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Developing Methods and Measures to Assess Progress in Achieving Access Goals of the Americans with Disabilities Act: A Case Study of Small Towns in Montana

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Research Report

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Abstract

The Americans with Disabilities Act (ADA) was enacted without any baseline data against which to measure progress on achieving its public access goals. To date, no one has collected local, state, or national data to establish such a baseline or to assess progress in achieving those goals empirically. We developed a simple accessibility assessment tool that can aggregate data across businesses and communities. We then established a sampling frame for all Montana incorporated communities with populations of 2,500 – 10,000. We randomly selected 327 businesses to observe from a universe of 2,151 businesses that met inclusion criteria, and we trained accessibility advocates across the State to conduct observations. These advocates observed 236 businesses in 19 communities. Combining ratings across nine categories of accessibility, the State's small cities and towns achieved an overall accessibility rating of 66.5% (2.66 on a 4-point scale), including average ratings of 2.74 for municipal parking availability, 1.91 for municipal parking accessibility, 2.28 for private parking availability, 1.98 for private parking accessibility, 2.91 for the safety and accessibility of municipal routes to businesses, 3.01 for private routes to businesses, 2.80 for accessibility of business entries, 2.42 for accessibility of business doorways, and 3.09 for accessibility of business interiors. Using these data, we identified 86 businesses (35.9% of the sample) that had at least one barrier that would likely preclude a person using a wheelchair from doing business there. This report presents exploratory analyses of the relationship between accessibility ratings and demographic and economic variables. Results are discussed in terms of the value of having longitudinal

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data that can represent the accessibility of communities over time.

Introduction

The Americans with Disabilities Act (ADA) of 1990 is arguably the most significant single effort to enhance community participation of people with disabilities (Brown, 2001), in part by promoting physical access to public places and commercial facilities. Specifically, ADA Titles II and III provide disability advocates with legal tools for promoting access to public places.

Batavia (1992) points out that, despite the ADA's significance, it was "…passed without documentation of need … (and that) … no baseline data exist to assess the implementation of the ADA" (p. 16). Historically, advocates have monitored the implementation and outcomes of the ADA by using a legal model to track the number of complaints filed, characteristics of those filing complaints, the stated reasons for complaints, and how complaints were resolved. This incident-based approach doesn't systematically evaluate ADA compliance across communities, however. Without a meaningful approach to providing assessment data, advocates and policymakers can't measure progress in achieving access goals – they can only track changes in complaints. This limits their ability to encourage development of access in targeted areas or to acknowledge community progress.

Many small, rural communities have aging infrastructures, and few have advocacy groups dedicated to implementing the ADA (Innes, et al., 2000). Currently-available assessment tools and guidelines don't ask the questions or offer the solutions rural communities need to make progress. Of particular note, many assessment instruments are designed for conducting facility assessments. While these instruments provide much detailed information, they are complex, time consuming, and difficult to summarize across settings.

One way to track community accessibility and change over time is to observe the accessibility of places directly. While directly observing all places would be prohibitively expensive, researchers can use statistical sampling to describe a population based on a smaller number of observations (Thompson, 2002). For example, Seekins, Traci, Oreskovich, and Cummings (2008) used the Behavior Risk Factor Surveillance System – a random digit-dialed household telephone survey sponsored by the Centers for Disease Control – to estimate the prevalence of "visitable" homes in Montana. The purpose of this research was to develop and test methods to sample and measure accessibility of communities.

Method

We conducted this study in Montana, a geographically large state with a population of fewer than one million. Working in such a rural state was advantageous because there were relatively few small towns in which to develop and test our environmental assessment methods. We could then estimate the accessibility of small towns in the entire state. Montana has 129 incorporated towns. Table 1 shows the distribution of incorporated towns in Montana by population. We chose to observe rural communities with populations of 2,500 to 10,000. We excluded one of those communities because it is evolving into a bedroom community for a city in the larger population category.

Table 1. Montana's Incorporated Places by Population

Population Range	Number of Incorporated Places
Greater than 10,000	7
2,500 - 10,000	22
Less than 2,500	100

This study looked at places of public commerce "operated by a private entity, whose operations affect commerce." These include retail businesses, location-based consumer services (e.g. salons, physical therapy clinics), entertainment facilities (e.g. theaters, bars, restaurants), and financial institutions (e.g. banks, check cashing businesses).

Researchers used a business classification coding system (North American Industry Classification System, 2002) to identify businesses that do substantial business with the public (e.g. retail businesses). We excluded locations not covered by the ADA (e.g. private homes or churches); government buildings covered by other legislation (e.g. federal buildings covered by Section 504 of the Rehab Act); locations with limited public access (e.g. schools, medical providers, professional service providers, manufacturers, wholesalers); and businesses not dependent on a specific location (e.g. lawn care services, plumbers). We provided this list of business codes to a national business directory publisher, which matched the codes to businesses in its database and produced a list of 2,151 businesses appropriate for our study. Based on a preliminary power analysis, we required a total of 327 businesses; 15.20% stratified per city. We oversampled by 100 to account for businesses that might not be available for observation, and randomly selected 427 businesses appropriate for observation in 21 towns.

Measures

The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) are the standards for judging the accessibility of a business. The ADAAG is comprehensive, but cumbersome. Its 142-page manual of building codes requires precise measurement, such as this example about doorways:

4.13.5 Clear Width. Doorways shall have a minimum clear opening of 32 in (815 mm) with the door open 90 degrees, measured between the face of the door and the opposite stop. Openings more than 24 in (610 mm) in depth shall comply with 4.2.1 and 4.3.3.

The ADAAG is the standard for assessing legal compliance with the ADA, it is not a practical tool for calculating a community accessibility score. Applicable ADAAG codes vary widely from one business to the next. Further, the ADAAG uses yes/no compliance questions which aren't intended for comparison across businesses. Together, these two characteristics make creating summary scores across businesses difficult.

Our approach developed a scaled rating system for major access features that apply to a wide range of public businesses. We reviewed the ADAAG guidelines, and solicited input from a focus group of advocates and individuals with disabilities. We identified six major factors of business accessibility, including: parking availability, parking accessibility, safety and accessibility of route to entry, accessibility of entry to business, door and doorway accessibility, and accessibility of business interior. Three of the factors (parking availability, parking accessibility, and route to entry) could be provided by a municipality, by the private business itself, or by both. This led us to identify nine factors for assessment. We assigned each factor a 4-point rating scale (from least accessible to most accessible) to each feature. Each point on the ratings scale was anchored by operational descriptions of the feature. Following is each major factor and the operational descriptions of its scale.

Nine Access Factors Observed

City/Private Parking Location and Signage

1 - No designated parking within 2 city blocks

2 - Ground sign designated parking within 2 city blocks

3 - Upright designated parking within 2 city blocks

4 - Upright sign plus ground indicators within 2 city blocks

City/Private Parking Accessibility

1 - Standard space only

2 - Designated parking in a standard space

3 - Designated space with a marked area (5 feet wide) for a ramp to extend and a wheelchair to get out

4 - Designated space as in #3 above plus dedicated pathway to route to business

Safety and Accessibility of City/Private Route to Entry

1 - No accessible route to entry

2 - Safe and accessible route but the pathway is difficult to negotiate because of uneven terrain, loose or deep gravel, or high thresholds of 1-2”

3 - Accessible route to entry but exposes one to danger such as needing to go out into the street

4 - Clear, accessible, safe route to entry such as by curb cut to sidewalk with a firm surface that leads to business

Accessibility of Entry to Business

1 - Threshold exceeds a total of 2” in height; or there are steps to the door; or a ramp that is too steep to negotiate without assistance, or there is no landing space at the top of ramp, or a narrow landing that doesn’t allow space for a person in a chair or walker to open the door, or a recessed entry that makes it impossible for a person using a scooter or wheelchair to reach the handle or knob

2 - Level entry but threshold of door between 1-2;” recessed entry difficult to maneuver

3 - Level entry but between 1/2 “ - 1” - may include ramp that can be negotiated with some effort

4 - Level entry with threshold less than 1/2 ‘- may include ramp that is easily negotiable; any recessed entry is easy to maneuver

Door and Doorway Accessibility

1 - Door or doorway is not accessible - even with assistance (e.g. door is too narrow)

2 - Doorway accessible but the door itself presents obstacles (e.g., round-handled door knob, thumb lever, handle to high or too low to reach, heavy pull or push weight, double door with inadequate space between doors)

3 - Door handle is levered or “U” shaped and the door is medium weight that allows opening pull or push of only moderate exertion – double door opening provides space to maneuver a chair or walker while opening the door (or a swinging door)

4 - Fully automatic doorway or entry

Accessibility of Business Interior

1 – Once in the building, a person using a wheelchair or scooter can access less than 50% of the public area because of permanent obstacles (e.g., counters, walls, stairs, structural columns, etc.)

2 - Can access 50-70% of the public area (e.g., major aisles only)

3 - Can access 70-90% of the businesses or retail areas (e.g., major aisles and primary side aisles)

4 - Can move through at least 90% of the business’ public areas

The measure excluded some important access factors that weren’t available at all businesses or were too difficult to assess. For example, we didn’t evaluate restroom accessibility because many small businesses don’t provide restrooms for customers. Restroom evaluation also might require a team of male and female observers, and would significantly increase observation time.

In addition to rating the accessibility of the nine factors, observers noted characteristics of each business, such as whether the business was in a traditional arrangement (i.e. one of several on a city block), in a shared infrastructure (e.g., a mall), or in a free standing building. If a selected business was unavailable for observation, observers noted one of the seven possible reasons described below.

We developed observation protocol and training materials for observers. We conducted a pilot study in one of the selected communities to test our sampling procedures and our observation protocol, and revised both based on that experience.

Procedures

We recruited four centers for independent living serving Montana to conduct observations of towns within their service areas. Each center identified staff and consumer advocates to be observers.

Researchers sent each center a written observation protocol describing how to conduct observations, including operational definitions and examples of each rating anchor for each scale.1 Researchers also sent each center a list of randomly-selected businesses to observe and a list of replacement businesses. Centers also received sufficient rating forms for recording observations. Finally, the researchers provided an overall map of each town plotted with the selected and replacement businesses' locations and a map for each business, with directions from a central location (e.g., county courthouse, city hall, school). Each CIL distributed these materials to its observers and coordinated a training session for the observers.

The lead author provided training to the observers using synchronized telephone and PowerPoint presentation. The observers accessed the PowerPoint presentation via the internet. The training provided background information on the ADA, compared the ADAAG with this approach to measuring accessibility, oriented observers to the access rating forms to be used for evaluating each business, explained the protocol for locating selected businesses and rating their accessibility, and described how to interact with business owners or staff and how to proceed when a selected business could not be observed. The training used a series of photographs to portray a variety of situations so observers could practice evaluating various access features and recording observations. Observers practiced rating several common situations and the trainer provided feedback on their ratings and rationale.

After completing the training, each observer scheduled his or her observations. Observers often worked in teams, with each observer assigned to specific businesses. The protocol required an observer to locate the business to be observed and note whether the business was a traditional arrangement (one of several on a city block), one with shared infrastructure (e.g., a mall), or a free standing business. A business could be excluded from observation if it was located one mile outside of the city limit or city's retail area (if the area extended beyond the city limits) or if it was unavailable for observation. A business would be classified as unavailable for observation for seven reasons: (1) the business is a drive-up, walk-up, or small manufacturing business with no public areas inside the building (e.g., an ice cream stand), (2) the business formerly located at the address no longer exists, (3) the business at the address is different from the business listed for that address, (4) the business at the selected address is in a personal residence, (5) the business is closed for some other reason and the observer cannot return to observe when it is open, (6) the observer cannot find the address on the list, and (7) the observer feels uncomfortable about going inside (e.g., there is a barking dog on the premises). If an observer determined that a scheduled observation met one of these conditions, he or she was instructed to move on to the next business on the list and select a replacement business.

After confirming that an observation could be conducted, the observer located the business's main entrance. From the entrance, the observer located the closest accessible parking space to the main entrance and scored public or private parking availability and accessibility. Next the observer assessed the safety and accessibility of the private and city route from the parking space to the business's entrance. Next the observer evaluated the accessibility of the business's entry and doorway. Finally, the observer entered the business and rated the accessibility of its interior public space.

Sampling Businesses

Prior to developing and disseminating lists of businesses to observers, researchers identified those businesses located 1 mile outside of the city limit or city's retail area (if the area extended beyond the city limits). This step eliminated

30 businesses, reducing the number available for observation from 327 to 297. We replaced the 30 eliminated businesses with businesses from a "replacement" list. This reduced the number of replacement businesses from 100 to 70 and left observers in two cities without any replacements for those businesses meeting the unobservable criteria. Observers classified 70 businesses as unavailable for observation (12 were in the two cities without available replacement businesses). Observers did not draw from the replacement list in ten of the cities where replacements were available and needed to fill the quota identified for that city.

Data Analysis

Observers mailed their completed observation forms to the researchers. Researchers reviewed the scoring and clarified missing data and some ratings with the observers; then entered the data into SPSS 15. Researchers used simple descriptive analyses to calculate the mean rating for each feature across businesses.

Depending on the organization and architecture, access to any business may involve the use of infrastructure (e.g., sidewalk) maintained by a municipality or a private business. We combined ratings of parking availability, parking accessibility, and safety and accessibility of route to a business's entry to create measures of municipal and private infrastructure accessibility. Finally, the presence of any one significant barrier may preclude access to a business regardless of the accessibility of other features. We developed a protocol for identifying businesses with such barriers in order to calculate the percentage of businesses that would likely be inaccessible to a person using a wheelchair.

Results

Observers evaluated a total of 236 (72% of 327) businesses in 19 of the 21 communities eligible to participate. Researchers excluded data from one community because the observed businesses did not correspond to those selected for that community. Observations were not conducted in one community.

Observers classified 92 businesses as Traditional (40.7%), 38 as Shared Infrastructure/Mall (16.8%), and 96 as Free Standing (42.5%). Montana's total statewide community accessibility score was 2.66. Table 2 presents mean, median, standard deviation, and 95% confidence interval for each of the nine accessibility features. In addition, it presents aggregated ratings for municipal infrastructure, private infrastructure, and business interiors.

Table 3 presents the number and percentage of businesses scored at each rating point across each of the nine access features observed. This analysis shows the distribution of ratings that contribute to the total scores.

Table 2. Ratings of Nine Access Features Across 19 Small Towns in Montana

All Cities				
	Mean (n)	Mode	Std. Deviation	95% C.I.
City Parking Location & Signage	2.74 (101)	3.0	1.110	2.52; 2.96
Private Parking Location & Signage	2.28 (102)	1.0	1.214	2.05; 2.52
City Parking Accessibility	1.91 (101)	2.0	.950	1.72; 2.10
Private Parking Accessibility	1.98 (99)	1.0	1.152	1.75; 2.21
Safe & Accessible City Route to Entry	2.91 (117)	3.0	.096	2.75; 3.08

All Cities				
	Mean (n)	Mode	Std. Deviation	95% C.I.
Safe & Accessible Private Route to Entry	3.01 (121)	4.0	1.201	2.79; 3.22
Accessible Entry to the Business	2.80 (225)	4.0	1.246	2.64; 2.96
Door and Doorway Accessibility	2.42 (226)	3.0	.757	2.32; 2.52
Accessibility of Business Interior (18 businesses could not be entered)	3.09 (225)	4.0	1.207	2.93; 3.25
City Infrastructure	2.55 (99)	*	.813	2.38; 2.71
Private Infrastructure	2.83 (97)	*	1.030	2.31; 2.59
Accessibility of Business Interior	2.77 (206)	*	.808	2.66; 2.88
Total Accessibility Score	2.66 (226)	*	.735	2.57; 2.76

Table 3. Businesses Scored at Each Rating Point Across Nine Access Features

Feature & Rating	1 (%)	2 (%)	3 (%)	4 (%)	Total
City Parking Location & Signage	23 (22.8)	9 (8.9)	40 (39.6)	29 (28.7)	101 (100)
Private Parking Location & Signage	41 (40.2)	14 (13.7)	24 (23.5)	23 (22.5)	102 (100)
City Parking Accessibility	38 (37.6)	46 (45.5)	5 (5.0)	12 (11.9)	101 (100)
Private Parking Accessibility	47 (47.5)	26 (26.3)	7 (7.1)	19 (19.2)	99 (100)
Safe & Accessible City Route to Entry	11 (9.4)	20 (17.1)	54 (46.2)	32 (27.4)	117 (100)
Safe & Accessible Private Route to Entry	21 (17.4)	23 (19.0)	11 (9.1)	66 (54.5)	121 (100)
Accessible Entry to the Business	58 (25.8)	27 (11.4)	42 (18.7)	98 (41.5)	225 (100)
Door and Doorway Accessibility	26 (11.5)	90 (39.8)	99 (43.8)	11 (4.9)	226 (100)
Accessibility of Business Interior (18 businesses could not be entered)	34 (16.4)	34 (16.5)	53 (25.6)	86 (41.5)	207 (100)

We calculated the percent of businesses that had architectural barriers which might make it impossible for a person using a wheelchair to do business there. Businesses were selected if they had a “1” rating in at least one of the following accessibility features: City Route, Private Route, Business Entry, Doorway Accessibility, or Business Interior. Using this criteria, we found that 81 businesses out of 226 (35.9%) were not accessible to individuals using wheelchairs.

We created two dummy variables to explore the role of infrastructure type. Preliminary analyses indicated that the dummy variable for free standing building (relative to traditional building) had no explanatory value for predicting total accessibility or sub-scores for city infrastructure, private infrastructure, and private interior. The dummy variable for shared infrastructure, however, significantly explained variance in the city-infrastructure score. A dummy variable to control for shared infrastructure relative to traditional or free standing will be retained in regression models for the city infrastructure score described below. It is possible that shared infrastructure serves as a proxy for the age of a building and may correlate with introduction of the ADA requiring designated parking spaces and routes to businesses.

In addition to these basic analyses we explored economic variables that might help explain the variance in accessibility across cities. Table 4 presents our tentative hypotheses and economic variables from the U.S. Census Bureau.

Table 4. Exploratory Hypotheses and Data Variables Used

Hypothesized Direction	Variable
Growing communities will have better infrastructure to meet the needs of people with disabilities	1. Change in county population , 1990-2000 2. Retail sales per capita, 2002
Based on need for accessibility, communities with a higher percent of disability or aging populations will be more accessible	3. Percent of county population over 65, 2000 4. Percent of county population with disabiity (age 5+), 2000
A more affluent population will predict accessibility, since there is a larger tax base to support community improvements	5. Home ownership rate, 2000 6. Median value of owner-occupied housing units, 2000 7. Median household income, 2004 8. Per capita money income, 1999 9. Bachelor's degree or higher (age 25+), 2000
Size of town and density of population will explain variance in accessibility	10. Person per square mile, 2000 11. City population, 2000

Table 5. Results of Exploratory Analysis of Economic and Demographic Predictors of Accessibility

Explanatory Variable	Total Score (n=207)	City Infrastructure (n=98)	Private Infrastructure (n=96)	Private Interior (n=205)
PopGrowth	R = .280 R2= .079 F = 19.086 Sig. = .000	R = .464 R2= .215 F = 26.610 Sig. = .000	R = .351 R2= .123 F = 13.381 Sig. = .000	R = .140 R2= .020 F = 4.066 Sig. = .045
RetailSales	R = .173 R2= .030 F = 6.950 Sig. = .009	R = .262 R2= .069 F = 7.136 Sig. = .009	R = .017 R2= .000 F = .028 Sig. = .868	R = .133 R2= .018 F = 3.659 Sig. = .057
Percent65	R = .057 R2= .003 F = .743 Sig. = .390	R = .148 R2= .022 F = 2.171 Sig. = .144	R = .012 R2= .000 F = .014 Sig. = .906	R = .081 R2= .007 F = 1.345 Sig. = .248
DisPerCapita-wrong direction	R = .239 R2= .057 F = 13.575 Sig. = .000	R = .327 R2= .107 F = 11.603 Sig. = .001	R = .052 R 2= .003 F = .260 Sig. = .611	R = .274 R2= .075 F = 16.591 Sig. = .000
House-Owned	R = .137 R2= .019 F = 4.297 Sig. = .039	R = .189 R2= .036 F = 3.598 Sig. = .061	R = .212 R2= .045 F = 4.462 Sig. = .037	R = .009 R2= .000 F = .017 Sig. = .898
House_Value	R = .229 R2= .052 F = 12.362 Sig. = .001	R = .365 R2= .133 F = 14.889 Sig. = .000	R = .301 R2= .090 F = 9.449 Sig. = .003	R = .116 R2= .014 F = 2.802 Sig. = .096

Explanatory Variable	Total Score (n=207)	City Infrastructure (n=98)	Private Infrastructure (n=96)	Private Interior (n=205)
Income_Median	R = .252 R2= .063 F = 15.129 Sig. = .000	R = .353 R2= .124 F = 13.790 Sig. = .000	R = .186 R2= .035 F = 3.409 Sig. = .068	R = .184 R2= .034 F = 7.170 Sig. = .008
Percent BA	R = .118 R2= .014 F = 3.146 Sig. = .077	R = .136 R2= .018 F = 1.828 Sig. = .180	R = .078 R2= .006 F = .587 Sig. = .445	R = .107 R2= .012 F = 2.381 Sig. = .124
Person Per Square Mile	R = .053 R2= .003 F = .633 Sig. = .427	R = .131 R2= .017 F = 1.705 Sig. = .195	R = .167 R2= .028 F = 2.717 Sig. = .103	R = .096 R2= .009 F = 1.893 Sig. = .170
City Pop	R = .037 R2= .001 F = .309 Sig. = .579	R = .019 R2= .000 F = .035 Sig. = .853	R = .052 R2= .003 F = .254 Sig. = .616	R = .015 R2= .000 F = .048 Sig. = .826

Many of the significant explanatory variables are likely to covary and present multicollinearity problems if used simultaneously in multivariate regression models. Table 6 shows the correlation matrix for all significant variables to look at how potential explanatory variables covary. When correlations are greater than .700, variables that explain the most variance will be retained for follow-up regression models.

Table 6. Correlations Between Possible Explanatory Variables

	Pop Growth	Retail Sales	Disability Rate	Home Ownership	House Value	Median Income	Per Capita Income
Pop Growth	1.0	.193	-.241	.311	.887	.624	.545
Retail Sales		1.000	-.530	-.071	.172	.716	.522
Disability Rate			1.000	.354	-.202	-.487	-.229
Home Ownership				1.000	.349	.291	.383
House Value					1.000	.680	.751
Median Income						1.000	.871
Per Capita Income							1.000

Using information about the strength of association from bivariate comparisons, and omitting variables that are likely to introduce issues of multicolinearity, we explored models for each accessibility score (total accessibility, city infrastructure, private infrastructure, and private interior).

Total Accessibility

We present two models that account for variance in that total accessibility score. Table 7 reports regression results from a model exploring total accessibility as a function of population growth, median county income, county rate of disability, and home ownership rate (R2 = .135; F = 8.634, $p \leq .000$).

Table 7. Total Accessibility Regression Model-Preliminary

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Population Growth	.018	.189	2.327	.021
Median Income	-1.45 E-005	-.074	-.753	.452
Disability Rate	-.110	-.303	-3.406	.001
Home Ownership	.034	.207	2.524	.012

Table 8 reports on a more parsimonious model omitting median income (R2 = .133; F = 11.345, p ≤ .000).

Table 8. Total Accessibility Regression Model-Final

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Population Growth	.016	.160	2.239	.026
Median Income	-.096	-.264	-3.636	.000
Disability Rate	-.096	-.264	-3.636	.000
Home Ownership	.030	.181	2.436	.016

City Infrastructure

We present two models to account for variance in the city infrastructure score. The first model explores city infrastructure as a function of population growth, median county income, and a dummy variable to account for shared infrastructure (R2 = 35.2; F = 12.768, p ≤ .000).

Table 9. City Infrastructure Regression Model-Preliminary

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Population Growth	.056	.486	4.346	.000
Median Income	-2.97 E-005	-.119	-.975	.332
Disability Rate	-.125	-.290	-3.091	.003
Home Ownership	.755	.293	3.477	.001

Like the model for total accessibility, a more parsimonious model omits median income (R2 = 34.6; F = 16.716, p ≤ .000).

Table 10. City Infrastructure Regression Model-Final

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Population Growth	.048	.415	4.876	.000
Disability Rate	-.108	-.252	-2.955	.004
Shared Infrastructure	.720	.280	3.363	.001

Private Infrastructure

Variance in private infrastructure is explained by population growth and home ownership rate (R2 = 13.6; -F = 7.375, p ≤ .001).

Table 11. Private Infrastructure Regression Model-Preliminary

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Population Growth	.042	.316	3.142	.002
Home Ownership	.025	.116	1.151	2.53

A more parsimonious model for private infrastructure omits home ownership (R2 = 12.3; F = 13.381, $p \leq .000$).

Table 12. Private Infrastructure Regression Model-Final

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Population Growth	.047	.335	3.658	.000

Private Interior

Economic variables do not describe the interior of private businesses well. For instance, population growth, median income and rate of disability explain only 8% of the variance in private interior (R2 = .080, F = 5.88, $p \leq .001$).

Table 13. Private Interior Regression Model-Preliminary

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Population Growth	.008	.075	.836	.394
Disability Rate	-.099	-.255	-3.141	.002
Median Income	-3.37 E-008	.000	.096	.999

Table 14. Private Interior Regression Model-Final

Variable	Beta Unstandardized	Beta Standardized	t	Sig.
Disability Rate	-.106	-.274	-4.073	.000

This confusing outcome for private infrastructure implies that rate of disability negatively affects community accessibility. It is more likely that rate of disability is interacting spuriously with other economic variables. For instance, 70% of the variance in disability can be explained by the following economic variables: percent of population with BA (-); median income (-); population growth rate (-); house_value (+); persons per square mile (+); and per capita income (+).

Discussion

This study reports on the development of methods and measures for gathering baseline data on public accessibility across communities. Overall, Montana's small cities and towns achieved an average of 2.66 on a 4-point scale but 36% of businesses had at least one physical barrier that would prevent patronage by a person using a wheelchair. We found that the recent economic growth rate of a community was positively associated with accessibility, but the type of business structure did not predict access.

Compared to private parking spaces, a higher percentage of city parking spaces are within two city blocks of the observed businesses, and are designated spaces with either an upright sign or an upright sign plus a painted pavement sign. Within 2 city blocks of the observed businesses: (1) most

city and private parking spaces are standard-sized, (2) 43% of the city spaces are designated handicapped parking, and (3) almost 50% of the private parking spaces are not designated handicapped parking.

Private routes to businesses' entries are the safest with 53% scoring a 4, generally because they enter directly from a parking lot. A high percentage (46.2%) of cities' parking spaces were rated 3. That is because most city spaces are on the street and are oriented such that a person in a wheelchair exiting from the passenger side must enter into the street, often passing behind one or more cars, to get to a curb cut.

Just over 43% of the observed businesses can be entered with ease. Unfortunately, one-quarter of the observed businesses are impossible or difficult to access. However, we did not record the specific reason a business scored 1 on this factor.

Half the businesses observed had accessible doorways and doors, with 43.9% scoring a 3 and 5% scoring a 4. Thirty-nine percent (39%)of the businesses' doors presented obstacles, and almost 12% of the businesses had inaccessible doorways or doors.

Two-thirds of the businesses (67.8%) provided access to 70-100% of their public commercial floor space (bathrooms were not observed). One-third of businesses had fairly large portions of floor space blocked by obstacles that people using wheelchairs or scooters could not negotiate.

These data suggest that private businesses appear to have worked in good faith to create or maintain the accessibility of their businesses' interiors. It is perhaps surprising that this factor received the highest average rating. Disability advocates might reinforce and congratulate such businesses for their efforts. Conversely, the accessibility of both municipal and private parking scored the lowest. If parking accessibility is highly important, significant progress might be made by targeting this factor. One community, for example, took advantage of the State's highway renovation to improve downtown accessibility. It raised the sidewalk to meet building doorways, installed curb cuts on all intersection corners, and provided dedicated parking spaces at each city block corner.

While these findings are of interest, methodologically, there are several limitations to this study. First, we relied on systematic training to establish consistency in observation and did not collect inter-rater reliability.

Second, observers did not always follow the prescribed protocol. For example, one of the observers reported in an interview that she was a trained ADA evaluator and had used ADAAG standards rather than those established for this study to judge several factors. Similarly, two observers inadvertently mismatched the names and addresses of the businesses they were assigned to observe. One observer was familiar with the businesses she was to observe and was able to successfully complete her assignment. The other observer, however, was unfamiliar with his assigned community and classified many businesses as "unable to observe. It is unclear how this error happened and what effect it may have had regarding the misclassified businesses.

Third, we did not examine the validity of deriving aggregate scores by combining ratings of separate dimensions.

Exploratory analyses suggest that economic and demographic variables may influence a community's accessibility. In general, our analyses suggested that economic vitality and population growth are positively associated with accessibility. Surprisingly, our analyses did not show a correlation between accessibility and percent of city residents over 65 years old, and showed a negative correlation with percent of city residents with disability. Larger samples and data collected over time might yield a clearer understanding of these relationships.

Future research might improve these methods by addressing several issues. First, researchers might refine the scales for rating the accessibility of a business's interior. Second, training might be improved by (a) providing additional examples, (b) developing a follow-up test and requiring trainees to meet established criteria on

their knowledge of implementation procedures, (c) developing methods for establishing inter-rater reliability at a distance, (d) developing methods for communicating with the observers in the field, and (e) ensuring that observers do not use ADAAG criteria for this research. Finally, to test their generalizability, the methods and measures should be used to assess the accessibility of larger communities.

Conclusion

This study provides scientific framework for creating baseline measures of public accessibility. These methods have the potential to measure progress in achieving the goals of the Americans with Disabilities Act at a community, state, and national level.

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