CHAT – Technical notes

The following technical notes include the sections “Topic technical notes” for the 15 topic areas currently in CHAT, “Parameters” that are consistent across topics, and “Appendices”.

Topic technical notes

Parameters

Appendices

Topic technical notes

Behavioral Risk Factor Surveillance System (BRFSS)

Citation: Washington State Department of Health, Center for Health Statistics, Behavioral Risk Factor Surveillance System Data, 2012-2021, Community Health Assessment Tool (CHAT), October 2023.

Description: Behavioral risk factor surveillance data for a random-digit dial sample of Washington state residences.

- **Coverage:** Washington residences with a landline or cellular telephone.
- **Statistics:** Crude proportion, Age adjusted proportion, Age adjusted within a specified age range proportion
- **Variables by year type:** Every, Even Odd, Random
- **Variable by category:** Comorbid, Behavioral, Preventative, Healthcare Access, Injury Related
- **Years:** 2012–most recent year available; updated annually
- **Geography**: State, County, LHJ, ACH, Rural2, Rural4 (Rurality based on ZIP code)
- **Age**: Not available
- **Gender**: Male, Female
- **Race/ethnicity:** 7 groupings described in Race and Ethnicity technical note

Limitations:

- BRFSS is a population-based, cross sectional telephone survey.
- Cross sectional design introduces selective survival bias, and the interview conducted at one point in time does not allow one to infer causality.
- Surveys are self-reported, and this can introduce recall bias.
- Vulnerable populations such as those incarcerated or those in nursing homes cannot participate in the survey since BRFSS does not permit proxy interviews.

Additional information:
Center for Health Statistics BRFSS

Birth Risk Factors (BRFs)

Citation: Washington State Department of Health, Center for Health Statistics (CHS), Birth Certificate Data, 1990–2022, Community Health Assessment Tool (CHAT), September 2023.

Description: Conditions or characteristics of the infant or the mother present at birth that might contribute to health issues for the infant.

- **Coverage:** All states and Canada forward births to non-residents to the state in which the mother resides. The Center for Health Statistics estimates the birth certificate system to be 99% complete.
- **Statistics:** Percent of births with the risk factor from among those birth certificates with information for the specific BRF; output includes the number and percent of records missing information on the risk factor of interest.
- **Birth Risk Factors:** Baby's birth weight, gestational age, mother's prenatal care (both the pre and post 2003 definitions), marital status, smoking status, educational attainment, pre-pregnancy body mass index (BMI = 703.1 x (weight in lb / square of height in inches)), weight gain during pregnancy, prior pregnancy, gestational diabetes, gestational hypertension, place of birth, delivery facility type, and the option to restrict the data using up to two conditional factors selected from the list of BRFs
- **Years:** 1990–most recent year available; updated annually

- **Geography** (mother's residence at delivery): State, county, ZIP code, census tract, census block group, school district, health reporting areas (HRAs – King County only).
- **Age of mother**: 9 age groups or single year of age as described in Age technical note
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Notes: The 2003 Washington birth certificate changed from the certificate that had been used previously. The changes are

- Changes in the way multiple race data were collected
- Addition of
    - Mother's height and weight
    - Pre-pregnancy weight (used to calculate pre-pregnancy BMI)
    - Maternal smoking by trimester
- Changes in prenatal care initiation dates.
    - Washington State Department of Health calculates prenatal care to be comparable to data collected before and after the 2003 changes to the birth certificate. Thus, CHAT data on prenatal care (Prenatal Care Init), which are based on the WA DOH method, are not comparable to data compiled by the National Center for Health Statistics (NCHS) and others that use the new birth certificate and the NCHS method.
    - Beginning in 2014 CHAT will also offer the NCHS definitions for prenatal care initiation trimesters (NCHSPrenatalCare). For more details see Appendix 5.

Cutpoints for Birth Risk Factors
Birth weight in grams

- Very high:4,500–8,164
- High:4,000–4,499 grams
- Normal: 2,500–3,999 grams
- Moderately low: 1,500–2,499 grams
- Very low: 227–1,499 grams

Kotelchuck Index

- Adequate: ≥80% of expected visits
- Inadequate: <80% of expected visits

Pre-pregnancy BMI (Centers for Disease Control recommendations)

- Underweight: <18.5
- Normal weight: 18.5–24.9
- Overweight: 25.0–29.9
- Obese: ≥30.0

Prenatal care initiated (both calculations: the difference is in the calculation of the month)

- 1st trimester: 1–3 months
- 2nd trimester: 4–6 months
- 3rd trimester: 7–10 months

Weight gain during pregnancy (Centers for Disease Control recommendations)

- Below recommended
    - If BMI <18.5 and weight gain <28 lbs
    - If BMI 18.5–24.9 and weight gain <25 lbs

    - If BMI 25.0–29.9 and weight gain <15 lbs
    - If BMI ≥30.0 and weight gain <11 lbs
- Recommended
    - If BMI <18.5 and weight gain = 28–40 lbs
    - If BMI 18.5–24 .9 and weight gain = 25–35 lbs
    - If BMI 25.0–29 .9 and weight gain = 15–25 lbs
    - If BMI ≥30.0 and weight gain = 11–20 lbs
- Above recommended
    - If BMI <18.5 and weight gain >40 lbs
    - If BMI 18.5–24 .9 and weight gain >35 lbs
    - If BMI 25.0–29 .9 and weight gain >25 lbs
    - If BMI ≥30.0 and weight gain >20

Premature birth (based on calculated gestational age)

- Very premature: <32 weeks gestation
- Premature: ≥32 weeks and <37 weeks gestation
- Not premature: ≥37 weeks

Limitations: Some BRFs have relatively large proportions of missing values. Check the results for number and percentage of missing records before interpreting results.

Additional information:
Center for Health Statistics Birth Data

Birth Risk Factors for Infant Death

Citation: Washington State Department of Health, Center for Health Statistics, Linked Birth and Death File, 1990–2021, Community Health Assessment Tool (CHAT), April 2023.

Description: Conditions or characteristics of the infant or the mother present at birth that might contribute to mortality of the infant.

- **Coverage:** All states and Canada forward births or infant deaths to non-residents to the state in which the mother resides. The Center for Health Statistics estimates these data to be 99% complete.
- **Statistics:** Percent of infant deaths with the risk factor from among those with birth certificates with this information recorded; output includes a count of records missing information and the percentage of the total number of birth certificates missing information on the risk factor of interest.
- **Birth Risk Factors:** Baby's birth weight, gestational age; mother's prenatal care (both the pre and post 2003 definitions), marital status, smoking status, educational attainment, pre-pregnancy body mass index (BMI = 703.1 x (weight in lb / square of height in inches)), weight gain during pregnancy, prior pregnancy, gestational diabetes, gestational hypertension, place of birth, delivery facility type, and the option to restrict the data using up to two conditional factors selected from the list of BRFs
- **Years:** 1990–most recent year available; updated annually
- **Geography** (mother's residence at delivery): State, county, ZIP code, health reporting areas (HRAs – King County only).
- **Age of Mother:** 9 age groups or single year of age as described in Age technical note
- **Race/ethnicity:** Race of Mother. All groupings described in Race and Ethnicity technical note

Notes: The 2003 Washington birth certificate changed from the certificate that had been used previously. The changes are

- Changes in the way multiple race data were collected
- Addition of

    - Mother's height and weight
    - Pre-pregnancy weight (used to calculate pre-pregnancy BMI)
    - Maternal smoking by trimester
- Changes in prenatal care initiation dates.
    - Washington State Department of Health calculates prenatal care to be comparable to data collected before and after the 2003 changes to the birth certificate. Thus, CHAT data on prenatal care (Prenatal Care Init), which are based on the WA DOH method, are not comparable to data compiled by the National Center for Health Statistics (NCHS) and others that use the new birth certificate and the NCHS method.
    - Beginning in 2014 CHAT will also offer the NCHS definitions for prenatal care initiation trimesters (NCHSPrenatalCare). For more details see Appendix 5.

Cutpoints for BRFs for Infant Death

Infant birth weight in grams

- Very high: 4,500–8,164
- High: 4,000–4,499 grams
- Normal: 2,500–3,999 grams
- Moderately low: 1,500–2,499 grams
- Very low: 227–1,499 grams

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- Adequate: ≥80% of expected visits
- Inadequate: <80% of expected visits

Pre-pregnancy BMI (Centers for Disease Control recommendations)

- Underweight: <18.5
- Normal weight: 18.5–24.9
- Overweight: 25.0–29.9
- Obese: ≥30.0

Prenatal care initiated (both calculations: the difference is in the calculation of the month)

- 1st trimester: 1–3 months
- 2nd trimester: 4–6 months
- 3rd trimester: 7–10 months

Weight gain during pregnancy (Centers for Disease Control recommendations)

- Below recommended
    - If BMI <18.5 and weight gain <28 lbs
    - If BMI 18.5–24.9 and weight gain <25 lbs
    - If BMI 25.0–29.9 and weight gain <15 lbs
    - If BMI ≥30.0 and weight gain <11 lbs
- Recommended
    - If BMI <18.5 and weight gain = 28–40 lbs
    - If BMI 18.5–24 .9 and weight gain = 25–35 lbs
    - If BMI 25.0–29 .9 and weight gain = 15–25 lbs
    - If BMI ≥30.0 and weight gain = 11–20 lbs
- Above recommended
    - If BMI <18.5 and weight gain >40 lbs
    - If BMI 18.5–24 .9 and weight gain >35 lbs

- If BMI 25.0–29 .9 and weight gain >25 lbs
- If BMI ≥30.0 and weight gain >20

Premature birth (based on calculated gestational age)

- Very premature: <32 weeks gestation
- Premature: ≥32 weeks and <37 weeks gestation
- Not premature: ≥37 weeks

Limitations: Some BRFs have relatively large proportions of missing values. Check the results for number and percentage of missing records before interpreting results.

Additional Information:
Center for Health Statistics infant death data

Cancer Incidence

Citation: Washington State Department of Health, Washington State Cancer Registry-Incidence data for diagnosis years 1992–2020, Community Health Assessment Tool (CHAT), July 2023.

Description: Newly diagnosed cancer cases for a given year among Washington state residents

- **Coverage:** The Washington State Cancer Registry (WSCR) has agreements with most other states to get records for Washington State residents diagnosed with cancer out of state. WSCR estimates the data to be more than 95% complete.
- **Statistics:** Crude rate, age-specific rate, age-adjusted rate
- **Cancer diagnostic categories:** International Classification of Diseases – Oncology (ICD-O) codes grouped into diagnostic categories using SEER groups
- **Years:** 1992–most recent year available; updated annually
- **Geography** (residence at diagnosis): State, county, ZIPcode, census tract, health reporting areas (HRAs – King County only)
- **Age:** 6 groups, 11 groups, 20 groups, single year of age as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Limitations

- Raw ICD-O codes for cancer are not in CHAT.
- For sex-specific conditions, the default denominator in CHAT uses the entire population. The user must specify the sex of interest when calculating sex specific rates.
- Percent missing is not shown.

Additional Information
Washington State Cancer Registry technical documentation
WSCR cancer codes
Surveillance Epidemiology and End Results (SEER) groupings

Communicable Disease

Sexually Transmitted Disease (STD)

Citation: Washington State Department of Health, STD Services Section, PHIMS-STD, 1992–2022, Community Health Assessment Tool (CHAT), June 2023.

Description: Washington residents who seek diagnosis and treatment for sexually transmitted diseases (STDs) and are reported to the Washington State Department of Health under WAC 246-101 and RCW 70.24.

- **Coverage:** PHIMS-STD includes incident cases of laboratory confirmed chlamydia infection, gonorrhea, and syphilis reported by diagnosis date. Genital herpes may be reported without laboratory confirmation. Other rare STDs may be reported based on clinical findings with or without laboratory confirmation. Cases are not unique persons diagnosed with disease (e.g., a person may have more than one infection within a given year). The STD services section estimates that completeness of reporting is high for persons seeking and receiving care for STDs, reproductive health services or other care in both public and private care settings.
- **Statistics:** Crude rate**,** age-specific rate, age-adjusted rate
- **STD diagnostic categories:** STD diagnostic categories use CSTE-CDC definitions and include chancroid, chlamydia, granuloma inguinale, gonorrhea, lymphogranuloma venereum, syphilis (primary, secondary, early latent, late latent, latent unknown duration, late with symptoms, congenital, primary with neurological symptoms, secondary with neurological symptoms, early latent with neurological symptoms, late latent with neurological symptoms, latent unknown duration with neurological symptoms, late with symptoms and neurological symptoms, neurological symptoms no stage), neonatal herpes, herpes initial genital infection.
- **Years:** 1992–most recent year available; updated annually
- **Geography** (place of residence): State, county
- **Age:** 6 groups, 11 groups, 20 groups as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** Not available; more than one-quarter of records are missing information on race or ethnicity

Limitations:

- Clinically diagnosed STD cases may be under-reported through public health surveillance.
  - Laboratory confirmed cases of chlamydia underestimate the burden of disease because not all cases are diagnosed and not all diagnosed cases are laboratory confirmed.
  - Completeness of reporting may vary by source of health care, because diagnostic practices differ.
- Because 25% or more of STD cases are missing information on race or ethnicity, the WA-DOH STD services section considers these variables to be unreliable for quantitative analysis. This parameter is no longer in CHAT for STDs.

Additional information:
WA-DOH STD program

Note: Consistent with the WA-DOH Data Use Guidelines, the WA-DOH STD program recommends using gender-specific crudes rates when presenting STD data.

Tuberculosis (TB)

Citation: Washington State Department of Health, Tuberculosis Program, PHIMS-TB data, 1993–2021, Community Health Assessment Tool (CHAT), September 2022.

Description: Washington State residents diagnosed with an active case of TB and reported to the Washington State Department of Health under WAC 246-101 and RCW 70.28.

- **Coverage:** Comprised of all verified cases of TB for WA residents the WA-DOH TB program estimates these data to be 99% complete.
- **Statistics:** Crude rate, age-specific rate, age-adjusted rate
- **TB diagnostic categories:** Pulmonary, extra-pulmonary, both pulmonary and extra-pulmonary, site unknown using CSTE-CDC case definitions
- **Years:** 1993–most recent year available; updated annually

- **Geography** (place of residence): State, county
- **Age:** 6 groups, 11 groups, 20 groups, single age as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Limitations:

- Date of birth is not verified so some ages could be incorrect
- For the small number of death certificate only cases, race and ethnicity are determined by family members or the medical examiner and may not be the race or ethnicity that the person would have reported.

Additional information:
WA-DOH TB program

Note: Consistent with the WA-DOH Data Use Guidelines recommends using crude rates when presenting TB data.

Other Communicable Diseases (CD)

Citation: Washington State Department of Health, Communicable Disease Epidemiology Office, PHIMS and WDRS, 1994–2021, Community Health Assessment Tool (CHAT), June 2023.

Description: Selected notifiable conditions reported to the Washington State Department of Health under WAC 246-101.

- **Coverage:** All conditions defined as reportable under WAC 246-101 and reported to the Communicable Disease Epidemiology Office. Coverage varies depending on the condition. For some conditions only a fraction of cases will be reported because patients may not be aware of being infected, are symptomatic but do not contact a health care provider, are not confirmed with appropriate tests, or are not reported after diagnosis.
- **Statistics:** Crude rate, age-specific rate, age-adjusted rate
- **CD diagnostic categories:** Based on CDC-CSTE case definitions and reported in the Communicable Disease Epidemiology annual report
- **Years:** 1994–most recent year available; updated annually
- **Geography** (place of residence): State, county
- Age**:** 6 groups, 11 groups, 20 groups as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** Not available; 20–30% of records are missing information on race or ethnicity

Additional information:
WA-DOH Communicable Disease Epidemiology Office

Notes

- Consistent with the WA-DOH Data Use Guidelines, the WA-DOH Communicable Disease Epidemiology Office recommends using crude rates when presenting these data.
- The list of notifiable (or reportable) conditions changes over time. Before running a query that includes several years you should confirm that the conditions you are interested in were notifiable during that entire period. A table showing what was notifiable beginning in 2000 is available here.

Limitations: The Communicable Disease Epidemiology Office cannot provide information on what conditions were required to be reported prior to 2000.

Fertility

Citation: Washington State Department of Health, Center for Health Statistics Birth Certificate Data, 1990–2022, Community Health Assessment Tool (CHAT), September 2023.

Description: The number of live births to residents of Washington, including those residents who give birth outside of the state.

- **Coverage:** All states and Canada forward births to non-residents to the state in which the mother resides. The Center for Health Statistics estimates birth certificates to be 99% complete.
- **Statistics:** Crude birth rate, general fertility rate, age-specific birth rate, total fertility rate, sex ratio at birth
- **Years:** 1990–most recent year available; updated annually
- **Geography** (place of residence): State, county, ZIP code, census tract, census block group, school district, health reporting areas (HRAs – King County only).
- **Age of Mother:** 9 age groups or single year of age as described in Age technical note
- **Gender of infant:** Male, female (for sex ratio only)
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Additional information:
Center for Health Statistics Birth Data

Hospitalization

Hospitalizations

Citations

- WA Hospital Discharge Data, Comprehensive Hospitalization Abstract Reporting System (CHARS) 1987-2021. Washington State Department of Health, Center for Health Statistics, Community Health Assessment Tool (CHAT), Feb 2023.
- Office for Oregon Health Policy and Research, Oregon State Hospital Discharge Data 1987–1999.
- Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (Oregon) (OR-SID) 2000–2020, Community Health Assessment Tool (CHAT), March 2024.

Description: Hospitalization data in CHAT include Washington residents with in-patient stays at state licensed acute care hospitals in Washington (RCW 70.41.020 or RCW 71.12) or community hospitals in Oregon (ORS 442.400). Neither datasets contains emergency room or outpatient records from these hospitals; records from federal hospitals including military, Veteran's Administration, Department of Defense or Indian Health Services; private alcoholism or longterm care hospitals such as rehabilitation facilities. CHAT does not include state psychiatric hospitals licensed by the Department of Social and Health Services.

- **Coverage:** Both Washington and Oregon datasets contain 98%–100% of hospitalization records from reporting hospitals. For 2004–2009 OR-SID included all but one identified community hospital; for 2003, OR-SID was missing two community hospitals. It is not known how these might affect hospitalization records for Washington residents.
- **Statistics:** Crude rate, age-specific rate, age-adjusted rate
- **Diagnostic categories:** The default menu uses the Healthcare Cost and Utilization Project (HCUP) Clinical Classification Software (CCS) multiple categories. Other menu options are special code groups that use one or more diagnoses fields (alcohol related, drug related, opiate related, diabetes related, carbon monoxide related, childbirth related), and the raw ICD-9-CM codes.
- **Years:** 1990–most recent year available; updated annually. Oregon data may be one year behind CHARS.
- **Geography** (place of residence): State, county by ZIP code, ZIP code

- **Age:** 6 groups, 11 groups, 20 groups, single age as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** Not available; not collected prior to 2008 and currently missing greater than 15%
- **Topic filters:** Oregon hospitalizations; discharge status of deceased

Limitations

- CHAT provides information on hospitalizations, not people.
- An individual hospitalized more than once will be counted more than once, even if hospitalized for the same condition, i.e. there are no unduplicated hospitalization data.
- For sex-specific conditions, the default denominator in CHAT uses the entire population. The user must specify the sex of interest when calculating sex specific rates.
- When including the Oregon data, cell sizes of less than 10 are suppressed.
- As of October 1, 2015, the International Classification of Disease (ICD) version 10 is used for **all** Washington Hospitalization data. This means that the 2015 CHARS source files have 9 months of ICD version 9 (Jan-Sep) and 3 months (Oct-Dec) of ICD version 10 data. Unfortunately we have ICD9 to ICD10 conversion issues that cannot be addressed with a crosswalk or a reference map in the form needed for CHAT import. To remedy this, CHAT hospitalization data labeled 2015 will be comprised of the last 3 months of 2014 (Oct-Dec) and the first 9 months of 2015 (Jan-Sep) data which is naturally all in ICD-9. In laymen terms, the last 3 months of "2015" are duplicates of the last 3 months of 2014 (October 1, 2014-December 31, 2014 is substituted for October 1, 2015-December 31, 2015). Again, this re-use of the last 3 months of 2014 hospitalization data is due to the ICD conversion problems. Please note that when using the Hospitalization module with the 2015 year selected in CHAT, you will need to include a disclaimer regarding this 3 months of 2014 ICD9 data used as 2015 data in your results.

Additional Information:
Center for Health Statistics Hospital Data

Injury Hospitalization

Citations

- WA Hospital Discharge Data, Comprehensive Hospitalization Abstract Reporting System (CHARS) 1987-2021. Washington State Department of Health, Center for Health Statistics, Community Health Assessment Tool (CHAT), Feb 2023.
- Office for Oregon Health Policy and Research, Oregon State Hospital Discharge Data 1987–1999.
- Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (Oregon) (OR-SID) 2000–2020, Community Health Assessment Tool (CHAT), March 2024.

Description: Hospitalization data in CHAT include Washington residents with in-patient stays at state licensed acute care hospitals in Washington (RCW 70.41.020 or RCW 71.12) or community hospitals in Oregon (ORS 442.400). Neither datasets contains emergency room or outpatient records from these hospitals; records from federal hospitals including military, Veteran's Administration, Department of Defense or Indian Health Services; private alcoholism or long termcare hospitals such as rehabilitation facilities. CHAT does not include state psychiatric hospitals licensed by the Department of Social and Health Services.

- **Coverage:** Both Washington and Oregon datasets contain 98%–100% of hospitalization records from reporting hospitals. For 2004–2009 OR-SID included all but one identified community hospital; for 2003, OR-SID was missing two community hospitals. It is not known how these might affect hospitalization records for Washington residents. External cause of injury codes are approximately 95% complete. The Center for Health Statistics imputes e-codes when they are missing. In recent years, the Center has imputed approximately 2.5% of the e-codes in CHARS and 3.5% in OR-SID. These proportions are

higher for earlier years because of larger proportions of missing e-codes. External cause of injury codes might be less complete for earlier data from the Office for Oregon Health Policy and Research.

- **Statistics:** Crude rate, age-specific rate, age-adjusted rate
- **Diagnostic categories:** Injury by intent and mechanism using the International Collaborative Effort (ICE) on Injury Statistics
- **Years:** 1990–most recent year available; updated annually
- **Geography** (place of residence): State, county by ZIP code, ZIP code
- **Age:** 6 groups, 11 groups, 20 groups, single age as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** Not available; not collected prior to 2008 and currently missing greater than 15%
- **Topic filters:** include Oregon data; filter out fatal discharge status

Limitations

- CHAT provides information on hospitalizations, not people.
- An individual hospitalized more than once will be counted more than once, even if hospitalized for the same condition, i.e. there are no unduplicated hospitalization data.
- When including the Oregon data cell sizes of less than 20 are suppressed.
- As of October 1, 2015, the International Classification of Disease (ICD) version 10 is used for **all** Washington Hospitalization data. This means that the 2015 CHARS source files have 9 months of ICD version 9 (Jan-Sep) and 3 months (Oct-Dec) of ICD version 10 data. Unfortunately we have ICD9 to ICD10 conversion issues that cannot be addressed with a crosswalk or a reference map in the form needed for CHAT import. To remedy this, CHAT hospitalization data labeled 2015 will be comprised of the last 3 months of 2014 (Oct-Dec) and the first 9 months of 2015 (Jan-Sep) data which is naturally all in ICD-9. In laymen terms, the last 3 months of “2015” are duplicates of the last 3 months of 2014 (October 1, 2014-December 31, 2014 is substituted for October 1, 2015-December 31, 2015). Again, this re-use of the last 3 months of 2014 hospitalization data is due to the ICD conversion problems. Please note that when using the Hospitalization module with the 2015 year selected in CHAT, you will need to include a disclaimer regarding this 3 months of 2014 ICD9 data used as 2015 data in your results.

Additional Information
WA-DOH Injury and Trauma

Infant Mortality

Citation: Washington State Department of Health, Center for Health Statistics, Linked Birth and Death File, 1990–2021, Community Health Assessment Tool (CHAT), April 2023.

Description: The infant mortality data in CHAT come from the linked birth certificate – infant death certificate dataset. This includes all births to residents of Washington and all infant deaths for infants residing in Washington.

- **Coverage:** All states and Canada forward births or infant deaths to non-residents to the state in which the mother resides. These data include deaths to all infants during the first 365 days, born to residents of Washington State. The Center for Health Statistics estimates these data to be 99% complete.
- **Statistics:** Neo-natal mortality rate, post neo-natal mortality rate, total infant mortality rate
- **Diagnostic categories:** NCHS 130 groupings, Leading Infant Causes, NIMS , ICD-10 raw codes; Underlying cause of death only
- **Years:** 1990–most recent year available; updated annually
- **Geography** (place of residence): State, county, ZIP code, health reporting areas (HRAs – King County only)
- **Age of mother:** 9 age groups or single year of age as described in Age technical note
- **Race/ethnicity:** Race of Mother. All groupings described in Race and Ethnicity technical note

Additional information:
Center for Health Statistics Infant Death Data

Life Expectancy

Citation: Washington State Department of Health, Center for Health Statistics, Death Certificate Data, 1990–2022, Community Health Assessment Tool (CHAT), January 2024.

Description: Life expectancy is the number of years a newborn can expect to live if the current age-specific deaths rates remain constant. For life expectancy calculations of older age groups, the result is the number of years of additional life a person in that age group can expect to live, if the current death rates for that age group remain constant.

- **Coverage:** Deaths occurring to Washington State residents. The Center for Health Statistics estimates these data to be 99% complete.
- **Statistics:** Life expectancy in years
- **Years:** 1990–most recent year available; updated annually
- **Geography** (place of residence): State, county, ZIP code, census tract, census block group, health reporting areas (HRAs – King County only)
- **Age:** 20 age groups as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Limitations

- Life Expectancy estimates by subcounty may be unreliable due to small numbers. Subcounty data includes census tract, census blocks, census block groups, and school districts. Please exercise caution when doing your analysis with populations containing less than 5,000.

Additional information
See Appendix 4 for calculations.
WA-DOH Center for Health Statistics Death Data

Mortality

Mortality

Citation: Washington State Department of Health, Center for Health Statistics, Death Certificate Data, 1990–2022, Community Health Assessment Tool (CHAT), November 2023.

Description: Death certificate data for all Washington residents by county of residence, including residents who die outside of Washington State.

- **Coverage:** All states and Canada forward deaths to non-residents to the state of residence. The Center for Health Statistics estimates these data to be 99% complete.
- **Statistics:** Crude rate, age-specific rate, age-adjusted rate, YPLL65, YPLL85
- **Diagnostic categories:** NCHS 113 groupings, NCHS leading causes, ICD-10 raw codes, (underlying cause only), and special code groups that use one or more diagnoses fields (alcohol related, drug related, opiate related, diabetes related, carbon monoxide related, childbirth related)
- **Years:** 1990–most recent year available; updated annually
- **Geography:** State, county, ZIP code, census tract, census block group, school district, health reporting areas (HRAs – King County only).
- **Age:** 6 groups, 11 groups, 20 groups, single age as described in Age technical note

- **Gender:** Male, female
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Limitations

- The Center for Health Statistics recommends against using “multiple race” death data in analysis. Multiple race decedents are under ascertained on the death certificate and death rates are biased low and life expectancy biased high.
- For sex-specific conditions, the default denominator in CHAT uses the entire population. The user must specify the sex of interest when calculating sex specific rates.

Additional information
WA-DOH Center for Health Statistics Death Data

Mortality – External Cause

Citation: Washington State Department of Health, Center for Health Statistics, Death Certificate Data, 1990–2022, Community Health Assessment Tool (CHAT), November 2023.

Description: Death certificate data for external causes of injury for all Washington residents by county of residence.

- **Coverage:** All states and Canada forward deaths to non-residents to the state of residence. The Center for Health Statistics estimates these data to be 99% complete.
- **Statistics:** Crude rate, age-specific rate, age-adjusted rate, YPLL65, YPLL85
- **Diagnostic categories:** Injury by intent and mechanism using the International Collaborative Effort (ICE) on Injury Statistics; nature of the injury not included
- **Years:** 1990–most recent year available; updated annually
- **Geography:** State, county, ZIP code, census tract, census block group, school district, health reporting areas (HRAs – King County only).
- **Age:** 6 groups, 11 groups, 20 groups, single age as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Limitations: The Center for Health Statistics recommends against using “multiple race” death data in analysis. Multiple race decedents are under ascertained on the death certificate and death rates are biased low and life expectancy biased high.

Additional information

WA-DOH Injury and Trauma

Population

Citations

- 2011-2022: Washington State Population Interim Estimates (PIE), December 2022.
- 2010, 2000, 1990: Bureau of the Census, U.S. Decennial Census.
- Revised 2001–2009:
  Washington State Office of Financial Management, Forecasting Division, single year intercensal estimates 2001-2009; 2011–2019, Community Health Assessment Tool (CHAT), February 2020.
- Revised 1991–1999:

Washington State Office of Financial Management, Forecasting division, single year intercensal estimates 1991-1999, updated to 2010 geographies, Community Health Assessment Tool (CHAT), April, 2013

Description: Population data are counts of the number of people living in a defined geographic area by selected demographic characteristics.

- **Statistics:** Counts (estimates for non census years)
- **Years:** 1990–most recent year available; updated annually
- **Geography:** State, county, ZIP code, census tract, census block group, school district, health reporting areas (HRAs – King County only).
- **Age:** 6 groups, 11 groups, 20 groups, single age as described in Age technical note
- **Gender:** Male, female
- **Race/ethnicity:** All groupings described in Race and Ethnicity technical note

Limitations

- Small differences in the counts for a given subgroup (i.e. geography, age group, sex) may appear when getting counts directly for that group compared to when adding up from lower levels. These small differences are due to rounding.
- Race4/Race5 grouping temporarily hidden across modules using PIE estimates.

Additional information

WA-OFM (Office of Financial Management)

Pregnancy and Abortion

Citations

- **Abortion:** Washington State Department of Health, Center for Health Statistics, Abortion Reporting System–Report of Induced Termination of Pregnancy, 1990–2022, Community Health Assessment Tool (CHAT), November 2023.
- **Pregnancy**
    - **Abortion:** Washington State Department of Health, Center for Health Statistics, Abortion Reporting System–Report of Induced Termination of Pregnancy, 1990–2022, Community Health Assessment Tool (CHAT), November 2023.
    - **Birth:** Washington State Department of Health, Center for Health Statistics, Vital Statistics System–Washington State Certificate of Live Birth, 1990–2022, Community Health Assessment Tool (CHAT), September 2023.
    - **Fetal death:** Washington State Department of Health, Center for Health Statistics, Vital Statistics System–Washington State Fetal Death Certificate, 1990–2022, Community Health Assessment Tool (CHAT), November 2023.

Description: Abortions include induced abortions from abortion providers in Washington State, and through agreement, other states and Canada for Washington State residents. CHAT defines pregnancy to include live birth from Certificates of Live Birth, fetal death from Certificates of Fetal Death (required reporting for gestational ages 20 weeks or more), and induced abortions from abortion providers in Washington State. Through agreement, these datasets also include events in other states and Canada for Washington State residents.

- **Coverage:** All states and Canada provide this information on non-residents to the state of residence. The Center for Health Statistics estimates records of live birth and induced abortions to be 99% complete; fetal death may be less complete due to difficulty in ascertaining fetal deaths that happen around 20 weeks.
- **Statistics:** Abortion rate, pregnancy rate, abortion percent
- **Years:** 1990–most recent year available; updated annually

- **Geography:** State, county
- **Age of mother:** 9 age groups or single year of age as described in Age technical note
- **Gestational age:** By trimester, week groups, and single week for abortion percent only
- **Race/ethnicity:** Not available; 20–30% of abortion records missing information on race or ethnicity

Notes

- Abortions for 1992–1995 contain additional records that were imputed due to a failure to report by one facility. A table showing the number of added records is shown here. Imputation was based on straight-line interpolation for categories formed by single year of woman's age and her place of residence. For some of these counties so few additional records were added that abortion or pregnancy rates will not change.
- Beginning in January 2006, the Center for Health Statistics calculates gestational age in weeks by subtracting the date of last normal menses from the birth date, dividing by 7 and truncating decimal places. If the menses day is missing but the month and year are present, a value of '15' is used for the day. In data files issued before 2006, if the menses month or year were missing or the calculated gestational age was <18 or >45 weeks, the gestational age was estimated from the child's birth weight.

Additional Information:
Center for Health Statistics

Parameters

General Statistics

Statistics used in multiple modules of CHAT

- **Crude rates:** The total number of events divided by the total population, multiplied by a factor of 10 (e.g., 1000, 10,000, 100,000)
- **Age-adjusted rates:** The rate of occurrence within a given population based on a population age distribution of the U.S. standard population
- **Age-specific rates:** The number of events per age group divided by the population for that age group, multiplied by a factor of 10 (e.g., 1,000, 10,000, 100,000)
- **Age adjusted rate within a specified age range**: The rate of occurrence within a given population based on a population age distribution of a standard population for a specified age range
- **YPLL65:** The years of potential life lost relative to age 64 per 100,000 population
- **YPLL85:** The years of potential life lost relative to age 84 per 100,000 population

Diagnosis

The diagnosis parameter is where you can select the cause or condition of interest for the current query. For some modules this area consists of two or more classification schemes. Once you have selected a scheme you can select several causes or conditions, combine several causes or conditions into a new group, and save the query or new group for future use.

Years

The year parameter shows the years for which data are available in CHAT. This is the area where you can select the years of data, as well as combine years of data for the query.

Geography

The geography parameter includes selections of the state and county as the basic units available for query. Some modules also allow the user to select sub-county levels for analysis such as ZIP code, census tract, census block group, school district, and health reporting areas (HRAs – King County only). These sub-county levels are usually filtered by county, with the exception of ZIP code which can be selected without the county filter because some ZIP codes cross county boundaries.

Age

For most of the modules age is available in 3 different grouping schemes

6 groups <1, 1–14, 15–24, 25–44, 45–64, 65+

11 groups <1, 1–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, 85+

20 groups <1, 1–4, 5–9, 10–14, 15–17, 18–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+

For some modules age is also available as single year of age. All of these age groupings can be grouped into custom age groups.

The 9 age groups for birth risk factors, fertility, and pregnancy and abortion are those of the mother and are 10–14, 15–17, 18–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49.

Gender

CHAT uses the gender categories male, female or the option to combine the two (default).

Race and Ethnicity

CHAT has 4 distinct groupings for race, and ethnicity. For the “4” or “5” race groups in CHAT records with multiple race are assigned (bridged) to a single race. NCHS provides bridged race files for birth and death certificates. The North American Association of Central Cancer Registries (NAACCR) coding provides bridged files for cancer data. For race groups “6” and “7” the data are not bridged and individuals indicating more than one race are categorized as “multiple race.” The Washington State Department of Health recommends using the “7” groups classification (with Hispanic as race) and dropping the “multiple race” group. For more information on race categories see the DOH Data Guidelines.

- 4 groupings. White, Black, American Indian/Alaskan Native, Asian/Pacific Islander
- 5 groupings. White-NH, Black-NH, American Indian/Alaskan Native-NH, Asian/Pacific Islander-NH, Hispanic as race (NH=non-Hispanic)
- 6 groupings. White only, Black only, American Indian/Alaskan Native only, Asian only, Pacific Islander only, multi-race (available beginning in 2004)
- 7 groupings. White only-NH, Black only-NH, American Indian/Alaskan Native only-NH, Asian only-NH, Pacific Islander only-NH, multi-race-NH, Hispanic as race (available beginning in 2004) (NH=non-Hispanic)

For ethnicity, available as a separate parameter for race groups “4” and “6”, the selection of Hispanic or non-Hispanic is available.

Appendices

Appendix 1: Imputed Abortions 1992–1995

Frequencies of the Added Records,1992-1995				
County	**1992**	**1993**	**1994**	**1995**
State Total[2]	**1209**	**1191**	**1278**	**1315**
Chelan	23	21	19	16
Clallam	26	26	26	25
Cowlitz	1	1	0	0
Douglas	3	2	2	1
Grant	1	1	0	0
Grays Harbor	5	4	2	0
Island	13	14	18	20
Jefferson	20	20	15	13
King Remainder	231	238	271	293
Seattle	513	473	490	484
Kitsap	80	67	64	58
Kittitas	0	1	1	2
Lewis	3	3	2	1
Mason	3	2	2	1
Pacific	0	0	1	1
Pierce Remainder	33	38	48	55
Tacoma	52	60	73	84
San Juan	4	4	3	3
Skagit	12	12	15	15
Snohomish Remainder	83	90	102	110
Everett	37	42	51	57
Spokane	1	2	2	3
Stevens	0	1	1	2
Thurston	16	17	17	19
Walla Walla	1	1	1	1
Whatcom	27	27	29	29
Whitman	2	2	3	3
Yakima	2	2	2	2
Unknown	17	20	18	17
Out-of-State	53	43	38	31
Total Records Added	1262	1234	1316	1346

[1]The general abortion rate shown under "All Ages" equals total abortions per 1,000 women of childbearing age (15-44). Age-specific rates equal the number of abortions to women in a specific age group per 1,000 women in that age group.

[2]Total abortions includes 13 for which county of residence was unknown.

* Rate not calculated because number of events was less than 5.

Population Data: Office of Financial Management, Forecasting Division, "Population Estimates by Age and Sex, 1980-1997, Washington State," December 4, 1997.

Appendix 2: CHAT Glossary and acronyms

The following definitions explain terms and conventions used in CHAT. They do not necessarily correspond to more general definitions.

Abortion rate: CHAT follows the National Center for Health Statistics and defines abortion rate as the number of induced abortions among women of all ages per 1,000 women age 15–44 years.

Abortion percent: The number of induced abortion per 100 pregnancies.

Age-adjusted rate: The rate in a given population adjusted to the age distribution of a standard population. CHAT uses the 2000 U.S. standard population. (see Data Guidelines)

Age-specific birth rate: The number of births to women in a specific age range per 1,000 women in that age range.

Age-specific rate: The rate of occurrence of the event in a specified age range divided by the population of that age range, per a multiple of 10, such as 100,000 for deaths. (see Data Guidelines)

Birth risk factor: Variables from the birth certificate, present during pregnancy or at the time of birth, that might affect the birth outcome or health of the infant.

BMI: Body Mass Index. The BMI is calculated as 703.1 x (weight in lb / square of height in inches).

Cancer incidence rate: The rate of newly diagnosed cancers in a given time period (usually a year) per 100,000 population.

CCS (Clinical Classification Software): The software program used in CHAT to assign hospitalization events to diagnostic groups.

CHS (Center for Health Statistics): The Center for Health Statistics at the Washington State Department of Health. This center houses the vital statistics datasets for Washington State.

CHARS (Comprehensive Hospital Abstract Reporting System): The statewide hospital discharge reporting system used by civilian ambulatory hospitals in Washington State.

Confidence interval: The expected range of variation due to chance. (Data Guidelines)

County by ZIP code: The aggregation of ZIP codes to form counties in the CHARS database. This process involves assigning ZIP codes that cross county boundaries to a single county based on majority of the population, the location of the post office, or recommendations from LHJ staff.

Crude birth rate: The total number of births per 1,000 population.

Crude rate: The number of events divided by the total population per a multiple of 10 (such as 100,000 for deaths). (See Data Guidelines)

DOH (Department of Health): The Washington State Department of Health.

Fertility rate: See general fertility rate and total fertility rate.

Fetal death: Death prior to the complete expulsion or extraction from its mother of a product of human conception. Reporting of fetal deaths in Washington state is required only when the gestational period is 20 weeks or more. Fetal deaths are used in CHAT to calculate pregnancies and perinatal deaths.

General fertility rate: CHAT follows the National Center for Health Statistics and defines the general fertility rate as the total number of births to women of all ages per 1,000 women age 15–44 years.

Gestational age (calculated): Number of weeks elapsed between the first day of the last menstrual period and the date of delivery or date of pregnancy termination. If the month but not the day of the last menses is known, 15 is used for the day of the month.

HCUP: Healthcare Cost and Utilization Project. This is a collection of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ) to create a national resource of health care data.

HRAs (Health reporting Areas): Geographical boundaries based on census block aggregations. These are only applicable to King county.

ICD-9: International Classification of Diseases, 9th revision, used in coding causes of death prior to 1999. This is the World Health Organization (WHO) coordinated disease classification system that preceded ICD-10.

ICD-9-CM: International Classification of Diseases, 9th Revision, Clinical Modification. This is the WHO coordinated clinical modification of the ICD-9 disease classification system. CHARS and other hospital discharge sets use the ICD-9-CM to code reasons for hospitalization including diagnoses and procedures. NCHS issues corrections, additions, and deletions to the ICD-9-CM on October 1st of each year. Diagnoses codes can contain up to five digits. Procedure codes can contain up to four digits.

ICD-10: International Classification of Diseases, 10th revision, used in coding causes of death since 1999. This is the WHO coordinated disease classification system that replaced the ICD-9. CHAT provides the ICD-10 raw codes for analysis.

ICD-O-3: International Classification of Disease, Oncology, 3rd edition, used in coding cancer cases.

ICE Matrix: The International Collaborative Effort on Injury Statistics. The Centers for Disease Control and Prevention and the National Center for Health Statistics sponsor this program to promote international standards in injury data collection and analysis. This "matrix" classifies injuries by intent and mechanism, not by nature of injury.

Imputed abortions: Counts of abortions added to several counties in the early 1990s to adjust the data because one facility had failed to report abortions during this time.

Induced abortion: The purposeful interruption of pregnancy to prevent a live birth.

Infant mortality rate: The death of an infant under one year of age (366 days) per 1,000 live births. (See also neonatal mortality rate and post-neonatal mortality rate).

Joinpoint: National Cancer Institute trend analysis software that looks at discreet moments in time (points) to identify changes in rates. CHAT provides Joinpoint ready export data.

Kotelchuck index: Also called the Adequacy of Prenatal Care Utilization Index (APNCU). This measure calculates the adequacy of prenatal care based on when prenatal care began and the number of prenatal visits prior to delivery. It is a ratio of observed to expected visits based on the American College of Obstetricians and Gynecologists care standards. The American College of Obstetricians and Gynecologists considers a ratio of 80% or greater an adequate percentage of visits, but not an indication of the quality of care.

Life expectancy: The number of years of life remaining at a specified age based on statistical calculations. Here is a detailed explanation of the calculation

Maternal death: Death attributed to complications of pregnancy, childbirth, or abortion (ICD 10: 000-099). In 2004, a pregnancy check box was added to the death certificate and this has resulted in an increased number of these deaths being recorded.

National Center for Health Statistics 113 Groupings Table B: Causes of mortality reported nationally by the National Center for Health Statistics.

National Center for Health Statistics 130 groupings Table C: Causes of infant mortality reported nationally by the National Center for Health Statistics.

NCHS*:* National Center for Health Statistics

NCI: National Cancer Institute

Neonatal mortality rate: All infant deaths within the first 27 days after birth per 1,000 live births.

NIMS: National Infant Mortality Surveillance project.

Perinatal death rate*:* Fetal deaths plus deaths to infants within the first six days of life.

PHIMS: *Public Health Issue Management System. This system provides the data for CDs, STDs, and TB.*

Pregnancy rate: CHAT follows the National Center for Health Statistics and defines the pregnancy rate as the number of births, induced abortions and fetal deaths among women of all ages per 1,000 women age 15 – 44.

Premature birth percent: Percentage of live births in which the infant was born before the end of the 37th week of gestation based on calculated gestational age.

Primary diagnosis: This is the first diagnosis on a CHARS record. It is suppose to represent the condition the hospital establishes to be chiefly responsible for occasioning the hospital admission. However, because of hospital reimbursement practices, it is not clear that the 1st diagnosis is always the most immediate cause for hospitalization.

Post-neonatal mortality rate: All infant deaths from the 28th through the 365th day after birth per 1,000 live births.

SAW (Secure Access Washington): A security system through which CHAT users provide a single user ID and password to access CHAT.

School District: Census based geographical area encompassing a designated school district.

SEER (Surveillance Epidemiology and End Results program): The cancer surveillance program of the National Cancer Institute (NCI) that includes cancer registries in selected areas across the U.S. The Fred Hutchinson Cancer Research Center in Seattle is responsible for a SEER registry that includes newly diagnosed cancer cases from 13 Puget Sound counties. These cancer cases are in WSCR .

Sex ratio at birth: The sex ratio is calculated as the number of male infants divided by the number of female infants. It includes only full-term (≥37 weeks) singleton births.

Special code groups: The diagnoses under hospitalizations and mortality that requires the use of multiple diagnoses fields for calculation.

Total fertility rate: A hypothetical measure of the average number of children that would be born to a woman in her lifetime based on age-specific fertility rates of a given period.

Underlying cause of death: The disease that initiated the train of morbid events leading directly or indirectly to death or the circumstances of the injury that produced the fatality.

WSCR (Washington State Cancer Registry): Washington's cancer registry, containing newly diagnosed cases of cancer by diagnosis year.

***WSCR code grouping*:** This grouping (based on the National Cancer Institute's SEER program) covers the most frequently occurring cancers in Washington State.

Years of Potential Life Lost (YPLL): In CHAT, the number of years lost due to a specific disease or condition before age 65 or 85.

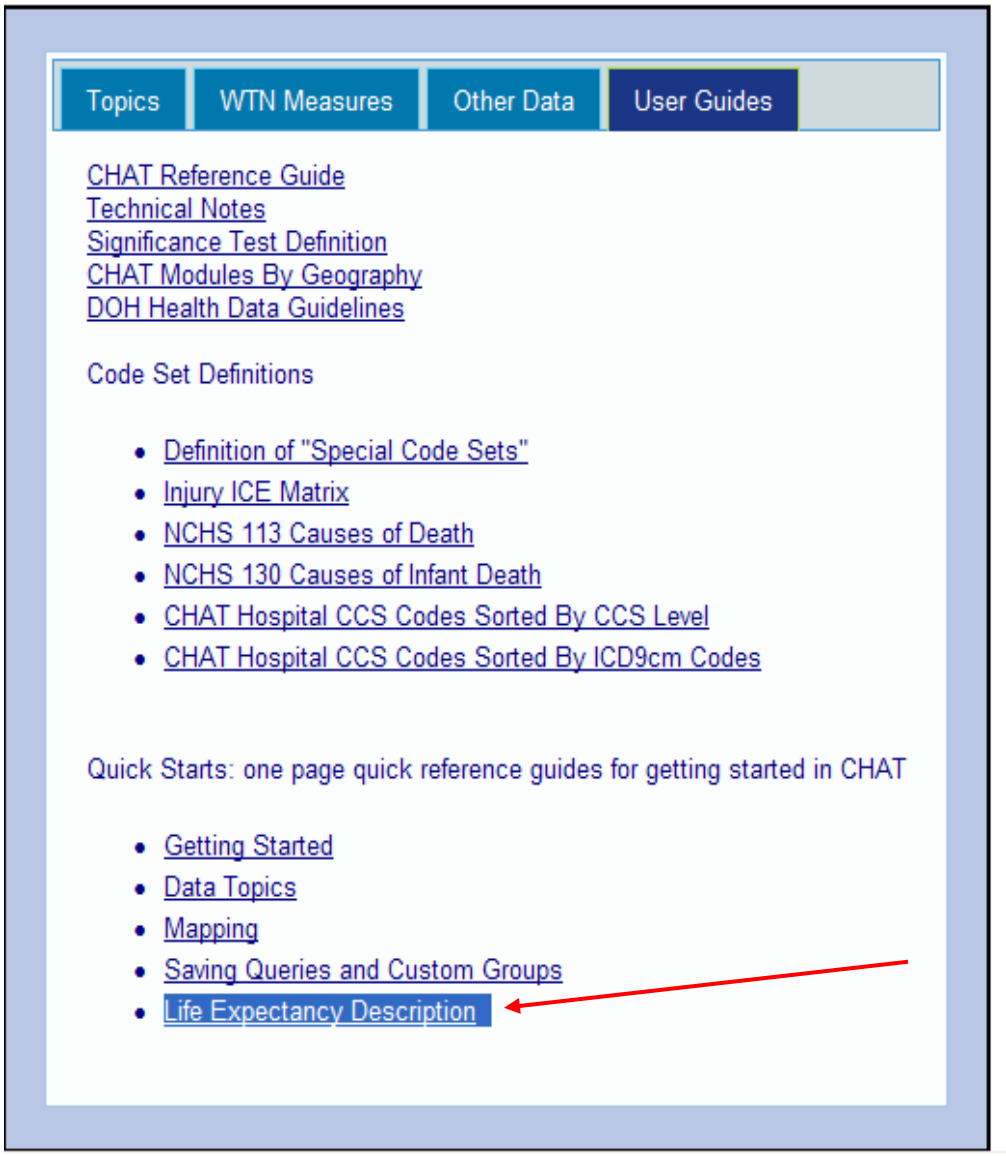
Appendix 3: Communicable disease matrix

Table: Communicable diseases by years reportable (2000 – 2013). For more details

Condition	Years reportable
Arboviral Disease	2004 – current
Botulism-Foodborne	2000 – current
Botulism-Infant	2000 – current
Botulism-Wound	2000 – current
Brucellosis	2000 – current
Campylobacteriosis	2000 – current
Cholera	2000 – current
Cryptosporidiosis	2000 – current
Diptheria	2002 – current
E. coli	2000 – current
Giardiasis	2000 – current
Haemophilus Influenza (invasive <5 years old	2000 – current
Hantavirus Pulmonary Syndrome (HPS)	2000 – current
Hemolytic Uremic Syndrome (HUS)	2001 – 2010
Hepatitis A	2000 – current
Hepatitis B	2000 – current
Hepatitis C	2000 – current
Hepatitis Unspecified (Infectious)	2000 – current
Legionellosis	2000 – current
Leptospirosis	2000 – current
Listeriosis	2000 – current
Lyme Disease	2000 – current
Malaria	2000 – current
Measles	2000 – current
Meningococcal Disease (Invasive)	2000 – current
Mumps	2000 – current
Paralytic Shellfish Poisoning (PSP)	2001 – current
Pertussis	2000 – current
Plague	2000 – current
Polio	2002 – current
Psittacosis	2000 – current
Q Fever	2000 – current
Rabies (Human)	2000 – current
Rabies Post-exposure Prophylaxis	2007 – 2010
Rare Diseases of Public Health Significance	2000 – current
Relapsing Fever	2000 – current
Rubella	2000 – current
Salmonellosis	2000 – current
Shiga Toxin-producing E. Coli	2010 – current
Shigellosis	2000 – current
Suspected rabies Exposure	2010 – current
Tetanus	2000 – current
Tularemia	2000 – current
Typhoid Fever	2000 – 2001; 2004 – current
Typhus	2001 – current
Unexplained Critical Illness or Death	2001 – 2006
Vibriosis (non-cholera)	2000 – current
Yersiniosis	2000 – current

Appendix 4: Life Expectancy Statistic

Life Expectancy technical notes go to User Guides in CHAT main page.



Appendix 5: Calculation of Prenatal Care Initiation

Prenatal care calculation methods: Comparison between Washington State and the National Center for Health Statistics

(Patricia Starzyk, Washington State Department of Health Center for Health Statistics)

Abstract: The 2003 birth certificate revision created the need to calculate the month of pregnancy when prenatal care began. Washington State and the National Center for Health Statistics did this calculation independently. Their numbers differ considerably. This report examines the reasons for this difference. Most of the difference is related to the way in which the calculation converts fractional months to whole months. Trend data for Washington State and comparisons with states still collecting the actual month care began suggest that the Washington State calculation method better reflects the way the data would have been reported in the past, but it may overestimate the amount of timely care provided. On the other hand, the NCHS method may underestimate timely care.

Background: The 2003 US Standard Birth Certificate revision replaced the item 'month of pregnancy prenatal care began' with the actual date of the first prenatal care visit. The national Certificate Review Panel felt that this change would provide more accurate data (1). However, in order to study prenatal care initiation, we now have to convert this date into the month or trimester of pregnancy when care began.

The Washington State Center for Health Statistics (WACHS) was one of the first states to start using the new certificate form. At the time (2003) we had no guidance on how to do this conversion so we wrote our own program. This program calculates the month when prenatal care began by subtracting the menses date from the date of the first visit. If the menses date is missing or out of range we estimate it from the birth date and the gestational age.

We verified this calculation in two ways:

1. We compared the computer calculation against a hand calculation for a sample of records to make sure the program was correct and

2. We compared the percent distribution of month care began to pre-revision data.

The calculated data seemed to be consistent with earlier data. Before the revision (2002), about 83% of mothers statewide had first trimester care, with very little change over the previous eight years. The 2003 calculated data showed only a slight drop in first trimester care (to 81%), which we thought might be related to the change in the data collection method.

On the other hand, when the National Center for Health Statistics (NCHS) later independently calculated the month care began, they found a considerably lower percentage of first trimester care (74%) for Washington State in 2003 (2).

Pennsylvania, the only other state to use the new revision in 2003, had similar results. The percent first trimester care calculated by Pennsylvania (82%) was much higher than the percentage (76%) NCHS calculated for them (3).

In fact, according to data calculated by NCHS, states that used the 2003 revision had a much smaller percentage of first trimester care overall (69%) than did states still using the old certificate, which collected the month care began directly (83%) (4). NCHS attributed this difference to the change in reporting method, not to an actual difference in prenatal care initiation. If the new reporting method collects more accurate prenatal care data, as expected, then the lower percent first trimester care for the 'revised' states could mean that timely prenatal care has been overestimated in the past.

However, whether this overestimation is small or substantial for Washington State depends on whether we use the WACHS or NCHS calculated prenatal care data. Both of these calculations use the same data but come up with quite different numbers. We need to understand why these differences occur before we can decide which number best reflects prenatal care access since 2003. This report compares the two calculation methods and accounts for most of the difference between them.

Comparison of methods: NCHS shared a copy of their calculation program, which allowed us to compare the two methods. We used 2006 data, which at the time were the most recent published data available from NCHS for comparison. We also used only data for births occurring in Washington State to avoid mixing in out of state data collected under the old method.

We investigated several factors which could contribute to the difference we see. Table 1 summarizes the results.

Table 1. Possible reasons for the difference in calculated prenatal care data

Factor	WACHS method	NCHS method	Effect on 2006 data
Converting dates to days	Uses dates stored in SAS (# days since Jan 1, 1960)	Uses century dates (year x 365 + # days left in year)	None
Converting data when calculated month is <0	Assigned to unknown	Assigned to 1st trimester care	Slight difference in 1st trimester care (78.4% vs. 78.5%)
Using gestational age when menses date is missing	Full term births only (37-41 weeks)	All gestational ages	Slight difference in 1st trimester care (78.4% vs. 78.3%)
Imputing missing day when month and year are given	Set the day to 15	Hot deck using data from similar but complete birth records (details unknown)	Not likely to be large; imputation done for about 1% of records
Converting calculated fractional months to an integer	Round calculated months to nearest whole number	Truncate calculated months and add 1	Major difference (see below)

Both methods calculate the number of months in the same way:

Calculated months = (date 1st visit in days – menses date in days)/30.4

This calculation generally yields fractional months (e.g., 2.1). WACHS and NCHS convert this fraction to a whole number in very different ways:

WACHS: Months = ROUND (calculated months)

(*Rounds to nearest whole number*).

NCHS: Months = INT (calculated months) + 1

(*Truncates the fractional part leaving only the integer and then adds 1*)

The WACHS formula uses the standard way of converting fractions to whole numbers. The NCHS formula assumes that any fractional value greater than the exact month means that care began in the next month. Thus, for example, a calculated month of 2.1 would be the 2nd month by the WACHS formula and the 3rd month by the NCHS formula.

Test calculation: By substituting the NCHS formula in the WACHS calculation program we should be able to generate numbers close to what NCHS produces. Table 2 shows the results of this calculation.

Table 2. Comparison of calculation methods by trimester – 2006 occurrence births

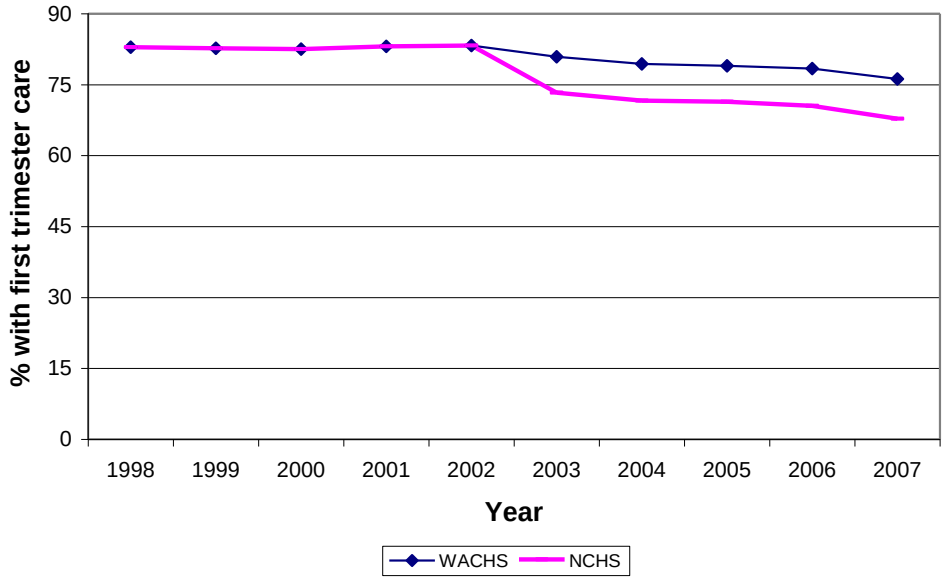
	Percent of births		
Trimester care began	**WA State current method**	**WA State using NCHS formula**	**Reported by NCHS (4)**
First	78.4	70.5	70.3
Second	16.4	23.1	23.1
Third/No care	5.1	6.4	6.6

By substituting the NCHS formula for ours, we can very closely approximate the NCHS result, which confirms our assumption that the method used to convert fractional months to whole months is the major cause of the difference.

Comparison to other data: The WACHS method provides about a 10% higher estimate of first trimester care compared to the NCHS method. Second trimester care and third trimester/no care are about 30% and 20% lower, respectively. How do these data compare to data reported before the revision?

Trend data: Trend data shows how Washington State data have changed as a result of the revision.

Figure 1. Percent of births with first trimester care, Washington State Occurrences 1998-2007



Before the revision, WACHS and NCHS report the same percentages of first trimester care. After the revision the two percentages parallel each other, with WACHS figures being about 10% higher. The WACHS method connects more seamlessly with previous years' data.

How were the data collected before the revision? WACHS surveyed all birthing hospitals in 1998 to determine who provided the data, who collected it, and how they collected it. Data for the prenatal care section were collected in a variety of ways, but for most of the hospitals surveyed (66/70) the mother provided the information, sometimes in conjunction with medical records or nursing staff (5).

Data for unrevised states*:* This comparison shows what our data might look like if we were still collecting the actual month when prenatal care began.

Table 3. Percent of births by trimester care began – 2002 and 2006 occurrence births

	Trimester prenatal care began		
Year and state	**First**	**Second**	**Third/no care**
2002 – pre-revision (6)			
Oregon	81.6	14.6	3.8
Washington	83.4	13.5	3.1
2006 – Ore unrevised; WA revised (4)			
Oregon	79.2	16.5	4.3
Washington (WACHS)	78.4	16.4	5.1
Washington (NCHS)	70.3	23.1	6.6

Before the revision, Washington and Oregon had similar proportions of care in the first trimester. As of 2006, Oregon had not yet revised its certificate. Thus, Oregon data can approximate what first trimester care would look like for Washington using the old data collection method. As Table 3 shows, the WACHS method gives a similar proportion of first trimester care but the NCHS method gives a much lower estimate.

Both trend data and data for unrevised states suggest that before the revision the informant (typically the mother) would have rounded fractional months to the nearest whole number. This means that the WACHS calculated data are more consistent with how data would have been reported in the past, but not necessarily more 'correct' than the NCHS data.

Which prenatal care data should we use? Programs generally use prenatal care data in comparison rather than as single, absolute numbers. In that case, the difference between the WACHS and the NCHS absolute numbers might not affect the conclusions we would draw from the data. We studied two common data uses – tracking progress towards goals and describing differences between groups.

Progress towards goals: One Healthy People 2020 (HP2020) goal is to increase the proportion of women who have early prenatal care (7). Figure 1 (page 4) shows that, regardless of which calculation method we use, we are moving in the wrong direction if we hope to achieve this goal. First trimester care has decreased steadily ever since 2003, the first year of the revision. At first we attributed this change to the change in data collection method. However, in that case, we might expect the trend to level off rather than continuing to decrease. The continuing decrease in first trimester care may be more strongly related to a decrease in the number of obstetric care providers (8) than to the change in the data collection method.

Because the goal has no specific numeric target, but simply mentions changes in the proportion of early care, we can use either method to track progress (or lack thereof) towards the goal.

Differences between groups: We studied first trimester care data by calculation method for mother's race/ethnicity (Table 4) and mother's age (Table 5). As comparison measures, we ranked the percent first trimester care (from highest to lowest) and calculated the ratio of the WACHS percent to the NCHS percent.

Table 4. First Trimester care by mother's race/ethnicity – 2006 occurrence births

Mother's Race*	**WACHS method**		**NCHS method**		**Ratio of percents**
	Percent	**Rank**	**Percent**	**Rank**	**(WACHS/NCHS)**
Non-Hispanic					
White	81.8	1	74.4	1	1.10
African American	71.2	3	63.2	3	1.13
Native American	63.4	5	53.8	5	1.18
Asian	81.3	2	74.4	2	1.09
Pacific Islander	51.3	6	41.6	6	1.23
Hispanic	70.6	4	60.5	4	1.17

**Includes only cases where mother reported a single race*

Table 5. First Trimester care by mother's age – 2006 occurrence births

Mother's Age	**WACHS method**		**NCHS method**		**Ratio of percents**
	Percent	**Rank**	**Percent**	**Rank**	**(WACHS/NCHS)**
15-17	56.9	7	45.8	7	1.24
18-19	66.1	6	55.6	6	1.19
20-24	72.6	5	63.5	5	1.14
25-29	80.6	4	73.1	4	1.10
30-34	84.0	2	77.1	2	1.09
35-39	84.4	1	77.5	1	1.12
40-44	81.2	3	73.6	3	1.10

Ranking: Both calculation methods give us the same ranking for race and age. For example, White mothers and mothers aged 35-39 are the most likely to have timely care and Pacific Islander and teenage mothers are the least.

Ratio of percents: The WACHS method gives about a 10-20% higher estimate of first trimester care. The percentage differences are highest for Pacific Islanders and young teens. However, these are also two of the numerically smallest groups and their percentages might be less reliable.

Discussion: In 2003, Washington State started collecting the date of the first prenatal care visit rather than the month care began. This change allows us to collect more accurate data (1). However, even if the data we currently collect are more accurate, we still have to reduce a continuous process (entry into prenatal care) to a discrete set of numbers (whole number of months or trimesters when care began). WACHS and NCHS do this reduction in two different ways, which creates differences in the data. Each method has its flaws.

The WACHS method (using the standard way of rounding) assumes that care begun on the 14th day of the month has the same effect as care begun on the 15th day of the previous month, which overestimates timely care.

The NCHS method (always rounding up) assumes that care begun on the last day of the month has the same effect as care begun on the second day of the month, which underestimates timely care.

Analysts generally use prenatal care data in comparison with previous data, rather than as absolute numbers. For this reason, we might want to use the Washington state method for comparisons within the state, since this method better reflects the way informants provided the data in the past. For interstate comparisons, we should use data calculated by NCHS.

The bottom line: The good news is that both methods will usually reach the same conclusion about prenatal care access. The bad news is also that both methods reach the same conclusion, which is that prenatal care access is getting worse.

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