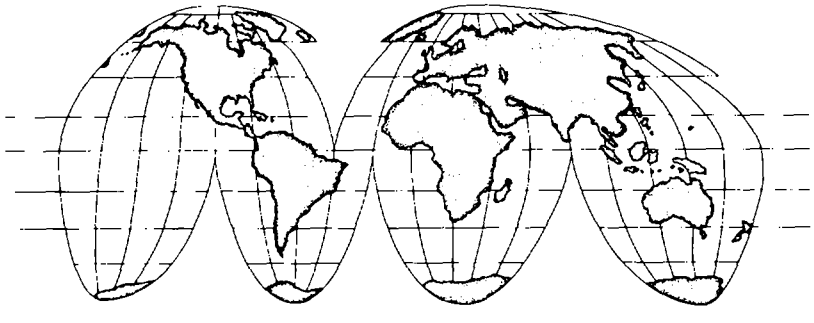
Sources of Injury Related Data and Special Methodological Problems



The Death Certificate as a Source of Injury Data

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Introduction

The death certificate is one of our oldest sources of data on injuries, representing a system that has evolved over hundreds of years and one that has achieved a modicum of international comparability. In lieu of well established, comprehensive, and comparable data sets for morbidity, heavy reliance continues to be placed on death certificate information for both national and international injury surveillance and research. The mortality data system based on the death certificate may provide a model for other data systems in terms of its legal basis, statistical content, processing, and international standards to promote comparability. While the death certificate as a source of injury data is described in terms of the U.S. experience, it is believed that many of the examples and observations are applicable more generally.

Examples are provided of the use of death certificate information for injury prevention and control. This is followed by a description of the structure and content of the death certificate with an emphasis on items of particular relevance to injury data, and by the way in which death certificate information is processed and processing changes that are likely in the foreseeable future as a result of automation increasingly applied to information and statistical systems. The paper concludes with a discussion of some issues in the use of death certification information for injury research and injury monitoring.

Importance of Death Certificate Information

As a cause of death, the average level of mortality from Accidents and adverse effects in the United States has decreased almost 50 percent since 1950 (Figure 1) (1). Yet while the level of age–adjusted death rates from this cause decreased, the relative importance of accident mortality increased, that is, its rank a leading cause of death increased because the mortality from other leading causes of death, principally heart disease and stroke, decreased even more sharply than accidents during this period. Thus, accidents was the 5th leading cause of death in the United States in 1991 for all age groups combined but the leading cause of death for each of the age groups 1–4 years, 5–14 years, 15–24 years, and 25–44 years (Table 1). At older ages, the relative importance of accidents decreases because the high age–specific mortality of chronic diseases enables them to compete successfully for a higher ranking as the leading cause (2). By ages 45–64, accidents dropped to a ranking of 4th, and by ages 65 and over, accidents further declined to a rank of 7th. Still in the older age groups, accidents are a significant cause of death accounting for a total of 26,444 deaths to persons 65 and older in 1991.

In terms of it impact on health, society, and family, the toll of accident mortality as usually measured is greatly understated because of its great impact among the young and therefore its much greater effect on life expectancy than chronic diseases whose mortality is concentrated at older ages. This effect is well known, of course, and is reflected in the use in injury presentations of alternative measures such as Potential Years of Life Lost rather than age–adjusted death rates when depicting the health impact of accident mortality.

The continuing importance of death certificate data from the national vital statistics system is underscored by the major undertaking to monitor the health status of the U.S. population described in Healthy People 2000: National Health Promotion and Disease Prevention Objectives (3). This comprehensive statistical effort involves monitoring the well–being of the U.S. population in terms of the 22 priority areas of which Unintentional injuries is priority area No. 9 (Figure 2). In Healthy People 2000, injury mortality and morbidity are measured using a variety of indicators (Figure 3), four of which are based on mortality data from the death certificate. These areas are deaths for all injuries combined, for falls, for drownings, and for residential fire deaths.

Death certificate data are also the foundation of major occupational injury information published by the National Institutes for Occupational Safety and Health through the National Traumatic Occupational Fatality Reporting System

(4), or NTOF, and by the U.S. Bureau of Labor Statistics through its Census of Fatal Occupational Injuries (5). A recent occupational mortality report of the National Center for Health Statistics (NCHS) based on information from death certificates shows that accidents are a major source of mortality in certain occupation groups (6). Examples from this report illustrate the use of death certificate information for identifying high risk occupations. Shown in Figure 4 are the ten highest statistically significant Proportionate Mortality Ratios (PMR's) for occupations and causes of death in 12 states in 1984. Thus, in the extractive occupations, for males 20 years and over, mortality from accidents was almost five times higher than that in all occupations combined, reflected in a PMR of 456. For men working in Forestry, fishing and hunting, the relative risk of death measured by the PMR was 361; for male farm workers the PMR was 248; and for electricians, 246. These were all statistically significant. For females, occupations with elevated risk of death from accidents include persons working in mail distributing occupation with a PMR of 203 (Figure 5); and protective service occupations, a PMR of 199. The report shows that there were many other occupations where accidents are a major risk, but these were the most prominent in terms of an elevated PMR. A report with more recent data and a much larger data base is now in preparation as a collaborative project of NCHS and NIOSH.

These illustrations underscore the continuing importance of information from the death certificate as an important source of data to define and to monitor the health burden of injuries both in the United States and in other countries.

The Death Certificate

The document that is the basis for mortality data in the U.S. and other countries in the death certificate. In the decentralized vital statistics of the U.S., death certificates are legal and statistical documents of the states, not of the Federal government. However, some degree of standardization in the structure and content of the various death certificates used by the states is achieved by their willingness, for the most part, to adhere to a "model" certificate promulgated by NCHS. Shown in Figure 6 is the U.S. Standard Certificate of Death that was promulgated by NCHS in 1989 (8) and adopted in a form very close to this by all of the states.

In the United States, two persons complete the information on the death certificate. The bottom half of the certificate is the medical certification of death which is completed by the attending physician, medical examiner, or coroner; and the top half, which contains the demographic information, is completed by the funeral director, who also has the ultimate responsibility for filing the certificate with the appropriate state registration officials, who are custodians of the original records. The state registration officials also have the authority and responsibility to conduct queries for questionable or incomplete information (such as followup for death whose cause is pending investigation), or where the particulars of an accident are not adequately described.

On the U.S. Standard Certificate of Death, the format of the medical certification of death is consistent with the International Form of Medical Certificate of Cause of Death required by the World Health Organization (9). To the extent that there are differences between the WHO standard and the certificate format recommended by NCHS to the states, it is the additional line in Part I of the U.S. Standard to allow for more medical conditions in the chain of events leading to death.

For injury–related deaths, the U.S. Standard Certificate of Death has a number of items including the date and time of the injury, whether the injury occurred at work, a description of how the injury occurred, the place of injury, and the actual street location of the injury. Clearly, the death certificate is a potentially rich source of statistical information on injuries. It is also instructive to note what the standard death certificate does not ask regarding injuries. It does not, for example, ask explicitly about drug or alcohol involvement; and it does not clearly specify the degree of detail that is acceptable when describing how the injury occurred. Moreover, it does not include prompts specific for accidents that would encourage the medical provider to provide useful information in an automobile accident whether the decedent was the driver or a passenger, or the location of the accident in terms of such categories as mine, farm, or residence. As the death certificate is now structured, the level of reporting detail for accidents is left entirely to the judgement, ingenuity, and energy of the certifier.

The reverse side of the U.S. Standard Certificate of Death contains instructions for completing the death certificate (Figure 7). At the bottom of the instructions are two examples of properly–completed medical certifications. One of these—the upper example—is a so–called "natural" cause of death; the lower example is an injury, in this case an automobile accident that resulted in death from a skull fracture. Inclusion of these examples in the death certificate instructions in the two dozen states that adopted them greatly assisted in proper completion of death certificates, according to the many appreciative calls received by NCHS staff. The impact of the revised certificates is also reflected in NCHS and state mortality statistics, where improvements were observed in the specificity of medical certifications and the reporting of some ill–defined certifications. In terms of the latter (Table 2), for example, the trend in deaths reported for Heart failure, which had been increasing annually from 1979 to 1988 declined by 10 percent between 1988 and 1989, a reduction presumably attributable to the introduction of the revised death certificates. Introduction of the revised death certificate resulted in a number of other trend discontinuities among the leading causes of death such as for diabetes and for atherosclerosis, as noted in the NCHS annual mortality report for 1989 (10).

The statistical consequences of the revision in the U.S. death certificates is instructive in the sense that it shows that almost any change in a vital statistics data collection instrument may have an effect on the resultant information that is collected. That should be borne in mind as the U.S. and other countries move toward electronic systems of data entry for vital records, as discussed below.

Processing Death Certificate Information

The nature and quantity of injury information on the death certificate has been substantially and positively affected by changes in the way in which information from the death certificate has been processed. Additional changes are underway that will further affect the types of data on injury available to researchers and others. These changes have implications for international studies of health and for the international comparability of mortality statistics. While these processing systems were developed in the United States, they are being increasingly adopted by other countries, and may eventually become a model or a standard for processing mortality data.

Multiple Cause Coding

The first major change occurred in 1968, when NCHS began to routinely code multiple causes of death rather than just the underlying cause of death. While multiple causes had been periodically coded before, as early as 1917 and for a major study in 1955, this type of coding had never been done routinely because of the expense involved. But beginning with mortality data for 1968, multiple cause coding was introduced on a routine basis on the grounds that the resultant data would be more uniform and much more informative than underlying cause of death data alone. The software and data entry system is called "ACME," a well–known by now acronym that stands for Automated Classification of Medical Entities (11). The practical significance of the system is (1) that a medical coder codes not one but all of the conditions reported on the medical certification of death, (2) the computer system, not a medical coder, selects the single underlying cause of death resulting in much more consistency in selecting the underlying cause, and (3) most important, that both underlying and multiple cause–of–death data tapes and tabulations are available on an annual basis. For injury research, ACME opened up new doors by making available on a routine basis for the first time the "nature of injury" or N–codes. These codes describe the impact of an external cause of death. Thus, in the earlier example of a motor vehicle accident resulting in a skull fracture, the only information captured in underlying cause–of–death tabulations is the motor vehicle accident or the external cause; the skull fracture, or nature of injury, ordinarily would not be captured. But in multiple cause–of–death statistics, it is routinely available. Mortality data shown in Table 3 from a paper by Israel, Rosenberg, and Curtin, (12) show a cross–tabulation of injuries, suicides, and homicides by their respective nature of injuries. Thus, in 1979, a total of 54,479 nature of injury entries were reported for motor vehicle accidents (second column of the table); almost half were intracranial injuries, excluding those associated with skull fractures. Nature–of–injury codes are useful also in providing more specificity than the traditional E–codes for, for example, the types of poisons that resulted in a poisoning death, or in adverse effects and complications.

Multiple cause data are useful for injury research not only for analysis, but also for understanding the nature of the medical certification itself. For example, shown in Table 4 is the distribution of conditions reported on the death certificate for the ten leading causes of death (13). In 1991, of the 89,347 deaths due to injuries, 16.1 percent had three conditions reported on the death certificate. This percent could be examined over time to see if information on injuries is growing more or less informative, and in relation to the trend for other causes of death. In another example of using multiple cause data to evaluate the medical certification of death, Table 5 shows the average number of causes per death for selected underlying causes that are infrequently reported with other causes of death. For motor vehicle accidents, the average number of conditions reported on the death certificate is 1.94. External causes are more likely than other causes to be the only condition reported on the death certificate. For almost half of motor vehicle accidents, no other condition was reported on the death certificate. In contrast, other underlying causes are frequently reported with other causes (Table 6). For diabetes, for example, on only 2.8 percent of the certificates in 1991, was this the only cause reported on the death certificate; the average number of causes reported for these certificates was 3.46.

TRANSAX

Other changes in processing death certificate information have important implications for injury research. In 1977–78, NCHS developed the actual system by which multiple cause–of–death data are processed; this is called the "TRANSAX" system, for translation of axes (14). Under this system, for each death record, two types of information are made available, one in which the statistical record contains a code, called the "entity" code, for every condition reported on the death certificate, and the other, a "record" code which combines information from several codes when appropriate using linkages that are reminiscent of those used for underlying cause–of–death data. For example, acute myocardial infarction and hypertension as entities on a death certificate would be combined into Acute myocardial infarction with hypertensive disease.

MICAR

Another important development in processing mortality data occurred in 1990 when NCHS began implementing the "MICAR" system (15). MICAR, which stands for Mortality Medical Indexing, Classification, and Retrieval, is a major step toward simplifying data entry for medical information from the death certificate. The ultimate goal of NCHS in developing the MICAR system is entry of the full text of the medical certification of death and with computer identification of appropriate multiple cause–of–death codes, both entity axis and record axis codes, and—through ACME—selection, as now, the underlying cause of death. In 1990, the first year of implementation of MICAR, about five percent (94,372) of the U.S. death records were coded using MICAR with subsequent processing through ACME for underlying cause and through TRANSAX for multiple cause–of–death data. In 1991, the percent increased to 26, with 573,416 records (16). With MICAR and its successor SUPERMICAR, which is still under development, each entry on the death certificate is classified to an index or reference number that is independent of the International Classification of Diseases, and that will eventually permit retrieval of the full text of the medical certification of death. Examples of SUPERMICAR listings shown in Figures 8 through 11 show the potential of this system for retrieving information of value for injury surveillance and research.

Electronic Death Certificate

The next major development in both collecting and processing data from the death certificate will be the electronic death certificate (EDC). The EDC concept, and it is that to a large extent, is that the funeral director and the medical certifier will enter the literal information at a computer terminal from which it will be transmitted, without a paper copy, to the state, and then to NCHS. At the point of data entry, instructions can be given interactively; queries can be made for incomplete or inconsistent information; and edits can be implemented. At the state office, the information can be processed through TRANSAX and ACME, and the information can be used on a current basis for creating continuous data stream in real time at both the state and national level. Such a system, when fully

implemented, could have a dramatically positive effect for both the timeliness and the quality of death registration data.

The development of an electronic vital record began with the birth certificate in the 1980's, and has been widely implemented. For 1991, a total of 19 states either partly or entirely collected their birth certificate information in this way. It is estimated that about 25 percent of the almost 4 million births annually are reported on electronic birth certificates. The impetus for an electronic death certificate has not been as compelling as for an electronic birth certificate; but the process has begun, most notably with early implementation of such a system in New Hampshire and now with a number of pilot tests in a number of states. Creating such a system for the death certificate is more complicated than for the birth certificate. For the birth certificate only one person is responsible for completing the record; but for the death certificate, both a medical certifier and a funeral director are now involved in the process. How the information from these two sources will be integrated and cross-checked will present a challenge. In addition, for the death certificate, the editing and querying process is much more complicated than for births. One will have to question the certifier for, for example, a lack of specificity for cause of death, such as failing to report the primary site of a cancer, or failing to adequately describe the circumstances under which an injury occurred.

In the next few years, it is likely that development and initial implementation of an EDC will occur, resulting in much better and more timely death registration data.

Mortality Data Dissemination

Mortality data from the death certificate are made available in both published and electronic form. "Final" mortality data—representing the entire death file and processed largely by the states using the automated systems—are available 1.5–2.0 years after the close of a data year. Processing the final mortality data is largely automated. In contrast, provisional mortality data are based on a 10–percent sample and are processed manually by NCHS; they are available about 4–5 months after the principal month of occurrence. Another difference is that final mortality data are available on both a multiple and underlying cause basis, while provisional mortality data are available only on an underlying cause basis. The final data has been available in electronic form on data tapes beginning with the 1968 data year; but provisional data are not yet available electronically.

Issues in the Use of Death Certificate Information for Injury Surveillance and Research

Death certificate information from the national vital statistics system constitute a basic and important element in a statistical system for monitoring injuries, as noted in the use of these data for Healthy People 2000 and for occupational injury surveillance. Yet, there are a number of issues and limitations in the use of mortality data that should be noted. Some of these are related to the quality and completeness of the information reported on the death certificate.

Completeness

Among the issues are the completeness of the information. For example, for 48,574 motor vehicle accident deaths in the U.S. in 1989, a total of 8,553 or almost one of five did not specify who was injured, that is, a driver or a passenger or a cyclist or a pedestrian (17). In the case of the 12,151 falls in the U.S. in 1981, the largest specified number, 1,163, was on steps; but 5,694, or almost half of these deaths were from Other and unspecified falls. In the important area of firearm mortality, it is important to identify which deaths are from handguns. In 1989, of the 1,489 deaths attributed to firearms, a total of 231 were reported as due to handguns. Yet, almost five times as many were not firearms unspecified as to type, which constituted the largest category of accidental firearm deaths. Thus, the area of completeness of reporting is a critical element in the effective use of death certificate information for injury prevention and control.

How can this be addressed? For one thing, better education of medical certifiers is needed on how to complete the death certificate. NCHS has initiated a number of efforts directed at physicians to improve cause-of-death reporting

beginning with two national workshops, one in 1989 (18) and the other in 1991 (19). These initiatives are continuing. A second approach to addressing this problem is querying at the state level. Death certificates with incomplete information on injuries should not be permitted to pass to the stage of processing without asking the medical certifier for sufficiently complete information to make it useful for injury surveillance (20). These initiatives need to be national in scope if they are to result in good information on which to base injury prevention programs.

Information Augmentation

It needs to be recognized that even if all the items on the death certificate were answered completely and accurately, there would still be need for additional information on injuries that is not routinely captured on the death certificate, or, if captured, not in a standard, uniform, and dependable way. Examples include whether drugs or alcohol may have been involved in the accident. Without a direct question to the certifier asking about substance abuse, one can expect as many studies have shown that the impact of substance abuse on injuries cannot be adequately measured using information on the standard death certificate. Additional information from another source is needed to augment the information routinely collected on the death certificate.

What kinds of augmentation are possible? One type is what NCHS calls "followback" surveys. These are surveys using death certificates as a sampling frame that can be used to get additional information on deaths for a special subset of the decedent population, based on demographic characteristics or on causes of death. Last conducted in 1986 (21); the National Mortality Followback Survey focussed on obtaining socio–economic information such as income, and information on health care in the last year of life. A new NCHS mortality followback survey is going into the field this year.

Another approach to augmenting information reported on the death certificate is by linking information reported on the death certificate with that from another source. For example, the 1993 national mortality followback survey includes a component to link with abstracts of coroner/medical examiner records. This will not only augment information on the death certificate but will also be a useful basis for checking the reliability of the cause of death reported by the same medical examiner or coroner who completed the death certificate.

The death certificate can be linked to a variety of other sources including hospital records, health examination survey records, health interview records, and administrative records—each of which can potentially enrich the mortality data base for injury research.

Validity and Reliability

The question of validity and reliability is one that suffuses information from the vital registration system. The death certificate, and in particular cause of death, is always a prime suspect in these investigations. Many studies have been published on the validity of cause of death reflected in the NCHS annotated bibliography of 128 such studies carried out over a period of 23 years (22), with an update published in 1991 (23).

Some of these studies raise troubling questions regarding the medical certification of death, but these have been largely in the area of natural causes, or deaths related to disease processes of relatively long duration. For injuries, the cause of death tends to be more clear–cut and immediate in its fatal action. Nevertheless, questions of validity do often arise regarding manner of death, that is, whether the injury was accidental, suicidal, or homicidal. Only in–depth studies can shed light on this, and, even in some cases, the basic records will not reveal what the medical certifier has chosen not to report.

Conclusion

In conclusion, the death certificate is likely to continue to serve as a basic source of injury data despite its known limitations, because it still represents the only data source with mandatory reporting, universal coverage, and international standards for data collection, classification, and reporting (24). These are formidable attributes—developed over several centuries—to which other data systems aspire in their relative youth, but have

not yet realized. Until they do, mortality data will continue to be a key data source for injury surveillance and research on an national and international basis.

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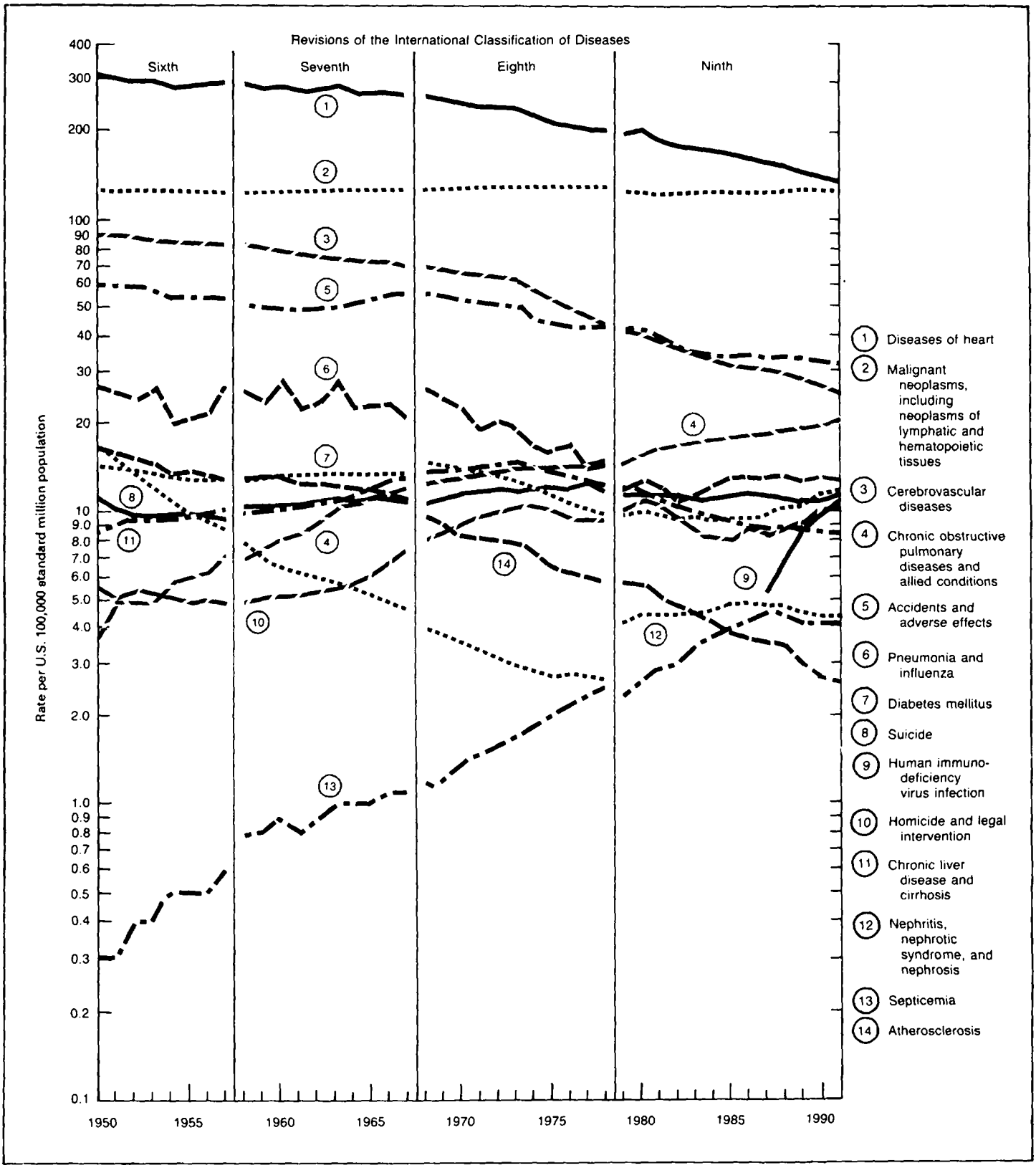


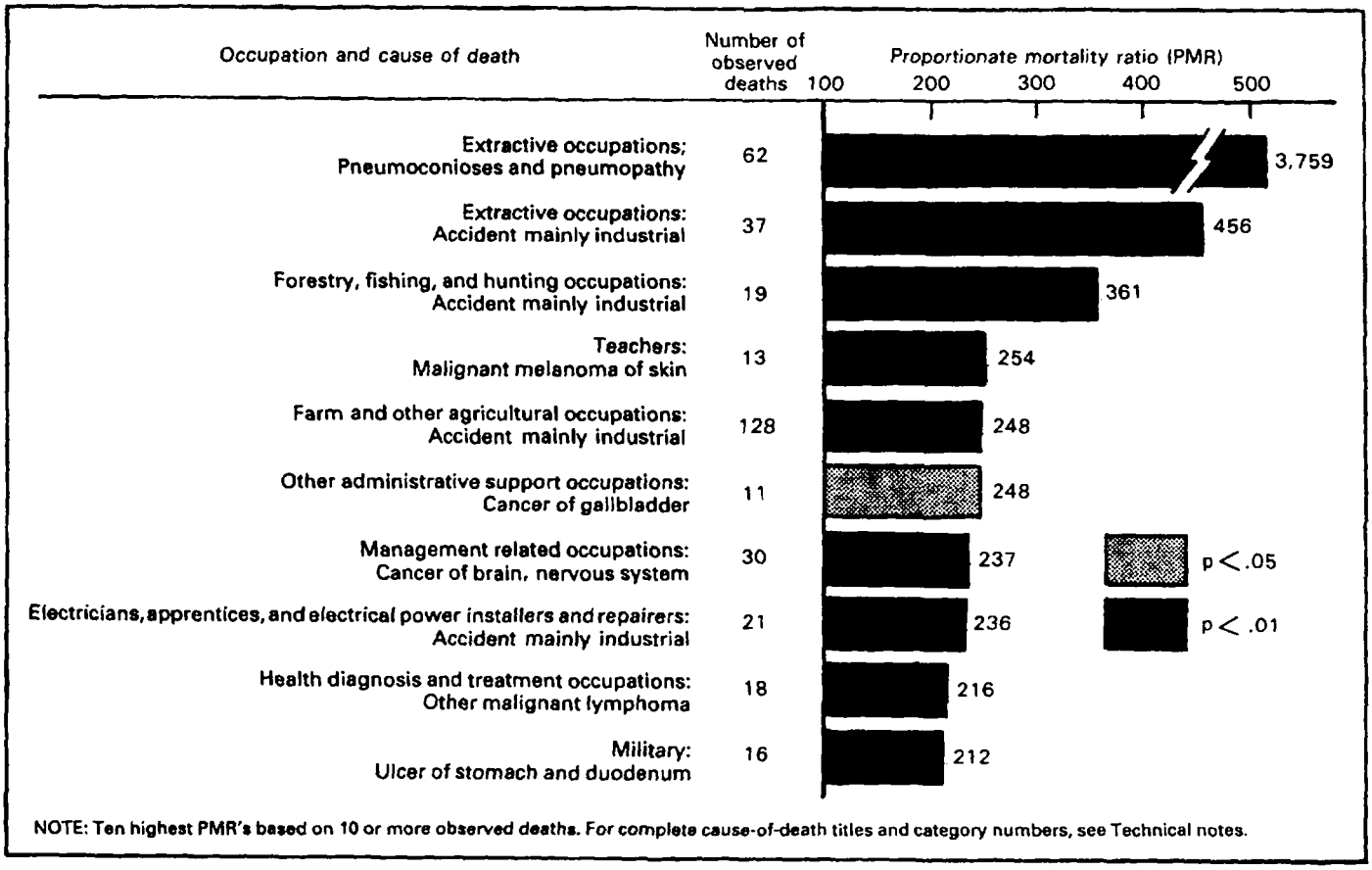
Figure 1. Age-adjusted rates for 14 of the 15 leading causes of death: United States, 1950–91

Figure 2. Priority areas for Healthy People 2000

1. Physical activity and fitness objective status
2. Nutrition objective status
3. Tobacco objuective status
4. Alcohol and other drugs bojective status
5. Family planning objective status
6. Mental health and mental disorders objective status
7. Violent and abusive behavior objective status
8. Educational and community based programs objective status
9. Unintentional injuries objective status
10. Occupational safety and health objective status
11. Environmental health objective status
12. Food and drug safety objective status
13. Oral health objective status
14. Maternal and infant health objective status
15. Heart disease and stroke objective status
16. Cancer objective status
17. Diabetes and chronic disabling conditions objective status
18. HIV objective status
19. Sexually transmitted diseases objective status
20. Immunization and infectious diseases objective status
21. Clinical preventive services objective status
22. Surveillance and data systems objective status

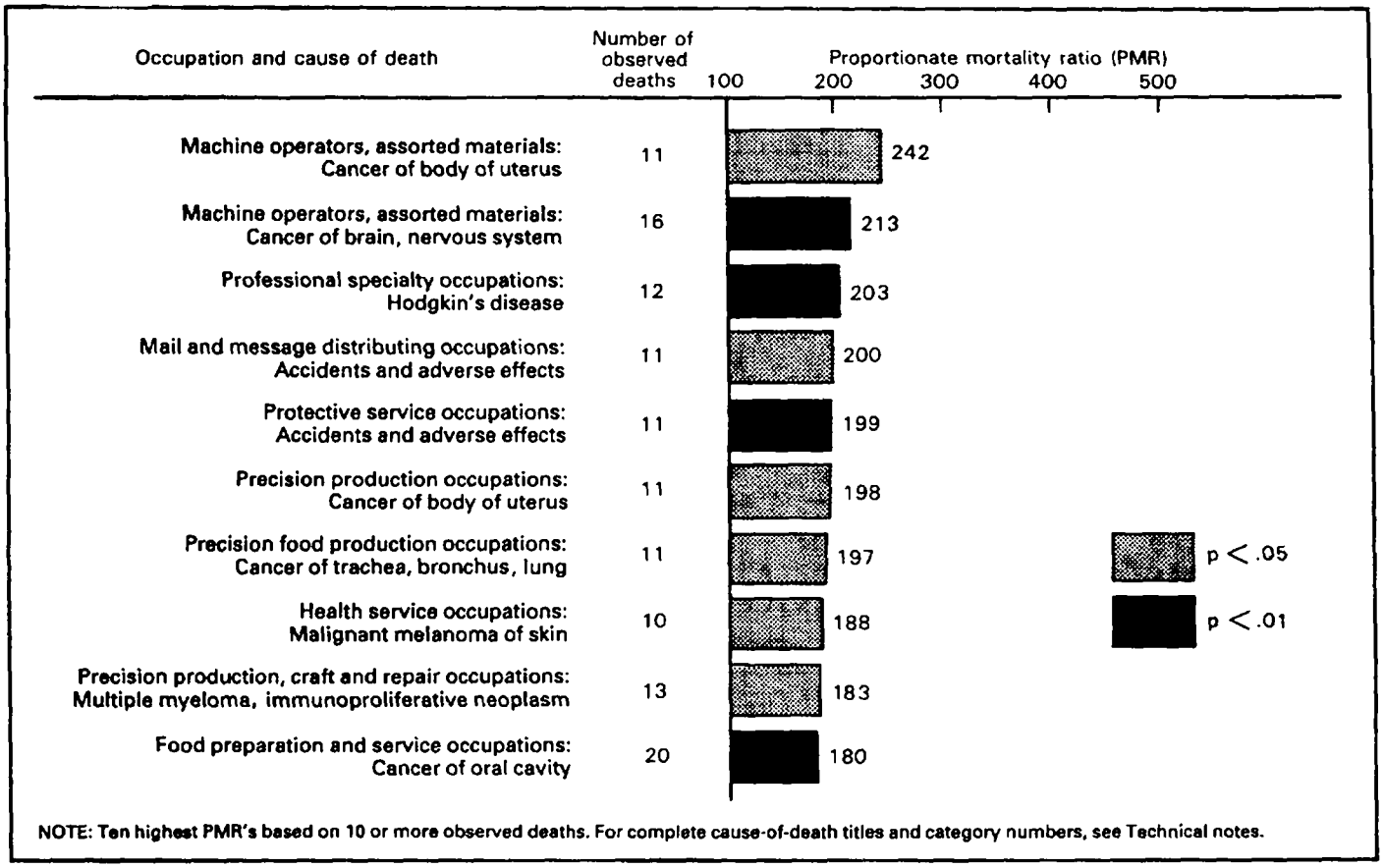
Figure 3. Unintentional injuries objective status, Healthy People 2000

	Objective	Original	Revised
9.1	**Unintentional injury deaths (age-adjusted per 100,000)**	34.5	34.7
	a. American Indians/Alaska Natives (age-adjusted per 100,000)	82.6	66.0
	b. Black males (age-adjusted per 100,000)	64.9	68.0
	b. White males (age-adjusted per 100,000)	53.6	49.8
9.2	**Unintentional injury hospitalizations (per 100,000)**	887	832
9.3	**Motor vehicle crash-related deaths**		
	Per 100 million vehicle miles traveled (VMT)	2.4	...
	Age-adjusted per 100,000 people	18.8	19.2
	a. Children 14 years and under (per 100,000)	6.2	...
	b. People 15-24 years (per 100,000)	36.9	...
	c. People 70 years and over (per 100,000)	22.6	...
	d. American Indians/Alaska Natives (age-adjusted per 100,000)	46.8	37.7
	e. Motorcyclist (per 100 million VMT)	40.9	...
	(per 100,000)	1.7	...
	f. Pedestrians (per 100,000)	3.1	2.8
9.4	**Fall-related deaths (age-adjusted per 100,000)**	2.7	No change
	a. People 65-84 years (per 100,000)	18.0	18.1
	b. People 85 years and over (per 100,000)	131.2	133.0
	c. Black males 30-69 years (per 100,000)	8.0	8.1
9.5	**Drowning deaths (age-adjusted per 100,000)**	2.1	No change
	a. Children aged 4 and under (per 100,000)	4.2	4.3
	b. Males 15-34 years (per 100,000)	4.5	No change
	c. Black males (age-adjusted per 100,000)	6.6	No change
9.6	**Residential fire deaths (age-adjusted per 100,000)**	1.5	1.7
	a. Children 4 years and under (per 100,000)	4.4	4.5
	b. People 65 years and over (per 100,000)	4.4	4.9
	c. Black males (age-adjusted per 100,000)	5.7	6.4
	d. Black females (age-adjusted per 100,000)	3.4	3.3
	e. Residential fire deaths caused by smoking	17%	26%
9.7	**Hip fractures among older adults (per 100,000)**	714	...
	a. White females 85 years and over	2,721	...
9.8	**Nonfatal poisoning (per 100,000)**	103	108
	a. Among children 4 years and under	650	648
9.9	**Nonfatal head injuries (per 100,000)**	125	118
9.10	**Nonfatal spinal cord injuries (per 100,000)**	5.9	5.3
	a. Males	8.9	9.6
9.11	**Secondary disabilities associated with head and spinal cord injuries**		
	Head injuries (per 100,000)	20.0	...
	Spinal cord injuries (per 100,000)	3.2	...
9.12	**Motor vehicle occupant protection systems**	42%	...
	a. Children 4 years and under	84%	...
9.13	**Helmet use by motorcyclists and bicyclists**		
	Motorcyclists	60%	...
	Bicyclists	8%	...
9.14	**Safety belt and helmet use laws**		
	Number of States with safety belt laws	33	...
	Number of States with Motorcycle Helmet Use Laws	22	...
9.15	**Number of States with handgun design to protect children.**	0	...
9.16	**Fire suppression sprinkler installation (number of localities)**	...	700
9.17	**Residences with smoke detectors**	81%	...
9.18	**Injury prevention instruction in schools**	---	...
9.19	**Protective equipment in sporting and recreation events**	---	...
	National Collegiate Athletic Association		
	Football	Required	...
	Hockey	Required	...
	Lacrosse	Required	...
	High school football	Required	...
	Amateur boxing	Required	...
	Amateur ice hockey	Required	...
9.20	**Number of States with design standards for roadway safety**	---	...
9.21	**Injury prevention counseling by primary care providers**	---	...
9.22	**Number of States with linked emergency medical services and trauma systems**	2	...



NOTE: Ten highest PMR's based on 10 or more observed deaths. For complete cause-of-death titles and category numbers, see Technical notes.

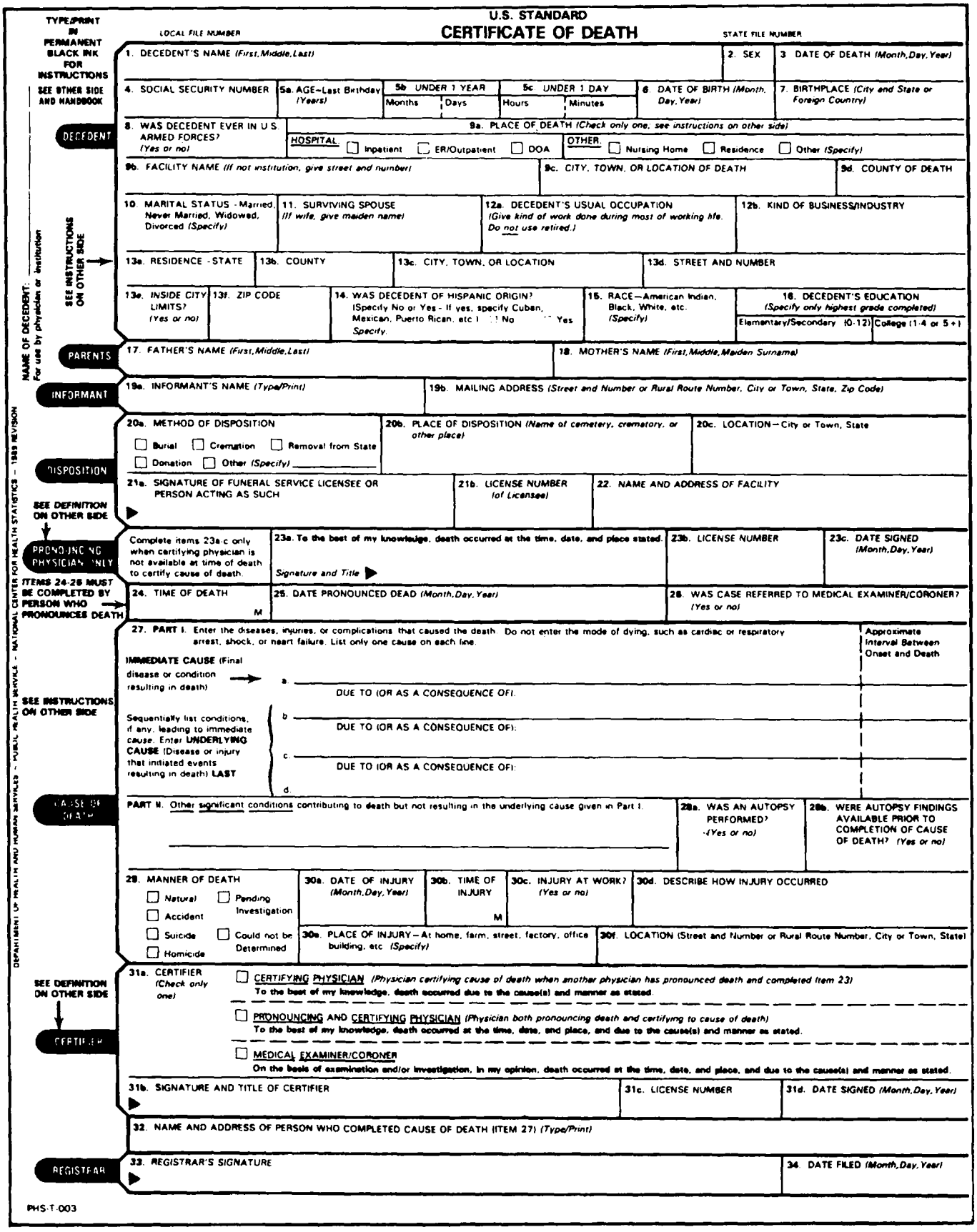
Figure 4. Ten highest statistically significant proportionate mortality ratios (PMR's) for occupations and causes of death and observed number of deaths for males 20 years of age and over: Total of 12 reporting States, 1984



NOTE: Ten highest PMR's based on 10 or more observed deaths. For complete cause-of-death titles and category numbers, see Technical notes.

Figure 5. Ten highest statistically significant proportionate mortality ratios (PMR's) for occupations and causes of death and observed number of deaths for females 20 years of age and over: Total of 12 reporting States, 1984

FIGURE 6. U.S. STANDARD CERTIFICATE OF DEATH



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

DECEDENT

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: ☐ Inpatient ☐ ER/Outpatient ☐ DOA
OTHER: ☐ Nursing Home ☐ Residence ☐ 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.) ☐ No ☐ 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+)

SEE INSTRUCTIONS ON OTHER SIDE

NAME OF DECEDENT: For use by physician or institution

PARENTS

17. FATHER'S NAME (First, Middle, Last)
18. MOTHER'S NAME (First, Middle, Maiden Surname)

INFORMANT

19a. INFORMANT'S NAME (Type/Print)
19b. MAILING ADDRESS (Street and Number or Rural Route Number, City or Town, State, Zip Code)

DISPOSITION

20a. METHOD OF DISPOSITION
☐ Burial ☐ Cremation ☐ Removal from State
☐ Donation ☐ 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

SEE DEFINITION ON OTHER SIDE

PRONOUNCING PHYSICIAN ONLY

Complete items 23a-c only when certifying physician is not available at time of death to certify cause of death.
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)

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

24. TIME OF DEATH — M
25. DATE PRONOUNCED DEAD (Month, Day, Year)
26. WAS CASE REFERRED TO MEDICAL EXAMINER/CORONER? (Yes or no)

CAUSE OF DEATH

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.

Approximate Interval Between Onset and Death

IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. _____
DUE TO (OR AS A CONSEQUENCE OF):

SEE INSTRUCTIONS ON OTHER SIDE

Sequentially list conditions, if any, leading to immediate cause. Enter UNDERLYING CAUSE (Disease or injury that initiated events resulting in death) LAST
b. _____
DUE TO (OR AS A CONSEQUENCE OF):
c. _____
DUE TO (OR AS A CONSEQUENCE OF):
d. _____

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
☐ Natural ☐ Pending Investigation
☐ Accident
☐ Suicide ☐ Could not be Determined
☐ 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
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 DEFINITION ON OTHER SIDE

CERTIFIER

31a. CERTIFIER (Check only one)
☐ 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.
☐ 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.
☐ MEDICAL EXAMINER/CORONER
On the basis of examination and/or investigation, in my opinion, death occurred at the time, date, and place, 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)

REGISTRAR

33. REGISTRAR'S SIGNATURE
34. DATE FILED (Month, Day, Year)

PHS-T-003

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

FIGURE 7. U.S. STANDARD CERTIFICATE OF DEATH (REVERSE SIDE)

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 13-a-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 facilty 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

CAUSE OF DEATH

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.

		Approximate Interval Between Onset and Death
IMMEDIATE CAUSE (Final disease or condition resulting in death) → a.	Rupture of myocardium	Mins.
DUE TO (OR AS A CONSEQUENCE OF):		
Sequentially list conditions, if any, leading to immediate cause. Enter UNDERLYING CAUSE (Disease or injury that initiated events resulting in death) LAST — b.	Acute myocardial infarction	6 days
DUE TO (OR AS A CONSEQUENCE OF):		
c.	Chronic ischemic heart disease	5 years
DUE TO (OR AS A CONSEQUENCE OF):		
d.		

PART II. Other significant conditions contributing to death but not resulting in the underlying cause given in Part I: Diabetes, Chronic obstructive pulmonary disease, smoking

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	30a. DATE OF INJURY (Month, Day, Year)	30b. TIME OF INJURY	30c. INJURY AT WORK? (Yes or no)	30d. DESCRIBE HOW INJURY OCCURRED
☒ Natural ☐ Pending Investigation ☐ Accident ☐ Suicide ☐ Could not be Determined ☐ Homicide		M		

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

CAUSE OF DEATH

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.

		Approximate Interval Between Onset and Death
IMMEDIATE CAUSE (Final disease or condition resulting in death) → a.	Cerebral laceration	10 mins.
DUE TO (OR AS A CONSEQUENCE OF):		
Sequentially list conditions, if any, leading to immediate cause. Enter UNDERLYING CAUSE (Disease or injury that initiated events resulting in death) LAST — b.	Open skull fracture	10 mins.
DUE TO (OR AS A CONSEQUENCE OF):		
c.	Automobile accident	10 mins.
DUE TO (OR AS A CONSEQUENCE OF):		
d.		

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	30a. DATE OF INJURY (Month, Day, Year)	30b. TIME OF INJURY	30c. INJURY AT WORK? (Yes or no)	30d. DESCRIBE HOW INJURY OCCURRED
☐ Natural ☐ Pending Investigation ☒ Accident ☐ Suicide ☐ Could not be Determined ☐ Homicide	11/15/85	1 p. M	No	2-car collision–driver

30e. PLACE OF INJURY – At home, farm, street, factory, office building, etc. (Specify): Street

30f. LOCATION (Street and Number or Rural Route Number, City or Town, State): Route 4, Raleigh, North Carolina

Figure 8. Super-MICAR Certificate Listing

```
------------------------------------------------------------------------------------------
                              Certificate Information
------------------------------------------------------------------------------------------
Certificate:  000466          Sex:   M                    Date of Death:  03/24/1993
Age:          9               Unit:  MONTHS               State of Death:

                     Conditions Causing Death             Duration:
Ia:  CRANIO-CEREBRAL INJURIES                             MINUTES
Ib:
Ic:
Id:

II:  ACUTE ALCOHOLIC INTOXICATION

Manner of Death:  1           Date of Injury:  03/24/1993  Injury at Work?:  N
Injury Description:
FELL DOWN STAIRS
Place of Injury:              Date of Surgery:

State of Occurrence:          State-Specific Data:  02
------------------------------------------------------------------------------------------
```

Figure 9. Super-MICAR Certificate Listing

```
------------------------------------------------------------------------------------------
                              Certificate Information
------------------------------------------------------------------------------------------
Certificate:  000398          Sex:   F                    Date of Death:  02/14/1993
Age:          6               Unit:  MONTHS               State of Death:

                     Conditions Causing Death             Duration:
Ia:  PROBABLE ASPHYXIA
Ib:  WATERBED ACCIDENT
Ic:
Id:

II:

Manner of Death:  1           Date of Injury:  02/13/1993  Injury at Work?:  N
Injury Description:
WATERBED ACCIDENT
Place of Injury:              Date of Surgery:

State of Occurrence:          State-Specific Data:  02
------------------------------------------------------------------------------------------
```

Figure 10. Super-MICAR Certificate Listing

```
------------------------------------------------------------------------------------------
                              Certificate Information
------------------------------------------------------------------------------------------
Certificate:  000438          Sex:   M                    Date of Death:  03/26/1993
Age:          9               Unit:  MONTHS               State of Death:

                     Conditions Causing Death             Duration:
Ia:  MULTIPLE ORGAN FAILURE                               48 HOURS
Ib:  SEPSIS                                               48 HOURS
Ic:  50% TOTAL BODY SURFACE AREA BURN                     7 WEEKS
Id:

II:

Manner of Death:  1           Date of Injury:  02/07/1993   Injury at Work?:  N
Injury Description:
PRESUMABLY CARELESS COOKING
Place of Injury:              Date of Surgery:

State of Occurrence:          State-Specific Data:  02

------------------------------------------------------------------------------------------
```

Figure 11. Super-MICAR Certificate Listing

```
------------------------------------------------------------------------------------------
                              Certificate Information
------------------------------------------------------------------------------------------
Certificate:  000005          Sex:   M                    Date of Death:  01/15/1993
Age:          77              Unit:  YEARS                State of Death:

                     Conditions Causing Death             Duration:
Ia:  HYPOTHERMIA
Ib:  ENVIRONMENTAL COLD (OUTDOOR) EXPOSURE FOLLOWING
     APPARENT FALL WITH MINOR HEAD INJURY
Ic:
Id:

II:

Manner of Death:  1           Date of Injury:              Injury at Work?:
Injury Description:

Place of Injury:              Date of Surgery:

State of Occurrence:          State-Specific Data:

------------------------------------------------------------------------------------------
```