

## Department of Defense

United States (US) Department of Defense (DoD) Birth and Infant Health Research Program (BIHR)

**Purpose:** Surveillance, Research

**Partner:** Hospitals, Universities, Other DoD Programs

**Program status:** Currently collecting data

**Start year:** 1998

**Earliest year of available data:** 1998; data for formal analysis beginning with 2001

**Organizational location:** Deployment Health Research Department, Naval Health Research Center

**Population covered annually:** Approximately 100,000 per year

**Statewide:** No, National/Worldwide; includes all DoD beneficiaries

**Current legislation or rule:** Assistant Secretary of Defense, Health Affairs Policy Memorandum

**Legislation year enacted:** 1998

### Case Definition

**Outcomes covered:** Outcomes include those birth defects listed in the case definition of the National Birth Defects Prevention Network. For a birth defect to be represented, the diagnosis must appear at least once in an inpatient record, or at least twice on two separate dates for outpatient encounters. Same sex multiples are excluded from analysis.

**Pregnancy outcome:** Livebirths (All gestational ages and birth weights)

**Age:** Birth up to one year after delivery. Infants in the 2018 birth cohort may have incomplete data through the first year of life.

**Residence:** Worldwide; any birth to a US military beneficiary.

### Surveillance Methods

**Case ascertainment:** Active Case Finding, Passive case-finding with case confirmation, Passive case-finding without case confirmation, Electronic diagnostic codes from all inpatient and outpatient healthcare encounters of US military beneficiaries at both civilian and military care facilities.

**Delivery hospitals:** Disease index or discharge index, Discharge summaries, Specialty outpatient clinics, All inpatient and outpatient encounters at both civilian and military care facilities are captured in standardized DoD data.

**Pediatric & tertiary care hospitals:** Disease index or discharge index, Discharge summaries, Specialty outpatient clinics, All inpatient and outpatient encounters at both civilian and military care facilities are captured in standardized DoD data.

**Third party payers:** All inpatient and outpatient encounters at both civilian and military care facilities are captured in standardized DoD data.

**Other sources:** Validation of standardized electronic data performed by chart review of a random sample of births from military facilities.

### Case Ascertainment

**Conditions warranting chart review in newborn period:** Any chart with an ICD-9-CM code 740-759/ICD-10-CM code Q00-Q99, Any chart with a selected list of ICD-9-CM codes outside 740-759/ICD-10-CM codes outside Q00-Q99, Validation of standardized electronic data performed by chart review of a random sample of births from military healthcare facilities.

**Conditions warranting chart review beyond the newborn period:** Any infant with a codable defect

**Coding:** ICD-9-CM/ICD-10-CM, The BIHR program assesses outcomes through the first year of life; however, infants in the 2018 birth cohort may have incomplete data through the first year of life. Infants born on or after October 1, 2014 concluded their first year of life after the transition from ICD-9-CM to ICD-10-CM coding on October 1, 2015. For these infants, the BIHR program employed ICD-10-CM coding to assess outcomes for the final months of their assessment period.

### Data Collected

**Infant/fetus:** Identification information (name, address, date-of-birth, etc.), Demographic information (race/ethnicity, sex, etc.), Birth measurements (weight, gestation, Apgars, etc.), Tests and procedures, Infant complications, Birth defect diagnostic information

**Mother:** Identification information (name, address, date-of-birth, etc.), Demographic information (race/ethnicity, sex, etc.), Illnesses/conditions, Prenatal care, Prenatal diagnostic information, Pregnancy/delivery complications, Family history

**Father:** Identification information (name, address, date-of-birth, etc.), Demographic information (race/ethnicity, sex, etc.), Illnesses/conditions

### Data Collection Methods and Storage

**Data collection:** Electronic file/report submitted by other agencies (hospitals, etc.)

**Database collection and storage:** Access, SAS

### Data Analysis

**Data analysis software:** SAS

**Quality assurance:** Validity checks, Re-abstraction of cases, Double-checking of assigned codes, Comparison/verification between multiple data sources, Clinical review

**Data use and analysis:** Routine statistical monitoring, Baseline rates, Rates by demographic and other variables, Monitoring outbreaks and cluster investigations, Time trends, Observed vs. expected analyses, Epidemiological studies (using only program data), Identification of potential cases for other epidemiologic studies, Service delivery, Grant proposals, Prevention projects, Monitor birth defect outcomes following specific parental or gestational exposures of concern.

### System Integration

**System links:** DoD databases

**System integration:** DoD databases

### Funding

**Funding source:** 100% Other federal funding (non-CDC grants)

### Other

**Web site:**

<https://www.med.navy.mil/Naval-Medical-Research-Center/Naval-Health-Research-Center/Core-Research/Military-Population-Health/DoD-Birth-and-Infant-Health-Research-BIHR/>

**Surveillance reports on file:** DoD/Health Affairs policy memorandum; annual reports

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## **DATA TABLES**

**Department of Defense  
Birth Defects Counts and Prevalence 2014 - 2018 (Prevalence per 10,000 Live Births)**

Defect	Maternal Race/Ethnicity					Total*	Notes
	White, Non-Hispanic	Black, Non-Hispanic	Hispanic	Asian or Pacific Islander, Non-Hispanic	American Indian or Alaska Native, Non-Hispanic		
Anencephalus	20 <i>0.6</i>	3 <i>0.4</i>	6 <i>0.8</i>	2 <i>0.7</i>	1 <i>1.2</i>	33 <i>0.6</i>	
Anophthalmia/microphthalmia	49 <i>1.4</i>	16 <i>2.1</i>	13 <i>1.8</i>	2 <i>0.7</i>	2 <i>2.3</i>	83 <i>1.5</i>	
Anotia/microtia	105 <i>3.0</i>	14 <i>1.8</i>	34 <i>4.7</i>	12 <i>4.3</i>	6 <i>7.0</i>	183 <i>3.3</i>	
Aortic valve stenosis	117 <i>3.3</i>	15 <i>1.9</i>	19 <i>2.6</i>	3 <i>1.1</i>	3 <i>3.5</i>	163 <i>2.9</i>	
Atrial septal defect	5,034 <i>142.3</i>	1,186 <i>153.7</i>	1,042 <i>142.7</i>	320 <i>115.9</i>	103 <i>119.3</i>	7,954 <i>142.0</i>	1
Atrioventricular septal defect (Endocardial cushion defect)	216 <i>6.1</i>	47 <i>6.1</i>	38 <i>5.2</i>	19 <i>6.9</i>	8 <i>9.3</i>	349 <i>6.2</i>	2
Biliary atresia	84 <i>2.4</i>	41 <i>5.3</i>	19 <i>2.6</i>	9 <i>3.3</i>	0 <i>0.0</i>	158 <i>2.8</i>	
Bladder exstrophy	13 <i>0.4</i>	5 <i>0.6</i>	0 <i>0.0</i>	0 <i>0.0</i>	0 <i>0.0</i>	18 <i>0.3</i>	
Choanal atresia	101 <i>2.9</i>	16 <i>2.1</i>	17 <i>2.3</i>	4 <i>1.4</i>	3 <i>3.5</i>	143 <i>2.6</i>	
Cleft lip alone	240 <i>6.8</i>	27 <i>3.5</i>	26 <i>3.6</i>	18 <i>6.5</i>	6 <i>7.0</i>	327 <i>5.8</i>	
Cleft lip with cleft palate	257 <i>7.3</i>	37 <i>4.8</i>	38 <i>5.2</i>	24 <i>8.7</i>	9 <i>10.4</i>	378 <i>6.8</i>	
Cleft palate alone	396 <i>11.2</i>	53 <i>6.9</i>	78 <i>10.7</i>	29 <i>10.5</i>	11 <i>12.7</i>	590 <i>10.5</i>	
Cloacal exstrophy	106 <i>3.0</i>	26 <i>3.4</i>	23 <i>3.1</i>	7 <i>2.5</i>	2 <i>2.3</i>	171 <i>3.1</i>	
Clubfoot	910 <i>25.7</i>	159 <i>20.6</i>	148 <i>20.3</i>	48 <i>17.4</i>	11 <i>12.7</i>	1,313 <i>23.4</i>	
Coarctation of the aorta	381 <i>10.8</i>	73 <i>9.5</i>	62 <i>8.5</i>	15 <i>5.4</i>	11 <i>12.7</i>	558 <i>10.0</i>	
Common truncus (truncus arteriosus)	53 <i>1.5</i>	5 <i>0.6</i>	9 <i>1.2</i>	1 <i>0.4</i>	5 <i>5.8</i>	75 <i>1.3</i>	
Congenital cataract	134 <i>3.8</i>	34 <i>4.4</i>	25 <i>3.4</i>	7 <i>2.5</i>	2 <i>2.3</i>	213 <i>3.8</i>	
Congenital posterior urethral valves	64 <i>3.5</i>	16 <i>4.0</i>	6 <i>1.6</i>	4 <i>2.8</i>	2 <i>4.5</i>	95 <i>3.3</i>	3
Craniosynostosis	685 <i>31.1</i>	104 <i>20.9</i>	113 <i>24.0</i>	38 <i>21.3</i>	15 <i>28.2</i>	991 <i>28.1</i>	4
Deletion 22q11.2	59 <i>1.7</i>	7 <i>0.9</i>	10 <i>1.4</i>	2 <i>0.7</i>	1 <i>1.2</i>	80 <i>1.4</i>	
Diaphragmatic hernia	141 <i>4.0</i>	38 <i>4.9</i>	36 <i>4.9</i>	12 <i>4.3</i>	3 <i>3.5</i>	235 <i>4.2</i>	
Double outlet right ventricle	103 <i>2.9</i>	29 <i>3.8</i>	19 <i>2.6</i>	6 <i>2.2</i>	5 <i>5.8</i>	168 <i>3.0</i>	
Ebstein anomaly	47 <i>1.3</i>	8 <i>1.0</i>	11 <i>1.5</i>	2 <i>0.7</i>	3 <i>3.5</i>	77 <i>1.4</i>	
Encephalocele	47 <i>1.3</i>	7 <i>0.9</i>	6 <i>0.8</i>	3 <i>1.1</i>	1 <i>1.2</i>	67 <i>1.2</i>	
Esophageal atresia/tracheoesophageal fistula	109 <i>3.1</i>	14 <i>1.8</i>	21 <i>2.9</i>	6 <i>2.2</i>	2 <i>2.3</i>	157 <i>2.8</i>	
Gastroschisis	155 <i>4.4</i>	48 <i>6.2</i>	44 <i>6.0</i>	13 <i>4.7</i>	5 <i>5.8</i>	275 <i>4.9</i>	
Holoprosencephaly	94 <i>2.7</i>	27 <i>3.5</i>	16 <i>2.2</i>	3 <i>1.1</i>	4 <i>4.6</i>	151 <i>2.7</i>	
Hypoplastic left heart syndrome	136 <i>3.8</i>	32 <i>4.1</i>	22 <i>3.0</i>	8 <i>2.9</i>	4 <i>4.6</i>	214 <i>3.8</i>	
Hypospadias	2,190 <i>120.2</i>	448 <i>113.4</i>	328 <i>87.9</i>	122 <i>85.0</i>	48 <i>109.1</i>	3,259 <i>113.2</i>	3
Interrupted aortic arch	161 <i>4.6</i>	34 <i>4.4</i>	28 <i>3.8</i>	8 <i>2.9</i>	6 <i>7.0</i>	245 <i>4.4</i>	

**Department of Defense**  
**Birth Defects Counts and Prevalence 2014 - 2018 (Prevalence per 10,000 Live Births)**

Defect	Maternal Race/Ethnicity					Total*	Notes
	White, Non-Hispanic	Black, Non-Hispanic	Hispanic	Asian or Pacific Islander, Non-Hispanic	American Indian or Alaska Native, Non-Hispanic		
Limb deficiencies (reduction defects)	207 <i>5.9</i>	47 <i>6.1</i>	35 <i>4.8</i>	11 <i>4.0</i>	3 <i>3.5</i>	315 <i>5.6</i>	
Omphalocele	112 <i>3.2</i>	53 <i>6.9</i>	17 <i>2.3</i>	5 <i>1.8</i>	1 <i>1.2</i>	195 <i>3.5</i>	
Pulmonary valve atresia and stenosis	485 <i>13.7</i>	146 <i>18.9</i>	104 <i>14.2</i>	34 <i>12.3</i>	12 <i>13.9</i>	804 <i>14.4</i>	
Pulmonary valve atresia	30 <i>0.8</i>	4 <i>0.5</i>	8 <i>1.1</i>	3 <i>1.1</i>	0 <i>0.0</i>	48 <i>0.9</i>	
Rectal and large intestinal atresia/stenosis	175 <i>4.9</i>	37 <i>4.8</i>	45 <i>6.2</i>	15 <i>5.4</i>	5 <i>5.8</i>	291 <i>5.2</i>	
Renal agenesis/hypoplasia	276 <i>7.8</i>	59 <i>7.6</i>	52 <i>7.1</i>	22 <i>8.0</i>	5 <i>5.8</i>	422 <i>7.5</i>	
Single ventricle	90 <i>2.5</i>	25 <i>3.2</i>	14 <i>1.9</i>	6 <i>2.2</i>	2 <i>2.3</i>	145 <i>2.6</i>	
Small intestinal atresia/stenosis	181 <i>5.1</i>	47 <i>6.1</i>	32 <i>4.4</i>	16 <i>5.8</i>	3 <i>3.5</i>	284 <i>5.1</i>	
Spina bifida without anencephalus	195 <i>5.5</i>	17 <i>2.2</i>	32 <i>4.4</i>	7 <i>2.5</i>	1 <i>1.2</i>	255 <i>4.6</i>	
Tetralogy of Fallot	240 <i>6.8</i>	49 <i>6.3</i>	38 <i>5.2</i>	23 <i>8.3</i>	5 <i>5.8</i>	364 <i>6.5</i>	
Total anomalous pulmonary venous connection	44 <i>1.2</i>	4 <i>0.5</i>	8 <i>1.1</i>	2 <i>0.7</i>	3 <i>3.5</i>	63 <i>1.1</i>	
Transposition of the great arteries (TGA)	153 <i>4.3</i>	31 <i>4.0</i>	19 <i>2.6</i>	8 <i>2.9</i>	4 <i>4.6</i>	225 <i>4.0</i>	
Dextro-transposition of great arteries (d-TGA)	145 <i>4.1</i>	28 <i>3.6</i>	19 <i>2.6</i>	8 <i>2.9</i>	4 <i>4.6</i>	214 <i>3.8</i>	
Tricuspid valve atresia and stenosis	48 <i>1.4</i>	16 <i>2.1</i>	9 <i>1.2</i>	2 <i>0.7</i>	1 <i>1.2</i>	79 <i>1.4</i>	5
Trisomy 13	33 <i>0.9</i>	13 <i>1.7</i>	6 <i>0.8</i>	3 <i>1.1</i>	0 <i>0.0</i>	56 <i>1.0</i>	
Trisomy 18	66 <i>1.9</i>	19 <i>2.5</i>	14 <i>1.9</i>	7 <i>2.5</i>	1 <i>1.2</i>	110 <i>2.0</i>	
Trisomy 21 (Down syndrome)	523 <i>14.8</i>	105 <i>13.6</i>	92 <i>12.6</i>	36 <i>13.0</i>	8 <i>9.3</i>	786 <i>14.0</i>	
Turner syndrome	50 <i>2.9</i>	10 <i>2.7</i>	14 <i>3.9</i>	4 <i>3.0</i>	0 <i>0.0</i>	79 <i>2.9</i>	6
Ventricular septal defect	2,665 <i>75.3</i>	507 <i>65.7</i>	546 <i>74.8</i>	159 <i>57.6</i>	62 <i>71.8</i>	4,080 <i>72.9</i>	7
<b>Total live births</b>	<b>353,830</b>	<b>77,182</b>	<b>73,033</b>	<b>27,614</b>	<b>8,632</b>	<b>559,991</b>	
<b>Male live births</b>	<b>182,173</b>	<b>39,507</b>	<b>37,306</b>	<b>14,355</b>	<b>4,398</b>	<b>287,917</b>	
<b>Female live births</b>	<b>171,657</b>	<b>37,675</b>	<b>35,727</b>	<b>13,259</b>	<b>4,234</b>	<b>272,074</b>	

**Department of Defense  
Birth Defects Counts and Prevalence 2014 - 2018 (Prevalence per 10,000 Live Births)**

Defect	Maternal Age (Years)		Total*	Notes
	Less than 35	35+		
Gastroschisis	243 <i>5.1</i>	4 <i>0.6</i>	275 <i>4.9</i>	
Trisomy 13	36 <i>0.8</i>	18 <i>2.8</i>	56 <i>1.0</i>	
Trisomy 18	66 <i>1.4</i>	38 <i>5.9</i>	110 <i>2.0</i>	
Trisomy 21 (Down syndrome)	455 <i>9.5</i>	296 <i>45.6</i>	786 <i>14.0</i>	
<b>Total live births</b>	<b>476,445</b>	<b>64,909</b>	<b>559,991</b>	

**Notes**

1. Data for this condition include patent foramen ovale.
2. Data for this condition include inlet ventricular septal defect.
3. Data for this condition include male and unknown gender cases only. Prevalence is calculated per 10,000 male live births.
4. Data for this condition include only those cases captured through ICD-10-CM codes and is restricted to infants whose first year of life occurred in fiscal year 2016 or later.
5. Data for this condition include cases with tricuspid stenosis or hypoplasia.
6. Data for this condition include female and unknown gender cases only. Prevalence is calculated per 10,000 female live births.
7. Data for this condition include inlet ventricular septal defect and probable ventricular septal defect.

**General comments**

\*Data for totals include unknown and/or other.

-Data for all conditions exclude infants that appear as multiples of same gender.

-Infants born in 2018 may not have a full year of follow-up data available.

-Minimum criteria for a case: One diagnosis from institutional records, or two diagnoses from professional encounter records from different dates.

-Race/ethnicity for the Department of Defense Birth and Infant Health Research (BIHR) program is based on the military parent through whom the infant receives military health care benefits. This may be the infant's mother or father. The BIHR program does not account for multiple races.