

MORTALITY BY OCCUPATION, INDUSTRY, AND CAUSE OF DEATH

24 Reporting States, 1984–1988

by

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ABSTRACT

Through a collaborative project with the National Institute for Occupational Safety and Health and the National Cancer Institute, 24 State health departments have provided occupation- and industry-coded death certificate data for 1 or more years from 1984 through 1988 to the National Center for Health Statistics. The occupation, industry, and cause-of-death data for 1,062,000 white males, 139,834 black males, 438,603 white females, and 72,976 black females were analyzed using age-adjusted, race- and gender-specific proportionate mortality ratios (PMRs) and 95% confidence intervals (CIs). The analysis includes 192 cause-of-death categories, 325 occupation categories, and 235 industry categories.

Results are presented for all combinations of occupation and cause of death or industry and cause of death that meet the following criteria: (1) the PMR for the aged-20-and-over group was ≥ 120 , (2) the lower limit of the 95% CI of the PMR for the aged-20-and-over group exceeded 100, and (3) the observed number of deaths in the aged-20-and-over group was ≥ 10 . The tables include the number of observed deaths and PMRs for the three age groups (20 and over, 20 to 64, and 65 and over).

Some findings support previously reported associations: for example, coal workers' pneumoconiosis in white male mining machine operators (PMR=5,146; 95% CI=4,696-5,629) and malignant neoplasm of the lung in white male insulation workers (PMR=188; 95% CI=152-229). Other results suggest new areas for research: for example, malignant neoplasm of the esophagus in white waitresses (PMR=203; 95% CI=141-282) and cerebrovascular diseases in black farmers (male PMR=134; 95% CI=128-140; female PMR=141; 95% CI=126-157).

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MORTALITY BY OCCUPATION, INDUSTRY, AND CAUSE OF DEATH

24 Reporting States, 1984–88

INTRODUCTION

The purpose of this report is to present estimates of the relative risks of mortality for selected causes of death by occupation and industry for white and black males and females. The report includes data for the period 1984–88 for 24 States reporting this information from death certificates through the vital statistics system. The report is a collaborative effort of the National Institute for Occupational Safety and Health (NIOSH) and the National Center for Health Statistics (NCHS), both components of the Centers for Disease Control and Prevention (CDC) and the National Cancer Institute (NCI).

Occupation and industry information from death certificates can serve as a readily available resource for monitoring occupational mortality on an ongoing basis. This information has the advantage of being useful for many occupations, industries, and diseases. The data draw on the strengths of the vital statistics system, which include universal coverage, uniformity of information, large numbers of events, and geographic identifiers.

The results from this occupational mortality study may be used as a screening tool to identify possible associations of cause of death and occupation (or industry) that warrant further study, to evaluate the results of other studies, to target occupational groups for health promotion activities, or to use for descriptive purposes. An apparent excess of cause-specific mortality in an industry or occupation must be verified by more definitive studies.

Because of space restrictions, this report presents only statistically significant proportionate

mortality ratios (PMRs)—that is, those in which the lower bound of the confidence interval (CI) is greater than 100. All results are available upon request.

BACKGROUND

Information from death certificates was first used to describe occupational mortality in the United States in 1890. According to a brief description of occupational mortality studies in the United States,¹ tabulations of mortality by occupation were made for each census year from 1890 through 1940. The population data collected in the census were used to compute population-based measures of risk. These tabulations were, however, published only for the years 1890, 1900, and 1930. Evaluations found that the quality of the occupation-specific information was generally unsatisfactory. For the 1950 census year, efforts were made to improve the quality of occupational descriptors on death certificates. A major report was published based on deaths of men aged 20 to 64.^{2,3} In this report, population estimates from the 1950 Census of Population were used to produce standardized mortality ratios (SMRs).

Other countries have produced reports on occupational mortality. Great Britain has published decennial reports on patterns of mortality for occupational groups since 1851. The latest publication covers the years 1979–80 and 1982–90.⁴ These reports have been used primarily to provide readily available background data for suspected associations between an occupation and excess mortality. A major report from Canada described mortality by occupation in British Columbia, using data from 1950 through 1984.⁵

Although the United States Standard Certificate of Death has requested information on the occupation of the decedent since 1900, until recently this information has not been readily accessible. Since the report using the 1950 data, there has been no national report on occupational disease mortality. Work-related fatal injuries were described in a recent report.⁶ Based on the National Traumatic Occupational Fatalities (NTOF) database, the report described occupational injury fatalities by broad industrial and occupational categories for the period 1980 through 1989. In addition, several States (including California,^{7,8} Kentucky,⁹ Maine,¹⁰ New Hampshire,¹¹ New York,¹² North Carolina,¹³ Pennsylvania,¹⁴ Rhode Island,¹⁵ South Carolina,¹⁶ Utah,¹⁷ and Washington^{18,19}) have coded the occupation data and published studies.

Over the last decade, NIOSH, NCHS, NCI, and the Bureau of the Census have collaborated to improve the quality of the occupational data collected on death certificates; to develop routine, standardized coding of this information by State health departments; and to partially reimburse selected States for the production of these data. Since 1984, a number of States have submitted the information in coded, machine-readable form to NCHS. The first report using these data was a *Monthly Vital Statistics Report Supplement*, based on the 1984 data from 12 States.²⁰ It described the data and presented cause-specific estimates of relative risk for broad occupation and industry categories for males and females.

The availability of additional years of data and the contributions of additional States make possible this report on occupational mortality for 24 States for 1984 through 1988. The data were sufficient to compute estimates of relative risk for detailed occupation, industry, and cause-of-death categories. The report is more representative of the United States and more current than many of the individual State reports. It is hoped that researchers will find this a useful

addition to the occupational mortality surveillance literature.

METHODS

The United States *Standard Certificate of Death* requests information on the *usual occupation* and *kind of business or industry* for each decedent. Beginning in 1983, an increasing number of State health departments have coded this information using standardized coding procedures. Twenty-four State health departments included the data in the coded death certificate data provided to NCHS for 1 or more years from 1984 through 1988. See Table A-1 in Appendix A for States and years included.

The information on occupation and industry was coded according to the 1980 Bureau of the Census classification.²¹ The occupation and industry categories included in the report are described in Lists A-1 and A-2 in Appendix A. The underlying cause of death was coded according to the *Ninth Revision, International Classification of Diseases*.²² The analysis included 185 selected causes of death for males and 188 selected causes for females (List A-3 in Appendix A).

The analysis includes deaths that occurred in the 24-State reporting area to residents of one of the 24 States. The criteria for inclusion in the analysis differed for males and females. For males, all white and black decedents aged 20 and older were included. For females, decedents reported in the occupation category of *Housewives, homemakers* were not included in either the occupation or industry analysis. Therefore, all white and black female decedents aged 20 and older with an occupation code other than *Housewives, homemakers* were included.

The measure of association used in this report is the proportionate mortality ratio (PMR). Age-standardized PMRs for the four race-sex groups were calculated using a computer program

developed at NIOSH.²³ For a specific race-sex group, the program calculates PMRs by comparing the proportion of deaths from a specific cause within a specific occupation or industry group with the proportion of deaths for that cause for all occupations or industries. Age stratification was done by 5-year age groups. The program provides 95% confidence limits for the PMRs.

See Appendix A for a description of the computation of the PMRs and the confidence limits.

RESULTS AND DISCUSSION

The detailed statistical results are presented for a total of 1,713,413 decedents, of whom 1,062,000 are white males, 139,834 are black males, 438,603 are white females, and 72,976 are black females (Table 1). The numbers for females are much smaller than for males because females reported as housewives were not included in the analysis; for more than half of the females, *housewife* was reported as their usual occupation.

Detailed results are presented in Tables B-1 through B-16, found on the diskette attached to the back page of this report. These include the number of observed deaths and PMRs for the three age groups: aged 20 and over, aged 20 to 64, and aged 65 and over. The tables show different combinations of occupation and cause of death, or industry and cause of death, depending on three criteria: (1) the PMR for the aged-20-and-over group was ≥ 120 , (2) the lower limit of the 95% CI of the PMR for the aged-20-and-over group exceeded 100, and (3) the observed number of deaths in the aged-20-and-over group was ≥ 10 . Space limitations preclude the display of all PMRs, but they are available upon request.

Four tables are shown for each race-sex group (see Appendix B for a complete list of the detailed tables on the diskette):

- Tables B-1 through B-4, occupation by cause of death
- Tables B-5 through B-8, cause of death by occupation
- Tables B-9 through B-12, industry by cause of death
- Tables B-13 through B-16, cause of death by industry

Highlights of the results are presented in Tables 2–9 for each race-sex group. Some of these PMRs identify previously recognized occupational associations. Others are newly reported or support findings from other surveillance reports and may indicate a need for further evaluation of the relationship of the occupation or industry to the cause of death. Still others may be due to socioeconomic status or lifestyle factors. Some PMRs may be elevated due to chance.

In Tables 2 through 9, to focus on associations that make substantial contributions to overall mortality and to de-emphasize the importance of chance or rare events, a minimum number of deaths per cause of death and occupation or industry combination was established. Similarly, to ensure the stability of the PMR estimates, each PMR included in these tables was required to have a minimum lower limit of the 95% CI. This minimum will eliminate highly elevated PMRs based on a small number of deaths. For each cause of death, the occupation or industry with the highest PMR meeting these criteria is shown in Tables 2–9. The minimum number of deaths and lower confidence limit vary according to sex and race to take into account the differences in the total number of deaths in each race-sex group in the data set. For white males the minimum number of deaths was 50 and the minimum lower 95 percent confidence limit was 150; for black males and white females, the criteria was 20 and 125; and for

Table 1. Decedents in selected occupations and industries by race, sex, and former work status

Race and sex	Total number	Ever employed*				Never employed		Unknown work status	
		Reported		Retired		Number	% of total	Number	% of total
		Number	% of total	Number	% of total				
Selected occupations									
White, male	1,062,000	1,001,929	94.3	19,633	1.8	17,603 [†]	1.7	22,835	2.1
Black, male	139,834	126,752	90.6	3,257	2.3	5,217 [†]	3.7	4,608	3.3
White, female	438,603	409,670	93.4	7,722	1.8	9,544 [†]	2.2	11,667	2.7
Black, female	72,976	66,129	90.6	1,450	2.0	3,217 [†]	4.4	2,180	3.0
Selected industries									
White, male	1,062,000	1,012,257	95.3	4,405	0.4	16,242 [§]	1.5	29,096	2.7
Black, male	139,834	123,930	88.6	1,736	1.2	4,934 [§]	3.5	9,234	6.6
White, female	438,603	412,705	94.1	2,285	0.5	9,627 ^{§,**}	2.2	13,986	3.2
Black, female	72,976	65,404	89.6	1,017	1.4	3,242 ^{§,**}	4.4	3,313	4.5

*The number of decedents coded as *Reported*, *Retired*, *Never employed*, and *Unknown* varies between occupation and industry because these items are reported independently on the death certificate. The coding procedure does not reconcile any inconsistencies.

[†]Includes *Homemakers*, *Students*, *Volunteers*, and *Unemployed, never worked, disabled*.

[‡]Includes *Students*, *Volunteers*, and *Unemployed, never worked, disabled*; excludes *Housewives, homemakers*.

[§]Includes *Homemakers*, *Students*, *Unemployed*, *Volunteers*.

**Excludes female decedents coded as *Housewives, homemakers*.

Table 2. Occupations with the highest PMRs for selected causes of death in white males aged 20 and over: total of 24 reporting States, 1984–88*

Cause of death and occupation	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Human immunodeficiency virus infection (042–044) Hairdressers and cosmetologists (458)	99	1,288	1,046	1,568
Malignant neoplasm of trachea, bronchus, and lung (162) Insulation workers (593)	97	188	152	229
Malignant neoplasm of brain and other and unspecified parts of nervous system (191–192) Electrical and electronic engineers (055)	57	224	170	290
Non-Hodgkin's lymphomas (200, 202.0–202.2, 202.8, 202.9) Clergy (176)	94	187	152	229
Mental disorders (290–319) Cooks, except short order (436)	59	200	153	259
Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.3, 571.0–571.3, 790.3, E860.0, E860.1) Bartenders (434)	70	297	232	376
Parkinson's disease (332) Teachers, except postsecondary (155–159)	69	205	160	260
Chronic obstructive pulmonary diseases and allied conditions (490–496) Mining machine operators (616)	1,206	158	151	165
Coalworkers' pneumoconiosis (500) Mining machine operators (616)	479	5,146	4,696	5,629
Motor vehicle accidents, including late effects (E810–E825, E929.0) Truck drivers, heavy (804)	1,574	156	151	162
Air and space transport accidents (E840–E845) Airplane pilots and navigators (226)	107	8,795	7,208	10,628
Struck accidentally by falling object (E916) Forestry and logging occupations (494–496)	77	1,978	1,561	2,472
Accidents caused by machinery (E919) Farmers, except horticultural (473)	423	590	535	649
Accidents caused by firearm missile (E922) Farmers, except horticultural (473)	72	206	161	259
Accidents caused by electric current (E925) Electricians (555, 575, 576)	68	742	576	940
Suicide (E950–E959) Physicians (084)	127	194	162	231
Homicide and injury purposely inflicted by other persons (E960–E969) Roofers (595)	79	211	167	263

*Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 50 deaths and that the lower confidence limit of the PMR was at least 150. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after occupations are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

Table 3. Occupations with the highest PMRs for selected causes of death in black males aged 20 and over: total of 24 reporting States, 1984–88*

Cause of death and occupation	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Human immunodeficiency virus infection (042–044) Teachers, except postsecondary (155–159)	33	424	292	596
Malignant neoplasm of esophagus (150) Painters, construction and maintenance (556, 579)	31	187	127	266
Malignant neoplasm of colon (153) Sales occupations, personal goods and services (263–278)	27	213	140	310
Malignant neoplasm of prostate (185) Teachers, except postsecondary (155–159)	61	174	133	223
Diabetes mellitus (250) Cooks, except short order (436)	71	189	148	239
Mental disorders (290–319) Groundskeepers and gardeners, except farm (486)	55	189	143	246
Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.3, 571.0–571.3, 790.3, E860.0, E860.1) Painters, construction and maintenance (556, 579)	60	169	129	218
Acute myocardial infarction (410) Winding and twisting machine operators (738)	21	222	138	340
Other ischemic heart disease (411–414) Crane and tower operators (849)	66	164	127	208
Cerebrovascular diseases (430–438) Farmers, except horticultural (473)	1,162	134	128	140
Pneumonia and influenza (480–487) Helpers, construction trades (865)	21	225	140	345
Chronic obstructive pulmonary diseases and allied conditions (490–496) Molding and casting machine operators (719)	26	196	128	287
Coal workers' pneumoconiosis (500) Mining machine operators (616)	24	7,880	5,049	11,725
Motor vehicle accidents, including late effects (E810–E825, E929.0) Miscellaneous textile machine operators (749)	42	185	133	250
Accidents due to natural and environmental factors, including late effects (E900–E909, E929.5) Farm workers (479)	21	263	163	403
Accidents caused by submersion, suffocation and foreign bodies (E910–E915) Farm workers (479)	29	194	130	279
Struck accidentally by falling object (E916) Forestry and logging occupations (494–496)	30	1,917	1,293	2,737
Suicide (E950–E959) Guards (415, 425–427)	31	197	134	280

*Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 20 deaths and the lower confidence limit of the PMR was at least 125. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after occupations are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

Table 4. Occupations with the highest PMRs for selected causes of death in white females aged 20 and over: total of 24 reporting States, 1984-88*

Cause of death and occupation	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Malignant neoplasm of lip, oral cavity and pharynx (140-149) Waiters and waitresses (435)	49	191	141	252
Malignant neoplasm of esophagus (150) Waiters and waitresses (435)	35	203	141	282
Malignant neoplasm of small intestine, including duodenum (152) Secretaries, stenographers, and typists (313-315)	30	186	126	265
Malignant neoplasm of trachea, bronchus, and lung (162) Waiters and waitresses (435)	716	143	133	154
Malignant neoplasm of breast (174, 175) Teachers, postsecondary (113-154)	104	174	143	211
Malignant neoplasm of cervix uteri (180) Cooks, except short order (436)	70	163	127	206
Malignant neoplasm of other parts of uterus (179, 181-182) Teachers, except postsecondary (155-159)	315	140	125	157
Malignant neoplasm of ovary and other uterine adnexa (183) Librarians, archivists, and curators (164, 165)	59	187	142	241
Acute lymphoid leukemia (204.0) Secretaries, stenographers, and typists (313-315)	32	198	136	280
Diabetes mellitus (250) Cooks, except short order (436)	319	154	138	172
Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.5, 571.0-571.3, 790.3, E860.0, E860.1) Waiters and waitresses (435)	93	197	159	242
Parkinson's disease (332) Teachers, except postsecondary (155-159)	213	155	135	178
Anterior horn cell disease (335) Teachers, except postsecondary (155-159)	102	165	135	201
Multiple sclerosis and other demyelinating diseases of central nervous system (340-341) Teachers, except postsecondary (155-159)	62	195	150	250
Chronic obstructive pulmonary diseases and allied conditions (490-496) Waiters and waitresses (435)	421	148	134	163
Diseases of the skin and subcutaneous tissue (680-709) Winding and twisting machine operators (738)	26	197	129	289
Motor vehicle accidents, including late effects (E810-825, E929.0) Truck drivers, heavy (804)	30	258	174	369
Suicide (E950-E959) Painters, sculptors, craft-artists, and artist printmakers (188)	26	195	127	285
Homicide and injury purposely inflicted by other persons (E960-E969) Bartenders (434)	20	302	185	467

*Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 20 deaths and the lower confidence limit of the PMR was at least 125. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after occupations are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

Table 5. Occupations with the highest PMRs for selected causes of death in black females aged 20 and over: total of 24 reporting States, 1984–88*

Cause of death and occupation	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Human immunodeficiency virus infection (042–044) Laborers, except construction (889)	21	221	137	338
Malignant neoplasm of breast (174,175) Teachers, except postsecondary (155–159)	253	187	164	211
Malignant neoplasm of ovary and other uterine adnexa (183) Teachers, except postsecondary (155–159)	51	184	137	243
Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.3, 571.0–571.3, 790.3, E860.0, E860.1) Private household occupations (403–407)	192	157	135	181
Other ischemic heart disease (411–414) Health aides, except nursing (446)	30	193	131	276
Cerebrovascular diseases (430–438) Farmers, except horticultural (473)	326	141	126	157
Homicide and injury purposely inflicted by other persons (E960–E969) Bus drivers	13	255	136	437

*Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 10 deaths and the lower confidence limit of the PMR was at least 125. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after occupations are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

Table 6. Industries with the highest PMRs for selected causes of death in white males aged 20 and over: total of 24 reporting States, 1984–88*

Cause of death and industry	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Human immunodeficiency virus infection (042–044) Beauty shops (772)	92	1,253	1,010	1,537
Malignant neoplasm of lip, oral cavity and pharynx (140–149) Eating and drinking places (641)	128	188	157	224
Non-Hodgkin's lymphomas (200, 202.0–202.2, 202.8, 202.9) Religious organizations (880)	109	187	154	226
Other metabolic disorders and immunity disorders (270–279) Eating and drinking places (641)	140	196	165	231
Diseases of the nervous system and sense organs (320–389) Legal services (841)	117	184	152	220
Coal workers' pneumoconiosis (500) Coal mining (041)	490	5,318	4,857	5,810
Symptoms, signs and ill-defined conditions (780–799) Tires and inner tubes, manufacturing (210)	123	353	293	421
Motor vehicle nontraffic accidents (E820–E825) Agricultural production, crops (010)	54	208	156	271
Air and space transport accidents (E840–E845) Air transportation (421)	107	2,577	2,112	3,114
Fall on or from ladders or scaffolding (E881) Construction (060)	104	242	197	293
Struck accidentally by falling object (E916) Logging (230)	79	1,818	1,440	2,266
Accidents caused by machinery (E919) Agricultural production, livestock (011)	109	647	532	781
Accidents caused by firearm missile (E922) Agricultural production, crops (010)	77	222	175	277
Accidents caused by electric current (E925) Construction (060)	210	176	153	202
Suicide (E950–E959) Offices of physicians (812)	118	207	172	249

*Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 50 deaths and the lower confidence limit of the PMR was at least 150. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after industries are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

Table 7. Industries with the highest PMRs for selected causes of death in black males aged 20 and over: total of 24 reporting States, 1984-88*

Cause of death and industry	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Human immunodeficiency virus infection (042-044) Colleges and universities (850)	22	256	161	388
Malignant neoplasm of colon (153) U.S. Postal Service (412)	62	189	145	243
Malignant neoplasm of prostate (185) Elementary and secondary schools (842)	189	145	125	168
Mental disorders (290-319) Horticultural services (021)	44	223	162	300
Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.3, 571.0-571.3, 790.3, E860.0, E860.1) Horticultural services (021)	48	187	138	249
Cerebrovascular diseases (430-438) Agricultural production, crops (010)	1,458	134	129	140
Coal workers' pneumoconiosis (500) Coal mining (041)	25	7,679	4,970	11,336
Diseases of the digestive system (520-579) Apparel and accessories, except knit, manufacturing (151)	23	223	141	335
Motor vehicle accidents, including late effects (E810-E825, E929.0) Logging (230)	81	205	163	255
Accidental falls, including late effects (E880-E888, E929.3) Construction (060)	159	166	141	194
Accidental drowning and submersion (E910) Agricultural production, crops (010)	34	200	139	280
Accidental mechanical suffocation (E913) Construction (060)	21	285	177	436
Struck accidentally by falling object (E916) Logging (230)	33	1,895	1,305	2,662
Accidents caused by machinery (E919) Agricultural production, crops (010)	24	482	309	717
Accidents caused by electric current (E925) Construction (060)	21	203	126	311
Suicide (E950-E959) Armed forces (942)	69	171	133	217
Homicide and injury purposely inflicted by other persons (E960-E969) Taxicab service (402)	36	211	148	292

*Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 20 deaths and the lower confidence limit of the PMR was at least 125. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after industries are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

Table 8. Industries with the highest PMRs for selected causes of death in white females aged 20 and over: total of 24 reporting States, 1984–88*

Cause of death and industry	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Malignant neoplasm of trachea, bronchus, and lung (162) Miscellaneous entertainment and recreation services (802)	154	155	132	182
Malignant neoplasm of connective and other soft tissue (171) Insurance (711)	23	200	127	300
Malignant neoplasm of breast (174, 175) Religious organizations (880)	260	156	137	176
Malignant neoplasm of cervix uteri (180) Eating and drinking places (641)	192	159	137	183
Malignant neoplasm of ovary and other uterine adnexa (183) Religious organizations (880)	90	175	141	215
Malignant neoplasm of other and unspecified female genital organs (184) Nursing and personal care facilities (832)	20	252	154	389
Malignant neoplasm of brain and other and unspecified parts of nervous system (191–192) Elementary and secondary schools (842)	347	139	125	155
Leukemia (204–208) Educational services, n.e.c. (860)	22	206	129	312
Myeloid leukemia (205) Miscellaneous retail stores (682)	22	218	136	330
Diabetes mellitus (250) Other rubber products, and plastics footwear and belting, manufacturing (211)	49	184	136	243
Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.3, 571.0–571.3, 790.3, E860.0, E860.1) Miscellaneous entertainment and recreation services (802)	20	204	125	315
Anterior horn cell disease (335) Elementary and secondary schools (842)	129	153	128	182
Rheumatic fever and rheumatic heart disease (390–398) Religious organizations (880)	35	211	147	293
Chronic obstructive pulmonary diseases and allied conditions (490–496) Funeral service and crematories (781)	29	204	137	293
Diseases of liver (570–573) Air transportation (421)	23	310	196	465
Symptoms, signs and ill-defined conditions (780–799) Tires and inner tubes, manufacturing (210)	26	355	232	521
Motor vehicle accidents, including late effects (E810–E825, E929.0) Meat products, manufacturing (100)	42	177	128	240
Suicide (E950–E959) Miscellaneous professional and related services (892)	37	233	164	321
Homicide and injury purposely inflicted by other persons (E960–E969) Grocery stores (601)	93	222	179	272

*Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 20 deaths and the lower confidence limit of the PMR was at least 125. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after industries are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

Table 9. Industries with the highest PMRs for selected causes of death in black females aged 20 and over: total of 24 reporting States, 1984–88*

Cause of death and industry	Number of deaths	PMR	95% confidence limits	
			Lower	Upper
Human immunodeficiency virus infection (042–044) Not specified manufacturing industries (392)	11	310	155	555
Sarcoidosis (135) Hospitals (831)	26	191	125	281
Malignant neoplasm of lip, oral cavity and pharynx (140–149) Laundry, cleaning, and garment services (771)	16	219	125	356
Malignant neoplasm of esophagus (150) Hotels and motels (762)	19	249	150	388
Malignant neoplasm of trachea, bronchus, and lung (162) Radio, TV, and communication equipment, manufacturing (341)	11	333	166	596
Malignant neoplasm of breast (174, 175) Elementary and secondary schools (842)	387	153	138	169
Malignant neoplasm of ovary and other uterine adnexa (183) National security and international affairs (932)	11	275	137	493
Benign neoplasms, carcinoma in situ, and neoplasms of uncertain behavior and of unspecified nature (210–239) Apparel and accessories, except knit, manufacturing (151)	10	274	132	504
Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.3, 571.0–571.3, 790.3, E860.0, E860.1) Private households (761)	194	157	135	180
Cerebrovascular diseases (430–438) Agricultural production, crops (010)	501	139	127	152
Diseases of arteries, arterioles, and capillaries (440–448) National security and international affairs (932)	14	228	125	382
Diseases of the digestive system (520–579) Canned and preserved fruits and vegetables, manufacturing (102)	12	268	138	468
Homicide and injury purposely inflicted by other persons (E960–E969) Bakery products, manufacturing (111)	10	368	177	677

* Data include only deaths to residents of the 24-State reporting area occurring in the area. Criteria for inclusion in this table were that the occupation-cause-of-death combination was based on at least 10 deaths and the lower confidence limit of the PMR was at least 125. Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*,²² and numbers after industries are category numbers of the *Classified Index of Industries and Occupations, 1982*.²¹ PMRs are age-adjusted (see Appendix A). For a list of reporting States, see Appendix A.

black females the criteria was 10 and 125. While Tables 2–9 show the occupation or industry with the highest PMR for selected causes of death, Tables B1–B16 show many other very interesting findings.

Occupations and Causes of Death

Table 2 shows occupations with the highest PMRs for selected causes of death in white males. Many of these occupational associations have been previously recognized; for example, (1) malignant neoplasm of the trachea, bronchus, and lung in insulation workers, (2) coal workers' pneumoconiosis in mining machine operators, and (3) air and space transport accidents in airplane pilots and navigators. Some associations support results from other reports; for example, malignant neoplasm of the brain and other and unspecified parts of the nervous system in electrical and electronic engineers, (which was elevated in the study from Great Britain⁴), and Parkinson's disease in all teachers but post-secondary (which was elevated in Great Britain⁴ and Washington State¹⁹). Other associations may be related to socioeconomic or lifestyle factors; for example, alcohol-associated diseases in bartenders—although demands of the job may also contribute to the elevated PMRs.

For black males, the highest PMR for each cause of death is shown in Table 3. Fewer of these associations can be classified as previously recognized: (1) coal workers' pneumoconiosis in mining machine operators and (2) struck accidentally by a falling object in forestry and logging occupations. Other associations have been reported previously in surveillance reports but not substantiated; for example, cerebrovascular diseases in farmers, except horticulture (seen in males in Great Britain,⁴ British Columbia,⁵ New York State,¹² and Washington State¹⁹) and chronic obstructive pulmonary disease and allied conditions in molding and casting machine operators (which

was elevated in Great Britain⁴). An association that may be due to lifestyle or socioeconomic factors or to chance is malignant neoplasm of the colon in sales occupations and personal goods and services.

For white females, the highest PMR for each cause is shown in Table 4. Few of the associations shown in this table have been previously recognized. Instead, two occupations experienced excess deaths for a number of causes—which may indicate a need for further study of these groups or for targeted health promotion activities. Teachers, except postsecondary (the largest occupation group for white females) have the highest PMRs for four causes of death: (1) malignant neoplasm of other parts of the uterus, (2) Parkinson's disease, (3) anterior horn cell disease, and (4) multiple sclerosis and other demyelinating diseases of the central nervous system. Two of these associations support results from other studies. An elevated risk for Parkinson's disease in female teachers was reported in Washington State.¹⁹ As seen in Table 2, white male teachers in this study also had a highly elevated PMR for Parkinson's disease. Elevated risks for multiple sclerosis were reported in Washington State¹⁹ and Great Britain.⁴ Waitresses experience the highest PMRs for five causes of death: (1) malignant neoplasm of the lip, oral cavity, and pharynx, (2) malignant neoplasm of the esophagus, (3) malignant neoplasm of the trachea, bronchus, and lung, (4) alcohol-associated diseases, and (5) chronic obstructive pulmonary diseases and allied conditions. Smoking and alcohol consumptions are major risk factors for these causes of death, and the table illustrates the effect of lifestyle in this analysis and the need for health promotion programs for this occupational group.

For black females, the highest PMR for each cause is shown in Table 5. As with the white females, these are not recognized occupational associations. Two of the associations are similar

to the results in other race-sex groups: the PMR for malignant neoplasm of the breast is elevated in teachers, except postsecondary, as it was for white female teachers, postsecondary; and the PMR for cerebrovascular diseases in farmers, except horticultural, is elevated for both black males and females. This may indicate a need for followup.

Industries and Causes of Death

Table 6 shows the highest PMRs for industry and cause-of-death combinations for white males. Because some occupations are concentrated in one industry, many of the high PMRs for industry are similar to the results in the occupation analysis; for example, (1) human immunodeficiency virus infection in workers in beauty shops, (2) non-Hodgkin's lymphomas in workers in religious organizations, (3) coal workers' pneumoconiosis in workers in coal mining, (4) air and space transport accidents in workers in air transportation, (5) struck accidentally by a falling object in logging workers, (6) accidents caused by machinery in agricultural production, livestock, (7) accidents caused by firearm missiles in workers in agricultural production, crops, (8) accidents caused by electric current in construction industry workers, and (9) suicide in workers in offices of physicians.

For black males, the industry results similar to the occupation results include (1) human immunodeficiency virus infection in workers in colleges and universities, (2) malignant neoplasm of the prostate in workers in elementary and secondary schools, (3) mental disorders in workers in horticultural services, (4) cerebrovascular diseases in agricultural production workers, (5) coal workers' pneumoconiosis in coal mining workers, and (6) struck accidentally by falling object in logging workers.

For white females, the industry results are quite different from those in the occupation analysis.

Only malignant neoplasm of the cervix uteri in workers in eating and drinking places and anterior horn cell disease in workers in elementary and secondary schools are similar to the occupation results. Two of the associations have been reported previously: malignant neoplasm of the breast in workers in religious organizations¹² and homicide in grocery store employees.¹⁹

As with the white females, few of the results for black females are similar to the occupation results. Those similar are malignant neoplasm of the breast in workers in elementary and secondary schools, alcohol-associated diseases in workers in private households, and cerebrovascular diseases in workers in agricultural production, crops.

Using the Results

The findings in this report can lend themselves to prevention of premature death which may be associated with workplace exposures and to understanding the association between exposure to risk factors or hazardous substances at work and death. A number of considerations for interpreting and applying the results of this analysis follow.

The PMRs presented in this report can be used in several ways. They may be evaluated by researchers and used as leads for further study. They may be used as additional information in the evaluation of previously hypothesized associations. They may identify new occupations and industries not previously recognized as experiencing an excess risk for a known occupational disease. They may be used to target health promotion and intervention activities to the appropriate workers for non-occupational disease.

A statistically significant elevation of a PMR cannot be interpreted directly as indicating a causal relationship between the industry or occupation and the cause of death. Since a very large number of PMRs were tested for statistical significance, many of the elevated PMRs will

occur due to chance. Other elevated PMRs will be due to confounding factors. Cigarette smoking, which is more prevalent among blue collar workers compared with white collar workers in the United States,²⁴ is potentially a strong confounder for a number of causes of death, including malignant neoplasms of the lung, larynx, and bladder, and ischemic heart disease. Alcohol consumption is a potential confounder for liver disease and malignant neoplasms of the mouth, pharynx, esophagus, and larynx. Socioeconomic factors such as availability of health care and diet are also potential confounders for a number of diseases.

Individual PMRs must be evaluated to determine which associations are likely to reflect cause-and-effect relationships.²⁵ Several questions should be asked about the association:

1. Is a relationship of the potential exposure in the workplace with the disease biologically plausible? Is the relationship in accord with the known facts of the natural history and biology of the disease?
2. Is the result consistent with other surveillance or epidemiologic studies or with other race-sex groups?
3. Can the results be explained by confounding or bias?
4. Is the disease associated with workers in other occupations with similar exposures?
5. Is the result consistent with results for other diseases thought to have the same risk factor(s)?

Associations that appear, after evaluation, to be work-related may be followed up with more rigorous epidemiologic studies. More definitive studies may also be warranted to followup apparent associations of occupational groups with nonoccupational diseases for which health

promotion or intervention activities are appropriate.

Analyses of Females

The analyses of the black and white females excluded housewives to prevent biases in the PMRs caused by using this large category—which includes more than half of the females. Women whose usual occupation is described as *Housewife* on the death certificate may have had some experience in the workforce with unknown exposures. Since occupation is used in the PMR analysis as a surrogate for occupational exposure, this increase in the amount of misclassification of exposure could bias the PMRs toward the null. Furthermore, prior diseases may cause some women to remain out of the workforce. The resulting elevated proportion for such a disease for *Housewives* could mask an association of the disease with other occupations.

Limitations

Death certificates collect information about the *usual occupation* and *usual industry* of the decedent. This information is provided by an informant (usually the next-of-kin) to the funeral director at the time of death. The data have two types of limitations: (1) since the information is provided by a proxy who may not be aware of the exact type of work and the length of each job, the information given may not reflect the usual occupation and industry or may be non-specific, and (2) the single items of usual occupation and usual industry may not be representative of the total work history. As a result, in cases where the death is definitely related to an occupational exposure, the usual occupation and industry recorded on the death certificate may not represent the job in which an exposure responsible for the disease occurred.

Several studies have compared the death certificate information about occupation and industry with employment information from interviews

conducted before death or interviews with next-of-kin.^{26,27,28,29,30} Except for one,²⁷ the studies are small, with fewer than 400 comparisons. They are all limited geographically, and some are limited to specified causes of death. For white males, agreement for occupation ranged from 53% to 69%; and for industry, it ranged from 62% to 84%. Percent agreement for white females was a little higher than for white males. In one study of black males and females,²⁷ the percent agreement for black females was similar to that for white females. The percent agreement for black males for occupation was 35%, and for industry it was 69%.

Another limitation is the quality of cause-of-death information reported on the death certificate. The medical certification of cause of death is made only by a qualified person, usually a physician, a medical examiner, or a coroner. The reliability and accuracy of cause-of-death statistics are, to a large extent, governed by the ability of the certifier to make the proper diagnosis and by the care with which he or she records this information on the death certificate. A number of studies³¹ have focused on the quality of this information by comparing the specified underlying cause of death to various sources, including autopsy reports and hospital records. The studies of the quality of the cause-of-death information have limitations similar to those found in the studies of employment information quality. Most of the studies are small, the alternative source of information may not be accurate, and there is no standard definition of *agreement*. In general, the accuracy of the certification differs among disease outcomes. A small study comparing the death certificate information with autopsy data³² found an 87% agreement for neoplasms, 82% for circulatory diseases, 50% for digestive diseases, and 33% for respiratory diseases. A second autopsy study³³ found an overall concordance of 85%. This ranged from about 95% concordance for neoplasms and vascular diseases to 88% for digestive and 76% for respiratory diseases.

For accidental deaths, the information about injury at work was not routinely coded for NCHS before data year 1993. The NIOSH Division of Safety Research has constructed a database that contains information from death certificates with an indication that the injury occurred at work.⁶ The NTOF database contains records from all U.S. States from 1980 through 1993 for decedents aged 16 or older with an *external* cause of death and a *Yes* response to the *Injury at work* item on the death certificate. These data more accurately identify occupations and industries with a high risk of death due to work-related injuries than do the data in this report.

Death certificates have little information about potential confounding factors, including tobacco and alcohol use and socioeconomic status. Tobacco and alcohol use are known to be more highly associated with some occupations than with others.^{24,34} Socioeconomic status is usually determined by income and years of education, which are also associated with occupation. Without this information, it is not possible to control in the analysis for these possible confounders, resulting in spuriously elevated or decreased PMRs. However, studies comparing crude risk estimators with smoking-adjusted estimators suggest that the absence of information about smoking will seldom lead to serious errors in risk estimation.^{35,36} The lack of information about confounders is starting to be partially addressed. The *Standard Certificate of Death*, as revised in 1989, now collects information about the education of the decedent. The coded information was added to the 1989 mortality files for 21 States. Four States have added items collecting information about the contribution of tobacco use to the death.

Several authors have discussed the advantages and limitations of the PMR method.^{37,38,39,40} Briefly, the advantages are as follows: (1) the population at risk is not needed to calculate the PMRs and, therefore, additional misclassification is not introduced by using a different source

of occupation information in the denominator, and (2) the computer programming is relatively simple and inexpensive. The main limitation is that without a population at risk, it is not possible to estimate death rates. The PMR indicates only whether the age-standardized proportion of deaths from a specific cause appears to be higher or lower than the expected proportion for a particular occupation or industry. The PMR will be a poor estimate of the risk of death if the population-based SMR for all causes for an occupation or industry group is greatly above or below 100. For example, the SMR is often affected by socioeconomic factors, with high socioeconomic groups having lower all-cause SMRs than low socioeconomic groups.⁴¹ Therefore, a high socioeconomic occupation could have elevated PMRs for causes of death for which the death rates themselves were not elevated. The PMR may also be misleading if the death rate for a major cause of death is much higher or lower than expected in the occupation or industry. For example, if persons are selected into an occupation according to health status or level of fitness, the mortality risk for cardiovascular disease is likely to be low. This may cause a spurious increase in the PMRs for other causes of death.

CONCLUSIONS

The results shown in Tables 2-9 demonstrate that analyses of death certificate data are useful for the surveillance of occupational mortality. Time trend analyses would be possible for the known associations of occupation with cause of death that were identified in this report. For example, malignant neoplasm of the trachea, bronchus, and lung in insulation workers; alcohol-associated disease in bartenders; chronic obstructive pulmonary diseases and coal workers' pneumoconiosis in mining machine operators; and accidents caused by electricity in electricians could be monitored with periodic analyses of the data.

The results could be used to generate leads for further research. Several associations with high PMRs in this report have elevated results in other occupational mortality surveillance studies. For example, elevated estimates of risk for Parkinson's disease in both male and female teachers have been seen in Great Britain⁴ and Washington State.¹⁹ Elevated estimates of risk for cerebrovascular disease among farmers were reported in Great Britain,⁴ Washington State,¹⁹ British Columbia,⁵ and New York State.¹² The need for followup may be indicated.

Past occupational mortality studies have been shown to be useful for targeting studies of work-related conditions and to add to the body of evidence generated from epidemiologic studies. In the United States, Dr. Samuel Milham, Jr. has long been a proponent of using mortality data for the surveillance of occupation-related deaths. His publications of data from Washington State have stimulated several followup epidemiologic studies.⁴² A recent example is leukemia in electrical workers. The possibility of elevated leukemia rates in workers exposed to electric and magnetic fields was first suggested by an analysis of death certificate data from Washington State.⁴³ This was followed by supporting evidence from the British mortality data⁴⁴ and other surveillance studies. Several epidemiologic studies are now ongoing to investigate this hypothesis. Results from Milham's surveillance reports have been cited in many other reports of epidemiologic studies.

A meta-analysis of cancer and occupation based primarily on death certificate data from the United States and Great Britain⁴⁵ suggested priorities for further occupational cancer research. The report consistently found excess lung cancer in motor exhaust-related occupations. Two subsequent case-control studies, with adjustment for tobacco use,^{46,47} have supported these findings.

The Registrar General of Great Britain has published decennial reports on occupational

mortality since 1851.⁴ The British occupational mortality data have been used as background material supporting a number of studies, such as mortality studies of coal miners and gas workers and a study of nasal cancer in the boot and shoe industry.⁴⁸ The data have been used often to check hypothesized associations between a cause of death and an occupation.

NIOSH publishes the Work-Related Lung Disease Surveillance Report which includes mortality data on lung diseases which are caused predominately by work exposures. The 1994 report⁴⁹ included PMRs for asbestosis, malignant neoplasm of the pleura, pneumoconioses, and hypersensitivity pneumonitis by occupation and industry. The surveillance information is used for establishing priorities, for investigation and intervention, and for tracking progress toward elimination of preventable disease.

In addition to using the occupational mortality studies for research purposes, a few State health departments have used the analyses of their occupational data in policy setting. The State analyses have been used also as a source of information for unions, workers, and employers on possible elevated health risks for the workers.

This analysis, based on data from 24 States, is able to examine the mortality profile for smaller occupations and industries and to include rarer causes of death than the individual State analyses. The PMRs are based on larger numbers of observed deaths, resulting in more stable estimates. It is our hope that researchers will find these data of value in stimulating ideas for epidemiologic studies and in supporting the results of ongoing projects. The report should be a valuable resource for monitoring mortality by occupation and industry and for checking new hypotheses about conditions related to occupational exposures. It should be a useful resource for State health departments in

addressing their need for information about occupational mortality.

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APPENDIX A

TECHNICAL NOTES

NATURE AND SOURCES OF DATA

Data shown in this report are based on information for deaths occurring in 24 reporting States for at least one of the years during the period 1984–88 (Table A–1).

These mortality data are based on information from the original death certificates received in the State registration offices. Except for the occupation and industry information, the demographic information was based on State-coded data provided on computer tape to NCHS through the Vital Statistics Cooperative Program (VSCP) (except information for Georgia for 1984 that was coded by NCHS). Occupation and industry were coded by the States and were provided on computer tape to NCHS through purchase orders. The medical information was State-coded and provided on computer tape to NCHS through the VSCP by Alaska (1988), Colorado, Idaho, Kansas, Maine, Nebraska, New Hampshire, North Carolina, South Carolina, Vermont, and Wisconsin. Based on copies of the original death certificates, NCHS coded the medical information for Alaska (1987), Georgia, Indiana, Kentucky, Missouri, Nevada, New Jersey, New Mexico, Ohio, Oklahoma, Rhode Island, Tennessee, and Utah.

Mortality data in this report refer to all deaths of residents in the 24-State reporting area that occurred in that area.

OCCUPATION AND INDUSTRY ITEMS ON DEATH CERTIFICATE

The information in this report is based on occupation and industry entries on the Standard

Certificate of Death that were responses to the questions in items 14a (*Usual Occupation [Give kind of work done during most of the working life, even if retired]*) and 14b (*Kind of business or industry*) (Figure A–1).

The Standard Certificate of Death is issued by the Public Health Service as a means of attaining uniformity in the content of vital statistics information collected by the States. While the certificates in each State may differ somewhat from the Standard to the extent required by the needs of the State or by special provisions of the State vital statistics law, the certificates of most States conform closely in content and arrangement to the Standard.

CLASSIFICATION OF OCCUPATION AND INDUSTRY

Occupation and industry information from the death certificate is classified according to the Bureau of the Census' *Alphabetical Index of Industries and Occupations*.^{21*} The information is coded using a special adaptation of the occupation and industry coding instructions used by the Bureau of the Census for information reported on censuses and surveys. The instructions, used by NCHS and the reporting States, are in the *NCHS Instruction Manual, Part 19, Industry and Occupation Coding for Death Certificates*.⁵⁰

For this report, the 503 Bureau of the Census occupations and 6 other occupation categories

*References cited in the appendices are listed on pp. 18–21.

Table A-1. States included in the analysis by year

State	1984	1985	1986	1987	1988
Alaska				X	X
Colorado	X	X	X	X	X
Georgia	X	X	X	X	X
Idaho					X
Indiana			X	X	X
Kansas	X	X	X	X	X
Kentucky	X	X	X	X	X
Maine	X	X	X	X	X
Missouri	X	X	X		
Nebraska	X	X			
Nevada	X	X	X	X	X
New Hampshire	X	X	X	X	X
New Jersey					X
New Mexico			X	X	X
North Carolina				X	X
Ohio		X	X	X	X
Oklahoma		X	X	X	X
Rhode Island	X	X	X	X	X
South Carolina	X	X	X	X	X
Tennessee		X	X	X	X
Utah		X	X	X	X
Vermont			X	X	X
West Virginia					X
Wisconsin	X	X	X	X	X

(*Armed Forces; Retired; Housewives, homemakers; Students; Volunteers; and Unemployed, never worked, disabled*) were grouped into 325 occupation categories for analysis (List A-1). The analyses also included all 231 Bureau of the Census industry categories plus 3 other industry categories (*Armed Forces, Retired, and Homemaker, Student, Unemployed, Volunteer*) for a total of 235 industries (List A-2).

CAUSE-OF-DEATH CLASSIFICATION

The mortality statistics in this report were compiled in accordance with the World Health

Organization (WHO) regulations, which specify that member nations classify causes of death by the current *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death*.²² Causes of death for 1984-88 were classified according to the *Ninth Revision of the International Classification of Diseases*.²²

In addition to specifying the classification, the WHO regulations outline the form of the medical certification and the procedures to be used in coding cause of death. Cause-of-death data presented in this publication were coded by procedures outlined in the annual issues of Part 2a of the *NCHS Instruction Manual*.⁵¹

CAUSE-OF-DEATH LIST

For analysis of occupation and industry mortality data, a special list of 192 causes of death (List A-3) was developed jointly by NIOSH and NCHS. Of the 192 causes, 185 were analyzed for males and 188 for females. This list was created keeping in mind those causes of death that might possibly be associated with occupational exposures, particularly malignant neoplasms of selected sites and numerous accidental death categories.

QUALITY CONTROL

Quality control for the occupation and industry (O/I) coding was conducted by NCHS. For each year, States that maintained an error rate of less than 10% for the year and had less than 10% of their records coded to *Retired* or *Unknown* were included in the analysis. All 24 States met the criteria for at least 1 year. See Table 1 in the

main text for the number and percentage distribution of the records coded to *Retired* or *Unknown*.

PMRs AND SIGNIFICANCE TESTING

The computer program for computing PMRs and statistical tests was developed by NIOSH. The PMR does not make use of a population at risk and, therefore, is not equivalent to a death rate. The PMR for an occupation (industry) indicates whether the proportion of deaths attributed to a particular cause of death is higher (greater than 100) or lower (less than 100) than the corresponding proportion for all occupations (industries) combined. In this report, PMRs are age-adjusted for white males, black males, white females, and black females.

PMRs for the four race-sex groups were computed using Table A-2 for a specific age group.

Table A-2. Computation table *

Occupation (Industry)	Cause of death		
	Cause X	Other causes	All causes
Occupation Y	A_i	B_i	N_{1i}
Other occupations	C_i	D_i	N_{2i}
All occupations	M_{1i}	M_{2i}	T_i

* Abbreviations:

i = i^{th} age group (5-year age groups 20-24, 25-29, etc.) for white males, black males, white females, or black females
 A_i = observed number of deaths for a specific occupation (industry) and cause-of-death combination for the i^{th} age group

$E(A_i)$ = expected number of deaths for a specific occupation (industry) and cause-of-death combination for the i^{th} age group

$$E(A_i) = \frac{M_{1i} N_{1i}}{T_i}$$

$$PMR = \frac{\sum A_i}{\sum E(A_i)} \cdot 100$$

**U.S. STANDARD
CERTIFICATE OF DEATH**

TYPE/PRINT
IN
PERMANENT
BLACK INK
FOR
INSTRUCTIONS
SEE OTHER SIDE
AND HANDBOOK

LOCAL FILE NUMBER

STATE FILE NUMBER

NAME OF DECEDENT:
For use by physician or institution

SEE INSTRUCTIONS
ON OTHER SIDE

SEE DEFINITION
ON OTHER SIDE

ITEMS 24-26 MUST
BE COMPLETED BY
PERSON WHO
PRONOUNCES DEATH

SEE INSTRUCTIONS
ON OTHER SIDE

SEE DEFINITION
ON OTHER SIDE

1. DECEDENT'S NAME (First, Middle, Last)		2. SEX	3. DATE OF DEATH (Month, Day, Year)
4. SOCIAL SECURITY NUMBER	5a. AGE—Last Birthday (Years)	5b. UNDER 1 YEAR Months Days	5c. UNDER 1 DAY Hours Minutes
6. DATE OF BIRTH (Month, Day, Year)		7. BIRTHPLACE (City and State or Foreign Country)	
8. WAS DECEDENT EVER IN U.S. ARMED FORCES? (Yes or no)		9a. PLACE OF DEATH (Check only one; see instructions on other side) HOSPITAL: <input type="checkbox"/> Inpatient <input type="checkbox"/> ER/Outpatient <input type="checkbox"/> DOA OTHER: <input type="checkbox"/> Nursing Home <input type="checkbox"/> Residence <input type="checkbox"/> Other (Specify)	
9b. FACILITY NAME (If not institution, give street and number)		9c. CITY, TOWN, OR LOCATION OF DEATH	9d. COUNTY OF DEATH
10. MARITAL STATUS—Married, Never Married, Widowed, Divorced (Specify)		11. SURVIVING SPOUSE (If wife, give maiden name)	12a. DECEDENT'S USUAL OCCUPATION (Give kind of work done during most of working life. Do not use retired.)
12b. KIND OF BUSINESS/INDUSTRY			
13a. RESIDENCE—STATE	13b. COUNTY	13c. CITY, TOWN, OR LOCATION	13d. STREET AND NUMBER
13e. INSIDE CITY LIMITS? (Yes or no)	13f. ZIP CODE	14. WAS DECEDENT OF HISPANIC ORIGIN? (Specify No or Yes—If yes, specify Cuban, Mexican, Puerto Rican, etc.) <input type="checkbox"/> No <input type="checkbox"/> Yes Specify:	15. RACE—American Indian, Black, White, etc. (Specify)
16. DECEDENT'S EDUCATION (Specify only highest grade completed) Elementary/Secondary (0-12) College (1-4 or 5+)			
17. FATHER'S NAME (First, Middle, Last)		18. MOTHER'S NAME (First, Middle, Maiden Surname)	
19a. INFORMANT'S NAME (Type/Print)		19b. MAILING ADDRESS (Street and Number or Rural Route Number, City or Town, State, Zip Code)	
20a. METHOD OF DISPOSITION <input type="checkbox"/> Burial <input type="checkbox"/> Cremation <input type="checkbox"/> Removal from State <input type="checkbox"/> Donation <input type="checkbox"/> Other (Specify)		20b. PLACE OF DISPOSITION (Name of cemetery, crematory, or other place)	20c. LOCATION—City or Town, State
21a. SIGNATURE OF FUNERAL SERVICE LICENSEE OR PERSON ACTING AS SUCH		21b. LICENSE NUMBER (of Licensee)	22. NAME AND ADDRESS OF FACILITY
23a. To the best of my knowledge, death occurred at the time, date, and place stated. Signature and Title		23b. LICENSE NUMBER	23c. DATE SIGNED (Month, Day, Year)
24. TIME OF DEATH M		25. DATE PRONOUNCED DEAD (Month, Day, Year)	26. WAS CASE REFERRED TO MEDICAL EXAMINER/CORONER? (Yes or no)
27. PART I. Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line. IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. _____ DUE TO (OR AS A CONSEQUENCE OF): b. _____ DUE TO (OR AS A CONSEQUENCE OF): c. _____ DUE TO (OR AS A CONSEQUENCE OF): d. _____ Sequentially list conditions, if any, leading to immediate cause. Enter UNDERLYING CAUSE (Disease or injury that initiated events resulting in death) LAST			Approximate Interval Between Onset and Death
PART II. Other significant conditions contributing to death but not resulting in the underlying cause given in Part I.			28a. WAS AN AUTOPSY PERFORMED? (Yes or no)
			28b. WERE AUTOPSY FINDINGS AVAILABLE PRIOR TO COMPLETION OF CAUSE OF DEATH? (Yes or no)
29. MANNER OF DEATH <input type="checkbox"/> Natural <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Accident <input type="checkbox"/> Could not be Determined <input type="checkbox"/> Suicide <input type="checkbox"/> Homicide	30a. DATE OF INJURY (Month, Day, Year)	30b. TIME OF INJURY M	30c. INJURY AT WORK? (Yes or no)
30d. DESCRIBE HOW INJURY OCCURRED		30f. LOCATION (Street and Number or Rural Route Number, City or Town, State)	
30e. PLACE OF INJURY—At home, farm, street, factory, office building, etc. (Specify)			
31a. CERTIFIER (Check only one) <input type="checkbox"/> CERTIFYING PHYSICIAN (Physician certifying cause of death when another physician has pronounced death and completed Item 23) To the best of my knowledge, death occurred due to the cause(s) and manner as stated. <input type="checkbox"/> PRONOUNCING AND CERTIFYING PHYSICIAN (Physician both pronouncing death and certifying to cause of death) To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner as stated. <input type="checkbox"/> MEDICAL EXAMINER/CORONER On the basis of examination and/or investigation, in my opinion, death occurred at the time, date, and due to the cause(s) and manner as stated.			
31b. SIGNATURE AND TITLE OF CERTIFIER		31c. LICENSE NUMBER	31d. DATE SIGNED (Month, Day, Year)
32. NAME AND ADDRESS OF PERSON WHO COMPLETED CAUSE OF DEATH (ITEM 27) (Type/Print)			
33. REGISTRAR'S SIGNATURE			34. DATE FILED (Month, Day, Year)

DEPARTMENT OF HEALTH AND HUMAN SERVICES — PUBLIC HEALTH SERVICE — NATIONAL CENTER FOR HEALTH STATISTICS — 1989 REVISION

Figure A-1. U.S. Standard Certificate of Death.

INSTRUCTIONS FOR SELECTED ITEMS

Item 9 — Place of Death

If the death was pronounced in a hospital, check the box indicating the decedent's status at the institution (inpatient, emergency room/outpatient, or dead on arrival (DOA)). If death was pronounced elsewhere, check the box indicating whether pronouncement occurred at a nursing home, residence, or other location. If other is checked, specify where death was legally pronounced, such as a physician's office, the place where the accident occurred, or at work.

Items 13a-f. — Residence of Decedent

Residence of the decedent is the place where he or she actually resided. This is not necessarily the same as "home State," or "legal residence." Never enter a temporary residence such as one used during a visit, business trip, or a vacation. Place of residence during a tour of military duty or during attendance at college is not considered as temporary and should be considered as the place of residence.

If a decedent had been living in a facility where an individual usually resides for a long period of time, such as a group home, mental institution, nursing home, penitentiary, or hospital for the chronically ill, report the location of that facility in items 13a through 13f.

If the decedent was an infant who never resided at home, the place of residence is that of the parent(s) or legal guardian. Do not use an acute care hospital's location as the place of residence for any infant.

Items 23 and 31 — Medical Certification

The PRONOUNCING PHYSICIAN is the person who determines that the decedent is legally dead but who was not in charge of the patient's care for the illness or condition which resulted in death. Items 23a through 23c are to be completed only when the physician responsible for completing the medical certification of cause of death (Item 27) is not available at time of death to certify cause of death. The pronouncing physician is responsible for completing only items 23 through 26.

The CERTIFYING PHYSICIAN is the person who determines the cause of death (Item 27). This box should be checked only in those cases when the person who is completing the medical certification of cause of death is not the person who pronounced death (Item 23). The certifying physician is responsible for completing items 27 through 32.

The PRONOUNCING AND CERTIFYING PHYSICIAN box should be checked when the same person is responsible for completing items 24 through 32, that is, when the same physician has both pronounced death and certified the cause of death. If this box is checked, items 23a through 23c should be left blank.

The MEDICAL EXAMINER/CORONER box should be checked when investigation is required by the Post Mortem Examination Act and the cause of death is completed by a medical examiner or coroner. The Medical Examiner/Coroner is responsible for completing items 24 through 32.

Item 27. — Cause of Death

The cause of death means the disease, abnormality, injury, or poisoning that caused the death, not the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure.

In Part I, the immediate cause of death is reported on line (a). Antecedent conditions, if any, which gave rise to the cause are reported on lines (b), (c), and (d). The underlying cause, should be reported on the last line used in Part I. No entry is necessary on lines (b), (c), and (d) if the immediate cause of death on line (a) describes completely the train of events. **ONLY ONE CAUSE SHOULD BE ENTERED ON A LINE.** Additional lines may be added if necessary. Provide the best estimate of the interval between the onset of each condition and death. Do not leave the interval blank; if unknown, so specify.

In Part II, enter other important diseases or conditions that may have contributed to death but did not result in the underlying cause of death given in Part I.

See examples below.

SEE INSTRUCTIONS ON OTHER SIDE	27. PART I. Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line. IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. <u>Rupture of myocardium</u> DUE TO IOR AS A CONSEQUENCE OF: b. <u>Acute myocardial infarction</u> DUE TO IOR AS A CONSEQUENCE OF: c. <u>Chronic ischemic heart disease</u> DUE TO IOR AS A CONSEQUENCE OF: d. _____	Approximate Interval Between Onset and Death	
		Mins.	6 days
CAUSE OF DEATH	PART II. Other significant conditions contributing to death but not resulting in the underlying cause given in Part I. <u>Diabetes, Chronic obstructive pulmonary disease, smoking</u>	28a. WAS AN AUTOPSY PERFORMED? (Yes or no) Yes	28b. WERE AUTOPSY FINDINGS AVAILABLE PRIOR TO COMPLETION OF CAUSE OF DEATH? (Yes or no) Yes
	29. MANNER OF DEATH <input checked="" type="checkbox"/> Natural <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Accident <input type="checkbox"/> Could not be Determined <input type="checkbox"/> Suicide <input type="checkbox"/> Homicide	30a. DATE OF INJURY (Month, Day, Year) _____	30b. TIME OF INJURY _____ M
	30d. DESCRIBE HOW INJURY OCCURRED _____	30e. PLACE OF INJURY—At home, farm, street, factory, office building, etc. (Specify) _____	
	30f. LOCATION (Street and Number or Rural Route Number, City or Town, State) _____		

SEE INSTRUCTIONS ON OTHER SIDE	27. PART I. Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line. IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. <u>Cerebral laceration</u> DUE TO IOR AS A CONSEQUENCE OF: b. <u>Open skull fracture</u> DUE TO IOR AS A CONSEQUENCE OF: c. <u>Automobile accident</u> DUE TO IOR AS A CONSEQUENCE OF: d. _____	Approximate Interval Between Onset and Death	
		10 mins.	10 mins.
CAUSE OF DEATH	PART II. Other significant conditions contributing to death but not resulting in the underlying cause given in Part I. _____	28a. WAS AN AUTOPSY PERFORMED? (Yes or no) No	28b. WERE AUTOPSY FINDINGS AVAILABLE PRIOR TO COMPLETION OF CAUSE OF DEATH? (Yes or no) No
	29. MANNER OF DEATH <input type="checkbox"/> Natural <input type="checkbox"/> Pending Investigation <input checked="" type="checkbox"/> Accident <input type="checkbox"/> Could not be Determined <input type="checkbox"/> Suicide <input type="checkbox"/> Homicide	30a. DATE OF INJURY (Month, Day, Year) <u>11/15/85</u>	30b. TIME OF INJURY <u>1 p.</u> M
	30d. DESCRIBE HOW INJURY OCCURRED <u>2-car collision—driver</u>	30e. PLACE OF INJURY—At home, farm, street, factory, office building, etc. (Specify) <u>Street</u>	
	30f. LOCATION (Street and Number or Rural Route Number, City or Town, State) <u>Route 4, Raleigh, North Carolina</u>		

Figure A-1 (Continued). U.S. Standard Certificate of Death.

When the total observed number of deaths, ΣA_i , are greater than 1,000, the following methods are used. The observed number of deaths, A_i , are assumed to be binomially distributed with parameters N_{1i} and M_{1i}/T_i . Under the null hypothesis ($H_0: PMR=100$), the mean of the ΣA_i is $\Sigma E(A_i)$ and the variance is

$$Var(\Sigma A_i) = \sum \frac{M_{1i} M_{2i} N_{1i} N_{2i}}{T_i^2 (T_i - 1)}$$

The distribution of the ΣA_i is unknown but can be assumed to be approximately normally distributed. Thus, hypotheses can be tested using the following statistic:

$$Z = \frac{\Sigma A_i - \Sigma E(A_i)}{\sqrt{\sum \frac{M_{1i} M_{2i} N_{1i} N_{2i}}{T_i^2 (T_i - 1)}}$$

which is assumed to have a standard normal distribution. This formula is equivalent to statistically testing the hypothesis ($H_0: PMR=100$), by using the following Mantel-Haenszel (M-H) chi-square test with one-degree of freedom:⁵²

$$\text{M-H chi-square} = \frac{(\Sigma A_i - \Sigma E(A_i))^2}{\sum \frac{M_{1i} M_{2i} N_{1i} N_{2i}}{T_i^2 (T_i - 1)}}$$

It should be noted for this study that this formula excludes the correction for continuity. A PMR is significantly different from 100 at the 0.05 level if the computed M-H chi-square is greater than or equal to 3.84.

When the total observed number of deaths, ΣA_i , is greater than 1,000, the upper and lower 95% confidence limits are computed in the following way:

$$PMR \pm 1.96 \times \frac{\sqrt{\sum \frac{M_{1i} M_{2i} N_{1i} N_{2i}}{T_i^2 (T_i - 1)}}}{\sum \frac{M_{1i} N_{1i}}{T_i}}$$

When the total observed number of deaths, ΣA_i , is equal to or less than 1,000, the following methods are used. Since the A_i 's are distributed approximately as Poisson random variables, the ΣA_i 's are also distributed approximately as a Poisson random variable. Under the null hypothesis ($H_0: PMR=100$), the mean and variance of the ΣA_i is $\Sigma E(A_i)$. Therefore, *exact* two-sided tests based on the Poisson distribution are used to determine if the ΣA_i is significantly different from the $E(\Sigma A_i)$ (or equivalently, if the PMR is significantly different from 100).⁵³

When the total observed number of deaths, ΣA_i , is equal to or less than 1,000, the 95% confidence limits of a PMR are determined in the following way. Denote the mean of ΣA_i to be λ . Then the confidence limits for the PMR ($\lambda / \Sigma E(A_i)$) are determined by obtaining *exact* confidence limits for λ and dividing the resulting end points by $\Sigma E(A_i)$. Let the lower limit on λ be denoted by L and the upper limit by U. The 95% CI represents all possible values of λ which satisfy the following two inequalities:⁵⁴

$$\sum_{i = \Sigma A}^{\infty} \frac{e^{-\lambda} \lambda^i}{i!} \geq 0.025 \quad \text{and} \quad \sum_{i = 0}^{\Sigma A} \frac{e^{-\lambda} \lambda^i}{i!} \geq 0.025$$

Thus L and U were obtained from the following equations:

$$\sum_{i = \Sigma A}^{\infty} \frac{e^{-L} L^i}{i!} = 0.025 \quad \text{and} \quad \sum_{i = 0}^{\Sigma A} \frac{e^{-U} U^i}{i!} = 0.025$$

When these two end points are divided by $\Sigma E(A_i)$ and multiplied by 100, this determines a 95% CI that will cover 100 if and only if the hypothesis test with $\alpha = 0.05$ is not significant.

It should be noted that the criterion for PMRs to be shown in this report is that the PMR for a cause of death and an occupation (industry) had to be 120 or more and statistically significantly *higher* than 100 and had to have 10 or more observed deaths for the group aged 20 and over for a particular race-sex group. All other PMRs are available upon request.

Caution should be exercised in interpreting statistically significant PMRs. Since approximately 430,000 PMRs were statistically tested, about 5% (about 21,500) would be expected to be

statistically significant at least at the .05 level, just due to chance (if the tests were independent).⁵⁵

PUBLIC-USE DATA TAPES

Beginning with data for 1985, mortality public-use data tapes include information about the occupation and industry of the decedent, along with other coded demographic and medical information. The detailed contents of the mortality data tapes and other public-use data tapes from NCHS are described in the NCHS publication *Catalog of Electronic Data Products*.⁵⁶ The 1985–93 mortality public-use data tapes may be purchased from the following:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161, (703) 487–4650

List A-1: 325 Selected Occupations*

Managers and administrators (003-017, 019)	Teachers, postsecondary (113-154)
Funeral directors (018)	Teachers, except postsecondary (155-159)
Management related occupations (023-037)	Counselors, educational and vocational (163)
Architects (043)	Librarians, archivists, and curators (164, 165)
Aerospace engineers (044)	Social scientists and urban planners (166-173)
Metallurgical and materials engineers (045)	Social workers (174)
Mining engineers (046)	Recreation workers (175)
Petroleum engineers (047)	Clergy (176)
Chemical engineers (048)	Religious workers, n.e.c. (177)
Nuclear engineers (049)	Lawyers and judges (178, 179)
Civil engineers (053)	Writers (183, 184, 195)
Agricultural engineers (054)	Designers (185)
Electrical and electronic engineers (055)	Entertainers (186, 187, 193, 194, 198)
Industrial engineers (056)	Painters, sculptors, craft-artists, and artist printmakers (188)
Mechanical engineers (057)	Photographers (189)
Marine engineers and naval architects (058)	Public relations specialists (197)
Engineers, n.e.c.† (059)	Athletes (199)
Surveyors and mapping scientists (063)	Health technologists and technicians (203-208)
Mathematical and computer scientists (064-068)	Engineering and related technologists and technicians (213-218)
Physicists and astronomers (069)	Science technicians (223-225)
Chemists, except biochemists (073)	Airplane pilots and navigators (226)
Atmospheric and space scientists (074)	Air traffic controllers (227)
Geologists and geodesists (075)	Broadcast equipment operators (228)
Physical scientists, n.e.c. (076)	Computer programmers (229)
Agricultural and food scientists (077)	Tool programmers, numerical control (233)
Biological, life, and medical scientists (078, 083)	Legal assistants (234)
Forestry and conservation scientists (079)	Technicians, n.e.c. (235)
Physicians (084)	Supervisors and proprietors, sales occupations (243)
Dentists (085)	Sales occupations, business goods and services (253-257)
Veterinarians (086)	Sales representatives, mining, manufacturing and wholesale (258, 259)
Optometrists (087)	Sales occupations, personal goods and services (263-278)
Podiatrists (088)	Sales related occupations (283-285)
Health diagnosing practitioners, n.e.c. (089)	Computer equipment operators (304, 308, 309)
Registered and licensed practical nurses (095, 207)	
Pharmacists (096)	
Dietitians (097)	
Therapists (098-105)	
Physicians' assistants (106)	

List A-1 (Continued): 325 Selected Occupations*

Secretaries, stenographers, and typists (313-315)	Elevator operators (454)
Information clerks (316-323)	Pest control occupations (455)
Records processing occupations, except financial (325-336)	Supervisors, personal service occupations (456)
Financial records processing occupations (305, 337-344)	Barbers (457)
Duplicating, mail and other office machine operators (345-347)	Hairdressers and cosmetologists (458)
Communications equipment operators (306, 348-353)	Attendants, amusement and recreation facilities (459)
Mail and message distributing occupations (354-357)	Guides (463)
Material recording, scheduling, and distributing clerks, n.e.c. (359-374)	Ushers (464)
Adjusters and investigators (375-378)	Public transportation attendants (465)
Miscellaneous administrative support occupations (379-389)	Baggage porters and bellhops (466)
Private household occupations (403-407)	Welfare service aides (467)
Firefighting and fire prevention occupations (413, 416, 417)	Child care workers, except private household (468)
Police and detectives, public service (414, 418)	Personal service occupations, n.e.c. (469)
Sheriffs, bailiffs, and other law enforcement officers (423)	Farmers, except horticultural (473)
Correctional institution officers (424)	Horticultural specialty farmers (474)
Guards (415, 425-427)	Managers, farms, except horticultural (475)
Supervisors, food preparation and service occupations (433)	Managers, horticultural specialty farms (476)
Bartenders (434)	Supervisors, farm workers (477)
Waiters and waitresses (435)	Farm workers (479)
Cooks, except short order (436)	Marine life cultivation workers (483)
Short-order cooks (437)	Nursery workers (484)
Food counter, fountain and related occupations (438)	Supervisors, related agricultural occupations (485)
Kitchen workers, food preparation (439)	Groundskeepers and gardeners, except farm (486)
Waiters'/waitresses' assistants (443)	Animal caretakers, except farm (487)
Miscellaneous food preparation occupations (444)	Graders and sorters, agricultural products (488)
Dental assistants (445)	Inspectors, agricultural products (489)
Health aides, except nursing (446)	Forestry and logging occupations (494-496)
Nursing aides, orderlies, and attendants (447)	Fishers, hunters, and trappers (497-499)
Supervisors, cleaning and building service workers (448)	Supervisors, mechanics and repairers (503)
Maids and housemen (449)	Automobile mechanics (505-506)
Janitors and cleaners (453)	Bus, truck, and stationary engine mechanics (507)
	Aircraft mechanics (508, 515)
	Small engine repairers (509)
	Automobile body and related repairers (514)
	Heavy equipment mechanics (516)
	Farm equipment mechanics (517)
	Industrial machinery repairers (518)
	Machinery maintenance occupations (519)

List A-1 (Continued): 325 Selected Occupations*

Electronic repairers, communications and industrial equipment (523)
Data processing equipment repairers (525)
Household appliance and power tool repairers (526)
Telephone line installers and repairers (527)
Telephone installers and repairers (529)
Miscellaneous electrical and electronic equipment repairers (533)
Heating, air conditioning, and refrigeration mechanics (534)
Camera, watch, and musical instrument repairers (535)
Locksmiths and safe repairers (536)
Office machine repairers (538)
Mechanical controls and valve repairers (539)
Elevator installers and repairers (543)
Millwrights (544)
Specified mechanics and repairers, n.e.c. (547)
Not specified mechanics and repairers (549)
Brickmasons and stonemasons (553, 563, 564)
Tile setters, hard and soft (565)
Carpet installers (566)
Carpenters (554, 567, 569)
Drywall installers (573)
Electricians (555, 575, 576)
Electrical power installers and repairers (577)
Painters, construction and maintenance (556, 579)
Paperhangers (583)
Plasterers (584)
Plumbers, pipefitters, and steamfitters (557, 585, 587)
Concrete and terrazzo finishers (588)
Glaziers (589)
Insulation workers (593)
Paving, surfacing, and tamping equipment operators (594)
Roofers (595)
Sheetmetal duct installers (596)
Structural metal workers (597)
Drillers, earth (598)
Construction trades, n.e.c. (599)
Supervisors, extractive occupations (613)
Drillers, oil well (614)
Explosives workers (615)
Mining machine operators (616)
Mining occupations, n.e.c. (617)
Supervisors, production occupations (633)
Tool and die makers (634, 635)
Precision assemblers, metal (636)
Machinists (637, 639)
Boilermakers (643)
Precision grinders, fitters, and tool sharpeners (644)
Patternmakers and model makers, metal (645)
Lay-out workers (646)
Precious stones and metals workers (jewelers) (647)
Engravers, metal (649)
Sheet metal workers (653, 654)
Miscellaneous precision metal workers (655)
Patternmakers and model makers, wood (656)
Cabinet makers and bench carpenters (657)
Furniture and wood finishers (658)
Miscellaneous precision woodworkers (659)
Dressmakers (666)
Tailors (667)
Upholsterers (668)
Shoe repairers (669)
Apparel and fabric patternmakers (673)
Miscellaneous precision apparel and fabric workers (674)
Hand molders and shapers, except jewelers (675)
Patternmakers, lay-out workers, and cutters (676)
Optical goods workers (677)
Dental laboratory and medical appliance technicians (678)
Bookbinders (679)
Electrical and electronic equipment assemblers (683)
Miscellaneous precision workers, n.e.c. (684)
Butchers and meat cutters (686)
Bakers (687)

List A-1 (Continued): 325 Selected Occupations*

- Food batchmakers (688)
Inspectors, testers, and graders (689)
Adjusters and calibrators (693)
Water and sewage treatment plant operators (694)
Power plant operators (695)
Stationary engineers (696)
Miscellaneous plant and system operators (699)
Lathe and turning machine set-up operators (703)
Lathe and turning machine operators (704)
Milling and planing machine operators (705)
Punching and stamping press machine operators (706)
Rolling machine operators (707)
Drilling and boring machine operators (708)
Grinding, abrading, buffing, and polishing machine operators (709)
Forging machine operators (713)
Numerical control machine operators (714)
Miscellaneous metal, plastic, stone, and glassworking machine operators (715)
Fabricating machine operators, n.e.c. (717)
Molding and casting machine operators (719)
Metal plating machine operators (723)
Heat treating equipment operators (724)
Miscellaneous metal and plastic processing machine operators (725)
Wood lathe, routing, and planing machine operators (726)
Sawing machine operators (727)
Shaping and joining machine operators (728)
Nailing and tacking machine operators (729)
Miscellaneous woodworking machine operators (733)
Printing machine operators (734)
Photoengravers and lithographers (735)
Typesetters and compositors (736)
Miscellaneous printing machine operators (737)
Winding and twisting machine operators (738)
Knitting, looping, taping, and weaving machine operators (739)
Textile cutting machine operators (743)
Textile sewing machine operators (744)
Shoe machine operators (745)
Pressing machine operators (747)
Laundering and dry cleaning machine operators (748)
Miscellaneous textile machine operators (749)
Cementing and gluing machine operators (753)
Packaging and filling machine operators (754)
Extruding and forming machine operators (755)
Mixing and blending machine operators (756)
Separating, filtering, and clarifying machine operators (757)
Compressing and compacting machine operators (758)
Painting and paint spraying machine operators (759)
Roasting and baking machine operators, food (763)
Washing, cleaning, and pickling machine operators (764)
Folding machine operators (765)
Furnace, kiln, and oven operators, except food (766)
Crushing and grinding machine operators (768)
Slicing and cutting machine operators (769)
Motion picture projectionists (773)
Photographic process machine operators (774)
Miscellaneous machine operators, n.e.c. (777)
Machine operators, not specified (779)
Welders and cutters (783)
Solderers and brazers (784)
Assemblers (785)
Hand cutting and trimming occupations (786)
Hand molding, casting, and forming occupations (787)
Hand painting, coating, and decorating occupations (789)
Hand engraving and printing occupations (793)
Hand grinding and polishing occupations (794)
Miscellaneous hand working occupations (795)
Production inspectors, checkers, and examiners (796)
Production testers (797)
Production samplers and weighers (798)
Graders and sorters, except agricultural (799)

List A-1 (Continued): 325 Selected Occupations*

Supervisors, motor vehicle operators (803)	Supervisors; handlers, equipment cleaners, and laborers, n.e.c. (863)
Truck drivers, heavy (804)	Helpers, mechanics and repairers (864)
Truck drivers, light (805)	Helpers, construction trades (865)
Driver-sales workers (806)	Helpers, surveyor (866)
Bus drivers (808)	Helpers, extractive occupations (867)
Taxi cab drivers and chauffeurs (809)	Construction laborers (869)
Parking lot attendants (813)	Production helpers (873)
Motor transportation occupations, n.e.c. (814)	Garbage collectors (875)
Railroad conductors and yardmasters (823)	Stevedores (876)
Locomotive operating occupations (824)	Stock handlers and baggers (877)
Railroad brake, signal, and switch operators (825)	Machine feeders and offbearers (878)
Rail vehicle operators, n.e.c. (826)	Freight, stock, and material handlers, n.e.c. (883)
Water transportation occupations (828-834)	Garage and service station related occupations (885)
Supervisors, material moving equipment operators (843)	Vehicle washers and equipment cleaners (887)
Operating engineers (844)	Hand packers and packagers (888)
Longshore equipment operators (845)	Laborers, except construction (889)
Hoist and winch operators (848)	Armed forces (905) [‡]
Crane and tower operators (849)	Retired (913) [‡]
Excavating and loading machine operators (853)	Housewives, homemakers (914) [‡]
Grader, dozer, and scraper operators (855)	Students (915) [‡]
Industrial truck and tractor equipment operators (856)	Volunteers (916) [‡]
Miscellaneous material moving equipment operators (859)	Unemployed, never worked, disabled (917) [‡]
	Occupation not reported (999)

*Numbers after occupations are Bureau of the Census category numbers of the *Classified Index of Industries and Occupations*, 1982.

[†]n.e.c.=not elsewhere classified

[‡]Occupation groups constructed for coding death certificate information.

List A-2: 235 Industries*

Agricultural production, crops (010)	Soaps and cosmetics (mfg) (182)
Agricultural production, livestock (011)	Paints, varnishes, and related products (mfg) (190)
Agricultural services, except horticultural (020)	Agricultural chemicals (mfg) (191)
Horticultural services (021)	Industrial and miscellaneous chemicals (mfg) (192)
Forestry (030)	Petroleum refining (200)
Fishing, hunting, and trapping (031)	Miscellaneous petroleum and coal products (mfg) (201)
Metal mining (040)	Tires and inner tubes (mfg) (210)
Coal mining (041)	Other rubber products, and plastics footwear and belting (mfg) (211)
Crude petroleum and natural gas extraction (042)	Miscellaneous plastics products (mfg) (212)
Nonmetallic mining and quarrying, except fuel (050)	Leather tanning and finishing (mfg) (220)
Construction (060)	Footwear, except rubber and plastic (mfg) (221)
Meat products (mfg) [†] (100)	Leather products, except footwear (mfg) (222)
Dairy products (mfg) (101)	Logging (230)
Canned and preserved fruits and vegetables (mfg) (102)	Sawmills, planing mills, and millwork (231)
Grain mill products (mfg) (110)	Wood buildings and mobile homes (mfg) (232)
Bakery products (mfg) (111)	Miscellaneous wood products (mfg) (241)
Sugar and confectionery products (mfg) (112)	Furniture and fixtures (mfg) (242)
Beverage industries (mfg) (120)	Glass and glass products (mfg) (250)
Miscellaneous food preparations and kindred products (mfg) (121)	Cement, concrete, gypsum, and plaster products (mfg) (251)
Not specified food industries (mfg) (122)	Structural clay products (mfg) (252)
Tobacco manufactures (130)	Pottery and related products (mfg) (261)
Knitting mills (mfg) (132)	Miscellaneous nonmetallic mineral and stone products (mfg) (262)
Dyeing and finishing textiles, except wool and knit goods (mfg) (140)	Blast furnaces, steelworks, rolling and finishing mills (mfg) (270)
Floor coverings, except hard surface (mfg) (141)	Iron and steel foundries (mfg) (271)
Yarn, thread, and fabric mills (mfg) (142)	Primary aluminum industries (mfg) (272)
Miscellaneous textile mill products (mfg) (150)	Other primary metal industries (mfg) (280)
Apparel and accessories, except knit (mfg) (151)	Cutlery, hand tools, and other hardware (mfg) (281)
Miscellaneous fabricated textile products (mfg) (152)	Fabricated structural metal products (mfg) (282)
Pulp, paper, and paperboard mills (mfg) (160)	Screw machine products (mfg) (290)
Miscellaneous paper and pulp products (mfg) (161)	Metal forgings and stampings (mfg) (291)
Paperboard containers and boxes (mfg) (162)	Ordnance (mfg) (292)
Newspaper publishing and printing (171)	Miscellaneous fabricated metal products (mfg) (300)
Printing, publishing and allied industries, except newspapers (172)	Not specified metal industries (mfg) (301)
Plastics, synthetics, and resins (mfg) (180)	Engines and turbines (mfg) (310)
Drugs (mfg) (181)	Farm machinery and equipment (mfg) (311)

List A-2 (Continued): 235 Industries*

Construction and material handling machines (mfg) (312)	Services incidental to transportation (432)
Metalworking machinery (mfg) (320)	Radio and television broadcasting (440)
Office and accounting machines (mfg) (321)	Telephone (wire and radio) (441)
Electronic computing equipment (mfg) (322)	Telegraph and miscellaneous communication services (442)
Machinery, except electrical, n.e.c. [‡] (mfg) (331)	Electric light and power (460)
Not specified machinery (mfg) (332)	Gas and steam supply systems (461)
Household appliances (mfg) (340)	Electric and gas, and other combinations (462)
Radio, TV, and communication equipment (mfg) (341)	Water supply and irrigation (470)
Electrical machinery, equipment, and supplies, n.e.c. (mfg) (342)	Sanitary services (471)
Not specified electrical machinery, equipment and supplies (mfg) (350)	Not specified utilities (472)
Motor vehicles and motor vehicle equipment (mfg) (351)	Motor vehicles and equipment (whls) [§] (500)
Aircraft and parts (mfg) (352)	Furniture and home furnishings (whls) (501)
Ship and boat building and repairing (mfg) (360)	Lumber and construction materials (whls) (502)
Railroad locomotives and equipment (mfg) (361)	Sporting goods, toys, and hobby goods (whls) (510)
Guided missiles, space vehicles, and parts (mfg) (362)	Metals and minerals, except petroleum (whls) (511)
Cycles and miscellaneous transportation equipment (mfg) (370)	Electrical goods (whls) (512)
Scientific and controlling instruments (mfg) (371)	Hardware, plumbing and heating supplies (whls) (521)
Optical and health services supplies (mfg) (372)	Not specified electrical and hardware products (whls) (522)
Photographic equipment and supplies (mfg) (380)	Machinery, equipment, and supplies (whls) (530)
Watches, clocks, and clockwork operated devices (mfg) (381)	Scrap and waste materials (whls) (531)
Not specified professional equipment (mfg) (382)	Miscellaneous wholesale, durable goods (whls) (532)
Toys, amusement, and sporting goods (mfg) (390)	Paper and paper products (whls) (540)
Miscellaneous manufacturing industries (391)	Drugs, chemicals, and allied products (whls) (541)
Not specified manufacturing industries (392)	Apparel, fabrics, and notions (whls) (542)
Railroads (400)	Groceries and related products (whls) (550)
Bus service and urban transit (401)	Farm-product raw materials (whls) (551)
Taxicab service (402)	Petroleum products (whls) (552)
Trucking service (410)	Alcoholic beverages (whls) (560)
Warehousing and storage (411)	Farm supplies (whls) (561)
U.S. Postal Service (412)	Miscellaneous wholesale, nondurable goods (562)
Water transportation (420)	Not specified wholesale trade (571)
Air transportation (421)	Lumber and building material retailing (580)
Pipe lines, except natural gas (422)	Hardware stores (581)
	Retail nurseries and garden stores (582)
	Mobile home dealers (590)

List A-2 (Continued): 235 Industries*

Department stores (591)	Services to dwellings and other buildings (722)
Variety stores (592)	Commercial research, development, and testing labs (730)
Miscellaneous general merchandise stores (600)	Personnel supply services (731)
Grocery stores (601)	Business management and consulting services (732)
Dairy products stores (602)	Computer and data processing services (740)
Retail bakeries (610)	Detective and protective services (741)
Food stores, n.e.c. (611)	Business services, n.e.c. (742)
Motor vehicle dealers (612)	Automotive services, except repair (750)
Auto and home supply stores (620)	Automotive repair shops (751)
Gasoline service stations (621)	Electrical repair shops (752)
Miscellaneous vehicle dealers (622)	Miscellaneous repair shops (760)
Apparel and accessory stores, except shoe (630)	Private households (761)
Shoe stores (631)	Hotels and motels (762)
Furniture and home furnishings stores (632)	Lodging places, except hotels and motels (770)
Household appliances, TV, and radio stores (640)	Laundry, cleaning, and garment services (771)
Eating and drinking places (641)	Beauty shops (772)
Drug stores (642)	Barber shops (780)
Liquor stores (650)	Funeral service and crematories (781)
Sporting goods, bicycles, and hobby stores (651)	Shoe repair shops (782)
Book and stationery stores (652)	Dressmaking shops (790)
Jewelry stores (660)	Miscellaneous personal services (791)
Sewing, needlework, and piece goods stores (661)	Theaters and motion pictures (800)
Mail order houses (662)	Bowling alleys, billiard and pool parlors (801)
Vending machine operators (670)	Miscellaneous entertainment and recreation services (802)
Direct selling establishments (671)	Offices of physicians (812)
Fuel and ice dealers (672)	Offices of dentists (820)
Retail florists (681)	Offices of chiropractors (821)
Miscellaneous retail stores (682)	Offices of optometrists (822)
Not specified retail trade (691)	Offices of health practitioners, n.e.c. (830)
Banking (700)	Hospitals (831)
Savings and loan associations (701)	Nursing and personal care facilities (832)
Credit agencies, n.e.c. (702)	Health services, n.e.c. (840)
Security, commodity brokerage, and investment companies (710)	Legal services (841)
Insurance (711)	Elementary and secondary schools (842)
Real estate, including real estate-insurance-law offices (712)	Colleges and universities (850)
Advertising (721)	

List A-2 (Continued): 235 Industries*

Business, trade, and vocational schools (851)	Miscellaneous professional and related services (892)
Libraries (852)	Executive and legislative offices (900)
Educational services, n.e.c. (860)	General government, n.e.c. (901)
Job training and vocational rehabilitation services (861)	Justice, public order, and safety (910)
Child day care services (862)	Public finance, taxation, and monetary policy (921)
Residential care facilities, without nursing (870)	Administration of human resources programs (922)
Social services, n.e.c. (871)	Administration of environmental quality and housing programs (930)
Museums, art galleries, and zoos (872)	Administration of economic programs (931)
Religious organizations (880)	National security and international affairs (932)
Membership organizations (881)	Armed forces (942)**
Engineering, architectural, and surveying services (882)	Retired (951)**
Accounting, auditing, and bookkeeping services (890)	Homemaker, student, unemployed, volunteer (961)**
Noncommercial educational and scientific research (891)	Industry not reported (990)

*Numbers after industries are Bureau of the Census category numbers of the *Classified Index of Industries and Occupations*, 1982.

† mfg=manufacturing industry

‡ n.e.c.=not elsewhere classified

§ whls=wholesale trade

** Industry groups constructed for coding death certificate information

List A-3: 192 Selected Causes of Death*

- Infectious and parasitic diseases (001-139)
- Pulmonary tuberculosis (011)
 - Tularemia (021)
 - Brucellosis (023)
 - Cutaneous disease due to other mycobacteria (031.1)
 - Tetanus (037)
 - Human immunodeficiency virus infection with specified conditions (042-444)
 - Viral hepatitis A (070.0, 070.1)
 - Viral hepatitis B (070.2, 070.3)
 - Other and unspecified viral hepatitis (070.4-070.9)
 - Spotted fevers (082.0)
 - Sporotrichosis (117.1)
 - Sarcoidosis (135)
- Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissue (140-208)**
- Malignant neoplasm of lip, oral cavity, and pharynx (140-149)
 - Malignant neoplasm of lip (140)
 - Malignant neoplasm of nasopharynx (147)
 - Malignant neoplasm of digestive organs and peritoneum (150-159)
 - Malignant neoplasm of esophagus (150)
 - Malignant neoplasm of stomach (151)
 - Malignant neoplasm of small intestine, including duodenum (152)
 - Malignant neoplasm of colon (153)
 - Malignant neoplasm of rectum, rectosigmoid junction, and anus (154)
 - Malignant neoplasm of liver and intrahepatic bile ducts (155)
 - Malignant neoplasm of gallbladder and extrahepatic bile ducts (156)
 - Malignant neoplasm of pancreas (157)
 - Malignant neoplasm of retroperitoneum (158.0)
 - Malignant neoplasm of peritoneum, specified and unspecified (158.8, 158.9)
 - Malignant neoplasm of respiratory and intrathoracic organs (160-165)
 - Malignant neoplasm of nasal cavities, middle ear, and accessory sinuses (160)
 - Malignant neoplasm of larynx (161)
 - Malignant neoplasm of trachea, bronchus, and lung (162)
 - Malignant neoplasm of pleura (163)
 - Malignant neoplasm of thymus, heart, and mediastinum (164)
 - Malignant neoplasm of bone, connective tissue, skin, and breast (170-175)†**
 - Malignant neoplasm of bone and articular cartilage (170)
 - Malignant neoplasm of connective and other soft tissue (171)
 - Malignant melanoma of skin (172)
 - Other malignant neoplasm of skin (173)
 - Malignant neoplasm of breast (174, 175)
- Malignant neoplasm of genitourinary organs (179-189)†**
- Malignant neoplasm of female genital organs (179-184)
 - Malignant neoplasm of cervix uteri (180)
 - Malignant neoplasm of other parts of uterus (179, 181-182)
 - Malignant neoplasm of ovary and other uterine adnexa (183)
 - Malignant neoplasm of other and unspecified female genital organs (184)
- Malignant neoplasm of male genital organs (185-187)†**
- Malignant neoplasm of prostate (185)
 - Malignant neoplasm of testis (186)
 - Malignant neoplasm of penis and other male genital organs (187)
- Malignant neoplasm of bladder (188)
- Malignant neoplasm of kidney and other and unspecified urinary organs (189)
- Malignant neoplasm of other and unspecified sites (190-199)†**
- Malignant neoplasm of eye (190)
 - Malignant neoplasm of brain and other and unspecified parts of nervous system (191-192)
 - Benign, uncertain, and unspecified neoplasms of brain and nervous system (225, 237.5-237.9, 239.6)
 - Malignant neoplasm of thyroid gland (193)
 - Malignant neoplasm of other endocrine glands and related structures (194)
 - Malignant neoplasm of all other and unspecified sites (195-199)
- Malignant neoplasm of lymphatic and hematopoietic tissue (200-208)**
- Non-Hodgkin's lymphomas (200, 202.0-202.2, 202.8, 202.9)
 - Hodgkin's disease (201)
 - Reticuloendothelioses (202.3-202.5)
 - Multiple myeloma and immunoproliferative neoplasms (203)
 - Leukemia (204-208)
 - Lymphoid leukemia (204)
 - Acute lymphoid leukemia (204.0)
 - Chronic lymphoid leukemia (204.1)

List A-3 (Continued): 192 Selected Causes of Death *

- Myeloid leukemia (205)
 - Acute myeloid leukemia (205.0)
 - Chronic myeloid leukemia (205.1)
- Monocytic leukemia (206)
- Other specified leukemia (207)
- Benign neoplasms, carcinoma in situ, and neoplasms of uncertain behavior and of unspecified nature (210-239)
 - Benign, uncertain, and unspecified neoplasms, except brain and nervous system (210-224, 226-237.4, 238-239.5, 239.7-239.9)
 - Polycythemia vera (238.4)
- Endocrine, nutritional and metabolic diseases, and immunity disorders (240-279)
 - Disorders and diseases of endocrine glands (240-259)
 - Disorders of thyroid gland (240-246)
 - Diabetes mellitus (250)
 - Disorders of parathyroid gland (252)
 - Disorders of the pituitary gland and its hypothalamic control (253)
 - Disorders of adrenal glands (255)
 - Nutritional deficiencies (260-269)
 - Other metabolic and immunity disorders (270-279)
- Diseases of blood and blood-forming organs (280-289)
 - Non-autoimmune and unspecified hemolytic anemias (283.1, 283.9)
 - Aplastic anemia (284)
 - Agranulocytosis (288.0)
 - Methemoglobinemia (289.7)
- Mental disorders (290-319)
 - Alcohol-associated diseases (291, 303, 305.0, 357.5, 425.5, 535.3, 571.0-571.3, 790.3, E860.0, E860.1)[†]
 - Mental disorders related to alcohol abuse (291, 303, 305.0)
 - Mental disorders related to drug abuse (292, 304, 305.2-305.9)
- Diseases of the nervous system and sense organs (320-389)
 - Parkinson's disease (332)
 - Other cerebellar ataxia (334.3)
 - Anterior horn cell disease (335)
 - Multiple sclerosis and other demyelinating diseases of central nervous system (340-341)
 - Epilepsy (345)
 - Disorders of the peripheral nervous system, except myoneural disorders, muscular dystrophies and other myopathies (350-357)
- Myoneural disorders (358)
- Diseases of the circulatory system (390-459)
 - Diseases of the heart (390-398, 402, 404-429)
 - Rheumatic fever and rheumatic heart disease (390-398)
 - Hypertensive disease (401-405)
 - Ischemic heart disease (410-414)
 - Acute myocardial infarction (410)
 - Other ischemic heart disease (411-414)
 - Diseases of pulmonary circulation and other forms of heart disease (415-429)
 - Chronic pulmonary heart disease (416)
 - Cerebrovascular disease (430-438)
 - Diseases of arteries, arterioles, and capillaries (440-448)
 - Raynaud's syndrome (443.0)
 - Polyarteritis nodosa and allied conditions (446)
 - Diseases of veins and lymphatics (451-457)
- Diseases of the respiratory system (460-519)
 - Acute respiratory infections and other diseases of the upper respiratory tract (460-478)
 - Pneumonia and influenza (480-487)
 - Other diseases of respiratory system (490-519)
 - Chronic obstructive pulmonary diseases and allied conditions (490-496)
 - Extrinsic, unspecified asthma, and other pneumonitis due to solids and liquids (493.0, 493.9, 507.8)
 - Extrinsic allergic alveolitis (495)
 - Pneumoconioses and pneumopathy due to inhalation of other dust (500-505)
 - Coal workers' pneumoconiosis (500)
 - Asbestosis (501)
 - Pneumoconiosis due to other silica or silicates (502)
 - Other and unspecified pneumoconiosis (503-505)
 - Pneumoconiosis due to other inorganic dust (503)
 - Pneumopathy due to inhalation of other dust (504)
 - Respiratory conditions due to chemical fumes, vapors, oils, and essences (506, 507.1)
- Diseases of the digestive system (520-579)
 - Diseases of esophagus (530)
 - Diseases of stomach and duodenum (531-537)
 - Gastric, duodenal, gastrojejunal, and peptic ulcer, site unspecified (531-534)
 - Regional enteritis (555)
 - Idiopathic proctocolitis (556)

List A-3 (Continued): 192 Selected Causes of Death*

Diseases of liver (570-573)	other and unspecified ethyl alcohol and its products (E860.2-E866)
Acute and subacute necrosis of liver (570)	Accidental poisoning by agricultural and horticultural chemical and pharmaceutical preparations other than plant foods and fertilizers (E863)
Disorders of gallbladder and biliary tract (574-576)	Accidental poisoning by gases and vapors (E867-E869)
Diseases of pancreas (577)	Accidental falls, including late effects (E880-E888, E929.3)
Diseases of the genitourinary system (580-629)	Fall on or from stairs or steps (E880)
Diseases of urinary system (580-599)	Fall on or from ladders or scaffolding (E881)
Diseases of kidney (580-593)	Fall into hole or other opening in surface (E883)
Acute or chronic renal failure (584-586)	Other fall from one level to another (E884)
Diseases of male genital organs (600-608)	Accidents caused by fire and flames, other than private dwelling (E891-E899)
Diseases of female genital organs (610-629)	Accidents due to natural and environmental factors, including late effects (E900-E909, E929.5)
Complications of pregnancy, childbirth, and the puerperium (630-676)	Excessive heat (E900)
Diseases of the skin and subcutaneous tissue (680-709)	Accidents caused by submersion, suffocation and foreign bodies (E910-E915)
Contact dermatitis and other eczema (692)	Accidental drowning and submersion (E910)
Diseases of musculoskeletal system and connective tissue (710-739)	Inhalation and ingestion of other object causing obstruction of respiratory tract or suffocation (E912)
Diffuse diseases of connective tissue (710)	Accidental mechanical suffocation (E913)
Rheumatoid arthritis and other inflammatory polyarthropathies (714)	Foreign body accidentally entering eye, adnexa, or other orifice (E914-E915)
Congenital anomalies (740-759)	Certain accidents mainly of industrial type (E846, E916-E921, E923-E927)
Certain conditions originating in the perinatal period (760-779)	Struck accidentally by falling object (E916)
Symptoms, signs, and ill-defined conditions (780-799)	Striking against or struck accidentally by objects or persons (E917)
External causes of injury and poisoning (E800-E999)	Caught accidentally in or between objects (E918)
Transport accidents, including late effects (E800-E848, E929.0-E929.1)	Accidents caused by machinery (E919)
Railway accidents (E800-E807)	Accidents caused by cutting and piercing instruments or objects (E920)
Motor vehicle accidents, including late effects (E810-E825, E929.0)	Accident caused by firearm missile (E922) [§]
Motor vehicle nontraffic accidents (E820-E825)	Accident caused by explosive material (E923)
Water transport accidents (E830-E838)	Accident caused by electric current (E925)
Air and space transport accidents (E840-E845)	Overexertion and strenuous movements (E927)
Accidents involving powered vehicles used solely within the buildings and premises of an industrial or commercial establishment (E846)	Suicide (E950-E959)
Accidental poisoning, including late effects (E850-E869, E929.2)	Homicide and injury purposely inflicted by other persons (E960-E969)
Accidental poisoning by drugs, medicaments, and biologicals (E850-E858)	Injury undetermined whether accidentally or purposely inflicted (E980-E989)
Accidental poisoning by alcoholic beverages and other and unspecified ethyl alcohol and its products (E860.0, E860.1)	
Accidental poisoning by other solid and liquid substances, except alcoholic beverages and	

*Numbers after causes of death are category numbers of the *Ninth Revision of the International Classification of Diseases, 1975*.

†Boldface indicates that this category was not included in the analysis.

‡A constructed category including mental disorders and other diseases and conditions related to alcohol consumption.

§Not included within broad category.

APPENDIX B

LIST OF DETAILED TABLES FOUND ON ATTACHED DISKETTE

- B1. Number of deaths, PMRs, and 95 percent confidence limits for occupation by causes of death and age for white males: total of 24 reporting States, 1984–88**
- B2. Number of deaths, PMRs, and 95 percent confidence limits for occupation by causes of death and age for black males: total of 24 reporting States, 1984–88**
- B3. Number of deaths, PMRs, and 95 percent confidence limits for occupation by causes of death and age for white females: total of 24 reporting States, 1984–88**
- B4. Number of deaths, PMRs, and 95 percent confidence limits for occupation by causes of death and age for black females: total of 24 reporting States, 1984–88**
- B5. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by occupation and age for white males: total of 24 reporting States, 1984–88**
- B6. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by occupation and age for black males: total of 24 reporting States, 1984–88**
- B7. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by occupation and age for white females: total of 24 reporting States, 1984–88**
- B8. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by occupation and age for black females: total of 24 reporting States, 1984–88**
- B9. Number of deaths, PMRs, and 95 percent confidence limits for industry by causes of death and age for white males: total of 24 reporting States, 1984–88**
- B10. Number of deaths, PMRs, and 95 percent confidence limits for industry by causes of death and age for black males: total of 24 reporting States, 1984–88**
- B11. Number of deaths, PMRs, and 95 percent confidence limits for industry by causes of death and age for white females: total of 24 reporting States, 1984–88**
- B12. Number of deaths, PMRs, and 95 percent confidence limits for industry by causes of death and age for black females: total of 24 reporting States, 1984–88**

- B13. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by industry and age for white males: total of 24 reporting States, 1984–88**
- B14. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by industry and age for black males: total of 24 reporting States, 1984–88**
- B15. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by industry and age for white females: total of 24 reporting States, 1984–88**
- B16. Number of deaths, PMRs, and 95 percent confidence limits for causes of death by industry and age for black females: total of 24 reporting States, 1984–88**

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