COMPARABILITY OF CAUSE OF DEATH AND CONTINUITY OF STATISTICAL TRENDS: 2001 STATUS

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. The new set of age-adjustment weights uses the year 2000 U.S. population as a standard.

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. In this report, ALL age-adjusted mortality rates (including those for 1980, and 1991-2001) are based on the (new) 2000 standard, and they CANNOT BE compared to rates using the 1940 standard population. This is because the age structures of the 1940 and year 2000 populations differ. From 1940 to 2000 the U.S. population "aged" considerably. The age-adjusted rates based on the year 2000 standard are different because the year 2000 population standard, which has an older age structure, gives more weight than the 1940 standard to death rates at older ages where mortality is higher. More than 1,800 age-adjusted mortality rates in this report were recomputed for the new population standard so that mortality rates can be compared over time.

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. 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.

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. Comparability-modified number of deaths and/or mortality rates, are shown for the five causes of death for which the discontinuity in trend (resulting from implementation of ICD-10) is substantial. The comparability-modified data present the number of deaths and mortality rates that would have been classified as *influenza and pneumonia*, *Alzheimer's disease*, *nephritis, nephrotic syndrome and nephrosis*, *septicemia*, or *falls* had the ICD-10 classification system and coding rules been in place. For the remaining causes of death, little or no change occurred in the number of deaths assigned using the different coding revisions. The measures of comparison between ICD-9 and ICD-10 – the "comparability ratios" – for the causes of death shown in this report are provided in the ***Technical Notes*** (pp.434-437).

The statistical consequences of the new standard and of the new revision of the ICD were discussed in greater detail in the year 2000 edition of the ***Arizona Health Status and Vital Statistics*** report (see www.hs.state.az.us/plan/2000ahs/pdf/093_094text2.pdf)

The new population standard and the revision of the ICD are not the only factors affecting the comparability of cause of death and the continuity of statistical trends in mortality. The mortality data for Arizona residents for 1999-2001 are not quite as complete as they used to be in the past. There seems to be a problem with the out-of-State deaths of the residents of Arizona: their records (copies of death

certificates from other states) are not always sent to the Office of Vital Records of the Arizona Department of Health Services:

Data year	1996	1997	1998	1999	2000	2001
Reported out-of-State deaths of AZ residents	1,608	1,431	1,569	792	844	1,009

Since mortality rates express the likelihood (or risk) of death in a specified population (i.e., all Arizona residents) regardless of the place of occurrence, missing data about the number of events in the numerator (i.e., resident deaths occurring out-of-State) contributed to misrepresentation of mortality risks for Arizonans

In particular, mortality rates for 1999-2001 were understated because the numerators used to calculate them were too small.

Another disturbing peculiarity of the mortality data collection process is a growing number of records where cause of death is missing. The majority of those records are, again, for Arizonans who died outside Arizona in 2001. Unfortunately, missing cause of death accounted for 970 records, almost as many as diabetes (1,040 deaths), the eighth leading cause of death in 2001.

Data year	1996	1997	1998	1999	2000	2001
Missing cause of death	16	30	12	11	197	970

As a result, the cause-specific numbers and rates for 2001 also are understated.

Last but not least, before data for 2000, mortality medical information was based on manual coding of an underlying death for each certificate in accordance with WHO rules, and done locally by the Office of Vital Records. Effective with the 2000 data year, cause-of-death data presented in this publication were coded by the National Center for Health Statistics, using computerized procedures of SuperMICAR (Mortality Medical Indexing and Retrieval) and ACME (Automated Classification of Medical Entities) systems.
It seems that the conversion to computerized coding contributed to at least some of the breaks in comparability over time of cause-of-death statistics for *drug-induced deaths*, *intentional self-harm (suicide)*, *firearm-suicide*, and *accidental discharge of firearms*:

Data year	1999	2000	2001
Drug-induced deaths	543	331	577
Suicide	773	737	600
Suicide by firearms	495	486	358
Accidental discharge of firearms	7	11	114

Unprecedented decline in the number of suicides seems to be associated with the equally unprecedented increase in the number of firearm deaths classified as accidental. It looks like approximately 100 firearm fatalities, that would have been classified as suicides had the manual coding system been in place, were classified as accidents in 2001.

Some experience is usually necessary before the data are collected and coded as accurately and completely as possible in changed circumstances. Data in future years will indicate if this assumption is reasonable