Birth Defects Surveillance

New Mexico 2015-2024

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Executive Summary

This report presents findings from the New Mexico Birth Defects Prevention and Surveillance System (NMBDPASS) for the 2015–2024 birth cohorts. Key findings include:

- Enhanced surveillance processes introduced in 2019, and applied beginning with the 2015 cohort, improved data quality and detection.
- 18.8% of births (2015–2024) to NM resident mothers were diagnosed with least one birth defect (BD).
- Male infants had higher BD diagnosis rates (21.9%) than females.
- Most of the newborns diagnosed with at least one BD were born of mother between the ages of 26-30 (29.1%).
- Asian/Native Hawaiian and Other Pacific Islander (ANHOPI) and Black/African American children showed notable increases (70.7% and 70.8%, respectively). Hispanic children accounted for the largest cumulative percent of those diagnosed with least one BD (55.7%), followed by Whites (24.9%).
- Metropolitan designated counties showed the largest BD increase (71.9%); rural areas had a smaller share but a notable rise (17.5%).
- Integumentary system defects were most common (30.2%); musculoskeletal system defects rose the most (138.8%).
- Between 2015–2024, BDs contributed to 21.6% of 1,070 child deaths. In the same period, there were 105 fetal deaths.
- Between 2022-2024, 6.0% of birth to NM resident mothers were exposed to substances (ex. alcohol, tobacco, drugs) in-utero.

Contents

I. Background and History

Birth defects (BDs) are conditions present at birth that can affect nearly any part of the body. According to the Centers for Disease Control and Prevention (CDC), BDs affect about 1 in every 33 babies born in the United States annually.1 BDs can be moderate or have severe health implications. Although the causes for some are well known (like fetal alcohol spectrum), others are not yet identified. Some may have multifactorial causes. Among risk factors that increase the probability of BDs are substance use during pregnancy, family history of BDs (which may indicate a genetic factor), and certain infections during pregnancy (e.g. Zika virus).

In New Mexico (NM), BD surveillance has evolved significantly. Beginning in the early 1990s, a BD registry was started at the NM Department of Health's (NMDOH) Public Health Division's (PHD) Family Health Bureau (FHB) Children's Medical Services Program (CMS). Between 1995-2005, this registry—eventually named the New Mexico Birth Defects Prevention and Surveillance System (NMBDPASS)— focused on supporting providers plan services for children with special healthcare needs, by closely working with CMS. In 2005, following the expiration of federal funding, responsibility for surveillance transitioned to the Epidemiology and Response Division's (ERD) Environmental Health Epidemiology Bureau (EHEB) Environmental Public Health Tracking Program (EPHT), which was funded through a cooperative agreement with the CDC. Requirements of the agreement included surveillance of 12 major structural and genetic birth defects. Despite the transition to ERD-EHEB, NMBDPASS continued to work closely with CMS.

A significant enhancement came in 2014 with the hiring of a dedicated Birth Defects Epidemiologist through the Preventive Health and Health Services Block. In 2018, NMBDPASS expanded surveillance to all BDs with varying levels of follow-up. Funding from the Microcephaly grant (due to the Zika Virus) allowed the creation of two new positions: 1) Social and Community Services Coordinator at CMS and 2) BDs Health Educator at NMBDPASS.

These positions collaborated in strengthening education and family support efforts, developing cultural and linguistically appropriate material for at-risk populations and help to identify families in need of referral services. Some of the material produced can be found here: https://nmtracking.doh.nm.gov/health/reproductive/BirthDefects.html

In 2019, substantial updates to data processing were made to improve accuracy and consistency. To have several years of results consistent with these changes, BDs data were reprocessed starting with the 2015 birth cohort. The process changes introduced were: use of SAS as main processing tool, replacement of manual modification (to input results of diagnosis ascertainment) and deduplication (when the same child was reported multiple times) by SAS instructions, and the NMDOH's Community and Health Systems Epidemiology Bureau-Hospital Inpatient Discharge Database (HIDD) annual file was added to supplement the BDs Abstract File (compiled from monthly reports from birthing facilities) in the creation of the hospitalization file, and incorporation of text identification of birth defects to make use of character variables from the fetal death file and prenatal care data. Finally, several BDs indicators were created, including one to help track the number of children born with at least one BD diagnosed. The new system is flexible enough to allow the incorporation of more indicators when necessary. Starting with birth cohort 2023, three additional urinary system indicators were incorporated. However, codes for which implementation started October 1, 2025 (QA0 - Neurodevelopmental disorders related to specific genetic pathogenic variants) were not made into a new individual indicator, as processing was already underway. However, any case with such a code would have been captured by the any BD indicator (see Body System section).

In 2025, NMBDPASS functions were officially transferred from the Environmental Health Epidemiology Bureau (EHEB) to the Maternal and Child Health Program as part of a reorganization process. During the transition period, the former NMBDPASS manager continued performing surveillance activities which culminated with the processing of the first year of data for the 2024 cohort (included in this report).

The purpose of this report is to present the status of BDs in New Mexico (during the surveillance period), disseminate the findings of the process changes, provide a broad view of BDs as a public health issue in NM, and inform policies and intervention strategies including both educational activities and services offered to affected families. This report also includes a brief description of the educational outreach that was part of the NMBDPASS' activities that were facilitated by the BDs Health Educator.

II. Surveillance Methods

Production of the surveillance database

NMBDPASS conducts population-based surveillance of children diagnosed with birth defects by birth cohorts. A birth cohort is comprised of all children born in NM from a NM resident mother, within a calendar year. Progress of all birth cohort children is followed through age four. For each birth cohort, a surveillance database is created. The birth cohort surveillance database is updated until children reach four years of age, at which time the surveillance file is considered complete, and it is closed.

The birth certificates (BCs) annual file, from NMDOH Bureau of Vital Records and Health Statistics (BVRHS) forms the core of the BD surveillance database. BCs contain information on approximately fifteen BDs. The number of conditions is expanded by linking the BC annual file to the following databases:

1. BVRHS' death certificates (DC) annual file, from where all deaths (age four or less) for which any BD was a contributor or direct cause are kept.
2. Prenatal care annual file (PC), comprised of reports from prenatal care facilities.
3. Hospitalization file (HF), which itself is constructed by merging two datasets:

a. BDs Abstract File. Every month, facilities that offered medical services to patients with BDs, send a report to NMBDPASS. Upon reception, two things are done with those reports:
    i. A copy is processed and each case is provided with a unique identifier and forwarded to CMS for provision of services.
    ii. Cases are entered into the BDs Abstract File. One file is created each calendar year.
b. Hospital Inpatient Discharge Database (HIDD), the annual file is used to create indicators for birth defects, based on data from the diagnosis variables. Then, a dataset, on which only cases, four years of age or less, with at least one BD diagnosis are kept.

4. Ascertainment file (AF), created after the BCs file is merged with the datasets listed above. From that database, a subset is created containing only cases with BDs for which diagnosis verification (ascertainment) is required, as well as identifiers that are used to request pertinent medical records from the birthing facilities. Once available, the medical records are reviewed to confirm diagnosis. The ascertainment decisions (ex. Condition confirmed) are recorded on the AF. Once all cases have been ascertained, the file is imported as a SAS file and merged into the main surveillance database. Of all BDs identified, due to grant requirements, eight conditions are subject to diagnosis ascertainment or verification, by reviewing the medical records' information (common truncus, transposition of great arteries, tetralogy of Fallot, pulmonary valve atresia, tricuspid valve atresia, hypoplastic left heart syndrome, total anomalous pulmonary venous connection, and renal agenesis).

After the AF file information is merged back, the BVRHS' fetal death (FD) annual file is added, and a final surveillance database is created. Since cohorts are followed through age four, surveillance files remain open and are updated (with data from DCs, HFs, and AFs) every year until the cohort reaches the age of four. Then, the surveillance file is closed.

BDs are identified on the DCs and HF by flagging codes related to BDs from the International Classification of Diseases, Clinical Modification ninth (ICD-9-CM, 740-759 range) and tenth (ICD-10-CM, Q codes) revisions. Additionally, text recognition code has been developed to expand data capturing, as notes from the AFs as well as variables from the PCs file and FDs file contain valuable information in text-based variables. Some of the flags generated by the mechanisms described are modified by determinations made during the ascertainment process.

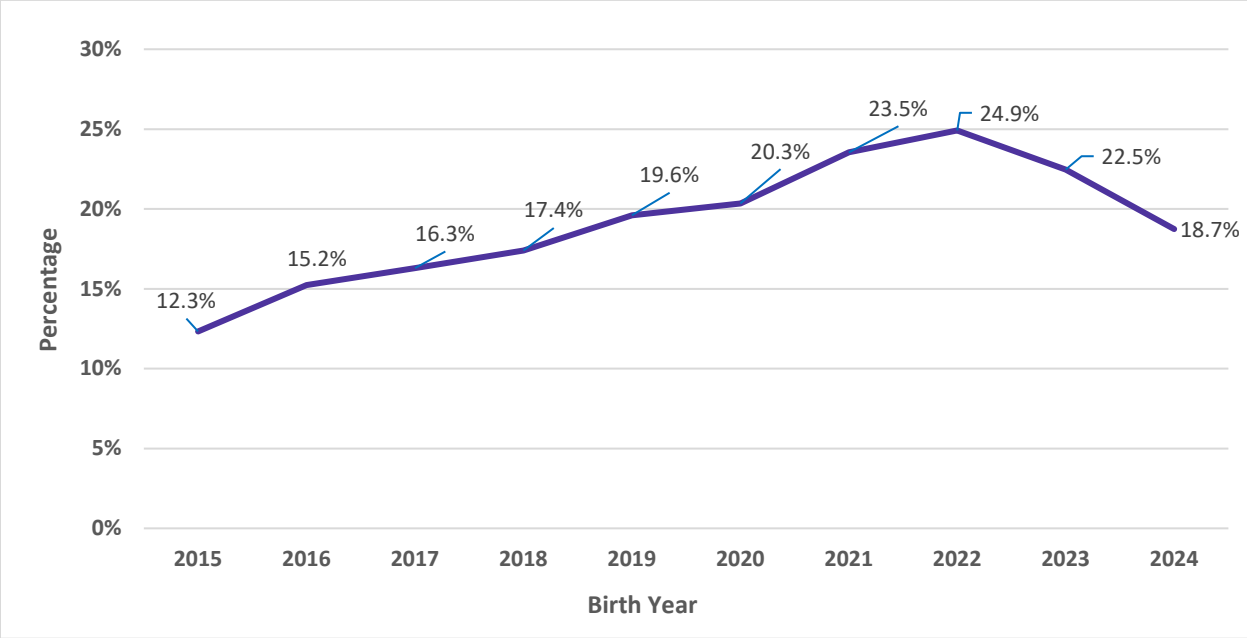
III. Descriptive Statistics

This section presents descriptive statistics on birth defects among children born in New Mexico between 2015 and 2024. The analyses include breakdowns by sex, race/ethnicity, maternal age, health region, and body system. Small cell counts have been suppressed in accordance with data confidentiality policies.

Between 2015-2024, there were 206,959 births in NM from NM resident mothers. The number of children born ranged from 18,467 in 2023 to 23,805 in 2015. For the surveillance period, the percentage of those born with at least one BD diagnosed was 18.8%. Between 2015 and 2024, there was a 20.8% increase in the number of children (four years of age or younger) diagnosed with at least one BD, even with 2024 data being on its first surveillance year. Graph 1.

The decrease between 2022 (with 24.9% of those born with at least one BD diagnosed) and 2024 (18.7%) was 26.2%. This decrease comes after a 60.9% increase between 2015-2022. Although there is not a clear explanation for the increase reported, we will discuss this finding in the summary section.

Graph 1. Percent of births with at least one birth defect diagnosed, New Mexico 2015 - 2024



Child sex

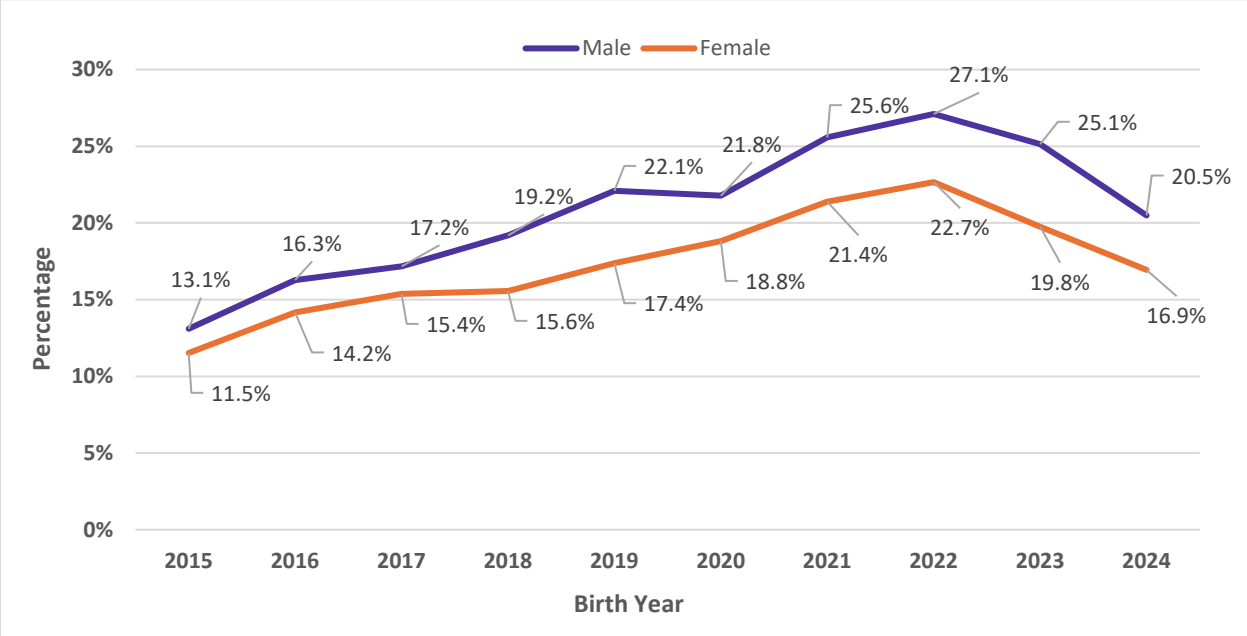
In NM, between 2015-2024, 51.0% of children born to a NM resident mother were males and 49.0% females. The proportion of male children born with at least one BD compared to that of females was 21.9% higher among male newborns. Graph 2

The difference in percentages between sexes may be partially explained by the higher number of male genital system BD indicators (20) compared to those of females (2). However, studies have shown differences in the prevalence of BDs between sexes.2 Results from this analysis align with studies that demonstrate a higher prevalence of BDs of the genital organs (165.0%), urinary system (80.0%) and digestive system (33.4%) in males compared to females. The BD system showing the highest prevalence among females was the integumentary system (13.4% higher).

Race/ethnicity

In NM, between 2015-20243, 56.0% of newborns were born from a Hispanic mother, 27.0% from a White mother, 12.2% from an American Indian/Alaska Native (AIAN) mother, 2.4% from an Asian/Native Hawaiian and Other Pacific Islander (ANHOPI) mother, and 2.2% from a Black/African Americans (B/AA) mother. For 0.3% of births, the maternal race/ethnicity was unknown. For the current report, the race/ethnicity of the child will be that of the mother.

Graph 2. Percentage of births with at least one birth defect diagnosed, by sex of the children, New Mexico 2015 - 2024



Assessing each racial/ethnic group separately (Table 1), ANHOPI children showed higher percentages of BD diagnosis (24.6%), followed by B/AAs (22.2%), AIANs (20.9%), Hispanics (18.8%), and Whites (17.3%). B/AAs and ANHOPI children showed the largest increase in the number of cases with at least one BD, during the surveillance period (70.8% and 70.7%, respectively), followed by Whites (48.5%) and Hispanics (47.0%). Studies have also shown that BD differences by race/ethnicity may be attributed to either genetic or socio-cultural factors.3 Results from the present report showed both similarities and differences in the prevalence of BD by body system.

It is worth mentioning that data from the hospitalization file does not include data from federal facilities like the Veterans Administration or the Indian Health Service. Thus, data on the AIAN population may be underestimated. Table 1

Table 1. Percentage of births with at least one birth defect diagnosed, by maternal race/ethnicity, New Mexico 2015 - 2024

Maternal race/ethnicity	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
American Indian/Alaska Native	15.2%	18.8%	18.9%	19.6%	20.5%	23.7%	25.6%	28.5%	23.0%	17.9%
Asian/Native Hawaiian and Other Pacific Islander	16.3%	18.6%	24.1%	19.1%	26.8%	21.5%	31.3%	35.9%	28.7%	24.3%
Black/African American	14.7%	17.8%	20.1%	17.8%	25.4%	22.2%	29.0%	27.9%	24.9%	21.9%
Hispanic	12.5%	15.1%	15.9%	17.2%	19.6%	20.3%	23.4%	24.4%	22.3%	19.0%
White	10.3%	13.6%	15.1%	16.7%	18.7%	18.6%	21.9%	23.1%	21.6%	17.4%
Other/Unknown	10.5%	9.1%	15.4%	14.9%	22.2%	25.6%	31.0%	19.4%	35.7%	29.1%

Maternal age

Between 2015-2024, the age range of NM mothers that gave birth was 12-55. Most of the births were among women in the age-group 26-30 followed by those in the age-group 21-25, except for 2015 where the inverse happened. The age group of 31-35 was the third group with the most births, followed by the age group 16-20.

Between 2015-2024, a bell-shape relationship was observed between maternal age and the percentage of children born with at least one BD, with the maternal age-group 26-30 having the highest cumulative percent of children diagnosed with at least one BD (29.1%). It is worth taking data for the age group of 46 or older with caution, as the number of births overall and the number of cases with BDs are small, making the estimates unstable. The maternal age group 36-40 showed the larger increase in children born with at least one BD diagnosed (112.1%), followed by the age-groups 41-45 (100.0%) and 31-35 (77.0%). The age group 16-20 showed a 13.1% decrease. Graph 3 and Table 2.

Graph 3. Percentage of births with at least one birth defect diagnosed, by maternal age, New Mexico 2015 - 2024

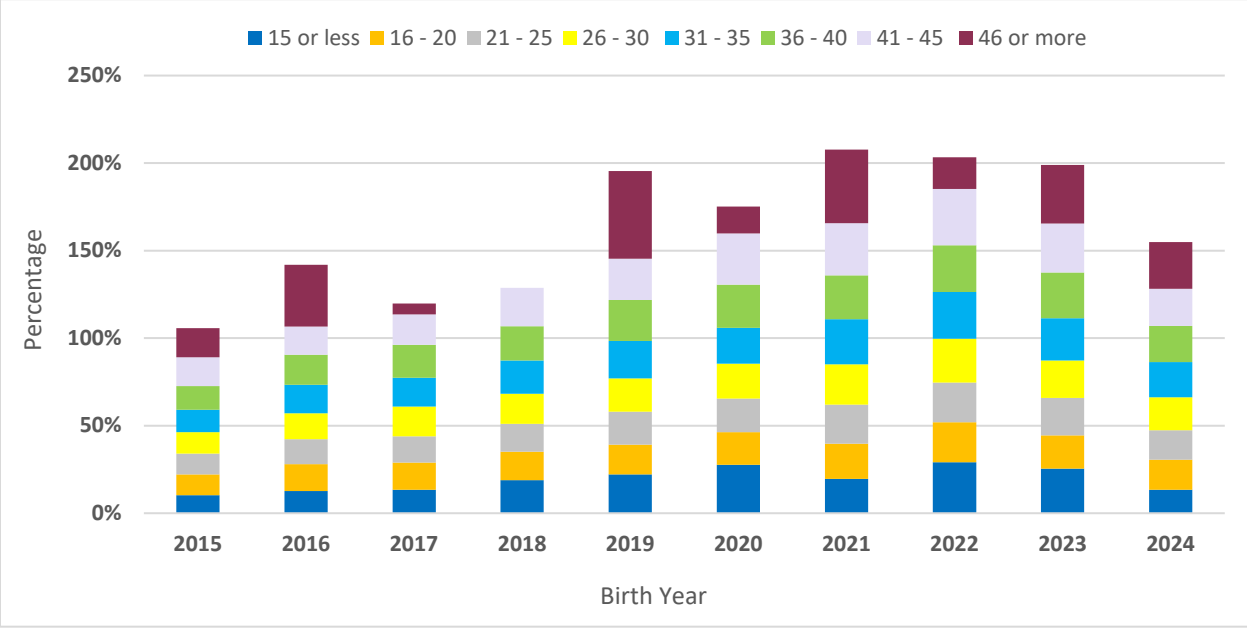


Table 2. Percentage of births with at least one birth defect diagnosed, by maternal age, New Mexico 2015 - 2024

Maternal age group	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
15 or less	10.3%	12.6%	13.5%	19.0%	22.2%	27.6%	19.6%	29.2%	25.5%	13.3%
16 - 20	11.9%	15.4%	15.4%	16.3%	17.0%	18.7%	20.1%	22.8%	19.0%	17.2%
21 - 25	11.8%	14.2%	15.0%	15.9%	18.8%	19.2%	22.4%	22.6%	21.4%	16.8%
26 - 30	12.3%	14.9%	17.0%	17.1%	19.1%	19.8%	23.1%	25.1%	21.3%	18.9%
31 - 35	12.7%	16.2%	16.3%	19.1%	21.2%	20.6%	25.6%	26.7%	24.1%	20.0%
36 - 40	13.6%	17.1%	18.8%	19.5%	23.4%	24.8%	25.1%	26.6%	26.1%	20.7%
41 - 45	16.4%	16.1%	17.4%	22.0%	23.7%	29.1%	29.7%	32.2%	28.1%	21.1%
46 or more	16.7%	35.3%	6.3%	0.0%	50.0%	15.4%	42.1%	18.2%	33.3%	26.7%

Health Region

In NM there are five health regions (HR). Maternal HR of residence was established by using information about the county of residence of the mother (Table 3a).

Between 2015-2024, 44.3% of children born in NM were born of mothers residing in the Metro HR, followed by the Southwest (17.8%) and the Southeast (15.2%). The Northeast accounted for 11.7% of the births and the Northeast for 11.0%.

Table 3a. New Mexico Counties and Health Regions

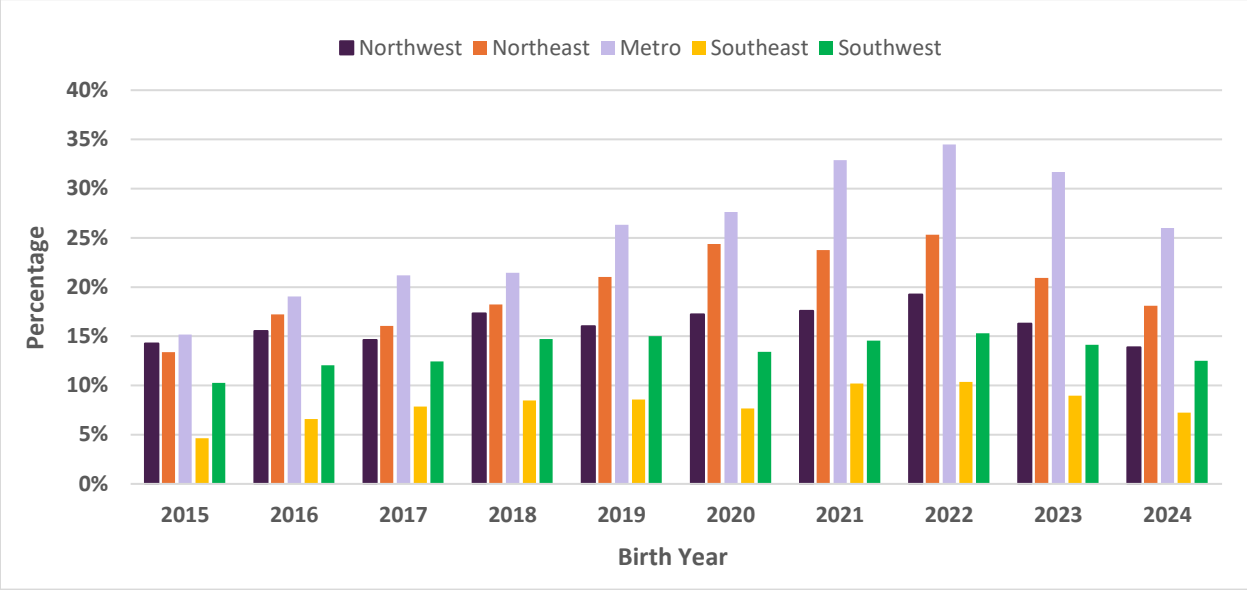
Health Region	Counties
Northwest	Cibola, McKinley, and San Juan
Northeast	Colfax, Guadalupe, Harding, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, Taos, and Union
Metro	Bernalillo, Sandoval, Torrance, and Valencia
Southeast	Chaves, Curry, De Baca, Eddy, Lea, Lincoln, Quay, and Roosevelt
Southwest	Catron, Dona Ana, Grant, Hidalgo, Luna, Otero, Sierra, and Socorro

The highest cumulative percentage of children born with at least one BD diagnosed was found in the Metro HR (59.0%), which also experienced the highest increase of BDs during the surveillance period (59.4%). The Southwest HR had the second highest percentage of children born with at least one BD (12.6%) but the fourth highest increase (14.5%). The third highest percentage of children born with at least one BD and second highest increase was observed in the Northeast HR (12.2% and 29.2%, respectively). The Northwest HR showed the fourth cumulative percentage (9.4%) but experienced a 27.8% decrease during the surveillance period. Table 3b and Graph 4.

Table 3b. Percentage of births with at least one birth defect diagnosed, by maternal Health Region of residence, New Mexico 2015 - 2024

Health Region	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Northwest	14.3%	15.5%	14.6%	17.3%	16.0%	17.2%	17.6%	19.2%	16.3%	13.9%
Northeast	13.4%	17.2%	16.1%	18.2%	21.0%	24.4%	23.7%	25.3%	20.9%	18.1%
Metro	15.2%	19.0%	21.2%	21.4%	26.3%	27.6%	32.9%	34.5%	31.7%	26.0%
Southeast	4.6%	6.6%	7.9%	8.5%	8.6%	7.7%	10.2%	10.4%	9.0%	7.2%
Southwest	10.3%	12.1%	12.4%	14.7%	15.0%	13.4%	14.5%	15.3%	14.1%	12.5%

Graph 4. Percentage of births with at least one birth defect diagnosed, by maternal Health Region of residence, New Mexico 2015 - 2024



Two things are worth mentioning when considering the results of this sub-section and the next. First, NMBDPASS surveillance population is composed of children born in NM to a NM resident mother. Thus, counts for counties bordering other states may be affected, as families may use medical services outside NM, especially for conditions requiring more advanced care or services than those provided by NM facilities in close proximity. Second, in NM, the Metro Region (which comprises the same counties designated as Metropolitan – Table 4a) population is the largest in the state.

Urban/Rural Designation

Another way of assessing BDs by residence of the mother is by grouping counties based on their designation as rural, urban, or a mix of both. This is important due to the health disparities experienced by rural communities, among others due to the limited access to health care services.4 In NM, four designations are currently used, based on the populations and following CDC-National Center for Health Statistics (NCHS) classification (https://www.cdc.gov/nchs/data-analysis-tools/urban-rural.html): Metropolitan counties, small metropolitan counties, mixed urban-rural counties, and rural counties. (Table 4a)

Table 4a. New Mexico Counties and Urban/Rural Designation

Urban/Rural Designation	Counties
Metropolitan	Bernalillo, Sandoval, Torrance, and Valencia
Small Metro	Dona Ana, San Juan, and Santa Fe
Mixed Urban/Rural	Chaves, Cibola, Curry, Eddy, Grant, Lea, Los Alamos, Luna, McKinley, Otero, Rio Arriba, Roosevelt, San Miguel, and Taos
Rural	Catron, Colfax, De Baca, Guadalupe, Harding, Hidalgo, Lincoln, Mora, Quay, Sierra, Socorro, and Union

On average, between 2015-2024, 44.3% of children born in NM were born by mothers who were residents of a metropolitan designated county, followed by those residing in mixed urban/rural counties (30.7%). Those residing in rural counties had the lowest percentage of births (3.7%).

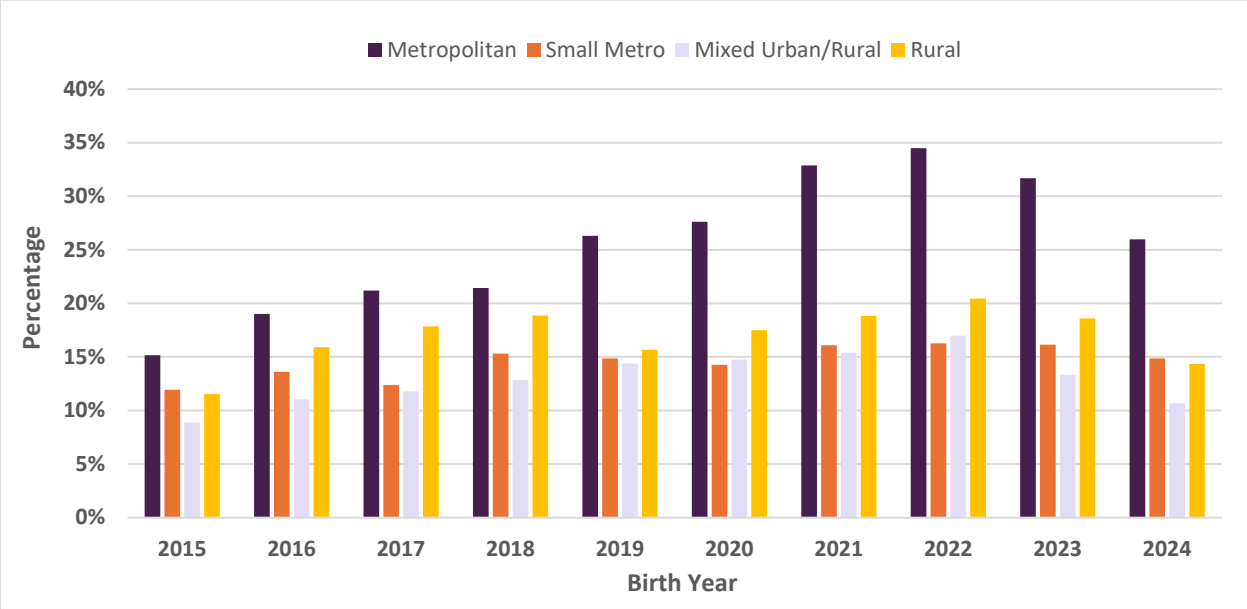
Between 2015 and 2024, the metropolitan designated counties showed the highest increase, as well as the highest cumulative number, of children born with at least one BD (71.9% and 59.4%, respectively). Counties designated as mixed urban/rural and small metro showed the second cumulative number of cases and third highest increase (20.9% and 7.9%, respectively). Rural designated counties were second in increase (17.5%) but had the fourth cumulative number of children born with at least one BD (3.3%).

Finally, when considering the cumulative percentage of BD cases, calculated using the number of births from each urban/rural designation with at least one BD as numerator, and the number of births from each urban/rural designation as denominator, rural designated counties had the second highest percentage of cases (16.8%), behind metropolitan designated counties (25.2%) Table 4b and Graph 5.

Table 4b. Percentage of births with at least one birth defect diagnosed, by urban/rural designation of the mother's county of residence, New Mexico 2015 - 2024

Urban/Rural Designation	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Metropolitan	15.2%	19.0%	21.2%	21.4%	26.3%	27.6%	32.9%	34.5%	31.7%	26.0%
Small Metro	11.9%	13.6%	12.4%	15.3%	14.9%	14.3%	16.1%	16.3%	16.2%	14.9%
Mixed Urban/Rural	8.9%	11.0%	11.8%	12.8%	14.4%	14.7%	15.4%	17.0%	13.3%	10.7%
Rural	11.6%	15.9%	17.8%	18.9%	15.7%	17.5%	18.8%	20.4%	18.6%	14.4%

Graph 5. Percentage of births with at least one birth defect diagnosed, by urban/rural designation of the mother's county of residence, New Mexico 2015 - 2024



Body system

A new surveillance process for data collection and analysis started to be developed in 2019. To have comparative data for a long period, BD data starting with the cohort of 2015 was re-analyzed using the new process.

The new surveillance process produces 299 indicators. One indicator accounts for any BD in a neonate (to estimate prevalence of BDs in the population), one per body system in general (ex. nervous system, circulatory system, etc.), several indicators for individual BDs (ex. renal

agenesis, cleft lip, etc.) or groups of BDs (ex. other circulatory system BDs), and one for BDs not categorized within any of the body systems identified, as their impact could be multisystemic.

The body systems with the most indicators created were the musculoskeletal system (67), the circulatory system (60), and eye-ear-face-neck (31). Cleft lip and palate defects were not included in the former group but with the digestive system (25). Percentages were calculated using the number of cases with at least one birth defect on a body system as numerator and the number of cases with at least one birth defect overall as denominator. Table 5a

Table 5a. Percentage of birth defects by body system, New Mexico 2015 - 2024

Body system (Number of indicators)*	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Any birth defect**	12.3%	15.2%	16.3%	17.4%	19.8%	20.3%	23.5%	24.9%	22.5%	18.7%
Nervous system (15)	3.0%	3.8%	3.6%	3.4%	3.6%	3.6%	4.3%	3.6%	3.9%	4.2%
Eye, ear, face, and neck (31)***	4.2%	4.7%	5.9%	6.0%	5.6%	5.2%	6.0%	6.7%	5.4%	5.7%
Circulatory system (60)	29.2%	24.2%	23.3%	25.3%	25.0%	25.7%	22.8%	24.3%	28.0%	31.1%
Respiratory system (15)	3.2%	2.3%	2.5%	2.8%	3.0%	2.4%	2.8%	2.8%	2.9%	2.3%
Digestive system (25)	17.7%	17.7%	17.7%	20.0%	20.0%	21.7%	24.5%	24.0%	26.2%	21.8%
Genital organs (26)	6.2%	7.2%	8.9%	9.7%	9.4%	8.4%	9.1%	9.1%	8.5%	7.5%
Urinary system (21)	8.8%	9.6%	8.5%	8.8%	7.7%	7.4%	7.9%	6.7%	6.4%	6.7%
Musculoskeletal system (67)	12.5%	13.9%	15.4%	17.7%	20.6%	17.4%	21.2%	19.0%	21.1%	18.4%
Integumentary system (18)	33.9%	36.1%	36.4%	28.6%	28.1%	29.6%	29.2%	32.5%	24.7%	25.2%
Chromosomal abnormalities (18)	2.7%	2.1%	2.4%	2.4%	3.3%	5.6%	3.4%	1.9%	2.0%	1.7%
Other birth defects****	2.3%	1.8%	2.3%	2.4%	2.0%	2.0%	2.0%	1.8%	1.5%	1.3%

*The total number of births with at least one birth defect diagnosed (per year) was used to calculate the percentages per body system

**The total number of births (per year) was used to calculate the percentage of infants born with at least one birth defect diagnosed

***Cleft lip and cleft palate BDs are not included here but with the digestive system

****This group is comprised of BDs not assigned to any of the body systems listed

Between 2015-2024, among children diagnosed with at least one BD, defects of the integumentary system showed the highest cumulative percentage (30.2%), followed by those of the circulatory system (25.7%) and digestive system (21.4%). The Musculoskeletal system showed the largest increase in the number of cases (138.8%), followed by BDs of the digestive system (109.2%), and the genital organs (92.3%). The 'Other BDs' category showed an 8.8% decrease during the surveillance period. It is worth re-iterating that NMBDPASS

follows cases through the age of four. So, only the birth cohorts of 2015-2020 are complete and closed and the 2024 cohort is on its first surveillance year. Thus, both the prevalence and the extent of the increases may change, with those showing decreases potentially changing direction. Table 5a

A technical note to consider for the data presented from this point forward. Due to how percentages are calculated (see pertinent footnotes), they will not add up to one hundred. This is because children can be diagnosed with more than one BD and these can be distributed on different body systems.

Among male children, the three body systems with the highest cumulative percentage of cases were: the integumentary system (25.4%), closely followed by the circulatory system (25.3%), and the digestive system (22.5%). The largest increases happened among BDs of the musculoskeletal (151.3%), eye, ear, face, and neck (119.6%), and digestive system (108.0%). Decreases were observed for chromosomal abnormalities (7.0%) and the other BDs category, which showed the largest decrease (11.8%). Table 5b

Table 5b. Percentage birth defects diagnosed by body system among male children, New Mexico 2015-2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	3.0%	3.6%	3.2%	3.6%	2.8%	4.0%	3.6%	3.0%	3.9%	3.5%
Eye, ear, face, and neck	3.5%	4.6%	5.0%	5.3%	5.5%	4.9%	6.2%	6.3%	5.3%	5.8%
Circulatory system	28.6%	23.7%	23.3%	25.6%	24.2%	26.0%	21.8%	24.0%	26.2%	31.7%
Respiratory system	3.3%	2.2%	2.3%	2.6%	3.0%	2.7%	2.5%	3.2%	3.0%	2.3%
Digestive system	18.9%	18.9%	19.1%	21.1%	21.0%	23.5%	25.5%	25.6%	26.8%	21.5%
Genital organs	10.2%	11.9%	14.6%	16.2%	15.5%	14.4%	14.6%	14.6%	13.7%	12.5%
Urinary system	11.2%	11.8%	10.8%	11.2%	10.0%	8.8%	10.2%	8.7%	8.1%	8.3%
Musculoskeletal system	11.9%	13.8%	14.2%	16.5%	19.4%	16.6%	20.8%	18.1%	20.3%	19.0%
Integumentary system	28.8%	30.4%	31.4%	23.3%	23.1%	24.2%	24.4%	27.7%	21.6%	21.4%
Chromosomal abnormalities	2.7%	2.1%	2.5%	2.3%	3.1%	4.8%	3.2%	2.1%	1.7%	1.7%
Other birth defects	2.1%	1.8%	2.1%	2.1%	2.1%	2.0%	1.6%	1.7%	1.3%	1.6%

Percentages were calculated using the number male children (four years of age or younger) with at least one BD per body system as numerator and the total number of male children diagnosed with at least one birth defect overall as denominator

Among female children, the same three body systems as in males showed highest cumulative percentage of cases: the integumentary system (36.2%), circulatory system (26.2%), and digestive system (20.0%). Both groups also showed the largest increase among BDs of the musculoskeletal system (125.4%). They differed among the body systems showing the second and third largest increases. Among females, those were observed among BDs of the digestive system (111.0%), and nervous system (77.5%). Decreases were observed for BDs of the urinary system (7.5%), integumentary system (3.4%), and other BDs (5.9%). Table 5c.

Comparing male and female children, males showed a higher cumulative percentage of BDs of the genital organs than females (165.0% difference). This was also true for BDs of the urinary system (80.0% difference) and digestive system (33.4%). Females showed a higher cumulative percentage of BDs of the integumentary system than males (13.4% difference).

Table 5c. Percentage birth defects diagnosed by body system among female children, New Mexico 2015-2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	3.0%	4.0%	4.1%	3.1%	4.5%	3.2%	5.0%	4.5%	3.9%	5.1%
Eye, ear, face, and neck	5.0%	4.7%	6.8%	6.9%	5.6%	5.6%	5.7%	7.2%	5.6%	5.7%
Circulatory system	29.9%	24.8%	23.2%	24.9%	26.2%	25.3%	24.1%	24.7%	30.3%	30.3%
Respiratory system	3.1%	2.3%	2.9%	3.0%	2.9%	2.1%	3.0%	2.4%	2.8%	2.1%
Digestive system	16.2%	16.3%	16.0%	18.6%	18.7%	19.4%	23.1%	22.1%	25.4%	22.1%
Genital organs	1.6%	1.6%	2.1%	1.6%	1.2%	0.9%	2.2%	2.2%	1.8%	1.4%
Urinary system	6.0%	6.9%	5.7%	5.9%	4.6%	5.8%	5.1%	4.2%	4.1%	4.7%
Musculoskeletal system	13.2%	14.0%	16.7%	19.2%	22.2%	18.5%	21.8%	20.0%	22.1%	17.8%
Integumentary system	39.9%	42.8%	42.4%	35.3%	34.7%	36.2%	35.2%	38.3%	28.6%	29.9%
Chromosomal abnormalities	2.7%	2.1%	2.3%	2.4%	3.5%	6.5%	3.6%	1.5%	2.3%	1.6%
Other birth defects	2.5%	1.8%	2.5%	2.8%	1.9%	1.9%	2.6%	1.9%	1.8%	0.9%

Percentages were calculated using the number female children (four years of age or younger) with at least one BD per body system as numerator and the total number of female children diagnosed with at least one birth defect overall as denominator

Over the surveillance period and acknowledging the caveat that cohorts from 2021-2024 are still on follow-up, Hispanic children had the largest cumulative number of BDs diagnosed (56.0%), followed by Whites (27.0%), and AIANs (12.2%). That follows the pattern of the population distribution in NM. Among AIAN, BDs of the genital organs showed the largest increase (153.3%), followed by BDs of the musculoskeletal system (120.5%), and BDs of the

eye, ear, face, and neck (94.7%). Among ANHOPIs, the body systems with largest increases were genital organs (333.3%), nervous system (300.0%), and musculoskeletal system (163.6%). BDs of the eye, ear, face, and neck (400.0%), nervous system (250.0%), and digestive system (237.5%) were the ones with the highest increases among B/AA. For Hispanics, the highest increases happened among BDs of the musculoskeletal system, digestive system, and genital organs (153.4%, 119.2%, and 98.0%, respectively). Among Whites, the highest increases happened among BDs of the nervous system (110.0%), musculoskeletal system (108.2%) and digestive system (100.0%). The largest decreases were observed among BDs of the respiratory system among AIANs (42.1%), chromosomal abnormalities among ANHOPIs (100%), and urinary system among B/AA (42.9%). Tables 5d-h

Table 5d. Percentage birth defects diagnosed by body system among American Indian/Alaska Native (AIAN) children, New Mexico 2015-2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	3.7%	2.6%	4.3%	2.3%	3.1%	5.3%	5.0%	3.6%	4.5%	4.7%
Eye, ear, face, and neck	4.1%	4.6%	6.1%	4.0%	4.0%	4.9%	5.8%	6.7%	7.6%	5.8%
Circulatory system	25.2%	25.0%	23.0%	25.8%	23.3%	25.3%	23.4%	27.1%	29.4%	34.6%
Respiratory system	4.1%	2.6%	2.3%	2.9%	3.5%	2.7%	3.5%	2.3%	2.3%	3.4%
Digestive system	10.3%	11.3%	9.2%	9.4%	9.0%	10.4%	16.3%	12.9%	17.7%	15.6%
Genital organs	3.2%	5.4%	4.7%	7.9%	7.7%	7.7%	7.6%	7.8%	7.8%	5.0%
Urinary system	6.9%	9.6%	8.0%	8.3%	8.1%	7.7%	9.4%	6.9%	6.2%	6.1%
Musculoskeletal system	9.5%	8.7%	10.9%	12.5%	15.4%	14.1%	18.4%	15.0%	19.9%	16.1%
Integumentary system	55.3%	54.2%	53.9%	47.5%	49.6%	48.0%	43.5%	46.7%	33.9%	31.4%
Chromosomal abnormalities	2.8%	1.8%	2.9%	2.3%	2.4%	4.3%	3.5%	2.6%	1.6%	1.3%
Other birth defects	3.9%	3.0%	2.3%	2.5%	1.6%	2.0%	2.1%	1.6%	1.0%	1.6%

Percentages were calculated using the number AIAN children (four years of age or younger) with at least one BD per body system as numerator and the total number of AIAN children diagnosed with at least one birth defect overall as denominator

Table 5e. Percentage birth defects diagnosed by body system among Asian/Native Hawaiian and Other Pacific Islander (ANHOPI) children, New Mexico 2015-2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	1.2%	2.1%	3.4%	3.2%	2.2%	2.9%	2.9%	5.0%	2.9%	6.5%
Eye, ear, face, and neck	3.7%	2.1%	5.9%	6.4%	5.9%	2.9%	4.3%	5.5%	2.1%	5.7%
Circulatory system	23.2%	14.7%	21.0%	21.3%	20.0%	21.0%	12.1%	16.6%	20.7%	26.0%
Respiratory system	4.9%	1.1%	3.4%	0.0%	1.5%	0.0%	2.9%	1.7%	0.7%	2.4%
Digestive system	26.8%	26.3%	17.6%	30.9%	20.7%	37.1%	40.0%	26.5%	25.7%	25.2%
Genital organs	3.7%	3.2%	13.4%	14.9%	7.4%	5.7%	12.9%	9.9%	9.3%	4.1%
Urinary system	8.5%	9.5%	8.4%	3.2%	7.4%	4.8%	7.9%	5.5%	4.3%	4.9%
Musculoskeletal system	13.4%	10.5%	10.1%	9.6%	21.5%	18.1%	23.6%	17.7%	20.7%	22.8%
Integumentary system	29.3%	42.1%	49.6%	34.0%	40.0%	33.3%	31.4%	45.3%	33.6%	25.2%
Chromosomal abnormalities	2.4%	2.1%	1.7%	0.0%	2.2%	4.8%	2.1%	3.3%	0.0%	2.4%
Other birth defects	2.4%	1.1%	0.0%	3.2%	3.0%	2.9%	2.9%	1.1%	0.0%	2.4%

Percentages were calculated using the number ANHOPI children (four years of age or younger) with at least one BD per body system as numerator and the total number of ANHOPI children diagnosed with at least one birth defect overall as denominator

Table 5f. Percentage birth defects diagnosed by body system among Black/African American (B/AA) children, New Mexico 2015-2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	3.1%	3.9%	5.3%	1.2%	3.4%	0.9%	2.2%	3.2%	6.3%	3.2%
Eye, ear, face, and neck	3.1%	3.9%	5.3%	1.2%	3.4%	0.9%	7.4%	4.8%	9.0%	2.1%
Circulatory system	35.4%	30.3%	20.2%	22.9%	25.6%	21.7%	24.4%	16.7%	25.2%	24.2%
Respiratory system	3.1%	5.3%	2.1%	3.6%	4.3%	1.9%	5.9%	3.2%	2.7%	1.1%
Digestive system	12.3%	13.2%	9.6%	13.3%	18.8%	15.1%	19.3%	22.2%	24.3%	20.0%
Genital organs	4.6%	6.6%	6.4%	14.5%	8.5%	9.4%	14.8%	11.9%	9.0%	15.8%
Urinary system	10.8%	6.6%	3.2%	4.8%	6.0%	4.7%	5.9%	6.3%	3.6%	3.2%
Musculoskeletal system	13.8%	11.8%	10.6%	14.5%	21.4%	12.3%	19.3%	16.7%	21.6%	24.2%
Integumentary system	35.4%	47.4%	51.1%	39.8%	34.2%	48.1%	37.0%	42.1%	39.6%	23.2%
Chromosomal abnormalities	1.5%	0.0%	4.3%	1.2%	3.4%	1.9%	3.7%	0.0%	0.9%	1.1%
Other birth defects	1.5%	2.6%	0.0%	1.2%	6.0%	2.8%	0.7%	1.6%	5.4%	0.0%

Percentages were calculated using the number B/AA children (four years of age or younger) with at least one BD per body system as numerator and the total number of B/AA children diagnosed with at least one birth defect overall as denominator

Table 5g. Percentage birth defects diagnosed by body system among Hispanic children, New Mexico 2015-2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	2.9%	3.8%	4.1%	4.1%	3.6%	3.1%	4.3%	3.5%	3.6%	4.4%
Eye, ear, face, and neck	4.4%	4.8%	5.8%	6.4%	5.8%	5.7%	6.2%	6.7%	5.5%	5.9%
Circulatory system	28.7%	24.0%	22.9%	25.3%	26.0%	24.9%	23.1%	24.3%	27.4%	31.5%
Respiratory system	3.0%	2.1%	2.5%	2.7%	2.9%	2.5%	2.3%	2.8%	3.2%	2.2%
Digestive system	17.7%	17.4%	17.2%	20.1%	19.4%	20.9%	23.2%	23.4%	26.5%	21.0%
Genital organs	6.0%	7.1%	10.2%	9.7%	9.3%	8.4%	8.7%	9.2%	8.1%	7.5%
Urinary system	8.9%	9.1%	8.3%	9.2%	8.2%	6.9%	7.8%	6.3%	6.3%	7.1%
Musculoskeletal system	12.4%	13.1%	15.8%	18.1%	20.2%	17.6%	20.9%	19.6%	21.4%	18.0%
Integumentary system	33.9%	37.3%	35.8%	27.4%	27.2%	29.1%	30.6%	31.9%	24.5%	26.0%
Chromosomal abnormalities	2.4%	2.3%	2.6%	2.4%	3.8%	6.7%	3.6%	1.8%	1.9%	2.1%
Other birth defects	1.6%	1.3%	2.2%	2.3%	1.6%	1.6%	1.9%	1.8%	1.2%	1.4%

Percentages were calculated using the number Hispanic children (four years of age or younger) with at least one BD per body system as numerator and the total number of Hispanic children diagnosed with at least one birth defect overall as denominator

Table 5h. Percentage birth defects diagnosed by body system among White children, New Mexico 2015-2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	3.0%	4.6%	2.1%	2.9%	3.8%	4.2%	4.3%	3.8%	4.2%	3.1%
Eye, ear, face, and neck	3.8%	4.6%	5.8%	6.4%	5.9%	4.9%	5.8%	7.0%	4.2%	5.6%
Circulatory system	33.2%	24.6%	25.1%	25.5%	24.5%	28.4%	22.8%	24.7%	30.0%	30.2%
Respiratory system	2.9%	2.4%	2.7%	3.1%	2.9%	2.5%	3.0%	3.3%	2.8%	2.0%
Digestive system	22.4%	21.9%	24.5%	24.7%	26.8%	29.0%	30.0%	31.8%	30.1%	26.7%
Genital organs	9.2%	9.0%	8.3%	9.9%	10.9%	8.9%	9.6%	9.0%	9.6%	8.2%
Urinary system	9.6%	10.8%	9.6%	9.2%	6.5%	8.7%	7.9%	7.7%	7.2%	6.9%
Musculoskeletal system	14.7%	19.1%	17.9%	20.7%	23.7%	19.5%	23.3%	20.3%	20.6%	19.5%
Integumentary system	19.7%	20.8%	24.7%	20.0%	17.2%	17.8%	17.8%	22.7%	17.4%	20.2%
Chromosomal abnormalities	3.6%	1.9%	1.5%	2.5%	2.8%	4.4%	2.8%	1.6%	2.7%	0.7%
Other birth defects	2.7%	2.3%	3.1%	2.7%	2.4%	2.5%	2.3%	1.9%	2.2%	0.8%

Percentages were calculated using the number White children (four years of age or younger) with at least one BD per body system as numerator and the total number of White children diagnosed with at least one birth defect overall as denominator

Comparing race/ethnicities and using the White children as reference category, AIANs had cumulatively more BDs of the integumentary system than Whites, making for a 24.9% difference. For all the other BD categories, AIANs have less diagnosed BDs compared to Whites. Both ANHOPI and B/AA had less cumulative number of cases for all body system BDs compared to Whites. The biggest differences were found for BDs of the respiratory system among ANHOPIs (169.9%) and for the digestive and urinary systems for B/AAs (174.9% both). Hispanics had more cumulative BDs diagnosed for all body systems, compared to Whites. The biggest difference was among BDs of the integumentary system (109.9%), followed by

chromosomal anomalies (92.4%), and eye, ear, face, and neck (80.9%). Excluding the other BDs category, the smallest difference between Hispanics and Whites was among BDs of the digestive system (53.7%).

Fetal and child deaths

Between 2015-2024, there were 1,070 deaths among children (age four years or younger) born in NM from a NM resident mother. Considering only those who died, the highest percentage occurred in 2016 (11.8%), closely followed by 2019 (11.7%). Of the children's deaths under consideration, the highest percentages can be found among infants (less than one year of age, 94.0%), males (55.0%), of Hispanic ethnicity (52.5%), born of mothers between the ages of 21–25 (28.1%), residing in the Metro health region (46.2%), and residing on a metropolitan designated county (46.2%). For this section, it is necessary to consider that the birth cohorts of 2021-2024 are still undergoing follow-up.

Of the children who died between 2015-2024, 21.6% had at least one diagnosed BD that contributed to their deaths. Considering only those who died, the 2015 cohort showed the highest percentage of these cases (13.9%). The 2015 cohort also had highest percentage of children that died due to BDs among those children that died during the surveillance period, 30.2%.

The characteristics of the groups with the highest percentages of children that died due to a BD were almost the same as for the overall children's deaths, among the population of surveillance during the period surveilled: infants (less than one year of age, 92.0%), males (54.2%), of Hispanic ethnicity (52.8%), residing in the Metro health region (48.6%), and residing on a metropolitan designated county (48.6%). The only difference (besides the magnitude of the measures) was that they were born to mothers between the ages of 26–30 (25.5%).

BDs of the circulatory system accounted for the highest cumulative percentage (59.2%) of BDs identified on the death certificates (DC) data. The other two high-percentage categories were the musculoskeletal system (36.4%), and (not including the 'other BDs' category – 34.4%) the nervous system (28.4%). Percentages for any birth defect deaths were calculated using the total number of children deaths with at least one BD present as cause of death per year as numerator and the total number of children deaths for any cause as denominator. On

the other hand, percentages per body system were calculated using the total number of children deaths with at least one BD per body system as numerator, and the total number of children deaths with at least one BD as denominator. Table 6a

Table 6a. Percentage of children's deaths due to birth defects by body system, New Mexico 2015 - 2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Any birth defect*	30.2%	23.8%	23.2%	24.8%	24.0%	19.3%	19.2%	21.2%	22.4%	26.0%
Nervous system	25.0%	23.3%	23.1%	41.4%	13.3%	42.9%	15.8%	40.0%	31.6%	31.6%
Eye, ear, face, and neck**	9.4%	3.3%	3.8%	13.8%	6.7%	9.5%	10.5%	16.0%	5.3%	10.5%
Circulatory system	75.0%	53.3%	69.2%	69.0%	50.0%	57.1%	63.2%	52.0%	47.4%	47.4%
Respiratory system	28.1%	26.7%	19.2%	27.6%	20.0%	23.8%	10.5%	20.0%	5.3%	10.5%
Digestive system	9.4%	23.3%	19.2%	34.5%	10.0%	23.8%	15.8%	16.0%	15.8%	21.1%
Genital organs	9.4%	6.7%	15.4%	17.2%	6.7%	4.8%	5.3%	12.0%	15.8%	15.8%
Urinary system	34.4%	30.0%	19.2%	24.1%	26.7%	23.8%	21.1%	36.0%	15.8%	21.1%
Musculoskeletal system	37.5%	33.3%	46.2%	55.2%	16.7%	42.9%	26.3%	40.0%	31.6%	31.6%
Integumentary system	3.1%	10.0%	7.7%	6.9%	3.3%	4.8%	5.3%	12.0%	5.3%	0.0%
Chromosomal abnormalities	21.9%	13.3%	26.9%	37.9%	23.3%	28.6%	31.6%	36.0%	42.1%	26.3%
Other birth defects***	40.6%	30.0%	46.2%	31.0%	23.3%	33.3%	42.1%	28.0%	42.1%	52.6%

*The total number of children deaths (per year) due to birth defects was used to calculate the percentage of children death for any type of birth defect. The total number of children deaths (per year) due to birth defects was used to calculate the percentages per body system per year

**Cleft lip and cleft palate BDs are not included here but with the digestive system

***This group is comprised of BDs not assigned to any of the body systems listed

Additionally, for the same surveillance period, 105 fetal deaths were identified and added to the surveillance database, due to having been caused by BDs. If the other BDs category is set aside (60.0%), the highest percentage of BDs identified on the FD files were chromosomal abnormalities (29.5%), followed by BDs of the circulatory system (24.8%), and musculoskeletal system (21.0%).

The characteristics of the groups with the highest percentages were the similar as for the overall children's deaths among the population of surveillance during the period surveilled: males (53.3%), of Hispanic ethnicity (60.0%), and the women were between the ages of 21–25 (21.9%). Data on county of residence was not available for the full surveillance period. For the last two years, most of the cases occurred among women residents of Bernalillo County. Table 6b

In comparison to the surveillance live population, those that died before the age of one or during pregnancy were due to BDs with more critical impact, like those of the nervous system and circulatory system, or multisystemic ones (captured in the other BDs category).

Table 6b. Percentage of fetal deaths due to birth defects by body system, New Mexico 2015 - 2024

Body system	Birth Year									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nervous system	10.0%	11.1%	8.3%	25.0%	0.0%	0.0%	0.0%	33.3%	18.2%	25.0%
Eye, ear, face, and neck*	10.0%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Circulatory system	50.0%	22.2%	16.7%	33.3%	25.0%	44.4%	10.0%	25.0%	0.0%	25.0%
Respiratory system	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.1%	0.0%
Digestive system	10.0%	0.0%	8.3%	0.0%	0.0%	22.2%	20.0%	8.3%	9.1%	8.3%
Genital organs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Urinary system	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	18.2%	0.0%
Musculoskeletal system	20.0%	33.3%	41.7%	16.7%	12.5%	22.2%	20.0%	8.3%	36.4%	0.0%
Integumentary system	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chromosomal abnormalities	30.0%	22.2%	8.3%	41.7%	12.5%	44.4%	40.0%	50.0%	18.2%	25.0%
Other birth defects**	80.0%	77.8%	91.7%	75.0%	75.0%	55.6%	0.0%	41.7%	63.6%	41.7%

*Cleft lip and cleft palate BDs are not included here but with the digestive system

**This group is comprised of BDs not assigned to any of the body systems listed

Comparison with national estimates

CDC estimates BDs affect 1 in 33 babies (3%) born each year in the US.1 NM estimates for the reporting period (2015-2024) are about six times higher. This difference can be explained by how CDC's estimate was calculated, based on major structural or genetic birth defects. On the other hand, NM's is based on all BDs. Thus, these estimates are not comparable. Acknowledging this, Table 7 shows reported differences between selected NM and US estimates. Most of the US (period 2010-2014) estimates for comparison come from Mai et al (2019) report, 5 with two additional estimates obtained from other sources.6,7

We can observe that for most of the conditions reported, NM frequencies are similar to those at the national level (ex. Spina bifida, double outlet right ventricle, single ventricle, total anomalous pulmonary venous connection, trisomy 21). For some, NM frequencies are below the national frequencies (ex. Anencephaly, common truncus, transposition and dextro-transposition of great arteries, trisomy 18). Yet, for others NM frequency is above the national frequency (ex. Coarctation of the aorta, interrupted aortic arch, cleft palate, cleft lip without cleft palate, cleft lip with cleft palate, club foot, diaphragmatic hernia). Table 7. The comparison column is calculated by diving the NM ration by the US one.

Table 7. Comparison of Frequency of Selected Birth Defects between New Mexico (2015-2024 Aggregated) and the US*

Birth defect	Number of cases in NM	NM	US*	Comparison
Any birth defect	38,988	1/5	1/33**	6.2
Nervous system	1,448	1/143	***	
Anencephaly	22	1/9,408	1/4,647	0.5
Encephalocele	2	1/103,484	1/10,502	
Spina bifida	76	1/2,723	1/2,758	1.0
Eye, ear, face, and neck	2,185	1/95	***	
Anopthalmia/micropthalmia	29	1/7,137	1/5,243	0.7
Circulatory system	10,027	1/21	***	
Double outlet right ventricle	37	1/5,594	1/5,997	1.1
Common truncus (truncus arteriosus)	7	1/29,567	1/15,696	0.5
Transposition of the great arteries	32	1/6,468	1/2,695	0.4
Dextro-transposition of great arteries	30	1/6,899	1/3,413	0.5
Single ventricle	16	1/12,935	1/13,351	1.0
Atrioventricular septal defect	68	1/3,044	1/1,859	0.6
Tetralogy of Fallot	64	1/3,234	1/2,171	0.7
Pulmonary valve atresia and stenosis	109	1/1,899	1/1,052	0.6
Pulmonary valve atresia	20	1/10,348	1/7,104	0.7
Tricuspid valve atresia and stenosis	11	1/18,815	1/5,938	0.3
Ebstein anomaly	12	1/17,247	1/13,047	0.8
Hypoplastic left heart syndrome	18	1/11,498	1/3,841	0.3
Coarctation of the aorta	190	1/1,089	1/1,795	1.6
Interrupted aortic arch	24	1/8,624	1/16,066	1.9
Total anomalous pulmonary venous connection	25	1/8,279	1/7,809	0.9
Respiratory system	1,053	1/197	***	
Digestive system	8,353	1/25	***	
Cleft palate	188	1/1,101	1/1,687	1.5
Cleft lip without cleft palate	131	1/1,580	1/2,807	1.8
Cleft lip with cleft palate	229	1/904	1/1,563	1.7
Esophageal atresia	69	1/3,000	1/4,144****	1.4
Tracheoesophageal fistula/atresia	63	1/3,285		
Large intestinal atresia/stenosis	76	1/2,723	1/2,242****	0.8
Rectal atresia/stenosis	4	1/51,742		0.0
Genital organs	3,317	1/62	***	
Hypospadias	628	1/330	1/200^	0.6
Urinary system	3,027	1/68	***	
Renal agenesis	134	1/1,545	1/1000^^	0.6
Musculoskeletal system	7,030	1/29	***	
Clubfoot	617	1/335	1/593	1.8
Any limb reduction	119	1/1,739	1/1,943*****	1.1

Other limb defects	399	1/519		
Diaphragmatic hernia	92	1/2,250	1/3,591	1.6
Omphalocele	31	1/6,676	1/4,175	0.6
Gastroschisis	138	1/1,500	1/1,953	1.3
Integumentary system	11,789	1/18	***	
Chromosomal abnormalities	1,072	1/193	***	
Trisomy 21 (Down syndrome)	318	1/651	1/707	1.1
Trisomy 18 (Edwards syndrome)	21	1/9,856	1/3,315	0.3
Trisomy 13 (Patau syndrome)	14	1/14,783	1/7,409	0.5
Other	752	1/275	***	

*Estimates as reported on Mai CT, Isenburg JL, Canfield MA, Meyer RE, Correa A, Alverson CJ, Lupo PJ, Riehle-Colarusso T, Cho SJ, Aggarwal D, Kirby RS. National population-based estimates for major birth defects, 2010–2014. Birth Defects Research. 2019; 111(18): 1420-1435 https://www.cdc.gov/ncbddd/birthdefects/data.html Last Reviewed: June 28, 2023 4

**For the US, estimated is based on major structural or genetic birth defects1. For NM, is based on all BDs over total number of births (150,286) over the period reported (2015-2021)

***No data available to compare

****For the US, the indicators were reported collapsed into one indicator

*****For the US, comparison reported was that of limb defects overall
^For the US, comparison as found on CDC. Facts about Hypospadias | CDC. Centers for Disease Control and Prevention. Published December 4, 2019. Last Reviewed: June 28,2023 5

^^For the US, comparison as found on https://www.healthline.com/health/renal-agenesis#symptoms Last medically reviewed on September 3, 2018 6

CDC estimates that heart defects affect approximately 1% of births in the US each year. 8 Data from NM shows that BDs of the circulatory system (ICD-10-CM codes Q20 to Q28), during the period of surveillance, amounted to 4.8% of all births (that occurred in NM to a NM resident mother) with annual percentages being the highest in 2023 (6.3%) and the lowest in 2015 (3.6%). If diagnosis codes are restricted to proper heart-related codes (Q20 to Q24), the cumulative percentage for NM would be 4.1% with the same years showing the highest and lowest annual percentages during the surveillance period. It is worth mentioning that of the eight conditions for which case confirmation (ascertainment) is performed, seven are circulatory system BDs. A brief analysis of the number of cases with one of such diagnosis that are confirmed shows a variability of ranging from 54.5% for tricuspid valve atresia/stenosis to 83.3% for common truncus

IV. Risk Factor Analysis

Birth defects and substance use

For decades, New Mexico (NM) has been facing an epidemic of substance (ex. alcohol, tobacco) misuse. NM not only has ranked among the states with the highest drug overdose death rates but has consistently been first on alcohol-related death rates.9 A report by Haight et al (2018)10 revealed that the number of pregnant women with opioid use disorder more than quadrupled in the US between 1999-2014.

In utero exposure to substances has been linked to changes in the nervous system.11 A cohort study by Wen et al. (2021)12 found that women who were dispensed prescription opioids during the third trimester had higher risk for certain BDs. An article by Branum and Ahrens (2017)13 reported that, on average, women are unaware of being pregnant until five to six weeks into their pregnancy.

An analysis was conducted using data from the 2022 to 2024 birth cohorts, as were the only ones for which data was reliably collected. Exposure was determined by the presence of the ICD-10-CM diagnosis codes on the child's hospital records and/or by identification of alcohol or tobacco use during pregnancy from birth certificate files. A different exposure category – 'other' – was created by excluding alcohol, tobacco, and drug exposures from the overall substance exposure.

Codes and descriptions used to elaborate Table 8 were taken from The Web's Free 2024 ICD-10-CM/PCS Medical Coding Reference - www.icd10data.com. No other data sources for exposure (ex. Board of Pharmacy – Prescription Monitoring Program, Children, Youth & Families Department– Plan of Care, and HIDD) were available at the time of the writing of this report, but this may be the focus of future analysis. Thus, the exposure may be underestimated. The MedCalc Software Ltd. Relative risk calculator was used to calculate relative risk (RR) of birth defects (overall and by body region), the confidence interval, and p-value.14

Comparison groups were comprised of cases devoid of the specific exposure analyzed. For instance, RR for cases with in-utero alcohol exposure, the comparison group consisted of cases without alcohol exposure in utero. A caveat to note here is that it cannot be discarded that other kinds of exposures may have occurred, as in NM polysubstance use (consumption

of two or more substances together or within a short period) tends to be common among those misusing substances.9

Table 8. Variables used to determine substance exposure in utero

Code*	Description
P04.0	Newborn affected by maternal anesthesia and analgesia in pregnancy, labor and delivery
P04.1	Newborn affected by other maternal medication
P04.11	Newborn affected by maternal antineoplastic chemotherapy
P04.12	Newborn affected by maternal cytotoxic drugs
P04.13	Newborn affected by maternal use of anticonvulsants
P04.14	Newborn affected by maternal use of opiates**
P04.15	Newborn affected by maternal use of antidepressants**
P04.16	Newborn affected by maternal use of amphetamines**
P04.17	Newborn affected by maternal use of sedative-hypnotics**
P04.1A	Newborn affected by maternal use of anxiolytics**
P04.18	Newborn affected by other maternal medication***
P04.19	Newborn affected by maternal use of unspecified medication***
P04.2	Newborn affected by maternal use of tobacco^
P04.3	Newborn affected by maternal use of alcohol^^
P04.4	Newborn affected by maternal use of drugs of addiction
P04.40	Newborn affected by maternal use of unspecified drugs of addiction***
P04.41	Newborn affected by maternal use of cocaine**
P04.42	Newborn affected by maternal use of hallucinogens**
P04.49	Newborn affected by maternal use of other drugs of addiction***
P04.5	Newborn affected by maternal use of nutritional chemical substances
P04.6	Newborn affected by maternal exposure to environmental chemical substances
P04.8	Newborn affected by other maternal noxious substances
P04.81	Newborn affected by maternal use of cannabis**
P04.89	Newborn affected by other maternal noxious substances
P04.9	Newborn affected by maternal noxious substance, unspecified
Q86.0	Fetal alcohol syndrome (dysmorphic)^^

Source: www.icd10data.com

*All diagnosis starting with P04 were used to determine any substance exposure

**Were used to create individual flags as well as collectively to determine drug exposure

***Were used collectively to create the other drugs category. They were also used (alongside individually identified drugs) to create the drug exposure

^Was used, alongside tobacco use during pregnancy variables (from the birth certificate files) to determine tobacco exposure

^^Was used, alongside alcohol use during pregnancy variables (from the birth certificate files) to determine alcohol exposure

In utero exposure to substances was identified in 6.0% of the births for 2022-2024, with the annual percentages as follows: 2022-6.1%, 2023-6.3%, and 2024-5.6%. Among those exposed to substances in utero, the highest exposure was for tobacco in all three cohorts (cumulative percent: 56.4%), followed by exposure to drugs (34.6%), and alcohol (21.7%).

For the combined 2022-2024 cohorts, children exposed to any type of substance in utero were 1.5 times more at risk of having any type of BD diagnosed than those that were not exposed. In utero exposures to alcohol and tobacco did not yield significant results. Table 8.

Table 8. Relative Risk (RR) of any birth defect by different types of in utero exposure to substances, New Mexico 2022-2024

Type of In Utero Exposure*	Any birth defect			
	RR	Confidence Interval		p-value
Any substance	1.5	1.4	1.5	< 0.0001
Alcohol	1.3	1.1	1.4	0.0002
Tobacco	1.1	1.0	1.2	0.1236
Drugs	2.5	2.3	2.6	< 0.0001
Other**	0.3	0.2	0.6	< 0.0001
Type of In Utero Drug Exposure	**Any birth defect**			
	RR	Confidence Limits		p-value
Amphetamines	2.8	2.5	3.1	< 0.0001
Antidepressants	3.5	2.7	4.5	< 0.0001
Anxiolytics	4.5	4.5	4.6	< 0.0001
Cannabis	0.0	0.0	0.0	0.0
Cocaine	1.9	1.5	2.4	< 0.0001
Hallucinogens	0.0	0.0	0.0	0.0
Sedative-hypnotics	1.5	0.5	4.7	0.4743
Opioids	2.7	2.4	3.0	< 0.0001
Other drugs***	2.2	2.0	2.4	< 0.0001

Data sources: Birth certificates and HIDD, 2022-2024

*Identified using alcohol and tobacco use variables on the birth certificates and codes listed on Table 8 on the infant's record on HIDD

**Created by excluding alcohol, tobacco, and drugs individually identified

***Created by excluding all individually specified drugs

Comparison groups per each exposure category were comprised of those cases devoid of the specific exposure listed

However, both in utero exposure to drugs and other exposures were significant for an increased risk of any type of BD diagnosed. Individually identified drug exposures were analyzed next. All in utero drug exposures analyzed, except for cannabis, hallucinogens, and sedative-hypnotics were significant for an increased risk of having any type of BD diagnosed. There were not any cases with codes evidencing maternal use of cannabis or hallucinogens during the surveillance period. Table 8.

In NM, two types of substances are of main public health concern – opioids and amphetamines.9 For this reason, a final analysis calculated the RR of BDs by body region due to exposure to amphetamines and opioids.

Table 9. Relative Risk (RR) of birth defects by body region due to in utero exposure to amphetamines or opioids, New Mexico 2022-2024

Amphetamine in utero exposure				Opioid in utero exposure			
RR	Confidence Limits		p-value	RR	Confidence Limits		p-value
Nervous system							
10.6	6.8	16.4	< 0.0001	7.1	4.4	11.4	< 0.0001
Eye, ear, face, and neck							
2.1	0.0	0.0	0.0668	2.9	1.6	5.2	0.0003
Circulatory system							
5.4	4.5	6.6	< 0.0001	4.3	3.5	5.3	< 0.0001
Respiratory system							
3.9	0.0	0.0	0.0022	6.0	3.2	11.1	< 0.0001
Digestive system							
2.6	1.9	3.7	< 0.0001	2.2	1.6	3.0	< 0.0001
Genital organs							
2.0	1.0	3.9	0.0482	3.4	2.2	5.3	< 0.0001
Urinary system							
1.6	0.7	3.8	0.2942	2.4	1.3	4.4	0.0049
Musculoskeletal system							
2.5	1.7	3.7	<.0001	2.8	2.0	3.8	< 0.0001
Integumentary system							
2.5	1.8	3.4	< 0.0001	2.6	2.0	3.4	< 0.0001
Chromosomal abnormalities							
1.1	0.0	0.0	0.8950	0.9	0.0	0.0	0.8790
Other birth defects							
2.7	0.7	10.8	0.1588	1.0	0.1	7.2	0.9886

Data sources: Birth certificates and HIDD, 2022-2024

The comparison group for Amphetamine in utero exposure was comprised of cases without amphetamine exposure in utero. The comparison group for Opioid in utero exposure was comprised of cases without opioid exposure in utero.

Children from the 2022-2024 cohorts exposed in-utero to amphetamines were at higher risk of being diagnosed with BDs of the nervous, circulatory, digestive, musculoskeletal, and integumentary systems than those children not exposed to amphetamines in-utero. Those exposed to opioids in-utero, followed the same pattern. Table 9

Although results from both cohorts signaled for increased risk for BDs for certain body systems, a more in-depth analysis to determine specific BDs was not performed at this time. Also considered for future analyses would be combining both cohorts to add power to the assessment.

V. Prioritized Birth Defects for Interventions

The changes introduced in the BDs surveillance data processing have allowed the identification of BDs with a high number of diagnoses in NM. In this section, only a brief description of them will be offered. The identification of these high number of BDs diagnosed may aid a Health Educator (BDHE) in creating educational materials for families and medical personnel.

Microcephaly (Q02)

Microcephaly is a nervous system BD characterized by a smaller head size than expected and variable severity. Microcephaly occurs when the brain ceases to develop in utero or soon after birth. Like other BDs, it can be present alone or alongside other BDs. Risk factors include infections during pregnancy (ex. Zika, HIV, rubella), exposure to chemicals (ex. arsenic, mercury), genetic abnormalities, and malnutrition.15,16

Accessory auricle (Q17.0)

Accessory auricle is a common benign ear BD, described by Hwang (2017) as 'abnormal auricular appendages remaining after the formation of the anterior auricle in early embryonic development'. 17,18

Congenital stenosis and stricture of lacrimal duct (Q10.5)

Congenital stenosis and stricture of lacrimal duct is an eye BD. It is the narrowing or blockage of the lacrimal duct, either unilaterally or bilaterally. It can self-correct spontaneously at varying degrees. Risk factors include trisomy 21 (Down syndrome), craniosynostosis, and cleft lip and/or palate.19-21

Atrial septal defect (Q21.1)

Atrial septal defect (ASD) is a circulatory system BD. It is characterized by a hole, of variable in size, in the wall that divides the heart's atria (upper chambers). It is normal for this opening to be present at birth, closing after some weeks or months. It is when it does not close that health issues may develop, depending on the size of the opening. This BD can be present by itself or with other heart BDs.22

Ventricular septal defect (Q21.0)

Ventricular septal defect (VSD) is a circulatory system BD. It is characterized by a hole, of variable in size, in the wall that divides the heart's ventricles (lower chambers). In the normal development process, this opening closes before birth. Some VSDs may close spontaneously but, if they do not, may produce health complications. As was the case with ASDs, this BD can occur by itself or with other heart BDs. Dakkak (2023) refers to it as 'the most common congenital cardiac anomaly in children'.23,24

Patent ductus arteriosus (Q25.0)

Patent ductus arteriosus is a circulatory system BD. It occurs when the ductus arteriosus, the fetal artery that connects the aorta to the pulmonary artery, does not close after birth. Although failure to close is common on premature babies, it is rare on full-term ones. The opening can vary in size and have adverse health effects. Risk factors include infections during pregnancy (ex. rubella), exposure to chemicals (ex. alcohol), and genetic abnormalities.25

Congenital laryngomalacia (Q31.5)

Congenital laryngomalacia is a respiratory system BD. It is characterized by the occurrence of a high-pitched sound (stridor) when breathing, due to an abnormally formed larynx (voice box). In less severe presentations, it can self-resolve after birth. More severe cases can produce breathing problems.26,27

Ankyloglossia (Q38.1)

Ankyloglossia is a digestive system BD, also known as tongue-tie. It is characterized by a short and thick lingual frenum (the membrane that connects the tongue to the floor of the mouth) that prevents the normal movement of the tongue. It can present different levels of severity. Ankyloglossia has been associated with other conditions (ex. trisomy 13). A study by Han (2012) showed it may be linked to chromosome X. 28-30

Hypospadias (Q54.[0-3,8,9])

Hypospadias is a genital organs BD. Hypospadias are one of the most common BDs. This condition results from the abnormal development of the urethra. In male children with this condition, the opening of the urethra is not located at the tip of the penis. The severity of this condition varies. The unspecified type (Q54.9) accounted for most of the cases.5

Unspecified undescended testicle, unilateral (Q53.10)

Unspecified undescended testicle, unilateral is a genital organs BD. It is the most common BD of the genital organs in male children and is characterized by the late descent, if at all, of the testicles to the scrotum. This affects the development of the testicles and fertility.31 In NM surveillance, the unilateral presentation was the most common type.

Congenital hydronephrosis (Q62.0)

Congenital hydronephrosis is a urinary system BD. It is characterized by Khono (2020) as 'a pathological condition in which the renal pelvis and renal calyces dilate as a result of stagnation or reflux of urine'.32 Its severity is variable.33

Plagiocephaly (Q67.3)

Plagiocephaly is a musculoskeletal system BD. Etymologically meaning oblique head, this BD is also known as flathead. It is characterized by the asymmetric shape of the skull.34,35

Macrocephaly (Q75.3)

Macrocephaly is a musculoskeletal system BD. In this condition, 'the head circumference of an infant is above 2 standard deviations above the mean for gestational age and sex'.36

Congenital non-neoplastic nevus (Q82.5)

Congenital non-neoplastic nevus is an integumentary system BD. 'Congenital melanocytic nevi are pigmented lesions that are usually present a [sic] birth.'37 Although they could be malignant, the benign presentation was the one accounting for more diagnosis in our population. Their caused by (somatic) mutations occurring in utero.37

Congenital sacral dimple (Q82.6)

Congenital sacral dimple is an integumentary system BD. They are common BDs, characterized by an indentation or depression of the skin just above the furrow between the buttocks. Although they could be related to other health conditions, like spina bifida, most occurrences of this BD are benign.38,39

VI. Educational Outreach

NMBDPASS data and anecdotal evidence collected from families and providers assisted the Birth Defects Health Educator (BDHE), Aimee Roth, in developing educational materials. All materials (written to an 8th-grade or below reading level) were provided in English, Spanish, and Navajo.

Anecdotal reports received by the BDHE showed that many birthing women were unaware of general healthy behaviors during pregnancy, such as taking prenatal vitamins and not smoking or drinking alcohol. Using this information, the BDHE created a one-page flyer discussing tips for encouraging a healthy pregnancy. This was disseminated to all the public health offices across the state and provided to various physician offices and medical personnel. Additional materials created focused on many of the BDs tracked nationally. These materials were aimed at families and were one-pagers that discussed what the BD is, symptoms the family may see in the child, and what NM is doing to reduce/prevent/treat the BD.

In NM, access to cell service and internet can vary across the state. It is not abnormal for those living in rural areas to have very limited access to internet and cell service. To address this limitation, the BDHE created two different guides for families and providers. One guide listed all the pediatric specialists in NM along with their contact information. The second guide focused on identifying resources for anyone suffering from drug misuse who was interested in seeking treatment. The guide listed all rehabilitation facilities in NM, contact information for each one, insurance accepted (self-pay or sliding scale as well), and if they worked with families or not. These guides were provided in paper format to families and providers and electronically to anyone who requested an electronic version.

The BDHE additionally attended health fairs and state-wide health events across the state where they had a booth and disseminated all materials. Two of the largest events attended annually were the Education for Parents of Indigenous Children with Special Needs (EPICS) and the Parents Reaching Out (PRO) conference. Periodically, the BDHE was invited to attend events and health fairs as an exhibitor on Tribal land. These invitations helped to disseminate the materials to tribal members who may not otherwise have knowledge or access to said materials.

Material produced by the BDHE and other information made available by NMBDPASS can be found here: https://nmtracking.doh.nm.gov/health/reproductive/BirthDefects.html 40

VII. Summary

BD surveillance in NM has changed over the years, to better serve its population. The changes introduced (inclusion of HIDD as data source, creation of several individual indicators for BDs, replacement of manual data input and deduplication by SAS processing) seek to offer a more comprehensive view of BDs in NM and present opportunities for both research and education.

Even though not all BDs have the same impact on the neonate, being able to identify patterns in different systems, or specific BDs, could help in the development of interventions to either prevent new occurrences of BDs or minimize their impact. The identification of BDs that are more frequently diagnosed will enable NMBDPASS to produce new educational material, for both families and providers.

On average, between 2015-2024, around 19% of children born in NM to a NM resident mother had, at least, one BD diagnosed. Male children had more diagnosis of BDs than females, with BDs of the genital organs, urinary system, and digestive system, having a higher prevalence among males than females. Among females, the integumentary system BDs were the highest.

Despite Hispanic, White, and American Indian/Alaska Native children representing the racial/ethnic groups with more children born in NM, Asian/Native Hawaiian and Other Pacific Islander children showed both higher percentages of BD diagnosis as well as the largest increase in BDs for the period analyzed. Yet, the small number of cases make these data unstable. Excluding the maternal age-group of 15 or less, an inverse relationship between maternal age and percentage of children born with at least one BD was observed. The maternal age group 15 or less showed the largest increase in children born with at least one BD diagnosed.

In NM, the Metro Health Region had the highest number of children born, of those born with at least one BD diagnosed, and the highest increase in the period analyzed. Assessment by the county urban/rural designation showed that the metropolitan designated areas had the highest percentage increase of children born with at least one BD. However, despite showing the smallest average of children born with at least one BD, the rural areas showed the third highest increase in BDs during the surveillance period.

An analysis conducted by the Program Evaluation Unit of the Legislative Finance Committee

may help to partially explain some of the observed demographic results.41 The analysis showed that between 2010-2019, NM's birth rate decreased by 19%, partially explained by the decline in teen births. During this same period, population growth varied by race/ethnicity. The American Indian/Alaska Native population grew by 9.7%, Asian/Native Hawaiian and Other Pacific Islander by 20%, Black/African American by 11%, and Hispanic by 7.8%, whereas the White population decreased by 0.5%. Analyzed by age, the age-group of 18-44 grew by 2% whereas the 45-64 decreased by 7.5%. When assessed by county, Eddy's population (Southeast Health Region – Mixed Urban/Rural) increased by 18% whereas Colfax's (Northeast Health Region - Rural) decreased by approximately 15% (the largest increase and decline in the NM for that period, respectively). Bernalillo and Sandoval counties (both part of the Metro Health Region and designated as Metropolitan) alongside Dona Ana (Southwest Health Region – Small Metro) and Santa Fe (Northeast Health Region – Small Metro) increased, in combination, by 2.9%. The rest of the state experienced a population decline of 0.04%.

The surveillance system here presented comprises 299 indicators. The musculoskeletal system and the circulatory system had the most indicators created. However, defects of the integumentary system showed the highest cumulative percentage and BDs of the digestive system showed the largest increase. Among AIAN, ANHOPI, B/AA, and Hispanics BDs of the integumentary system showed the highest percentage. Among Whites it was the digestive system.

One thousand seventy children (age four or younger) died between 2015-2024 with 94% happening before the age of one, Of the children who died, 21.6% were due to a BD, with those of the circulatory system accounting for the highest percentage of BDs identified on the death certificates. During the same period, 105 fetal deaths due to BDs were identified. Setting aside the other BDs category, chromosomal abnormalities accounted for the highest percentage of BDs identified on the fetal death files. Whether the terminations were elective or not was not analyzed.

The changes introduced in the BDs surveillance data processing allowed the identification of BDs with a high number of diagnoses in NM. Some of them include microcephaly, accessory auricle, congenital laryngomalacia, ankyloglossia, and congenital non-neoplastic nevus, among others.

Aggregated data from three cohorts showed that in-utero exposures (any substance, which includes alcohol, tobacco, drugs, and other substances) were significant for an increased risk of any type of BD diagnosed. Individually identified drug exposures were also analyzed, with almost all the exposures identified showing a significantly increased risk. A more in-depth analysis of amphetamines and opioid exposures showed an increased risk of having a BD diagnosed for most of the body systems. Further analysis would be warranted.

Results presented in this report showed a 20.8% increase in the number of children (four years of age or younger) diagnosed with at least one BD, between 2015 and 2024 (the latter being in its first year of data collection). This increase is difficult to explain, as BDs are due to different factors, sometimes even in combination. The structure and capacity of NMBDPASS did not permit an in-depth study of the causes of the increase but one may be warranted.

Some possible contributing factors are the change of diagnosis codes from ICD-9-CM to ICD-10-CM, which occurred during the last quarter of 2015. There may be some surveillance bias also at play. Communications with the Community and Health Systems Epidemiology Bureau (CHSEB), data stewards of HIDD, revealed that one new facility started reporting in 2019 and a second one in 2020. Finally, quality improvements have been established, with a standardized code validation implemented starting with HIDD 2019. However, as stated, how much these elements explain the totality, or a portion, of the increase is something that is unfeasible to determine at present.

VIII. Limitations

As previously noted, the surveillance database is compiled from several data systems, but hospital records account for most identified BDs. Therefore, it is necessary to acknowledge some limitations of these data. BDs in hospital records are identified through ICD-10-CM codes. This code system started to be implemented during the fourth quarter of 2015. Previously, the ICD-9-CM system was used. The new system has more specificity for certain conditions, including BDs. That may account for some of the increases between 2015 and 2016. HIDD is an administrative data system, used for reimbursement claims from the facilities to the insurance companies. Some diagnoses may have the purpose of prompting testing of children (ex. echography) to discard suspected conditions. Some changes could also be due to the introduction of new codes to identify BDs. For example, late in 2022, new codes were

introduced to differentiate between atrial septal defects (ASDs) reportable as BDs and those that are not. As mentioned earlier on this report, HIDD does not include data from federal facilities (ex. Indian Health Service). Thus, data on the AIAN population may be underestimated.

The relative risk analysis was restricted to two cohorts. This analysis suffered from limited data of in utero substance exposure. Other sources were not available to improve on the exposure variable. Diagnostic codes used were restricted to those on the children's HIDD records. Maternal HIDD records contain codes related to substance use. A future analysis could expand the scope of the risk analysis by looking at maternal HIDD records throughout the pregnancy period.

NMBDPASS surveillance population comprises children born in NM to a NM resident mother. For NM families residing in areas bordering other states, it may be easier to seek medical services outside NM, like in Arizona, Colorado, or Texas. Some of this usage may be just convenient but it may also be driven by a shorter distance to a facility offering more advanced services, especially for conditions requiring them, like BDs. Thus, some cases suffering from BDs, even some of greater consequences, would be excluded.

Finally, NMBDPASS only performs diagnosis ascertainment on eight conditions, due to workforce capacity. If some of the BDs accounting for high numbers of diagnosis were subject to ascertainment processes, we might see some of these counts decreasing. The extent of this decrease is difficult to determine at this time.

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