Rural Health Policy

A Comparison of the Rural-Urban Mortality Differential for Deaths From All Causes, Cardiovascular Disease and Cancer*

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ABSTRACT: *Using a nine category continuum of residence ranging from major metropolitan counties of one million or more to isolated rural counties with less than 2,500 residents, the data presented indicate that although rural-urban differentials in mortality narrowed over the decade of the 1970s, by 1980 non-metropolitan counties continued to have crude death rates that were significantly higher than metropolitan counties for deaths from all causes, cardiovascular disease, and cancer. A detailed examination of directly standardized rates reveals that virtually all of the rural-urban mortality differential is due not to residence* per se, *but to differences in demographic structure, particularly age composition. Rural areas have an age distribution more heavily skewed toward the older ages where the probability of death is higher. The implications of the findings for broad-based rural health care policy are discussed with an emphasis on the need to consider the special health and service needs of an aging population.*

The dichotomous portrayal of an idyllic rural existence and a hectic, anomic urban existence bears little resemblance to reality in American society. The erroneous nature of the stereotype notwithstanding, there *are* differences in socioeconomic and demographic characteristics related to the size of communities (Bender et al., 1985). One feature of rural America that has claimed continual distinction is health (Roemer, 1976). In the main, the thesis is that rural areas are decidedly disadvantaged in terms of health status (Cordes, 1985; Wright and Lick, 1986). Whether, as Navarro (1976) contends, "rural America is a rougher place to live and die than is urban America" (pp. 111) is not entirely clear from the available empirical evidence. The purpose of this paper is to examine the evidence on mortality differentials between rural and urban America for the period from 1970 to 1980. We examine differentials in cancer mortality, cardiovascular disease, and total deaths from all causes as a means of addressing the existence and persistence of a rural health disadvantage in the continental United States.

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Rural Versus Urban Health Status

Published reports suggest that rural dwellers consistently have had an equal or higher prevalence of serious chronic health conditions (Kane, 1977), higher infant mortality rates (Copp, 1976; Matthews, 1974), more restricted activity days (Rosenblatt and Moscovice, 1982), and lower self-reported health status (Kleinman and Wilson, 1977) than their urban counterparts. Wright and Lick (1986) cited crude death differentials in Georgia and the United States and concluded that rural areas could be described as "health disaster areas" and that over time, the relative disadvantage of rural populations has increased. Contrary findings suggest that the death experience of the most rural areas is no different than that of the most urban areas once age and sex differences are controlled (Miller, 1982); that on balance, the death rates of metropolitan areas exceeded those of non-metropolitan areas by 5% and that the difference occurred only among whites (Clifford and Brannon, 1985; Kitagawa and Hauser, 1973) and that the lowest death rates in the United States tended to be concentrated in rural areas of the Great Plains and the Western Corn Belt (Sauer, 1974).

Which set of the above findings is correct? In fact, none are necessarily correct or incorrect. Rather, the apparently contradictory findings demonstrate a fundamental point. It is inappropriate and may be misleading to speak of *the* disadvantaged health status of rural America. There is not a homogeneous rural America and, depending upon how one defines *rural,* the results vary. Hence, it is entirely reasonable to expect that the health differences *among* rural areas may be as pronounced or more pronounced than the differences *between* rural and urban areas. Similarly, and more central to the current effort, any examination of mortality variation by residence is sensitive to compositional differences in the populations under considerations. To the extent that reported differentials in mortality reflect different demographic structures (e.g., age, sex, race), and these differences are attributed to residence *per se,* health policy decisions may be misguided and/or ineffectual. If the mortality experience of rural and urban areas is to be compared, it is imperative that, at a minimum, the confounding effects of age, race and sex be eliminated. Only then can a valid estimate of the influence of residence be made.

In the following sections we present crude mortality rates and then hierarchically adjust the crude rates for the age, sex, and race composition of the area. Subsequently, we formally compare the observed mortality differentials to see how much of the variability is actually attributable to rural or urban residence in comparison to the demographic composition of the population. In the current analysis, residence is measured along a continuum ranging from major metropolitan counties of one million or more inhabitants to small, isolated rural counties with the largest area containing less than 2,500 residents (Note 1). Race is dichotomized as white versus all other.

The following section presents the analysis first for total deaths from all causes combined, and then for deaths from cardiovascular disease and cancer.

Analysis and Findings

Table 1 contains data from the National Center for Health Statistics on mortality rates for all causes of death by residence category and time period. In 1970, the three most rural groups of counties had an average crude death rate (11.23) approximately 26% higher than major metropolitan counties, and 19% higher than the rate for the nation as a whole. Additionally, the smallest, most isolated rural counties had the highest rate of any group (11.72). The rural-urban difference decreased to 22.7% in 1975 and declined even more rapidly over the next five-year period to a 1980 level of 9.74 deaths per 1,000 population in rural areas (Note 2). However, even though the rural-urban difference decreased by 31% over the decade of the 1970s, by 1980, the most rural counties in the nation still experienced a crude death rate that was 17.3% higher than their metropolitan counterpart, and 13.3% higher than the national average. And, as was true in 1970, the small, isolated rural areas exhibited the highest rate (10.14) of any group of counties.

From a health policy perspective, the key question is: Why is the death rate higher in rural areas? Is higher mortality in rural areas primarily due to demographic compositional differences in rural and urban populations, or does it reflect residence-related differences in social, economic, environmental, and medical care factors? A valid answer to the question is critical in formulating health policy. If higher rural mortality is attributable to inequalities in availability and access to medical care, the policy and programmatic implications are different than if they are primarily due to the demographic profile of the residents of rural areas. Panels 2-4 of Table 1 contain mortality rates for which the influence of the demographic composition of the community has been removed (Note 3). The rates in Panel 2 have been adjusted for age, and in Panel 3 the influences of both age and sex have been removed. Finally, the fourth panel of Table 1 contains rates that have been simultaneously adjusted for the three major demographic determinants of differential mortality in the United States; that is, age, sex, and race.

Residence Differences in Adjusted Rates

As was true with crude death rates, there was a monotonic decline in age-adjusted mortality rates for both rural and urban areas between 1970 and 1980. The reduction for urban areas over the ten-year period was 18.2% compared to a 19.3% reduction for rural areas. However, despite the fact that rural areas exhibited a somewhat larger reduction, the age-adjusted mortality rates continue to suggest a rural disadvantage. The magnitude of the disadvantage is, however, very different from that portrayed by the crude rates. For the age-adjusted rates, the maximum residence difference was 1.94% in 1975, reducing to virtually no difference in 1980 (i.e., .17%, or approximately one death per 100,000 population). Further, by 1980, the age-adjusted rate for rural areas was actually less than the comparable rate for the total United States (7.70 vs. 7.77).

Table 1: Death Rates per 1,000 Population From All Causes by Residence for the Continental U.S., 1970, 1975, and 1980[1].

	Residence Category											
	Most Urban Counties							Most Rural Counties				
Year	1	2	3	4	5	6	7	8	9	U.S. Rate	Rural-Urban Difference[2] (Percentage)	Rural-U.S. Difference[3] (Percentage)
						Crude Rates						
1970	9.12	8.80	8.81	9.90	9.92	11.24	11.47	10.51	11.72	9.42	26.08	19.25
1975	8.63	8.45	8.30	9.18	9.18	10.33	10.69	9.63	10.84	8.87	22.77	17.10
1980	8.46	8.34	8.02	8.81	8.71	9.74	10.04	9.04	10.14	8.59	17.73	13.39
						Age-Adjusted Rates						
1970	9.55	9.41	9.36	9.51	9.70	9.61	9.72	9.60	9.46	9.51	1.62	.88
1975	8.44	8.40	8.34	8.41	8.59	8.50	8.68	8.56	8.43	8.48	1.94	.90
1980	7.81	7.70	7.55	7.60	7.73	7.66	7.78	7.72	7.60	7.77	.17	-.90
						Age-Sex Adjusted Rates						
1970	9.60	9.44	9.39	9.48	9.67	9.53	9.63	9.46	9.31	9.51	-.04	-.46
1975	8.53	8.47	8.38	8.42	8.61	8.47	8.64	8.46	8.32	8.48	.16	-.12
1980	7.91	7.78	7.62	7.64	7.78	7.67	7.79	7.67	7.52	7.77	-1.40	-1.41
						Age-Sex-Race Adjusted Rates						
1970	9.55	9.44	9.43	9.59	9.73	9.58	9.68	9.43	9.36	9.51	.18	-.21
1975	8.45	8.45	8.42	8.52	8.65	8.52	8.69	8.45	8.36	8.46	.71	.47
1980	7.82	7.75	7.64	7.71	7.81	7.71	7.83	7.66	7.56	7.74	-.69	-.77

[1]Rates are three-year averages centered on 1970 and 1975; the 1980 rates are two-year averages for 1979 to 1980.
[2]The rural-urban percentage differences is calculated by dividing the average difference between the three most rural counties (categories 7-9) and the three most urban counties (categories 1-3), by the average of the three most urban counties.
[3]The rural U.S. percentage difference is calculated by subtracting the average rate for the three most rural counties (categories 7-9) from the U.S. Rate and dividing the difference by the U.S. Rate.

Although rural areas continued to exhibit higher levels of mortality than urban areas in 1980, the residence differentials across the decade were attenuated markedly once the influence of age was removed. The last two panels of data in Table 1 contain rates that are purged of the influence of sex and race in addition to age. An examination of the age-sex-adjusted rates shows that the relatively disadvantaged position of rural areas has been reversed. In every instance except one (rural-urban difference in 1975), rural areas have lower age-sex-adjusted death rates than urban areas or the nation as a whole. Furthermore, the small, isolated rural counties exhibited the *lowest* death rates of any residence category at all three time periods. The same situation exists for the age-sex-race adjusted rates. It should be noted in this context that rural areas, as defined in this analysis (i.e., residence categories 7, 8, and 9), exhibited not only the lowest rates (category 9), but also the highest rates for 1975 and 1980 (category 7). This situation speaks forcefully to the idea that rural America is very heterogeneous, and to treat it as though it were otherwise in a policy context is unwise.

The data presented above demonstrate that the vast majority of the exaggerated mortality experience of rural areas is not attributable to being rural, *per se*. Rather, rural areas have higher crude death rates primarily because they have a different demographic composition than urban areas. As demonstrated by the age-adjusted rates, if rural and urban areas had an identical age distribution, the 26% higher crude rate in rural areas in 1970 would be reduced to 1.62%. The 17.7% difference in 1980 would be reduced to less than 1%. If the counties had identical age, sex, and race compositions, the 1980 differential would actually favor rural areas by a small margin. In other words, the overwhelming majority of the rural-urban differential in total mortality is due to the concentration of older Americans (with a greater risk of mortality) in rural areas.

Rural/Urban Differences in Deaths from Cardiovascular Disease

Examining residence differences in total deaths from all causes gives a very general picture of any relative disadvantage of rural America. However, aggregating across all causes of death can distort important differences that may exist for specific causes. In the following section, we present rural-urban comparison rates for the two leading causes of death, cardiovascular disease (ICD 390-448) and cancer (ICD 140-208).

In 1970, the death rate from cardiovascular disease in the United States was approximately five per 1,000 population. The average rate for rural areas was 6.06, 21.69% higher than the national average and 30.32% higher than their urban counterpart. For the small isolated rural communities, the differential was even more pronounced with a crude rate of 6.44, fully 40% above their metropolitan counterpart with the lowest rate of 4.6. Over the ten-year period under investigation, the crude rate for rural areas dropped over 18% (from 6.06 to 4.95), outstripping the 12% decline in urban areas

Table 2: Death Rates per 1,000 Population From Cardiovascular Disease by Residence for the Continental U.S., 1970, 1975, and 1980[1].

	Residence Category											
	Most Urban Counties							Most Rural Counties				
Year	1	2	3	4	5	6	7	8	9	U.S. Rate	Rural-Urban Difference (Percentage)	Rural-U.S. Difference (Percentage)
						Crude Rates						
1970	4.74	4.62	4.60	5.43	5.30	6.24	6.31	5.43	6.44	4.98	30.32	21.69
1975	4.42	4.32	4.26	4.92	4.81	5.65	5.78	4.88	5.83	4.61	26.94	19.23
1980	4.20	4.06	3.98	4.55	4.38	5.12	5.20	4.45	5.19	4.30	21.22	15.02
						Age-Adjusted Rates						
1970	5.01	5.00	4.92	5.15	5.13	5.13	5.13	4.83	4.92	5.02	-.33	-1.19
1975	4.30	4.28	4.26	4.40	4.41	4.46	4.48	4.20	4.30	4.32	1.09	.15
1980	3.82	3.71	3.70	3.82	3.79	3.84	3.84	3.68	3.67	3.78	-.34	-1.32
						Age-Sex Adjusted Rates						
1970	5.12	5.11	5.01	5.19	5.17	5.12	5.11	4.78	4.84	5.10	-3.35	-3.72
1975	4.40	4.37	4.34	4.45	4.47	4.47	4.48	4.17	4.24	4.39	-1.47	-2.12
1980	3.88	3.75	3.75	3.85	3.82	3.84	3.84	3.64	3.60	3.82	-2.63	-3.31
						Age-Sex-Race Adjusted Rates						
1970	5.11	5.11	5.03	5.23	5.19	5.13	5.12	4.79	4.84	5.09	-3.28	-3.41
1975	4.38	4.37	4.35	4.48	4.48	4.48	4.49	4.18	4.24	4.39	-1.44	-1.98
1980	3.85	3.75	3.76	3.87	3.83	3.86	3.85	3.65	3.62	3.81	-2.13	-2.72

[1]Rates are three-year averages centered on 1970 and 1975; the 1980 rates are two-year averages for 1979 to 1980.

Table 3: Death Rates per 1,000 Population From Cancer by Residence for the Continental U.S., 1970, 1975, and 1980[1].

	Residence Category											
	Most Urban Counties							Most Rural Counties				
Year	1	2	3	4	5	6	7	8	9	U.S. Rate	Rural-Urban Difference (Percentage)	Rural-U.S. Difference (Percentage)
						Crude Rates						
1970	1.67	1.56	1.50	1.60	1.56	1.73	1.74	1.61	1.77	1.62	8.25	5.35
1975	1.76	1.69	1.59	1.67	1.61	1.79	1.81	1.66	1.83	1.71	5.12	3.27
1980	1.85	1.81	1.69	1.79	1.72	1.88	1.91	1.78	1.93	1.81	5.06	3.49
						Age-Adjusted Rates						
1970	1.72	1.64	1.59	1.55	1.54	1.49	1.48	1.47	1.42	1.63	−11.72	−10.63
1975	1.72	1.68	1.62	1.56	1.54	1.51	1.50	1.50	1.44	1.64	−11.53	−9.75
1980	1.74	1.69	1.63	1.59	1.58	1.52	1.53	1.55	1.48	1.66	−9.84	−8.43
						Age-Sex Adjusted Rates						
1970	1.73	1.65	1.59	1.54	1.54	1.48	1.47	1.45	1.40	1.63	−13.08	−11.66
1975	1.75	1.70	1.63	1.56	1.55	1.50	1.50	1.48	1.42	1.65	−13.40	−11.15
1980	1.76	1.71	1.64	1.60	1.59	1.52	1.53	1.54	1.47	1.67	−11.16	−9.40
						Age-Sex-Race Adjusted Rates						
1970	1.73	1.65	1.60	1.55	1.54	1.48	1.47	1.45	1.40	1.63	−13.25	−11.65
1975	1.74	1.69	1.63	1.57	1.55	1.50	1.50	1.48	1.42	1.65	−13.20	−11.15
1980	1.75	1.71	1.65	1.60	1.59	1.53	1.54	1.54	1.47	1.67	−10.94	−9.18

[1]Rates are three-year averages centered on 1970 and 1975; the 1980 rates are two-year averages for 1979 to 1980.

and the 13.6% overall U.S. decline. Futher, the maximum difference had reduced from 40% to 30.6% and the highest rate was no longer in the most rural counties, but rather in counties with communities between 2,500 and 10,000 (the difference between the two was, however, only one death per 100,000 population). Nonetheless, by 1980 rural areas still exhibited a crude death rate 21.2% higher than urban areas and 15.0% above the U.S. rate.

The disadvantaged position of rural areas is pronounced. However, cardiovascular disease rates are heavily influenced by the age of the affected population. The extent of the age effect can be seen by comparing the age-adjusted rates in Table 2 with the crude rates. The age-adjusted rates show that if rural and urban areas had identical age distributions, their cardiovascular mortality rates would be almost identical with a slight edge going to rural areas. When the rates are also adjusted for sex and race, the advantage of rural areas increases slightly so that these areas have rates approximately 2% *lower* than the urban areas or the total United States.

Rural/Urban Differences in Deaths from Cancer

The trend for cancer mortality over the decade of the 1970s is fundamentally different from that for cardiovascular disease or deaths from all causes combined. As noted by the data in Table 3, cancer mortality increased for all residence categories between 1970 and 1980.

However, as was true for cardiovascular mortality and deaths from all causes, the crude cancer mortality rate for rural areas was higher than for urban areas in all three time points although the magnitude of the difference declined from 8.28% in 1970 to 5.06% in 1980. This narrowing reflects the fact that the 1970 to 1980 cancer mortality rates increased by 15.9% in urban areas, but in the rural areas the increase was only 10%.

When the influence of the age distribution is removed from the cancer mortality rates, the relative position of rural and urban areas is exactly opposite that observed for crude rates. Now the rural areas have lower rates than urban areas or the U.S. average rate in all three time periods. Furthermore, the smallest, most isolated rural areas that exhibited the highest crude rates of any residence category have the *lowest* age-adjusted rates of any residence category. The same situation exists for the age-sex adjusted rates and the age-sex-race adjusted rates. In fact, whereas the rural areas had crude rates an average of 8.25% higher than urban areas in 1970, their age-sex adjusted rates for the same period was over 13% *lower*. It should be noted, however, that cancer mortality rates are relatively low; hence, a 13% difference translates into urban death rates that exceed rural rates by approximately 20 deaths per 100,000 population. Similarly, the exaggerated crude rate in rural areas implies that cancer claims approximately 13 more victims per 100,000 population than in urban areas.

Summary and Implications

Rural-urban differentials in mortality continue to exist. Although differentials narrowed over the decade of the 1970s, by 1980 rural counties continued to have crude death rates that were as much as 21% higher than metropolitan counties for cardiovascular disease and as little as 5.06% higher for cancer. At first inspection, such a difference would appear to support the notion that rural areas are suffering disproportionately high death rates with the degree of disadvantage depending heavily on the specific cause of death under consideration. And, in fact, rural areas do have higher crude death rates than urban areas. However, a more detailed examination reveals that most of the difference between rural and urban counties is due not to residence *per se,* but to differences in demographic structure, particularly age composition. Rural areas have an age distribution more heavily skewed toward the older ages where mortality rates are higher. This difference accounts for most of the rural-urban differential in mortality. Indeed, once the influence of age and sex were removed from the rates, rural areas actually exhibited lower mortality rates than urban areas in all three time periods investigated for both cardiovascular disease and cancer. For death rates from all causes combined, the adjusted rates for rural areas were lower than or equivalent to urban areas with the exception of the year 1975. In that year the rural rates were higher than urban rates, but the difference was less than 1% (Note 4). These findings point to the dilemma in discussing *rural* America or *the* rural health situation. There is no homogeneous rural population and there is no one rural health status. Instead, there are many different *rural* populations defined in different ways and made up of different race, age, and sex groupings. Ultimately, every community will generate its own pattern of health and illness.

What are the implications of the current analysis for health policy? The original question was: Are higher mortality rates in rural areas primarily due to compositional differences in rural and urban populations? The findings of this analysis suggest that the answer is affirmative. Does this mean that there are no differences in mortality, and by implication, that the health care needs of rural and urban areas are not different? The answer to the latter question is clearly negative.

The concentration of older populations in rural areas and the consequent higher crude death rates call for attention to the special needs of this growing population. In 1984, the number of people aged 65 years and older living in rural America totaled approximately 9.6 million (National Center for Health Statistics, 1986). Of those, roughly 61% were between the ages of 65 and 74, 30% or about 3 million were between the ages of 75 and 84, and the remaining three quarters of a million were over 85 years old. Additionally, approximately 59% of this elderly population were women, with the concentration increasing to approximately 71% in the group 85 years and older. This elderly population is relatively poorly educated, with less than half having completed high school, and approximately 35% not having an education beyond the eighth grade. Finally, an important

characteristic of this population is its typical living arrangement. While overall, roughly 46% are husband and wife households, approximately 32%, or about 3 million, of the rural elderly population lives alone, with the figure reaching 53% for women 75 years and older.

What are the implications of the above reported figures for rural health care policy? Clearly, any broad-based rural health care policy should consider the special health and service needs of the elderly, particularly elderly females. This portends the need to consider issues that are more global than simply the provisions of traditional clinical services. Such policies need to concern themselves with the whole gamut of human service needs including not only the clinical, primarily curative aspects of medical care, but also the non-medical support network needs of an aging population such as transportation, housekeeping, food preparation and health education (Berkman and Syme, 1979). All of these are integrally bound together to influence the health of the rural population. Further, educational and transportation programs are critical to ensuring effective and efficient use of more traditional health services (Lee, 1985; Margolis, 1979; Snider, 1980).

The results presented above also have implications for health policy in the more restricted dimension of traditional medicine. The data make clear a critical point. Increasingly, primary physicians who locate in rural America are, *de facto,* spending a good deal of their time in the role of geriatrician. The occupants of such positions need to be broadly trained in the biology and pathology of aging, but also in the assessment and treatment of illness, primarily chronic illness, oftentimes involving multiple disorders, of an increasingly aged population. Chronicity may not be adequately addressed from the perspective of the traditional medical model which stresses individual disease, individual organs, acuteness of illness, and short-term care. Similarly, because they serve as the primary health contact for most individuals, the rural physician should be intimately familiar with important non-medical services available in the community. This need for a "comprehensive" orientation to the problems of an aging population comes exactly at a time when the number of primary care physicians is in steady decline while there is an increasing overabundance of specialists (U.S. Department of Health and Human Services, 1980; 1985). Specialists are an important component of any health system, but perhaps some nostalgia about the old family doctor who cared is not inconsistent with the medical manpower needs of rural America.

NOTES

1. The residence categories are as follows: (1) core or fringe metropolitan counties with 1 million or more population; (2) metropolitan counties with 500,000 to 999,999 population; (3) metropolitan counties with 50,000 to 499,999 population; (4) non-metropolitan, adjacent counties with the largest urban place 10,000+; (5) non-metropolitan nonadjacent counties with the largest urban place 10,000+; (6) non-metropolitan adjacent counties with size of largest place 2,500 to 9,999; (7) non-metropolitan, nonadjacent counties with size of largest place 2,500 to 9,999; (8) non-metropolitan adjacent counties with size of largest place

less than 2,500; (9) non-metropolitan, nonadjacent counties with size of largest place less than 2,500. This definition places primary emphasis on size of largest place in the county and less emphasis on adjacency to SMSA's than the earlier work of Clifford, Miller, and Stokes (1986).

2. The intertemporal percentage declines reported in the text were calculated as:

$$\frac{\text{1970 Rate} - \text{1980 Rate}}{\text{1970 Rate}} \times 100$$

3. All rates were adjusted by the direct methods using the 1970 U.S. Population as the standard population at all three time periods to facilitate intertemporal comparisons of mortality rates. The general formula for direct standardization is:

$$M = \frac{MaPa}{P} \times 1000$$

Where: $Ma = \frac{da}{Pa}$ = age (sex)(race) specific death rate in a given area

Pa = standard population for each age(sex)(race) group

P = total standard population

4. As Clifford, Miller and Stokes (1986) have reported, if the age adjusted rates are examined separately for race-sex groups, it becomes apparent that at the same time the residence differentials decreased over time, the racial differential remains pronounced.

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