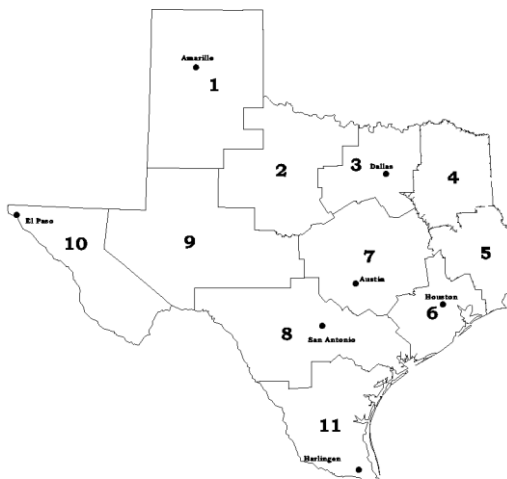


Texas Birth Defects Registry (TBDR) Annual Report Birth Defects Among 1999–2023 Deliveries

Methods

Scope of this Report

This report presents information on selected birth defects among deliveries during 1999 through 2023 to women who were residents of Texas at the time of delivery.



Case Definition

To be included as a case in the Texas Birth Defects Registry, all of the following criteria must be met:

- The mother's residence at the time of delivery must be in an area covered by the registry. During 1999–2023, the registry covered the entire state of Texas.
- The infant or fetus must have a structural birth defect or developmental disability monitored by the registry.
- The defect must be diagnosed prenatally or within one year after delivery. This is extended to six years of age for special cases, currently only for fetal alcohol syndrome.

The current case definition includes all pregnancy outcomes (live births, spontaneous fetal deaths, and induced pregnancy terminations) at all lengths of gestation. Prior to April 5, 2001, when the current case definition was adopted, the registry did not collect information on birth defects among fetal deaths before 20 weeks of gestation. Most 1999 and much of year 2000 surveillance activities were completed at the time this case definition went into effect. As a result, data in the Texas Birth Defects Registry for deliveries before 2001 include only a very small number of fetal deaths before 20 weeks of gestation.

Data Collection

The Texas Birth Defects Registry uses active surveillance. This means it does not require reporting by hospitals or medical professionals. Instead, trained program staff members regularly visit medical facilities where they have the authority to review logs, hospital discharge lists, and other records. From this review, a list of potential cases is created. Starting with deliveries during 2009, we began to also use Texas fetal death certificates with a congenital anomaly as the underlying cause or as a contributing of death (codes Q00.0 through Q99.9, International Classification of Diseases, Tenth Revision (ICD-10)) or with a congenital anomaly reported on the certificate to identify potential cases. Due to increasing workloads in 2010 we discontinued abstracting the maternal medical records. This impacts maternal information from delivery year 2009 to present. Program staff then review medical charts for each potential case identified. If the infant or fetus has a birth defect covered by the registry, detailed demographic and diagnostic information is abstracted. That information is entered into the computer and submitted for processing into the registry. Quality control procedures for finding cases, abstracting information, and coding birth defects help ensure completeness and accuracy.

Records in the birth defects registry were matched to birth certificates and fetal death certificates filed with the Vital Statistics Section of the Texas Department of State Health Services. When a record in the birth defects registry matched a birth or fetal death certificate, and information was not missing from the matching certificate, the analysis for this report used demographic data from the birth or fetal death certificate for the following: date of delivery, mother's date of birth, mother's race/ethnicity, and mother's county of residence at the time of delivery. Information on the sex of the infant or fetus was handled a bit differently. We used the sex reported on the matching birth or fetal death certificate. When a registry record did not match a birth or fetal death certificate, or when information was missing from the certificate, then this report used demographic data abstracted from medical records.

Regardless of the source of demographic information for this report, all diagnostic information was abstracted from medical records.

Data Analysis

Results are presented for 49 selected types of birth defects among deliveries during 1999 through 2023, regardless of whether the birth defect occurred alone or together with others. [Appendix B](#) lists the modified BPA codes used to define these birth defects, and [Appendix C](#) provides a glossary of birth defects and related terms.

Severe microcephaly, one of the types of birth defects presented in this report, is defined as a diagnosis of microcephaly, small head, or small brain, plus a head

circumference measurement at birth that is less than the third percentile for sex and gestational age, based on the International Fetal and Newborn Growth Consortium size-at-birth standards (1).

Because an infant or fetus often has more than one birth defect and not all monitored birth defects are included in the annual report, it is not meaningful to sum all diagnostic categories in the tables to obtain the total number of children with birth defects. In the data tables, totals are shown in the line labeled, "Infants & fetuses with regular reportable birth defects."

Tables include the number of cases found, the estimated prevalence per 10,000 live births, and the 95% confidence interval for the prevalence. A case is an infant or fetus with the specified birth defect. Birth prevalence was calculated as follows:

$$\frac{\text{number of birth defect cases in an area and time period}}{\text{number of live births in the same area and time period}} \times 10,000$$

The denominators used in calculating prevalence are shown in [Appendix A](#).

Birth prevalence is an estimate of the true prevalence, which can never be known with certainty. The 95% confidence interval contains the true prevalence of a birth defect 95% of the time. A wide interval indicates the uncertainty stemming from small numbers. This report displays 95% confidence intervals based on the Poisson distribution when there are 100 or fewer cases and based on the normal distribution when there are more than 100 cases.

A simple approach to determine whether the prevalence of a particular birth defect differs between groups, for example, between males and females, is to examine the 95% confidence intervals for each group's prevalence. If the 95% confidence interval for prevalence among males does not overlap with the 95% confidence interval for prevalence among females, we consider the prevalence values to be statistically significantly different. However, this method is more conservative and has less power than Poisson regression and will usually identify fewer significant differences between groups than Poisson regression.

Changes Affecting Analysis

Starting with the 1999–2017 Annual Report, the following changes were made to the types of birth defects shown:

- Added a category for "double outlet right ventricle." In reports published prior to the 1999–2017 Annual Report, diagnoses of double outlet right ventricle were included in the category "transposition of the great vessels."
- Removed diagnoses of double outlet right ventricle from the category "transposition of the great vessels." As a result, the prevalence of transposition

of the great vessels is lower than in reports prior to the 1999-2017 Annual Report.

- Changed the category “congenital hip dislocation” to “congenital hip dislocation without hip dysplasia” to correspond with changes we made in how we collect information on birth defects of the hip. Our surveillance staff no longer list congenital hip dislocation if the infant also has hip dysplasia (these children are listed as having hip dysplasia, a condition not shown in this report). As a result, the prevalence of “congenital hip dislocation without hip dysplasia” is lower than the prevalence of “congenital hip dislocation” in reports prior to the 1999-2017 Annual Report.
- Changed the category “infants and fetuses with any monitored birth defect” to “infants and fetuses with regular reportable birth defects.” A small number of the birth defect diagnoses we monitor are designated as “conditional inclusion” birth defects; the rest are called “regular reportable” defects. Conditional inclusion defects are only collected if the infant or fetus also has a regular reportable birth defect. Occasionally, a birth defect diagnosis is changed from being a regular reportable defect to a conditional inclusion. For example, we changed the diagnosis plagiocephaly from a regular reportable birth defect to a conditional inclusion defect. The new category “infants and fetuses with regular reportable birth defects” counts the number of infants and fetuses with one or more of the regular reportable birth defect diagnoses. As such, it will be responsive to changes when diagnoses change from regular reportable to conditional inclusion. As a result, the prevalence of “infants and fetuses with regular reportable birth defects” is slightly lower than the prevalence of “infants and fetuses with any monitored birth defect” in reports prior to the 1999-2017 Annual Report.

In 2021 and 2023, the TBDR changed methodology and procedures for the collection of patent ductus arteriosus. This change has impacted prevalence estimates for this defect. As a result, the prevalence of this defect has decreased over recent years.

Beginning in 2024, the TBDR discontinued reporting of epispadias in its annual report. This defect is still collected but data for this defect is no longer included in the annual report.

Beginning in 2025, the TBDR combined anophthalmia and microphthalmia into one category for the annual report. These defects are still collected separately but are reported together in the annual report. Additionally, all non-live pregnancy outcomes were combined into a single ‘Non-Live Birth’ category for Table 6.

In 2025, there were ongoing delays in accessing the EHR system of a facility in Region 1 for delivery year 2022 cases. Prevalence calculations for this region for delivery year 2022 may be underestimated.

Atrial septal defects (ASDs) are currently the most common reportable defect in the BDESB. In Texas, the prevalence is higher than in other states, due to broader inclusion criteria. Previously, all diagnosed ASDs were considered reportable defects, regardless of their size or the age of the patient at the time of diagnosis. In contrast, other states often restrict inclusion based on factors such as size, surgical intervention, or the age noted in the last echocardiogram mentioning the ASD.

To align Texas with national prevalence rates, the guidelines for coding ASDs were revised. The updated instructions may decrease the reported prevalence of ASDs in Texas by approximately 0.6%. ASDs will now be excluded if they are described as "tiny," "trivial," or "small," or if they are documented to have spontaneously closed. Conversely, ASDs will be included if they are documented to persist at 6 weeks of age or later, if they are described as larger than 4 mm, "small to moderate," "moderate," "moderate to large," or "large," or if there has been a surgical closure for the ASD or a comparison with a patent foramen ovale (PFO) (for example, "stitch closed," "complete closure," or "partial closure").

These new guidelines were implemented in July 2026 and will primarily affect the prevalence of ASDs for delivery years 2024 and onward. Cases completed before July 2026 were not retroactively revised or coded in accordance with the new instructions.

There were eight additional birth defects that were changed from being reportable on their own to being reportable only if they occur in the presence of another birth defect (i.e., they were made conditional inclusion defects). These changes were also implemented in July 2026. These changes will affect annual reporting across two categories: infants and fetuses with regular reportable birth defects and infants and fetuses with condition inclusion defects only.

In February of 2026, the registry moved to a new data system.

For the 2023 annual report, there was a reduction in case counts for public health regions 8 and 9 for delivery year 2023 compared to other years. Quality assurance activities ensured that cases were not missed in these regions for delivery year 2023. Public health regions 8 and 9 were still abstracting some cases from delivery year 2023 when above changes were made to move some birth defects to conditional inclusion thus making them invalid cases and reducing case counts. There should be minimal impact to prevalence of annual report defects over time across these two regions.

For the 2023 annual report, a new data table was added: Border vs. Non-Border (Border Status) based on the La Paz Agreement's definition of border area (2).

Limitations of these Data

These data are subject to several limitations. First, the registry only includes birth defects diagnosed within one year after delivery (except for fetal alcohol syndrome), so birth defects detected after the first birthday and diagnoses that are refined after the first birthday are not in the registry. Second, we do not capture diagnoses that are made outside of Texas or in Texas facilities that our staff does not access at this time, such as prenatal diagnostic facilities, private physicians' offices, and military facilities. Third, data are collected from medical records and as such are subject to differences in clinical practice.

Acknowledgements

The Department of State Health Services continues to work on behalf of children and families affected by birth defects in Texas and recognizes the critical contributions of families who have participated in research that one day will eliminate these conditions. We further acknowledge the dedicated efforts of the birth defects surveillance staff, who collect information on birth defects across the state.

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Reference

1. INTERGROWTH-21st (the International Fetal and Newborn Growth Consortium for the 21st Century) international standards for newborn weight, length, and head circumference by gestational age and sex. Available at: <https://intergrowth21.tghn.org/articles/international-standards-newborn-weight-length-and-head-circumference-gestational-age-and-sex-newborn-cross-sectional-study-inte/>.
2. Border area refers to the area within 100 kilometers (62 miles) of the Rio Grande, which includes the following 32 counties: Brewster, Brooks, Cameron, Crockett, Culberson, Dimmit, Duval, Edwards, El Paso, Frio, Hidalgo, Hudspeth, Jeff Davis, Jim Hogg, Kenedy, Kinney, La Salle, Maverick, McMullen, Pecos, Presidio, Real, Reeves, Starr, Sutton, Terrell, Uvalde, Val Verde, Webb, Willacy, Zapata, Zavala. This definition is based on the La Paz Agreement of 1983. (DSHS Office of Border Public Health: www.dshs.texas.gov/border-health; La Paz Agreement: <https://www.epa.gov/sites/default/files/2015-09/documents/lapazagreement.pdf>)