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100% RAG U.S.

DIFFERENTIAL MORTALITY IN OKLAHOMA

1931-1938

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1931-1938

By

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PREFACE

It is utterly impossible for any present day investigator of mortality phenomena to express his gratitude to all those persons to whom he is indebted. This brief word is my attempt to do so as adequately as I can. I have attempted to give credit to many benefactors through citations of their work where it appears or is applicable in the following study, and in the bibliography. This is only a small gesture to a few individuals who have developed and refined techniques of mortality investigation through the years.

There are others to whom I am more immediately indebted. First among these is Dr. Otis B. Duncan of the Department of Sociology and Rural Life, Oklahoma A. and M. College, who has been my advisor for the study, and through whom the original sources were made available to me. His assistance and advice have exceeded that required at the professional level, for I have been greatly dependent upon him for much personal guidance during the course of my work in his department.

Then, too, the physical task of tabulation and preparation of data would have been much heavier and extremely long if I had not had the help of my wife, Frances, over the period of many weeks, as well as her encouragement and assistance throughout the final preparation of the study.

To these two especially, and to many others who have given encouragement and advice, I am deeply grateful. They more than I are deserving of the credit for whatever merit there may be in the completed task.

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CHAPTER I
INTRODUCTION

1. Statement of Purpose.

This study of mortality in Oklahoma is intended as an analysis of various differential factors in that phase of the demography of the state. Particular emphasis will be placed on differentials of residence, race and sex in order to show specific variations in mortality rates for rural-urban, white-colored, and male-female population groups. Trends in such other differentials as age and occupation will also be treated in general proportions.

Incident to any study of mortality is a survey of predominant causes of death of a population, as well as the trends and incidence of stillbirths within that population. These characteristics of the demography of the state of Oklahoma will also be studied.

Thus, the chief problems to be investigated are (1) general and specific group differentials in Oklahoma mortality, (2) mortality trends in the state for the period, (3) the principal causes of Oklahoma deaths, and (4) stillbirths as they occur differentially by residence and race.

In the extreme breadth of demographic studies these four problems afford many hypotheses which might be tested. In an effort to derive the utmost practical information on recent Oklahoma mortality, it was necessary to posit a rather broad hypothesis, with several propositions stated as a frame of reference for dealing with that hypothesis. To this end, the present study has been made on the assumption that Oklahoma mortality is characterized by significant differentials among

various population groups, and that these differentials are to be found in differences and trends in death rates, as well as in susceptibility to certain specific mortality phenomena and causes of death. The following propositions are stated as basic to the investigation of this hypothesis:

1. There are distinct rural-urban differences in Oklahoma mortality, and rates for urban places will exceed those for rural areas of the state.
2. Mortality trends in general are decreasing in Oklahoma, reflected particularly in decreased mortality in the oldest age brackets, distinct decreases in infant mortality, and a lowering of the incidence of deaths of children under five years of age.
3. Mortality rates among colored peoples of the state are decidedly higher than those for whites.
4. In general, there has been little change in the relative rank of the principal causes of death in Oklahoma, though there is high probability of increases in actual occurrences of degenerative diseases.
5. Stillbirths have a higher rate for urban than rural places, and a favorable difference for whites over colored populations.

2. Sources of Information.

The data from which this study was made were assembled as a part of a cooperative project completed in 1941.¹ It was the purpose of this project to study births and deaths in Oklahoma for the years 1931, 1933.

¹ A cooperative project sponsored by the Oklahoma Agricultural Experiment Station and the Oklahoma State Health Department. Clerical work was done by personnel furnished by Works Progress Administration.

1935, 1937, and 1938 in order to determine what differentials in vital processes exist between rural and urban localities. This task entailed the setting of a base for comparisons and the establishing of trends sufficiently reliable for predictive purposes. The first step toward realizing these purposes was to allocate births and deaths according to residence, since the original death certificates on file in the office of the Oklahoma State Health Department had not previously been so allocated.

It was this feature of allocation by residence which made the data particularly significant for the present study, since it applied what is generally considered to be a primary requirement for valid mortality statistics to the Oklahoma data, and made that data available in suitable form for further analysis and computation of meaningful mortality rates for the state. The need for proper allocation by residence and the effect of such allocation on mortality statistics has been clearly shown by other studies,² and is particularly relevant to differential treatment of death rates.

In these sources, deaths from all causes were included, and stillbirths were tabulated by race and residence, so that it is possible to use almost the entire data for this study. Since the study is concerned only with resident mortality in Oklahoma, all non-resident deaths and stillbirths have been disregarded.

3. Scope and Methods of Study.

For all practical purposes, the scope and methods of this study

² Harold F. Dorn, "The Effect of Allocation of Non-Resident Deaths Upon Official Mortality Statistics," Journal of the American Statistical Association, XXVII (Dec., 1932), 401-412.

have been set by the extent of the sources described above. The entire population of the State of Oklahoma was used as the base of the study, and the years considered were the same as those for which the project tabulated the original data. These years form an adequate sampling of the decade of the "thirties," and the rates and trends established are valid measures of the mortality experience in the State for the entire decade.

Historically, this particular decade was rather significant for such a study in Oklahoma. During that time the State passed its thirtieth year of statehood, and marked the fiftieth anniversary of its opening for settlement by the white man. Also, the area was rapidly coming of age so far as losing its frontier characteristics was concerned; its population was gaining the characteristics of an established section, and much of the population which had settled the area was reaching late maturity.³ This was a decade of economic depression and strain on the population, resulting in extensive mobility and migration;⁴ it was a decade of rapid industrial advancement and of rapid growth of urbanization within the state.⁵

³ Otis Durant Duncan, Population Trends in Oklahoma, Okla. A.E.S. Bull. No. 224, March, 1935; _____, Recent Population Trends in Oklahoma, Okla. A.E.S. Bull. No. B-269, August, 1943.

⁴ For a study of this movement of farm and open country families, see Otis Durant Duncan, The Theory and Consequences of Mobility of Farm Population, Okla. A.E.S. Circ. No. 88, May, 1940, p. 14; and Robert T. McMillan, Migration and Status of Open-Country Families in Oklahoma, Okla. A.E.S. Bull. No. T-19, Sept., 1943.

⁵ During this period the state's largest city reached a population of 200,000, and there was extensive growth in other urban places, some changing classification from rural to urban communities.

The method of study was predetermined by the nature of the data, any analysis of which was necessarily statistical. With the data tabulated by county to include all deaths by age, sex, race, residence and occupation for each year of the study, the statistical method for differential treatment began with the condensing of tabulation into annual data according to the various factors to be studied.

All data were in annual tally sheets by counties, and no state summaries had been drawn from them. These sheets were of three types, one showing raw data on all deaths, tallied by race, sex, age, residence and occupation, a second showing resident and non-resident deaths by coded causes of death, and a third tally showing total county deaths, resident and non-resident, for rural and urban places. This last form was the only summary tabulated, and of course showed little more than the total number of deaths in the county by size of community. Retabulation of all three tally sheets into state summaries was the first task of this study, and entailed the transcribing of such data from all three sheets, for each of 77 counties of the state, and for each of the five study years. The major division of retabulation was for rural and urban deaths. This division was determined by size of community, all places of 2500 population and over being classed as urban, and all others as rural.

The completion of this retabulation allowed for the computing of differential rates by years, and these computations were accomplished by the application of suitable methods for the determining of mortality rates and statistics.

⁶ For detailed methods of the type used, see Margaret J. Hagood, Statistics for Sociologists, New York: Reynal and Hitchcock, Inc., 1941. pp. 820 ff.

All such rates entailed the use of the total and specific group population figures for each separate year. So uniform has been the method of estimating such populations that a general statement of procedure at this point will serve to explain the basis of estimates used throughout the study. Base population figures for all groups and for the State were secured from the Sixteenth Census of the United States, in which the 1930 and 1940 figures were both available.⁷ From these base figures, all populations for intervening years were determined by straight line interpolation. It is recognized that the interpolative method is subject to such errors as may be present in registration in the published decennial censuses, and to variance in the acceleration with which a population may increase or decrease at different times within a decade, but this method is used here because it is the only method available for arriving at some of the necessary estimates.

In addition to the derived population figures, the only other data necessary for the establishment of rates was the number of annual live births in Oklahoma for the study years, these to be used as a base in determining infant mortality and stillbirth rates. For all years these figures were taken directly from the published annual vital statistics of the United States.⁸

⁷ Sixteenth Census of the United States, 1940: Population, II, tables 1 and 4.

⁸ Data for the years 1931, 1933 and 1935 were found in the annual publications of the Bureau of Census, Births, Stillbirths and Infant Mortality Statistics, Table 2, General Tables. For the years 1937 and 1938, this data was published in the annual volumes of the Bureau of Census, Vital Statistics of The United States, I, Table 2, General Tables.

Causes of death as used for this study are classified according to the International List of Causes of Death, 1929 revision.⁹ Although there was a revision of this list in 1938, which is at present more widely known and used,¹⁰ all deaths for the study years were registered according to the 1929 revision.

Special mention should be made of the method of occupational classification of the study, as it does not conform to that used in census data.¹¹ The occupational grouping used here was used in the cooperative project, and the principal differences between these groupings and those of the census are (1) the consolidation of the laboring classes into fewer categories of skills, and (2) the inclusion of "housewives"¹² as an occupational status.

This non-conformity with census classifications made it impossible to use census figures for Oklahoma occupations by years, and therefore impossible to compute occupational mortality rates.

4. Application.

The question of accuracy and applicability is always present in mortality studies. Accuracy of data, of transcription, and of tabulation and retabulation are prime factors. There must also be high

⁹ Manual of the International List of Causes of Death, Fourth Revision, Paris, 1929, Washington: U. S. Government Printing Office, 1931.

¹⁰ Manual of the International List of Causes of Death, Fifth Revision, Paris, 1938, and Joint Causes of Death, Fourth Edition, 1939, Washington: U. S. Government Printing Office, 1940.

¹¹ For census occupational classifications see A Social-Economic Grouping of the Gainful Workers of the United States, 1930, Washington: U. S. Government Printing Office, 1938.

¹² The complete classification for this study are shown in Chapter III, Table 5.

integrity of death registration within the population studied. Under present standards for valid mortality statistics, such registration must be allocated by residence or special correction for age-sex composition must be made, if rates derived from the data are to reflect a true differential for either race or residence.

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Toward a complete evaluation of this study, an application of some of these points is in order. In the first place, there is always a great likelihood of error in data derived from public documents, due to clerical inaccuracy in the transfer of information from death certificates to annual county tabulation forms. This study is unavoidably subject to these possible inaccuracies. The labor furnished for this task under the cooperative project was selected as carefully as possible, but it lacked highly specialized training for this type of research, other than instruction on the job by Works Project Administration supervisors. Errors were held to the least possible minimum through the use of recheck methods, but the inevitability of some error in handling so great a mass of registration data is recognized.

Once the data were accepted and analysis begun, a second possible inaccuracy appeared. This arose because of the retabulation necessary to assemble all county data into annual state tables, broken down into differentials. A meticulously careful retabulation of all data was accomplished in this study, the work being checked by means of check columns for both totals and subtotals for all differential factors. These check columns not only verified the accuracy of the final, but also of the preliminary tabulations made of county data by the project

13 See T. Lynn Smith, The Sociology of Rural Life, New York: Harper and Brothers, 1947, p. 162. Also, Margaret J. Hagood, op. cit., p. 823.

personnel.

A third limitation is that of the integrity of the death registration in Oklahoma. It was necessary to accept the figures for the study years at face value, there being no reliable criteria by which they could be checked for errors in registration. Oklahoma is probably subject to registration errors because of having little experience and education in the registration of vital statistics. This is to assume some underregistration in Oklahoma, since it has been pointed out that in the period 1910-1931 there was underregistration in the old established registration area of two percent for whites and 8.6 percent for Negroes.¹⁴ Correction for underregistration has not been made in the rates derived in this study. It is probably not a serious factor in the results obtained. Moreover, such correction factors as might be used for Negroes would not be applicable to the classification of colored used in the study. As used here, colored includes all non-whites, which would include many Indians in Oklahoma, and the application of a corrective constant for Negroes would produce a distortion in the race differential.

Finally, the figures for all causes of death, the annual totals, and the rates for each of the study years agree very closely with recently revised figures of the Oklahoma State Health Department for all years from 1928-1945, inclusive.¹⁵ Although this is not proof of perfection in the handling of data for this study, it is at least one objective check of results of another tabulation and computation of

¹⁴ Warren S. Thompson and P. K. Whelpton, Population Trends in the United States, New York: McGraw-Hill Book Company, Inc., 1933, p. 234.

¹⁵ Public Health Statistics, State of Oklahoma, 1945, Part II, Oklahoma City: Oklahoma State Health Department.

mortality rates for the same population including the same years.

CHAPTER II
REVIEW OF LITERATURE

1. Perspective.

It is impossible to survey in its entirety the great mass of available material on the subject of differential mortality. Since ancient times, demographers, sociologists and other thinkers have interested themselves with problems of comparative health and mortality among different groups of people. Whenever men have discoursed or written on the vital processes, they have been concerned with residence, manner of life, social and economic status, racial composition, as well as other traits, and how all these factors entered into both birth and death fluctuations.

Rather than attempt a discussion of all the varying opinions and findings of differential mortality through the ages, this review will merely skim some of the ancient thinking, show the growing interest in differential studies, specify some of the most recent and strictly differential studies in America, and generally establish a background of interest for this study in Oklahoma.

2. The Meaning of Differential.

The term differential has been thrown rather loosely into the literature of all ages, and has had a sufficiently broad connotation to fit the purposes of all who wanted to make some sort of comparison between groups. The analysis of a given event or class of events in any two places or groups has been said to be differential. Likewise, that same class of events, analyzed on the basis of a multiplicity of

variables or factors, also has been regarded as a differential treatment. Thus it is evident that differential has been used to describe many kinds of comparative studies and has applied to any number of comparisons. One may equally well speak of the differential between A and B, or the differential among A, B, C --- Z.

Hence, the review of literature on differential mortality may not deal with constant subject matter. What for centuries was a type of ethnocentric or prejudicial statement of where the most people died, has been refined into a science of statistical analysis of the occurrence of mortality events within whole populations and their many segments. One may no longer use the term differential loosely, but is obliged to limit and define it explicitly. Otherwise, that which is called a differential study may be nothing more than a simple comparison of two areas or populations.

Though some modern studies do not go beyond such simple comparisons, the ancient treatments of differential mortality were nearly all of this type. They dealt primarily with the advantages or disadvantages of life in rural or urban places, or with the superiority of physical types among rural peoples. Such differential treatments seem to appear earliest and most explicitly among the thinkers of the last four or five centuries B. C.

3. Ancient Sources.

Certainly, a simple comparison of rural and urban places was the central interest of earliest treatments of differential health, mortality, fertility, etc. Though not always stated as studies or opinions of differential health and mortality, these writings either directly or

indirectly refer to the lack of pestilence in rural areas as compared to cities, or else they speak of the general vitality, health and stalwart characteristics of rural people. As early as the time of Hesiod (eighth to eleventh century B.C.) such indirect inference is made, and in the writings of Plato (427-347 B.C.), Aristotle (384-322 B.C.), and Xenophon (circa 440-354 B.C.) the rural man is depicted as having definite physical and health advantages over his urban brother.¹

Following closely on the time of the Early Greek writers, and running through the first century A.D., the earliest Roman sources continue the theme of the advantages of health and physical strength enjoyed by rural people. Cato (234-149 B.C.), Varro (116-circa 27 B.C.), Polybius (205-123 B.C.), Virgil (70-19 B.C.), and Columella (first century A.D.) all add to the testimony that physical advantages of life and "the strongest and best soldiers" are to be found in the rural places, and these writers, especially Varro were more specific in their comparisons of rural-urban health in a differential fashion.²

4. Further Sources On Rural-Urban Differences.

It is only in relatively recent times that other differentials than those of residence have been given broad treatment in mortality literature. Although some degree of occupational difference was inherent in the treatment of differences between rural and urban places, even that phase of differential study was not seriously pursued until about the 19th century. Infant mortality was treated by most of the

¹ For an excellent treatment of these sources see Pitirim Sorokin, Carle C. Zimmerman and Charles J. Galpin, A Systematic Source Book In Rural Sociology, I, Minneapolis: University of Minnesota Press, 1930, pp. 24-39.

² Ibid., pp. 39-52.

writers of the 18th and 19th centuries, but fully differential studies of age at death did not become general until modern times. Perhaps most recent of all have been treatments of sex and race as mortality differentials. Especially is this true of race, which has its broadest field of application in the United States, and which has been seriously considered since the beginning of the twentieth century.

The most complete early studies of rural-urban differences in health and mortality can be credited to the Arabian Historian, Ibn Khaldun (1332-1406). Among a large number of comparisons which he made between rural and urban life was one concerning health and physical soundness, in which he stated the rural and nomadic peoples to be far superior to urban dwellers. Khaldun carried this comparison to the extent of saying that the practice of medicine was absolutely necessary for sedentary or urban peoples, but just as surely useless for nomads, who were natively healthy.³

European thinkers of the 15th, 16th and early 17th centuries echoed the thoughts of Khaldun and the ancients. In the Utopia of Sir Thomas More, it was suggested that all persons be obliged to spend a period of two years in agricultural pursuits, partly because of the advantages to be gained in health and the attainment of longer life.⁴ In Italy, Machiavelli, Giovanni Botero and J. B. Vico were all quite certain that for health, long life and good soldiers, one should look to the open country rather than to the cities.⁵

³ Ibid., p. 61. Also see Harry E. Barnes and Howard Becker, Social Thought From Lore to Science, New York: D. C. Heath and Co., 1938, pp. 266-279.

⁴ Sir Thomas More, The Utopia, Oxford: The Clarendon Press, 1895, pp. 120-121.

⁵ See Sorokin, Zimmerman and Galpin, op. cit., pp. 75-82.

The French Physiocrats as an entire school of thinkers were interested in uniformities of rural-urban characteristics, and among their principles they set forth the rural superiority of health and vitality.⁶

Health and hygiene were also important to the Political Arithmeticians of the 17th and 18th centuries. They were in agreement on the superiority of rural areas in health and vitality, presenting astounding figures to show the extremely higher rates of mortality in urban places. John Graunt, in England, presented urban mortality as exceeding that in rural places by at least 12 to one, and further stated that in the city of London deaths exceeded births while in the country the reverse was true.⁷

Sir William Petty agreed with these observations of his countryman, and made several predictions as to the future of the population of London, if the then prevailing death rates persisted. He went so far as to state that if all the people of the world were living in cities the size of London, with the same mortality conditions, the whole human race would be extinct in not more than 200 years.⁸

Richard Price stated London mortality rates to be from one in 20 to one in 26, and supposed that the excess of deaths over births, as well as the mortality rates, were positively correlated with the size

⁶ Ibid., p. 83 ff.

⁷ John Graunt, Natural and Political Observations on The Bills of Mortality, Baltimore: Johns Hopkins Press, 1939, pp. 75-76.

⁸ Sir William Petty, Several Essays In Political Arithmetic, London: The Phoenix Printery, 1711, pp. 38-40.

of the cities.⁹ Süssmilch showed similar data for German cities and rural places, estimating that rural mortality ran from one in 25 to one in 100, in small cities it was one in 25 or 28, while in large cities it was one in 20 to 24.¹⁰

Although the thinkers presented thus far have been unanimous in their belief that rural health and mortality was better than urban, no special effort has been made to select only those which held such views. There was practically universal agreement on this subject. At least two of the Arithmeticians presented, or tried to present, other views, but the data shown was such that it could have been interpreted as in agreement with the other thinkers, rather than disagreement. One such investigator was Edmund Halley in England, who thought that the rural-urban differences found by Graunt and Petty were not reliable, in that the cities which they used in their data were not representative. Hence, he studied Breslaw and surrounding rural areas in the manner of Graunt and Petty, and thought he had information which was in opposition to theirs, but this contention was later disproved.¹¹

Another investigator who found data which might have been interpreted as showing a deviation from the almost universal trend of superiority of rural over urban areas in the matter of health, was Deparcieux. This writer investigated the rural-urban aspects of Paris and its environs, and found that in the city of Paris itself deaths did not exceed births and that crude rates in cities were even lower than

9 Richard, Price, Observations, sixth edition, II London: C. and R. Baldwin, 1803, p. 40.

10 Johann Peter Süssmilch, Die Gottliche Ordnung, Berlin: 1775, as cited by Harold F. Dorn, Differential Rural-Urban Mortality in Ohio, 1930, (unpublished) Ph.D. Thesis, Univ. of Wisconsin, 1933, p. 3.

11 See Sorokin Zimmerman and Galpin, op. cit., p. 102.

in the surrounding country. His interpretation was not one of urban superiority, however, but involved certain processes of migration and a sort of standardizing of rates for rural and urban areas according to these processes. In the light of this interpretation, he found himself in agreement with the English Arithmeticians.¹²

At about the time of the Arithmeticians and continuing both in Europe and America, the central thinking of a majority of scholars was turned to the economic aspects of rural-urban differences. With the growth of industrialization, the most important comparisons were those of land versus production in industry; agriculture versus arts, industry, commerce, merchandising and labor. Some notable exceptions will serve to form a link from that period to more modern consideration of mortality differentials, including other factors than those of residence.

One of these writers dealt with the problem of higher mortality in cities as a dangerous trend so far as the continuation of the race was concerned. Morgan was not original in this assumption, but it was his opinion, as well as that of others, that the human race was doomed if the number of persons living in cities continued to increase.¹³

Another link is provided by John Stockton-Hough, who studied mortality in the great cities of Europe and America and held that these rates were twice that of the urban areas.¹⁴

¹² Ibid., p. 107.

¹³ John E. Morgan, "The Danger of Deterioration of the Race From the Too Rapid Increase of Great Cities," Transactions of the National Association for the Promotion of Social Science, 1865, pp. 444-449.

¹⁴ John Stockton-Hough, "On the Relative Influence of City and Country Life on Health, Fecundity, Longevity and Mortality," Social Science Association of Philadelphia, Papers of 1874, p. 194.

A third link with more modern writers was provided by William Farr in England. He stated the relative mortality of rural and urban areas in the form of a natural law and maintained that mortality increased as the eighth root of the density of population.¹⁵ Such a law, if sustained, gave a decidedly select position to rural areas in the matter of mortality, and it may be said that both early and more modern writers have agreed, in principle at least, with Farr's thesis.¹⁶

In no case can one leave the consideration of rural-urban differences in health, vitality or mortality without special mention of what is perhaps the most comprehensive exposition of these differences. For data relating to the United States and the countries of Europe, and covering the most extensive factors of rural-urban differences, one should be familiar with the work of Sorokin, Zimmerman and Galpin. Present treatment will not allow for the detail of their data, but it may be stated as at least a portion¹⁷ of their conclusion that the health of rural places is not poorer, and is perhaps rather better than that of urban places.

5. The Growing Interest in Mortality Studies.

To trace the modern interest in mortality studies generally, and in differential mortality in particular, is to cover a wide field of

¹⁵ Supplement to the 55th Report of the Registrar-General of England and Wales, as cited by Dorn, op. cit., p. 4.

¹⁶ See Pitirim Sorokin and Carle C. Zimmerman, Principles of Rural-Urban Sociology, New York: Henry Holt and Co., 1929, p. 200. Also, Pitirim Sorokin, Contemporary Sociological Theories, New York: Harper and Brothers, 1928, pp. 370 ff.

¹⁷ Sorokin, Zimmerman and Galpin, op. cit., Vol. III, Chapters XVIII and XIX.

endeavor, even if one limits his material to that produced in the United States. Of first importance is the growing emphasis on the study of mortality and vital statistics which has been placed officially by the Federal government through its agencies, especially the Bureau of Census. Though the first official census was made in 1790, the first vital statistics from official registration areas were the mortality data taken for ten states and a number of cities in 1900. In 1940, complete vital statistics data were published for the nation as a whole, and for the first time in history these data were matched by corresponding population data necessary for complete analysis.¹⁸

Throughout the forty-one year period of this development in official vital statistics there were increased interest and efficiency, and a continual expanding of the registration area to include the entire nation. An additional official source of study and information is the Public Health Service under the Treasury Department, which has issued extensive differential health information through the Public Health Bulletins. In addition to these bulletins the Public Health Reports of the United States Public Health Service are issued weekly, and have been published since 1878. These, too, cover a wide field of health information, and frequently deal with various differential aspects of health and mortality.

Outstanding among private interests and foundations which have been interested in differential aspects of mortality in the United States are the Metropolitan Life Insurance Company, the Milbank

¹⁸ Forrest E. Linder and Robert D. Grove, Vital Statistics Rates in the United States, 1900-1940, Washington: U.S. Government Printing Office, 1943. p. 1.

Memorial Fund and the Scripps Foundation. These are by no means exhaustive of private interests which have given aid and encouragement to differential studies of mortality, but they are those which have most regularly and consistently added to the information and literature in the field. Especially is this true of the Milbank Fund Quarterly, and the publications and Statistical Bulletin of the Metropolitan Life Insurance Company and other data published by this company's chief statistician, Louis I. Dublin. Much of the latter's work in differential mortality as it relates to occupational differences has also been published by the Bureau of Labor Statistics. One cannot mention Dublin or any other modern American investigator without also calling attention to Raymond Pearl and Alfred J. Lotka. Both of these men are outstanding in the general field of demography, as well as in the specific investigation of mortality characteristics. Pearl is especially known for his biological approach to demography, and Lotka has investigated many phases of vital processes.

To exhaust the entire list of agencies of the Federal government and to name every single private foundation or concern which has treated the matter of differential mortality would not be all-inclusive of important data gathered and published within this country alone. Professional journals, the several state departments of public health, the research facilities of many colleges and universities, and a vast number of independent scholars have all combined to furnish a varied and extensive resource of material on differential mortality since the turn of the present century. It would be impossible to even sketch the extent of this material in a study like this, but from parts of it can be drawn a general outline of data on some of the differential factors

studied.

6. Major Differential Factors Other Than Residence.

Mortality studies which have covered differentials other than place of residence are found almost entirely in what may be termed the modern period. Place of residence has not been eliminated, but other differentials have been added to the literature, especially since the turn of the century.

The factor of age of a population has always been taken into account in establishing death rates, but previously this factor was held of primary importance for infant mortality rates only. Recently, more interest has been shown in the standardization of death rates by age, in the life expectancy of a population, and in the actual rates of mortality at given ages within a population. Hence, the age composition of any universe studied becomes important and will be reflected in the mortality rates. One of the best examples of the effect of age on death rates is that mentioned by Thompson, and sustained by other writers, that death rates for females of child bearing age within a population where birthrates are normally high, will be higher than rates for males. For women of other ages, the reverse is generally
19
though not universally true.

Other important data on mortality relating to age are to be found in the United States Life Tables, published by the Bureau of Census and covering consecutive periods of time. These tables not only reflect the influence of age on mortality rates for various sections

19 Warren S. Thompson, Population Problems, New York: McGraw-Hill, 1942, p. 227.

and states within the nation, but also contain differential life expectancy tables for the period covered in each publication.

Male death rates are consistently higher than those for female. This is a finding presented by nearly all studies of differential mortality, and one which seems to have little or no explanation.

Whereas the male has historically been considered the stronger sex, in matters relating to mortality he appears to be the weaker in all periods of life. ²¹ Though some exception to this fact has already been mentioned as due to higher mortality among child bearing women, it is, ²² for the most part supported by much evidence. Some effort has been made to explain the fact as due to the higher incidence of violent deaths among males. It is highly doubtful that this type of death alone is sufficient to explain the higher male death rates, but it has ²³ been considered a factor.

Race differentials in mortality in the United States present a fertile field of investigation, and those investigations which have been made show mortality for whites to be decidedly lower than for colored peoples. Since Negroes constitute nearly 96 percent of the non-white population of the United States, most mortality studies have presented "colored" rates as synonymous with Negro rates, or vice versa.

A recent study of race differentials in mortality by Mary Gover

²⁰ For such information covering the decade in which this Oklahoma study lies, see U. S. Life Tables, 1930-1939, Washington: U.S. Government Printing Office, 1941.

²¹ See Edgar V. Allen, "The Relationship of Sex to Disease," Annals of Internal Medicine, VII, (February, 1934), pp. 1000-1011.

²² Ibid. Also W. S. Thompson, op. cit.

²³ Metropolitan Life Insurance Company, "The Threat of Violent Death to the Male," Statistical Bulletin, VI, (November, 1933), pp. 3-5.

reflects not only the wide differences in rates between white and colored, but also the improvement in the position of colored peoples. She states that in 1910 colored rates were approximately 50 percent higher than the white, while in 1940 they were only about 33 percent higher. Both race rates had declined in that time, with those for colored people showing the more rapid decline.²⁴ The majority of this decline is shown to have taken place among the colored peoples of ages 1 - 4, and 65 and over.

In an earlier study Gover investigated Negro mortality since 1920, and found similar differences in Negro and white rates. She also found differentials in mortality patterns within the Negro population, depending upon place of residence (rural or urban) and area of residence (North or South). Urban Negroes of the South had a higher rate than did those in rural areas, whereas the reverse was true in the North. For whites in these areas, urban rates were consistently higher than rural. Gover also found that the sex differences for colored peoples were not as great as for white, though male rates were higher on the whole than female.²⁵

Sibley investigated race differentials for mortality in Tennessee and found that Negro rates were higher than white rates, and that this difference maintained in all age groups younger than 75. Beyond that age he found rates to be generally lower for Negroes.²⁶

Thompson also presents valuable material on the factor of race in

²⁴ Mary Gover, "Negro Mortality," Public Health Reports, 61, (February 22, 1946), pp. 259-265.

²⁵ Mary Gover, "Mortality Among Southern Negroes Since 1920," U. S. Public Health Bulletin No. 235, June, 1937, p. 13.

²⁶ Elbridge Sibley, Differential Mortality in Tennessee, Nashville: Fisk University Press, 1930, pp. 33-36.

mortality studies, showing that element to be so important that for
 most areas separate rates should be given.²⁷ He makes the additional
 observation, as does Molyneaux,²⁸ that race is only a controlled
 variable, and while it is a differential factor it must not be
 construed as the "cause" of differing mortality rates. These differ-
 ences are held to be more likely a result of economic conditions.
 Molyneaux further applies this same reasoning to the factor of sex,
 which he says may actually reflect differences in mortality due to
 occupation. Thompson, however, reverses the procedure by saying that a
 study of differences in occupational mortality may lead to an easier
 understanding of the differences in death rates in various types of
 communities.²⁹ So it is that these differentials become closely related
 factors in any mortality studies.

Two other studies of the differentials of mortality have been made
 by Dorothy Wiehl. They relate specifically to expectance of life and to
 age differences, but are general in their scope to the extent of indicat-
 ing some interesting trends in mortality. It is her finding that age
 composition is especially important, since there has been a continual
 rise in some death rates during the last half century.³⁰

The foregoing literature on differentials has touched only
 scattered writings in the field as a result of the investigations of
 only a few of the present students of demography, mortality and vital

27 W. S. Thompson, op. cit., pp. 239-40.

28 J. Lambert Molyneaux, "Differential Mortality in Texas," American Sociological Review, Vol. 10, (February 1945), p. 22.

29 W. S. Thompson, op. cit., p. 239.

30 Dorothy G. Wiehl, "Trends in Mortality and Life Expectancy," The Milbank Memorial Fund, Quarterly Bulletin, XI, (January 1933), pp. 61-67. Also, "Some Recent Changes in Mortality Among Adults," Journal of Preventive Medicine, Vol. 4, (May-June, 1930), pp. 215-237.

processes. Specific studies of differential mortality that include a number of differential factors related to a given area or state, small enough to be directly applicable in stating specific differences among such units of studies, have not been carried out by many investigators. Of the literature mentioned, only the work of Sibley and Molyneaux was done in such an area, and not more than a few others of that type are known at present. One of these is a study of rural-urban mortality in Ohio, done by Harold Dorn in 1933,³¹ and another is a study of general mortality trends for the State of Minnesota by Calvin Schmid.³²

Molyneaux shows the need for such specific studies, stating that we have only generalities on mortality and that what is true for the United States as a whole may not be true for individual states, let alone separate counties.³³ He investigated mortality in the State of Texas, using the most refined methods and covering the differentials of race, sex, age and residence, as of January 1, 1940. More recently Molyneaux, Gilliam, and Florant studied these same differentials for the State of Virginia. The data were for the years 1939 and 1940, averaged to represent rates for January 1, 1940. For the most part they found conventional differences for age, race, sex and residence, but concluded that the greatest current need in Virginia was improved health services and conditions in small urban places.³⁴

³¹ Harold F. Dorn, op. cit.

³² Calvin F. Schmid, Mortality Trends in the State of Minnesota, Minneapolis: The University of Minnesota Press, 1937.

³³ J. L. Molyneaux, op. cit., p. 17.

³⁴ Lambert Molyneaux, Sara K. Gilliam, and L. C. Florant, "Differences in Virginia Death Rates by Color, Sex, Age and Rural or Urban Residence," American Sociological Review, Vol. 12, (October, 1947), p. 535.

Schmid has gone rather fully into differential study in Minnesota, showing trends of death rates in that state from 1910 to 1935, and even considering the seasonal variations of mortality. However, he chose specific causes of death for his most extensive elaboration, and in general was more concerned with trends than with differential treatment.³⁵

Although Dorn studied the differential of residence, he limited his study of mortality in Ohio to that factor alone and used data only for the one year of 1930. He did, however, make a significant contribution to the field of mortality studies in his special treatment on the effects of the allocation of mortality statistics by place of residence,³⁶ and his methodology was such as to subject the data to the most stringent tests of statistical significance.

Sibley called his study of mortality in Tennessee a differential study, and such it was from the standpoint of race; but beyond dealing with race differences for all causes and for specific causes of death, he studied practically no other factor of difference in mortality within the population of that state. Consequently the chief contribution which he made was to throw further light on the race differentials of mortality in a southern state.

Covering the mortality data for 1940 alone in Louisiana, Louise Kemp and T. Lynn Smith made a very extensive study of differential factors. They analyzed the 1940 data by principal causes of death, and studied these causes as they functioned differentially in race, sex, age

³⁵ *Op. cit.*, passim.

³⁶ See footnote 2, Chapter 1.

and residence.³⁷ To complete their investigation, they compared the mortality rates for Louisiana with those of the nation, and showed trends of comparison from 1920.

Any long-time review of the literature on mortality must of necessity be either selective in the material it chooses or else extremely voluminous. In any case, it is possible to derive certain over-all, persisting characteristics about the differential trends of death rates, even as has been done here. Such a review must certainly conclude that the need in the field is for more extensive and discriminating differential study of smaller areas or units of population. As stated by Molyneaux, only studies of smaller units, such as the studies of Texas and Virginia, will produce the type of mortality information which is now needed to make more comprehensive analysis of the total mortality of the Nation and to show more specific characteristics of mortality from area to area. To that end the present differential study of Oklahoma mortality is pointed. Numerous and apparent as its limitations may be, such a study is a contribution, at least, to the general knowledge about differential mortality, and to the specific knowledge of differential mortality patterns within a given state for a reasonably long period of time.

³⁷ Louise Kemp and T. Lynn Smith, Health and Mortality in Louisiana, La. A.E.S. Bull. No. 390, May, 1945.

CHAPTER III

GENERAL PATTERNS OF MORTALITY

1. The Trend of Oklahoma Mortality.

For all years of this study, Oklahoma averaged 20,200 deaths per year, and except for slight variations, the total annual deaths and the annual crude mortality rates do not show any significant annual change over that period. Although the trend is slightly upward through 1937, the greatest difference in crude rate between the lowest and highest years is but .6 deaths per 1000 population.

Table 1 shows these crude rates, as well as race and sex specific rates for the sample years,¹ and it will be observed that the 1938 level of mortality is essentially what it was in 1931. In view of these rates Oklahoma mortality was relatively constant during the decade. However, it is possible that these rates and the data from which they are derived do not reveal the true trend of mortality of the period.

In the first place, it has been stated that this was a period of extensive migration from the state, and there is further evidence that those who migrated were in a large proportion young adults. The children involved in the migration were usually under 10 years of age, the average age of emigrating children being under five years. Only 7 percent of the Oklahomans migrating to California during that period were 55 years of age and over.² This being the case, the Oklahoma

1 As used throughout this study, crude death rates will denote deaths per 1,000 or 10,000 total population, without correction for age. Specific group rates will denote group deaths for like units of population within any given group, and will not be corrected for age.

2 Otis Durant Duncan, The Theory and Consequences of Mobility of Farm Population, Okla. A.E.S. Circ. No. 88, May, 1940. pp. 14, 15 and 18.

people who left the state during the "thirties" were not those of the high mortality ages or the extremely young or the extremely old. These people evidently stayed and died in Oklahoma. That some of them died in this period is highly probable, and that they died during a time when Oklahoma was losing an average of almost 6,000 of its population annually would mean that their deaths were computed in this study against a shrinking base population.

Another factor which is to be considered in connection with this migratory pattern is that many of the people who left the State and who died during the period had not established a residence elsewhere, and their deaths were credited back to their place of origin and were computed against this shrinking Oklahoma population. That such is highly probable is shown by the fact that many of these migrants went by short moves to California and other points, some of them taking as long as 36 months and over to reach California, and 94 percent of them requiring more than six months for the move.³ That some of these people died is a statistical probability, and that their deaths were recorded ultimately in the Oklahoma records is in line with the policy of exchanging death registrations of residents dying outside an area. As migrants, these people, for the most part, had no other established residence than Oklahoma.

It is significant that the percentage of residents dying outside the area (county) in which they lived turned sharply upward after 1933, with percentages of all deaths of 9.0, 8.9 and 8.0 for the years 1935, 1937 and 1938, respectively. Again, it is reasonable to suppose that

³ Ibid., p. 16.

some of these deaths outside the county were entirely outside the State, and were possibly migrants.

If the validity of these latter factors be allowed, assuming that they are reflected in the crude rates shown in Table 1, and that Oklahoma death registrations were rather complete and accurate, it is fair to state that without such a distortion as they may have caused, the actual trend of crude mortality in Oklahoma for the period could have been slightly but steadily downward. This is to say that of the nearly 60,000 population Oklahoma lost from 1930 to 1940, some who no longer lived in the State were actually registered as Oklahoma mortality statistics.

Table 1 - Crude and Race-Sex Specific Mortality Rates, Oklahoma, By Selected Years, 1931-38.*

Year	Crude rate	Race - Sex specific rates					
		Total male	White male	Colored male	Total female	White female	Colored female
1938	8.4	8.6	8.4	10.6	6.7	6.4	9.6
1937	8.9	9.3	9.1	11.4	6.9	6.7	9.1
1935	8.8	8.9	8.9	9.5	7.0	6.8	8.3
1933	8.6	9.1	9.0	10.1	7.2	7.0	8.3
1931	8.3	8.7	8.4	11.3	7.1	6.7	10.4

* Rates based on deaths per 1000 annual estimated population.

The larger portion of Table 1 represents a race-sex breakdown of the mortality experience for the period. As in the case of crude rates, these rates for race and sex are somewhat erratic throughout the period, with only those rates for females reflecting a definite trend. Although this trend is slight, it is continuously downward for females as a whole and for white females, and it is generally so for colored females. The rates for males do not show much definite movement, those

for total males and white males having considerable fluctuation in the middle years, but ending the period at the same level they held when it began. The rates for colored males are even more erratic than for whites, with a slightly greater trend toward lower ratios through the years. The reason for this condition is not clear from the data alone, but in the light of what is known concerning colored mortality and under-registration of colored deaths, it can be surmised that the erratic tendencies were due to the vicissitudes of colored registration in the State. The trend toward lower rates may have been due to sheer improvement in colored mortality, since it has already been shown that such improvement was taking place in other areas.

As a whole, race-sex trends are not at all definite, as was the case with the crude rates, and any lower trends are about balanced by slightly higher ones in other groups. The most definite characteristic in these specific rates is the decided difference between white and colored rates in all years. This is to be expected, however, since all race differential mortality literature reveals the same situation in the populations studied. This literature is just as unanimous in declaring that such differences are not the result of inherent racial differences, but are due to differences in socio-economic status between white and colored populations.⁴ This is assumed to be true in Oklahoma.

2. Characteristics for Race, Sex and Residence.

A more specific and exacting analysis of the mortality experience in Oklahoma is shown in Table 2. Deaths from all causes have been tabulated and calculated into specific rates for race and sex, with a

⁴ Warren S. Thompson, Population Problems, Third Ed., New York: McGraw-Hill Book Co., 1942, pp. 239-40.

further differentiating factor of residence. By this means, not only are race-sex differences apparent, but the rural-urban characteristics by race and sex and for the State are derived. Rural and urban classification as used here are the same as those used in the decennial census of the United States.⁵

The consistency of differential between white and colored, rural and urban, and male and female is so marked as to be almost invariable. In only two years do any white rates exceed those for colored people, and this is due to a marked increase in white rural male deaths for those years, 1933 and 1935. This results in an excess of total white rural deaths for those years over colored rural deaths. In every case urban rates are greater than rural, and male rates are greater than female rates.

Taking these patterns of differences between the differential groups as established, a further evaluation of Table 2 should be made as to trends or changes in the patterns from year to year. In general there are none. Such small changes as occur are no greater than would be expected through annual differences due to epidemics or other variable conditions of one year over another. The most pronounced of these small changes, so far as any trend is concerned, is the tendency of rural rates to be slightly higher through the period than they were in 1931, and for those of urban areas to be somewhat lower.

An examination of race rates within the two residence areas reveals that such change as has been noted is due mostly to lower death rates

⁵ All communities of less than 2500 population and all open country residences are classed as rural, while all communities having a population of 2500 and over are classed as urban.

Table 2 - Rural-Urban Mortality Differences, By Race and Sex, Oklahoma, By Selected Years, 1931-1938.*

Race	Sex					
	Total		Male		Female	
	Rural	Urban	Rural	Urban	Rural	Urban
1938	6.3	10.0	6.9	11.6	5.6	8.5
White	6.1	9.6	6.8	11.3	5.4	8.1
Colored	8.0	13.8	8.3	15.1	7.8	12.6
1937	6.6	10.8	7.4	12.7	5.7	8.9
White	6.5	10.3	7.3	12.3	5.6	8.5
Colored	7.9	14.5	8.7	16.8	7.0	12.5
1935	6.6	10.4	7.3	12.0	5.8	8.9
White	6.6	10.0	7.4	11.6	5.8	8.5
Colored	6.3	13.8	6.7	15.3	5.9	12.5
1933	6.5	11.1	7.1	12.9	5.8	9.5
White	6.5	10.8	7.2	12.4	5.8	9.1
Colored	6.5	14.6	6.9	16.9	6.0	12.6
1931	6.0	11.5	6.6	12.9	5.4	10.2
White	5.8	10.9	6.4	12.4	5.1	9.5
Colored	8.0	17.0	8.2	18.3	7.7	15.8

* Group specific rates based on deaths per 1000 estimated population.

for colored and slightly higher for white populations as the decade progresses. This may be the most significant factor among these differentials, due to the control of one specific disease. Colored peoples in Oklahoma, both Negroes and Indians, are particularly subject to tuberculosis, and as will be seen in Chapter IV, the control of and consequent fall in number of deaths resulting from this one disease alone may be sufficient to explain a somewhat lower mortality of colored populations in the state.

3. Age Patterns and Infant Mortality.

The particular interest of this study in the age factor in mortality is one of comparison. It has been stated that the decade of the study was one in which many of the people who originally settled in

Oklahoma were reaching advanced ages. It is intended here mainly to determine the incidence of death in the various age groups, in order to find out just what ages of Oklahomans were dying in greater or smaller numbers during the decade.

Table 3 shows infant mortality rates and mortality rates of other specified age groups within the population. This analysis of age differentials in mortality for the study period is significant in comparison with the rates shown in Table 1 for the entire population. It is notable that rates computed for specific age groups show a close relationship with the annual trend or movement of the crude rates - the movement is not great, and it is erratic. Further, it is notable that the age specific rates reveal those age groups which were responsible for the greatest movement of death rates, since this may partially account for the erratic tendencies of the crude rates of Table 1. The two age groups which most affect these trends are infancy and ages 65 and over. In every age group from four years through 64 there is some improvement in mortality with the passing of every year. In the age groups through years one, two and three there is improvement of rates in nearly every year, and the general trend of the rates from 1931 through 1938 is downward. Consequently, except for the very young and the very old age groups in Oklahoma, there was some constant improvement in mortality rates during the decade. Both the failure to show an over-all improvement and the absence of a definite trend for the period may be attributed to the lack of constancy and improvement in mortality experience among the very old and the very young segments of the population.

A third significant observation which may be made by comparing

Table 3 - Infant Mortality Rates and Age Specific Mortality Rates, Oklahoma, By Selected Years, 1931-1938.

Age groups	Annual rates				
	1938	1937	1935	1933	1931
Under 1*	47.4	54.5	52.4	56.1	55.1
1**	7.7	7.4	8.4	11.0	10.0
2	4.1	4.6	3.5	4.6	4.5
3	2.4	2.6	2.7	3.5	3.3
4	1.5	2.1	2.3	2.6	2.8
5-9	1.1	1.1	1.5	1.6	1.7
10-14	1.0	1.2	1.4	1.4	1.5
15-24	1.9	2.2	2.4	2.7	2.8
25-34	2.7	2.9	3.3	3.7	4.0
35-44	4.0	4.2	4.5	5.0	5.1
45-64	10.6	11.7	11.8	11.0	11.9
65 and over	55.5	59.1	57.6	59.6	60.1

* Infant Mortality Rates, based on deaths per 1000 annual live births.

** Rates for all ages one year and over based on deaths per 1000 annual estimated population within the age group.

Tables 1 and 3 seems almost an inconsistency when taken at face value. Table 3 shows a more favorable pattern of mortality experience for the State than do the crude rates. Regardless of the small erratic annual movement within the period, age specific rates, as the incidence of deaths per 1000 in each age group, reveal that fewer persons per 1000 population in those groups died at the close than at the beginning of the period. This is true even though only the population of ages 25 years and older was increasing throughout the period.

The explanation of this discrepancy seems to be that mortality rates computed by specific age groups are a more exact reflection of mortality experience than crude rates. Such "adjusted" rates are the only exact measures of mortality in a population in which variables are operative.

⁶ Hagoood, op. cit., pp. 823-24.

Longevity of life is of special interest in the computation of mortality on the basis of age composition of a population. From such a computation, with additional detail to that used here, life tables are drawn, and the expectancy of life of a population may be reckoned.⁷ Table 3 implies that further detailed computations for Oklahoma during the period studied would produce life tables showing increasing longevity for the State's population.

This implication applies only to the experience of the period, for it is likely that Oklahoma was headed into somewhat higher mortality rates, especially at older ages, in the years immediately following this study. Such likelihood is due primarily to the rapid aging of the population, and to the fact that the older segment of the population had ultimately to reach the end of its years. Since only these older age groups were increasing numerically during the decade, ultimately their deaths must tend to raise the crude death rate for the State. This point will be shown clearly in the mortality rates for leading causes of death discussed in Chapter IV.

It is altogether likely that such an influence has already been felt in Oklahoma mortality. Vital Statistics Special Reports published for the State for 1944 show the following crude death rates for the years of 1940 to 1944, inclusive: 9.0, 8.9, 8.7, 9.3, and 9.2. The rates are exclusive of deaths of members of the armed forces overseas during those years, yet are somewhat higher, as a whole, than the crude rates for the study years. Assuming that general health conditions in Oklahoma were at least no worse for the above years than they were during the last decade, it is legitimate to further assume that the

⁷ Ibid., Chap. 28.

gradually rising annual crude rates in the first years of the present decade were at least partially due to the effects of an increasing number of deaths of older persons.

Some consideration is due the possible causes of fluctuations of mortality in Oklahoma during these years. In the first place, the rather favorable mortality experience is likely due to advances in the control of many types of diseases during the decade, as well as to an improvement in the mortality experience of the colored races. A further possible factor is that of general environmental conditions, particularly economic. Though there is evidence on both sides of the question, earlier studies for various countries have found some indication that so long as physiological levels are satisfied, times of depression are not characterized by rising death rates.⁸ The period of depression which occurred during the years of this study brought no radical changes in mortality experience in Oklahoma, and was not one of rapidly rising death rates. To this extent, the experience reflected in Tables 1 and 3 agrees with earlier American studies which found that death rates rose in periods of prosperity and tended to decrease in times of depression.⁹

4. Stillbirth Characteristics for Race and Residence.

Demographic studies have always considered stillbirths as a separate phenomenon. They cannot be classed as a part of mortality, since children born dead are never a factor in population estimates and

⁸ For an extensive treatment of this subject, see Pitirim Sorokin and Carle C. Zimmerman, Principles of Rural-Urban Sociology, New York: Henry Holt & Co., 1929, p. 196 ff.

⁹ Ibid.

enumeration. Stillbirths are a vital factor in the general health index of a population, however, and are highly important as a symptom of the virility of parents and their offspring.¹⁰

Vital statistics records of the United States show that rates for stillbirths are consistently higher in cities than in rural areas, and for colored than for white populations. In general, the rates for Oklahoma for the base period of study agree with these statistics for the nation as a whole. Table 4 shows stillbirth rates for the State, computed to show differentials of race and residence.

From these differential rates the stillbirth patterns of rural and urban and white and colored peoples are apparent. It will be noticed, however, that rural-urban differences began to disappear in the last two years of the study, rural areas having but a slight advantage in 1937, and the disadvantage being distinctly rural for 1938. This condition in these years was but the culmination of the trend shown in the earlier years, as these residence rates were drawing closer together in each successive study year. This suggests the conclusion that the reversal of rates in 1938 was not the result of abnormal conditions for that particular year, unless this abnormality is considered to lie in the very high rural rates.

For race differences there was no such reversal of superiority. Whites had smaller rates for every year and for both rural and urban areas. This was true, even though there was much improvement in the urban colored rates as the period progressed. By 1937, urban colored rates were actually lower than those for rural colored people. Though the urban white rate was never lower than for rural whites, this group

¹⁰ Ibid., p. 186.

Table 4 - Stillbirth Rates for Race and Residence, Oklahoma
by Selected Years, 1931-38.*

Residence	Race		
	All races	White	Colored
1938**	27.9		
Rural	30.3		
Urban	25.2		
1937	23.8	23.2	29.9
Rural	23.6	22.9	31.9
Urban	23.8	23.5	28.1
1935	29.8	29.3	35.4
Rural	27.6	27.5	28.5
Urban	32.5	31.6	42.2
1933	31.3	30.6	39.4
Rural	28.1	27.9	28.5
Urban	35.5	34.2	48.9
1931	31.2	30.3	39.3
Rural	25.7	25.0	33.8
Urban	37.5	36.6	45.7

* Rates based on stillbirths per 100 annual live births.

** 1938 data tabulated by the Project for residence only.

also showed marked improvement each year, and the total result of these improvements in both races for urban areas was the reduction of total rural-urban differences.

If the pattern set between 1931 and 1938 has been maintained, it is evident that there may no longer be a general rural superiority in stillbirth rates, and it is highly probable that the superiority of whites over colored populations has been greatly reduced.

5. Occupational Rankings.

Deaths were not tabulated according to the standard census classification of gainful workers, the principal differences being the

inclusion of "housewives" as a separate occupational group, and the failure to make a detailed breakdown of other groups such as the general class of "farmers" and to make a fuller classification of skills to include semiskilled workers.

The classifications used are sufficient for little more than a comparison on the basis of the percentage of all deaths occurring in each of seven broader groups of Oklahomans. This comparison is significant, however, especially as to the pattern of deaths among these groups - whether or not there were significant changes in the percentages of total deaths which occurred from year to year in each classification.

Table 5 shows a comparison of the percentages of all deaths which fall within each occupational group for each year, and it will be noted that there are no significant changes in these percentages from year to year. Specific rates for these groups might reveal a more significant difference, but such rates are not available due to the fact that group classifications do not coincide with those of the census, and population estimates for groups are therefore not available. By these percentage comparisons, however, an occupational pattern of mortality for the period is set - a pattern in which there is little variation for any group from year to year.

Little more than these comparisons is possible of deduction from Table 5, and almost any other observation on occupational deaths during the period would be mere conjecture. One such conjecture which might be partially sustained is that industrial occupational deaths in Oklahoma are well within the respective expectancies for each group. This

11 For census occupational groupings see A Social-Economic Grouping of the Gainful Workers of the United States, 1930, Washington: U.S. Government Printing Office, 1938.

Table 5 - Percentages of Deaths Occurring in Seven Occupational Groupings, Oklahoma, by Selected Years, 1931-38.

Occupations	Percent of Total Deaths				
	1938	1937	1935	1933	1931
1. Professional and technical: Doctors, Attorneys, Teachers, Musicians, Embalmers, Pharmacists.	3	3	3	3	3
2. Clerical: Stenographers, Book- keepers, Clerks.	4	4	4	4	4
3. Skilled: Barbers, Bricklayers, Printers, Bookbinders, Welders, Plumbers, Electricians, Rig- builders.	9	9	9	9	9
4. Unskilled: Truck and Cab Drivers, Milkmen, Grocer Clerks, Roust- abouts.	12	13	14	12	13
5. Owners, Managers, Proprietors and Superintendents.	7	7	6	6	5
6. Housewives.	37	35	34	36	37
7. Farmers	28	29	30	30	29

conjecture is made in view of the fact that Oklahoma was not extensively industrialized by the time of this study, but had those characteristics which pertain in a predominately rural area. Thus, there was a minimum of the nominally high risk occupations in the State, and a consequent greater stability in annual deaths within the existing occupational groups.¹²

This conjecture is further sustained by the large percentage of total deaths occurring in those occupational groups classed as "housewives" and "farmers." These two classes annually are responsible for

¹² For a recent treatment of occupation and death rates, see Warren S. Thompson, *op. cit.*, pp. 234 ff.

65 percent of all deaths in Oklahoma, and though there may be existing risks in homes and on farms, yet they are still of the "ordinary" risks of life in the State.

CHAPTER IV

PRINCIPAL CAUSES OF DEATH IN OKLAHOMA

1. Relative Rank of Leading Causes.

The 20,000 annual Oklahoma deaths result from various kinds of illnesses, accidents and violence, and unknown and illdefined causes. For the years of study these deaths produced an average mortality rate of 8.5 per 1000 population.

Causes of death may be said to fall into three general classes:

(1) the degenerative diseases, or those associated with advancing age; (2) the transmissible or contagious diseases; and (3) external causes of death. It is the purpose of this chapter to analyze the causes of deaths of Oklahoma people in the study years, and to determine the more important causes, or those which claimed the lives of the greatest number of the State's population. In so doing, it will be possible to know how each of the three general classes of causes of deaths operated in the Oklahoma mortality pattern during the period, and to what extent the pattern changed or did not change.

To accomplish such an analysis, rates have been calculated for each of 25 leading causes of death for each year of the study and for all years. These causes and their rates are given in Table 6. It will be noted that many of these causes are not specific or individual diseases as listed in the International List of Causes of Death,¹ but are general causes or types which include several specific diseases.

Of these 25 causes of death, heart disease was consistently the number one killer of Oklahomans, accounting for an average of 128

¹ See footnote 9, Chapter I.

Table 6 - Mortality Rates From Common Causes of Death Showing Relative Rank of Each Cause, Oklahoma, by Selected Years, 1931-1938.*

Cause of death	All years		1938		1937		1935		1933		1931	
	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate
All causes	-	856.4	-	834.7	-	893.1	-	874.8	-	855.0	-	827.1
Diseases of the heart (90-95)**	1	127.7	1	142.7	1	136.7	1	131.5	1	130.3	1	98.2
Pneumonia, all types (104-114)	2	93.9	4	69.8	2	85.3	2	117.6	2	100.1	2	96.6
Cerebral hemorrhage (82)	3	73.0	3	71.9	4	70.5	3	76.2	3	77.6	3	69.3
Cancer, all forms (45-53)	4	63.4	2	73.3	3	74.9	4	58.3	4	58.6	5	52.6
Nephritis (130-132)	5	52.2	5	60.5	5	65.1	7	44.9	7	45.3	7	45.5
Tuberculosis, all forms (23-32)	6	50.2	7	45.4	6	51.1	6	45.4	5	48.8	4	55.9
Congenital conditions (157-161)	7	49.2	6	48.5	6	51.1	5	46.8	6	48.7	6	51.4
Accidents other than motor veh. (176-98; 201-14)	8	39.9	8	43.9	8	42.9	8	37.4	8	35.2	8	40.4
Influenza (11)	9	24.8	11	17.9	9	41.1	12	21.3	10	24.8	13	19.2
Other diseases of the digestive sys. (115-118)	10	24.5	10	20.2	11	21.1	9	27.9	11	22.9	9	30.5
Motor vehicle accidents (210)	11	21.0	9	20.8	10	23.5	11	25.1	14	19.2	14	16.8
Senility (162)	12	20.7	13	15.0	13	16.3	10	23.8	13	21.1	10	27.0
Diarrhea and enteritis, all ages (119-120)	13	20.2	12	15.1	12	20.3	15	18.9	9	26.8	12	19.6
Other diseases of the nervous system (78-89)	14	17.8	17	12.2	14	15.5	14	19.4	12	21.3	11	20.5
Diseases of arteries & circu. system (97-103)	15	15.0	15	13.3	15	14.3	13	20.1	16	15.1	16	12.1
Appendicitis (121)	16	12.3	18	11.7	17	13.3	18	9.8	15	15.7	19	11.3
Diabetes mellitus (59)	17	10.8	14	13.6	16	13.4	20	9.6	21	9.0	22	8.7
Suicide (163-171)	18	10.6	19	10.2	18	11.0	16	10.5	20	9.7	17	11.5
Homicide (172-175)	19	9.3	24	6.9	23	7.0	21	8.7	17	12.4	17	11.5
Hernia, intestinal obstruction (122)	20	8.5	21	8.2	21	8.9	19	9.6	24	8.0	23	8.0
Other diseases of genito-urinary sys. (133-139)	21	8.4	20	8.8	20	9.7	17	10.0	26	6.8	26	7.4
Syphilis (34, 80, 83)	22	8.3	16	12.6	19	9.9	28	4.8	25	7.0	27	7.2
Puerperal causes (140-150)	23	7.9	23	7.4	22	8.5	22	7.5	22	8.4	23	8.0
Diphtheria (10)	24	7.8	25	5.0	28	3.9	25	5.5	18	12.1	15	12.4
Typhoid and paratyphoid fever (1 & 2)	25	7.6	29	4.0	24	5.3	23	7.3	19	10.2	20	11.2
Unknown and ill-defined (199-200)	--	21.9	--	27.6	--	24.2	--	27.3	--	10.3	--	20.5
All other causes	--	50.1	--	48.3	--	48.5	--	49.8	--	49.6	--	54.2

* Rates based on deaths per 100,000 estimated population.

** These figures represent coded causes of death as given in the International List of Causes of Death, 1929.

deaths per 100,000 population for all years studied. This degenerative disease was increasingly deadly as the decade progressed, and reached an all-time high of 143 deaths per 100,000 persons in 1938.

Second important for the decade was the class of diseases called "respiratory," excluding influenza, and including such specific diseases as pneumonia, bronchopneumonia, and bronchitis. This cause of death decreased in importance in the latter years of the period, but was responsible for 94 deaths per 100,000 population during the period as a whole.

In third ranking with a high degree of consistency was cerebral hemorrhage, the rates for which showed some slight decrease over the period. Steadily increasing in rate for a rank of fourth was cancer in all forms. This cause was second only to diseases of the heart in 1938, having advanced from fifth ranking 1931. In fifth ranking was nephritis, which also showed a distinct increase in rate in the latter years, 1937 and 1938.

Tuberculosis in all forms took sixth ranking, due primarily to a marked decrease in rate toward the end of the decade. Whereas cancer advanced fastest in the rankings among the first ten causes, tuberculosis showed the most rapid and constant decline, going from fourth place in 1931 to seventh place in 1938.

Congenital conditions, in seventh place, killed 49 persons per 100,000, while all accidents other than motor vehicle took the lives of 40 in every 100,000 Oklahomans, on the average. Ninth ranking was held by influenza with a rate of nearly 25 per 100,000, and in tenth place was "miscellaneous diseases of the digestive system" which killed 24.5 persons per 100,000 total population.

Table 7 - Mortality Rates From Common Causes of Death by Race, Sex and Residence, Oklahoma, by Selected Years, 1931-1938; Showing Average Rates for All Years.*

Cause of death	Total	Rural				Total	Urban			
		Male		Female			Male		Female	
		White	Colored	White	Colored		White	Colored	White	Colored
All causes	639.1	698.6	767.5	551.5	682.6	1078.7	1200.7	1648.9	873.8	1320.2
Diseases of the heart	88.3	110.1	86.2	67.9	61.5	181.9	227.9	219.2	133.9	179.0
Pneumonia, all types	74.9	77.9	107.3	66.3	81.2	114.8	122.6	239.7	91.5	139.9
Cerebral hemorrhage	57.3	64.2	51.6	51.4	50.1	89.5	100.2	97.3	76.1	109.3
Cancer, all forms	45.5	44.1	19.2	52.4	29.9	84.4	79.3	39.2	95.1	75.1
Nephritis	40.1	46.7	50.4	31.9	38.4	67.1	75.8	111.2	52.6	80.5
Tuberculosis, all forms	36.9	31.3	86.9	27.5	108.4	51.0	43.5	151.4	37.7	138.1
Congenital conditions	41.6	46.7	32.3	38.7	30.1	60.2	71.0	72.0	50.6	41.8
Accidents, other than motor vehicle	28.8	39.2	38.7	17.8	14.9	50.7	69.7	87.4	30.2	36.4
Influenza	22.6	22.0	26.2	21.7	31.9	27.3	27.9	45.2	22.6	47.2
Other diseases of the digestive system	15.7	15.7	18.3	14.9	18.4	35.5	35.8	53.6	30.3	62.1
Motor vehicle accidents	12.5	18.5	15.7	6.7	4.2	28.2	42.5	34.7	15.6	10.3
Senility	18.3	18.7	13.8	18.3	19.9	22.9	24.0	19.9	21.7	26.1
Diarrhea and enteritis, all ages	16.3	16.5	19.0	15.0	21.2	25.0	25.0	44.2	21.7	36.9
Other diseases of the nervous system	10.9	12.2	11.0	9.7	9.0	20.4	22.6	26.8	17.4	21.6
Diseases of arteries and circulatory system	9.7	12.0	8.2	8.2	3.5	18.3	20.5	22.3	16.2	14.8
Appendicitis	5.5	6.5	6.3	4.5	4.0	20.2	23.3	27.8	15.7	26.1
Diabetes mellitus	8.0	8.0	7.3	8.4	4.5	13.8	13.2	11.9	14.3	16.6
Suicide	7.5	12.4	5.6	3.2	1.2	14.9	24.2	7.4	8.0	2.7
Homicide	6.1	7.5	28.8	1.6	5.0	14.1	15.0	102.7	2.9	23.4
Hernia, intestinal obstructions	4.8	5.1	7.3	3.9	7.0	12.5	11.7	18.9	11.8	18.9
Other diseases of the genito-urinary system	4.9	6.6	7.0	3.0	3.2	11.8	13.6	23.3	8.8	12.1
Syphilis	4.3	4.3	14.8	2.3	9.2	10.0	10.3	41.7	5.1	22.0
Puerperal causes	5.9	.2	.2	10.4	24.4	9.5	.4	1.5	17.1	27.9
Diphtheria	7.5	7.4	6.1	8.4	2.0	8.0	9.1	6.0	7.6	3.6
Typhoid and paratyphoid	6.8	6.5	13.8	5.3	13.7	7.8	8.4	17.4	5.2	17.1

*Rates based on average annual deaths from common causes per 100,000 estimated population at mid-point of study period.

These first ten causes accounted for almost 70 percent of the average annual deaths of Oklahomans in the decade. The ten all-years average rates per 100,000 population range from 24.5 to 127.7, which means that the tenth ranking cause claimed but one-fifth as many lives as did the first place killer, and accounted for but three percent of deaths from all causes.

Although these causes occupied the first ten places, the rest of the first 25 causes are important enough to be given serious consideration in a study of what killed Oklahomans in the decade of the "thirties." Some of the tailenders of the list do not stay in the first 25 causes in each of the years, but demand attention because of their rankings over the period as a whole. The two lowest ranking causes accounted for an average of more than 175 total deaths per year.

Particularly significant in relation to all these causes is the year-to-year fluctuation, as well as the trend taken over the entire period. It has been mentioned already that marked increases and decreases appear in the rankings and rates of several of the first ten causes of death, and this is also true of other diseases or classes of diseases throughout the first 25 causes. It is notable that motor vehicle accidents steadily increased as fatal causes, as did diabetes, diseases of the genito-urinary system, and syphilis. Decreasing as causes of fatality were some diseases of the nervous system, the communicable diseases of diphtheria and the typhoids, and senility. The actual decrease of this latter cause is hardly to be expected in the face of the aging population of the state, but is probably explained in the possibility of more exact diagnosis of specific fatal causes for aged people.

Table 8 - Mortality Rates From Common Causes of Death by Race, Sex and Residence, Oklahoma, 1931.*

Cause of death	Total	Rural				Total	Urban			
		Male		Female			Male		Female	
		White	Colored	White	Colored		White	Colored	White	Colored
All causes	602.0	638.0	822.0	509.0	767.0	1154.0	1235.0	1828.0	952.0	1580.0
Diseases of the heart	90.8	79.2	82.4	48.0	60.1	150.0	176.2	201.2	114.5	184.5
Pneumonia, all types	70.2	73.9	108.4	59.6	79.7	138.1	141.4	314.3	110.2	189.1
Cerebral hemorrhage	53.8	62.8	43.4	45.1	54.3	90.0	106.1	83.0	76.2	78.4
Cancer, all forms	36.2	32.5	11.9	45.4	21.9	78.6	70.2	37.7	92.0	71.5
Nephritis	33.0	36.9	49.9	27.2	26.6	61.1	71.2	120.7	47.6	106.1
Tuberculosis, all forms	46.0	35.4	116.0	32.7	161.7	65.6	50.5	216.3	50.3	189.1
Congenital conditions	42.9	49.3	33.6	39.0	28.9	77.1	76.4	70.4	58.3	41.5
Accidents, other than motor vehicle	27.6	36.7	35.8	17.9	17.3	57.6	78.3	90.5	35.3	41.5
Influenza	15.9	13.4	23.8	16.0	27.7	24.8	23.5	47.8	20.3	53.1
Other diseases of the digestive system	18.4	18.5	27.1	16.6	21.9	55.6	58.0	67.9	45.7	108.4
Motor vehicle accidents	7.9	10.9	18.4	5.2	3.5	31.1	45.6	32.7	19.5	4.6
Senility	24.2	25.5	18.4	23.4	25.4	32.7	35.6	17.6	30.5	41.5
Diarrhea and enteritis, all ages	15.6	14.7	17.3	14.9	26.6	26.1	22.7	52.8	25.1	39.2
Other diseases of the nervous system	12.0	11.9	17.3	11.2	13.9	25.4	29.4	25.1	21.4	25.4
Diseases of arteries & circulatory sys.	8.5	10.6	11.9	6.7	1.2	14.7	15.9	20.1	12.8	16.1
Appendicitis	4.3	4.3	8.7	3.2	8.1	23.1	24.8	32.7	19.8	27.7
Diabetes mellitus	6.7	7.0	6.5	6.4	5.8	12.1	10.8	7.5	13.1	18.5
Suicide	7.4	12.1	8.7	2.9	1.2	18.0	30.5	12.6	8.0	2.3
Homicide	7.6	9.5	32.5	1.8	8.0	18.1	20.5	123.2	4.8	16.1
Hernia, intestinal obstruction	4.5	4.7	6.5	3.5	8.1	13.7	14.0	12.6	12.0	25.4
Other diseases of the genito-urinary sys.	4.1	5.7	8.7	2.0	2.3	11.7	13.0	20.1	9.6	11.5
Syphilis	3.2	3.0	10.8	1.7	8.0	9.1	7.8	35.2	5.6	25.4
Puerperal causes	5.6	.3	0	8.7	33.5	11.0	.5	0	20.9	25.4
Diphtheria	11.7	12.5	7.6	12.3	4.6	13.8	15.7	5.0	13.1	11.5
Typhoid and paratyphoid	9.7	9.9	22.8	6.4	19.6	12.9	11.6	27.7	9.4	41.5

* Rates based on deaths per 100,000 estimated population.

Improvement is also shown in the suicide rate, and homicides were materially decreased over the period, being 40 percent lower in 1938 than in 1931. Other causes not mentioned were either erratic or fairly stable during the period, and their relative position and importance may be seen most readily by examination of Table 6.

Observation of this table will also reveal the relative importance of the three general classes of causes of death mentioned on page 43. It is evident that the most important killers of Oklahomans, as a general class, are degenerative diseases, the incidence of which is greatest in middle and later life. Among these are four of the first five fatal diseases in Oklahoma as ranked for the period as a whole, namely, diseases of the heart, cerebral hemorrhage, cancer and nephritis.

There is wide variation in relative rank among the transmissible and infectious diseases, pneumonia, tuberculosis, and influenza being among the most frequent causes of death, while the typhoids and diphtheria are the last two of the first 25 causes.

This variation is also noted in the class of external and violent causes of death. Accidents of all types, if grouped together, hold fifth ranking over the entire period, while other external causes such as suicide, homicide and puerperal causes all rank relatively low on the list.

These general types of causes of death were important in Oklahoma mortality in the order in which they have been discussed in the preceding paragraphs. That this order will be maintained is problematical. Since Oklahoma has been shown to have an aging population, it is fairly certain that degenerative diseases will remain of first importance in the mortality of the State. However, if additional gains are made in

Table 9 - Mortality Rates From Common Causes of Death by Race, Sex and Residence, Oklahoma, 1933.*

Cause of death	Total	Rural				Total	Urban			
		Male		Female			Male		Female	
		White	Colored	White	Colored		White	Colored	White	Colored
All causes	651.0	717.0	694.0	579.0	595.0	1114.0	1244.0	1690.0	910.0	1257.0
Diseases of the heart	91.0	113.4	88.3	69.8	67.5	191.6	235.8	242.1	142.2	200.0
Pneumonia, all types	79.6	81.8	90.6	77.8	62.7	126.7	132.3	247.1	109.0	122.8
Cerebral hemorrhage	60.6	65.3	45.3	59.5	43.4	98.9	110.4	104.8	81.7	145.5
Cancer, all forms	44.1	44.8	22.6	48.5	26.5	77.6	71.8	32.4	91.2	50.0
Nephritis	34.4	41.3	38.5	27.5	24.1	60.7	67.8	74.9	50.8	72.7
Tuberculosis, all forms	41.4	36.3	92.9	32.1	103.6	51.7	41.5	147.2	40.9	145.5
Congenital conditions	43.5	48.0	41.9	40.8	27.7	57.3	68.3	79.9	46.9	34.1
Accidents, other than motor vehicle	25.3	37.6	43.0	11.5	8.4	49.2	73.4	84.9	24.9	22.7
Influenza	24.2	23.9	21.5	23.2	37.4	25.6	25.6	29.9	22.8	43.2
Other diseases of the digestive system	15.5	14.5	14.7	17.5	9.6	32.9	29.5	67.4	28.6	68.2
Motor vehicle accidents	12.1	18.0	10.2	6.8	6.0	27.4	41.8	37.4	13.1	20.5
Senility	19.7	19.4	13.6	20.7	20.5	22.9	24.6	17.5	22.3	18.2
Diarrhea and enteritis, all ages	22.1	22.1	23.8	20.9	30.1	32.5	34.3	44.9	25.9	63.7
Other diseases of the nervous system	13.8	16.9	7.9	12.3	6.0	27.2	30.5	47.4	22.5	20.5
Diseases of arteries & circulatory sys.	10.5	12.0	7.9	10.0	3.6	17.8	19.3	20.0	16.8	11.4
Appendicitis	6.0	6.7	7.9	5.2	3.6	29.7	37.5	22.5	22.8	29.6
Diabetes mellitus	6.3	6.0	6.8	7.1	2.4	11.7	11.0	17.5	11.0	18.2
Suicide	7.4	13.3	3.4	2.5	0	13.2	23.3	5.0	5.8	0
Homicide	8.3	10.5	35.1	2.6	6.0	18.6	19.8	144.8	3.7	22.7
Hernia, intestinal obstruction	4.5	4.2	9.1	4.3	3.6	12.6	13.4	20.0	11.0	13.6
Other diseases of the genito-urinary sys.	3.8	4.5	5.7	2.9	2.4	9.9	11.0	15.0	8.1	11.4
Syphilis	4.3	3.9	17.0	2.3	9.6	7.6	9.1	34.9	3.7	4.5
Puerperal causes	6.2	.4	1.1	10.7	26.5	10.7	.3	2.5	19.9	27.3
Diphtheria	11.2	11.0	6.8	13.4	1.2	13.3	14.5	15.0	12.8	6.8
Typhoid and paratyphoid	9.4	10.2	14.7	6.3	20.5	10.5	11.5	25.0	6.0	27.3

* Rates based on deaths per 100,000 estimated population.

the control of infectious and transmissible diseases, and if external causes such as fatal accidents of all types continue to increase, then it is possible that these last two classes might be reversed in position.

On the other hand, if the State has reached the end of its ability to control infectious diseases, and if safety campaigns and the reductions of suicides, homicides and accidents at birth continue, then the last two causes may retain their same relative importance. In any case, until the control of cancer is accomplished, and as long as the population of the State continues to be an aging one, it is safe to assume that the degenerative diseases will predominate in importance.

2. Residence, Race and Sex Differentials By Cause of Death.

Of greater interest and importance in this analysis of causes of death in Oklahoma is the manner in which they affected different segments of the State's population. The differentials chosen for specific study are residence, race and sex, and sufficient data are given to show the operation of these differential factors for the 25 leading causes of death over the entire period, and for each of the study years. In addition, the ten leading specific causes of death by race are shown separately as a basis for a general conception of the most important race differences.

Table 7 shows the average differential mortality experience in Oklahoma for the entire study period, the average death rate per 100,000 population, and average specific rates for the 25 leading causes of death for the three differential groups. These rates reveal the pattern of mortality in the State for the decade, and show some clear differences among the different population groups. Tables 8 through 12

Table 10 - Mortality Rates From Common Causes of Death by Race, Sex and Residence, Oklahoma, 1935.*

Cause of death	Total	Rural				Total	Urban			
		Male		Female			Male		Female	
		White	Colored	White	Colored		White	Colored	White	Colored
All causes	659.0	737.0	667.0	580.0	592.0	1041.0	1164.0	1533.0	849.0	1246.0
Diseases of the heart	91.3	115.7	74.7	70.4	61.7	181.0	226.9	225.4	134.2	163.6
Pneumonia, all types	92.8	101.6	116.2	82.3	75.6	135.9	150.0	250.2	108.5	152.4
Cerebral hemorrhage	60.8	66.8	61.6	56.4	41.6	91.6	100.0	81.7	81.9	114.3
Cancer, all forms	45.1	42.0	20.2	54.4	23.9	70.9	67.0	19.8	81.1	60.5
Nephritis	36.6	39.9	47.4	30.7	44.1	53.8	58.5	99.1	41.3	82.9
Tuberculosis, all forms	31.2	30.4	56.9	23.9	70.5	44.7	40.2	123.9	33.1	112.0
Congenital conditions	40.5	44.6	23.7	40.6	21.4	53.5	61.4	64.4	46.4	38.1
Accidents, other than motor vehicle	29.6	42.2	33.2	17.2	15.1	39.3	53.5	84.2	22.6	24.7
Influenza	20.3	21.1	19.0	20.0	17.6	21.2	22.6	44.6	14.4	47.1
Other diseases of the digestive system	16.5	16.6	10.7	16.9	18.9	37.9	37.8	61.9	31.8	69.5
Motor vehicle accidents	14.3	21.1	20.2	7.1	5.0	28.3	43.6	14.9	17.2	9.0
Senility	19.9	21.6	9.5	19.1	21.4	27.3	27.9	29.7	25.4	35.9
Diarrhea and enteritis, all ages	15.1	15.8	14.2	14.1	17.6	23.4	23.9	49.5	20.5	20.2
Other diseases of the nervous system	10.8	11.9	14.2	9.6	7.6	21.9	27.7	19.8	16.7	20.2
Diseases of arteries & circulatory sys.	12.3	16.8	9.5	8.5	5.0	26.4	30.3	24.8	23.3	22.4
Appendicitis	4.9	6.4	5.9	3.7	1.3	14.1	18.9	17.3	9.2	13.4
Diabetes mellitus	8.1	8.1	7.1	9.0	2.5	10.2	9.6	2.5	11.8	9.0
Suicide	8.9	12.0	4.7	4.5	1.3	14.2	23.1	0	7.7	9.0
Homicide	6.0	7.9	27.3	1.7	1.3	12.5	14.4	89.2	1.8	20.2
Hernia, intestinal obstruction	5.3	6.6	0	4.5	6.3	12.7	9.0	14.9	15.7	15.7
Other diseases of the genito-urinary sys.	6.2	8.5	5.9	4.2	2.5	13.0	14.6	37.2	9.0	13.4
Syphilis	3.2	3.8	8.3	1.4	6.3	5.6	6.4	12.4	3.1	15.7
Puerperal causes	5.9	.3	0	11.5	17.6	7.9	.3	2.5	14.9	15.7
Diphtheria	5.5	4.7	7.1	6.8	1.3	4.7	5.1	9.9	4.4	0
Typhoid and paratyphoid	5.9	5.4	7.1	5.4	13.9	7.8	8.2	14.9	5.9	13.4

* Rates based on deaths per 100,000 estimated population.

show the same rates for each of the study years.

Oklahoma mortality rates from all causes were lower for rural than for urban populations, for white than for colored people, and less for female than for males. At least one of these findings is also true for every one of the 25 leading causes of death, rural rates being lower than urban rates for every cause. In some cases this rural-urban difference was not large, but in others urban rates were twice as high as rural. Appendicitis was the assigned cause of death of more than three times as many urban as rural people.

With minor exceptions, this rural advantage also was maintained in each of the five study years. Rural rates for diphtheria were slightly higher than urban rates for the years 1935 and 1938, while more rural than urban people died of various forms of typhoid fevers in 1937. In all other cases, each of the 25 leading causes was more ravishing among urban people in every year.

This superiority of rural over urban mortality experience is increasingly evident as the specific death rates are observed for various causes for each of the years, and as rural and urban groups are compared in detail. Whether male or female, colored or white, it is seldom that any given rural rate exceeds the rate for the corresponding segment of the urban population. While scattering causes of urban superiority sometimes appear, the general rule is that for any given cause of death, for either race or either sex, rural Oklahomans showed greater resistance to deadly disease than their urban fellows.

Oklahoma mortality from all causes was hardly 60 percent as high in rural as in the urban populations. For many of the 25 leading causes of death in the State, rural people experienced rates less than

Table 11 - Mortality Rates From Common Causes of Death by Race, Sex and Residence, Oklahoma, 1937.*

Cause of death	Total	Rural				Total	Urban			
		Male		Female			Male		Female	
		White	Colored	White	Colored		White	Colored	White	Colored
All causes	662.0	730.0	865.0	557.0	702.0	1075.0	1230.0	1675.0	846.0	1261.0
Diseases of the heart	95.6	119.1	98.2	74.1	56.7	190.2	246.9	199.2	136.8	176.8
Pneumonia, all types	68.7	65.8	121.9	61.6	99.0	96.8	106.7	226.2	71.2	123.7
Cerebral hemorrhage	54.0	62.4	52.2	45.6	50.1	86.1	99.6	103.3	70.9	90.6
Cancer, all forms	51.4	51.6	24.9	56.6	34.3	100.0	97.2	51.6	108.6	90.6
Nephritis	49.5	63.1	56.0	33.7	50.1	82.6	120.7	157.4	64.4	70.7
Tuberculosis, all forms	34.5	29.0	72.1	27.9	101.6	49.2	47.8	120.5	34.7	123.7
Congenital conditions	43.2	47.2	27.4	40.4	47.5	63.0	75.5	86.1	50.8	44.2
Accidents, other than motor vehicle	30.4	38.7	48.5	21.0	13.2	52.2	73.9	115.6	26.4	39.8
Influenza	36.9	36.7	47.3	34.3	50.1	44.6	48.6	68.9	36.2	64.1
Other diseases of the digestive system	14.3	15.3	21.1	12.1	15.8	26.3	51.5	39.3	25.1	28.7
Motor vehicle accidents	14.2	21.1	13.7	8.0	4.0	29.3	43.0	51.6	16.1	11.0
Senility	13.9	14.8	11.2	13.5	11.9	16.6	17.4	22.1	15.6	11.0
Diarrhea and enteritis, all ages	16.4	17.8	22.4	14.4	13.2	24.6	25.6	39.3	20.1	42.0
Other diseases of the nervous system	10.1	12.3	9.9	8.3	5.3	13.9	14.8	9.8	12.6	22.1
Diseases of arteries & circulatory sys.	9.1	11.5	7.5	7.5	2.6	16.6	16.6	24.6	15.8	13.3
Appendicitis	6.3	8.0	3.7	5.3	1.3	18.8	46.7	34.4	13.3	33.1
Diabetes mellitus	9.3	9.9	7.5	9.2	6.6	17.3	18.0	19.7	16.8	13.3
Suicide	8.0	13.3	3.7	3.8	0	13.9	22.2	12.3	7.8	0
Homicide	4.0	4.2	24.9	.9	6.6	10.9	12.9	66.4	1.8	24.3
Hernia, intestinal obstruction	5.3	5.4	13.7	3.3	11.9	11.8	35.1	24.6	11.6	22.1
Other diseases of the genito-urinary sys.	5.4	7.9	6.2	2.5	6.6	12.6	13.7	29.5	9.8	13.3
Syphilis	4.6	4.3	13.7	3.1	10.6	11.4	10.3	56.6	5.3	33.1
Puerperal causes	6.0	.1	0	11.8	17.2	9.0	.8	2.5	14.8	33.1
Diphtheria	3.6	3.6	6.2	3.6	1.3	3.8	5.3	0	3.3	0
Typhoid and paratyphoid	5.3	4.3	17.4	5.3	1.3	4.6	6.1	14.8	2.3	4.4

* Rates based on deaths per 100,000 estimated population.

one-half as high as did urban people.

Another observation from Table 7 is that there was less difference between sexes and races in rural than in urban areas. Not only was this true of rates from all causes, but also of those for the leading causes of death. The rural white and colored and the rural male and female populations were more nearly equal in mortality experience than were like groups in urban areas.

Sex and race differences for specific causes were not so uniform, either in single years or as an average for all years. Examination of the data in Tables 8 through 12 will reveal differences among these groups, but a brief summary will expedite an understanding of their differential experience.

Race. For the whole study period, colored rates were greater than those of whites for all causes and for 15 of the 25 leading causes of death. In 12 of these 15 causes, this advantage was maintained in both sexes and in rural as well as urban places. Six of these causes were among the ten highest in Oklahoma, and the white mortality rate for all causes during the decade was only 77 percent as great as the colored rate. This difference represented 240 more deaths per 100,000 for colored than for white people.

In some specific causes of death, the advantage of the white over the colored population was very slight, but in others the difference was extremely great. Outstanding differences occurred in the rates for pneumonia, tuberculosis, homicides, syphilis, puerperal causes, and typhoid fevers of all types. The greatest differences appeared in deaths due to homicides. The homicide death rate was five times as great for colored as for white populations, and the tuberculosis and

Table 12 - Mortality Rates From Common Causes of Death by Race, Sex and Residence, Oklahoma, 1938.*

Cause of death	Total	Rural				Total	Urban			
		Male		Female			Male		Female	
		White	Colored	White	Colored		White	Colored	White	Colored
All causes	631.0	680.0	825.0	536.0	781.0	1003.0	1126.0	1514.0	805.0	1259.0
Diseases of the heart	100.3	125.4	91.8	78.3	63.5	193.6	251.3	222.9	138.9	169.0
Pneumonia, all types	63.8	67.1	104.5	51.5	94.6	77.3	82.9	161.7	59.5	111.9
Cerebral hemorrhage	58.1	64.1	58.6	50.9	63.5	80.5	84.7	112.7	69.2	116.3
Cancer, all forms	51.7	50.5	17.8	58.0	46.0	93.4	89.5	53.9	100.3	100.9
Nephritis	48.4	53.3	63.7	40.8	51.4	72.6	85.5	102.9	57.5	70.2
Tuberculosis, all forms	31.1	25.3	96.9	21.1	102.7	43.7	37.6	149.4	29.9	120.7
Congenital conditions	38.4	44.9	35.7	32.9	27.0	60.6	73.2	58.8	50.1	50.5
Accidents, other than motor vehicle	31.8	41.6	34.4	21.9	21.6	54.8	69.2	61.2	41.1	50.5
Influenza	16.3	15.3	21.7	15.3	24.8	19.9	18.7	34.3	18.7	28.5
Other diseases of the digestive system	13.6	13.6	17.8	11.7	27.0	25.2	27.9	31.8	20.7	37.3
Motor vehicle accidents	14.8	22.1	16.6	8.0	2.7	24.5	38.4	36.7	12.2	6.6
Senility	13.8	11.8	16.6	14.8	20.3	15.2	14.7	12.2	14.9	24.1
Diarrhea and enteritis, all ages	12.2	12.3	17.8	10.9	17.6	18.4	18.4	34.3	16.7	19.7
Other diseases of the nervous system	7.5	8.1	5.1	6.8	10.8	13.8	10.8	31.8	14.2	19.7
Diseases of arteries and circulatory sys.	8.3	9.2	3.8	8.2	5.4	16.0	20.0	22.0	12.2	11.0
Appendicitis	6.3	7.5	5.1	5.2	5.4	15.6	14.5	31.8	13.7	26.3
Diabetes mellitus	9.7	9.4	8.9	10.7	5.4	17.4	16.3	12.2	18.2	24.1
Suicide	7.0	11.4	7.6	2.4	4.1	15.0	22.1	7.3	10.5	2.2
Homicide	4.4	5.3	24.2	1.1	2.7	10.5	7.6	90.6	2.5	32.9
Hernia, intestinal obstruction	4.5	4.6	7.6	3.9	5.4	11.4	12.4	22.0	8.7	17.6
Other diseases of the genito-urinary sys.	5.3	6.8	8.9	3.5	2.7	11.4	15.5	14.7	7.2	11.0
Syphilis	6.2	6.4	25.5	3.0	12.2	16.0	17.6	68.6	7.5	30.7
Puerperal causes	5.3	0	0	9.3	27.0	9.0	0	0	15.2	37.3
Diphtheria	5.1	5.1	2.5	6.0	1.4	4.5	5.3	0	4.7	0
Typhoid and paratyphoid	3.4	2.6	6.4	2.8	12.2	3.9	4.5	4.9	2.5	11.0

* Rates based on deaths per 100,000 population.

syphilis rates were about three and one-half times as great.

The white-colored rates for all the leading causes of death are shown in Table 13. These rates are, of course, computed as average rates for all years of the study, and they show that some diseases or causes of death were more active in white than in colored populations. Except for the 15 causes for which colored rates exceeded the white rates, and except for cerebral hemorrhage in which the white and colored

Table 13 - Mortality Rates From Common Causes of Death by Race, Oklahoma, by Selected Years, 1931-1938; Showing Average Rates for All Years.*

Causes of death	White	Colored
All causes	827.0	1067.2
Diseases of the heart	122.4	116.1
Pneumonia, all types	84.4	126.0
Cerebral hemorrhage	68.8	68.6
Cancer, all forms	62.2	35.8
Nephritis	48.4	61.7
Tuberculosis, all forms	33.5	113.3
Congenital conditions	49.3	39.7
Accidents, other than motor vehicle	36.4	38.4
Influenza	23.1	34.8
Other diseases of the digestive system	21.7	32.0
Motor vehicle accidents	18.6	14.0
Senility	20.0	18.8
Diarrhea and enteritis, all ages	18.5	26.8
Other diseases of the nervous system	14.2	14.8
Diseases of arteries and circulatory system	13.1	10.0
Appendicitis	10.6	12.8
Diabetes mellitus	10.2	8.8
Suicide	10.9	4.0
Homicide	6.2	32.0
Hernia, intestinal obstructions	7.1	11.2
Other diseases of the genito-urinary system	7.1	9.2
Syphilis	4.9	18.8
Puerperal causes	6.4	13.2
Diphtheria	8.0	4.4
Typhoid and paratyphoid	6.2	14.8

* Rates based on average annual deaths per 100,000 estimated population at mid-point of study period.

rates were essentially the same, the remaining nine causes had rates which were higher for white than for colored.

Only two of these causes, however, produced outstanding racial differences, these being cancer and suicide. Colored deaths from cancer were slightly less than 58 percent of white deaths for that cause, while two and one-half times more whites than colored died from suicides. The excess of white people dying from other causes was slight.

As has been stated, the superiority of one race over the other for the entire study period did not persist in each of the study years. The fluctuations in these race rates for all the common causes of death in each of the years is not discussed, but Tables 8 through 12 show by sex and residence such changes as occurred from year to year. More specific information and rates by race have been prepared for the first ten common causes of death, and these are shown in Table 14.

Sex. Three causes were more effective among females than males in Oklahoma during the period. Cancer, diabetes, and, obviously, puerperal causes were those causes more deadly to women. Puerperal causes are associated with childbirth, and up to now it is known that more women than men have died of cancer. This was certainly true in Oklahoma during the "thirties." Cancer claimed the lives of 66 females and 53 males in every 100,000 of their respective populations. Practically no males are listed as dying from puerperal causes, and those deaths which are shown were undoubtedly male infants dying from causes associated with their birth. The female rates for this cause reflect both mothers and female infants who died of such causes, and by far the largest number of such deaths were the mothers rather than the infants. Though diabetes was fatal to more females than males, the difference was very small,

Table 14 - Leading Causes of Death for White and Colored Populations Showing Rate and Rank for Each Cause, Oklahoma, by Selected Years: 1931-1938.*

Cause of death by race	All Years		1938		1937		1935		1933		1931	
	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate
White												
Diseases of the heart	1	122.4	1	136.5	1	131.8	1	125.1	1	126.7	1	92.7
Pneumonia, all types	2	84.4	4	63.8	2	72.9	2	105.6	2	94.4	2	87.6
Cerebral hemorrhage	3	68.8	3	64.8	4	65.6	3	72.3	3	74.4	3	67.2
Cancer, all forms	4	62.2	2	69.2	3	72.0	4	57.4	4	59.0	5	53.5
All accidents	5	55.1	5	59.4	6	57.5	5	53.1	5	51.4	4	54.1
Congenital conditions	6	49.3	7	47.4	7	50.9	6	46.7	6	49.2	6	52.4
Nephritis	7	48.4	6	56.1	5	60.2	7	40.7	7	43.4	7	41.8
Tuberculosis, all forms	8	33.5	8	27.1	9	33.1	8	30.6	8	36.7	8	39.8
Influenza	9	23.1	10	16.5	8	38.0	10	19.8	9	23.8	10	17.2
Other diseases of digestive system	10	21.7	9	16.9	10	18.1	9	23.2	10	20.6	9	29.6
Colored												
Pneumonia, all types	1	126.0	2	112.6	1	132.6	1	131.5	3	111.6	2	143.5
Diseases of the heart	2	116.1	1	120.2	2	116.9	2	111.0	1	124.9	3	109.9
Tuberculosis, all forms	3	113.3	3	112.2	3	99.1	3	82.1	2	114.0	1	158.4
Cerebral hemorrhage	4	68.6	4	80.4	5	67.3	4	67.9	4	71.3	5	58.8
Nephritis	5	61.7	5	67.8	4	73.9	5	61.1	7	41.5	4	62.2
All accidents	6	52.6	6	51.9	6	63.6	6	46.6	5	49.7	6	52.7
Congenital conditions	7	39.7	8	39.8	8	46.7	7	32.2	6	41.9	8	38.9
Cancer, all forms	8	35.8	7	48.6	9	44.6	9	28.5	10	30.2	10	29.0
Influenza	9	34.8	9	27.2	7	54.9	10	27.7	8	31.7	9	33.6
Other diseases of digestive system	10	32.0	10	26.8	10	24.0	7	32.2	9	30.5	7	45.0

* Rates based on deaths per 100,000 population.

the rates for the entire period being 10.4 and 9.7 respectively.

Although these were the only causes of death in which female exceeded male mortality, they are far short of giving a complete picture of sex differences for all years. It is true that for all causes male mortality per 100,000 persons exceeded that for females by rates of 951.6 to 748.3, but in eight of the 25 common causes of death, these rates for males were but slightly greater than for females. The widest difference in these eight causes was that for tuberculosis, the rates being 43.0 and 40.8 for males and females, respectively.

For influenza, "other diseases of the digestive system," and diarrhea and enteritis the excess in male rates ranged between 1.1 and 1.7 deaths per 100,000 persons. In the case of senility, diphtheria, appendicitis, and hernia or other intestinal obstructions the range of male excess was from .1 to .4 per 100,000 persons.

Thus it is obvious that the higher male rates for the period occurred in slightly more than half of the leading causes of death. It is also notable that, except for cancer and tuberculosis, male rates gained much of their excess over female rates in the first ten causes of death. Those specific causes in which male mortality was greatly in excess of female mortality were homicides, suicides, motor vehicle accidents, accidents other than motor vehicle, syphilis, diseases of the heart, and nephritis. Comparisons for these and all other leading causes of death are shown in Table 15.

Further comparisons of specific sex rates by race and residence are shown in Tables 8 through 12, where such rates for each of the study years may be found. Although not discussed here in detail, these tables contain much valuable data on Oklahoma mortality throughout the period,

Table 15 - Mortality Rates From Common Causes of Death by Sex, Oklahoma, by Selected Years, 1931-1938; Showing Average Rates for All Years.*

Causes of death	Male	Female
All causes	951.6	748.8
Diseases of the heart	148.6	93.7
Pneumonia, all types	99.3	78.6
Cerebral hemorrhage	75.6	61.8
Cancer, all forms	53.1	66.0
Nephritis	58.1	41.1
Tuberculosis, all forms	43.0	40.8
Congenital conditions	54.1	42.2
Accidents other than motor vehicle	50.2	22.5
Influenza	24.7	23.6
Other diseases of the digestive system	23.4	22.1
Motor vehicle accidents	26.3	9.7
Senility	20.0	19.8
Diarrhea and enteritis, all ages	20.2	18.5
Other diseases of the nervous system	15.9	12.7
Diseases of the arteries and circulatory system	14.7	10.8
Appendicitis	7.6	7.5
Diabetes mellitus	9.7	10.4
Suicide	15.5	4.7
Homicide	14.5	3.1
Hernia, intestinal obstructions	7.7	7.3
Other diseases of the genito-urinary system	9.3	5.3
Syphilis	8.1	4.5
Puerperal causes	.3	14.2
Diphtheria	7.8	7.5
Typhoid and paratyphoid	7.9	6.3

* Rates based on average annual deaths per 100,000 estimated population at mid-point of study period.

and permit comparison of any of the yearly rates with the average rates shown in Table 7. It will be observed that there was some change in the various group specific rates from year to year, and that certain of the annual differences between groups by race, sex or residence are not the same in degree or direction as those shown in Table 7. This is to be expected, since the rates in Table 7 are average rates, and serve only to show central tendency of the differentials of mortality in the State for the whole period.

CHAPTER V

SUMMARY AND CONCLUSIONS

1. Summary.

1. Mortality in Oklahoma from 1931 to 1938 was erratic, and did not demonstrate definite trends in any direction.

2. White people of the State had more favorable mortality experience than did colored people. This was true over the entire period, even though there were instances of higher mortality rates for groups of whites than for corresponding groups of colored persons.

3. A much smaller proportion of rural than of urban dwellers in Oklahoma died during the period. This rural superiority is the most uniform pattern set in the State's mortality experience.

4. There was a decline in mortality rates for every age group except the very young and the very old, and the rates for all age groups were slightly lower at the close of the period than at the beginning. Such improvement as was made by the middle range of ages was so slight that it was about balanced by the over-all higher rates for infants and the aged. Consequently, taken year by year, there was no real trend of improvement for all ages.

5. Little is known about occupational mortality in Oklahoma, and the methodology of this study added little to that knowledge. As classified for this study, there was little change in the pattern of mortality among the occupational groups in the State, approximately the same proportion of each group dying in each of the study years. As would be expected in a rural state, the bulk of deaths occurred among farmers and housewives.

6. Stillbirths in Oklahoma were found to occur much more frequently among urban than rural and among colored than white populations. Though this was the over-all pattern in the period, there was evidence that the pattern was changing, since rural-urban differences tended to disappear as the period progressed, and colored-white differences tended to be smaller.

7. Ten specific causes of death accounted for about 70 percent of all Oklahoma deaths during the period, and the 25 leading causes of death accounted for 92 percent of the State's total mortality. Degenerative diseases were the leading causes of death in Oklahoma, and were followed by contagious and infectious diseases, and death from accidents and other external or violent causes. Of these, deaths from degenerative diseases and some external causes were on the increase, while most of the contagious and infectious diseases were taking the lives of fewer people each year.

8. The favorable position of the rural over the urban population of the State was maintained in specific causes of death as well as in total mortality. All causes, treated differentially by residence, resulted in higher mortality in urban than in rural areas.

9. The lower death rates of white in comparison with colored populations were also maintained for all leading causes and for total mortality. Although there were causes in which death rates were higher for some groups of whites than for colored peoples, in the majority of the first 25 causes a higher proportion of colored persons were victims. In some cases, this proportionate excess was very great.

10. Females exceeded males in mortality for only three of the 25 leading causes of death, but in another one-fourth of these causes

women had only a very slight advantage over the men of the State. The lower mortality of females was due to excessive male rates in some half-dozen specific causes of death.

2. Conclusions.

Conclusions drawn from this study of Oklahoma mortality are not spectacular, since the data have revealed no outstanding differential mortality characteristics in Oklahoma not found elsewhere; nor has it revealed much that was not already known or surmised about the State's mortality as a whole. Differential patterns of mortality by race, sex and residence are similar to those found by other investigators in other areas, and what has been accomplished is a verification of such patterns in the State, as well as a more dependable measure of the degree to which such differential patterns were present in Oklahoma during the decade.

Along with a few other more western states, Oklahoma has been known to have some of the very lowest crude death rates in the Nation. In fact, both the rates established by this study and those already published as vital statistics show that Oklahoma averaged fewer deaths per 1000 population than any other state, except North Dakota, throughout the study years.¹ Besides Oklahoma, only North Dakota and South Dakota had rates of less than 9.0 deaths per 1000 population, for the period, while those for the Nation averaged slightly more than 11.0 per 1000 persons.

This fact need not lead to any conclusion that Oklahoma holds an especially preferred rating in the matter of mortality. That the State

¹ Forrest E. Linder and Robert D. Grove, Vital Statistics in the United States, 1900-1940, Washington: U. S. Government Printing Office, 1947. Table 1, p. 124.

is young, that its population is an aging one, and that the mortality rates are lower than for the Nation as a whole may, on the other hand, justify an opposite conclusion. Since it is the opinion of leading demographers that the mortality of a population may decline only so far, and then must be affected adversely by the dying off of the old people whose lives were saved during earlier periods, it is highly probable that such a condition represents Oklahoma mortality during the study years. If this were true, then the rates for later years should be expected to rise to higher levels than those of the study period, and more nearly to equal those of the Nation as a whole.² A supporting fact for such a conclusion lies in the increasing importance of degenerative diseases as causes of death. Moreover, some minimum certainly must be reached in those fatal diseases of other types, the effects of which have been rather steadily reduced in the State for at least 20 years.

Further conclusions are reached by an examination of the basic propositions with which this study began.

1. The proposition that there were distinct rural-urban differences in Oklahoma mortality finds positive support, and there is little indication in the data that these differences will disappear. That these differences favor rural populations is historically true, and prevails in Oklahoma.

2. The second proposition is disproved in both its parts. Oklahoma mortality was not decreasing as a whole, and no real improvements were to be found in either the very young or very old age groups. Though there was some improvement in some groups under five years of age, the very important group of infant mortality showed little or no improvement

² See page 36 for Oklahoma rates for more recent years.

during the period.

3. The study sustained the proposition that, measured by mortality rates, whites have better health than colored peoples in Oklahoma. This difference was quite large, and there is little or nothing in the data to indicate any material change in the immediate future, even though some slight improvement in colored rates was noted.

4. The fourth proposition was only partially sustained. Some significant changes have occurred in the relative ranks of certain important causes of death in Oklahoma. These changes have included but have not been limited to degenerative diseases. Deaths from other causes have increased, and from still others have materially decreased, the year to year result being an approximate balance as measured by the annual crude death rate in the State.

5. The proposition concerning stillbirths was entirely sustained. Stillbirths were proportionately greater among urban than rural and among colored than white populations. There is evidence that this difference is decreasing for both residence and race groups, however, justifying the conclusion that future studies may find such differences greatly reduced or even reversed.

3. Need For Further Research.

No previous studies of the whole mortality patterns in Oklahoma have been made, and the limitations of the present study have been admitted. However, the strength of the study lies in the fact that the data are the first Oklahoma mortality statistics allocated by place of residence, and that the analysis of such data provides a base upon which further and more comprehensive studies may be laid. Since all subsequent death registrations have been made by place of residence,

there now exists a much larger mass of reliable data upon which future investigations may draw. A further study of Oklahoma mortality running through the years of World War II, and covering those additional years in which the State has undergone changes in age composition and urbanization, would be highly valuable as a record of mortality experience. This also would be a contribution to the general field of knowledge of mortality experience within the United States. Such a study, added to the present analysis, could cover the entire period since the admission of the State to the Registration Area, and could be accomplished with greater efficiency in time and money than was possible in the present study. All tabulations for subsequent data could be made directly from the properly allocated death registration certificates as a direct, single operation, with all study differentials determined beforehand.

There is a further advantage in such an investigation. The present census data are so classified and refined as to lend themselves to immediate comparisons among areas of the Nation, and to provide the census enumeration data on differential groups needed to standardize rates and establish more reliable population figures.

The advantages of further study may be summarized as follows:

1. More complete information on Oklahoma mortality would be made available.
2. This information would be more exact than any previous data, being better planned and based on better and more reliable source material.
3. A contribution would be made to the whole field of mortality studies, and an important period of time would be covered, relating both

to the State and to the Nation.

4. Mortality studies extending up to the present time would not only be superior to previous data, but would in turn provide a much more dependable and a longer time period base upon which still later investigations could be made.

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