

Washington State Department of Health
CENTER FOR HEALTH STATISTICS

Washington State Death File 2017

DATA USERS' GUIDE

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Washington State Department of Health, Center for Health Statistics is responsible for the collection, data quality assurance, and dissemination of preliminary and final vital statistics data sets in Washington State.

Center for Health Statistics is the only entity with authority to release vital statistics data files. Please do not share these data files with other agencies or members of the public. Instead, please direct them to <https://www.doh.wa.gov/DataandStatisticalReports/HealthStatistics/Death> so that they can obtain data files from our office.

The purpose of the current document is to provide an overview of the following topics to **death data** users:

- a) The collection and processing of death data in Washington State,
- b) The impact of our transition to our new data management system (WHALES) on data analysis,
- c) Known data quality issues that we are in the process of addressing,
- d) Notes on how key variables in the data set are derived.

1. General information about 2017 deaths

In 2017 there were 58,385 deaths including those that occurred in Washington State (regardless of decedents' state of residence) or among Washington State residents (regardless of state of occurrence). The distribution of deaths is as follows:

57,012 deaths among Washington residents:

- 55,640 WA resident deaths occurred in state
- 1,372 WA resident deaths occurred out of state

1,338 deaths among out of state residents occurred in Washington State

In comparison, there were 56,069 in 2016 of which 54,748 were among Washington State residents.

At the time of the release of final 2017 death data set there were 23 deaths with manner of death still listed as "pending" by the death certifier.

As required by our agreement with NCHS the death data files do not include information on where death occurred for Washington State residents who die out of state. We include deaths occurring in Washington State among out of state residents.

2. Differences between Death Statistical, Cause of Death Literals, Names, Geocode, and Quarterly files

The Death Statistical, Cause of Death Literals, Geocode, and Names Files contain **final data** for a given calendar year. They differ in the variables and decedent population they include. The Quarterly Files contain **provisional data** for the most recent quarter and are more likely to have missing or incomplete information e.g. cause of death information for external causes. Table 1 highlights the differences between the files.

Table 1. Similarities and differences between death data files

	Statistical	Cause of Death Literals	Names	Geocode
File type/release schedule	Final annual & quarterly preliminary			
Variable	X = present in file			
State File Number	X	X	X	X
Social Security Number			X	
Decedent Last Name			X	
Decedent First Name			X	
Decedent Middle Name			X	
Decedent Suffix			X	
Sex	X		X	
Age Unit	X		X	
Age	X		X	
Age Years	X			
Date of Birth	X		X	
Date of Birth - Month	X		X	
Date of Birth - Day	X		X	
Date of Birth - Year	X		X	
Date of Death	X		X	
Date of Death - Month	X		X	
Date of Death - Day	X		X	
Date of Death - Year	X		X	
Date of Death Modifier	X			
Time of Death - Hour	X			
Time of Death - Minutes	X			
Time of Death Modifier	X			
Birthplace State FIPS Code	X			
Birthplace Country	X			
Death City	X			
Death County	X		X	
Death County City WA Code	X			
Death County WA Code	X			
Death State	X			
Death Zip Code	X			
Place of Death Type	X			
Death Facility	X			
Armed Forces	X			
Marital Status	X			
Education	X			
Education 8 or Less	X			
Occupation	X			
Occupation Milham	X			

	Statistical	Cause of Death Literals	Names	Geocode
Industry	X			
Informant Relationship	X			
Race White	X			
Race Black	X			
Race Amer Indian Alaskan	X			
Race Asian Indian	X			
Race Chinese	X			
Race Filipino	X			
Race Japanese	X			
Race Korean	X			
Race Vietnamese	X			
Race Other Asian	X			
Race Hawaiian	X			
Race Guamanian or Chamorro	X			
Race Samoan	X			
Race Other Pacific Islander	X			
Race Other	X			
Race Tribe First	X			
Race Tribe Second	X			
Race Other Asian First	X			
Race Other Asian Second	X			
Race Other PI First	X			
Race Other PI Second	X			
Race Other First	X			
Race Other Second	X			
Bridge Race	X			
Race Summary Code	X			
Race Calculation	X			
Hispanic No	X			
Hispanic Mexican	X			
Hispanic Puerto Rican	X			
Hispanic Cuban	X			
Hispanic Other	X			
Hispanic NCHS Bridge	X			
Residence Street	X		X	
Residence City	X		X	
Residence City FIPS Code	X			
Residence City Limits	X			
Residence County	X		X	
Residence County City WA Code	X			X
Residence County WA Code	X			X
Residence County FIPS Code				
Residence State			X	
Residence State FIPS Code	X			
Residence Zip Code	X		X	X
Res Geo Source				X
Res Geo Match Score				X
Residence Latitude				X

	Statistical	Cause of Death Literals	Names	Geocode
Residence Longitude				X
Res Geo School District				X
Res Geo Census Tract 2000				X
Res Geo Census Block Grp 2000				X
Res Geo Census Block 2000				X
Res Geo ZCTA 2000				X
Res Geo Census Tract 2010				X
Res Geo Census Block Grp 2010				X
Res Geo Census Block 2010				X
Res Geo ZCTA 2010				X
Res Tribal Reservation Code	X			
Residence Length Units	X			
Residence Length	X			
Funeral Home Name	X			
Disposition	X			
Disposition Date	X			
Disposition Date - Month	X			
Disposition Date - Day	X			
Disposition Date - Year	X			
Disposition Place Name	X			
Certifier Designation	X			
ME Coroner Referred	X			
Cause of Death Line A		X		
Cause of Death Line B		X		
Cause of Death Line C		X		
Cause of Death Line D		X		
Interval Line A		X		
Interval Line B		X		
Interval Line C		X		
Interval Line D		X		
Conditions Part II		X		
ACME Line 1	X			
ACME Line 2	X			
ACME Line 3	X			
ACME Line 4	X			
ACME Line 5	X			
ACME Line 6	X			
ACME Line 7	X			
ACME Line 8	X			
ACME Line 9	X			
ACME Line 10	X			
ACME Line 11	X			
ACME Line 12	X			
ACME Line 13	X			
ACME Line 14	X			
ACME Line 15	X			
ACME Line 16	X			
ACME Line 17	X			

	Statistical	Cause of Death Literals	Names	Geocode
ACME Line 18	X			
ACME Line 19	X			
ACME Line 20	X			
ACME Sequence 1	X			
ACME Sequence 2	X			
ACME Sequence 3	X			
ACME Sequence 4	X			
ACME Sequence 5	X			
ACME Sequence 6	X			
ACME Sequence 7	X			
ACME Sequence 8	X			
ACME Sequence 9	X			
ACME Sequence 10	X			
ACME Sequence 11	X			
ACME Sequence 12	X			
ACME Sequence 13	X			
ACME Sequence 14	X			
ACME Sequence 15	X			
ACME Sequence 16	X			
ACME Sequence 17	X			
ACME Sequence 18	X			
ACME Sequence 19	X			
ACME Sequence 20	X			
ACME Cause Category 1	X			
ACME Cause Category 2	X			
ACME Cause Category 3	X			
ACME Cause Category 4	X			
ACME Cause Category 5	X			
ACME Cause Category 6	X			
ACME Cause Category 7	X			
ACME Cause Category 8	X			
ACME Cause Category 9	X			
ACME Cause Category 10	X			
ACME Cause Category 11	X			
ACME Cause Category 12	X			
ACME Cause Category 13	X			
ACME Cause Category 14	X			
ACME Cause Category 15	X			
ACME Cause Category 16	X			
ACME Cause Category 17	X			
ACME Cause Category 18	X			
ACME Cause Category 19	X			
ACME Cause Category 20	X			
ACME Nature of Injury Flag 1	X			
ACME Nature of Injury Flag 2	X			
ACME Nature of Injury Flag 3	X			
ACME Nature of Injury Flag 4	X			
ACME Nature of Injury Flag 5	X			

	Statistical	Cause of Death Literals	Names	Geocode
ACME Nature of Injury Flag 6	X			
ACME Nature of Injury Flag 7	X			
ACME Nature of Injury Flag 8	X			
ACME Nature of Injury Flag 9	X			
ACME Nature of Injury Flag 10	X			
ACME Nature of Injury Flag 11	X			
ACME Nature of Injury Flag 12	X			
ACME Nature of Injury Flag 13	X			
ACME Nature of Injury Flag 14	X			
ACME Nature of Injury Flag 15	X			
ACME Nature of Injury Flag 16	X			
ACME Nature of Injury Flag 17	X			
ACME Nature of Injury Flag 18	X			
ACME Nature of Injury Flag 19	X			
ACME Nature of Injury Flag 20	X			
Underlying COD Code	X		X	
Record Axis Code 1	X			
Record Axis Code 2	X			
Record Axis Code 3	X			
Record Axis Code 4	X			
Record Axis Code 5	X			
Record Axis Code 6	X			
Record Axis Code 7	X			
Record Axis Code 8	X			
Record Axis Code 9	X			
Record Axis Code 10	X			
Record Axis Code 11	X			
Record Axis Code 12	X			
Record Axis Code 13	X			
Record Axis Code 14	X			
Record Axis Code 15	X			
Record Axis Code 16	X			
Record Axis Code 17	X			
Record Axis Code 18	X			
Record Axis Code 19	X			
Record Axis Code 20	X			
Autopsy	X			
Autopsy Available	X			
Pregnancy	X			
Tobacco	X			
Manner	X			
Injury Description		X		
Date of Injury	X			
Date of Injury - Month	X			
Date of Injury - Day	X			
Date of Injury - Year	X			
Injury Date Modifier	X			
Time of Injury - Hour	X			

	Statistical	Cause of Death Literals	Names	Geocode
Time of Injury - Minutes	X			
Time of Injury Modifier	X			
Injury Place	X	X		
Injury ACME Place	X			
Injury City	X			
Injury County City WA Code	X			
Injury County WA Code	X			
Injury County	X			
Injury State	X			
Injury Zip Code	X			
Injury at Work	X			
Injury Transportation	X			
Date Received	X			
Local File Number	X			
Funeral Home Code	X			
Disposition Facility Code	X			
Drug All	X			
Opioid	X			
Heroin	X			
Natural Semisynthetic Opioid	X			
Methadone	X			
Synthetic Opioid	X			
Cocaine	X			
Prescription Opioid	X			
Psychostimulant	X			
Suicide All	X			
Suicide firearm	X			
Suicide Asphyxia	X			
Suicide Poisoning	X			
Suicide Other	X			
Firearm All	X			
Firearm Unintentional	X			
Firearm Homicide	X			
Firearm Undetermined	X			
Firearm Suicide	X			
Firearm Legal	X			
Malignant Neoplasm	X			
Heart Disease	X			
Alzheimers	X			
Unintentional Injury	X			
Chronic Lower Respiratory	X			
Cerebrovascular Disease	X			
Diabetes	X			
Chronic Liver Disease	X			
Influenza Pneumonia	X			
Parkinsons	X			
Essential Hypertension	X			
Pneumonitis	X			

3. Discontinuation of Washington State Opioid Death file

We are discontinuing the production of Washington State Opioid Death file as created for 1995-2015 deaths. In the coming months we will be evaluating the best way to produce data on this issue. We have created a number of opioid overdose death flags in the 2017 death files that are consistent with definitions created by the Centers for Disease Control and Prevention (CDC). Data users can find additional information about these and other disease flags in section 8 of this guide.

4. Collection and processing of death data

Typically, when a person dies of natural causes, the death registration process begins when a family member, friend, or staff person at a healthcare or long term care facility informs a funeral home of the death. The funeral home collects the information listed in Figure 1 (see below). The funeral home communicates this information to the decedent's health care provider through the Washington Electronic Death Registration System (EDRS). The health care provider, medical examiner, or coroner uses information in the decedent's medical record to submit the information requested on the medical portion or Part II of the death certificate (figure 2) including the cause of death.

Figure 1. Death Certificate – Part 1

**Washington State Death Worksheet
Electronic Death Registration System (EDRS)**

***Required Information**

*First Name		Middle Name	*Last Name		Suffix
*Gender <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Unknown	*County of Death		*Date of Death How Determined <input type="checkbox"/> Actual <input type="checkbox"/> Found	Time of Death How Determined <input type="checkbox"/> Actual <input type="checkbox"/> Found	
*Date of Birth (MM/DD/YYYY) <input type="checkbox"/> Unknown		*Reported Age <input type="checkbox"/> Unknown <input type="radio"/> 1 Year or more _____ Years <input type="radio"/> Less than 1 Year _____ Months _____ Days _____ Hours _____ Minutes			
*Social Security Number <input type="checkbox"/> Reason Not Available <input type="checkbox"/> None <input type="checkbox"/> Unknown <input type="checkbox"/> Not Obtainable		Any Aliases? First Name Middle Name Last Name Suffix			
*Hispanic Ethnicity <input type="checkbox"/> Unknown <input type="checkbox"/> Sought, but Unknown, <input type="checkbox"/> Refused, <input type="checkbox"/> Not obtainable <input type="checkbox"/> No Response <input type="checkbox"/> No, Not Spanish/Hispanic/Latino <input type="checkbox"/> Yes (Choose all that apply) <input type="checkbox"/> Mexican, Mexican American, Chicano <input type="checkbox"/> Puerto Rican <input type="checkbox"/> Cuban <input type="checkbox"/> Other Spanish/Hispanic/Latino _____		*Race <input type="checkbox"/> Unknown <input type="checkbox"/> Sought, but Unknown, <input type="checkbox"/> Refused, <input type="checkbox"/> Not obtainable (Choose all that apply) <input type="checkbox"/> White <input type="checkbox"/> Black or African American <input type="checkbox"/> American Indian/Alaskan Native _____ <input type="checkbox"/> Asian Indian <input type="checkbox"/> Chinese <input type="checkbox"/> Filipino <input type="checkbox"/> Japanese <input type="checkbox"/> Korean <input type="checkbox"/> Vietnamese <input type="checkbox"/> Other Asian _____ <input type="checkbox"/> Native Hawaiian <input type="checkbox"/> Guamanian or Chamorro <input type="checkbox"/> Samoan <input type="checkbox"/> Other Pacific Islander _____ <input type="checkbox"/> Other _____			
*Place of Birth <input type="checkbox"/> Birth Place Unknown	Country	State	County	City	
*Place of Residence	Country	Street	Unit	City	State Zip County
*Estimate Length of Time at Residence <input type="radio"/> 1 Year or more _____ Years <input type="radio"/> Less than 1 Year Months _____ Days _____ <input type="radio"/> Unknown		*Inside City Limits? <input type="radio"/> No Response <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown		Reside on Tribal Reservation? <input type="radio"/> No Response <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown	
*Education <input type="checkbox"/> 8 th grade or less (Specify) _____ <input type="checkbox"/> 9 th -12 th grade; no diploma <input type="checkbox"/> High school graduate or GED completed <input type="checkbox"/> Some college credit, but no degree <input type="checkbox"/> Associate degree (e.g., AA, AS) <input type="checkbox"/> Bachelor's degree (e.g., BA, AB, BS) <input type="checkbox"/> Master's degree (e.g., MA, MS, MEng, Med, MSW, MBA) <input type="checkbox"/> Doctorate (e.g., PhD, EdD or Professional degree (e.g., MD, DDS, DVM, LLB, JD))		*Usual Occupation (DO NOT enter RETIRED) *Business/Industry (DO NOT use COMPANY NAME)			
*Was Decedent ever in U.S. Armed Forces? <input type="radio"/> No Response <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown		*Marital Status at Time of Death <input type="checkbox"/> Never Married <input type="checkbox"/> Divorced <input type="checkbox"/> Unknown <input type="checkbox"/> Married <input type="checkbox"/> Widowed <input type="checkbox"/> Domestic Partner <input type="checkbox"/> Separated Surviving Spouse or Domestic Partner Name (give name prior to first marriage)			
*Parent's Names Father's First Name		Middle Name	Last Name		Suffix
Mother's First Name		Middle Name	Last Name (prior to first marriage)		
*Informant's Name		Relationship to Decedent		Address (Street, City, State, Zip, [Country if not United State])	
*Where did death occur? <input type="radio"/> No Response <input type="radio"/> Hospital _____ Location in Hospital <input type="checkbox"/> Inpatient <input type="checkbox"/> Emergency Room/Outpatient <input type="checkbox"/> Dead on Arrival		<input type="checkbox"/> Other Facility Name or Location <input type="checkbox"/> Hospice Facility <input type="checkbox"/> Nursing Home/Long Term Care Facility <input type="checkbox"/> Decedent Home <input type="checkbox"/> Other (Specify) _____ City Zip			
Funeral Home Handling Case				Was ME/Coroner Informed? <input type="radio"/> Yes <input type="radio"/> No	
*Disposition <input type="checkbox"/> Burial <input type="checkbox"/> Cremation <input type="checkbox"/> Removal from State <input type="checkbox"/> Donation <input type="checkbox"/> Entombment <input type="checkbox"/> Body not Recovered <input type="checkbox"/> Other (Specify)		Date of Disposition <input type="checkbox"/> Unknown Month Day Year (YYYY)		Place of Final Disposition (Name of cemetery, crematory, other place)	
Country	State	City			

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the back end, vital records data including death data are now being extracted from WHALES. This change in data systems does not affect CHAT users.

Once the death is registered, the information is forwarded by DOH Center for Health Statistics (CHS) to the National Center for Health Statistics (NCHS) for coding including the text fields capturing the cause of death (see Figure 2). NCHS returns the coded information (ICD 10 codes) to CHS within a few days after we send them the text/literals.

CHS performs routine data quality checks on an ongoing basis, especially after the close of a given calendar year as we approach the deadline for submitting the annual file NCHS and to data users.

5. Release of death data files

CHS will continue to release final death data files annually in comma delimited format (for Cause of Death Literals and Names files) and Microsoft Excel format (for Statistical and Geocode files). There will also be SAS and Stata versions of the Death Statistical file.

We plan to release the final data file for a given year approximately six months after the end of the calendar year. We will place the files on the DOH Y:Drive for DOH assessment staff and will upload them to CHS Data Files (accessed via Secure Access Washington) for local health assessment staff. The files will also be available for order to the general public at <https://www.doh.wa.gov/DataandStatisticalReports/HealthStatistics/Death>.

CHS will also release preliminary death data files on a quarterly basis within a month of the close of the previous quarter. Please note that certain variables in preliminary death data sets will have missing or incomplete information as we await additional information from medical certifiers. These fields include cause of death and manner of death particularly those involving deaths that are not due to natural causes. It can take up to 3 months to obtain complete cause of death and manner of death information for suicides, homicides, and deaths of undetermined intent. The delay is due to the length of time needed to complete toxicological tests, autopsies, and to collect additional information from various sources such as law enforcement reports (if applicable) medical examiners and coroners.

Table 2. Schedule of release of death files

Type of files	Annual files	Quarterly
Status	Final	Preliminary
Anticipated file release date. No later than:	August of the calendar year following death year	First 2 weeks of the month following the calendar quarter

6. Effects of transition to WHALES

a) Change in variable names

The most significant impact for data users using statistical software (SAS, Stata, etc.) to analyze death data for 2016 onward is that variable names for most data fields have changed starting with the 2016 death file. As the new variable names will not match those in death files for 2015 or older data any programs written to conduct analysis with pre-2016 data files will not work with files produced for 2016 and later. For example, the variable “cnty_res” in the pre-2016 format appears as “Residence County WA Code” in the new (2016 and later) format.

To assist with the transition we have created two resources to help data users. The first is a cross walk that displays old variable names and values and the corresponding new variable names and values. The second tool is a Stata do file that converts new (WHALES) variable names to the old ones. The do file (named “DthStatFile_ConvertToOldVarNames.do”) is available to data users with the death data set on our Secure Access Washington CHS Data Files site. The Death Statistical Data Dictionary and Crosswalks (hyperlink) includes both current and historical field names, formats and labels.

b) Names of funeral homes and disposition facilities

In death files for 2017 and later, the variables for funeral home and disposition facilities will appear as literals and codes for both funeral homes and disposition facilities.

c) Variables no longer in data set

The following variables will not be present in the death data sets beginning with the 2016 data. Some of these variables have not been in use for several years but remained in previous annual releases of death data as place holders to preserve the layout of the data sets. Other variables appear as literal fields in 2016 and later death files compared with codes in pre-2016 files.

Table 3. Variables dropped from death data beginning with 2016 data files

	Description	Old Variable Name	Notes
1	High school graduation status	hs_grad	Discontinued in 1992. Use “educ” (for pre-2016) and “Education” (for 2016 and later)
2	Contributory cause of death	contrib	Discontinued in 1989.
3	Place external injury occurred	injplace	Discontinued since 2012. Use “injpnchs” (pre-2016) or “Injury_ACME_Place” (for 2016 and later.)
4	Smoking status in 15 years prior to death	smoking	Discontinued in 2004. Use “tbcontri” (pre-2016) and “Tobacco” (for 2016 deaths and later.)
5	Federal occupation code	occ_fed	Discontinued in 2010.
6	Federal industry code	ind_fed	Discontinued in 2010.
7	Length of residence unit type	resunit	Discontinued in 2004 and replaced with res_lena (pre-2016 files). Use “Residence_Length_Units” for deaths in 2016 and later.
8	Length of residence, number of units	resunum	Discontinued in 2004 – replaced by res_auni (pre-2016) and “Residence_Length” (for deaths in 2016 and later.)
9	Citizenship status	citizen	Discontinued in 1992.
10	Emergency care code indicating whether emergency care was given.	emergent	Discontinued in 1988.
11	Funeral home code	funeralc	Use funeralc for pre-2016 death files. Use “Funeral_Home_Name” for deaths in 2016 and later. This is a field with the literal name of the funeral home rather than codes.
12	NCHS new record flag indicating records added since annual cutoff date.	nchsnew	Discontinued in 2000.
13	TRANSAX conversion flag indicating alternation of literal codes	transax	Discontinued in 1999

7. Known data quality issues

We are aware of the following data issues and we are working to address them as noted. Please note that these issues do not affect the use of CHAT. They are only relevant to data users who intend to analyze death data in statistical software such as SAS or Stata. In addition to the issues listed below, we are continuing to examine other data issues and will provide updates as needed. ***We welcome feedback from all data users if you identify a data issue not mentioned below.***

a) Pregnancy status variable

In death files for 2015 and earlier, men and women outside the expected age range for pregnancy (10 to 55 years) were coded as “8” indicating that the question is “not applicable.” In the new coding schema for data files for 2016 and beyond, all men and women outside the expected age range (below 10 years and above 55 years) should be coded as blank (“.”) to indicate that the question is not applicable. Due to a data conversion problem in the 2016 death file the pregnancy variable is blank (i.e. “not applicable”) for some women within the expected age range when they should have been coded as “8” (“no response”). CHS has made changes to WHALES to code these situations to “8” beginning with the 2017 annual data file.

Recommendation: To maintain consistency between the released 2016 death files and those issued for 2017 and later, please recode the blanks for women in the appropriate age range to “8” in 2016 in accordance with coding scheme below (for 2016 and later).

Table 4. Change in coding scheme for pregnancy status variable

Variable	New name (2016 and later)		Old name (2015 and prior)			
Pregnancy Status at time of death	Pregnancy	1 = Not pregnant within the past year 2 = Pregnant at the time of death 3 = Not pregnant, but pregnant within 42 days of death 4 = Not pregnant, but pregnant 43 days to 1 year before death 8 = No response 9 = Unknown if pregnant within the past year Blank = not applicable	1 N	pregstat	0 = Pregnancy status missing 1 = Not pregnant within 1 year 2 = Pregnant at death 3 = Not pregnant, but pregnant within 42 days 4 = Not pregnant, but pregnant 43 days to 1 year 8 = Not applicable 9 = Unknown	1 C

b) Geography Issues

Variables showing residence or occurrence county and city in 2016 show values with a series of ‘9’s. These values do not appear in the 2015 or previous years’ death files. Records with ‘9’s in the county and/or city fields may indicate that the individual was homeless or transient and used to be coded as a series of ‘0’s along with out of state residents in prior years.

Less than 0.5% of death records in 2016 show ‘9’s for city or county codes.

As of this release (summer 2018) death data for 2017 have not been geocoded, however, we anticipate completing this task by late fall 2018.

c) Querying non-specific causes of death

When death certificates are registered with cause of death statements that are vague CHS staff will follow up with the health care provider on record to try to obtain further details. There are approximately 700 ICD 10 codes for non-specific causes of death that will trigger follow up from CHS. Sometimes, this process will result in additional information being added to the cause of death statement that may change the underlying cause of death. Towards the end of 2016, as CHS prepared to switch over to WHALES, we were unable to conduct this follow up or “queries” on death certificates with nonspecific causes of death. Examples of causes of death that were not queried in 2016 due to the transition include “congestive heart failure”, “systolic heart failure”, “senile dementia” (with no additional specifics), “metastatic carcinoma”, “leukemia” (malignant neoplasm without specification of site). We estimate that 8 to 10% of death records that would have received follow up and may have resulted in a change to the underlying cause of death were not queried in 2016.

d) Missing and out of range values of out of state deaths among Washington residents

Information on decedents who were Washington state residents that died outside of Washington State are reported by the state of death to Washington State via the National Center for Health Statistics (NCHS). Due to restrictions imposed by an inter-jurisdictional exchange agreement NCHS can relay only specific variables in death data from other states where the death occurred. While we have near complete information for underlying and multiple cause information for out of state deaths, we do not have complete information for bridged race, summary race, Hispanic ethnicity, and armed forces participation. However, only a small percent of deaths (primarily in counties bordering Idaho or Oregon) are missing bridged race information.

e) Missing and out of range values for deaths occurring in Washington State

We have conducted exploratory analysis of the death data variables to identify and correct missing and out of range values. Deaths occurring within Washington State and having missing or incorrect information are more easily corrected compared with out of state deaths. As a result of these data quality efforts there are no missing or out of range values for variables of deaths occurring in Washington State.

8. Key analytic variables – derivation and use

a) Disease-specific flags

Beginning with the 2017 death statistical file we will include a series of calculated variables that flag the presence of select conditions (based on ICD 10 codes) in the underlying cause field or, in the case of certain drug related deaths, the multiple cause fields. The values for these variables will be either indicating the absence (value = ‘0’) or the presence (value = ‘1’) of the condition. The 2017 death statistical file contains flags for the following causes of death:

Table 5. New disease/condition flags added to death files starting with 2017 data

Field number	Variable name	Description
217	Drug All	Disease/injury flag Drug (total) overdose: underlying cause of death codes X40-X44, X60-X64, X85, Y10-Y14
218	Opioid	Disease/injury flag Opioid (unspecified) overdose: "Drug all" = 1 & multiple cause of death codes T40.0–T40.4
219	Heroin	Disease/injury flag Heroin overdose: "Drug All" = 1 & multiple cause of death code T40.1
220	Natural Semisynthetic Opioid	Disease/injury flag Natural and semisynthetic opioid overdose: "Drug All" = 1 & multiple cause code T40.2
221	Methadone	Disease/injury flag Methadone overdose: "Drug All" = 1 & multiple cause code T40.3
222	Synthetic Opioid	Disease/injury flag Synthetic opioid (including fentanyl, excluding methadone) overdose: "Drug All" = 1 & multiple cause code T40.4
223	Cocaine	Disease/injury flag Cocaine overdose: "Drug All" = 1 & multiple cause code T40.5
224	Prescription Opioid	Disease/injury flag Prescription drug overdose: "Drug All" = 1 & multiple cause code T40.2-T40.4
225	Psychostimulant	Disease/injury flag Psychostimulant overdose: "Drug All" = 1 & multiple cause code T43.6
226	Suicide All	Disease/injury flag Suicide - total: underlying cause codes U03, X60-X84, or Y87.0
227	Suicide firearm	Disease/injury flag Suicide - by firearm: underlying cause codes X72-X74
228	Suicide Asphyxia	Disease/injury flag Suicide - by asphyxia: underlying cause codes X70
229	Suicide Poisoning	Disease/injury flag Suicide - by poisoning: underlying cause codes X60-X69
230	Suicide Other	Disease/injury flag Suicide - by other means: underlying cause codes U03, X60-69, X71, X75-84, Y87.0
231	Firearm All	Disease/injury flag All firearm deaths: underlying cause codes W32-W34, X72-X74, X93-X95, Y22-Y24, Y35.0
232	Firearm Unintentional	Disease/injury flag Unintentional firearm deaths: underlying cause codes W32-W34
233	Firearm Homicide	Disease/injury flag Homicide with firearm: underlying cause codes X93-X95
234	Firearm Undetermined	Disease/injury flag Firearm deaths - undetermined intent : underlying cause codes Y22-Y24
235	Firearm Suicide	Disease/injury flag Unintentional firearm deaths: underlying cause codes X72-X74
236	Firearm Legal	Disease/injury flag Firearm deaths due to legal intervention: underlying cause codes Y35.0
237	Malignant Neoplasm	Disease/injury flag All malignant neoplasm deaths: underlying cause codes C00-C9
238	Heart Disease	Disease/injury flag Heart disease deaths: underlying cause codes I00-I09, I11, I13, I20-I51
239	Alzheimers	Disease/injury flag Alzheimer's disease deaths: underlying cause code G30
240	Unintentional Injury	Disease/injury flag All unintentional injury deaths: underlying cause codes V01-X59, Y85-Y86
241	Chronic Lower Respiratory	Disease/injury flag Chronic lower respiratory disease deaths: underlying cause codes J40-J4

Field number	Variable name	Description
242	Cerebrovascular Disease	Disease/injury flag Cerebrovascular disease deaths: underlying cause code I60-I69
243	Diabetes	Disease/injury flag Diabetes mellitus deaths: underlying cause codes E10-E14
244	Chronic Liver Disease	Disease/injury flag Chronic liver disease and cirrhosis deaths: underlying cause codes K70, K73-K74
245	Influenza Pneumonia	Disease/injury flag Influenza and pneumonia deaths: underlying cause codes J09-J18
246	Parkinsons	Disease/injury flag Parkinson's disease deaths: underlying cause codes G20-G21
247	Essential Hypertension	Disease/injury flag Essential (primary) hypertension and hypertensive renal disease deaths: underlying cause code I10, I12, I15
248	Pneumonitis	Disease/injury flag Deaths from pneumonitis due to solids and liquids: underlying cause code J69

We used NCHS definitions (ICD 10 codes) in developing the flags for these diseases and injuries. Taken together, the conditions listed above (see table above) account for over 80% of all deaths that occurred in 2016 and include the most common causes of death in Washington State.

b) Race and Ethnicity

Collection of data for decedents' race and ethnicity

- Informants/funeral homes provide DOH race and Hispanic ethnicity information for the decedent using a series of check boxes in the Electronic Death Registration System (EDRS). These race and ethnicity options are consistent with the multiple options provided on the U.S. Standard Certificate of Death (2003). Informants/funeral homes may select as many race categories and as many Hispanic sub-categories as appropriate. Race and ethnicity are required fields i.e. the funeral home must select an option even if the option is 'unknown'.

Figure 3. Screenshot of EDRS race/ethnicity data collection fields

- If the funeral home selects an “other” ethnicity or race option (e.g. “other Spanish/Hispanic/Latino” or “Other Asian”) they must enter additional details in the text box (literal) immediately following the “other” checkbox selected.
- DOH manually corrects spelling errors for literals and checks for valid entries against a master list of “other” race and ethnic subgroups which we update on an ongoing basis.
- All death records are forwarded to NCHS where the checkboxes and textboxes are assigned codes that are further processed to give us the individual race variables e.g. (‘Race White’, ‘Race Black’) and derived variables like ‘Bridge Race’ and ‘Race Summary Code’. The imputation procedure to derive bridge race categories is described in detail at http://www.cdc.gov/nchs/data/dvs/Multiple_race_documentation_5-10-04.pdf

Main analytic variables

For detailed guidelines please read visit:

<https://www.doh.wa.gov/Portals/1/Documents/1500/RaceEthnGuidelines.pdf>

For routine analysis involving the creation of mortality rates based on census-based population estimates (e.g. those developed by Washington State Office of Financial Management) please use the following variables and values:

- ‘Hispanic No’
 - ‘N’ = decedent was Hispanic (please note double negative)
 - ‘Y’ = decedent was NOT Hispanic
- ‘Race Summary Code’ – using those who responded that they are NOT Hispanic analyze by the following **single** race groups:
 - American Indian or Alaska Native, single race only, non-Hispanic
 - Asian, single race only, non-Hispanic
 - Black or African American, single race only, non-Hispanic

- Native Hawaiian or Other Pacific Islander, single race only, non-Hispanic
- White, single race only, non-Hispanic

Rationale –Use of this variable and values allows for calculation of rates because it is consistent with Census and OFM categorization of race and ethnicity. Use of multi race groups isn't necessary given that only 1.3% of death records in Washington State indicate multiple race at this time.

Limitation – undercount of certain races because of how race/ethnicity is ascertained. Reporting of race/Hispanic ethnicity (origin) on death certificates is sometimes based on observing the decedent, rather than questioning the next of kin. This procedure causes an underestimate of deaths for certain groups, particularly Native Americans, some Asian subgroups, and Hispanics. Thus, death rates based on death certificate data are lower than true death rates for these groups.

Related variables

- 'Bridge Race' - NCHS creates a bridge race variable to make multiple-race and single race data collection systems more comparable so that data users can calculate race-specific statistics. The bridging methodology developed by NCHS bridges the multiple-race group population counts to the four single-race categories specified in the old 1977 federal Office of Management and Budget (OMB) standards. In 1997, OMB revised the 1977 standards for collection of race and ethnicity data increasing the number of race categories previously used from four (White, Black, American Indian or Alaska Native (AIAN), and Asian or Pacific Islander (API)) to five (White, Black or African American, American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander). In addition, the revised standards require Federal data collection programs to allow respondents to select more than one race category when responding to a query on their racial identity. This provision means that under the revised standards there are potentially 31 race groups (5 single-race and 26 multiple-race), depending on whether an individual selects one, two, three, four, or all five of the single-race categories.ⁱ

Race bridging is needed within a given data system because the change in the race standards results in incomparability across time, thus making it difficult to perform trend analyses.

- WA DOH recommends using Race Summary because it allows Asians and Pacific Islanders to be reported as separate groups unlike Bridge Race.
- 'Hispanic NCHS Bridge'. A single variable which indicates both Hispanic ethnicity status and country of origin if decedent was Hispanic. Use 'Hispanic NCHS Bridge' when it is important to know the country to which the decedent had ancestral connection.

Precautions related to race and ethnicity data

Death rates for Hispanic, AIAN, and API persons should be interpreted with caution because of inconsistencies in reporting Hispanic origin or race on the death certificate compared with censuses, surveys, and birth certificates.

In 2017, more than one race was reported for 1.3% of the death records registered in Washington State (when race information was reported). Although still uncommon, a greater proportion of younger decedents were reported as belonging to multiple races compared with older decedents (9.4% of decedents under age 25 compared with 2.3% of decedents aged 25–64 and 0.8% of decedents aged 65 and over).

c) Cause of death

Collection of cause of death information

The health care provider caring for the decedent at the time of death reports the cause of death via EDRS. Mirroring the U.S. Standard death certificate form, EDRS provides four lines into which all cause of death information must be entered with the initiating disease or injury listed on the lowest line used. The following figure is a screen shot of the EDRS medical certification fields.

Figure 4. Screenshot of EDRS cause of death data collection fields

The screenshot displays the 'Chain of Events - Etiology' section of the EDRS form. It includes a title, a detailed instruction, and four main input fields (A, B, C, D) for the chain of events, each with a 120-character limit. To the right of each field is an 'Interval between Onset & Death' input field. Below these is a larger field for 'Other significant conditions contributing to death' with a 240-character limit.

Chain of Events - Etiology
Enter the chain of events - disease, injuries, or complications that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE.

*A. Immediate Cause of Death: (Final disease or condition resulting in death.) 120 *Interval between Onset & Death
-- Most recent condition --

B. Due To or as a Consequence Of: 120 Interval between Onset & Death
-- Next oldest condition --

C. Due To or as a Consequence Of: 120 Interval between Onset & Death
-- Next oldest condition --

D. Due To or as a Consequence Of: 120 Interval between Onset & Death
-- Oldest (original, initiating) condition --

Other significant conditions contributing to death: (Not resulting in the underlying cause given above.) 240

CHS forwards all raw cause of death information (i.e. the text information submitted through EDRS entered in the fields shown in Figure 2) in batches to NCHS for processing which includes the conversion of the words and phrases used to report causes of death into ICD 10 codes. NCHS returns the coded to CHS, typically within 2 weeks.

While EDRS contains basic spell-check functions, it does not provide detailed guidance on how to report cause of death in accordance with standard rules of nosology. Furthermore, inconsistencies in the quality of information reported in the cause of death section also contribute to incomplete and/or inaccurate information on the diseases or injuries leading to death.

CHS corrects more obvious problems with cause of death reporting by contacting providers who have reported non-specific or vague causes of death. Approximately 8% of all death data require follow up annually. About a

third of the providers respond to follow up letters with more specific and useful information regarding the cause of death.

Main analytic variable

- ‘Underlying COD Code’ - Typically, analysis of mortality data to calculate population-level death rates requires the use of the variable “Underlying COD code”.

Rationale

Each condition reported on the death certificate is assigned a code based on the International Classification of Diseases (ICD) 10th revision. Following ICD rules, one of these conditions is selected as the underlying cause-of-death which is defined as “(a) the disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury.”

The standard practice in calculating mortality rates is to use the underlying cause of death as the numerator. It is a simplified representation of the initiating condition that led to death and therefore, is a practical and useful measure in identifying leading health burdens and developing preventive measures on a population level.

Related variables

- ‘Record Axis Code 2’ through ‘Record Axis Code 20’ - Analysis of ‘Underlying COD Code’ provides insight into the initiating cause of death, rather than the full sequence of events that led to death. Disease or injury events other than the underlying cause of death including co-morbidities are often recorded as multiple cause and contributing conditions. In the death statistical file, the series of variables titled Record Axis Code 1 through Record Axis Code 20 list ICD 10 codes for all conditions reported on the death certificate in the order they were reported beginning with the underlying cause in Record Axis Code 1. In producing this series of codes, NCHS applies rules of nosology to edit contradicting causes of death, duplicates, and imprecisions in the same death record. The result is a series of codes that are the most meaningful and logical sequence of codes representing a given death.

To tabulate **multiple cause of death** use:

- Record Axis Code 2 through Record Axis Code 20

Record Axis Code 1 is the underlying cause of death.

- Other related variables - Variables that are not typically used to measure the burden of disease in terms of mortality are **ACME Line 1 through 20, ACME Sequence 1 through 20, ACME Cause Category 1 through 20, and ACME Nature of Injury 1 through 20**. These variables are used to report the line (b through d, additional reported added lines, or the other contributing conditions lines in the cause of death statement – see Figure 2), the position of each stated disease or injury on the line they were reported, the ICD 10 code associated with the condition, and a one digit flag indicating that the death was a result of an injury.

d) Place of residence and occurrence

There are multiple variables in the death statistical data set that provide information on places (country, state, county, city, zip) of birth, residence, and death.

Key analytic variables

- 'Residence State FIPS Code' – use this variable to select Washington State residents (value "WA"). **Mortality rates for Washington State are calculated using only state residents.**
- 'Death State' – use this variable if you wish to exclude deaths among Washington State residents that *occurred out of state.*

Other geography variables

- City of residence and occurrence including the following variables: 'Residence County City WA Code', 'Death County City WA Code' - All county-city codes are four-digit codes, with the first two digits being a county code and the second two being a city code. A city is given a separate code only if it has at least 2,500 people. Otherwise, it is given a 'balance of county' code (a two-digit county code and a city code of '00'), along with other small areas in the county. A city near the cutoff point may fluctuate above and below 2,500 population and thus may have a separate code in some years and not in others. For this reason, a count of zero deaths for one of these cities in a particular year may simply mean that it did not have a separate code in that year.

Population estimates provided by the Washington State Office of Financial Management (OFM) are used to establish which cities meet the population criteria for separate coding or become incorporated as separate cities. Because these estimates are published in the middle of the year, changes do not appear in the death data file until the following year. Thus, a city which first exceeds 2,500 population in 2017 would not have a separate code until 2018 are released.

The code for city of residence is based on whether or not the decedent lived within city limits. (These data are collected from the item on the death certificate: 'Inside city limits - yes/no'.) If he/she did (or if the city limits item is blank or unknown), the residence is given a distinct city code, as described above. If he/she did not, the city code is set to '00'. The city code in the file thus reflects reporting by the informant as to whether or not the decedent lived within city limits and may not agree with data determined by geocoding the address.

- Zip Code of residence

For death files 1968 through 2015, the field, 'geozip', was added to the Death Statistical files. The values for 'geozip' were determined from the geocoding process described below. The geocoded zip code may differ from the reported zip code for several reasons: (1) a data entry or reporting error for the reported zip code; (2) the zip code boundary changed; (3) the geocoding process matched the address to the wrong location. In 2017 approximately 3% of death records had different reported and geocoded zip codes. When working with data for 1988 through 2015, it is recommended that you use the 'geozip' field in preference to the reported zip code when the two zip codes do not agree. The reported zip code should continue to be used when the 'geozip' field is missing. However, zip code boundaries do change over time, so caution should be used when using zip codes for deaths occurring in earlier years, especially prior to 1994. The number of addresses with differences between reported zip code and geocoded zip code will increase when using older files because the geocoded zip field will have different boundaries.

For death files 2016 onwards, the geocoded zip code field will only be in the Death Geocode file. That file will be made available a month or two after the release of the other death files. The Death Statistical file will only include the reported field, 'Residence Zip Code'. It represents the zip code reported through EDRS. The reported zip code field will serve for most analyses, however, for those doing work that identifies specific zip codes, it is recommended that you use the geocoded zip code from the Death Geocode file.

- Variables derived by geocoding residential address.

We use a program developed in ArcGIS to match reported residential addresses to published standardized geographic information. Through this process we determine the latitude and longitude of the residential addresses of the decedents and assign the addresses to specific school districts, census tracts, block groups, and census blocks (as defined by both census 2000 and census 2010).

Geocoded variables, including the geocoded zip code, will be made available in the fall in the final Death Geocode file for 2017.

ⁱ National Center for Health Statistics, *Documentation for Vintage 2017 Bridged-Race Postcensal Population Estimates for Calculating Vital Rates*. Accessed at https://www.cdc.gov/nchs/data/nvss/bridged_race/Documentation_bridge_postcenv2017.pdf on August 16, 2018.