue of $141.50 in 2015 versus the $205.50 median per capita state revenue received by the fifteen libraries serving fewer than 100 persons in 2014. Combined with a median per capita federal revenue reduction of $88.61 and a median per capita increase in local revenue of only $6.31, the sustainability of the smallest Alaskan libraries was threatened in 2015. Louisiana rural libraries had the largest decline in median per capita revenue in the Southeast region—a median per capita decrease of $1.41 from 2014 median per capita state revenue of $2.90. Tennessee rural libraries

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ranked lowest among all states in median per capita total operating revenue and also had median per capita state revenue equal to zero. Other states with a zero median per capita state revenue included Idaho, Maine, Minnesota, New Hampshire, South Dakota, Texas, Vermont, Washington, Wisconsin, and Wyoming.

There is evidence that state funding for public libraries continued to decline after the period covered in this study, as observed by Peet (2018, n.p.):

> State funding, however, was the revenue source hit hardest in 2017, down -5.8% from 2016. It has declined steadily since the recession of 2007–09, other than an outlier spike in 2014, but this most recent drop more than doubled FY16's net decline of -2.7%. The smallest libraries were hit hardest, with a -7.3% drop for those serving populations of less than 10,000 and a -11.9% decrease for libraries in the 10,000–24,999 range. . . . State money in the South dropped -0.8%; the West/Mountain states saw the most damage, with a -9.3% drop.

Peet also reported slight increases in revenue from donations but large reductions in grants to public libraries in 2017, with libraries serving fewer than 10,000 persons receiving "the least grant money" (2018, n.p.). While the future effects of the 2018 federal income tax reductions are uncertain, Peet expressed concern that "FY19 [state] budgets will reflect diminished federal tax receipts, which will have systemic, ongoing reverberations" (2018, n.p.). Providing an example of Peet's concerns, the Kentucky Governor's fiscal 2018 through 2020 budget proposal eliminated all state funding for public libraries although Ky. Rev. Stat. Ann. § 171.201(2) mandates state aid to public libraries. The Governor's budget threatened the sustainability of "the 20 or so small

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county systems that aren't part of a library taxing district [and] state aid is the only thing between them and serious financial hardship" (Warburton, 2018, n.p.).

There is also evidence that the revenues of the state library administrative agencies declined between 2004 and 2016. Based on a survey of all state administrative agencies, the IMLS determined that overall state administrative agency revenues "decreased by 21 percent with an accompanying reduction of 22 percent in total expenditures" between 2004 and 2016 (*IMLS*, 2017h, p. 2). Further, revenues and expenditures authorized under the Library Services Technology Act "decreased by 20 percent from 2004 to 2016" (p. 2). Although much of the decline occurred during the Great Recession, a five percent recovery in revenues and a two percent recovery in expenditures between 2012 and 2014 were negated by a five percent decline between 2014 and 2016 (p. 2).

Complicated by periodic threats to IMLS and LSTA funding at the federal level (Peet, 2018, n.p.), constraints on federal and state revenue sources for rural public libraries can be expected to continue over the foreseeable future. While those constraints affect all public libraries, as illustrated by the Alaska libraries serving fewer than 100 persons, the effects of federal and state funding constraints are magnified as service area populations become smaller and more geographically remote from urban areas.

Nine rural libraries closed in 2014. Four of those libraries served between 100 and 499 persons and three served between 500 and 999 persons. Of the fifteen rural libraries closed in 2015, one served fewer than 100 persons and eleven served between 100 and 525 persons. News reports indicate that the Dunn Center Public Library in North Dakota serving 146 persons closed due to a decline in the numbers of volunteers and visitors

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(Sailer, 2016, n.p.); the Ariton-Dot Laney Memorial Library in Dale County, Alabama, serving 759 persons closed due to funding constraints (Elofson, 2015, n.p.); and the North Bridgton Public Library in Maine serving 4,832 persons closed due to funding constraints and declining visitors (Geraghty, 2014, n.p.). While it is unclear how many of the remaining twenty-one (21) rural library closures were directly related to funding constraints, the "challenge of sustainable funding is particularly acute in libraries serving small and rural communities" (Aspen, 2014, p. 40).

When viewed from the context of constrained state, federal, and nonprofit revenue sources, the continued sustainability of the smallest rural libraries looks bleak. However, from the context of the "glass half full" Kretzmann-McKnight ABCD approach (Kretzmann & McKnight, 1993; Scales, Street, & Cooper. 2014, pp. xv–xvi; Hildreth, 2007, pp. 8–9), even the smallest, most fiscally constrained rural public library holds economic, cultural, and social capital assets that can be invested in community initiatives to create "self-sustaining, long term community and economic development" (Aspen, 2014, p. 40). By promoting literacy, social equity, and human capital development, "Public libraries make attractive partners for local businesses and government agencies focused on rural sustainability" (Urban Libraries Council, 2010, p. i; Aspen, 2014, p. 40; see also Du, 2016, pp. 76–77; Mehra, Bishop, & Partee, 2017b, p. 245). The economic externalities generated by a rural library's proactive investment in community sustainability will, in turn, increase the likelihood of the long-term sustainability of the library's economic, cultural, and social capital assets.

The "Promoting and Enhancing the Advancement of Rural Libraries" project, conducted by the University of North Texas' College of Information and funded by the

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Robert and Ruby Priddy Charitable Trust, provides additional evidence that a rural library's proactive investment in civic engagement can increase the likely sustainability of both the community and the library. The project was designed to "empower one segment of the rural library sector [by changing the perception of rural Texas] libraries from role players to valued leaders in today's civic engagement space" (Martin, 2016, p. viii). One of the purposes of the project was "to demonstrate the value of the library" while developing community partners (p. vix). Reflecting on the lessons learned from the project in *Small Libraries, Big Impact*, Yunfei Du demonstrated that rural libraries can lead social change by promoting literacy, diversity, social justice, and equal access to information; supporting collaboration and entrepreneurship; and bridging the digital divide (Du, 2016). As Du demonstrated, library asset investments in communities can increase the likelihood of sustainability for both the community and the library.

One way that a rural library can lead in increasing community sustainability is by promoting itself as a gateway to government benefits and services. For example, even a rural library serving 53 residents in a 440 square foot building with a few public access computers can link residents to telemedicine consulting services for opioid addiction and pain management under the federal Comprehensive Addiction and Recovery Act of 2016 (National Rural Health Association, 2017, pp. 5, 7, and n. 58). In early 2018 the Presidential Interagency Task Force on Agriculture and Rural Prosperity identified:

> [T]he importance of telemedicine in enhancing [rural] access to primary care and specialty providers [and] found that improved access to mental and behavioral health care, particularly prevention, treatment and recovery

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resources, is vital to addressing the opioid crisis and other substance misuse in rural communities (*US Department of Agriculture*, 2018, n.p.).

As states struggle to fund the public health services consumed by the opioid crisis (Feeley & Hopkins, 2018, p. 248), rural libraries can provide cost-effective access to telemedicine services. Embedded in their communities and generally accepted as places of trust and safety, rural public libraries are uniquely positioned to collaborate with the public health agencies that are working to solve the opioid crisis.

Rural libraries can also support broader community health care initiatives. Spetz, Skillman, and Andrilla (2017) report that "up to 75% of rural primary care services" could be provided by nurse practitioners and physicians assistants, who "are more likely than physicians to serve as providers of care for patients enrolled in Medicaid or paying for care out-of-pocket, particularly in rural areas" (p. 228). As rural travel nursing continues to increase (see, e.g., Rogers, 2017, n.p.), public libraries can promote traveling health services within the community and increase access to those services by providing a "home base" for the delivery of travel nursing services to rural residents. Investing library assets in the provision of telemedicine and traveling nurse services benefits the community and increases the community's return on investment in the library.

Beyond rural health care services, a wide variety of government services and benefits are accessed remotely through rural public libraries. There is evidence that access to online, remote self-help government services and benefits through public library terminals generates administrative savings (Deloitte, 2015, p. 1, Australian study), and Mehra, Bishop, and Partee affirm that public libraries are a "low cost national information service and resource infrastructure" (2017b, p. 245). A cost-benefit analysis

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of libraries in their role as access providers to remote government services and benefits would likely reveal that state and federal revenue contributions to rural libraries yield positive returns on investment.

Recommendation

Acknowledging that there is no single solution to the issue of rural library sustainability in an era of declining revenues, the IMLS, national and state library associations, and library schools can promote the value of rural public libraries in effecting positive social changes in their communities and their value as cost effective gateways to government benefits and services. The ALA Libraries Transform Campaign at http://www.ilovelibraries.org/librariestransform/ is one example of the type of outcomes-based messaging that is well-suited for demonstrating libraries' value to their communities. New quantitative and mixed-method research is needed to conduct a cost-benefit analysis of public libraries as gateways to government services and benefits. IMLS funding for that research is consistent with its strategic goal to "Design IMLS grants and awards to encourage communities to invest resources, funding, and other support for museums and libraries" (*IMLS*, 2018, p. 11).

6.3 Volunteer Services

As discussed in Section 5.4, nearly 3% of the 4,189 rural libraries reported that they did not have any paid staff in 2014. Ninety-eight (98) percent of the libraries reporting zero paid staff were clustered among those libraries serving fewer than 2,500 persons, and 17.6% of the rural libraries serving fewer than 100 persons reported zero paid staff (see Table 5.12). Furthermore, while median total staff levels generally increased as service area size increased, median per capita total staff levels generally

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decreased as service area size increased. While reporting errors may exist, there is evidence suggesting that volunteers substituted for paid staff in the libraries reporting no paid staff and supplemented low levels of paid staff in many other rural libraries. For example, as previously mentioned, a median of nine volunteers substituted for paid staff in the six Alaska rural libraries that report zero paid staff in 2014 (Alaska, 2014).

As noted by Nicol and Johnson (2008, p. 154), "Volunteers have experienced a long and fruitful tenure serving American libraries. Their roles and responsibilities have been as diverse as the volunteers themselves." In her study of rural and small libraries, Hughes (2017) found that "Sixty-nine percent of rural libraries indicated that they used [aged 65 and older] adults as volunteers" in a variety of capacities, including helping with children's programming and after school programs (p. 46). Hughes concluded that "In some rural libraries, older adult volunteers enabled the libraries to function and often augmented the work of the single paid employee" (p. 46). In a recent economic benefit study of Texas public libraries, Jarrett (2017, p. 16) determined that all but fifteen Texas libraries utilized volunteers and that ten libraries were staffed only with volunteers. He concluded that:

> Volunteers in [Texas] libraries provided their communities with $20 million worth of services ($20,159,826) in FY2015. The vast majority of public libraries in Texas supplement their full- and part-time staffs with volunteers to provide services. In FY2015, more than 1.1 million hours (1,128,138 hours) were donated to Texas' public libraries, providing the volunteers with professional experience and the community with additional services (p. 16).

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Several state libraries also report volunteers substituting for or supplementing paid staff. For example, the Idaho Commission for Libraries (2016) public library statistics for fiscal year 2015 revealed a median of seven (7) volunteers among the thirty-three (33) libraries serving fewer than 2,500 persons (with eight volunteers in the only Idaho library serving fewer than 100 persons), a median of fifteen (15) volunteers within the nine (9) libraries servings 2,500 to 4,999 persons, a median of twenty-seven (27) volunteers within the ten (10) libraries serving 5,000 to 9,999 persons, and a median of 61 volunteers within the eleven (11) libraries serving 10,000 to 24,999 persons. Similar reports of volunteers substituting for or supplementing paid library staff can be found in the 2015 Nebraska Library Commission (2016) statistical report. The Kansas State Library (2016) public library statistics for 2015 indicated that volunteers were used by 78% of Kansas libraries. Clearly, a large number of public libraries welcome volunteers to supplement paid staff, and the smallest public libraries likely welcome volunteers to substitute for paid staff. Those volunteers increase the public value of rural libraries as they facilitate access to information and government services and benefits, offer their skills and knowledge to benefit the community, and represent the library in community engagement initiatives.

The use of volunteers to substitute for paid staff is controversial. A recent study of "community-managed" volunteer libraries in England failed to reach a definitive answer to the question of whether or not those libraries were "effective" in terms of thirty criteria, including visits, active borrowers, financial stability, analog and electronic collections, hours, and range of services (Cavanagh, 2017, pp. 226, 231). Instead, the researcher found a diversity of services, service quality, and service sustainability;

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concluded that some volunteer libraries were effective while some were not (p. 234); and recommended "greater access to professional advice if standards are to be embraced and embedded" (p. 226). Rimes, Nesbit, Christensen, and Brudney (2017) conducted a case study of a large urban southeastern public library that had recently reduced its staff by 35%, closed two branches and reduced hours at other branches, and doubled its volunteers from 250 to 500. The researchers focused on interactions between paid staff and volunteers, including the issue highlighted by earlier authors that "the expectations of paid staff that certain aspects of their job are not appropriate for volunteers, and that the use of volunteers in these roles can undermine professional standards and represent a threat to confidentiality" (p. 197). While commenting on the importance of devoting appropriate resources to volunteer management, the researchers observed that:

> Volunteers can offer insight and a fresh perspective on many organizational activities and are an important stakeholder in the work of an organization. Within library systems, volunteers are typically also patrons and may be able to offer staff an accessible means of understanding and responding to patrons' opinions and complaints" (p. 207).

Nicol and Johnson (2008) also comment that library volunteers "are often seen as more accessible than [librarian] experts" (p. 160).

Volunteers and Social Capital

Participation in voluntary associations has "the unique ability . . . to generate social capital [leading to] networks of interaction and communication serving all manner of additional useful purposes" (Lohmann, 2005, p. 98; see also Vårheim, 2009, p. 374).

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In terms of social capital, by providing "an essential connection to the community," public library volunteer programs help the community to become "intimately aware of their library's needs and goals" (Nicol & Johnson, 2008, p. 160). Library volunteer programs also build social capital by expanding the "move toward practice based on users' needs and the importance of community networking" (p. 154).

While Vårheim (2009, p. 374) cautioned that voluntary associations generate social capital among their members due to self-selection by persons already exhibiting high levels of social capital, Putnam (2000) considered volunteering to be "a central measure of social capital" (p. 116) and observed that "formal volunteering [is] more common in small towns than in big cities" (Putnam, 200, p. 119). The all-volunteer Whale Pass Community Library in Whale Pass, Alaska, serves a core community of thirty-nine persons. The library's history demonstrates the interaction of social capital and community development. After the library met the Alaska State Library requirements in 2004, community volunteers renovated a 1,500 square foot former school building centrally located across from the boat harbor for the library. Since 2005, the building "has undergone many upgrades, and the library, still staffed by volunteers, is a hive of activity providing books, DVDs, internet, computer use, children's programs, and other activities" (Whale Pass, 2015, pp. 40-41). The library building served as the community hub for planning Whale Pass' application for incorporation, and the library services were prominently featured in the formal incorporation application (pp. 40–41). When the application for incorporation was granted in 2016, the Local Boundary Commission issued the following comment in their Decision:

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> [The Commissioners] also noted the history of the volunteer-run library and the community association as evidence of organization capacity in Whale Pass which they find important in governance of a second class city (Local Boundary Commission, 2016, p. 3).

Based on the Commissioners' comments, the all-volunteer Whale Pass Community Library appears to be an effective community anchor institution that both builds and expends social capital for useful purposes.

Recommendation

The IMLS does not report public library volunteers or require state libraries to collect that information; therefore, the annual statistical reports accessible on many state library websites omit volunteer information (see, e.g., *Massachusetts*, n.d.; *New Mexico*, 2018). Additionally, there is not a standard reporting format for those state libraries that do report at least some volunteer information. For example, the Kansas State Library (2016) only indicates whether or not a library has volunteers; whereas, as described above, the Alaska State Library as well as the Idaho and Nebraska Library Commissions report both the number of volunteers and the number of volunteer hours. Jarrett (2017) conflates volunteer and trustee hours and it is unclear whether trustee hours are included in the report of Nebraska volunteer hours. Jarrett also highlights another issue surrounding the study of volunteer effectiveness in public libraries:

> Because detailed information about the types of services provided and donated by volunteers in Texas' public libraries are unavailable, one must make assumptions. Volunteers provide a range of services from unskilled labor to specialized assistance, and volunteers have all types of skills and

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> experiences. However, we do not know what proportions of volunteers possess and contribute different skills (p. 17).

In response to those issues, the IMLS should consider collecting information about volunteer numbers, hours, and services as part of its "Measures That Matter Project" with the Chief Officers of State Library Agencies (see https://www.imls.gov/news-events/news-releases/imls-and-cosla-announce-project-develop-public-library-data-and-outcomes). Alternatively, the IMLS could conduct periodic surveys to develop a comprehensive view of volunteers' roles in public libraries. That knowledge will provide new evidence of both rural library community engagement and public value.

6.4 Deep Child Poverty in Areas Served By Rural Libraries

As discussed in section 5.6 and detailed in Figure 5.14, above, the median percentages of children living in deep poverty, defined as "having cash income below half of one's poverty threshold [or] a subsistence level of about $1,000 a month for a family of 4" (*USDA*, 2017a, Deep Poverty), increased in the Far West, Mideast, Rocky Mountain, and Southeast regions during 2015. Furthermore, seven percent (7%) of the 1,659 counties served by IMLS-designated rural libraries in 2015 were identified as persistent child poverty counties. Persistent child poverty counties have maintained "child poverty rates of 20 percent or more over the last 30 years (measured by the 1980, 1990 and 2000 decennial censuses and 2007-11 American Community Survey 5-year estimates)" (*USDA*, 2017i, Persistent Child Poverty):

> Persistent poverty tends to be a rural county phenomenon that is often tied to physical isolation, exploitation of resources, limited assets and economic opportunities, and an overall lack of human and social capital.

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> Persistent poverty among children is of particular concern as the cumulative effect of being poor may lead to especially negative outcomes and limited opportunities that carry through to adulthood.

Table A.7, below, contains the counties served by rural libraries in 2015 where the child deep poverty rate exceeded twenty percent. While the largest increase in the median percent of children in deep poverty occurred in the Southeast region, as shown in the table, high percentages of children living in deep poverty could be found in all regions. Eighty percent (80%) of the 80 counties served by rural libraries where deep child poverty rates exceeded twenty percent were also persistent child poverty counties. The overall child poverty rate per county was higher than the deep child poverty rate in all but eight (8) of the 80 persistent child poverty counties. The ethnicity of children living in deep poverty varied by region and county, and the problems of deep child poverty and persistent child poverty crossed racial groups. Not shown in Table A.7, but revealed during data analysis, deep child poverty and persistent child poverty were found across USDA ERS RUCA, FAR, and economic typology codes.

Rural public libraries, the broader public library community, nonprofit organizations, and government agencies do invest their assets in alleviating persistent child poverty as they design programs and form collaborations to generate positive social change. For example, rural and non-rural public libraries, non-profit organizations, and library schools invest their economic, cultural, and social capital assets in programs specifically designed to combat childhood illiteracy. Some of those programs are described below:

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    - The Pilcrow Foundation continues the national work of The Libri Foundation to "provide new, quality, hardcover children's books to rural public libraries." The Foundation's Children's Book Project "ensures an opportunity for active engagement within the community and lifelong learning" by asking the library to raise one-third of the purchase costs of the new books to "build community investment in children's literacy and the library's future" (The Pilcrow Foundation, n.d., n.p.).
    - The Children's Literacy Foundation provides grants to rural libraries in New Hampshire and Vermont to "create excitement around reading, increase circulation, and strengthen their relationships with their communities" (Children's Literacy Foundation, 2017).
- The Book Buddies program was developed by the Harris County Public Library in Texas to increase child literacy. Facilitated by the children's librarian, the program matches K-3 children with adult volunteers trained in "best practices around book selection, reading aloud, building excitement about reading, encouraging reflection of the text, and supporting a child who is reading aloud" (Hunt & Takashima, 2017, p. 10).
    - The Ready to Read Alaska initiative is a partnership between the Anchorage Public Library and the Alaska State Library that is supported by the IMLS through a Library Services and Technology Act. The initiative's mission is "to promote early literacy

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development in Alaska's pre-kindergarten children" by advocating for early literacy and loaning free reading kits specifically designed for babies and toddlers to individuals and organizations, including libraries, that may otherwise lack adequate age-appropriate collections due to their expense (Ready to Read Alaska, n.d., n.p.).

- The Play & Read project "was designed as a family-focused early literacy empowerment program led by AmeriCorps volunteers based in public libraries in [Wisconsin] counties with high poverty rates" (Parrish & Schmidt, 2017, p. 30). The pilot program was funded by a $415,000 grant from the Wisconsin State Library and Education Agency, managed by two consultants at the Wisconsin Department of Public Instruction, and coordinated by a graduate student at the University of Wisconsin-Madison School of Library and Information Studies (p. 30). During the pilot, nineteen AmeriCorps members working with seven southern Wisconsin public libraries "built on children's preexisting literacies by facilitating play groups for three and four year olds [that] included shared reading, writing, and intentional vocabulary development" during weekly programs (p. 30). Families participated in periodic "literacy check-ins" with the AmeriCorps members and literacy assessments were administered (p. 30). The project was designed with intent of developing a "structure that could be supported with or without grant funds as well as be replicable in other parts of the state," and lessons learned from the

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pilot indicated that "committing staff time to training volunteers, identifying library non-user populations, and allocating time and resources to community outreach yields rich results" (p. 32).

- The School of Library and Information Science at the University of South Carolina supports the Children, Libraries and Literacy statewide initiative to reduce illiteracy in South Carolina (*School*, n.d., n.p.). An important component of that initiative is Cocky's Reading Express,™ the literacy outreach program serving "students in 4K through second grade because research shows that if children acquire strong reading skills and a love of reading by the end of second grade they are more likely to succeed academically and graduate on time" (*College*, n.d., n.p.). University students travel with Cocky, the school mascot, to visit and read to children in under-served areas across the state. At the end of the program, each child receives a book to take home.
- The California Placerville Library's Early Literacy on the Move program, funded by a $48,000 grant from First5 El Dorado, is an early literacy outreach project that sends childhood literacy specialists to sing and read with children in small, rural day care centers (EdSource, 2015, n.p.).

Although only the Pilcrow Foundation's Children's Book project was national in scope, many of the other child literacy programs described above could be implemented on a national basis given sufficient sustainable funding.

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One national program designed to combat child poverty is the USDA's national Summer Food Service Program (https://www.fns.usda.gov/sfsp/summer-food-service-program). Recognizing that "To be well read . . . You must be well fed" (Texas State Library and Archives Commission, 2017, n.p.), many public libraries participate in the USDA program (see, e.g., California Library Association, 2017; Saint Louis, 2017).

Long-term solutions to persistent poverty are achievable. The World Bank works towards long-term solutions to persistent poverty through social policy emphasizing asset accumulation and asset sustainability. Assets are accumulated and sustained through the exercise of agency—the empowerment "to act to reproduce, challenge, or change the rules [or structures] that govern the control, use, and transformation of resources" (Moser, 2008, pp. 57, 59). Rural public libraries are leaders in developing agency within their communities through literacy programs, employment skills training, health information services, and small business information services, among other community engagement activities. By empowering community development through their services and leadership, rural public libraries are working to decrease persistent poverty.

Recommendation

Public libraries work to decrease child poverty as they conduct literacy, employment, healthcare, and other programs that improve the quality of life in their communities. However, achieving long-lasting decreases in child poverty rates is a complex task that would benefit from national leadership. Operationalizing its five-year *Transforming Communities* strategic plan (*IMLS*, 2018), the IMLS could lead a coalition of state administrative libraries, national and state library associations, library schools, individual libraries, nonprofit organizations, and government partners in building

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nationally organized, fiscally sustainable programs supporting public libraries in their role as community leaders working to achieve measurable decreases in child poverty rates.

6.5 Study Limitations

As she considered the limitations of her study of rural and small town library management challenges, Rachel Fischer (2015, p. 370) concluded that:

> This report on the survey could not fully capture the depth of the challenges and solutions that the librarians wrote about. Quantitative studies do not yield enough data to fully understand how to solve managerial problems.

Reflecting Fischer's concerns, the data used in this study cannot reveal the age or quality of collections; age, capacity, or speed of public access terminals and Internet connections; or the experience and expertise of library staff, among other qualitative factors contributing to library effectiveness. Acknowledging those limitations, this study is intended to complement, rather than replace, qualitative or mixed-method studies of rural library assets and their mobilization to improve the quality of life in their communities. This study can be useful to qualitative researchers by providing new insights into rural library asset strengths and weaknesses within the broader socioeconomic landscape; suggesting specific areas of further study, such as the effectiveness of literacy programs in persistent child poverty counties; and triangulating qualitative research findings.

It is expected that the 2012 through 2015 trend in increasingly blended rural and urban landscapes will continue over time. However, future updates of the ERS urban-

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rural designations and the release of the 2020 census results may call for revisions in some conclusions drawn in this study.

There are limitations arising from the use of the data collected by third parties. For example, the time lag in the ERS FAR code file built from 2010 Census data likely explained the failure to match over one hundred rural libraries with FAR codes. Some USDA Data Atlas statistics and the 12-month reporting periods of some libraries deviated from a strict January through December schedule; however, variations in reporting schedules remained fairly constant across the 2012–2015 files. As previously discussed (see section 4.1), the IMLS variables used to operationalize rural public library assets were only available on a library-wide basis. Assets such as programs and terminals are not reported on the branch level by the IMLS; therefore, approximately 540 rural branches administered by suburban, town, or urban libraries were not included in this study. While mitigated by the fact that ninety percent of all rural libraries do not have branches (see section 5.4, above), the assets of rural branches administered by metropolitan libraries are likely subjects for future research.

Explanations of the association between individual predictors and the accuracy of the supervised classification algorithms were offered when possible. However, as noted periodically throughout Chapter 5, explanations of those associations remained incomplete where the "black box" nature of the classification algorithms obscured the associations between individual predictors and classification accuracy. The use of alternative data mining software may have provided more detailed explanations of the associations between individual predictors and prediction accuracy.

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While the IMLS maintains an online archive of prior Public Library Surveys, replication of some study results will be hindered by the removal of legacy USDA and AHRF public data files from the web. To mitigate the removal of non-IMLS public data collected over multiple years, copies of all public data files used in this study are maintained by the author.

Finally, the "raw library data" was reviewed at the state level prior to final submission and the IMLS conducted extensive editing of the Public Library Survey data (see *IMLS*, 2017d, p. 9), including imputation of non-response variables to decrease "the effect of non-response" (*IMLS*, 2016a, p. 16; see also *IMLS*, 2017d, pp. 8–15). Despite those data verification procedures and the data-scrubbing described in section 4.1, above, data anomalies may remain in the data. As noted by Hertz, Kusmin, Marré, and Parker (2014, p. 27), variable "precision should not be overstated" (p. 27). Careful attention to best statistical practices was intended to mitigate data anomalies, and the author accepts responsibility for any errors in interpretation or analysis.

6.6 Future Research

Based on the 2015 declines in classification algorithm accuracy, future research will begin with algorithm tests to determine whether asset patterns in more current Public Library Survey databases are best predicted by revised algorithms or whether the 2015 dataset was an anomaly. Analysis of future Public Library Survey datasets will help determine: (1) whether continued federal and state fiscal constraints negatively affect rural public library asset structures, (2) whether demographic indicators reflect continuing recovery from the Great Recession in rural areas served by public libraries, and (3) whether the blurring of urban-rural boundaries continues as expected. Future

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research will also expand the analysis of USDA ERS urban-rural designations to all public libraries and their branch locations in order to provide enhanced knowledge of public libraries within their geo-spatial landscapes. Another direction for future research is to investigate the economic, cultural, social capital, and socioeconomic factors that facilitate successful small, volunteer libraries like the Alaskan Whale Pass Community Library while, in comparison, some staffed rural libraries are much less effective in terms of per capita visits, programs, terminal use, and other outputs. A longer-term goal of future research is the cost-benefit investigation of public libraries as providers of local, state, and federal benefits and services, including an investigation of the economic multipliers that may arise from improved community health, increased employment, and decreased deep child poverty.

6.7 Conclusion

Data mining supervised classification algorithms were developed to identify information patterns in four large datasets containing IMLS Public Library Survey, USDA ERS, and AHRF health services statistics. Analysis of those patterns revealed that: (1) with the exception of non-librarian staff, rural public library median per capita assets did not generally decrease as distances from urban areas and urban clusters increased; (2) there were not clear demarcations between rural library governance structures in terms of asset structures; (3) with the exception of non-librarian staff, rural libraries serving the smallest service areas generally had the highest median per capita assets, including revenue from non-local sources; and (4) rural library asset variations between and within regions were largely explained by socioeconomic factors.

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The numbers of IMLS-designated rural libraries declined between 2011 and 2015 as geocoding updates reclassified the libraries closest to urban areas and urban clusters as urban, suburban, or town libraries. The continued blurring of rural-urban boundaries, when combined with observed decreases in state and federal revenue during 2015, decreased the likelihood of small rural library sustainability. Staffing statistics provided evidence that library volunteers substituted for paid staff in the smallest rural libraries and supplemented staffing levels in larger rural libraries. Persistent deep child poverty was found in many of the counties served by rural public libraries.

Specific recommendations were offered for facilitating rural public libraries' roles as community leaders working to increase the likelihood of community sustainability, and, as positive economic externalities emerge from that leadership, also increase the likelihood of library sustainability. Those recommendations included: (1) revised reporting of rural-urban designations to increase awareness of government programs and benefits available to the library's community, (2) increased advocacy for rural library sustainability through effective messaging of community engagement successes and cost-benefit studies of rural libraries as access providers for government benefits and services, (3) revised reporting or targeted studies to capture the public value created by rural library volunteers, and (4) the design of national, fiscally sustainable programs supporting public library leadership in measurably decreasing child poverty rates.

Rural libraries, no matter how small, invest their assets for the benefit of their communities by offering essential community services (*FEMA*, 2010, p. 2). Their public value is demonstrated as they offer literacy programs, provide remote access to government services and benefits, host community meetings, provide business

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development information, and conduct a variety of other community engagement activities. By leading positive community change, even the smallest rural library can help ensure its own sustainability as economic externalities arise from the investment of library assets in community development initiatives. Embedded in their communities and investing their assets for the benefit of the community, the public value created by rural libraries benefits the current and future generations of the people that they serve.

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APPENDIX A

SUPPLEMENTARY TABLES

Table A.1 2014 Rural Public Library Median Per Capita Assets by Service Area Size, Region, and Legal Basis Sorted by Operating Income (Displaying the Forty Highest and Forty Lowest Median Per Capita Operating Incomes)

Service Area Size	Region	Legal Basis	Programs	Op. Income	Outlets	Hours	Non-MLIS Librarians	Other Staff	Term-inals	Collec-tion
Under 100	Far West	Native Am.	1.4717	$1,615.92	0.0189	11.3208	0.0000	0.0094	0.1321	584
Under 100	Far West	Municipal	0.5696	$1,000.00	0.0127	9.7067	0.0032	0.0000	0.0723	67
Under 100	Far West	Multi-juris.	1.0870	$921.59	0.0114	7.6760	0.0096	0.0019	0.1271	73
Under 100	Far West	Non-profit	0.5213	$870.01	0.0123	11.2967	0.0000	0.0019	0.0674	123
1000-2499	Southwest	Other	0.0466	$597.80	0.0010	2.5999	0.0015	0.0030	0.0055	16
100-499	Great Lakes	Non-profit	0.2437	$546.28	0.0051	7.3604	0.0027	0.0029	0.0102	44
Under 100	Southwest	Non-profit	1.9581	$431.82	0.0114	11.4697	0.0027	0.0032	0.0557	139
100-499	Far West	Native Am.	0.1441	$345.68	0.0043	6.5020	0.0015	0.0003	0.0171	23
Under 100	Rocky Mountains	Library Dist.	0.0805	$227.01	0.0115	11.3563	0.0057	0.0011	0.0460	118
100-499	Rocky Mountains	Library Dist.	0.0094	$221.71	0.0065	11.2154	0.0016	0.0006	0.0309	54
500-999	Far West	County	0.0796	$204.66	0.0035	3.8182	0.0016	0.0007	0.0096	26
100-499	Far West	Municipal	0.1548	$181.91	0.0034	2.5043	0.0011	0.0000	0.0145	38
5000-9999	Far West	Multi-juris.	0.0360	$163.03	0.0011	0.9181	0.0000	0.0011	0.0049	12

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Service Area Size	Region	Legal Basis	Programs	Op. Income	Outlets	Hours	Non-MLIS Librarians	Other Staff	Term-inals	Collec-tion
1000-2499	Great Lakes	Non-profit	0.1007	$155.81	0.0008	1.5365	0.0002	0.0014	0.0023	84
100-499	Southwest	County	1.3965	$146.19	0.0035	3.5368	0.0018	0.0018	0.0105	78
1000-2499	Far West	Library Dist.	0.0992	$145.51	0.0005	0.9402	0.0005	0.0009	0.0038	30
1000-2499	Far West	County	0.1552	$136.23	0.0003	0.8689	0.0007	0.0006	0.0033	17
100-499	Southwest	Non-profit	0.2122	$136.17	0.0024	4.6369	0.0000	0.0000	0.0127	52
100-499	Southwest	Native Am.	0.3075	$133.63	0.0048	8.0063	0.0047	0.0036	0.0269	8
100-499	Far West	Non-profit	0.1551	$133.01	0.0043	4.1747	0.0002	0.0002	0.0131	49
500-999	Great Lakes	School Dist.	0.0457	$130.45	0.0014	1.4404	0.0014	0.0024	0.0083	22
5000-9999	Mideast	Multi-juris.	0.0651	$125.71	0.0001	0.3544	0.0000	0.0007	0.0042	13
1000-2499	Far West	Multi-juris.	0.0191	$119.18	0.0002	0.7093	0.0000	0.0007	0.0025	20
100-499	Far West	Library Dist.	0.0920	$118.86	0.0047	3.6485	0.0021	0.0009	0.0142	104
1000-2499	Mideast	Native Am.	0.0106	$118.84	0.0004	0.8577	0.0016	0.0003	0.0044	13
Under 100	New England	Non-profit	0.2308	$116.92	0.0161	14.3226	0.0031	0.0000	0.0323	132
100-499	Southwest	Municipal	0.0355	$111.65	0.0035	5.1381	0.0021	0.0000	0.0143	32
100-499	Great Lakes	Municipal	0.0346	$110.64	0.0028	3.3145	0.0013	0.0004	0.0090	39
Under 100	New England	Municipal	0.0379	$107.28	0.0142	4.6485	0.0015	0.0011	0.0227	210
1000-2499	Great Lakes	Non-profit	0.0610	$106.72	0.0005	1.4022	0.0007	0.0012	0.0028	82
500-999	Southwest	City/County	0.2259	$105.42	0.0012	2.6492	0.0012	0.0008	0.0155	31
100-499	Mideast	Non-profit	0.1011	$101.63	0.0029	2.6819	0.0012	0.0000	0.0106	40
25000-49999	Mideast	Library Dist.	0.0193	$97.47	0.0000	0.0941	0.0002	0.0009	0.0010	6
500-999	Southwest	Native Am.	0.0630	$93.51	0.0014	2.9523	0.0009	0.0004	0.0138	15
500-999	Southwest	County	0.0186	$90.19	0.0012	2.0137	0.0010	0.0003	0.0046	27
100-499	Far West	School Dist.	0.1431	$89.78	0.0025	1.5760	0.0012	0.0002	0.0178	102

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Service Area Size	Region	Legal Basis	Programs	Op. Income	Outlets	Hours	Non-MLIS Librarians	Other Staff	Term-inals	Collec-tion
1000-2499	Southwest	Multi-juris.	0.1292	$89.12	0.0006	1.3114	0.0005	0.0002	0.0093	12
5000-9999	Far West	Library Dist.	0.0351	$88.29	0.0002	0.4523	0.0001	0.0003	0.0026	13
500-999	Far West	Native Am.	0.3785	$87.94	0.0015	0.7154	0.0003	0.0000	0.0045	22
500-999	Mideast	Municipal	0.1157	$87.07	0.0013	1.7198	0.0007	0.0006	0.0081	28
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25000-49999	Southeast	Multi-juris.	0.0056	$16.44	0.0001	0.2421	0.0000	0.0002	0.0009	3
10000-24999	Great Lakes	Multi-juris.	0.0121	$16.44	0.0001	0.2049	0.0000	0.0002	0.0007	15
100-499	Plains	Multi-juris.	0.0492	$16.33	0.0027	2.9945	0.0007	0.0007	0.0109	9
50000-99999	Southwest	Multi-juris.	0.0138	$16.07	0.0001	0.1433	0.0001	0.0000	0.0005	2
50000-99999	Southeast	City/County	0.0059	$15.78	0.0001	0.1163	0.0001	0.0001	0.0007	2
10000-24999	Southeast	County	0.0072	$14.80	0.0001	0.2236	0.0001	0.0002	0.0012	4
25000-49999	Mideast	Non-profit	0.0085	$14.51	0.0001	0.1256	0.0000	0.0003	0.0007	2
100000-249999	Southwest	County	0.0053	$14.38	0.0001	0.1267	0.0001	0.0000	0.0007	1
1000-2499	Southwest	Non-profit	0.0100	$13.05	0.0003	0.3884	0.0002	0.0000	0.0019	7
5000-9999	Southeast	County	0.0094	$12.84	0.0001	0.2891	0.0001	0.0002	0.0015	11
1000-2499	Southeast	Multi-juris.	0.0181	$12.73	0.0003	0.5540	0.0002	0.0001	0.0011	24
10000-24999	Southwest	County	0.0053	$12.45	0.0002	0.2745	0.0001	0.0001	0.0012	3
50000-99999	Plains	County	0.0053	$12.32	0.0001	0.1809	0.0001	0.0001	0.0002	1
1000-2499	Southeast	County	0.0006	$11.88	0.0002	0.3868	0.0002	0.0000	0.0015	18
10000-24999	Plains	Multi-juris.	0.0230	$11.86	0.0002	0.2487	0.0002	0.0000	0.0010	3
1000-2499	Southwest	Multi-juris.	0.0094	$11.82	0.0002	0.3568	0.0002	0.0001	0.0029	4
5000-9999	Southwest	City/County	0.0033	$11.11	0.0002	0.3481	0.0002	0.0001	0.0007	2
5000-9999	Southeast	Municipal	0.0069	$10.78	0.0002	0.2838	0.0001	0.0001	0.0014	9
25000-49999	Southeast	City/County	0.0072	$10.60	0.0001	0.2275	0.0001	0.0000	0.0005	3

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Service Area Size	Region	Legal Basis	Programs	Op. Income	Outlets	Hours	Non-MLIS Librarians	Other Staff	Term-inals	Collec-tion
10000-24999	Southeast	Multi-juris.	0.0020	$10.59	0.0001	0.1723	0.0001	0.0001	0.0009	3
1000-2499	Southeast	Municipal	0.0048	$10.31	0.0003	0.4388	0.0002	0.0000	0.0022	19
25000-49999	Far West	County	0.0056	$10.26	0.0002	0.2165	0.0000	0.0001	0.0007	3
10000-24999	Southeast	Municipal	0.0066	$9.63	0.0001	0.1677	0.0001	0.0001	0.0008	8
25000-49999	Far West	Municipal	0.0059	$9.17	0.0000	0.0259	0.0000	0.0001	0.0008	3
10000-24999	Southwest	Multi-juris.	0.0154	$9.02	0.0001	0.1323	0.0000	0.0001	0.0022	2
50000-99999	Far West	County	0.0046	$8.88	0.0000	0.0440	0.0000	0.0001	0.0005	1
5000-9999	Mideast	Other	0.0128	$8.65	0.0002	0.3146	0.0001	0.0000	0.0008	4
1000-2499	Far West	School Dist.	0.0523	$8.35	0.0005	0.5126	0.0003	0.0000	0.0020	33
5000-9999	Rocky Mountains	Multi-juris.	0.0062	$7.99	0.0002	0.4979	0.0000	0.0001	0.0026	6
1000-2499	Plains	Native Am.	0.0000	$7.91	0.0002	0.5136	0.0002	0.0000	0.0015	1
10000-24999	Southwest	City/County	0.0078	$7.68	0.0002	0.2590	0.0001	0.0001	0.0026	2
5000-9999	Southeast	Non-profit	0.0053	$5.75	0.0002	0.4068	0.0001	0.0000	0.0015	4
500-999	New England	School Dist.	0.0000	$5.70	0.0014	0.3051	0.0001	0.0000	0.0268	19
10000-24999	Southwest	Municipal	0.0054	$5.27	0.0001	0.1872	0.0000	0.0000	0.0006	3
5000-9999	Southeast	Multi-juris.	0.0038	$5.04	0.0002	0.2295	0.0002	0.0000	0.0017	3
10000-24999	Southeast	City/County	0.0027	$4.70	0.0001	0.1786	0.0001	0.0000	0.0012	12
25000-49999	Rocky Mountains	Multi-juris.	0.0029	$3.94	0.0000	0.0971	0.0000	0.0001	0.0001	2
10000-24999	Southwest	Non-profit	0.0018	$2.00	0.0001	0.1036	0.0001	0.0000	0.0005	1
50000-99999	Plains	Municipal	0.0017	$0.83	0.0000	0.0235	0.0000	0.0000	0.0001	0
25000-49999	Southwest	Non-profit	0.0002	$0.60	0.0000	0.0312	0.0000	0.0000	0.0001	0

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Table A.2 2014 Rural Public Library Assets by Service Area Size and RUCA Code

Service Area Size	RUCA	Count	Hours	Outlets	Other Staff	Collection	Terminals	Other Income	Unemp. Rate
Under 100	**2 Metro flow ≥ 30% to UA**	2	5.6335	0.0137	0.0000	139	0.0258	$81.78	5.8%
	8 Small town flow ≥ 30% to small UC	2	13.1782	0.0162	0.0017	120	0.1376	$460.45	7.9%
	10 Rural areas flow to tract outside UA or UC	30	7.3445	0.0126	0.0000	104	0.0458	$13.49	6.5%
100-499	**1 Metro Core flow within UA**	3	3.2762	0.0032	0.0010	43	0.0159	$12.91	6.3%
	2 Metro flow ≥ 30% to UA	40	2.4313	0.0025	0.0000	23	0.0085	$6.05	5.1%
	3 Metro flow 10% - 30% to UA	4	3.1115	0.0039	0.0000	32	0.0072	$1.32	5.2%
	4 Micro Core flow within large UC	4	3.1362	0.0035	0.0001	19	0.0121	$1.86	5.4%
	5 Micro flow ≥ 30% to large UC	40	2.8213	0.0029	0.0000	30	0.0115	$4.28	4.6%
	6 Micro flow 10% - 30% to large UC	12	2.7854	0.0028	0.0000	21	0.0105	$1.65	4.9%
	7 Small town core flow within small UC	8	2.7204	0.0030	0.0006	48	0.0136	$19.79	6.0%
	8 Small town flow ≥ 30% to small UC	28	2.9683	0.0034	0.0000	22	0.0109	$5.21	4.1%
	10 Rural areas flow to tract outside UA or UC	274	2.7530	0.0032	0.0000	29	0.0109	$5.59	4.1%
500-999	**1 Metro Core flow within UA**	6	1.4980	0.0013	0.0001	30	0.0048	$4.23	5.3%
	2 Metro flow ≥ 30% to UA	99	1.6768	0.0014	0.0001	22	0.0055	$1.84	5.5%
	3 Metro flow 10% - 30% to UA	16	1.7173	0.0013	0.0000	19	0.0053	$2.08	6.1%
	4 Micro Core flow within large UC	6	2.0056	0.0012	0.0003	22	0.0056	$2.24	7.3%
	5 Micro flow ≥ 30% to large UC	73	1.6399	0.0014	0.0000	21	0.0057	$2.54	4.9%
	6 Micro flow 10% - 30% to	26	1.3717	0.0014	0.0000	25	0.0052	$1.62	5.7%

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Service Area Size	RUCA	Count	Hours	Outlets	Other Staff	Collection	Terminals	Other Income	Unemp. Rate
	large UC								
	7 Small town core flow within small UC	5	1.2763	0.0015	0.0000	10	0.0047	$2.64	4.0%
	8 Small town flow ≥ 30% to small UC	29	1.8021	0.0016	0.0000	23	0.0060	$2.95	4.9%
	9 Small town flow 10% - 30% to small UC	11	1.4914	0.0012	0.0000	29	0.0057	$9.00	6.2%
	10 Rural areas flow to tract outside UA or UC	359	1.6649	0.0013	0.0000	22	0.0062	$2.85	4.2%
1000-2499	**1 Metro Core flow within UA**	15	1.0254	0.0005	0.0004	10	0.0026	$2.73	6.0%
	2 Metro flow ≥ 30% to UA	305	0.9252	0.0006	0.0001	13	0.0029	$1.87	5.5%
	3 Metro flow 10% - 30% to UA	48	0.8859	0.0007	0.0001	13	0.0028	$2.83	6.3%
	4 Micro Core flow within large UC	8	0.9472	0.0006	0.0001	29	0.0037	$3.40	5.0%
	5 Micro flow ≥ 30% to large UC	138	0.9460	0.0007	0.0000	17	0.0032	$1.92	5.3%
	6 Micro flow 10% - 30% to large UC	33	0.8699	0.0006	0.0002	11	0.0025	$3.08	6.0%
	7 Small town core flow within small UC	11	0.8955	0.0006	0.0002	22	0.0021	$2.26	6.5%
	8 Small town flow ≥ 30% to small UC	73	0.9068	0.0006	0.0001	11	0.0029	$2.09	5.8%
	9 Small town flow 10% - 30% to small UC	18	0.7219	0.0007	0.0001	10	0.0028	$1.91	6.4%
	10 Rural areas flow to tract outside UA or UC	713	0.9821	0.0006	0.0001	16	0.0035	$3.02	5.2%
2500-4999	**1 Metro Core flow within UA**	20	0.5619	0.0003	0.0002	9	0.0015	$1.52	5.7%
	2 Metro flow ≥ 30% to UA	216	0.5299	0.0003	0.0002	9	0.0018	$1.89	5.6%
	3 Metro flow 10% - 30% to UA	34	0.5158	0.0003	0.0002	9	0.0014	$1.71	6.4%
	4 Micro Core flow within	3	0.5872	0.0003	0.0004	22	0.0030	$1.91	5.2%

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Service Area Size	RUCA	Count	Hours	Outlets	Other Staff	Collection	Terminals	Other Income	Unemp. Rate
	large UC								
	5 Micro flow ≥ 30% to large UC	79	0.4938	0.0003	0.0001	8	0.0019	$1.81	5.7%
	6 Micro flow 10% - 30% to large UC	25	0.4914	0.0003	0.0002	6	0.0016	$2.20	6.1%
	7 Small town core flow within small UC	13	0.6219	0.0003	0.0000	16	0.0018	$1.27	5.3%
	8 Small town flow ≥ 30% to small UC	17	0.5708	0.0003	0.0002	13	0.0014	$1.72	7.0%
	9 Small town flow 10% - 30% to small UC	13	0.5598	0.0003	0.0002	17	0.0020	$2.24	6.9%
	10 Rural areas flow to tract outside UA or UC	342	0.5560	0.0003	0.0002	10	0.0021	$2.34	5.6%
5000-9999	**1 Metro Core flow within UA**	37	0.2923	0.0001	0.0003	7	0.0012	$2.21	5.9%
	2 Metro flow ≥ 30% to UA	169	0.3253	0.0002	0.0002	6	0.0013	$1.94	5.8%
	3 Metro flow 10% - 30% to UA	20	0.3308	0.0001	0.0002	6	0.0013	$0.99	6.5%
	4 Micro Core flow within large UC	6	0.4102	0.0002	0.0002	7	0.0020	$5.55	6.3%
	5 Micro flow ≥ 30% to large UC	36	0.3396	0.0002	0.0001	6	0.0015	$2.00	5.9%
	6 Micro flow 10% - 30% to large UC	10	0.2663	0.0002	0.0001	5	0.0013	$1.85	7.0%
	7 Small town core flow within small UC	12	0.4448	0.0003	0.0004	9	0.0024	$2.31	6.1%
	8 Small town flow ≥ 30% to small UC	10	0.3427	0.0002	0.0002	9	0.0019	$1.41	7.4%
	9 Small town flow 10% - 30% to small UC	7	0.2767	0.0002	0.0002	6	0.0015	$2.57	6.7%
	10 Rural areas flow to tract outside UA or UC	173	0.3531	0.0002	0.0002	7	0.0015	$1.57	6.2%
10000-24999	**1 Metro Core flow within UA**	34	0.1755	0.0001	0.0002	5	0.0010	$1.94	5.7%

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Service Area Size	RUCA	Count	Hours	Outlets	Other Staff	Collection	Terminals	Other Income	Unemp. Rate
	2 Metro flow ≥ 30% to UA	57	0.2106	0.0001	0.0001	4	0.0012	$0.99	5.8%
	3 Metro flow 10% - 30% to UA	8	0.2015	0.0001	0.0002	6	0.0011	$1.14	6.5%
	4 Micro Core flow within large UC	11	0.2987	0.0001	0.0003	6	0.0011	$2.15	5.7%
	5 Micro flow ≥ 30% to large UC	16	0.2179	0.0001	0.0001	5	0.0014	$1.02	7.9%
	6 Micro flow 10% - 30% to large UC	5	0.1743	0.0001	0.0000	7	0.0010	$0.95	5.3%
	7 Small town core flow within small UC	52	0.3237	0.0002	0.0003	5	0.0017	$1.61	7.5%
	8 Small town flow ≥ 30% to small UC	6	0.3840	0.0002	0.0001	4	0.0008	$0.47	8.1%
	10 Rural areas flow to tract outside UA or UC	82	0.2489	0.0001	0.0002	5	0.0012	$0.98	7.1%
25000-49999	**1 Metro Core flow within UA**	13	0.1070	0.0000	0.0004	4	0.0010	$2.04	5.7%
	2 Metro flow ≥ 30% to UA	24	0.1415	0.0001	0.0002	3	0.0007	$0.78	6.3%
	3 Metro flow 10% - 30% to UA	4	0.2747	0.0001	0.0003	3	0.0012	$0.86	7.8%
	4 Micro Core flow within large UC	34	0.2351	0.0001	0.0003	4	0.0011	$1.73	6.3%
	5 Micro flow ≥ 30% to large UC	1	0.2548	0.0002	0.0000	2	0.0012	$1.63	9.3%
	6 Micro flow 10% - 30% to large UC	1	0.2322	0.0002	0.0000	2	0.0008	$0.81	6.7%
	7 Small town core flow within small UC	23	0.2986	0.0001	0.0004	5	0.0011	$1.25	6.8%
	10 Rural areas flow to tract outside UA or UC	16	0.2378	0.0001	0.0002	3	0.0010	$0.94	7.7%
50000-99999	**1 Metro Core flow within UA**	18	0.1391	0.0001	0.0002	3	0.0007	$0.92	6.1%
	2 Metro flow ≥ 30% to UA	10	0.1621	0.0001	0.0002	3	0.0009	$1.21	5.3%
	3 Metro flow 10% - 30% to	1	0.1675	0.0001	0.0002	2	0.0011	$1.03	9.8%

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Service Area Size	RUCA	Count	Hours	Outlets	Other Staff	Collection	Terminals	Other Income	Unemp. Rate
	UA								
	4 Micro Core flow within large UC	26	0.1585	0.0001	0.0002	2	0.0007	$1.33	6.4%
	5 Micro flow ≥ 30% to large UC	2	0.1617	0.0001	0.0002	3	0.0006	$0.38	6.8%
	7 Small town core flow within small UC	16	0.1665	0.0001	0.0002	3	0.0009	$0.83	7.0%
	8 Small town flow ≥ 30% to small UC	2	0.2149	0.0001	0.0003	3	0.0011	$2.86	6.1%
	10 Rural areas flow to tract outside UA or UC	3	0.1400	0.0001	0.0003	3	0.0013	$2.27	8.9%
100000-249999	**1 Metro Core flow within UA**	21	0.1350	0.0001	0.0003	2	0.0009	$1.09	6.2%
	2 Metro flow ≥ 30% to UA	3	0.1124	0.0000	0.0001	2	0.0011	$1.00	5.5%
	3 Metro flow 10% - 30% to UA	1	0.0159	0.0000	0.0000	0	0.0000	$0.09	7.7%
	4 Micro Core flow within large UC	7	0.1833	0.0001	0.0002	2	0.0008	$1.02	7.5%
	7 Small town core flow within small UC	2	0.1801	0.0001	0.0003	2	0.0015	$0.67	6.3%
	10 Rural areas flow to tract outside UA or UC	3	0.0610	0.0000	0.0002	2	0.0005	$0.55	7.0%
250000-499999	**1 Metro Core flow within UA**	4	0.1078	0.0001	0.0004	2	0.0007	$1.33	6.5%
	1 Metro Core flow within UA	2	0.1150	0.0001	0.0003	2	0.0008	$1.09	8.5%

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Table A.3 2014 Rural Public Library Median Per Capita Assets in RUCA Rural Code 10 by Service Area Size and Legal Basis

Service Area Size	Legal Basis	Count	Outlets	Hours	Other Staff	Collec-tion	Term-inals	Other Income	Other Income Less Alaska E-Rate	Op. Income	Op. Income Less Alaska E-Rate	Unemp. Rate
Under 100	**Multi-juris.**	2	0.0114	7.6760	0.0019	73	0.1271	$185.92	$0.00	$921.59	$735.68	7.7%
	Municipal	18	0.0127	5.7452	0.0000	57	0.0205	$10.51	$4.41	$115.29	$115.29	3.8%
	Native Am.	1	0.0189	11.3208	0.0094	584	0.1321	$941.89	$0.00	$1,615.92	$674.04	8.0%
	Non-profit	9	0.0123	11.7021	0.0000	132	0.0674	$566.89	$21.16	$725.95	$402.20	13.0%
100-499	**County**	3	0.0029	2.6379	0.0000	65	0.0086	$0.81	$0.81	$28.91	$28.91	4.7%
	Library District	5	0.0040	4.8500	0.0005	42	0.0111	$0.62	$0.62	$111.34	$111.34	6.7%
	Multi-juris.	3	0.0023	2.9945	0.0007	33	0.0109	$8.00	$8.00	$78.73	$78.73	4.1%
	Municipal	225	0.0032	2.6396	0.0000	27	0.0105	$4.13	$3.93	$49.50	$49.50	3.6%
	Native Am.	5	0.0038	7.5581	0.0006	21	0.0188	$0.00	$0.00	$94.09	$94.09	15.4%
	Non-profit	30	0.0039	3.6381	0.0000	46	0.0150	$33.65	$23.46	$108.99	$99.39	7.6%
	Other	2	0.0030	3.2351	0.0005	13	0.0246	$4.44	$4.44	$62.49	$62.49	5.3%
	School District	1	0.0027	1.0827	0.0004	180	0.0267	$10.24	$10.24	$117.10	$117.10	6.4%
500-999	**City/County**	1	0.0012	2.6492	0.0008	31	0.0155	$0.00	$0.00	$105.42	$105.42	7.2%
	County	11	0.0014	1.5714	0.0001	26	0.0054	$1.23	$1.04	$68.45	$68.45	3.5%
	Library District	14	0.0012	1.6212	0.0000	18	0.0060	$4.10	$4.10	$52.39	$52.39	6.4%
	Multi-juris.	11	0.0012	1.9174	0.0003	17	0.0067	$1.19	$1.19	$33.60	$33.60	2.9%
	Municipal	277	0.0013	1.6832	0.0000	22	0.0063	$2.68	$2.44	$46.67	$46.45	3.9%
	Native Am.	3	0.0015	2.7529	0.0004	22	0.0083	$0.00	$0.00	$71.14	$71.14	8.8%
	Non-profit	40	0.0013	1.4016	0.0000	20	0.0045	$15.47	$15.47	$39.26	$39.26	6.5%
	Other	1	0.0013	3.6492	0.0000	46	0.0067	$1.27	$1.27	$16.54	$16.54	5.3%
	School District	1	0.0014	0.3051	0.0000	19	0.0268	$1.46	$1.46	$5.70	$5.70	5.8%

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Service Area Size	Legal Basis	Count	Outlets	Hours	Other Staff	Collec-tion	Term-inals	Other Income	Other Income Less Alaska E-Rate	Op. Income	Op. Income Less Alaska E-Rate	Unemp. Rate
1000-2499	**City/County**	7	0.0005	0.8485	0.0000	19	0.0035	$0.85	$0.85	$22.67	$22.67	3.8%
	County	44	0.0006	1.0245	0.0000	18	0.0039	$1.26	$1.26	$38.94	$38.94	3.5%
	Library District	61	0.0005	1.0041	0.0002	13	0.0035	$2.33	$2.33	$49.77	$49.77	6.5%
	Multi-juris.	18	0.0007	1.2400	0.0000	25	0.0044	$1.15	$1.15	$36.85	$36.85	4.6%
	Municipal	456	0.0006	1.0096	0.0001	18	0.0036	$2.69	$2.68	$38.06	$38.06	4.6%
	Native Am.	1	0.0007	0.6757	0.0000	23	0.0068	$0.00	$0.00	$46.88	$46.88	13.3%
	Non-profit	119	0.0006	0.8279	0.0001	12	0.0031	$12.92	$12.60	$31.02	$31.02	6.3%
	Other	3	0.0004	0.7006	0.0000	10	0.0026	$33.86	$33.86	$44.81	$44.81	6.9%
	School District	4	0.0005	0.5998	0.0000	15	0.0037	$2.25	$2.25	$20.06	$20.06	8.2%
2500-4999	**City/County**	5	0.0003	0.5701	0.0002	9	0.0028	$1.66	$1.66	$23.05	$23.05	4.3%
	County	33	0.0003	0.5490	0.0001	10	0.0023	$1.38	$1.38	$31.06	$31.06	4.6%
	Library District	44	0.0003	0.6260	0.0004	9	0.0029	$2.17	$2.17	$47.04	$47.04	6.7%
	Multi-juris.	11	0.0002	0.4498	0.0001	16	0.0025	$1.40	$1.40	$25.12	$25.12	6.5%
	Municipal	182	0.0003	0.5757	0.0001	13	0.0020	$2.35	$2.29	$31.06	$31.06	5.2%
	Native Am.	10	0.0003	0.5807	0.0003	4	0.0031	$0.00	$0.00	$26.66	$26.66	7.2%
	Non-profit	53	0.0003	0.4723	0.0002	6	0.0015	$7.95	$7.95	$21.79	$21.79	5.9%
	Other	2	0.0003	0.5451	0.0001	7	0.0019	$3.35	$3.35	$15.73	$15.73	7.9%
	School District	2	0.0002	0.5200	0.0003	60	0.0018	$2.74	$2.74	$40.11	$40.11	3.8%
5000-9999	**City/County**	1	0.0004	0.7651	0.0002	10	0.0020	$0.03	$0.03	$28.83	$28.83	8.6%
	County	31	0.0002	0.3368	0.0002	7	0.0015	$0.62	$0.62	$28.42	$28.42	5.7%
	Library District	49	0.0002	0.4240	0.0003	6	0.0018	$1.77	$1.77	$41.59	$41.59	6.4%
	Multi-juris.	7	0.0002	0.3127	0.0001	6	0.0020	$0.36	$0.36	$10.88	$10.88	5.5%
	Municipal	52	0.0002	0.3323	0.0001	12	0.0013	$1.42	$1.42	$20.50	$20.50	6.7%
	Native Am.	3	0.0001	0.3040	0.0003	4	0.0015	$0.89	$0.89	$28.28	$28.28	7.2%

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Service Area Size	Legal Basis	Count	Outlets	Hours	Other Staff	Collec-tion	Term-inals	Other Income	Other Income Less Alaska E-Rate	Op. Income	Op. Income Less Alaska E-Rate	Unemp. Rate
	Non-profit	20	0.0002	0.3065	0.0001	4	0.0011	$6.88	$6.88	$19.13	$19.13	6.2%
	Other	1	0.0002	0.3146	0.0000	4	0.0008	$6.72	$6.72	$8.65	$8.65	5.3%
	School District	9	0.0001	0.3522	0.0002	34	0.0015	$2.74	$2.74	$31.99	$31.99	7.0%
10000-24999	**County**	28	0.0001	0.2381	0.0002	5	0.0011	$0.86	$0.86	$20.57	$20.57	8.0%
	Library District	35	0.0001	0.2790	0.0002	5	0.0013	$1.07	$1.07	$30.45	$30.45	7.1%
	Multi-juris.	3	0.0001	0.2651	0.0002	7	0.0012	$2.02	$2.02	$16.44	$16.44	8.6%
	Municipal	9	0.0001	0.1551	0.0001	5	0.0007	$0.87	$0.87	$9.63	$9.63	7.1%
	Native Am.	1	0.0011	2.4578	0.0004	5	0.0025	$0.00	$0.00	$32.80	$32.80	13.2%
	Non-profit	6	0.0001	0.2238	0.0001	3	0.0007	$7.17	$7.17	$15.24	$15.24	6.6%
25000-49999	**County**	6	0.0001	0.2689	0.0003	3	0.0015	$0.94	$0.94	$33.39	$33.39	8.6%
	Library District	3	0.0002	0.2845	0.0002	3	0.0021	$1.49	$1.49	$17.22	$17.22	7.8%
	Multi-juris.	6	0.0001	0.2311	0.0002	3	0.0010	$0.90	$0.90	$17.35	$17.35	7.4%
	Non-profit	1	0.0001	0.1802	0.0003	2	0.0008	$7.09	$7.09	$18.22	$18.22	5.8%
50000-99999	**County**	1	0.0001	0.1250	0.0002	2	0.0007	$0.01	$0.01	$10.16	$10.16	6.3%
	Multi-juris.	2	0.0001	0.1417	0.0004	3	0.0014	$3.60	$3.60	$26.76	$26.76	8.9%
100000-249999	**County**	1	0.0000	0.0490	0.0002	2	0.0007	$1.17	$1.17	$21.87	$21.87	5.8%
	Multi-juris.	2	0.0001	0.0844	0.0001	1	0.0004	$0.31	$0.31	$10.78	$10.78	7.3%

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Table A.4 2014 Rural Library Revenue from State Governments by Region and State

Region	State	Count	Median	Median Quartile 1	Median Quartile 3	Median Per Capita	Median Per Capita Quartile 1	Median Per Capita Quartile 3
Far West	**AK**	71	$8,504	$6,600	$16,830	$18.24	$6.36	$83.57
	CA	16	$5,225	$0	$16,413	$0.25	$0.00	$0.37
	NV	9	$9,812	$1,748	$28,463	$2.45	$0.73	$7.43
	OR	48	$1,000	$1,000	$1,428	$0.73	$0.42	$1.74
	WA	23	$0	$0	$0	$0.00	$0.00	$0.00
	Subtotal	167	$6,600	$1,000	$10,208	$1.69	$0.31	$14.54
Great Lakes	**IL**	231	$3,475	$1,740	$6,321	$1.60	$1.25	$2.43
	IN	104	$9,981	$4,837	$27,660	$3.14	$2.21	$4.23
	MI	177	$2,444	$1,425	$4,467	$0.52	$0.50	$0.55
	OH	73	$236,237	$136,282	$566,198	$29.99	$25.51	$49.51
	WI	203	$200	$0	$1,653	$0.02	$0.00	$0.34
	Subtotal	788	$2,543	$875	$7,623	$1.03	$0.38	$2.60
Mideast	**DE**	4	$98,583	$31,565	$206,716	$5.14	$3.96	$5.99
	MD	3	$215,494	$182,116	$476,254	$7.36	$7.27	$7.81
	NJ	6	$3,637	$1,388	$4,770	$0.45	$0.25	$0.81
	NY	326	$3,271	$1,398	$4,258	$1.36	$0.59	$2.85
	PA	90	$14,331	$8,628	$26,024	$3.29	$2.51	$4.71
	Subtotal	429	$3,900	$1,549	$9,376	$1.86	$0.72	$3.74
New England	**CT**	64	$1,630	$1,270	$2,523	$0.53	$0.30	$0.81
	MA	103	$2,308	$1,513	$4,876	$1.23	$0.97	$1.75
	ME	202	$0	$0	$0	$0.00	$0.00	$0.00
	NH	161	$0	$0	$150	$0.00	$0.00	$0.05
	RI	11	$31,569	$26,632	$40,503	$6.02	$4.57	$9.09

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Region	State	Count	Median	Median Quartile 1	Median Quartile 3	Median Per Capita	Median Per Capita Quartile 1	Median Per Capita Quartile 3
	VT	146	$0	$0	$0	$0.00	$0.00	$0.00
	Subtotal	687	$0	$0	$398	$0.00	$0.00	$0.20
Plains	**IA**	415	$1,358	$805	$1,871	$1.02	$0.59	$1.65
	KS	247	$4,665	$3,224	$7,801	$6.40	$4.07	$11.90
	MN	71	$0	$0	$0	$0.00	$0.00	$0.00
	MO	70	$4,613	$1,953	$21,733	$1.25	$1.03	$1.80
	ND	63	$1,561	$727	$3,986	$1.41	$1.02	$3.22
	NE	216	$763	$234	$976	$0.94	$0.48	$1.80
	SD	88	$0	$0	$0	$0.00	$0.00	$0.00
	Subtotal	1,170	$1,243	$363	$3,120	$1.11	$0.36	$2.78
Rocky Mountains	**CO**	59	$3,000	$3,000	$3,000	$0.94	$0.31	$2.21
	ID	60	$0	$0	$7,102	$0.00	$0.00	$3.43
	MT	55	$3,184	$2,531	$4,167	$1.30	$0.85	$1.93
	UT	22	$6,902	$4,354	$30,985	$3.07	$1.17	$6.25
	WY	12	$0	$0	$0	$0.00	$0.00	$0.00
	Subtotal	208	$3,000	$1,621	$4,880	$1.07	$0.23	$2.42
Southeast	**AL**	103	$3,385	$1,548	$6,963	$0.96	$0.96	$0.96
	AR	23	$45,843	$5,202	$143,381	$1.78	$0.98	$2.77
	FL	8	$588,327	$306,177	$925,602	$7.60	$4.58	$8.79
	GA	12	$318,919	$216,504	$391,801	$3.76	$2.79	$5.57
	KY	53	$15,807	$13,624	$23,631	$1.29	$0.97	$1.99
	LA	22	$56,320	$36,487	$77,425	$2.90	$2.19	$3.52
	MS	22	$117,265	$45,335	$185,620	$3.15	$2.65	$3.79
	NC	22	$115,289	$96,002	$315,327	$3.01	$1.95	$3.81
	SC	12	$75,638	$75,000	$129,393	$1.74	$1.25	$2.50

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Region	State	Count	Median	Median Quartile 1	Median Quartile 3	Median Per Capita	Median Per Capita Quartile 1	Median Per Capita Quartile 3
	TN	77	$0	$0	$0	$0.00	$0.00	$0.00
	VA	34	$107,583	$48,471	$152,444	$3.36	$2.77	$4.36
	WV	51	$36,841	$18,860	$66,592	$5.09	$5.07	$5.09
	Subtotal	439	$16,999	$1,548	$81,324	$1.47	$0.81	$3.58
Southwest	**AZ**	30	$0	$0	$4,606	$0.00	$0.00	$1.24
	NM	49	$10,401	$7,328	$13,084	$9.78	$6.22	$16.93
	OK	56	$3,635	$2,996	$5,438	$2.53	$1.59	$3.74
	TX	166	$0	$0	$0	$0.00	$0.00	$0.00
	Subtotal	301	$0	$0	$4,612	$0.00	$0.00	$2.58

Table A.5 RUCC Rural Categories 8 and 9, RUCA Rural Category 10, and FAR Level 4: Select Predictors by Region and Economic Type

Region	Econ Type	Count	Median Per Capita Operating Income	Median Per Capita Op. Income Less Alaska E-Rate	Median % Foreign Born	Median % Deep Poverty Children	Median % Poverty All Ages	Median % Unemploy-ment	Median % Veterans Over 18	Median Per Capita General Practice Physicians	Median Per Capita Advanced Practice RNs
Far West	**Farm**	3	$74.58	$74.58	1.0	7.7	23.3	6.4	13.8	0.00000	0.00145
	FedStGovt	3	$109.44	$90.93	2.8	11.7	19.1	15.1	11.2	0.00000	0.00144
	Manufacturing	8	$246.96	$213.15	35.3	4.2	9.9	4.9	7.2	0.00009	0.00089
	Mining	4	$74.75	$74.75	8.8	14.8	13.9	10.2	15.3	0.00036	0.00022
	Nonspecialized	13	$262.04	$127.98	1.3	14.3	25.7	18.7	11.4	0.00036	0.00054

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Region	Econ Type	Count	Median Per Capita Operating Income	Median Per Capita Op. Income Less Alaska E-Rate	Median % Foreign Born	Median % Deep Poverty Children	Median % Poverty All Ages	Median % Unemploy-ment	Median % Veterans Over 18	Median Per Capita General Practice Physicians	Median Per Capita Advanced Practice RNs
	Recreation	22	$155.11	$139.45	4.3	3.8	12.7	10.2	12.4	0.00063	0.00037
Great Lakes	**FedStGovt**	1	$28.42	$28.42	1.0	8.1	20.5	12.0	15.0	0.00024	0.00036
	Manufacturing	4	$59.00	$59.00	1.4	11.1	13.0	5.4	12.8	0.00044	0.00080
	Nonspecialized	1	$51.11	$51.11	1.8	7.9	16.1	7.7	9.5	0.00027	0.00013
	Recreation	20	$37.70	$37.70	1.7	8.8	14.8	8.7	13.9	0.00059	0.00070
Mideast	**FedStGovt**	1	$10.88	$10.88	2.1	11.6	21.9	7.9	11.9	0.00000	0.00013
	Recreation	6	$44.81	$44.81	1.1	9.1	14.3	7.2	12.0	0.00052	0.00052
New England	**FedStGovt**	3	$55.59	$55.59	3.5	9.8	19.6	6.8	13.7	0.00033	0.00033
	Manufacturing	2	$29.24	$29.24	1.7	12.8	20.3	7.5	14.1	0.00094	0.00076
	Recreation	1	$652.26	$652.26	3.0	7.3	11.7	5.9	12.8	0.00126	0.00070
Plains	**Farm**	174	$47.01	$47.01	1.0	5.6	12.7	3.1	11.4	0.00051	0.00038
	FedStGovt	4	$13.27	$13.27	0.6	29.1	29.4	10.3	8.7	0.00014	0.00066
	Manufacturing	8	$15.19	$15.19	0.9	3.7	15.6	5.0	11.1	0.00078	0.00075
	Mining	17	$34.19	$34.19	1.1	8.1	10.0	2.7	11.1	0.00046	0.00064
	Nonspecialized	8	$49.89	$49.89	1.1	9.0	21.4	6.3	11.2	0.00040	0.00051
	Recreation	4	$67.00	$67.00	1.7	4.6	10.6	5.1	14.2	0.00096	0.00022
Rocky Mountains	**Farm**	23	$47.82	$47.82	2.5	7.5	15.4	3.4	10.6	0.00045	0.00016
	FedStGovt	4	$36.78	$36.78	1.4	9.3	14.9	7.2	16.0	0.00044	0.00026
	Mining	10	$73.91	$73.91	2.1	5.7	11.5	5.8	11.1	0.00046	0.00032
	Nonspecialized	5	$24.23	$24.23	2.4	11.0	20.7	9.4	16.9	0.00079	0.00044
	Recreation	17	$59.94	$59.94	1.4	4.4	12.2	4.7	12.3	0.00064	0.00026

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Region	Econ Type	Count	Median Per Capita Operating Income	Median Per Capita Op. Income Less Alaska E-Rate	Median % Foreign Born	Median % Deep Poverty Children	Median % Poverty All Ages	Median % Unemploy-ment	Median % Veterans Over 18	Median Per Capita General Practice Physicians	Median Per Capita Advanced Practice RNs
Southeast	**FedStGovt**	2	$17.79	$17.79	1.7	20.3	36.2	9.3	6.8	0.00015	0.00058
	Manufacturing	1	$13.05	$13.05	0.1	34.5	33.7	17.4	5.8	0.00036	0.00027
	Mining	4	$17.10	$17.10	0.5	14.4	29.6	10.8	5.2	0.00034	0.00066
	Nonspecialized	5	$23.15	$23.15	0.5	13.0	27.8	8.3	8.5	0.00039	0.00076
	Recreation	3	$20.24	$20.24	0.3	7.9	17.6	8.6	11.5	0.00046	0.00035
Southwest	**Farm**	12	$26.32	$26.32	7.7	11.4	19.4	4.6	8.1	0.00038	0.00000
	FedStGovt	5	$51.27	$51.27	12.9	17.4	24.5	4.4	9.6	0.00000	0.00022
	Manufacturing	1	$5.87	$5.87	0.9	14.4	19.0	10.5	17.1	0.00019	0.00039
	Mining	4	$23.67	$23.67	10.3	5.3	12.0	3.5	8.6	0.00030	0.00000
	Recreation	2	$23.67	$23.67	2.4	18.2	18.7	6.0	14.1	0.00000	0.00030

Table A.6 2014–2015 Increases (Decreases) in Median Per Capita Operating Income by Region, Service Area Size, and Legal Basis

		Legal Basis								
Region	**Service Area Size**	**City/County**	**Municipal**	**County**	**Library District**	**Multi-Juris.**	**Native American**	**Non-profit**	**Other**	**School District**
Far West	**Under 100**		($778.91)			($314.90)	($1,282.07)	($601.88)		
	100 – 499		($104.33)		$59.12	($12.89)	($227.31)	($55.57)		($24.31)
	500 – 999		($3.25)	$63.67	($13.77)		$9.74	($29.30)		
	1,000 - 2,499		($1.18)	$10.89	($7.95)		$2.51	$2.30		$16.01
	2,500 - 4,999		$0.85	($130.49)	$0.78	$5.55				

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		Legal Basis								
Region	**Service Area Size**	**City/County**	**Municipal**	**County**	**Library District**	**Multi-Juris.**	**Native American**	**Non-profit**	**Other**	**School District**
	5,000 - 9,999		$2.56	$6.22	$2.22	($55.85)				
	10,000 - 24,999		($19.42)	$1.84	$6.87					
	25,000 - 49,999		$7.88	$2.30	$1.20					
	50,000 - 99,999		($66.57)	$2.04	$1.50				$1.56	
	100,000 - 249,999			$1.61	$1.63					
	250,000 - 499,999				$2.06					
Great Lakes	**100 – 499**		$5.67		($23.40)			($76.60)		
	500 – 999		$2.06		($0.09)	($6.97)				$14.54
	1,000 - 2,499		$1.80		$0.76	($1.87)	($1.11)	$3.79		$7.59
	2,500 - 4,999		($0.56)	$2.39	$0.91	($1.49)	$3.80	$9.70		$4.19
	5,000 - 9,999		$0.57	$6.65	$1.09	$1.10		($0.36)		$8.45
	10,000 - 24,999	($0.56)	($0.67)	$5.12	$1.54	$0.04				$14.19
	25,000 - 49,999	$1.87	$2.48	$1.99	($13.05)					($5.32)
	50,000 - 99,999			$2.85	$4.64					$2.59
	100,000 - 249,999			$0.09						
Mideast	**100 - 499**		$23.90					$3.25		
	500 - 999		$1.27					$12.44	($15.39)	
	1,000 - 2,499		$0.86		($0.55)			$4.49	$7.60	
	2,500 - 4,999		($0.71)		($6.64)		$7.17	$0.45	($3.37)	
	5,000 - 9,999		$0.10	$0.75	$1.35	$7.88		($0.84)	($0.86)	
	10,000 - 24,999		($2.88)	$1.95	$4.56			($1.17)	$4.33	
	25,000 - 49,999			$0.04	($97.47)			($1.53)	($13.83)	
	50,000 - 99,999			($14.17)				($16.79)		

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		Legal Basis								
Region	**Service Area Size**	**City/County**	**Municipal**	**County**	**Library District**	**Multi-Juris.**	**Native American**	**Non-profit**	**Other**	**School District**
	100,000 - 249,999			$31.95						
New England	**Under 100**		$13.54					$0.26		
	100 - 499		$4.70					$12.54		
	500 - 999		($0.84)			$2.01		$6.30		$0.69
	1,000 - 2,499		$3.81			($1.82)		$0.47		($1.11)
	2,500 - 4,999		$3.03			$4.63		$5.29		
	5,000 - 9,999		$0.36		$43.01			($1.61)		
	10,000 - 24,999		($5.12)					($16.09)		
	50,000 - 99,999							($3.24)		
Plains	**Under 100**		$10.99							
	100 - 499		$0.64	$0.71	$8.99	$8.67			($1.77)	
	500 - 999		($2.48)	$4.81	$11.31	($2.14)	$12.50		$16.93	
	1,000 - 2,499	$0.11	$1.61	$8.93	($1.47)	$4.35			$6.86	
	2,500 - 4,999		$1.20	($0.34)	$2.33	$6.81	$0.19			
	5,000 - 9,999		$1.96	$9.05	$0.69	$33.32	$1.04			
	10,000 - 24,999		($1.30)	$0.28	$2.30	($8.89)	($14.58)			
	25,000 - 49,999		($49.65)	($4.98)	$1.48	($2.22)				
	50,000 - 99,999		$0.08	($12.32)	$1.04					
	100,000 - 249,999	$3.05				($0.81)				
	250,000 - 499,999					($0.78)				
Rocky Mountain	**Under 100**				($11.66)					
	100 - 499		($3.08)	$0.43	($59.42)	$3.62				
	500 - 999		$1.60	$0.00	$1.05	($0.90)				

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		Legal Basis								
Region	**Service Area Size**	**City/County**	**Municipal**	**County**	**Library District**	**Multi-Juris.**	**Native American**	**Non-profit**	**Other**	**School District**
	1,000 - 2,499	$2.37	$0.80	$3.82	$6.01	($1.68)				
	2,500 - 4,999	$0.85	$4.24	$0.57	$4.07	($0.64)				
	5,000 - 9,999	($4.17)	$0.41	$0.93	$3.28	$1.10				
	10,000 - 24,999		$0.00	$3.65	$1.30	($28.19)				
	25,000 - 49,999			$2.08	$0.93					
	50,000 - 99,999		($0.20)							
	100,000-249,999				($35.41)					
Southeast	**100 - 499**		($15.48)							
	500 - 999		$2.28			($1.36)				
	1,000 - 2,499		$0.57	$1.45	$6.57	($2.22)		$1.64	($3.93)	
	2,500 - 4,999		$0.45	($0.32)	($1.55)	$2.73				
	5,000 - 9,999		($0.53)	$0.51	$13.05	($0.75)		($0.35)		
	10,000 - 24,999	($0.15)	$0.67	$0.10	$4.78	($3.50)		$1.45		
	25,000 - 49,999	($0.98)		($0.45)	($6.18)	($1.02)		($0.29)		
	50,000 - 99,999	$0.79	($0.01)	($0.67)	($47.45)	$0.63				
	100,000 - 249,999			$3.56		$0.77				
	250,000 - 499,999					$2.48				
Southwest	**Under 100**							($310.52)		
	100 - 499		($14.07)	$122.15			($0.94)	($11.30)	$53.43	
	500 - 999	$14.63	($13.37)	$14.42			($24.04)	$7.71		
	1,000 - 2,499	($1.83)	$2.78	($5.98)		($5.80)		($3.69)	$198.13	
	2,500 - 4,999	($1.55)	$0.56	($3.23)	($7.98)	($11.82)	($0.54)	($1.48)		
	5,000 - 9,999	($11.11)	($2.52)	($1.38)	($5.63)	$10.97	($0.60)	($0.54)		

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		Legal Basis								
Region	**Service Area Size**	**City/County**	**Municipal**	**County**	**Library District**	**Multi-Juris.**	**Native American**	**Non-profit**	**Other**	**School District**
	10,000 - 24,999	$8.92	$68.79	($0.73)	($0.24)	$0.79		$1.36		
	25,000 - 49,999			$0.01	($6.43)	$5.90		($0.60)		
	50,000 - 99,999			$8.29	($0.13)	$1.38				
	100,000 - 249,999			($0.39)	($46.76)					

Table A.7 Counties with Deep Poverty Children above Twenty Percent Served by Rural Libraries

Region	**State**	**County**	**Number of Rural Libraries (2015)**	**Persistent Child Poverty 1980-2011**	**% Deep Poverty Children 2010-2014**	**Poverty Children Under 18 % 2014**	**Poverty All Ages % 2014**	**Black Non-Hispanic % 2010**	**Hispanic % 2010**	**White Non-Hispanic % 2010**
SouthEast	KY	WOLFE	1	Y	40.6	50.3	36	0.1	0.6	98.5
SouthEast	KY	ROBERTSON	1	Y	39.0	35.0	23	0.1	1.0	97.8
GreatLakes	IL	ALEXANDER	1	Y	38.4	52.0	36	35.3	1.9	60.5
SouthEast	AL	WILCOX	1	Y	34.5	47.1	34	72.2	0.6	26.6
SouthEast	MS	SHARKEY	1	Y	32.8	54.1	37	70.7	0.8	27.8
SouthEast	KY	MENIFEE	1	Y	32.4	42.0	27	1.8	0.8	96.0
Plains	ND	ROLETTE	2	Y	32.4	41.1	32	0.2	1.0	20.1
SouthEast	AL	GREENE	1	Y	31.7	45.7	33	81.2	0.8	17.3
SouthEast	GA	JEFFERSON	1	Y	31.4	37.5	26	54.3	3.1	41.4
SouthEast	AL	PERRY	2	Y	31.3	65.9	47	68.4	1.1	29.7
Plains	SD	OGLALA LAKOTA	1	Y	31.3	53.5	52			
GreatLakes	MI	LAKE	3	Y	31.1	44.4	29	9.0	2.1	85.8
Plains	SD	TODD	1	Y	30.0	52.8	47	0.2	2.4	9.5

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Region	State	County	Number of Rural Libraries (2015)	Persistent Child Poverty 1980-2011	% Deep Poverty Children 2010-2014	Poverty Children Under 18 % 2014	Poverty All Ages % 2014	Black Non-Hispanic % 2010	Hispanic % 2010	White Non-Hispanic % 2010
Plains	SD	CORSON	1	Y	29.6	45.2	39	0.1	2.6	29.7
SouthWest	OK	PUSHMATAHA	1	Y	29.6	33.2	23	0.6	2.4	73.9
SouthEast	MS	CLAY	1	Y	29.2	42.3	28	58.0	1.0	40.1
SouthEast	NC	SWAIN	1	Y	28.9	28.8	19	0.5	3.9	65.6
RockyMtn	CO	OTERO	2	Y	28.7	34.7	26	0.5	40.3	56.5
Plains	SD	BENNETT	1	Y	28.3	45.5	35	0.1	2.0	33.3
Plains	SD	DEWEY	1	Y	28.2	32.7	27	0.1	1.8	20.9
SouthEast	MS	NOXUBEE	1	Y	27.9	44.7	31	71.5	0.8	27.0
SouthWest	TX	SCHLEICHER	1	N	27.7	19.2	14	0.9	44.4	54.1
SouthEast	AL	SUMTER	2	Y	27.5	51.1	38	74.7	0.6	24.0
SouthWest	TX	HUDSPETH	2	Y	27.1	38.8	27	0.9	79.6	18.1
SouthEast	KY	ELLIOTT	1	Y	26.8	40.2	32	3.3	0.8	95.2
SouthWest	TX	STONEWALL	1	N	26.7	21.7	16	2.6	14.0	80.9
SouthEast	KY	LEE	1	Y	26.4	45.1	35	2.3	0.7	95.9
SouthEast	MS	CLAIBORNE	1	Y	26.4	50.0	43	84.0	0.8	14.1
Plains	ND	SIOUX	1	Y	25.9	42.0	34	0.1	2.0	12.4
SouthWest	AZ	APACHE	1	Y	25.7	39.5	33	0.2	5.8	20.4
SouthEast	AR	MISSISSIPPI	1	Y	25.6	37.2	27	33.9	3.6	60.5
Plains	ND	BENSON	2	Y	25.5	41.3	30	0.0	1.2	43.0
SouthEast	KY	MCCREARY	1	Y	25.5	50.2	47	5.3	2.1	90.4
SouthEast	KY	LEWIS	1	Y	25.3	44.9	34	0.3	0.6	98.4
SouthEast	MS	BOLIVAR	1	Y	25.3	43.0	34	64.0	1.9	32.9
SouthEast	KY	MARTIN	1	Y	25.0	42.9	41	6.8	3.0	89.2

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Region	State	County	Number of Rural Libraries (2015)	Persistent Child Poverty 1980-2011	% Deep Poverty Children 2010-2014	Poverty Children Under 18 % 2014	Poverty All Ages % 2014	Black Non-Hispanic % 2010	Hispanic % 2010	White Non-Hispanic % 2010
SouthEast	AR	VAN BUREN	1	Y	24.9	33.0	22	0.4	2.7	94.1
SouthEast	MS	WILKINSON	1	Y	24.9	39.7	33	70.6	0.4	28.5
SouthEast	AL	LOWNDES	3	Y	24.7	42.7	31	73.3	0.8	25.1
SouthEast	AL	BARBOUR	3	Y	24.2	38.1	25	46.7	5.1	46.8
SouthWest	TX	CAMERON	1	Y	24.2	47.0	35	0.3	88.1	10.7
SouthEast	AL	HALE	3	Y	23.8	36.8	28	58.8	0.9	39.4
SouthEast	VA	CUMBERLAND	1	N	23.6	29.3	19	32.4	1.8	63.2
SouthEast	TN	LAKE	2	Y	23.4	44.0	42	27.6	1.7	69.1
SouthEast	KY	BELL	1	Y	23.2	45.1	34	2.2	0.7	95.1
SouthEast	SC	ORANGEBURG	1	Y	22.9	43.1	31	61.9	1.9	33.7
SouthEast	KY	MONROE	1	Y	22.7	39.1	26	2.1	2.6	94.1
SouthEast	TN	JACKSON	1	N	22.6	35.1	23	0.2	1.4	96.8
SouthEast	MS	PIKE	1	Y	22.2	40.8	31	51.3	1.2	45.9
SouthWest	TX	DUVAL	1	Y	22.0	33.9	26	0.7	88.5	10.2
RockyMtn	UT	SAN JUAN	1	Y	22.0	30.5	29	0.1	4.4	43.9
SouthEast	TN	COCKE	3	Y	21.9	40.4	28	1.8	1.8	94.2
RockyMtn	CO	DOLORES	1	N	21.9	19.5	15	0.1	4.0	90.9
RockyMtn	MT	BLAINE	2	Y	21.8	31.8	25	0.1	1.8	47.9
SouthEast	WV	CALHOUN	1	Y	21.8	29.8	22	0.2	0.7	97.9
SouthEast	VA	HIGHLAND	1	N	21.8	21.8	15	0.3	0.8	98.4
SouthEast	KY	CUMBERLAND	1	Y	21.7	37.8	28	2.6	0.9	94.9
SouthEast	WV	MCDOWELL	2	Y	21.7	46.2	35	9.5	0.4	88.8
SouthWest	AZ	NAVAJO	1	Y	21.6	35.4	29	0.8	10.8	43.9

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Region	State	County	Number of Rural Libraries (2015)	Persistent Child Poverty 1980-2011	% Deep Poverty Children 2010-2014	Poverty Children Under 18 % 2014	Poverty All Ages % 2014	Black Non-Hispanic % 2010	Hispanic % 2010	White Non-Hispanic % 2010
SouthEast	KY	LOGAN	1	N	21.5	25.9	17	6.5	2.4	89.2
Plains	NE	RICHARDSON	5	N	21.3	20.9	14	0.1	1.3	93.6
SouthWest	NM	CIBOLA	2	Y	21.3	37.6	29	0.8	36.5	21.5
SouthWest	TX	KENT	1	N	21.3	20.1	12	0.7	14.9	82.8
SouthEast	KY	MAGOFFIN	1	Y	21.2	41.0	30	0.1	0.7	98.3
SouthEast	GA	BIBB	1	Y	21.1	42.6	28	51.9	2.8	42.1
SouthEast	SC	MCCORMICK	1	Y	21.0	41.0	25	49.5	0.8	48.3
RockyMtn	MT	ROOSEVELT	1	Y	21.0	30.6	24	0.1	1.3	35.6
SouthEast	AL	PICKENS	5	Y	20.7	34.5	25	41.4	1.6	55.8
FarWest	NV	NYE	4	N	20.6	28.4	17	1.9	13.6	78.9
SouthEast	MS	CLARKE	1	Y	20.4	32.5	22	34.4	0.8	63.8
Plains	SD	DAY	2	N	20.4	19.7	16	0.1	1.1	87.6
SouthEast	FL	GADSDEN	1	Y	20.4	39.7	26	55.8	9.5	33.1
SouthEast	FL	JACKSON	1	N	20.3	31.7	24	26.3	4.3	66.6
SouthEast	KY	JACKSON	1	Y	20.3	36.0	27	0.1	0.6	98.5
SouthEast	AL	TALLAPOOSA	3	N	20.2	34.1	21	26.6	2.5	69.3
SouthEast	NC	HERTFORD	1	Y	20.2	35.3	26	60.2	2.6	34.4
SouthEast	NC	WARREN	1	Y	20.2	34.5	23	52.0	3.3	38.0
SouthEast	LA	ST. LANDRY	1	Y	20.2	40.2	30	41.1	1.6	55.2
Plains	SD	CHARLES MIX	4	Y	20.1	31.4	24	0.1	1.7	64.6
Plains	MO	CARTER	1	Y	20.1	35.4	24	0.1	1.7	95.6

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