

## COMPARABILITY OF CAUSE OF DEATH AND CONTINUITY OF STATISTICAL TRENDS FOLLOWING IMPLEMENTATION OF ICD-10 AND OF THE NEW STANDARD FOR AGE-ADJUSTMENT OF RATES

Beginning with the 2000 data year in Arizona (1999 nationally) two major changes have occurred that affect the computation of mortality rates, tabulation of leading causes of death and analyses of mortality data over time. First, a new revision of the International Classification of Diseases (ICD), used to classify causes of death, was implemented. The Tenth Revision (ICD-10) has replaced the Ninth Revision (ICD-9), which was in effect since 1979. Second, a new population standard for the age adjustment of mortality rates has replaced the standard based on the 1940 population and used since 1943.

Both changes have profound effects on the comparability of mortality data and continuity in statistical trends. Age-adjusted rates can only be compared to other age-adjusted rates that use the same population standard. The age-adjusted mortality rates in this report, based on the (new) 2000 standard, CANNOT BE compared to rates which use the 1940 standard population. Changing the standard also has affected the magnitude of age-adjusted death rates. For example, in 2000, the Arizona age-adjusted death rate for cardiovascular disease based on 1940 standard was 160.7 deaths per 100,000 population (**Table 4E**). The age-adjusted death rate based on the year 2000 standard was 276.1/100,000 (**Table 2B-2**), 72 percent greater than that based on the 1940 standard. The age-adjusted rates based on the year 2000 population standard are larger because the new

standard reflects an older age structure and it gives more weight than the 1940 standard to death rates at older ages where mortality is higher.

Breaks in comparability of mortality statistics effective with deaths occurring in 2000 also result from the implementation of ICD-10. ICD-10 is far more detailed than ICD-9, with about 8,000 categories compared with about 5,000 categories. ICD-10 uses alphanumeric codes compared with numeric codes in ICD-9. Some of the coding rules and rules for selecting the underlying cause of death have been changed. Moreover, cause-of-death titles have been changed and the cause-of-death categories regrouped. For example, the ICD-9 category "chronic obstructive pulmonary diseases (COPD)" was replaced by the ICD-10 category "chronic lower respiratory diseases (CLRD)". Unlike COPD, CLRD excludes allergic alveolitis and pneumonitis due to inhaled organic dust. Conversely, over 55 percent more deaths are classified to Alzheimer's disease in ICD-10 than ICD-9. Almost all of this increase comes from deaths classified in ICD-9 as Presenile dementia but reclassified in ICD-10 to Alzheimer's disease.

Any comparison of causes of mortality in Arizona between 2000 and previous years needs to take into account the changes in statistical trends that can be attributed to changes in the classification system alone. In order to assess whether changes in causes of death are "real" or due to new coding

and classification procedures, “comparability-modified” mortality rates are used for some of the leading causes of death discussed in this report. For example, if we look only at the age-adjusted rate over time, it appears that deaths from influenza and pneumonia have decreased from 32.9/100,000 in 1999 to 24.4/100,000 in 2000 (**Table 2B-2**). However, when we examine the comparability-modified age-adjusted rate for 1999 (**Table 2B-2**), we see that mortality risk due to influenza and pneumonia has actually increased between 1999 and 2000 (from 23.0 to 24.4/100,000, respectively), after taking the differences between the ICD-9 and ICD-10 into account.

In order to obtain comparability-modified data, the number of deaths or the death rate for a particular cause of death (influenza and pneumonia in the above example) classified by ICD-9 is adjusted by multiplying it by the comparability ratio for that cause. Comparability ratios are measures of comparison between ICD-9 and ICD-10 (comparability ratios for the causes of death shown in this report are provided in the *Technical Notes*). Comparability ratio of 1.0 indicates that the same number of deaths would be assigned to a cause-of-death when ICD-9 or ICD-10 was used.

In this report, comparability-modified data are shown for the four causes of death for which the discontinuity in trend (resulting from implementation of ICD-10) is substantial. **Table 2B-1** and **Table 2B-2** present the annual number of deaths and rates for 1994-1999 that would have been classified as influenza and pneumonia, Alzheimer’s disease, nephritis or septicemia, had the ICD-10 classification system and coding rules been in place. The comparability ratio for influenza and pneumonia is 0.6982,

a decrease of about 30.2 percent due to ICD-10. The comparability ratio for Alzheimer’s disease is 1.5536, indicating a 55.4 percent increase in Alzheimer’s disease death when classified by ICD-10. The comparability ratio for nephritis is 1.2320, an increase of about 23.2 percent due to ICD-10. The comparability ratio for septicemia is 1.1949.

For the remaining causes of death, little or no change occurred in the number of deaths assigned using the different coding revisions.

It is important to note that the comparability ratios used in this publication are based on the preliminary comparability study conducted by the National Center for Health Statistics and are subject to change once the final comparability study is completed. In addition, the comparability ratios are assumed to be applicable to mortality data for 1994-1999. Special caution must be exercised in interpreting differences in cause-specific mortality for years before 1994. This recommendation applies in particular to the age-adjusted mortality rates by race/ethnicity and gender for 1980 and 1990 in Table 2B-3. Those rates were re-calculated using the new population standard, but they are not comparability-modified.

Last but not least, mortality rates for selected causes of death used to monitor progress toward the year 2000 Health Objectives (sections 4C, 4E, 6C, and 6E) have not been re-calculated to the new standard. For comparability with the year 2000 target rates, the age-adjusted mortality rates in those sections use the 1940 standard population. Obviously, they should not be compared with the rates in Chapter 2 and Chapter 5.