Injury Epidemiology: Fourth Edition

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Chapter 6. NATIONAL INJURY SURVEILLANCE

The word "surveillance", with its connotation of police watching the residences of suspects, or someone's phone being tapped, may not be the best word to describe an epidemiologic activity. The epidemiologic use of the term refers to the collection of data on who, when, where, and, sometimes, how people become diseased or injured. The data are purged of individual identifiers so that the individuals involved are anonymous.

Surveillance can be used to target injury control measures if relevant circumstances and populations are specified. Identification of relatively homogeneous subsets of injuries in defined locations and populations coupled with a systematic review of Haddon's technical options for injury control (Chapter 2) can lead to substantial reductions if implemented. Some examples of the power of surveillance data in injury control are reserved for the end of Chapter 7. First, a description of some important surveillance systems is in order.

Several governmental and private agencies in the U.S. maintain surveillance systems that continually or periodically collect data on injuries. Some of these systems include data useful for more detailed study than simply following trends. The purpose of this chapter is to identify major national injury surveillance systems, note some of their strengths and weaknesses, and suggest improvements for usefulness in injury control.

The criteria for judging the adequacy of a surveillance system depend on its intended use and other possible uses (Klaucke, 1992). The measurement of trends in injuries of a given type requires that the definition of the type does not change during the period studied and, where all injuries of the type are not counted, the sampling method does not change in such a way as to alter the comparability of the count during segments of the period. For example, the International Classification of Diseases (ICD) includes two types of codes for injury, diagnosis codes -- sometimes called N-codes -- and codes for "external causes", called E-codes. Addition to the E-codes in 1968 of a category for "injuries undetermined whether accidental or purposely afflicted" resulted in a discontinuity in the trend in infant homicides. Apparently, some cases that would have been called homicide before the new category was added were placed in the undetermined category thereafter (Jason, et al., 1983). The process for updating the codes has been described elsewhere and should be read by anyone using these codes (Fingerhut and McLoughlin, 2001; Lima, 2022; World Health Organization, 2022).

As noted in Chapter 5, using surveillance or any data to correlate injuries to other factors requires attention to issues of classification and relevance to injury control. If rates are calculated, changes in the population exposed or changes in the measurement of exposure during the period examined must be considered. For example, trends in injury per population are sometimes adjusted for changes in the age distribution of the population, but not for other factors that may also have changed. Even population age adjustments can be misleading. In the cases of motor vehicle injuries or alcohol poisoning, for instance, the proportion of the population that is licensed in an age group or the age at which legal alcohol use may change such that population age adjustment is inadequate to account for changes in exposure by age. There are various issues regarding cluster analysis that are the focus of research (Yiannakoulias et al., 2007).

Finding clusters by geographic areas is of major importance in targeting certain injury control efforts. Distributions of injuries in certain regions may suggest very different priorities from those indicated by national or other larger areas. The reader may be surprised to learn, for example, during 1988-1992 drowning was the second leading cause of injury mortality in Alaska (Lincoln, et al, 1996). In one hospital in rural Ghana, burns were the second leading cause of admissions (Moch, et al., 1995). Complete counts of severe injuries during a period, rather than samples, are required to reveal clusters, particularly if the areas are small. Usually the smaller the area, the longer the period required for stable numbers.

Several sources of injury surveillance data have been evaluated on a variety of criteria including public health importance, usefulness/cost, acceptability to the persons who must record the data, timeliness of reporting, the prevalence of injuries in a defined population, sensitivity (identification of all cases), specificity (misclassification of non-cases as cases), simplicity of data collection and management, and flexibility in the inclusion of injuries not originally included (Graitcer, 1987). That evaluation is not repeated here, but each of those attributes of a surveillance system affects its use or usefulness.

GENERAL SURVEILLANCE. The National Center for Health Statistics assembles mortality records that provide information on trends and clusters of fatal injuries by age, gender, state, city, and county (Baker, et al., 1992). The data are based on death certificates that are usually filled out by physicians at the time of pronouncement of death or soon thereafter. Nosologists code the clinical nature of the injury and the area of the body injured (N-codes) and E-codes for circumstances under which the injuries occurred (N codes at WHO, 2022a and E-codes at CDC, 2022a). CDC (2022b) provides a convenient source of raw and age-adjusted injury mortality rates per population in the U.S. based on E-codes.

Researchers who investigated cases in detail question the accuracy of reporting certain types of injury on death certificates. In one state, about one in four cases of child deaths coded as intentional homicides were of questionable validity. It is unlikely that the death was intended in a variety of circumstances, e.g., that homicide was the appropriate category in the cases of pedestrians killed by hit-and-run drivers and children killed while playing with guns (Lapidus, et al., 1990). Fatal motorcycle injuries were underestimated by 38 percent on death certificates when checked against police reports (Lapidus, et al., 1994). In another state, a study of asphyxiation by food found that data on the death certificates were substantially incomplete, apparently due to the rush to complete the certificate so that the body could be released to the family (Salmi, et al., 1990). A comparison of categories of road deaths in death certificates and police reports indicates major discrepancies. Occupant deaths as a subset of motor vehicle fatalities are grossly undercounted in CDC's WISQARS (See Appendix 6-1).

The advantage of death certificate data is that they are available nationally on computers, and counts can be generated for local areas, but detailed examination of the medical examiner and coroner records is often more useful in areas where a thorough investigation is routine. In some cities or counties, an autopsy by a qualified forensic pathologist is required in cases of violent death, intentional or unintentional, but the results are usually in narrative form with no computerized coding (Raasch, 1985). The data, if coded and computerized, would be very useful for an increased understanding of injury circumstances. In many jurisdictions, however, a coroner, sometimes with no medical or other qualifications, is in charge of the investigation, which may be no more thorough than acceptance of the information on the death certificate. The wise researcher will examine the records in detail, and conduct an independent investigation of their reliability and validity, before assuming that they are coded accurately. As detailed in Appendix 6-1, death certificate data are very misleading for the study of trends in subsets of road deaths (vehicle occupants, pedestrians, bicyclists).

Hospital records are an important source of identification of severe, nonfatal injuries. The extent of use of International Classification of Diseases codes on hospital discharge records varies widely among hospitals. The National Hospital Discharge Survey conducted in 2010 provided computerized data on a national probability sample of 200,000 hospital discharges annually, including all discharges, not just those associated with injury. A new survey adds emergency department data to inpatient data (http://www.cdc.gov/nchs/nhcs.htm). Data on hospitalized injuries at the local level are available in hospitals that maintain a trauma registry, but in communities with more than one hospital, one or more may not have a registry, and the patients in those that do may not be representative of all injured patients from the area of interest

Even in hospitals where the injury coding is done systematically, the E-codes are often missing, particularly in cases with so many N-codes that there is no room for E-codes on computer files, as the data are structured (Marganitt, et al., 1990). In many cases, the medical history and notes by physicians and nurses in hospital records do not contain enough detail about the circumstances of an injury to classify it by E-code or specific geographic location.

The Council of State and Territorial Epidemiologists advocate Universal E-coding of hospital discharge records and several states now require them. The U.S. Indian Health Service routinely requires such coding in its hospitals and E-codes for injuries were found on 99.3 percent of its injury case records, although 25 percent lacked sufficient information for the validity of detailed 3-digit codes. Comparison of the codes and detailed examination of a sample of hospital records indicated excellent reliability in general categories (motor vehicle, fall) but discrepancies increased in the more refined subcategories (Smith, et al., 1990).

Although universal E-coding would provide much better information on trends and clusters of injuries by type, severity, and a few demographic characteristics, it would mainly serve as a source to identify cases of particular types of injury for more detailed investigation. Cases without E-codes are identifiable as injuries by N-codes, which are much more complete.

Since the codes are revised periodically, the researcher must be careful in examining trends in data that bridge a revision. The codes are relatively specific for some causes of injury, but in other cases, the aggregation of causes is frustrating to the researcher when more refined categories are needed. Also, new products and activities that are introduced after the latest revision will not have specific E-codes.

The available general surveillance systems of injuries that do not require hospitalization are valuable only for the indication of frequency and overall cost estimates. Given the priority to reduce death and severe injury, and the often-differing circumstances that contribute to severe and non-severe injuries, the devotion of resources to the collection of more detailed data on less severe injuries is difficult to justify. Exceptions may occur in work or other settings where very severe injuries are rare but musculoskeletal injuries result in an inability to work or drawn-out pain and suffering.

SPECIAL SURVEILLANCE SYSTEMS. Governmental agencies with statutory responsibility for monitoring certain types of injuries, or regulating products and activities that are associated with injuries, maintain special surveillance systems. Some of these provide sufficient detail for analytic as well as descriptive epidemiologic studies.

Among the best surveillance system in terms of detailed data on vehicles and vectors as well as environmental circumstances is the Fatal Analysis Reporting System (FARS) of the National Highway Traffic Safety Administration (NHTSA). Begun in 1975 as the Fatal Accident Reporting System, this system collects data on virtually all fatalities related to motor vehicles that occur on public roads in the U.S. for cases in which the fatally injured person died within 30 days. Most of the data are from police reports, but additional information is included from motor vehicle licensing agencies, hospitals, and coroners or medical examiners. (See ftp://ftp.nhtsa.dot.gov/fars/ to download annual datasets). The categories for some variables have changed from time to time so the user is warned to check them carefully before doing year-to-year comparisons or pooling data from more than one year. The completeness and accuracy of FARS data are specific to each variable and vary among states and over time for some variables. For example, the measurement of blood alcohol concentration of fatally injured drivers increased in the 1980s and was completed for more than 80 percent of such drivers in more than half of the states since 1984 (National Highway Traffic Safety Administration, 1988). In years and states where blood alcohol is not tested as systematically, the possibility of bias in the selection of those tested is of concern. NHTSA uses imputation methods to infer alcohol, or lack thereof, in missing cases. Such methods may be useful to gain a more accurate description of alcohol involvement but should not be used in causal analysis. To the extent that causal factors are used in the imputation, the reasoning is circular.

Speeds of vehicles in crashes are missing in more than half of FARS cases and, where it is found, the reliability is questionable. Belt use of survivors is overstated and police may assume that an ejected occupant was unbelted when in fact the person slipped out of the belt in a spinning or rolling vehicle. Faultfinding by police is also questionable since such judgments are made after the fact of the crash and may be based on reports by biased or unreliable eyewitnesses or a lack of knowledge of vehicle factors and conditions. For example, the driver may be blamed for a rollover that would not have happened if the vehicle were more stable, or a mechanical failure may be obscured by the destruction of evidence by crash forces.

An unusual attribute of the NHTSA files, FARS, and others, is the specificity of vehicle information. Codes for vehicle makes and models, as well as vehicle identification numbers that can be decoded as to make and model and other characteristics of the vehicle, are included in the data. When matched with data on vehicles in use by make and model, this allows characteristics of specific vehicles, coded in the vehicle identification number or obtained from other sources, to be examined regarding correlation to fatal injuries as illustrated in Appendices in this book.

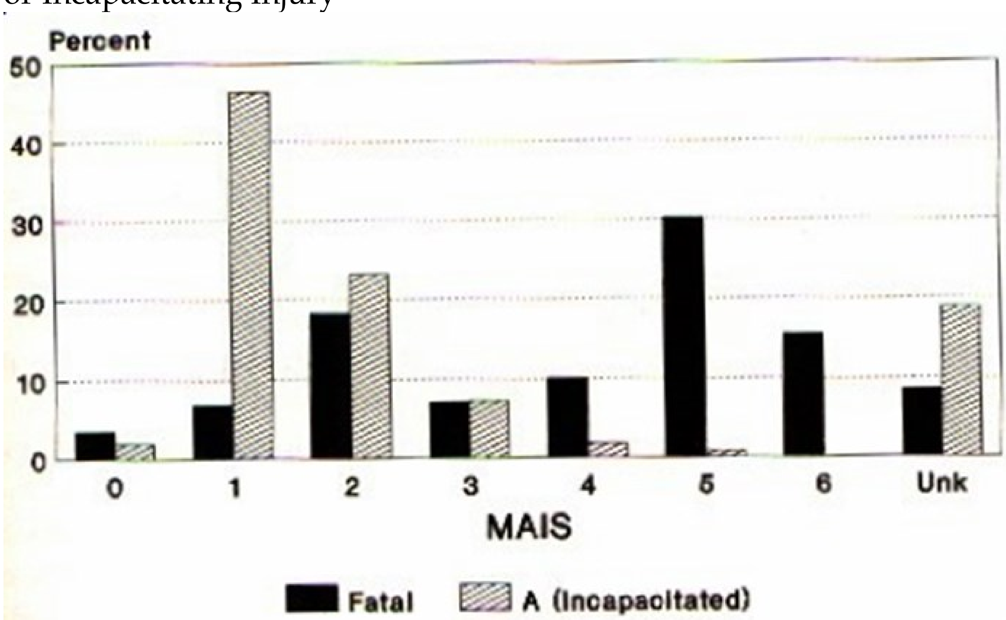
A system with data more detailed than that in FARS, but based on a sample of motor vehicle crashes on public roads where the vehicle was towed from the scene and the crash was reported to police, is the Crash Report Sampling System (Zhang, et al., 2019). The data are segmented into numerous files that require extensive matching to study specific issues. The number of vehicles in the sample by make, model, and model year is too small to investigate most vehicle-related issues.).

The data in Crash Report Sampling System files include more detail on injuries than FARS, including injuries by area of the anatomy, abbreviated injury scores, and injury severity scores but their use for analytic studies is dubious given the potential biases in sampling as well as substantially missing data on key variables that will be noted in subsequent chapters. The same problems in many variables in FARS are also present in the Crash Report Sampling System files such as missing alcohol and speed data and falsely classified seat-belt use.

Since is based on a sample of a limited number of cases (about 2700 crashes are in the 2018 sample), it is not useful for local injury surveillance unless the area of interest is in one of the sampling areas. Most states and many smaller jurisdictions have computerized files of motor vehicle cases investigated by police. Injury codes in these state and local files are not considered refined enough for adequate indication of injury severity other than death. There are too many cases in which a bloody but superficial cut is coded as severe, while in other cases a person with a severe internal injury is coded at the scene as suffering a non-severe injury. In a comparison of police rating of injury and hospital records of children struck as pedestrians or bicyclists, for example, the Injury Severity Score ranged from 0 to 30 in the least severe police code and 1 to 40 in the most severe nonfatal code (Agran, et al., 1990).

The police in most states use A, B, and C as codes for more to less serious injury in addition to K for persons killed. Figure 6-1 shows the distribution of fatal and A ("incapacitated") injury by the clinically-based maximum abbreviated injury score of passenger car and light truck drivers in the National Automotive Sampling System, a predecessor of the Crash Report Sampling System. The deaths increase with injury severity but the police judgments of "incapacitating" injury are not reflective of injury severity. Almost half had a maximum abbreviated injury score of less than 2. Selecting cases based on police codes of injury is unwise.

Figure 6-1. Maximum Abbreviated Injury Score Compared to Police Codes of Fatal or Incapacitating Injury



Some researchers combine fatal and "A" injuries in their studies which likely biases the results.

Police files are used in some areas for the identification of clusters of crashes on sections of roads, but the clusters of all reported crashes do not necessarily reflect the sites of the more severe injuries. A system still used in several states weights a fatal crash as only 9.1 times as important as a crash that only involved property damage (Federal Highway Administration, 1981). Site modifications based on such systems are too often directed to sites where crashes without injury are frequent, at the neglect of sites where severe injuries are clustered.

Beginning in 1988, the National Highway Traffic Safety Administration initiated a program to sample a larger number of police-reported crashes among the states. Called the General Estimates System (GES), it is an area probability sample of crashes reported to police throughout the country (National Highway Traffic Safety Administration, 1990). The data are exclusively those recorded by police. The advantage of the sample is the larger number of cases (about 50,000 per year) compared to the Crash Report Sampling System. The disadvantage is that the data on injury have not been augmented from other sources, and suffer from poor indicators of injury severity in all police data. Also, the vehicle identification number is missing in a third of the cases.

The National Poison Data System (NPDS) consists of data on queries from the public regarding a wide variety of potential and actual chemical exposures (household cleaning substances, cosmetics, drugs, spills, etc.) from local poison control centers. It is maintained by the Centers for Disease Control and Prevention. Annual reports can be viewed at: http://www.aapcc.org/annual-reports/. The NPDS has some value as an alert system for public health practitioners to identify emerging problems but it is of dubious value to epidemiologists. Since it is based on voluntary reports by the public, there are no systematic sampling design or severity criteria for a case to be included in the system. It appears that opioid poisonings are not commonly reported to poison control centers. They are not listed among the most frequent exposures. Forty-two percent of the calls in 2020 were about risks to children 0-5 years old.

The Substance Abuse and Mental Health Services Administration initiated an emergency room surveillance system using data from a structured sample of non-federal hospitals called DAWN. The system was abandoned after 4 years. About 45 percent of cases in 2011 were "adverse effects" compared to 8.5 percent classified as overmedication. CDC initiated a drug overdose reporting system in 2016 that included data in 47 states by 2022. The data are collected on drug-related deaths from death certificates, coroner/medical examiner reports, and toxicology. (https://www.cdc.gov/drugoverdose/od2a/pdf/SUDORS-Fact-Sheet.pdf).

Traumatic brain injuries (TBI) are given special attention because of the long-term consequence for those that survive. Too often, researchers accept the data uncritically when estimating the extent of the problem (e.g., Faul, et al., 2010). Attention to the problem has been enhanced by allegations by families of famous National Football League (NFL) players who developed numerous neurological problems in later life and whose brains showed damage at autopsy. In 2008, wives of damaged NFL players further publicized the issue when they were denied access to an NFL meeting. Self-reported emergency room visits for TBI increased dramatically during 2008-2010 in a national survey, probably a result of continued media stories about football injuries but also because of state laws requiring that concussions in high school sports be seen by medical professionals. Actual hospitalizations for TBI remained steady during the period while deaths attributed to TBI declined (Figure 6-2). Hospitalizations are likely the most accurate, particularly concerning TBI from exposure to nonlethal energy insults. Deaths attributed to brain injury are by far more common in car crashes where the energy exchange is usually much more violent than in sports. As noted previously, car crash fatalities, not just those attributable to TBI, declined.

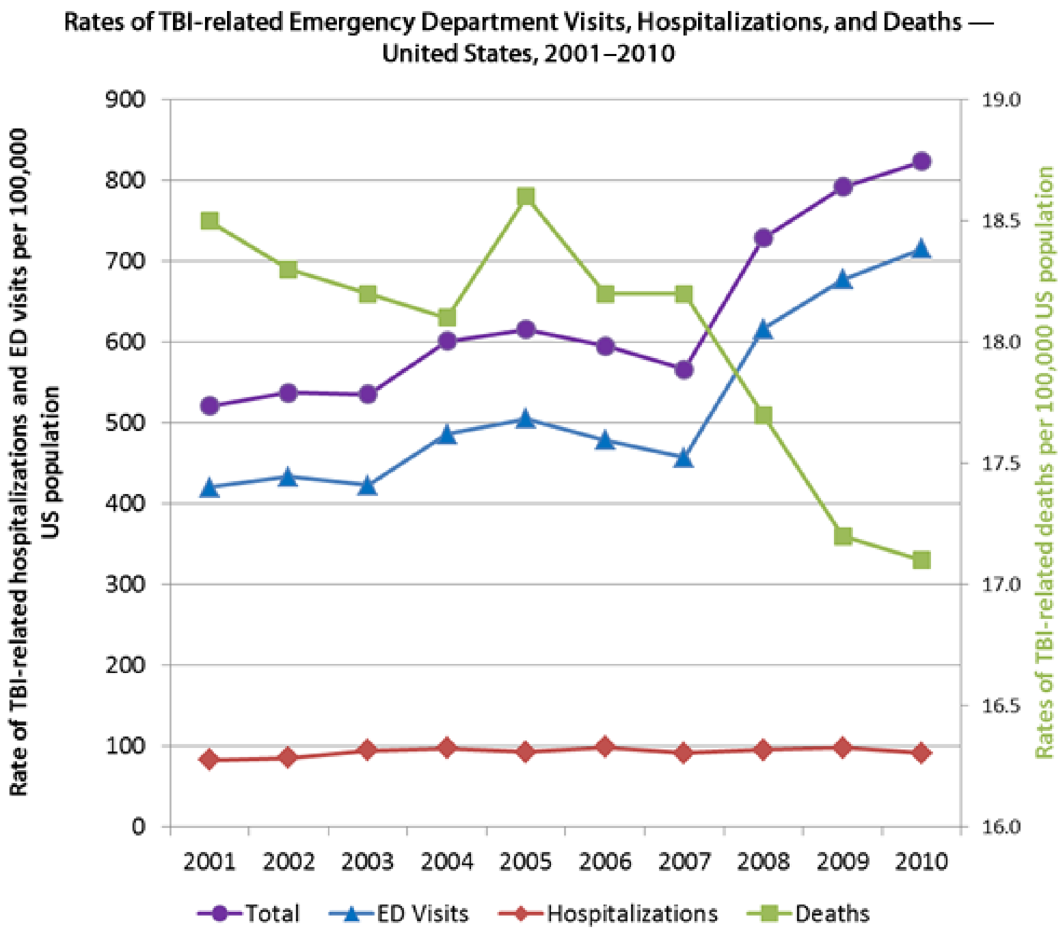


Figure 6-2. Self-reported emergency visits, actual hospital discharges, and deaths attributed to traumatic brain injury. Source: http://www.cdc.gov/traumaticbraininjury/data/rates.html

The Federal Bureau of Investigation (FBI) collects data from local police on several crimes, including assaults reported to the police and criminal homicides in its uniform crime reporting system (See: https://www.fbi.gov/how-we-can-help-you/need-an-fbi-service-or-more-information/ucr). Comparison of death certificates and deaths attributed to homicide in the FBI system indicate about 9 percent fewer homicides in the FBI files, at least partly because presumed non-criminal homicides, such as a felon killed by a law enforcement officer, are not included, and 4 percent of local jurisdictions do not report to the FBI (Rokaw, et al., 2006).

The FBI data include valuable information on trends in weapons used, demographic characteristics of victims, and relationship to assailants when known, but no data on the nature of the injuries. Medical examiner or coroner files can be used to identify homicide cases at the local level and are usually adequate for indicating trends, or clusters in certain neighborhoods, bars, or other places.

More detailed data on homicides and suicides have been collected in 6 states for the National Violent Death Reporting System since 2003 by the Centers for Disease Control and Prevention (Steenkamp, et al., 2006). Now truly "National", the data are collected from all 50 states. Data in the system are substantially more accurate than death certificate data. A study of unintentional shootings of children during 2005-2012 found eighty percent more cases in the system compared to death certificate data in the same states (Hemenway and Solnick, 2015).

Since nonfatal assaults are often not reported to police, ongoing interview surveys of the population -- the National Crime Victimization Surveys -- are sometimes used as sources of data on trends and some of their correlates. The trends in assault rates per population from the FBI reports and the Crime Surveys moved in opposite directions during 1974-1988, apparently because of increased reporting of assaults to the police (Jencks, 1991). Similar differences have been reported in other countries (Shepherd and Sivarajasingam, 2005). Data on the nature and severity of injury are inadequate in the surveys and children younger than 12 years are not interviewed. These files are available at http://www.bjs.gov/index.cfm?ty=daa. Households are interviewed seven times and then replaced in the sample. Before using the data, consultation with experts familiar with the files is recommended

Hospital records are the best source of serious nonfatal assault cases at the local level, although assaults are probably underestimated by these sources. The inaccuracy spills over into other categories. Assaults are sometimes reported to hospital personnel as falls or gun "accidents".

Surveillance of suicides is based on death certificates (Centers for Disease Control, 1986). Since there may be a doubt as to intent in some cases and pressure to protect families in others, the numbers recorded as suicides are thought to be an undercount. Nonfatal suicide attempts in hospital records are subject to substantial misidentification as "accidents" for the same reasons. Studies of gender and racial differences in suicides indicate that suicide classification is also biased by the means used among different gender and racial groups (Rockett, 2017). Because suicides can also cluster, apparently from imitative behavior, the Centers for Disease Control urges local communities to establish means of monitoring suicides and attempts, but the extent to which this is done is unknown.

The Substance Abuse and Mental Health Services Administration supports the Suicide Prevention Resource Center which provides grants for local suicide surveillance (http://www.sprc.org/grantees/core-competencies/data).

The Bureau of Labor Statistics (BLS) conducts an annual survey of employer summaries of injuries that meet reporting regulations according to standards of the Occupational Safety and Health Administration (OSHA). The evidence of under-reporting in some cases and over-reporting in others, as well as the lack of detail on machines, work practices, or worker characteristics, severely limits the usefulness of the data (Panel on Occupational Safety and Health Statistics, 1987).

Users of these data should be aware that some of the categories do not make any sense clinically. For example, repetitive motion injuries are classified as an illness, unless they result in back strain, which is always called injury. (OSHA data are available at: http://www.osha.gov/oshstats/work.html)

BLS collects more detailed data on worker injuries in industries subject to worker compensation laws from the workers' compensation records. (Data are available at: http://www.bls.gov/iif/home.htm). Important variables such as the nature of the injury, body part affected, occupation, and aspects of circumstances are included routinely, but others such as age, time of injury relative to time work began, and extent of disability, are optional. Lost work time is a misleading indication of severity because it is strongly related to maximum compensation in a given state for certain injuries (Robertson and Keeve, 1983). Also, industries and even plants within the same company vary in the practice of assigning workers to other duties that can be performed after certain injuries, as opposed to having the worker take time off until he or she can return to regular duties.

The National Institute for Occupational Safety and Health (NIOSH) attempted to estimate fatal occupational injuries in its National Traumatic Occupational Fatality database (Centers for Disease Control, 1987), but the case identification was dependent on accurate coding of occurrence at work. The system was discontinued in 1995. Whether or not a death is work-related is supposed to be recorded on the death certificate but the data is often missing. Fatal injuries in agriculture, for example, were undercounted by 20 percent when compared to independent sources (Murphy, et al., 1990). One study that identified cases of fatal farm injuries from both death certificates and newspaper clippings found 14 percent in newspaper clippings that were not identified in death certificates (Hayden, et al., 1995), and newspaper clippings are undoubtedly incomplete.

Investigation of the adequacy of death certificates at the local level is recommended before they are used. Similarly, hospital records often do not contain data on the place of injury. Also, non-hospitalized emergency-room records are inadequate for case-finding of worker injuries because some larger industries have clinics to treat less serious injuries.

The U.S. Consumer Product Safety Commission (CPSC) uses a sample of hospital emergency rooms and also uses death certificates to identify trends in product-related injuries and emerging problems. Major products were excluded at the outset – alcohol, motor vehicles, and firearms – but assaults and motor-vehicle injuries, as well as injuries such as falls with no mention of a product, were added in 2000. (https://www.cpsc.gov/research-and-reports-overview). Occasional special studies are conducted, such as the all-terrain-vehicle (ATV) case discussed in Chapter 5. In the general survey and specific studies, brand names and models of the products are not identified, precluding the comparison of injury incidence and severity by product characteristics. The sample of hospitals is small relative to the number in the country, and cannot be used for the identification of local injury clusters

The National Fire Data Center collects data based on reports from local fire marshals. Several important aspects of these data are computerized, including location, date, the response time of the fire department, type of construction, and type of injury. A detailed comparison of these records and death certificates, coroner or medical examiner records, and hospital records is needed to determine the completeness and reliability of reporting. (For data and links, see: https://www.usfa.fema.gov/nfirs/applications/)

The Coast Guard maintains records of deaths and some injuries related to the use of boats. Probably no more than 10 percent of nonfatal injuries related to boat use are reported to the Coast Guard. The data include boat type, "cause of accident" and alleged alcohol use as well as demographic variables. The data on "causes" may not be reliable and alcohol use is usually not confirmed by toxicological tests. A study of the completeness of reporting of deaths, and the reliability of other codes, should be undertaken before using these data. For Coast Guard reports on injury, see http://www.uscgboating.org/statistics/accident_statistics.php.

APPENDIX 6-1. FARS VS. WISQARS

The two major sets of data on road deaths use different sources and criteria for inclusion. The information on road deaths in the Fatality Analysis Reporting System (FARS) is based on police reports for case identification and crash scene data, supplemented by data from medical examiners or coroners and motor vehicle licensure files. Injured persons who die more than 30 days after the injury are not included (NHTSA, 2022). The Web-based Injury Statistics Query and Reporting System (WISQARS, 2022) is based on death certificates and places no limit on the time between injury and the time of death. Therefore, there should be more road death cases per year in WISQARS than in FARS. In the aggregation of all cases, that is true as indicated in Figure 6-3.

When subsets of the data are examined, however, a different picture emerges. Looking at vehicle occupants, pedestrians, pedal cyclists, and motorcyclists separately, major gaps and inconsistencies appear. Figure 6-4 displays the deaths attributed to vehicle occupants in the two files. Vehicle occupant deaths are undercounted in WISQARS by more than 10,000 per year. Apparently, death certificates do not contain adequate information to identify vehicle occupants in many cases. CDC dumps the cases where circumstances are unknown into an "unspecified" category. Several years ago, I suggested to CDC that they include a warning in WISQARS that the subsets were not accurate, or just report the total road deaths, but the suggestion was ignored.

Figure 6-3. Road Deaths Reported in FARS and WISQARS, 2011-2020

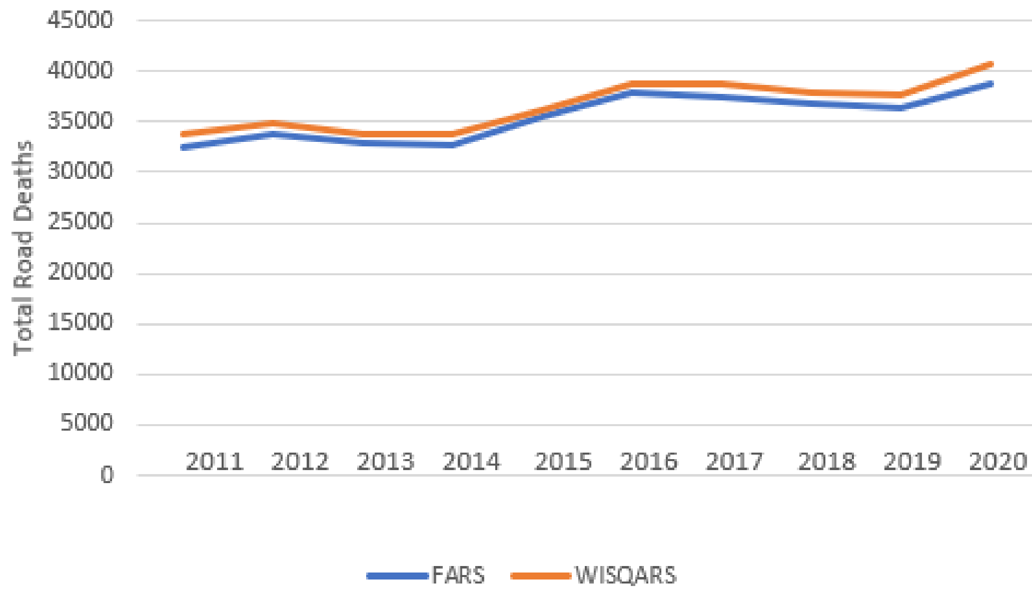


Figure 6-4. Vehicle occupant deaths included in FARS and WISQARS, 2011-2020.

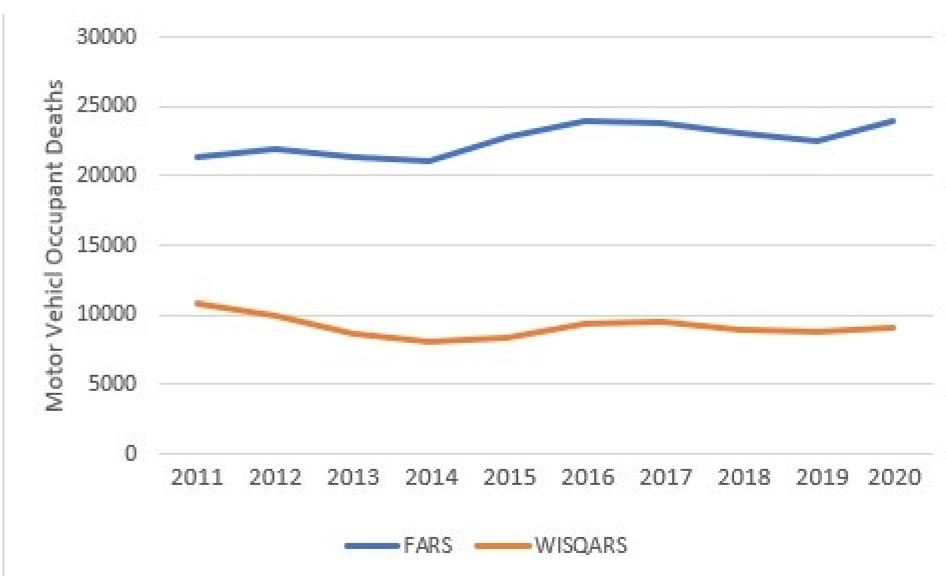


Figure 6-5. Pedestrian deaths included in FARS and WISQARS, 2011-2020.

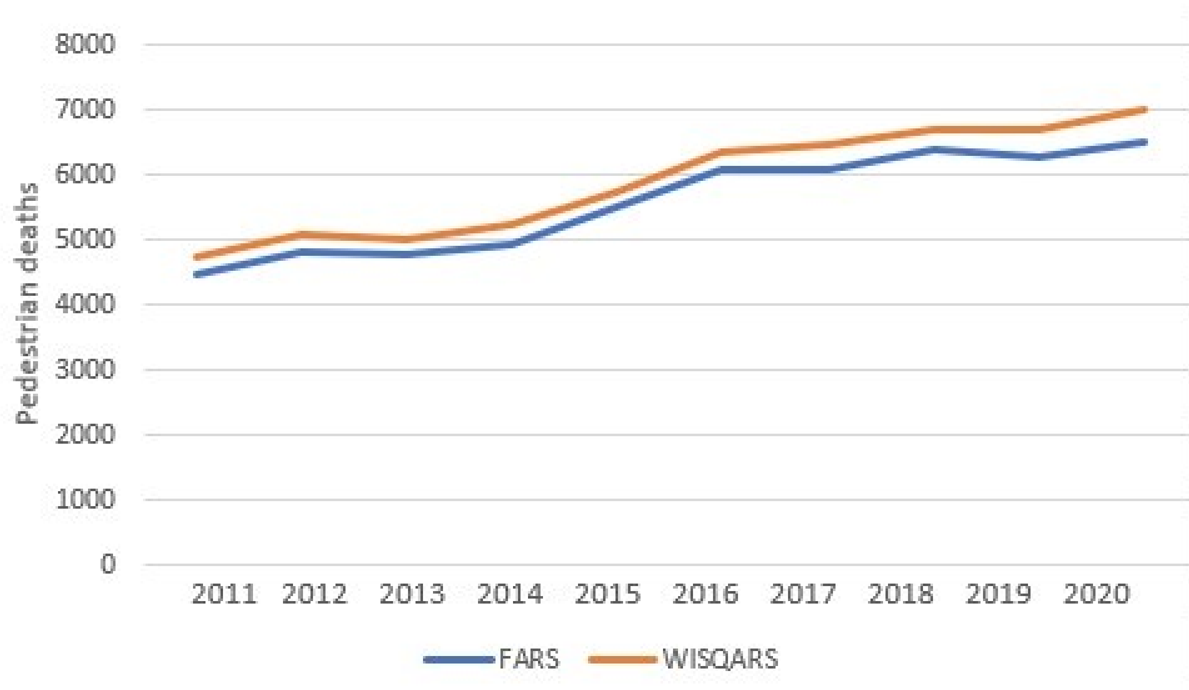


Figure 6-6. Pedal cyclist deaths included in FARS and WISQARS, 2011-2020.

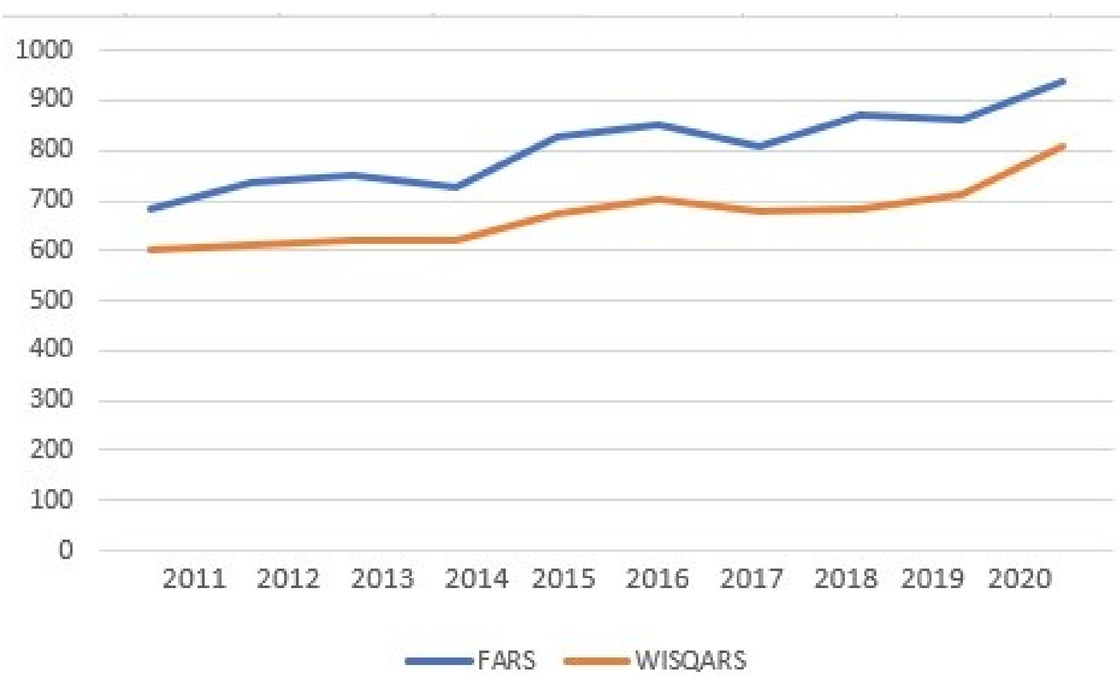
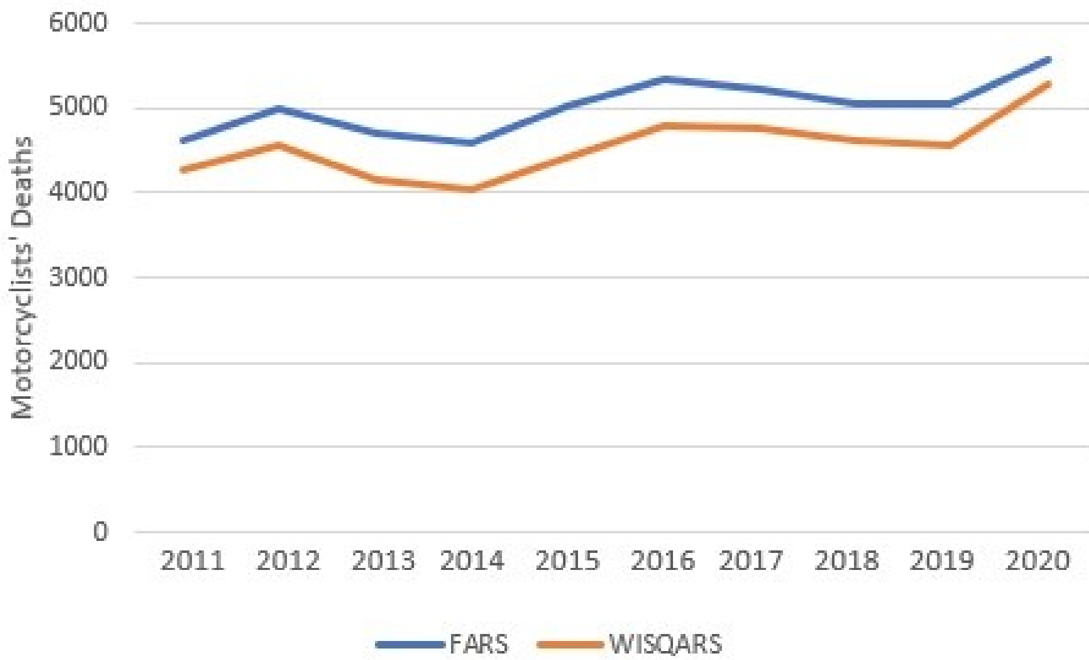


Figure 6-7. Motorcyclist deaths included in FARS and WISQARS, 2001-2015.



The FARS and WISQARS files are in closer agreement regarding pedestrian deaths (Figure 6-5) with WISQARS more consistently higher. Pedal cyclists' and motorcyclists' deaths in collisions with motor vehicles are substantially undercounted in WISQARS (Figures 6-6 and 6.7). These results suggest that WISQARS is not a useful analytic tool for subsets of road deaths. While it illustrates that there are deaths that occur more than a month after the initial injuries, the lack of data on circumstances renders the data useless. A similar conclusion can be drawn from a comparison of homicides reported by the U.S. Department of Justice and WISQARS (Bureau of Justice Statistics, 2014).

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