

Development of a Health Care Resource Index

Kevin J. Bennett, PhD

Janice C. Probst, PhD

Elizabeth Crouch, PhD

Michael Kacka, MD



South Carolina

Rural Health Research Center



UNIVERSITY OF SOUTH CAROLINA
SCHOOL OF MEDICINE

At the Heart of Public Health Policy

Rural Access to Care

- Provider shortages / maldistribution
 - ◆ PCPs
 - ◆ Specialists
- Hospital availability, closures
- Services may be limited (obstetrics)
- Travel for care
- Poorer outcomes



So why an index?

- RWJF County Health Rankings
 - ◆ County based
 - ◆ Mix of outcomes, resources, process measures, SES measures
- America's Health Rankings
 - ◆ Also county based
 - ◆ Mix of outcomes, policy, utilization, resources, and environment



So Why an Index?

- Looking for a single measure of health care resources in an area
- E.g. lack of a hospital doesn't tell the full story
- Comprehensive, across the care continuum



South Carolina

Rural Health Research Center



UNIVERSITY OF SOUTH CAROLINA
SCHOOL OF MEDICINE

Developing the HCRI

- Health Care Resource Index (HCRI)
- Area Health Resource File, 2016-2017 version
 - ◆ Most available data from 2014
- County based
- Began by examining all the resource measures
 - ◆ Providers
 - ◆ Facilities
 - ◆ Other organizations



Narrowing it down

- Operationalized in several forms:
 - ◆ Per 1,000 residents
 - ◆ Raw count (1,2,3, etc)
 - ◆ Yes / No (is there at least one)
- Correlation Matrix
 - ◆ Eliminated those with a $Rho > .80$
 - ◆ Some were close, but kept (e.g. RNs associated with specialists, hospital beds)



Final List

- Primary care providers [per 1,000]
- Total specialists (Allergy/Immunology, Cardiology, Dermatology, Gastroenterology, Pulmonology, Neurology, Orthopedics, Otolaryngology, Colorectal, Thoracic, Urology, Podiatry, Radiology) [per 1,000]
- Obstetrics /gynecology providers [per 1,000]
- Pharmacists [per 1,000]
- Dentists [Number per 1,000]
- Physician extenders (PA, NP, APRN) [per 1,000 residents]
- Registered nurses [per 1,000]
- Hospital beds [Number per 1,000 residents]
- Total community-based acute inpatient facilities (including VA facilities) [Yes/No]
- Facilities with an obstetrics unit [Yes/No]
- Home health and hospice facilities [Number]
- Community mental health facilities [Yes/No]
- Number of long term care beds [Number per 1,000 residents]
- Community clinics (rural health clinics, FQHCS) [Number]



Factor Analysis

	Factor1 Workforce	Factor 2 General Care Facilities	Factor 3 Specialized Care Facilities
Specialists	.86	-.10	.17
Reg. Nurses	.82	.42	.50
Phys. Extenders	.78	.19	.60
OB/GYN	.76	-.15	.22
Primary Care Providers	.73	.40	.14
Pharmacists	.69	.23	.30
Dentists	.62	-.09	.24
VA Hospitals	.22	-.10	.83
Clinics	.10	-.50	.77
Comm. Mental Health Facilities	.10	-.30	.53
Hospital Beds / 1,000	.32	.79	.1
Long Term Beds / 1,000	.01	.56	.01
Home Health/Hospice Facilities	-.30	.26	-.50



South Carolina

Rural Health Research Center



UNIVERSITY OF SOUTH CAROLINA
SCHOOL OF MEDICINE

HCRI Computation

- Standardized, zero-centered mean
- Number of general acute care hospital facilities, facilities with an obstetrics unit, and community mental health facilities
 - ◆ 1/-1
- HCRI = sum of above
- Subset into quartiles



Covariates

Anderson's Model

- ◆ Predisposing factors
 - ☞ % non-white
 - ☞ % male
 - ☞ % military veteran
- ◆ Enabling factors
 - ☞ % without a high school diploma
 - ☞ % with a college degree
 - ☞ % uninsured (< 65 years old and those <19 years old)
 - ☞ % unemployed
 - ☞ % in poverty
- ◆ Need factor -- % aged 65 years or older.
- ◆ Environmental
 - ☞ Rurality -- Urban Influence Codes (UICs)
 - ☞ metropolitan (UICs 1, 2), micropolitan (UICs 3, 5, 8), small adjacent (UICs 4, 6, 7) and remote rural (UICs 9, 10, 11, 12).
 - ☞ Region -- Northeast, Midwest, South, and West



Outcomes

- Number of ED visits per 1,000 Medicare beneficiaries
- 3-year overall age-adjusted mortality
- Risk-adjusted standardized per-capita Medicare expenditures.



South Carolina

Rural Health Research Center



UNIVERSITY OF SOUTH CAROLINA
SCHOOL OF MEDICINE

HCRI Overview

- 3137 counties included in the analysis
- HCRI values ranged from -9.30 to 116.89
- Median: -1.51
- Mean: 0.0004
- SD: 7.42
- IQ Range: 7.47.

	Mean	Median
Urban	2.22	0.18
All Rural [†]	-1.32	-2.09
Micropolitan [†]	0.20	-0.36
Small Adjacent [†]	-3.08	-3.59
Remote [†]	-1.04	-1.90

[†] Significantly different from Urban, $p < 0.05$



Associations, mean by HCRI quartile

	% Non-White	% Male	% 65+	% Vets.	% W/o a HS Diploma	% W/ College Degree	% Uninsured	% <19 Uninsured	% Unemployed	% in Poverty
All	8.0	49.6	17.3	8.2	13.6	17.9	14.0	6.5	6.0	15.8
0-25 th	6.5	50.0	18.0	8.4	17.3	14.3	15.9	7.8	6.2	16.6
25 th -										
50 th	6.3	49.7 [†]	17.6 [†]	8.2	15.0 [†]	15.8 [†]	14.3 [†]	6.6 [†]	6.2	16.6
50 th -										
75 th	7.2	49.6 [†]	17.6 [†]	8.3	12.4 [†]	18.8 [†]	13.0 [†]	6.1 [†]	6.1	15.4 [†]
75 th -										
100 th	12.7 [†]	49.2 [†]	15.7 [†]	7.8 [†]	11.4 [†]	24.4 [†]	12.9 [†]	5.7 [†]	5.8 [†]	15.2 [†]

[†] Significantly different from the 25th Percentile, p < 0.05



Outcome Measures

	ED visits/ 1,000 residents	3-year Mortality Rate	Standardized Risk-adjusted Per-capita Medicare Expenditures
All	659	10.5	9,399
0-25 th	634	10.8	9,390
25 th -50 th	688 [†]	11.0	9,510 [†]
50 th -75 th	666 [†]	10.7	9,437
75 th -100 th	651 [†]	9.6 [†]	9,288

[†] Significantly different from the 25th Percentile, $p < 0.05$



Discussion

- First ‘swipe’ at a comprehensive index
- Utility for studies, provide context
- Further analytic, component needs
 - ◆ Facilities?
 - ◆ HH/Hospice
 - ◆ Policy?
 - ◆ Coverage?
- Associations with outcomes – what is the driving factor?



Questions / Comments?

- Kevin J. Bennett – kevin.bennett@uscmed.sc.edu
- @scrhrc, @kevbosheth
- Our web site:
 - ◆ rhr.sph.sc.edu
- Funding from:
 - ◆ Federal Office of Rural Health Policy, Health Resources & Services Administration, USDHHS





The Rural Health Research Gateway provides access to all publications and projects from eight different research centers.

Visit our website for more information.

ruralhealthresearch.org

Sign up for our email alerts!

ruralhealthresearch.org/alerts

Shawnda Schroeder, PhD

Principal Investigator

701-777-0787

shawnda.schroeder@med.und.edu



**Rural Health Research
& Policy Centers**

Funded by the Federal Office of Rural Health Policy

www.ruralhealthresearch.org

Center for Rural Health
University of North Dakota
501 N. Columbia Road Stop 9037
Grand Forks, ND 58202