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# HEALTH PROGRESS IN NORTH CAROLINA FROM 1940 TO 1950

## AS MEASURED BY

## AGE-ADJUSTED MORTALITY RATES

By

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## Introduction

One of the best indexes ever devised for measuring the relative health of various population groups is the age-adjusted mortality rate, which is simply a weighted average of age-specific mortality rates, the weights usually being the percent distribution by age of some standard population. Sometimes age-adjusted mortality rates are called standardized rates.

The purpose of adjusting or standardizing rates is to make two or more mortality rates as comparable as possible insofar as age is concerned. That is to say, the aim of the adjustment is to eliminate that part of the difference between two mortality rates which is due to the fact that the two base populations do not have the same proportions in the various age groups.

For example, if the mortality rate of North Carolina is adjusted to the age distribution of the United States total population then, for all practical purposes, the age-adjusted mortality rate thus obtained can be defined as that mortality rate which North Carolina would have had, if the percentage age distribution of her population had, in fact, been like that of the United States.

Readers interested in more discussion of the definition and methods of constructing adjusted rates are referred to

Vital Statistics in the United States 1900-1940, by the National Office of Vital Statistics. Washington: Superintendent of Documents, United States Printing Office, 1947.

The tables in this report are based on mortality rates adjusted to the age distribution of the total population of the United States. The mortality rates of Table I, page 5, have been adjusted to the age distribution of the 1940 United States total population by the direct method; but the mortality rates of Tables II, page 6, and III, page 7, have been adjusted to the age distribution of the 1950 United States total population by the indirect method.[1/]

## North Carolina, the South and the Nation

Table I shows in compact form the age-adjusted mortality rates of North Carolina, the South, and the Nation by color and residence, and by sex and residence for 1940 and 1950.[2/] Space is not available in this publication to discuss all of the important relationships and differences revealed by Table I. However, we should like to point out five important facts:

1. Within color, sex, and residence groups, mortality rates in North Carolina vary only slightly from the mortality rates in the Nation.

2. Between 1940 and 1950 the age-adjusted mortality rate for North Carolina declined more than did the corresponding rate for the Nation.

3. Urban adjusted mortality rates in both North Carolina and the Nation declined more than rural adjusted mortality rates.

4. Female adjusted mortality rates declined more than the corresponding rates for males in both North Carolina and the Nation.

5. Although nonwhite adjusted mortality rates are still substantially above the corresponding white rates, the gap between the two color groups is rapidly closing. The decline in the mortality rates of urban nonwhite people, both in North Carolina and the Nation, is outstanding.

The reader will find other significant trends and differences.

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1/ The use of two different bases and methods for adjustment is due to the use of adjusted rates already available in two different studies. Time did not permit readjusting all rates to the same base. Although such readjustments can and will be made, the comparisons within the tables of this report are valid and useful as they stand.

2/ Adjusted rates for the South in 1950 by sex and color will be made available in the final report of this study.

## How North Carolina Ranks Among the States

Table II, page 6, shows the crude (unadjusted) and the age-adjusted mortality rates for the 48 states and the District of Columbia. Note that North Carolina's crude rate is second lowest in the Nation, but that her age-adjusted rate is 36th! Incidentally, this is about where North Carolina ranks in infant mortality. We can no longer say, therefore, that our adults are more healthy than our infants.

## Health Progress in Our Counties

Table III, page 7, shows the age-adjusted mortality rates of North Carolina's 100 counties in 1940 and 1950. The United States total population of 1950 is used as the standard, or adjustment, population for both 1940 and 1950. The counties have been ranked according to the amount of change in the mortality-vitality change index which takes into consideration not only the percentage decline in the mortality rate but also the percentage increase in the vitality rate. The vitality rate is the complement of the mortality rate. Whereas the mortality rate indicates the probability of dying during one year, the vitality rate indicates the probability of living through one year. The mathematical and logical validity of the mortality-vitality change index will be discussed more fully in a research note at a later date.

Because of the need for publishing Table III at once, we shall not take time to analyze and interpret the results. Health educators, administrators, and leaders in each county may make their own interpretations of the results of the computations presented in Table III. We have gone far enough in our analysis to see that counties with high percentages of rural farm people made less progress than did counties with low percentage of such population.

We have also found moderately high and significant correlations between white and nonwhite, and between male and female, age-adjusted mortality rates as of 1950 on a county basis. These significant correlations lead us to believe that age-adjusted rates by counties are highly reliable.

TABLE I

AGE-ADJUSTED MORTALITY RATES BY SEX, COLOR, AND RESIDENCE, 1940 AND 1950, UNITED STATES, THE SOUTH, AND NORTH CAROLINA[a]/

| Residence, Color, and Sex | United States | | The South[b]/ | | North Carolina | |
|---|---|---|---|---|---|---|
| | 1940 | 1950 | 1940 | 1950 | 1940 | 1950 |
| All Groups | 10.7 | 8.4 | 11.6 | 8.8 | 11.4 | 8.7 |
| White | 10.2 | 8.0 | 10.2 | 7.8 | 10.1 | 7.6 |
| Nonwhite | 16.2 | 12.2 | 16.1 | 12.6 | 15.2 | 12.3 |
| Male | 12.1 | 10.0 | 13.0 | [c]/ | 12.8 | 10.2 |
| Female | 9.3 | 6.9 | 10.1 | [c]/ | 10.0 | 7.2 |
| Urban | 11.4 | 8.9 | 13.8 | 9.7 | 13.1 | 9.8 |
| Rural | 9.8 | 7.4 | 10.2 | 7.9 | 10.6 | 8.1 |
| White Urban | 10.8 | 8.5 | 12.0 | 8.5 | 11.0 | 8.2 |
| White Rural | 9.3 | 7.1 | 10.2 | 7.9 | 9.7 | 7.3 |
| Nonwhite Urban | 18.1 | 13.1 | 20.0 | 14.3 | 18.2 | 14.0 |
| Nonwhite Rural | 14.4 | 10.9 | 14.0 | 11.0 | 13.6 | 11.2 |
| White Male | 11.5 | 9.6 | 11.7 | [c]/ | 11.6 | 9.3 |
| White Female | 8.7 | 6.4 | 8.6 | [c]/ | 8.6 | 5.9 |
| Nonwhite Male | 17.5 | 13.5 | 17.4 | [c]/ | 16.4 | 13.5 |
| Nonwhite Female | 14.9 | 10.9 | 14.8 | [c]/ | 14.0 | 11.1 |

[a]/ Adjusted to the total United States population of 1940.

[b]/ "The South" in this table includes all 17 of the states classified as southern by the United States Census Bureau.

[c]/ Not yet available.

TABLE II

AGE-ADJUSTED MORTALITY RATES FOR THE 48 STATES, 1950.*

| Rank | State | Deaths Per 1000 Population | |
|---|---|---|---|
| | | Age-Adjusted Rate | Crude Rate |
| -- | United States | 9.638 | 9.638 |
| 1 | Nebraska | 8.214 | 9.519 |
| 2 | Oklahoma | 8.499 | 8.719 |
| 3 | Kansas | 8.527 | 10.003 |
| 4 | Minnesota | 8.585 | 9.395 |
| 5 | Iowa | 8.600 | 10.293 |
| 6 | Arkansas | 8.606 | 8.071 |
| 7 | North Dakota | 8.631 | 8.377 |
| 8 | Utah | 8.651 | 7.221 |
| 9 | Oregon | 8.700 | 9.160 |
| 10 | Colorado | 8.752 | 9.267 |
| 11 | South Dakota | 8.786 | 9.008 |
| 12 | Idaho | 8.953 | 8.217 |
| 13 | Connecticut | 8.991 | 9.527 |
| 14 | Wisconsin | 9.000 | 9.835 |
| 15 | California | 9.015 | 9.329 |
| 16 | Washington | 9.051 | 9.452 |
| 17 | Massachusetts | 9.125 | 10.529 |
| 18 | New Hampshire | 9.194 | 11.394 |
| 19 | Maine | 9.269 | 10.819 |
| 20 | Wyoming | 9.289 | 8.041 |
| 21 | Vermont | 9.307 | 11.031 |
| 22 | Texas | 9.431 | 8.215 |
| 23 | Missouri | 9.477 | 11.053 |
| 24 | Indiana | 9.496 | 10.327 |
| 25 | Ohio | 9.544 | 10.147 |
| 26 | Montana | 9.592 | 9.851 |
| 27 | Florida | 9.626 | 9.587 |
| 28 | Michigan | 9.667 | 9.062 |
| 29 | Kentucky | 9.810 | 9.459 |
| 30 | New Jersey | 9.890 | 10.154 |
| 31 | Rhode Island | 9.962 | 10.491 |
| 32 | New York | 9.967 | 10.524 |
| 33 | West Virginia | 10.000 | 8.690 |
| 34 | Illinois | 10.011 | 10.616 |
| 35 | Tennessee | 10.014 | 8.939 |
| 36 | North Carolina | 10.123 | 7.664 |
| 37 | Pennsylvania | 10.131 | 10.498 |
| 38 | Louisiana | 10.373 | 8.846 |
| 39 | Arizona | 10.420 | 8.567 |
| 40 | Georgia | 10.491 | 8.804 |
| 41 | Alabama | 10.494 | 8.765 |
| 42 | Maryland | 10.583 | 9.568 |
| 43 | Virginia | 10.609 | 8.952 |
| 44 | Nevada | 10.752 | 9.920 |
| 45 | Delaware | 10.833 | 11.006 |
| 46 | New Mexico | 10.926 | 8.032 |
| 47 | Mississippi | 11.005 | 9.539 |
| 48 | District of Columbia | 11.349 | 10.671 |
| 49 | South Carolina | 11.460 | 8.490 |

*Adjusted to the age distribution of the total 1950 population of the United States by the indirect method.

Source of data: U. S. Bureau of the Census and the National Office of Vital Statistics

TABLE III

MORTALITY-VITALITY TRENDS IN NORTH CAROLINA COUNTIES, 1940-1950

| Rank | County | Age Adjusted Mortality Rates | | | Mortality-Vitality Change Index* |
|---|---|---|---|---|---|
| | | 1940 | 1950 | (1950) - (1940) | |
| 1 | Wayne | 23.6 | 10.8 | -12.8 | 8.46 |
| 2 | Burke | 16.0 | 7.2 | -8.8 | 7.01 |
| 3 | Onslow | 17.1 | 9.8 | -7.3 | 5.63 |
| 4 | Brunswick | 16.5 | 9.8 | -6.7 | 5.26 |
| 5 | Wake | 16.6 | 10.4 | -6.2 | 4.85 |
| 6 | Hoke | 15.9 | 9.9 | -6.0 | 4.80 |
| 7 | Graham | 10.6 | 5.9 | -4.7 | 4.59 |
| 8 | New Hanover | 17.8 | 11.8 | -6.0 | 4.54 |
| 9 | Beaufort | 18.1 | 12.2 | -5.9 | 4.43 |
| 10 | McDowell | 13.2 | 8.2 | -5.0 | 4.38 |
| 11 | Lenoir | 18.8 | 12.9 | -5.9 | 4.34 |
| 12 | Jackson | 11.8 | 7.4 | -4.4 | 4.07 |
| 13 | Carteret | 13.6 | 8.9 | -4.7 | 4.06 |
| 14 | Durham | 15.4 | 10.4 | -5.0 | 4.06 |
| 15 | Richmond | 16.9 | 11.7 | -5.2 | 4.03 |
| 16 | Craven | 17.7 | 12.4 | -5.3 | 4.02 |
| 17 | Camden | 14.3 | 9.6 | -4.7 | 3.96 |
| 18 | Clay | 8.8 | 5.1 | -3.7 | 3.96 |
| 19 | Warren | 15.2 | 10.4 | -4.8 | 3.92 |
| 20 | Pasquotank | 16.4 | 11.6 | -4.8 | 3.78 |
| 21 | Forsyth | 15.1 | 10.5 | -4.6 | 3.77 |
| 22 | Surry | 13.2 | 8.9 | -4.3 | 3.77 |
| 23 | Buncombe | 13.3 | 9.0 | -4.3 | 3.75 |
| 24 | Cumberland | 16.4 | 11.7 | -4.7 | 3.70 |
| 25 | Harnett | 14.5 | 10.1 | -4.4 | 3.68 |
| 26 | Columbus | 15.5 | 11.0 | -4.5 | 3.64 |
| 27 | Bertie | 15.9 | 11.4 | -4.5 | 3.60 |
| 28 | Cabarrus | 13.5 | 9.4 | -4.1 | 3.55 |
| 29 | Mecklenburg | 14.4 | 10.2 | -4.2 | 3.53 |
| 30 | Avery | 11.6 | 7.9 | -3.7 | 3.45 |
| 31 | Guilford | 13.6 | 9.6 | -4.0 | 3.45 |
| 32 | Anson | 14.0 | 10.0 | -4.0 | 3.40 |
| 33 | Pender | 14.6 | 10.6 | -4.0 | 3.34 |
| 34 | Stanly | 12.5 | 8.8 | -3.7 | 3.33 |
| 35 | Hertford | 14.8 | 10.8 | -4.0 | 3.31 |
| 36 | Pitt | 15.7 | 11.6 | -4.1 | 3.30 |
| 37 | Orange | 12.2 | 8.6 | -3.6 | 3.28 |
| 38 | Davie | 11.4 | 8.0 | -3.4 | 3.20 |
| 39 | Davidson | 12.4 | 8.9 | -3.5 | 3.16 |
| 40 | Transylvania | 11.6 | 8.3 | -3.3 | 3.08 |
| 41 | Ashe | 10.7 | 7.6 | -3.1 | 3.01 |
| 42 | Sampson | 14.6 | 11.0 | -3.6 | 3.00 |
| 43 | Bladen | 14.0 | 10.6 | -3.4 | 2.89 |
| 44 | Caldwell | 12.4 | 9.2 | -3.2 | 2.89 |
| 45 | Wilson | 17.6 | 13.8 | -3.8 | 2.89 |
| 46 | Montgomery | 12.2 | 9.1 | -3.1 | 2.82 |
| 47 | Yadkin | 10.0 | 7.2 | -2.8 | 2.81 |
| 48 | Pamlico | 13.4 | 10.2 | -3.2 | 2.78 |
| 49 | Haywood | 11.1 | 8.2 | -2.9 | 2.77 |
| 50 | Union | 12.7 | 9.6 | -3.1 | 2.77 |
| 51 | Duplin | 15.4 | 12.0 | -3.4 | 2.76 |
| 52 | Randolph | 11.5 | 8.6 | -2.9 | 2.72 |
| 53 | Yancey | 9.2 | 6.6 | -2.6 | 2.72 |
| 54 | Granville | 13.4 | 10.3 | -3.1 | 2.70 |

TABLE III (Continued)

MORTALITY-VITALITY TRENDS IN NORTH CAROLINA COUNTIES, 1940-1950

| Rank | County | Age Adjusted Mortality Rates | | | Mortality-Vitality Change Index* |
|---|---|---|---|---|---|
| | | 1940 | 1950 | (1950)-(1940) | |
| 55 | Watauga | 10.9 | 8.1 | -2.8 | 2.70 |
| 56 | Alamance | 11.2 | 8.4 | -2.8 | 2.66 |
| 57 | Vance | 15.3 | 12.1 | -3.2 | 2.61 |
| 58 | Henderson | 11.7 | 8.9 | -2.8 | 2.60 |
| 59 | Edgecombe | 15.6 | 12.4 | -3.2 | 2.58 |
| 60 | Rowan | 12.2 | 9.4 | -2.8 | 2.55 |
| 61 | Rutherford | 10.5 | 7.9 | -2.6 | 2.55 |
| 62 | Person | 12.4 | 9.6 | -2.8 | 2.53 |
| 63 | Gaston | 11.6 | 8.9 | -2.7 | 2.52 |
| 64 | Madison | 11.1 | 8.6 | -2.5 | 2.39 |
| 65 | Cherokee | 11.1 | 8.6 | -2.5 | 2.39 |
| 66 | Currituck | 13.0 | 10.3 | -2.7 | 2.38 |
| 67 | Dare | 12.4 | 9.8 | -2.6 | 2.35 |
| 68 | Nash | 15.5 | 12.6 | -2.9 | 2.35 |
| 69 | Washington | 15.6 | 12.7 | -2.9 | 2.34 |
| 70 | Martin | 14.9 | 12.1 | -2.8 | 2.31 |
| 71 | Gates | 13.4 | 10.8 | -2.6 | 2.26 |
| 72 | Robeson | 15.6 | 12.8 | -2.8 | 2.26 |
| 73 | Johnston | 13.0 | 10.5 | -2.5 | 2.21 |
| 74 | Rockingham | 13.0 | 10.5 | -2.5 | 2.21 |
| 75 | Franklin | 13.2 | 10.7 | -2.5 | 2.19 |
| 76 | Iredell | 12.1 | 9.8 | -2.3 | 2.10 |
| 77 | Mitchell | 10.1 | 8.0 | -2.1 | 2.10 |
| 78 | Lee | 13.8 | 11.5 | -2.3 | 1.97 |
| 79 | Scotland | 16.1 | 13.7 | -2.4 | 1.91 |
| 80 | Chowan | 13.6 | 11.4 | -2.2 | 1.90 |
| 81 | Jones | 13.7 | 11.5 | -2.2 | 1.89 |
| 82 | Lincoln | 10.4 | 8.5 | -1.9 | 1.87 |
| 83 | Wilkes | 10.6 | 8.7 | -1.9 | 1.86 |
| 84 | Chatham | 11.9 | 9.9 | -2.0 | 1.85 |
| 85 | Catawba | 11.2 | 9.3 | -1.9 | 1.81 |
| 86 | Hyde | 11.1 | 9.2 | -1.9 | 1.81 |
| 87 | Cleveland | 10.2 | 8.4 | -1.8 | 1.79 |
| 88 | Halifax | 14.5 | 12.4 | -2.1 | 1.76 |
| 89 | Macon | 9.3 | 7.7 | -1.6 | 1.67 |
| 90 | Stokes | 10.8 | 9.2 | -1.6 | 1.55 |
| 91 | Tyrrell | 13.2 | 11.5 | -1.7 | 1.49 |
| 92 | Moore | 10.4 | 8.9 | -1.5 | 1.48 |
| 93 | Swain | 9.8 | 8.7 | -1.1 | 1.12 |
| 94 | Polk | 8.9 | 8.1 | -0.8 | 0.85 |
| 95 | Caswell | 11.5 | 10.7 | -0.8 | 0.75 |
| 96 | Greene | 13.0 | 12.2 | -0.8 | 0.71 |
| 97 | Perquimans | 11.9 | 11.2 | -0.7 | 0.65 |
| 98 | Alleghany | 9.2 | 8.8 | -0.4 | 0.42 |
| 99 | Northampton | 9.8 | 9.6 | -0.2 | 0.20 |
| 100 | Alexander | 10.0 | 10.2 | +0.2 | -0.20 |

(*Vitality change index = $\frac{(m_1 - m_0)\ 100}{\sqrt{m_0\ (1-m_0)}}$ )

Source: Vital Statistics of the United States, 1949, 1950, 1950 and United States Census of Population, 1950.