Chronic Respiratory Disease Mortality in the United States

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THE CHRONIC RESPIRATORY diseases have long been an important cause of death in England and Wales. In fact, chronic bronchitis has been often referred to as the "English disease." Until recent years, there was little evidence that these diseases were of public health consequence in the United States. The death rate for respiratory tuberculosis has been declining in a spectacular fashion, but, to offset this trend, the mortality from lung cancer has been increasing steadily. Since 1949, when data on emphysema first became available as a result of the sixth revision of the International Classification of Diseases, the death rate for this disease condition has been increasing rapidly, although the absolute magnitude of the rate has not been impressive. In 1961, Dorn called attention to the increasing mortality from the chronic respiratory diseases in the United States (*1*).

Formal recognition of chronic bronchopulmonary diseases as an emerging public health problem came with the publication of a supplement to the March 1963 issue of the *American Journal of Public Health*. In this supplement, Walkup and Connolly indicated the magnitude of the problem (*2*), and Merrill pointed out overall trends for certain chronic respiratory diseases and presented other elucidating data (*3*).

The statistical assessment of chronic respiratory diseases is difficult because they often occur in association with cardiovascular diseases. Such associations do not appear in primary mortality tabulations. Also, the selection of the underlying cause of death for tabulation purposes results in a frequent loss of data on chronic respiratory diseases.

This paper presents some information prepared by the National Vital Statistics Division from the multiple coding of diagnoses for the calendar year 1955, based on a sample of death certificates. Also, trend data by age, color, and sex for a group of chronic respiratory diseases are presented to show the unusual mortality pattern for these diseases.

Multiple Cause Data

Mortality data for 1955 were coded for the underlying cause of death and other diseases and conditions reported on a sample of death certificates. A maximum of five conditions were coded, which made possible the identification of about 99 percent of the reported diagnoses. For about one-half of the States, a 50 percent sample was coded. For the rest, the sampling ratio was 25 percent. This accounts for the difference in the counts obtained in the annual tabulations which are shown in the first column of the table and the sample counts of the underlying cause in the third column.

According to the mortality tabulations for 1955, about 59,000 deaths were attributed to the specified chronic respiratory diseases. Actually, there were an additional 35,000 chronic respiratory disease conditions reported but not classified as a cause of death. In other words, less than two-thirds (62 percent) of the chronic respiratory diseases specified on death certifi-

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cates in 1955 appeared in the official mortality statistics.

The proportion of deaths assigned to an underlying cause may be large or small, depending on the diagnostic category. For example, "healed tuberculosis" is not coded as the underlying cause unless it happens to be the only diagnosis reported in part I of the medical certificate. Even if selected as the underlying cause, healed tuberculosis is not identified in the tabulation as such. On the other hand, a large proportion of deaths involving cancer of lung and bronchus is assigned to that disease category. A question may well be raised as to why all lung cancers should not have been coded as the underlying cause of death. According to the international coding procedures, if a disease of the heart is reported in part I of the death certificate and lung cancer, even if specified as primary, is reported as a contributory condition by the medical certifier, the death is assigned to the disease of the heart.

It is apparent from the data that the chronic respiratory diseases are frequently associated with other diseases and that the annual mortality tabulations do not fully describe the role played by the chronic respiratory diseases in the causation of death. In a sense, the published statistics on chronic respiratory diseases represent only the visible portion of the iceberg. On the other hand, many of the chronic respiratory diseases should not enter the statistics of underlying causes of death. The chronic obstructive lung diseases should be properly attributed to the primary disease, if reported. That this is not always the case is indicated by the relatively large number of deaths assigned to bronchiectasis, pulmonary fibrosis, and emphysema without mention of bronchitis.

Mortality Trends

Merrill's data for California show a steadily rising mortality from selected chronic respiratory diseases for the total population. The data by age, color, and sex present some interesting patterns.

Chronic respiratory diseases coded as underlying and contributory causes of death, United States, 1955, based on sample of death certificates

Diagnostic category [1]	Official mortality tabulation, underlying cause	Multiple cause tabulation			
		Total conditions	Underlying cause of death	Contributory condition	Percent underlying cause of total
Total	57,755	93,952	58,567	35,385	62.3
Tuberculosis of respiratory system (001–008)	13,676	19,781	13,614	6,167	68.8
Respiratory tuberculosis with mention of occupational disease (001)	454	507	427	80	84.2
Other respiratory tuberculosis (002–008)	13,222	18,199	13,185	5,014	72.4
Healed tuberculosis	----------	1,075	2	1,073	0.2
Malignant neoplasm of lung and bronchus, primary (162)	12,530	13,281	12,886	395	97.0
Malignant neoplasm of lung and bronchus, not specified as primary (163)	14,297	14,932	14,247	685	95.4
Asthma (241)	5,960	13,083	5,940	7,143	45.4
Bronchitis, unqualified (501)	532	2,062	665	1,397	32.3
Chronic bronchitis (502)	1,307	3,814	1,360	2,454	35.7
Bronchitis with emphysema (502.0)	532	1,081	569	512	52.6
Other (502.1)	775	2,733	791	1,942	28.9
Pneumoconiosis due to silica and silicates, occupational (523)	1,361	2,900	1,407	1,493	48.5
Silicosis (523.0)	629	1,525	661	864	43.3
Anthracosilicosis (523.1)	550	939	566	373	60.3
Other (523.2–523.3)	182	436	180	256	41.3
Other specified pneumoconiosis and pulmonary fibrosis, occupational (524)	76	113	60	53	53.1
Other chronic interstitial pneumonia (525)	2,244	6,232	2,289	3,923	36.8
Bronchiectasis (526)	2,133	5,363	2,197	3,166	41.0
Emphysema without mention of bronchitis (527.1)	3,639	12,411	3,902	8,509	30.2

[1] Figures in parentheses refer to International List numbers (sixth revision).

The national data presented in the charts are for the diseases of the respiratory system, excluding influenza and pneumonia (International List Nos. 470–475, 500–527) for 1935–60. They do not include certain important chronic respiratory diseases such as tuberculosis, lung cancer, and asthma. On the other hand, they include certain acute diseases of the upper respiratory tract which, for the most part, affect those in the younger ages. For all ages in 1960, 78 percent of the deaths attributed to this group of diseases were assigned to bronchitis, chronic interstitial pneumonia, bronchiectasis, and other primary diseases of the lung and pleural cavity including emphysema. A grouping of this type lacks specificity of diagnoses, but it also minimizes the effects of changes in classification of diseases.

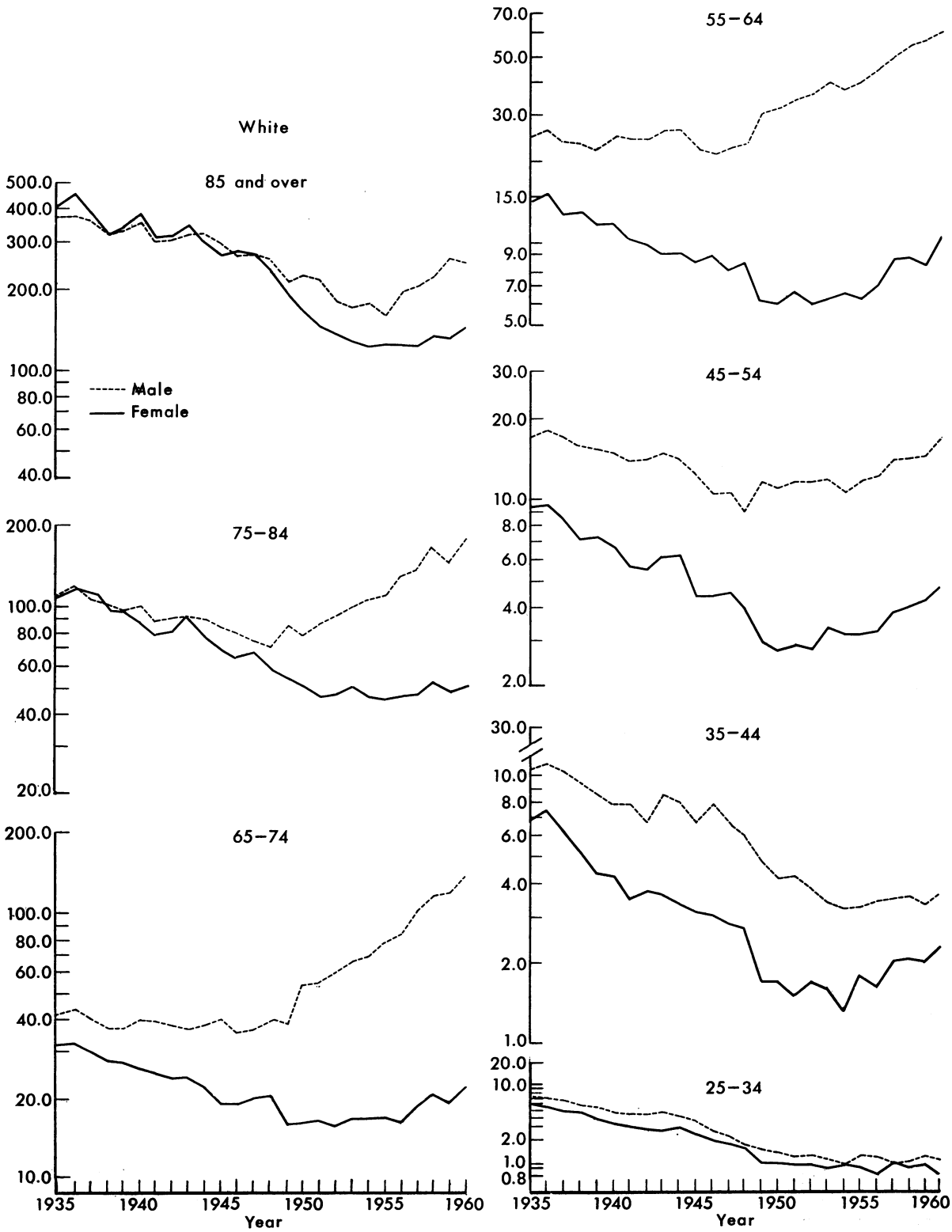
The trends of mortality from this group of diseases of the respiratory system by age, color, and sex show interesting configurations. In the younger age groups (not shown in graph), the trend downward is rapid, with indications of slowing up in the rate of decline in recent years. With increasing age, the tendency to level off becomes more and more marked. Also, the point at which the leveling-off takes place comes earlier. This characteristic differs somewhat between whites and nonwhites.

Beginning at age 35, a reversal in trend may be seen in the death rate for the chronic respiratory diseases, which started to rise in the early 1950's. *Lancet* recently referred to a report of a subcommittee of the Scottish Standing Medical Advisory Committee which indicates that mortality from chronic bronchitis has, in general, declined since 1920 (*4*). However, among men over 55 years of age, the rate over the past 10 years appears to be increasing in Scotland. This trend suggests that a change in chronic respiratory disease mortality may be occurring in parts of the world other than the United States.

Another interesting characteristic of the trend lines is the relatively small difference in the death rate by sex in the early ages. The sex differential widens with increase in age, but the trends are more or less parallel until the population reaches middle age. In the middle and later years, the mortality experience of males is so different from that of females that the existence of completely different sets of etiological factors for males and females is suggested. After age 45, the rate of decline of the death rate for males from 1933 to 1950 is appreciably lower than the corresponding rate for females. For ages 55–74 years, the trend was practically level before it started to increase rapidly about 1949 or 1950. The death rate for females has also increased after a period of declining trend, but the present rate of increase is not nearly as great as for the males. Also, the upturn in the death rate for females occurs 4 or 5 years after the point of reversal of the trend for males.

The large increase in the death rate for males in 1949 suggests that the change in classification of diseases may be a factor in the rise in mortality. The comparability ratios based on data for 1950 indeed show the effects of differences in classification procedures. More deaths were classified as caused by diseases of the respiratory system (excluding influenza and pneumonia) among white males 45 years and over when the sixth revision of the International Classification of Diseases was first used in 1949. The excess ranged from 6 percent for the age group 85 years and over to 44 percent for the age group 65–74 years. However, similar excesses did not occur in the data for the other population subgroups. On the contrary, the comparability ratios were generally less than 1.0, which indicates that the reporting of chronic respiratory diseases for white males differs significantly from that for nonwhite males and for females. However, this does not explain why the death rate for white males should rise or why the death rates of the other subgroups should change so markedly. It seems clear that chronic respiratory diseases are being reported with increasing frequency, but it is not known whether the recorded increase in mortality is real or only apparent. If it is not a real increase, the rate should level off in time. There is no evidence of such a tendency at this time.

The recent rise in the death rate for diseases of the respiratory system excluding influenza and pneumonia has been impressive. The rate for white males 65–74 years of age in 1960 is 153 percent higher than the corresponding rate for 1950. For nonwhite males of the same age


White
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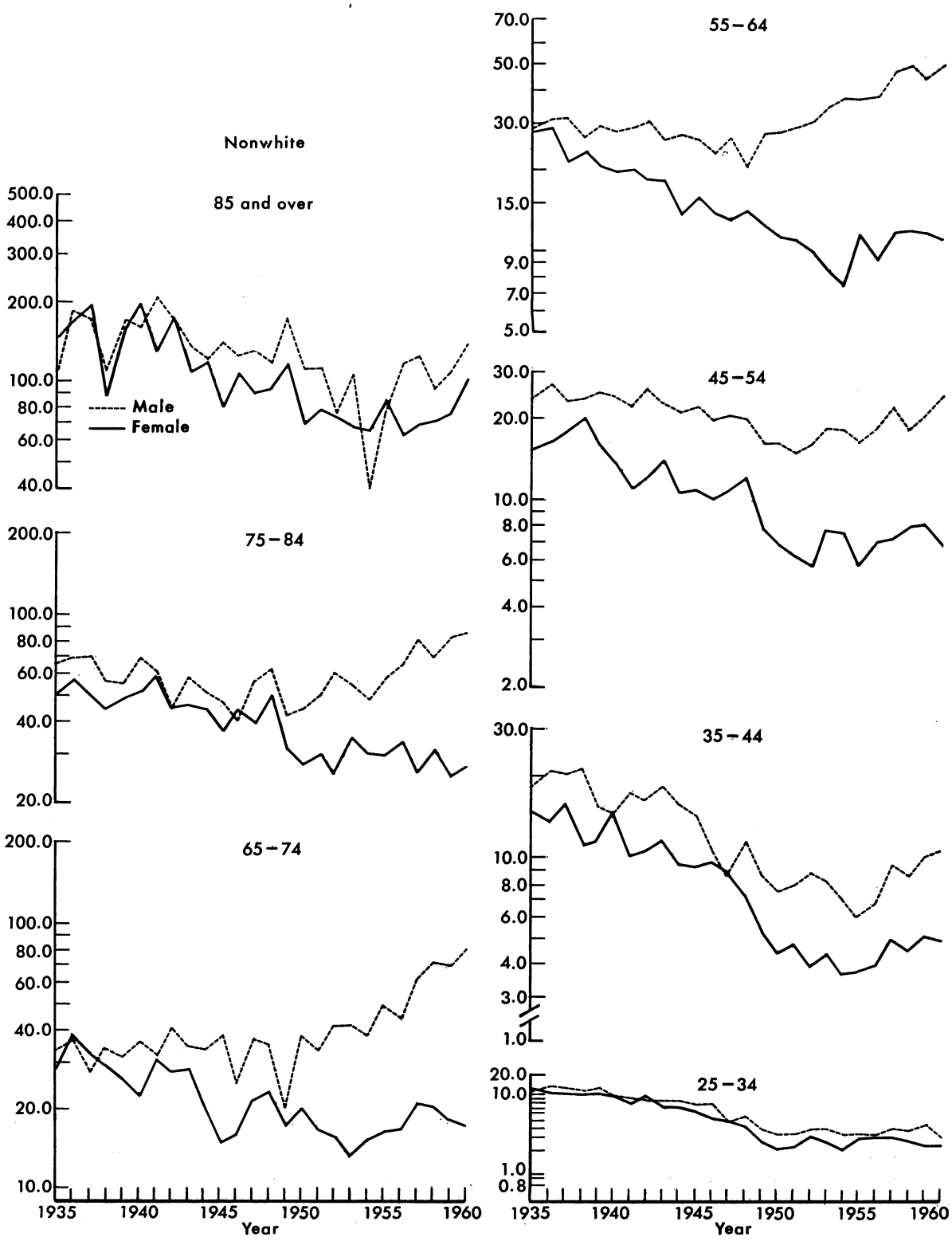
and pneumonia, by age, color, and sex, United States, 1935–60



group, the increase is 120 percent. For the age group 75–84 years, the rate for white males increased about 140 percent over the decade, while the rate for nonwhite males increased 93 percent. At ages below 65 years, the increase is not nearly as great but still substantial. For white males 55–64 years, the rate for 1960 is 90 percent higher than the same rate for 1950; for nonwhite males, the increase is about 83 percent.

These are large relative increases. Already the number of deaths from this group of chronic respiratory diseases exceeds the number of deaths from respiratory tuberculosis in every age group over 45 years among white males and over 65 years among nonwhite males. In 1948, deaths from the chronic obstructive lung diseases, that is, chronic bronchitis, bronchiectasis, pulmonary fibrosis, and emphysema, constituted about 15 percent of the total number of deaths from chronic respiratory diseases among white males 45 years and over. By 1960, this proportion had just about doubled. About 10 percent of the cases of obstructive diseases of the lung among white males 45 years and over in 1960 were specified as pneumoconioses of occupational origin. Chronic bronchitis (and bronchitis unqualified) and other chronic interstitial pneumonia each accounted for about 13 percent of the total. On the other hand, the primary disease cannot be identified from the mortality tabulations in the remainder (63 percent) of the deaths. These were attributed to bronchiectasis (about 10 percent) and emphysema (53 percent).

There are no signs of any change in the upward trends. At the present rates of change of the various components of chronic respiratory diseases, the rate for the chronic obstructive lung diseases will exceed the death rate for the group of other chronic respiratory diseases, (respiratory tuberculosis, lung cancer, and asthma) for white males over 45 years of age before the end of this decade. This is truly an emerging public health problem, especially for the males in the population.

Smoking and air pollution have been suggested as factors responsible for the rising trend. However, unless there has been a rapid, marked, and permanent change in the atmospheric environment and in smoking habits, it would be difficult to explain the sudden and dramatic reversal of trends. More information is needed, particularly in regard to the primary disease underlying emphysema. The growing problem of the chronic respiratory diseases in the United States deserves careful and intensive study.

REFERENCES

(*1*) Dorn, H. F.: The increasing mortality from chronic respiratory disease. *In* Proceedings of the Social Statistics Section. American Statistical Association, Washington, D.C., 1961, pp. 148–152.

(*2*) Walkup, H. E., and Connolly, E. C.: The dimensions of the chronic respiratory disease problem. Amer J. Public Health 53 (supp.): 1–6, March 1963.

(*3*) Merrill, M. H.: Public health responsibilities and program possibilities in chronic respiratory diseases. Amer J Public Health 53 (supp.): 25–33, March 1963.

(*4*) Bronchitis in Scotland [Editorial]. Lancet No. 7279: 481, Mar. 2, 1963.

Conference Calendar

September 16–21, 1963: International Congress on Occupational Health, Madrid, Spain. Dr. P. Sangro, Secretario General, Pabellón núm. 8, Facultad de Médicina, Ciudad Universitaria, Madrid–3 (Spain).

September 27–28, 1963: Western Industrial Health Conference, San Francisco, Jack Tar Hotel. Chapman Burk, Publicity Co-chairman, Code 732, Mare Island Naval Shipyard, Vallejo, Calif.

November 22–25, 1963: National Society for Crippled Children and Adults, Chicago, Palmer House. Headquarters of society: 2023 West Ogden Ave., Chicago 12, Ill.

October 1–4, 1963: Animal Care Panel, Los Angeles, Ambassador Hotel. Animal Care Panel, P.O. Box 1028, Joliet, Ill., Joseph J. Garvey, Executive Secretary. (Area Code 815–727–9120).

March 21–24, 1964: International Society of Cybernetic Medicine, Naples, Italy. Secretariat of Congress (SIMC), 348 Via Roma, Naples (Italy).