

## APPENDIX A: Technical Notes

### Data Sources

Demographic and Socioeconomic Data: U.S. Bureau of the Census, American Fact Finder, 2000 Census and 1990 Census.

Population Estimates: For maternal and child health, and mortality indicators, county population data were obtained from the American Fact Finder, U.S. Bureau of the Census, 2000 Census. Hospitalization rates were calculated using 1999 population estimates. Intercensal population estimates for the county were calculated assuming a linear increase between the decennial censuses. These intercensal population estimates were used for calculating rates to depict trend data for health indicators other than communicable diseases. Trend data for communicable diseases used intercensal and postcensal population estimates obtained from California Department of Finance.

Birth Data: Alameda County Public Health Department Vital Statistics Files obtained from the Automated Vital Statistics System (AVSS).

Death Data: Alameda County Public Health Department Vital Statistics Files obtained from the Automated Vital Statistics System (AVSS).

Hospital Discharge Data: Hospital Inpatient Discharge Data collected by the California Office of Statewide Health Planning and Development (OSHPD).

Cancer Incidence Data: Cancer incidence data from the Northern California Cancer Center (NCCC).

Communicable Disease Data:

**AIDS:** Cases of Acquired Immune Deficiency Syndrome from the HIV/AIDS Reporting System (HARS) database maintained by Alameda County Public Health Department.

**Chlamydia:** Cases of Chlamydia from the California Department of Health Services Sexually Transmitted Disease Control Branch. Cases of

Chlamydia among Berkeley residents are reported to the City of Berkeley, and therefore, are excluded from county figures.

**Tuberculosis:** Reportable cases of tuberculosis from the Tuberculosis Information Management System (TIMS) maintained by Alameda County Public Health Department. Cases of tuberculosis among Berkeley residents are reported to the City of Berkeley, and therefore, are excluded from county counts.

Childhood Immunization Data: Childhood immunization data was obtained from California State Department of Health Services, Immunization Branch.

### Limitations of Data and Other Data Issues

Hospital Discharge Data: Because persons with multiple hospitalizations during the year can be counted more than once, hospital discharge data produces the estimates for discharges, not persons. Changes in rates of hospitalization may be attributed to changes in hospital admission practices or the diagnostic coding of illnesses, or reflective of true changes in the patterns of disease. Hospitalization data captures those illnesses or injuries serious enough to get people admitted to the hospital, but may not describe the prevalence of a given illness in the population since many who have the illness are not hospitalized.

Race and ethnicity data is missing for many cases due to the omission of a race field on many hospital discharge forms. Reportedly, race is not recorded in about 18% of hospital discharge records.<sup>1</sup> Therefore, there are a large number of cases of 'unknown' and 'other' values for which rates are not calculated, resulting in an over-estimation of rates for some racial groups and an under-estimation for others.

Birth Data: Information on the newborn is taken from the birth certificate. The race/ethnicity on the birth certificate is reported by self-identification according to the race and ethnicity of the mother.

Mortality Data: The race and ethnicity of the decedent is from the death certificate as reported by family members to the funeral director. However, birth and census population data use the self-reported race of the respondent. As a result of the combined effect of numerator and denominator biases, it has been estimated that death rates are overestimated by about 1% among Whites, and 5% among African Americans; and are underestimated by 21% for the American Indian or Alaska Natives, 11% among Asian or Pacific Islanders, and 2% among Hispanics.<sup>2</sup>

Change of International Classification of Disease: Mortality data for specific causes of death in this report are classified and coded according to the World Health Organization's (WHO) tenth revision of the International Classification of Diseases (ICD-10) implemented in the United States in 1999. However, the mortality trend data for 1990 to 1998, and hospital discharge data are based on ninth revision of International Classification of Disease (ICD-9).

Since the beginning of the century, the International Classification of Disease (ICD) for mortality has been modified about once every 10 years, except for the 20-year interval between the last two revisions, ICD-9 and ICD-10. ICD-10 differs from ICD-9 in many respects:

1. ICD-10 is far more detailed than ICD-9, about 8,000 categories compared with 4,000 categories, mainly to provide more clinical detail for morbid-ity applications.
2. ICD-10 uses 4-digit alpha-numeric codes compared with 4-digit numeric codes in ICD-9.
3. Three additional chapters have been added, some chapters rearranged, cause of death titles have been changed, and conditions have been regrouped.
4. Some coding rules have been changed.<sup>3</sup>

Introduction of 10th revision of International Classification of Disease creates discontinuities in time series trends for causes of death due to the reclassification of diseases and changes in the coding rules. This means the Healthy People 2010 objectives may not be strictly comparable with the tracking data for 1999 and subsequent

years whose baseline data were 1997 and 1998.

Multiple Race Coding: The data on race in Census 2000 are not directly comparable to those collected in previous censuses. The October 1997 revised standards issued by the US Office of Management and Budget (OMB) led to changes in the question on race for Census 2000. In Census 2000, respondents were allowed to select more than one category for race. Also, the "Asian and Pacific Islander" category was separated into two categories, "Asian" and "Native Hawaiian and Other Pacific Islander."

For racial/ethnic comparison of mortality data, only 2000 data is presented. Therefore, it is more vulnerable to random variation since the data is based on a single year.

Leading Causes of Death: Causes are ranked according to the number of deaths because it most accurately reflects the frequency of cause-specific mortality. In this report, leading causes of death were derived from the recommended list of 50 rankable causes from the 113 selected causes of death developed for use with ICD-10.<sup>4</sup> Leading causes of infant mortality were derived from a separate ranking procedure using the recommended list of 71 rankable causes from the 130 selected causes of infant death developed in accordance with ICD-10.<sup>4</sup>

Ranking leading causes of death is a useful tool for illustrating the relative burden of cause-specific mortality. However, the rankings do not necessarily indicate those causes of death of greatest public health importance. Some causes of death of public health importance, such as lung cancer and motor vehicle crashes are excluded from the ranking procedure and included in broader rankable categories, namely, all cancer and unintentional injuries, respectively. If they were included in the rankings, both causes would be placed among the 10 leading causes of death.

Years of Potential Life Lost: Years of Potential Life Lost is a summary measure often used to gauge the overall health of a population. Because females live longer than males, and actual life expectancies at birth in the United States are lower than some other regions of the world, the

female life expectancy table from Murray was used so as not to underestimate the disease burden in the population.<sup>5</sup>

## Data Definitions

**Race and Ethnicity:** Race and ethnicity for hospital discharge, cancer Incidence and communicable disease data were defined as follows:

**African American:** ethnicity is non-Hispanic, and race is Black

**American Indian:** ethnicity is non-Hispanic, and race is American Indian, Eskimo, or Aleut

**Asian/Pacific Islander:** ethnicity is non-Hispanic, and race is any of the following:

Asian(Unspecified) or Asian(Specified): Chinese, Japanese, Korean, Vietnamese, Cambodian, Thai, Laotian, Filipino, Indian, Samoan, Hawaiian, Guamanian, or Pacific Islander

**Latino:** ethnicity is Hispanic regardless any race

**White:** ethnicity is non-Hispanic, and race is White

Race and ethnicity for maternal, child and adolescent data and mortality data were defined as follows:

**African American:** ethnicity is non-Hispanic, and race is Black

**American Indian:** ethnicity is non-Hispanic, and race is American Indian, or Eskimo, or Aleut

**Asian:** ethnicity is non-Hispanic, and race is any of the following:

Asian (Unspecified) or Asian (Specified): Chinese, Japanese, Korean, Vietnamese, Cambodian, Thai,

Laotian, Filipino, Indian

**Latino:** ethnicity is Hispanic regardless any race

**Native Hawaiian and other Pacific Islander:** Native Hawaiian, Samoan, Guamanian, or Pacific Islander

**White:** ethnicity is non-Hispanic, and race is White

**Two or More Races:** ethnicity is non-Hispanic, and races are more than one of the above

### Case Definition:

**AIDS:** The Centers for Disease Control and Prevention expanded the AIDS surveillance case definition in 1993 to include all HIV-infected persons with a CD4+ T-lymphocyte count of less than 200 cells/uL or with one of the AIDS-defining clinical conditions.

**Chlamydia:** A case that is laboratory confirmed by isolation of *C. trachomatis* by culture.

**Tuberculosis:** Positive cultures for *M. tuberculosis* confirm the diagnosis of TB. However, TB may also be diagnosed by the medical provider on the basis of clinical signs and symptoms in the absence of positive cultures.

**Cancer Incidence:** A cancer case is defined in this report as a primary malignant tumor, that is, one originating in a particular organ or anatomic site rather than having spread from another location. Primary site and histological type of the cancer are coded according to the International Classification of Diseases of Oncology (ICD-O), Second Edition.<sup>6</sup> The ICD-O-2 codes and histological types used to define cases of cancer in this report are described below:

Site	ICD-O-2 Site Code	Histology Type
Breast	C500-C509	Excludes Types 9590-9989
Prostate	C619	Excludes Types 9590-9989
Lung	C340-C349	Excludes Types 9590-9989

**Asthma Hospitalization:** Asthma discharge if ICD-9 code 493 appears in the primary diagnosis code position.

**Diabetes-Related Hospitalization:** Diabetes discharge if ICD-9 code 250 appears in the primary diagnosis code position or any one of four underlying diagnosis code positions.

**Coronary Heart Disease-Related Hospitalization:** CHD discharge if ICD-9 codes 402, 410-414, and 429.2 appear in the primary diagnosis code position or any one of four underlying diagnosis code positions.

**Stroke-Related Hospitalization:** Stroke discharge if ICD-9 codes 430-438 appear in the primary diagnosis code position or any one of four underlying diagnosis code positions.

**Injury Hospitalization:** A subset of injury hospitalizations was created based on guidelines estab-

lished by the National Center for Injury Prevention and Control.<sup>7</sup> The injury subset is defined using specific inclusion and exclusion criteria within the primary diagnosis field (N-codes). By this definition, an injury hospitalization is defined as:

A record in which the principal reason for admission, after study, to a non-federal, acute-care, inpatient facility was an injury, including late effects, but excluding adverse effects of therapeutic use of drugs and adverse effects of medical/surgical care and the late effects of those adverse effects.

Specific types of injury are defined by selection of specified E-codes. The first listed valid E-code is used unless it meets additional exclusion criteria. Additional E-codes are checked if the first E-code is excluded.

**ICD-10 Codes**

The following tabulation lists are the ICD-10 codes used in this report for the selected causes of death and for the matrix of injury death by mechanism.

**ICD-10 Codes for Mortality Data**

Cause of Death	ICD-10 Code
All Cancer	C00-C97
All Causes	A00-Y89
Alzheimer's Disease	G30
Asthma	J45-J46
Certain Conditions Originating in the Perinatal Period	P00-P96
Chronic Liver Disease and Cirrhosis	K70, K73-K74
Chronic Lower Respiratory Diseases	J40-J47
Congenital Malformations, Deformations, and Chromosomal Abnormalities	Q00-Q99
Coronary Heart Disease	I11, I20-I25
Diabetes	E10-E14
Diseases of Heart	I00-I09, I11, I13, I20-I51
Disorders Related to Short Gestation and Low Birth Weight, Not Elsewhere Classified	P07
Essential (primary) Hypertension and Hypertensive Renal Disease	I10-I12
Female Breast Cancer	C50
Homicide	X85-Y09, Y87.1
Human Immunodeficiency Virus (HIV) Disease	B20-B24
Influenza & Pneumonia	J10-J18
Lung Cancer	C33-C34
Motor Vehicle Crash	V02-V04, V09.0, V09.2, V12-V14, V19.0-V19.2, V19.4-V19.6, V20-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2
Newborn Affected by Maternal Complications of Pregnancy	P01
Prostate Cancer	C61
Respiratory Distress of Newborn	P22
Stroke	I60-I69
Sudden Infant Death Syndrome (SIDS)	R95
Suicide	X60-X84, Y87.0
Unintentional Injury	V01-X59, Y85-Y86

### ICD-10 Codes for the Matrix of Injury Mortality by Mechanism

Mechanism	ICD-10			
	All injury	Manner		
		Unintentional	Suicide	Homicide
All Injury	V01-Y36, Y85-Y87, Y89	V01-X59, Y85-Y86	X60-X84, Y87.0	X85-Y09, Y87.1
Cut/pierce	W25-W29, W45, X78, X99, Y28, Y35.4	W25-W29, W45	X78	X99
Drowning	W65-W74, X71, X92, Y21	W65-W74	X71	X92
Fall	W00-W19, X80, Y01, Y30	W00-W19	X80	Y01
Fire/hot object or substance	X00-X19, X76-77, X97-X98, Y26-Y27, Y36.3	X00-X19	X76-77	X97-X98
Firearm	W32-W34, X72-74, X93-X95, Y22-Y24, Y35.0	W32-W34	X72-74	X93-X95
Machinery	W24, W30-W31	W24, W30-W31		
All transport	V01-V99, X82, Y03, Y32, Y36.1	V01-V99	X82	Y03
Motor vehicle crash	V02-V04, V09.0, V09.2, V12-V14, V19.0-V19.2, V19.4-V19.6, V20- V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0- V87.8, V88.0-V88.8, V89.0, V89.2	V02-V04, V09.0, V09.2, V12- V14, V19.0-V19.2, V19.4- V19.6, V20-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2		
All other transport- related	V01, V05-V06, V09.1, V09.3, V09.9, V10, V11, V15-V18, V19.3, V19.8, V19.9, V80.0- V80.2, V80.6-V80.9, V81.2-V 81.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V89.9, V90-V99, X82, Y03, Y32, Y36.1	V01, V05M V06, V09.1, V09.3, V09.9, V10, V11, V15-V18, V19.3, V19.8, V19.9, V80.0- V80.2, V80.6-V80.9, V81.2- V81.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V89.9, V90-V99	X82	Y03
Natural/environmental	W42, W43, W53-W64	W42, W43, W53-W64		
Overexertion	X50	X50		
Poisoning	X40-X49, X60-X69, X85-X90, Y10-Y19, Y35.2	X40-X49	X60-X69	X85-X90
Struck by or against	W20-W22, W50-W52, X79, Y00, Y04, Y29, Y35.3	W20-W22, W50-W52	X79	Y00, Y04
Suffocation	W75-W84, X70, X91, Y20	W75-W84	X70	X91

## ICD-9 Codes

The following tabulation list is the ICD-9 codes used in this report for the selected causes of morbidity data, and for the early years' mortality data (1990-1998).

### ICD-9 Codes for Morbidity and Mortality Data

Cause	ICD-9 Code
Acquired Immunodeficiency Syndrome (AIDS)	042-044
All Cancer	140-208
All Causes	001-E999
Asthma	493
Breast Cancer	174
Coronary Heart Disease	402, 410-414, 429.2
Diabetes	250
Diseases of the Heart	390-398, 402, 404-429
Homicide/Assault	E960-E969
Lung Cancer (bronchus & lung)	162.2-162.9
Motor Vehicle Crashes	E810-E825
Prostate Cancer	185
Stroke	430-438
Suicide/Self-Inflicted Injury	E950-E959
Unintentional Injury	E800-E949

## Rates

**Age-Adjustment:** All age-adjusted rates in this report are adjusted by the direct method to the 2000 US Standard Population. In general, the number of deaths for specific causes of mortality in a community is affected by the size and age composition of the population. Because the risk of dying is primarily a function of age, simply calculating a crude rate for vital events such as death {e.g. (number of deaths/population)X100,000} can lead to misleading conclusions when comparing different sub-populations. This is because populations with a large component of elderly people tend to have a high death rate simply because the risk of dying is determined mostly by age.

In order to nullify the effect of differences in the age composition of populations, disease rates can be age-adjusted. Age-adjusting methodology

involves first calculating rates for each age category for each sub-population to determine age-specific rates. Each age-specific rate is then multiplied by the proportion of the corresponding age category in a standard population. The sum of these weighted age-specific rates in a community is the age-adjusted rate for that community. Age-adjusted disease rates form a better basis for an unbiased comparison of sub-populations.

**Variability of Rates:** All vital statistics, including death rates, are subject to random variation. This variation is inversely related to the number of events (e.g. deaths) used to calculate the rate. The smaller the number of events, the greater the likelihood of random variation.

In order to protect against providing misleading information based on statistically unreliable rates, this report adopts the recommendations of the

National Center for Health Statistics (NCHS)<sup>8</sup> regarding the calculation of rates. NCHS recommends that rates are statistically reliable when they are based upon 20 or more events occurring during the period in question, and the relative standard error (RSE) of the related rate is less than 23%. Rates not meeting these criteria are not shown in the report.

**Confidence Intervals:** A good measure of the reliability of a rate is the confidence interval (CI) around the rate estimate. A confidence interval defines the range of rates that would be determined by repeated sampling of the same phenomenon. By statistical convention, a 95% confidence interval is considered a useful measure of the range of accuracy of an estimate. This means that with repeated sampling, one would obtain a rate within the confidence interval 95% of the time.

Formula:

$$95\% \text{ CI} = \text{Rate} \pm (1.96 \times \text{SE})$$

$$\text{SE} = (\text{Rate} \sqrt{\quad})^*$$

$$\text{RSE} = (\text{SE}/\text{Rate}) \times 100$$

Where:

CI = Confidence Interval

SE = Standard Error

E = Number of Events

RSE = Relative Standard Error

If RSE > 23%, then rate is considered unreliable

\* Standard error of an age-adjusted rate is calculated using the sum over the age groups of weighted age-specific rates divided by the square root of the number of events in each age group.

Based on recommendations of the National Center for Health Statistics (NCHS)<sup>8</sup> regarding the calculation of rates and confidence intervals, the standard error of any rate based on fewer than 100 events is based on the Poisson distribution. The Poisson distribution is similar to the binomial distribution but is characterized by very small numbers of events occurring (p) in a large number of trials (n).<sup>9</sup>

## References

1. Kozak LJ. Underreporting of race in the National Hospital Discharge Survey. Advance data from Vital and Health Statistics No. 265. Hyattsville, Maryland. NCHS, 1995.
2. Rosenberg HM, Maurer JD, Sorlie PD, et al. Quality of death rates by race and Hispanic origin: A summary of current research, 1999. National Center for Health Statistics (NCHS). Vital and Health Statistics 2(128), 1999.
3. Anderson RN, Minino AM, Hoyert DL, Rosenberg HM. Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates. National vital statistics reports; vol 49 no 2. Hyattsville, Maryland: National Center for Health Statistics. 2001.
4. Anderson RN. Deaths: Leading causes for 1999. National vital statistics reports; vol 49 no 11. Hyattsville, Maryland: National Center for Health Statistics. 2001.
5. Murray CJ, Lopez AD. The global burden of disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Cambridge, MA. Harvard University Press on behalf of The World Health Organization and The World Bank. 1996.
6. International Classification of Diseases for Oncology. 2nd edition (ICD-O 2). World Health Organization. 1990.
7. Davies M, Connolly A, Horan J. (eds). State Injury Indicators Report. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. December 2001.
8. Technical Appendix from Vital Statistics of United States, 1995, Mortality. US Dept. of Health and Human Services. National Center for Health Statistics. Hyattsville, MD: April 1999.
9. Kahn, HA, Sempos, CT. Statistical Methods in Epidemiology. New York. Oxford University Press. 1989.