Comparison of Coding Schemas for Rural-Urban Designations with New York State Counties and Birth Outcomes as Exemplars

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Abstract

Purpose: The purposes of this article are to provide background information on the agencies responsible for the development of rural coding schemas at the county level, to explain the types of codes and the definitions of terms included in the codes, and to provide a concise table that presents the assigned codes for each county in New York State.
Findings: Roles of U.S. Census Bureau, Office of Management and Budget, and Economic Research Service were described. At the county level, Urban Influence Codes, Rural Urban Continuum Codes, and NCHS Codes were outlined and compared. RUCA and Frontier Community Codes were discussed as non-county based rural classification schemas.
Conclusions: Nursing is integral to the attainment of better health outcomes through advocacy and policy recommendation at federal, state, and local levels. Accurate measures of rurality should be applied at the decision making level for the allocation of scarce resources that support projects and programs most effective for vulnerable rural populations. Maintaining policies that benefit vulnerable populations requires funding; but needs analyses using inappropriate coding schemas can result in lack of funding or the implementation of policies that are ineffective for the targeted population. This study attempted to elucidate nuances among the three rural coding schemas and demonstrated that using the appropriate rural coding schema may highlight rural/urban health disparities more clearly.

Keywords: Classification schemas, County, Rural Definitions, Rural-Urban Codes, New York State

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Nursing is integral to the attainment of better health outcomes through advocacy, participation in policy recommendation at the local, state, and national levels, and through the provision of skilled care for vulnerable populations in community and hospital settings. Working in tandem with policy planners, advanced practice nurses play a key role in ensuring that the voice of nursing is heard and that evidence-based practices are implemented (Bent, 2011).

Policies and programs that achieve better health outcomes are vital for both rural and urban settings. However, attainment of appropriate policies and programs can be difficult since the definitions of rural and urban are complex. To date, there are over a dozen definitions for rural and urban that are being used by federal agencies (Cromartie & Bucholtz, 2008).

Definitions for urban and rural have been based on three concepts: the administrative concept, the land-use concept, and the economic concept. The administrative concept defines

urban based on municipal boundaries or jurisdictional boundaries while the land-use concept employs definitions based on population density. The concept most often used for rural research is the economic concept that is based on commuting patterns that allow rural areas to access the labor, trade, and media markets found in urban locations (Cromartie & Bucholtz, 2008).

From a health policy perspective, in order to match the administrative structures responsible for policy implementation and evaluation, policy analyses and recommendations need to be conducted at the county level rather than smaller geographic areas. Yet, some classification schemas assign codes for statistical areas that cross county and state lines. Maintaining policies that benefit vulnerable populations requires funding; but needs analyses using inappropriate coding schemas can result in lack of funding or the implementation of policies that are ineffective for the targeted population.

New York State: An Exemplar

There are 62 counties in NYS. The economic base of each of these counties is dependent, in part, on federal grants that are determined by the rural or urban classification of the county. Counties have been designated as rural or urban by one system, as nonmetropolitan or metropolitan by another and as metropolitan statistical or micropolitan statistical areas by a third. There is a need for articulation of the meanings embedded in different codes and their relationships to the counties of New York.

Among the agencies that have developed classification codes, there is no standard method of classification. Definitions of rural have been based on geographical units of counties, zip codes, and census blocks. Counties are political jurisdictions that have stable boundaries, but they vary greatly in population and landmass. In addition, larger counties possess both urban and rural areas. While zip codes are more precise than county designations, they are used primarily by the postal service and tend to change more frequently. Census blocks are the most precise. “Policies based on census tract definitions can be hard to implement, because census geography information is not commonly used by programs and payers, including Medicare intermediaries, insurance companies, and Medicaid” (Coburn et al., 2007).

Classification schemas chosen by researchers or policy analysts are often based on the applicability of their definitions to policies, populations, and desired outcomes. For example, choosing a classification scheme whose definition is inappropriate can result in the lack of accessibility of a program designed for rural populations that are located within a metropolitan or urban county. The purposes of this article are to provide background information on the agencies responsible for the development of coding schemas at the county level, to explain the types of codes and the definitions of terms included in the codes, and to provide a concise table that presents the assigned codes for each county in New York State.

Agencies Responsible for Developing Codes

There are four agencies that have developed codes: The United States (US) Census Bureau, the Office of Management and Budget (OMB), the Economic Research Service (ERS) of the US Department of Agriculture (USDA), and the National Center for Health Statistics (NCHS) of the Center for Disease Control and Prevention (CDC). The first two have provided definitions based on population and land area. The ERS has devised the codes that are used to determine eligibility for Federal grant programs in rural areas, by policy makers when they implement programs and laws, and by researchers and government agencies for statistical consistency and accuracy in their studies (Rural Assistance Center, 2009). The NCHS codes are based on the codes devised by the other three agencies and are used with the NCHS data systems “to study the association

between urbanization level of residence and health and to monitor the health of urban and rural residents" (Center for Disease Control and Prevention, 2006).

U.S. Census Bureau. "The Census Bureau identifies and tabulates data for the urban and rural populations and their associated areas solely for the presentation and comparison of census statistical data (U.S. Census Bureau, 2002). The Census Bureau has divided geographic areas into census block groups. For the 2000 census, the Bureau defined urban by territory, population, and housing units. The classification of urban was further divided into urban areas and urban clusters. Urban areas have populations of at least 50,000 and urban clusters have populations between 2,500 and 50,000. Each of these classifications was determined by total land area and population. Urban areas and urban clusters each have core areas as well. Core areas are within the urban area or urban cluster and have a population density of 1,000 per square mile (Coburn et al., 2007).

The Census Bureau classified rural as all territory, population, and housing units located outside of urban areas and urban clusters (U.S. Census Bureau, 2002). "The Bureau's definition is the only federal definition that applies the term 'rural' in an official, statistical capacity, allowing it to be viewed as the 'official' or 'default' definition of rural." (Rural Assistance Center, 2009). Although the definitions are used as a basis for the ERS classifications, the Census Bureau's urban areas and urban clusters are not assigned by county. In New York, there are 16 urban areas, some of which extend into Pennsylvania, Connecticut, and New Jersey and 116 urban clusters, most of which are towns or cities.

Office of Management and Budget. The OMB classifies population and areas solely for statistical purposes. In 2003, the OMB developed the designations of metropolitan, micropolitan, and combined statistical areas so that national definitions would be consistent (Bolten, 2004; Rural Assistance Center, 2009). Designations are updated annually to reflect changes in population estimates. "The OMB classifies counties as *metropolitan*, when one or more county is the 'core' and other counties are included based on commuting patterns into the core" (Coburn et al., 2007). According to the OMB, counties included in metropolitan and micropolitan statistical areas contain both urban and rural territories and populations (Bolten, 2004). A metropolitan area contains at least one central county with urbanized areas. Micropolitan counties are located outside metropolitan areas and are divided into micropolitan areas and noncore counties. Micropolitan areas have at least one urban cluster with a population between 10,000 and 50,000 plus adjacent territory with high commuting ties (Coburn et al., 2007; Office of Management and Budget, 2008). Combined statistical areas are groupings of metropolitan and micropolitan statistical areas. Since they are combinations of these areas, they cannot be compared with individual metropolitan and micropolitan statistical areas (Office of Management and Budget, 2008). As of 2008 in New York, there were 14 metropolitan statistical areas, 15 micropolitan statistical areas, and 6 combined statistical areas. A complete list of these areas can be found at http://www.whitehouse.gov/omb/assets/omb/bulletins/fy2009/09-01.pdf. Although this document is large, it provides lists of these areas for all states in List 6 beginning on page 112 of the document.

Economic Research Service. The Economic Research Service (ERS) of the United States Department of Agriculture's Office of Rural Health Policy is an agency in which research is conducted that provides information on economics and policy for decision making in the areas of food, farming, natural resources, and rural development (United States Department of Agriculture, 2009). ERS is the agency responsible for developing the Urban Influence Codes

(UI), the Rural-Urban Continuum Codes (RUCC), and the Rural Urban Commuting Area (RUCA) codes.

Types and Definitions of Codes

County Level Codes.

Urban Influence Codes. In 2003, The ERS revised UI codes based on changes in OMB definitions. These codes were designed to capture differences that exist among economies so that smaller economies would be able to benefit from the influences of information, communication modalities, trade, and finance they could access in urban economies (United States Department of Agriculture Economic Research Service, 2007). For that reason, using Census Bureau definitions, counties have been designated as metropolitan, micropolitan, and noncore based on population, land area, and commuting patterns. Metropolitan counties are coded as 1 or 2 and nonmetropolitan counties are coded as 3-12. Table 1 provides a summary of these codes.

Rural Urban Continuum Codes. In 2003, the ERS also revised RUCC using OMB designations of metropolitan and nonmetropolitan as a basis for the revision. While working with county level data, these codes allow researchers to subdivide nonmetropolitan data into more precise residential groups that permit the analysis of trends applicable to rural locations and proximity to metropolitan locations (United States Department of Agriculture Economic Research Service, 2004). Metropolitan counties are coded 1-3, based on population, and nonmetropolitan counties are coded 4-9 based on urban population in the county and whether they are adjacent to a metropolitan area. Table 2 shows a summary of these codes.

National Center for Health Statistics. The NCHS codes classify all US counties and county equivalents as either urban or rural based on a six-level scheme. Definitions are based on OMB definitions and RUCC and UIC classifications (Center for Disease Control and Prevention, 2006). Within this classification scheme, large metropolitan central counties are coded as most urban and nonmetropolitan noncore counties are coded as most rural. Large metropolitan counties are divided into the categories of large metro central, code 1, and large metro fringe, code 2, to differentiate between the health measures reported for the residents living in these two types of counties. There are 36 metropolitan counties and 26 nonmetropolitan counties in New York State. Included in the 26 nonmetropolitan counties are 11 nonmetropolitan noncore counties. A weakness of the NCHS classification schema is that all noncore counties are coded as 6. By grouping the 11 nonmetropolitan noncore counties together, smaller noncore counties with limited resources may be at a disadvantage as they attempt to implement and maintain programs that address their unique health measures.

According to the NCHS, their county classification scheme should only be used for data files in which data for all counties have been reported (Center for Disease Control and Prevention, 2006). Information about this classification scheme and data sets can be accessed at http://www.cdc.gov/nchs/data_access/urban_rural.htm. Table 3 shows the descriptions and definitions for each of the NCHS codes.

Additional Codes.

RUCA Codes. The ERS, working with the WWAMI Rural Health Research Center of the University of Washington, developed the RUCA codes. These codes are based on census tracts and use the "Bureau of Census urbanized area standard and place definitions in combination with commuting information to characterize rural and urban status of census tracts" (Rural Assistance

Center, 2009). RUCA codes are tiered based on level of commuting and primary flow to urban areas and urban clusters. Codes 1-3 are for metropolitan areas, codes 4-6 are for micropolitan areas, codes 7-9 are for small rural town cores, and code 10 is for an isolated small rural area. The ERS has a spreadsheet on its website at http://www.ers.usda.gov/Data/RuralUrbanCommutingAreaCodes/2000 that provides 2000 RUCA codes by either state census tracts or all US census tracts. The WWAMI Research Center provides a zip code approximation of RUCA codes at its website http://depts.washington.edu/uwruca/ruca-data.php where two choices are available: *general methods* or Census Tract RUCA codes (Rural Health Research Center, n.d.a.). Since RUCA codes use smaller geographic units, this system is more precise than county-based coding systems (Washington State Department of Health, 2009). In the healthcare arena, use of RUCA codes can help to delineate areas of poverty, and to support the need for federally funded programs for those living in impoverished locations. In addition, RUCA codes are valuable for the determination of provider ratios for specific areas, especially when those smaller areas are located in larger metropolitan areas.

Frontier Community Codes. The federal Office of Rural Health Policy in collaboration with ERS is working on a new definition of rural. This project, to have been completed in 2011, will provide a standardized definition for rural frontier/remote (Rural Health Research Center, n.d.b.). The National Center for Frontier Communities has defined frontier as "fewer than seven people per square mile" (Rural Assistance Center, 2011). The designation of frontier is achieved through a point scale that totals a maximum of 105 points. Points are awarded for density, distance, and travel time. An area needs to accrue 55 points to reach the designation of frontier. The detailed point scale can be found at http://www.frontierus.org/documents/matrix.htm (National Center for Frontier Communities, n.d.).

Comparison of Alternative Coding Schemas

Based on the definitions for each of the codes and the foci of the agencies responsible for assigning codes, counties whose code numbers are different may actually be defined essentially the same way. The Urban Influence Codes, the RUCC, and the NCHS Classification Schemes all assign a code of "1" for metropolitan counties whose population is equal to or greater than 1 million, but NCHS further divides its metropolitan counties into central and fringe counties with populations equal to or greater than 1 million to address the diverse health needs that exist in these types of counties (Center for Disease Control and Prevention, 2006). An RUCC of "2" has essentially the same definition as an NCHS code of "3," indicating counties in metro areas with populations of 250,000 to 1 million. An RUCC of "3" has essentially the same definition as an NCHS code of "4," indicating counties in metro areas with populations of fewer than 250,000. The Urban Influence Code "2" corresponds to the RUCCs "2" and "3" and the NCHS codes "3" and "4."

Examination of the coding schemes through contingency tables demonstrated that only 7 counties are coded as "1" and only 5 counties are coded as "6" in all three classification schemes. The remaining county codes may be similar for two of the agencies and differ for a third or may differ for all three agencies. For example, Alleghany County has a different code for each classification scheme. The Urban Influence Code for Alleghany County is "9," the RUCC is "7," and the NCHS code is "6." Clinton County's Urban Influence Code is "8" while both the RUCC and NCHS codes are "5." Seneca County's Urban Influence Code is "3," but it is "6" for both

RUCC and NCHS codes. These three counties highlight the differences that exist in the assignment of county codes.

It is not difficult to see why county code designations require articulation. It is necessary to understand both the purposes of the agencies which assign codes and the definitions of the codes themselves. Tioga County, in NYS, illustrates this well. Based solely on its 2007 population of 50,453, Tioga County would be classified as a rural county by any conceptual measure. However, since it is located near a metropolitan area with a population of 50,000-250,000 and a substantial number of its residents commute from a nonmetropolitan to a metropolitan area for employment, Tioga County is classified as a "2" for Urban Influence Code, "2" for RUCC, and a "4" for NCHS. When deciding on the classification scheme, it is important to remember that the terms rural and nonmetropolitan are not equal. The term nonmetropolitan includes the county commuting patterns. Since NCHS codes differentiate between health measures that exist in the counties, the assigned code of "4" identifies Tioga as a county with health measures consistent with counties in metropolitan areas containing populations of 50,000-249,000.

Table 1 shows the codes for each of the classification schemes presented in this paper and Table 2 provides comparisons of the codes and their definitions for the three classification schemas. From a perusal of Table 2, one can see that using NCHS codes can simplify analyses since the groupings of micropolitan counties and noncore counties have resulted in fewer codes. However, the simplicity of this coding system is only valuable when this classification schema is the best choice for the research being conducted.

Application of Codes in the Analysis of Birth Outcomes in New York State Counties

The importance of choosing the appropriate rural coding schema can be demonstrated using low birth weight (LBW) as an example. Healthy People 2010 and Healthy People 2020 include the improvement of the health of women, infants, and children as goals. Both emphasize the importance of maternal physical and emotional health and both recognize the effect their absence can have on birth outcomes. Both call for the reduction of LBW (Peck & Alexander, n.d.).

Many nurse researchers have addressed issues, in general, related to poorer birth outcomes such as race, smoking, and substance abuse. African American women have the highest rate of LBW (Center for Disease Control and Prevention, 2002, July 12; Gorman, 1999; Kramer & Hogue, 2008; Laditka, Laditka, & Probst, 2006; Nabukera et al., 2009). A goal of both Healthy People 2010 and Rural Healthy People 2010 is the reduction of substance abuse (Peck & Alexander, n.d.).

LBW is defined as a birth weight less than 2500 grams (5.5 pounds) at birth and VLBW is defined as less than 1500 grams (3.3 pounds) at birth. Data for VLBW, by definition, are included in LBW data. From 2006-2008 in NYS, the percentages of LBW and VLBW infants were 8.2% and 1.5% respectively (New York State Department of Health, 2010a, 2010b).

Table 1

New York Counties by Classification Schema

County	Population for 2007	Urban Influence Code	Rural-Urban Continuum Codes (RUCC)	National Center for Health Statistics (NCHS)
Albany	299,307	2	2	3
Allegany	49,637	9	7	6
Bronx	1,373,659	1	1	1
Broome	195,973	2	2	4
Cattaraugus	80,087	3	4	5
Cayuga	80,066	5	4	5
Chautauqua	133,945	3	4	5
Chemung	88,015	2	3	4
Chenango	51,207	6	6	6
Clinton	82,215	8	5	5
Columbia	62,363	5	6	5
Cortland	48,369	5	4	5
Delaware	46,286	6	6	6
Dutchess	292,746	2	2	3
Erie	913,338	1	1	1
Essex	38,119	6	6	6
Franklin	50,449	8	5	5
Fulton	55,114	5	4	5
Genesee	58,122	3	4	5
Greene	49,246	6	6	6
Hamilton	5,075	7	8	6
Herkimer	62,558	2	2	3
Jefferson	117,201	5	4	5
Kings	2,528,050	1	1	1
Lewis	26,472	6	6	6
Livingston	63,196	1	1	2
Madison	69,829	2	2	3
Monroe	729,681	1	1	1
Montgomery	48,809	5	4	5
Nassau	1,306,533	1	1	2
New York	1,620,867	1	1	1
Niagara	214,845	1	1	2
Oneida	232,304	2	2	3
Onondaga	454,010	2	2	3
Ontario	103,956	1	1	2
Orange	377,169	2	2	3
Orleans	42,371	1	1	2
Oswego	121,454	2	2	3
Otsego	62,397	5	6	5
Putnam	99,489	1	1	2
Queens	2,270,338	1	1	1
Rensselaer	155,318	2	2	3
Richmond	481,613	1	1	1

County	Population for 2007	Urban Influence Code	Rural-Urban Continuum Codes (RUCC)	National Center for Health Statistics (NCHS)
Rockland	296,483	1	1	2
St. Lawrence	109,809	8	5	5
Saratoga	215,852	2	2	3
Schenectady	150,818	2	2	3
Schoharie	32,063	2	2	3
Schuyler	19,027	7	6	6
Seneca	34,228	3	6	5
Steuben	96,874	5	4	5
Suffolk	1,453,229	1	1	2
Sullivan	76,303	6	4	6
Tioga	50,453	2	2	4
Tompkins	101,055	2	3	4
Ulster	181,860	2	3	4
Warren	66,143	2	3	4
Washington	62,743	2	3	4
Wayne	91,291	1	1	2
Westchester	951,325	1	1	2
Wyoming	41,932	4	6	6
Yates	24,557	4	6	6

Data from United States Department of Agriculture Economic Research Service (United States Department of Agriculture Economic Research Service, 2003b)
Data from United States Department of Agriculture Economic Research Service (United States Department of Agriculture Economic Research Service, 2003a)
Data from National Center for Health Statistics

For the purposes of this exemplar, birth outcomes was defined as LBW, but not VLBW (>1500 grams to 2500 grams), with an attempt to capture nuances for this population of infants that may help guide policy makers as they evaluate programs to help reduce the incidence and prevalence of LBW. Using LBW but not VLBW (between 1500 and 2500 grams) as an outcome variable, neither RUCC nor Urban Influence Codes yielded any significant differences among NYS counties. Hence, one could conclude that rurality is not related to birth outcomes. However, when the same analysis was conducted using the NCHS schema, the results indicated significant differences among NYS counties, contradicting the previous results. This finding reinforces the necessity for carefully choosing the coding schema that provides the basis for decisions regarding policies, programs, and resource allocations.

The classification schema chosen may change the amount of federal funding allocated for the implementation and support of programs that are important for the reduction of this birth outcome so that policy gaps and needs that yield more convincing scientific evidence are illuminated. Policies that address teen pregnancy and birth rates, substance abuse, and Medicaid providers are of particular value for the reduction of LBW and LBW, but not VLBW.

Table 2

Comparison of Codes and Definitions for Metropolitan Status

Status	Urban Influence Codes	RUCC	NCHS
Metropolitan	**1:** counties in metro area of >/= 1 million	**1**: counties in metro area of >/= 1 million	**1**: Central counties in metro area of >/= 1 million
			2: Fringe counties in metro area of >/= 1 million
Metropolitan	**2**: counties in metro area of 50,000-249,999	**2**: counties in metro area of 250,000-999,999	**3**: counties in metro area of 250,000-999,999
		3: counties in metro area of 50,000-249,999	**4**: counties in metro area of 50,000-249,9999
Nonmetropolitan	**3**: micropolitan, adjacent to metro area of >/= 1 million		**5**: Micropolitan Counties
	4: micropolitan, adjacent to metro area of 50,000-999,999		
	5: micropolitan, not adjacent to metro area	**4**: counties with urban population of 20,000-49,999, adjacent to metro area	
Nonmetropolitan	**6**: noncore counties, *adjacent* to metro area of >/= 1 million	**5**: counties with urban population of 20,000-49,999, *not adjacent* to metro area	**6**: Noncore Counties
	7: noncore counties *with* a town of 2,500-9,999, *adjacent* to metro area of 50,000-999,999	**6**: counties with urban population of 2,500-19,999, *adjacent* to metro area	
	8: noncore counties *without* a town of 2,500-9,999, *adjacent* to metro area of 50,000-999,999	**7**: counties with urban population of 2,500-19,999 *not adjacent* to metro area	
	9: noncore counties *with* a town of 2,500-9,999, *adjacent* to a micropolitan county	**8**: counties with urban population under 2,500, *adjacent* to metro area	
	10: noncore counties *without* a town of 2,500-9,999, *adjacent* to a micropolitan county	**9**: counties with urban population under 2,500, *not adjacent* to metro area	
	11: noncore counties *with* a town of 2,500-9,999, *not adjacent* to metro area or micropolitan county		
	12: noncore counties *without* a town of 2,500-9,999, *not adjacent* to metro area or micropolitan county		

Data from National Center for Health Statistics (Ingram & Franco, 2009)

Conclusion

The role of nurses at all levels of care is vital for the reduction of health disparities and the attainment of better health outcomes. Nurses advocate and lobby for the vulnerable and underserved populations. Advanced practice nurses and nurse researchers must participate in

policy formulation at state and national levels so that best practices are implemented as a result of evidence-based practice research.

In the light of the recent major cuts in federal budgets, securing funding for improving the health of vulnerable populations has become even more challenging for the nursing profession. Accurate measures of rurality should be applied at the decision making level for the allocation of scarce resources that support projects and programs most effective for vulnerable rural populations. This study attempted to elucidate nuances among the three rural coding schemas and demonstrated that using the appropriate rural coding schema may highlight rural/urban health disparities more clearly. "The key is to use a rural-urban definition that best fits the needs of a specific activity, recognizing that any simple dichotomy hides a complex rural-urban continuum, with very gentle gradations from one level to the next" (Cromartie & Bucholtz, 2008, p. 29).

In this study New York State Counties and birth outcomes have been used as exemplars. Other states and health outcomes need to be studied in similar manners to guide researchers and policy makers in their decisions.

There are limitations to each of these coding systems. Since they are based on commuting patterns and populations, they do not specify whether a county is rural or urban. As county populations and commuting patterns shift, codes can change. It is the responsibility of researchers and grant writers to decide which code best fits the project on which they are working based on the aggregates included in the study as well as the aggregates excluded from the study and to provide clear explanation that justifies the code's implementation.

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