NASS2.0
National Assisted Reproductive Technology Surveillance System

State-Specific Assisted Reproductive Technology Surveillance, United States

2019 Data Brief

October 2021

Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion

State-Specific Assisted Reproductive Technology Surveillance, United States: 2019 Data Brief

Saswati Sunderam, PhD; Yujia Zhang, PhD; Amy Jewett, MPH; Dmitry M. Kissin, MD

Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion

Introduction

Since the birth of the first US infant conceived with assisted reproductive technology (ART) in 1981, both the use of ART and the number of fertility clinics providing ART services have increased steadily (1, 2). ART includes fertility treatments in which eggs or embryos are handled in the laboratory (i.e., in vitro fertilization [IVF] and related procedures) (1). Although the majority of infants conceived through ART are singletons, women who undergo ART procedures are more likely than women who conceive naturally to have multiple births because multiple embryos may be transferred (3). Multiple births can pose substantial risks for both mothers and infants, including obstetric complications, preterm birth, and low birthweight (4-7). This report provides state-specific information on US ART procedures performed in 2019 and compares birth outcomes that occurred in 2019 with outcomes for all infants born in the United States in 2019 and includes data from the 50 states, the District of Columbia, and Puerto Rico.

Methods

Data for ART procedures and ART birth outcomes were obtained from CDC's National ART Surveillance System (NASS) for reporting years 2018 and 2019 (1,8). See Technical Notes for more information about NASS and the data collected through that system. Data for all infants born in the United States were obtained from CDC's National Vital Statistics System for reporting year 2019 (9,10). To compare ART births to all US births in 2019, ART-conceived births were aggregated from procedures performed in 2018 and 2019. The data are presented nationally and for 50 States, District of Columbia, and Puerto Rico, classified by mother's reported state of residence at time of treatment. This report presents data

on all procedures initiated with the intent to transfer at least one embryo, including procedures that used thawed embryos for transfer. All cycles in which egg or embryo banking was performed for future ART cycles were excluded.

We first calculated the number and outcomes of ART procedures performed in 2019 and the number of ART procedures performed per million women 15-44 years of age using data on population size from the US Census Bureau (11). Because patients can undergo multiple ART procedures, measures of ART use are an approximation; certain women who use ART are younger or older than the age range of 15–44 years, and certain women might have had more than one procedure during the reporting period. Average number of embryos that were transferred and the proportion of embryo-transfer procedures performed with a single embryo in 2019 were calculated for women <35 years, 35-37 years, and >37 years. The number of infants born in 2019 that were singletons, multiples (twins, triplets and higher order), with low birthweight (<2,500g), or preterm (<37 weeks gestation) was calculated for ART infants and all infants, as well as the respective percentages for each group. The proportion of ART infants among all infants with these outcomes was also calculated. The proportion of ART-conceived infants among all US births that were low birthweight or preterm as well as the proportion of small for gestational age (born at <10^{th} percentile of birthweight for gestational age) infants were calculated for singleton births.

Results

In 2019, there were 209,687 ART procedures (range: 149 in Alaska to 26,090 in California) performed in 448 US fertility clinics and reported to CDC (Table 1 and Figure 1). These procedures resulted in 77,998 live birth deliveries (range: 62 in Alaska to 10,037 in California) and 83,946 infants (range: 67 in Alaska to 10,820 in California) born. Nationally, 3,226 ART procedures were performed per million women of reproductive age (15–44 years). ART use rates exceeded the national rate in 16 states (California, Connecticut, Delaware, the District of Columbia, Hawaii, Illinois, Maryland, Massachusetts, New

Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Utah, Vermont, and Virginia). ART use exceeded 1.5 times the national rate in 8 states (Connecticut, Delaware, the District of Columbia, Illinois, Maryland, Massachusetts, New Jersey, and New York).

Nationally, among all ART transfer procedures, the average number of embryos transferred was similar across age groups (1.2 among women aged <35 years, 1.2 among women aged 35–37 years, and 1.3 among women aged >37 years) (Table 2). Single-embryo transfer (SET) rates among all embryo-transfer procedures were 80.6% among women aged <35 years (range: 40.5% in Puerto Rico to 94.4% in the District of Columbia), 79.5% among women aged 35-37 years (range: 29.5% in Puerto Rico to 91.5% in Delaware), and 72.4% among women aged >37 years (range: 40.4% in Puerto Rico to 85.2% in Delaware).

In 2019, ART contributed to 2.1% of all infants born in the United States (range: 0.5% in Puerto Rico to 5.5% in Massachusetts) (Table 3). Approximately 83% of ART-conceived infants were singleton infants. Approximately 16.3% (12,798 of 78,525) of ART-conceived infants were twins and 0.5% (395 of 78,525) were triplets and higher-order infants. Overall, ART contributed to 10.6% of all multiple births, including 10.6% of all twin births and 12.0% of all triplets and higher-order births (Table 4). Almost all (97.0%) of ART-conceived multiple births were twins. The percentage of multiple births was higher among infants conceived with ART (16.8%) (range: 8.6% in Delaware to 37.3% in North Dakota) than among all infants born in the total birth population (3.3%) (range: 2.2% in Puerto Rico to 3.8% in Michigan and South Dakota).

Nationally, infants conceived with ART contributed to 3.9% of all low birthweight infants (range: 0.8% in Mississippi to 9.3% in Massachusetts) (Table 5). Among ART-conceived infants, 16.1% were low birthweight compared with 8.3% among all infants. ART-conceived infants contributed to 4.9% of all

preterm infants (range: 1.4% in Alabama to 11.3% in Massachusetts) (Table 6). The percentage of preterm births was higher among infants conceived with ART (24.4%) than among all infants born in the total birth population (10.2%).

The percentage of low birthweight among singletons was 8.3% among ART-conceived infants and 6.7% among all infants born (Table 7). The percentage of preterm births among ART-conceived singleton infants was 15.4% compared with 8.5% among all singleton infants. The percentages of small for gestational age infants was 7.0% among ART-conceived infants compared with 9.3% among all infants.

Summary

Although singleton infants accounted for the majority of ART-conceived infants, multiple births from ART varied substantially among states and nationally contributed to greater than 10% of all twins, triplets and higher-order infants born in the United States. Variations in SET rates among states (or territory) were noted, which might, in part, account for high multiple birth rates observed in some states (or territory).

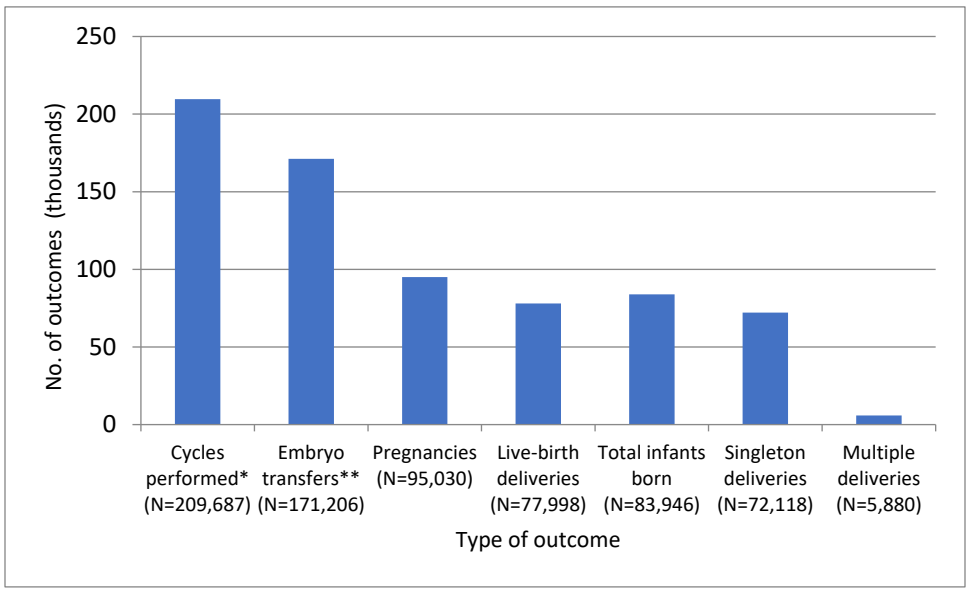
Public Health Action

Reducing the number of embryos transferred and increasing use of single embryo transfer procedures, when clinically appropriate, can help reduce multiple births and related adverse health consequences for both mothers and infants (3). While risks to mothers from multiple-birth pregnancy include higher rates of caesarean delivery, gestational hypertension, and gestational diabetes, infants from multiple births are at increased risk for numerous adverse sequelae such as preterm births, birth defects, and developmental disabilities (4-7). Long-term follow-up of ART infants through integration of existing maternal and infant health surveillance systems and registries with data available from NASS might be useful for monitoring adverse outcomes on a population basis (12).

References

1. Centers for Disease Control and Prevention. *2018 assisted reproductive technology success rates. Atlanta, GA: US Department of Health and Human Services. 2020.*
2. Sunderam S, Kissin DM, Zhang Y, et al. *Assisted reproductive technology surveillance—United States, 2017.* MMWR Surveill Summ, 2020. **69**(9): p. 1-24.
3. Practice Committee of the American Society for Reproductive Medicine and Practice Committee of the Society for Assisted Reproductive Technology. *Guidance on the limits to the number of embryos to transfer: a committee opinion.* Fertil Steril, 2021. **116**(4): p. 651-654.
4. Practice Bulletin No. 169. American College of Obstetricians and Gynecologists. *Multifetal gestations: twin, triplet, and higher-order multifetal pregnancies.* Obstet Gynecol, 2016.128:e131e46.
5. MacKay AP, Berg CJ, King JC, et al. *Pregnancy-related mortality among women with multifetal pregnancies.* Obstet Gynecol, 2006. **107**(3): p. 563-568.
6. Di Tommaso M, Sisti G, Colombi I, et al. *Influence of assisted reproductive technologies on maternal and neonatal outcomes in early preterm deliveries.* J Gynecol Obstet Hum Reprod, 2019. **48(10)**: p. 845-848.
7. Dawson AL, Tinker SC, Jamieson DJ, et al. *Twinning and major birth defects, National Birth Defects Prevention Study, 1997-2007.* J Epidemiol Community Health, 2016. **70**(11): p. 1114-1121.
8. Centers for Disease Control and Prevention. *Assisted Reproductive Technology Surveillance Report, 2019.* Atlanta (GA): US Dept of Health and Human Services; 2021.
9. National Center for Health Statistics, *Vital statistics data available. Natality public use file and CD-ROM. Hyattsville, MD, National Center for Health Statistics.*
10. Martin JA, Hamilton BE, Osterman MJK, et al. *Births: final data for 2019.* Natl Vital Stat Rep, 2019. **70** (2).
11. US Census Bureau. 2019 population estimates. Available from https://data.census.gov/cedsci/table?t=Age%20and%20Sex&g=0100000US.04000.001&tid=ACSDP1Y2019.DP05&hidePreview=true&tp=true
12. Mneimneh AS, Boulet SL, Sunderam S, et al. *States Monitoring Assisted Reproductive Technology (SMART) Collaborative: Data Collection, Linkage, Dissemination, and Use.* J Womens Health, 2013. 22:571-77.

Figure 1. Number and outcomes of assisted reproductive technology procedures performed in 2019 – United States and Puerto Rico



*Excludes 121,086 cycles in which egg or embryo banking was performed and 10 research cycles.
**Includes all procedures in which at least one embryo was transferred

TABLE 1. Number and outcomes of assisted reproductive technology procedures performed in 2019, by female patient's reporting area of residence at time of treatment — United States and Puerto Rico

Patient's reporting area of residence*	No. of ART clinics†	No. of ART procedures performed§	No. of ART embryo-transfer procedures¶	No. of ART pregnancies	No. of ART live-birth deliveries	No. of ART singleton live-birth deliveries	No. of ART multiple live-birth deliveries	No. of ART live-born infants	ART procedures per 1 million women aged 15–44 years**
Alabama	5	1,241	925	490	401	350	51	452	1,301
Alaska	0	149	125	71	62	57	5	67	1,047
Arizona	13	2,947	2,453	1,413	1,141	987	154	1,297	2,110
Arkansas	1	629	498	236	192	170	22	214	1,079
California	72	26,090	20,663	12,067	10,037	9,264	773	10,820	3,235
Colorado	8	2,490	2,347	1,615	1,371	1,260	111	1,482	2,111
Connecticut	6	3,629	2,850	1,685	1,423	1,330	93	1,517	5,452
Delaware	2	893	634	346	283	275	8	291	4,942
District of Columbia	2	1,370	1,066	583	480	467	13	494	7,208
Florida	27	8,773	6,956	3,780	3,067	2,821	246	3,316	2,256
Georgia	8	4,598	3,805	2,188	1,777	1,643	134	1,915	2,115
Hawaii	6	1,192	934	505	416	368	48	464	4,535
Idaho	1	657	531	315	254	226	28	283	1,903
Illinois††	24	12,645	9,772	5,302	4,279	3,970	309	4,590	5,050
Indiana	8	2,625	2,167	1,066	884	771	113	999	2,005
Iowa	2	1,580	1,320	749	614	569	45	659	2,651
Kansas	4	1,156	993	575	476	445	31	508	2,056
Kentucky	4	1,426	1,165	579	457	415	42	500	1,678
Louisiana	4	1,657	1,302	684	557	521	36	593	1,790
Maine	1	601	497	261	220	199	21	241	2,564
Maryland	6	6,295	4,904	2,613	2,076	1,989	87	2,163	5,312
Massachusetts††	8	10,626	8,801	4,527	3,794	3,569	225	4,020	7,628
Michigan	10	4,598	3,857	2,089	1,742	1,485	257	1,998	2,447
Minnesota	5	3,246	2,786	1,632	1,359	1,208	151	1,510	2,988
Mississippi	3	596	535	301	257	240	17	274	1,014
Missouri	9	2,437	2,063	1,138	933	835	98	1,033	2,066
Montana	1	378	320	192	157	146	11	168	1,941
Nebraska	2	1,084	863	441	357	313	44	401	2,896
Nevada	6	1,418	1,152	682	556	513	43	601	2,357
New Hampshire	0	1,031	846	438	370	348	22	392	4,195
New Jersey††	18	10,652	9,210	5,425	4,477	4,264	213	4,692	6,365
New Mexico	2	391	356	222	197	182	15	212	984
New York	43	23,459	19,318	9,536	7,603	7,142	461	8,073	6,054
North Carolina	10	4,709	3,860	2,257	1,855	1,726	129	1,981	2,277
North Dakota	1	262	224	135	112	95	17	131	1,725
Ohio	11	5,532	4,501	2,363	1,920	1,794	126	2,048	2,498
Oklahoma	3	1,124	933	493	419	354	65	485	1,448
Oregon	4	1,463	1,321	853	732	642	90	827	1,758
Pennsylvania	13	7,812	6,256	3,220	2,606	2,477	129	2,738	3,278
Puerto Rico	3	299	244	109	80	58	22	103	486
Rhode Island††	1	969	794	321	267	250	17	284	4,712
South Carolina	3	1,871	1,495	890	706	659	47	756	1,891
South Dakota	1	297	250	141	118	99	19	137	1,835
Tennessee	9	1,869	1,549	936	766	714	52	818	1,402
Texas	42	16,084	13,318	7,646	6,310	5,842	468	6,787	2,666
Utah	4	2,355	1,935	1,118	932	834	98	1,033	3,327
Vermont	2	414	340	160	132	119	13	143	3,619
Virginia	11	6,300	5,036	2,689	2,121	2,002	119	2,238	3,740
Washington	11	4,629	3,681	2,267	1,847	1,734	113	1,961	3,042
West Virginia	2	408	346	193	146	134	12	158	1,280
Wisconsin	6	2,372	2,005	1,104	931	864	67	999	2,181
Wyoming	0	195	172	106	85	77	8	93	1,817
Non-US residents	.	8,164	6,932	4,283	3,644	3,302	342	3,987	§§
Total	448	209,687	171,206	95,030	77,998	72,118	5,880	83,946	3,226

ART = assisted reproductive technology.

*In cases of missing patient's residence data (0.4%), it was assigned as the location where the ART procedure was performed.
†The ART procedures and outcomes by patient's reporting area of residence do not necessarily reflect the procedures and outcomes of the ART clinics within the reporting area because some patients seek treatment at a clinic in a location other than their area of residence.
§Excludes 121,086 cycles in which egg or embryo banking was performed and 10 research cycles.
¶Embryo-transfer procedures include all procedures performed in which at least one embryo was transferred.
**On the basis of US Census Bureau estimates. Source: US Census Bureau. https://data.census.gov/cedsci/.
††State with comprehensive insurance mandate requiring insurers to cover the costs associated with diagnosis and treatment of infertility inclusive of ART services for at least four oocyte retrievals.
§§Non-US residents were excluded from rate because the appropriate denominators were not available.

TABLE 2. Number of assisted reproductive technology embryo-transfer procedures, average number of embryos transferred, and the percentage of single embryo transfer procedures performed in 2019, by female patient's age group and reporting area of residence at time of treatment — United States and Puerto Rico

Patient's reporting area of residence*	<35 years			35–37 years			>37 years		
	No. of embryo-transfer procedures†	Average no. of embryos transferred	SET (%)	No. of embryo-transfer procedures	Average no. of embryos transferred	SET (%)	No. of embryo-transfer procedures	Average no. of embryos transferred	SET (%)
Alabama	508	1.2	75.8	176	1.3	71.6	241	1.4	66.4
Alaska	52	1.1	86.5	27	1.1	85.2	46	1.3	65.2
Arizona	1,072	1.4	60.8	560	1.4	65.5	821	1.4	65.0
Arkansas	257	1.3	71.6	111	1.3	70.3	130	1.4	61.5
California	6,007	1.2	79.0	5,021	1.2	79.9	9,635	1.4	73.2
Colorado	866	1.2	83.3	637	1.1	85.7	844	1.2	83.8
Connecticut	1,103	1.1	87.7	671	1.2	78.5	1,076	1.4	70.9
Delaware	313	1.1	93.0	118	1.1	91.5	203	1.2	85.2
District of Columbia	231	1.1	94.4	276	1.1	89.1	559	1.2	84.6
Florida	2,705	1.2	78.4	1,613	1.2	77.8	2,638	1.3	72.5
Georgia	1,564	1.2	79.1	904	1.2	78.3	1,337	1.3	72.8
Hawaii	287	1.4	61.7	199	1.3	69.8	448	1.5	57.6
Idaho	275	1.3	65.5	97	1.3	74.2	159	1.3	73.6
Illinois§	3,965	1.2	80.5	2,298	1.2	76.3	3,509	1.4	64.5
Indiana	1,161	1.3	68.0	494	1.4	64.6	512	1.5	55.9
Iowa	752	1.2	80.6	268	1.2	79.1	300	1.2	75.7
Kansas	505	1.1	86.1	245	1.1	85.7	243	1.3	76.5
Kentucky	675	1.3	67.1	234	1.3	69.2	256	1.5	56.3
Louisiana	622	1.2	84.4	279	1.2	77.1	401	1.3	72.3
Maine	234	1.1	90.2	107	1.2	78.5	156	1.2	79.5
Maryland	1,841	1.1	90.3	1,101	1.1	85.8	1,962	1.2	78.8
Massachusetts§	3,395	1.1	89.7	2,170	1.2	84.5	3,236	1.5	65.7
Michigan	1,882	1.5	56.4	916	1.4	59.8	1,059	1.5	59.3
Minnesota	1,344	1.3	73.4	670	1.3	74.2	772	1.3	69.4
Mississippi	300	1.2	80.7	124	1.2	77.4	111	1.3	69.4
Missouri	1,089	1.3	73.5	442	1.3	70.1	532	1.5	58.1
Montana	167	1.2	83.2	79	1.1	89.9	74	1.2	83.8
Nebraska	491	1.3	72.7	189	1.3	70.9	183	1.3	69.9
Nevada	485	1.3	75.3	307	1.2	78.2	360	1.2	84.2
New Hampshire	361	1.1	87.3	241	1.2	83.4	244	1.5	65.2
New Jersey§	3,548	1.1	89.6	2,203	1.1	87.6	3,459	1.3	78.0
New Mexico	180	1.2	83.3	70	1.2	80.0	106	1.3	73.6
New York	6,470	1.2	83.7	4,265	1.2	79.8	8,583	1.4	69.5
North Carolina	1,711	1.1	86.2	907	1.2	84.1	1,242	1.3	76.2
North Dakota	140	1.4	63.6	37	1.4	62.2	47	1.4	57.4
Ohio	2,348	1.2	83.4	1,001	1.2	79.3	1,152	1.4	67.9
Oklahoma	525	1.4	64.6	194	1.5	56.2	214	1.6	57.9
Oregon	454	1.3	74.4	347	1.2	75.5	520	1.2	78.8
Pennsylvania	2,819	1.1	88.5	1,520	1.1	86.2	1,917	1.3	77.9
Puerto Rico	74	1.6	40.5	61	1.8	29.5	109	1.7	40.4
Rhode Island§	350	1.2	84.9	191	1.2	78.5	253	1.6	60.1
South Carolina	724	1.2	83.3	353	1.2	79.0	418	1.4	65.1
South Dakota	151	1.5	51.7	50	1.5	50.0	49	1.5	53.1
Tennessee	736	1.2	83.0	348	1.2	83.9	465	1.3	73.5
Texas	5,980	1.2	79.8	3,217	1.2	78.6	4,121	1.3	75.1
Utah	1,098	1.2	76.4	377	1.3	74.3	460	1.3	75.0
Vermont	131	1.3	72.5	79	1.4	67.1	130	1.6	58.5
Virginia	1,818	1.2	84.4	1,261	1.2	83.0	1,957	1.3	78.7
Washington	1,388	1.1	86.9	958	1.2	85.1	1,335	1.2	82.8
West Virginia	190	1.3	73.7	73	1.3	68.5	83	1.3	69.9
Wisconsin	1,024	1.2	80.2	471	1.2	77.3	510	1.4	67.5
Wyoming	89	1.3	70.8	46	1.2	78.3	37	1.4	64.9
Non-US residents	1,840	1.2	77.7	1,301	1.2	82.9	3,791	1.2	79.7
Total	68,297	1.2	80.6	39,904	1.2	79.5	63,005	1.3	72.4

SET = single-embryo transfer. In SET, only one embryo is placed in the uterus per transfer regardless of how many embryos were available.
*In cases of missing patient's residence data (0.4%), it was assigned as the location where the ART procedure was performed.
†Includes all procedures in which at least one embryo was transferred.
§State with comprehensive insurance mandate requiring insurers to cover the costs associated with diagnosis and treatment of infertility inclusive of ART services for at least four oocyte retrievals.

TABLE 3. Number, proportion, and percentage of infants and singleton infants born with use of assisted reproductive technology in 2019, by female patient's reporting area of residence at time of treatment — United States and Puerto Rico

Patient's reporting area of residence*	Total no. of infants born†§	No. of ART infants born¶	Proportion of ART infants among all infants (%)	Singleton infants among ART infants		Singleton infants among all infants		Proportion of ART singletons among all singletons (%)
				No.	(%)	No.	(%)	
Alabama	58,615	434	0.7	364	(83.9)	56,573	(96.5)	0.6
Alaska	9,822	87	0.9	69	(79.3)	9,538	(97.1)	0.7
Arizona	79,375	1,362	1.7	1,022	(75.0)	77,026	(97.0)	1.3
Arkansas	36,564	222	0.6	160	(72.1)	35,350	(96.7)	0.5
California	446,479	10,816	2.4	8,968	(82.9)	432,468	(96.9)	2.1
Colorado	62,869	1,402	2.2	1,150	(82.0)	60,788	(96.7)	1.9
Connecticut	34,258	1,486	4.3	1,227	(82.6)	33,034	(96.4)	3.7
Delaware	10,562	280	2.7	256	(91.4)	10,216	(96.7)	2.5
District of Columbia	9,079	458	5.0	411	(89.7)	8,802	(96.9)	4.7
Florida	220,002	3,375	1.5	2,793	(82.8)	213,133	(96.9)	1.3
Georgia	126,371	1,923	1.5	1,589	(82.6)	121,870	(96.4)	1.3
Hawaii	16,797	481	2.9	350	(72.8)	16,293	(97.0)	2.1
Idaho	22,063	305	1.4	237	(77.7)	21,345	(96.7)	1.1
Illinois**	140,128	4,595	3.3	3,872	(84.3)	135,240	(96.5)	2.9
Indiana	80,859	934	1.2	684	(73.2)	78,233	(96.8)	0.9
Iowa	37,649	709	1.9	589	(83.1)	36,421	(96.7)	1.6
Kansas	35,395	439	1.2	374	(85.2)	34,294	(96.9)	1.1
Kentucky	53,069	509	1.0	372	(73.1)	51,342	(96.7)	0.7
Louisiana	58,941	586	1.0	500	(85.3)	56,995	(96.7)	0.9
Maine	11,779	219	1.9	177	(80.8)	11,351	(96.4)	1.6
Maryland	70,178	2,150	3.1	1,926	(89.6)	67,833	(96.7)	2.8
Massachusetts**	69,117	3,809	5.5	3,340	(87.7)	66,699	(96.5)	5.0
Michigan	107,886	1,994	1.8	1,462	(73.3)	103,838	(96.2)	1.4
Minnesota	66,027	1,518	2.3	1,219	(80.3)	63,853	(96.7)	1.9
Mississippi	36,636	292	0.8	248	(84.9)	35,290	(96.3)	0.7
Missouri	72,127	1,070	1.5	817	(76.4)	69,611	(96.5)	1.2
Montana	11,079	137	1.2	123	(89.8)	10,751	(97.0)	1.1
Nebraska	24,755	400	1.6	284	(71.0)	23,829	(96.3)	1.2
Nevada	35,072	593	1.7	448	(75.5)	34,003	(97.0)	1.3
New Hampshire	11,839	341	2.9	280	(82.1)	11,472	(96.9)	2.4
New Jersey**	99,585	4,374	4.4	3,917	(89.6)	96,267	(96.7)	4.1
New Mexico	22,960	205	0.9	161	(78.5)	22,313	(97.2)	0.7
New York	221,539	7,782	3.5	6,722	(86.4)	214,164	(96.7)	3.1
North Carolina	118,725	1,828	1.5	1,540	(84.2)	114,884	(96.8)	1.3
North Dakota	10,454	150	1.4	94	(62.7)	10,068	(96.3)	0.9
Ohio	134,461	1,994	1.5	1,670	(83.8)	129,738	(96.5)	1.3
Oklahoma	49,143	443	0.9	315	(71.1)	47,600	(96.9)	0.7
Oregon	41,858	828	2.0	615	(74.3)	40,442	(96.6)	1.5
Pennsylvania	134,230	2,608	1.9	2,307	(88.5)	129,745	(96.7)	1.8
Puerto Rico	20,353	94	0.5	61	(64.9)	19,911	(97.8)	0.3
Rhode Island**	10,175	303	3.0	257	(84.8)	9,848	(96.8)	2.6
South Carolina	57,038	812	1.4	668	(82.3)	55,090	(96.6)	1.2
South Dakota	11,449	152	1.3	98	(64.5)	11,013	(96.2)	0.9
Tennessee	80,450	847	1.1	705	(83.2)	77,805	(96.7)	0.9
Texas	377,599	6,637	1.8	5,424	(81.7)	365,763	(96.9)	1.5
Utah	46,826	998	2.1	789	(79.1)	45,159	(96.4)	1.7
Vermont	5,361	159	3.0	133	(83.6)	5,160	(96.3)	2.6
Virginia	97,429	2,354	2.4	1,993	(84.7)	94,002	(96.5)	2.1
Washington	84,895	1,823	2.1	1,585	(86.9)	82,418	(97.1)	1.9
West Virginia	18,136	172	0.9	126	(73.3)	17,503	(96.5)	0.7
Wisconsin	63,270	955	1.5	779	(81.6)	61,151	(96.7)	1.3
Wyoming	6,565	81	1.2	62	(76.5)	6,339	(96.6)	1.0
Total	3,767,893	78,525	2.1	65,332	(83.2)	3,643,874	(96.7)	1.8

ART = assisted reproductive technology.

*In cases of missing patient's residence data (0.4%), it was assigned as the location where the ART procedure was performed.

†US births exclude births to non-US residents. Source: Martin JA, Hamilton BE, Osterman MJ, Driscoll AK. Births: final data for 2019. Natl Vital Stat Rep 2019;70:1–51.

§US births exclude births to non-US residents. Source: National Center for Health Statistics, Vital statistics data available. Natality public use file and CD-ROM. Hyattsville, MD, National Center for Health Statistics.

¶Includes infants conceived from ART procedures performed in 2018 and born in 2019 and infants conceived from ART procedures performed in 2019 and born in 2019. Total ART births exclude births to non-US residents.

**State with comprehensive insurance mandate requiring insurers to cover the costs associated with diagnosis and treatment of infertility inclusive of ART services for at least four oocyte retrievals.

TABLE 4. Number, percentage, and proportion of multiple births, twins, and triplets and higher-order infants born with use of assisted reproductive technology procedures in 2019, by female patient's reporting area of residence at time of treatment — United States and Puerto Rico

Patient's reporting area of residence*	Multiple-birth infants among ART infants†§		Multiple births among all infants¶		Proportion of ART multiples among all multiples (%)	Twin infants among ART infants†§		Twin infants among all infants¶		Proportion of ART twins among all twins (%)	Triplets and higher order among ART infants†§		Triplets and higher order among all infants¶		Proportion of ART triplets and higher order among all triplets+ (%)
	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
Alabama	70	(16.1)	2,042	(3.5)	3.4	70	(16.1)	1,997	(3.4)	3.5	0	(0.0)	45	(0.1)	0.0
Alaska	18	(20.7)	284	(2.9)	6.3	18	(20.7)	272	(2.8)	6.6	0	(0.0)	12	(0.1)	††
Arizona	340	(25.0)	2,349	(3.0)	14.5	328	(24.1)	2,298	(2.9)	14.3	12	(0.9)	51	(0.1)	23.5
Arkansas	62	(27.9)	1,214	(3.3)	5.1	62	(27.9)	1,196	(3.3)	5.2	0	(0.0)	18	(0.0)	††
California	1,848	(17.1)	14,011	(3.1)	13.2	1,800	(16.6)	13,697	(3.1)	13.1	48	(0.4)	314	(0.1)	15.3
Colorado	252	(18.0)	2,081	(3.3)	12.1	**	**	2,054	(3.3)	**	**	**	27	(0.0)	**
Connecticut	259	(17.4)	1,224	(3.6)	21.2	250	(16.8)	1,202	(3.5)	20.8	9	(0.6)	22	(0.1)	40.9
Delaware	24	(8.6)	346	(3.3)	6.9	24	(8.6)	**	**	**	0	(0.0)	**	**	**††
District of Columbia	47	(10.3)	277	(3.1)	17.0	**	**	259	(2.9)	**	**	**	18	(0.2)	**††
Florida	582	(17.2)	6,869	(3.1)	8.5	558	(16.5)	6,677	(3.0)	8.4	24	(0.7)	192	(0.1)	12.5
Georgia	334	(17.4)	4,501	(3.6)	7.4	312	(16.2)	4,361	(3.5)	7.2	22	(1.1)	140	(0.1)	15.7
Hawaii	131	(27.2)	504	(3.0)	26.0	**	**	487	(2.9)	**	**	**	17	(0.1)	**††
Idaho	68	(22.3)	718	(3.3)	9.5	**	**	697	(3.2)	**	**	**	21	(0.1)	**
Illinois	723	(15.7)	4,888	(3.5)	14.8	704	(15.3)	4,744	(3.4)	14.8	19	(0.4)	144	(0.1)	13.2
Indiana	250	(26.8)	2,626	(3.2)	9.5	244	(26.1)	2,549	(3.2)	9.6	6	(0.6)	77	(0.1)	7.8
Iowa	120	(16.9)	1,228	(3.3)	9.8	**	**	1,210	(3.2)	**	**	**	18	(0.0)	**††
Kansas	65	(14.8)	1,101	(3.1)	5.9	**	**	1,067	(3.0)	**	**	**	34	(0.1)	**
Kentucky	137	(26.9)	1,727	(3.3)	7.9	128	(25.1)	1,670	(3.1)	7.7	9	(1.8)	57	(0.1)	15.8
Louisiana	86	(14.7)	1,946	(3.3)	4.4	86	(14.7)	1,889	(3.2)	4.6	0	(0.0)	57	(0.1)	0.0
Maine	42	(19.2)	428	(3.6)	9.8	42	(19.2)	**	**	**	0	(0.0)	**	**	**††
Maryland	224	(10.4)	2,345	(3.3)	9.6	218	(10.1)	2,283	(3.3)	9.5	6	(0.3)	62	(0.1)	9.7
Massachusetts	469	(12.3)	2,418	(3.5)	19.4	463	(12.2)	2,350	(3.4)	19.7	6	(0.2)	68	(0.1)	8.8
Michigan	532	(26.7)	4,048	(3.8)	13.1	512	(25.7)	3,949	(3.7)	13.0	20	(1.0)	99	(0.1)	20.2
Minnesota	299	(19.7)	2,174	(3.3)	13.8	287	(18.9)	2,092	(3.2)	13.7	12	(0.8)	82	(0.1)	14.6
Mississippi	44	(15.1)	1,346	(3.7)	3.3	44	(15.1)	1,319	(3.6)	3.3	0	(0.0)	27	(0.1)	0.0
Missouri	253	(23.6)	2,516	(3.5)	10.1	**	**	2,474	(3.4)	**	**	**	42	(0.1)	**
Montana	14	(10.2)	328	(3.0)	4.3	14	(10.2)	**	**	**	0	(0.0)	**	**	**††
Nebraska	116	(29.0)	926	(3.7)	12.5	116	(29.0)	897	(3.6)	12.9	0	(0.0)	29	(0.1)	0.0
Nevada	145	(24.5)	1,069	(3.0)	13.6	**	**	1,045	(3.0)	**	**	**	24	(0.1)	**
New Hampshire	61	(17.9)	367	(3.1)	16.6	**	**	**	**	**	**	**	**	**	**††
New Jersey	457	(10.4)	3,318	(3.3)	13.8	439	(10.0)	3,201	(3.2)	13.7	18	(0.4)	117	(0.1)	15.4
New Mexico	44	(21.5)	647	(2.8)	6.8	44	(21.5)	631	(2.7)	7.0	0	(0.0)	16	(0.1)	††
New York	1,060	(13.6)	7,375	(3.3)	14.4	1,051	(13.5)	7,196	(3.2)	14.6	9	(0.1)	179	(0.1)	5.0
North Carolina	288	(15.8)	3,841	(3.2)	7.5	282	(15.4)	3,752	(3.2)	7.5	6	(0.3)	89	(0.1)	6.7
North Dakota	56	(37.3)	386	(3.7)	14.5	50	(33.3)	367	(3.5)	13.6	6	(4.0)	19	(0.2)	††
Ohio	324	(16.2)	4,723	(3.5)	6.9	312	(15.6)	4,538	(3.4)	6.9	12	(0.6)	185	(0.1)	6.5
Oklahoma	128	(28.9)	1,543	(3.1)	8.3	**	**	1,507	(3.1)	**	**	**	36	(0.1)	**
Oregon	213	(25.7)	1,416	(3.4)	15.0	198	(23.9)	1,372	(3.3)	14.4	15	(1.8)	44	(0.1)	34.1
Pennsylvania	301	(11.5)	4,485	(3.3)	6.7	292	(11.2)	4,363	(3.3)	6.7	9	(0.3)	122	(0.1)	7.4
Puerto Rico	33	(35.1)	442	(2.2)	7.5	**	**	430	(2.1)	**	**	**	12	(0.1)	**††
Rhode Island	46	(15.2)	327	(3.2)	14.1	46	(15.2)	**	**	**	0	(0.0)	**	**	** ††
South Carolina	144	(17.7)	1,948	(3.4)	7.4	134	(16.5)	1,892	(3.3)	7.1	10	(1.2)	56	(0.1)	17.9

South Dakota	54	(35.5)	436	(3.8)	12.4	54	(35.5)	**	**	**	0	(0.0)	**	**	**††
Tennessee	142	(16.8)	2,645	(3.3)	5.4	136	(16.1)	2,581	(3.2)	5.3	6	(0.7)	64	(0.1)	9.4
Texas	1,213	(18.3)	11,836	(3.1)	10.2	1,169	(17.6)	11,495	(3.0)	10.2	44	(0.7)	341	(0.1)	12.9
Utah	209	(20.9)	1,667	(3.6)	12.5	**	**	1,604	(3.4)	**	**	**	63	(0.1)	**
Vermont	26	(16.4)	201	(3.7)	12.9	26	(16.4)	**	**	**	0	(0.0)	**	**	**††
Virginia	361	(15.3)	3,427	(3.5)	10.5	355	(15.1)	3,357	(3.4)	10.6	6	(0.3)	70	(0.1)	8.6
Washington	238	(13.1)	2,477	(2.9)	9.6	232	(12.7)	2,424	(2.9)	9.6	6	(0.3)	53	(0.1)	11.3
West Virginia	46	(26.7)	633	(3.5)	7.3	40	(23.3)	612	(3.4)	6.5	6	(3.5)	21	(0.1)	28.6
Wisconsin	176	(18.4)	2,119	(3.3)	8.3	164	(17.2)	2,059	(3.3)	8.0	12	(1.3)	60	(0.1)	20.0
Wyoming	19	(23.5)	226	(3.4)	8.4	**	**	208	(3.2)	**	**	**	18	(0.3)	**††
Total	13,193	(16.8)	124,019	(3.3)	10.6	12,798	(16.3)	120,721	(3.2)	10.6	395	(0.5)	3,298	(0.1)	12.0

ART = assisted reproductive technology; triplets+ = triplets and higher order infants

*In cases of missing patient's residence data (0.4%), it was assigned as the location where the ART procedure was performed.

†ART totals include infants conceived from ART procedures performed in 2018 and born in 2019 and infants conceived from ART procedures performed in 2019 and born in 2019. Total ART births exclude births to non-US residents.

§Includes only the number of infants live born in a multiple-birth delivery. For example, if three infants were born in a live-birth delivery and one of the three infants was stillborn, the total number of live-born infants would be two. However, the two infants still would be counted as triplets.

¶US births exclude births to non-US residents. Source: National Center for Health Statistics, Vital statistics data available. Natality public use file and CD-ROM. Hyattsville, MD, National Center for Health Statistics.

**To protect confidentiality, cells with values of 1–4 for ART infants and cells with values of 0–9 for all infants are suppressed. Also suppressed are data that can be used to derive suppressed cell values. These values are included in the totals.

††Estimates on the basis of N <20 in the denominator have been suppressed because such rates are considered unstable.

TABLE 5. Number, percentage, and proportion of infants born with use of assisted reproductive technology in 2019 by low birthweight category and female patient's reporting area of residence at time of treatment — United States and Puerto Rico

Patient's reporting area of residence*	Very low birthweight (<1,500 g)					Moderately low birthweight (1,500–2,499 g)					Low birthweight (<2,500 g)				
	ART infants†		All infants§		Proportion of ART VLBW infants among all VLBW infants (%)	ART infants†		All infants§		Proportion of ART MLBW infants among all MLBW infants (%)	ART infants†		All infants§		Proportion of ART LBW infants among all LBW infants (%)
	No.	(%)	No.	(%)		No.	(%)	No.	(%)		No.	(%)	No.	(%)	
Alabama	9	(2.2)	1,107	(1.9)	0.8	65	(15.7)	5,029	(8.6)	1.3	74	(17.8)	6,136	(10.5)	1.2
Alaska	¶	¶	106	(1.1)	¶	¶	¶	513	(5.2)	¶	11	(12.8)	619	(6.3)	1.8
Arizona	37	(2.8)	884	(1.1)	4.2	232	(17.7)	4,951	(6.2)	4.7	269	(20.5)	5,835	(7.4)	4.6
Arkansas	¶	¶	572	(1.6)	¶	¶	¶	2,808	(7.7)	¶	46	(21.2)	3,380	(9.2)	1.4
California	267	(2.6)	5,019	(1.1)	5.3	1,405	(13.5)	26,680	(6.0)	5.3	1,672	(16.0)	31,699	(7.1)	5.3
Colorado	41	(3.1)	724	(1.2)	5.7	209	(15.8)	5,187	(8.3)	4.0	250	(19.0)	5,911	(9.4)	4.2
Connecticut	49	(3.3)	462	(1.3)	10.6	195	(13.3)	2,195	(6.4)	8.9	244	(16.6)	2,657	(7.8)	9.2
Delaware	7	(2.7)	203	(1.9)	3.4	32	(12.4)	792	(7.5)	4.0	39	(15.1)	995	(9.4)	3.9
District of Columbia	11	(2.4)	176	(1.9)	6.3	41	(9.1)	720	(7.9)	5.7	52	(11.5)	896	(9.9)	5.8
Florida	113	(3.4)	3,411	(1.6)	3.3	445	(13.5)	15,820	(7.2)	2.8	558	(16.9)	19,231	(8.7)	2.9
Georgia	59	(3.5)	2,295	(1.8)	2.6	230	(13.7)	10,360	(8.2)	2.2	289	(17.2)	12,655	(10.0)	2.3
Hawaii	24	(5.4)	233	(1.4)	10.3	98	(22.1)	1,177	(7.0)	8.3	122	(27.5)	1,410	(8.4)	8.7
Idaho	11	(3.7)	216	(1.0)	5.1	41	(13.6)	1,303	(5.9)	3.1	52	(17.3)	1,519	(6.9)	3.4
Illinois	107	(2.4)	1,938	(1.4)	5.5	570	(12.6)	9,841	(7.0)	5.8	677	(15.0)	11,779	(8.4)	5.7
Indiana	33	(3.6)	1,078	(1.3)	3.1	160	(17.7)	5,529	(6.8)	2.9	193	(21.3)	6,607	(8.2)	2.9
Iowa	11	(1.6)	429	(1.1)	2.6	93	(13.2)	2,114	(5.6)	4.4	104	(14.8)	2,543	(6.8)	4.1
Kansas	23	(5.7)	486	(1.4)	4.7	46	(11.3)	2,199	(6.2)	2.1	69	(17.0)	2,685	(7.6)	2.6
Kentucky	18	(3.6)	756	(1.4)	2.4	107	(21.7)	3,886	(7.3)	2.8	125	(25.3)	4,642	(8.7)	2.7
Louisiana	17	(2.9)	1,099	(1.9)	1.5	64	(11.1)	5,249	(8.9)	1.2	81	(14.0)	6,348	(10.8)	1.3
Maine	¶	¶	132	(1.1)	¶	¶	¶	735	(6.2)	¶	28	(13.0)	867	(7.4)	3.2
Maryland	42	(2.0)	1,094	(1.6)	3.8	229	(10.8)	5,017	(7.1)	4.6	271	(12.8)	6,111	(8.7)	4.4
Massachusetts	61	(1.7)	769	(1.1)	7.9	428	(11.7)	4,488	(6.5)	9.5	489	(13.4)	5,257	(7.6)	9.3
Michigan	75	(3.9)	1,580	(1.5)	4.7	325	(16.8)	7,834	(7.3)	4.1	400	(20.7)	9,414	(8.7)	4.2
Minnesota	34	(2.3)	746	(1.1)	4.6	187	(12.6)	3,791	(5.7)	4.9	221	(14.8)	4,537	(6.9)	4.9
Mississippi	5	(1.8)	830	(2.3)	0.6	32	(11.7)	3,680	(10.0)	0.9	37	(13.5)	4,510	(12.3)	0.8
Missouri	25	(2.5)	1,016	(1.4)	2.5	155	(15.2)	5,340	(7.4)	2.9	180	(17.7)	6,356	(8.8)	2.8
Montana	¶	¶	98	(0.9)	¶	¶	¶	706	(6.4)	¶	14	(10.3)	804	(7.3)	1.7
Nebraska	15	(3.9)	284	(1.1)	5.3	65	(16.8)	1,588	(6.4)	4.1	80	(20.6)	1,872	(7.6)	4.3
Nevada	19	(3.3)	472	(1.3)	4.0	120	(20.9)	2,605	(7.4)	4.6	139	(24.2)	3,077	(8.8)	4.5
New Hampshire	10	(3.0)	93	(0.8)	10.8	30	(9.0)	663	(5.6)	4.5	40	(11.9)	756	(6.4)	5.3
New Jersey	97	(2.3)	1,306	(1.3)	7.4	476	(11.1)	6,506	(6.5)	7.3	573	(13.3)	7,812	(7.8)	7.3
New Mexico	5	(2.6)	311	(1.4)	1.6	37	(19.1)	1,815	(7.9)	2.0	42	(21.6)	2,126	(9.3)	2.0
New York	151	(2.0)	2,950	(1.3)	5.1	893	(12.0)	14,871	(6.7)	6.0	1,044	(14.1)	17,821	(8.0)	5.9
North Carolina	49	(2.9)	1,978	(1.7)	2.5	207	(12.3)	9,069	(7.6)	2.3	256	(15.2)	11,047	(9.3)	2.3
North Dakota	6	(4.1)	130	(1.2)	4.6	31	(21.4)	578	(5.5)	5.4	37	(25.5)	708	(6.8)	5.2
Ohio	50	(2.7)	2,048	(1.5)	2.4	220	(12.0)	9,485	(7.1)	2.3	270	(14.7)	11,533	(8.6)	2.3
Oklahoma	13	(3.0)	653	(1.3)	2.0	92	(21.5)	3,392	(6.9)	2.7	105	(24.5)	4,045	(8.2)	2.6
Oregon	11	(1.3)	408	(1.0)	2.7	139	(17.1)	2,393	(5.7)	5.8	150	(18.4)	2,801	(6.7)	5.4
Pennsylvania	56	(2.2)	1,876	(1.4)	3.0	277	(11.0)	9,379	(7.0)	3.0	333	(13.2)	11,255	(8.4)	3.0
Puerto Rico	9	(9.8)	243	(1.2)	3.7	23	(25.0)	1,811	(8.9)	1.3	32	(34.8)	2,054	(10.1)	1.6
Rhode Island	5	(1.7)	129	(1.3)	3.9	28	(9.5)	667	(6.6)	4.2	33	(11.1)	796	(7.8)	4.1
South Carolina	22	(2.9)	1,028	(1.8)	2.1	95	(12.4)	4,582	(8.0)	2.1	117	(15.3)	5,610	(9.8)	2.1
South Dakota	11	(7.4)	127	(1.1)	8.7	29	(19.5)	675	(5.9)	4.3	40	(26.8)	802	(7.0)	5.0

Tennessee	21	(2.6)	1,243	(1.5)	1.7	96	(11.7)	6,113	(7.6)	1.6	117	(14.2)	7,356	(9.1)	1.6
Texas	197	(3.1)	5,288	(1.4)	3.7	929	(14.4)	26,514	(7.0)	3.5	1,126	(17.4)	31,802	(8.4)	3.5
Utah	25	(2.5)	491	(1.0)	5.1	164	(16.7)	2,990	(6.4)	5.5	189	(19.2)	3,481	(7.4)	5.4
Vermont	5	(3.3)	50	(0.9)	10.0	20	(13.2)	301	(5.6)	6.6	25	(16.4)	351	(6.5)	7.1
Virginia	83	(3.6)	1,406	(1.4)	5.9	305	(13.3)	6,726	(6.9)	4.5	388	(16.9)	8,132	(8.3)	4.8
Washington	33	(1.8)	818	(1.0)	4.0	201	(11.1)	4,638	(5.5)	4.3	234	(13.0)	5,456	(6.4)	4.3
West Virginia	¶	¶	281	(1.5)	¶	¶	¶	1,491	(8.2)	¶	35	(21.1)	1,772	(9.8)	2.0
Wisconsin	34	(3.7)	818	(1.3)	4.2	133	(14.5)	3,970	(6.3)	3.4	167	(18.2)	4,788	(7.6)	3.5
Wyoming	0	(0.0)	86	(1.3)	0.0	24	(31.2)	557	(8.5)	4.3	24	(31.2)	643	(9.8)	3.7
Total	2,020	(2.7)	51,976	(1.4)	3.9	10,143	(13.4)	261,323	(6.9)	3.9	12,163	(16.1)	313,299	(8.3)	3.9

ART = assisted reproductive technology; LBW = low birthweight; MLBW = moderately low birthweight; VLBW = very low birthweight.

*In cases of missing patient's residence data (0.4%), the patient's residence was assigned as the location where the ART procedure was performed.

†ART totals include infants conceived from ART procedures performed in 2018 and born in 2019 and infants conceived from ART procedures performed in 2019 and born in 2019. Total ART infants exclude births to non-US residents and include only infants with birthweight data available.

§US births exclude births to non-US residents. Source: National Center for Health Statistics, Vital statistics data available. Natality public use file and CD-ROM. Hyattsville, MD, National Center for Health Statistics.

¶To protect confidentiality, cells with values of 1–4 for ART infants and cells with values of 0–9 for all infants are suppressed. Also suppressed are data that can be used to derive suppressed cell values. These values are included in the totals.

TABLE 6. Number, percentage, and proportion of infants born with use of assisted reproductive technology in 2019, by preterm gestational age category and female patient's reporting area of residence at time of treatment — United States and Puerto Rico

Patient's reporting area of residence*	Very preterm birth (<32 weeks)					Early preterm birth (<34 weeks)					Late preterm birth (34–36 weeks)					Preterm birth (<37 weeks)				
	ART infants†		All infants§		Prop. of ART VPTB infants among all VPTB infants	ART infants†		All infants§		Prop. of ART EPTB infants among all EPTB infants	ART infants†		All infants§		Prop. of ART LPTB infants among all LPTB infants	ART infants†		All infants§		Prop. of ART PTB infants among all PTB infants
	No.	(%)	No.	(%)	(%)	No.	(%)	No.	(%)	(%)	No.	(%)	No.	(%)	(%)	No.	(%)	No.	(%)	(%)
Alabama	16	(3.7)	1,192	(2.0)	1.3	28	(6.5)	2,044	(3.5)	1.4	78	(18.1)	5,267	(9.0)	1.5	106	(24.6)	7,311	(12.5)	1.4
Alaska	¶	¶	100	(1.0)	¶	6	(7.0)	229	(2.3)	2.6	15	(17.4)	725	(7.4)	2.1	21	(24.4)	954	(9.7)	2.2
Arizona	62	(4.6)	1,065	(1.3)	5.8	128	(9.4)	1,888	(2.4)	6.8	280	(20.6)	5,547	(7.0)	5.0	408	(30.0)	7,435	(9.4)	5.5
Arkansas	10	(4.5)	693	(1.9)	1.4	12	(5.4)	1,169	(3.2)	1.0	53	(24.0)	3,193	(8.7)	1.7	65	(29.4)	4,362	(11.9)	1.5
California	312	(2.9)	6,144	(1.4)	5.1	684	(6.4)	10,401	(2.3)	6.6	1,772	(16.5)	29,557	(6.6)	6.0	2,456	(22.8)	39,958	(8.9)	6.1
Colorado	54	(3.9)	842	(1.3)	6.4	109	(7.8)	1,520	(2.4)	7.2	261	(18.7)	4,484	(7.1)	5.8	370	(26.4)	6,004	(9.6)	6.2
Connecticut	72	(4.9)	517	(1.5)	13.9	116	(7.8)	899	(2.6)	12.9	218	(14.7)	2,309	(6.7)	9.4	334	(22.6)	3,208	(9.4)	10.4
Delaware	9	(3.2)	215	(2.0)	4.2	21	(7.5)	347	(3.3)	6.1	45	(16.1)	783	(7.4)	5.7	66	(23.6)	1,130	(10.7)	5.8
District of Columbia	11	(2.4)	164	(1.8)	6.7	25	(5.5)	281	(3.1)	8.9	49	(10.7)	664	(7.3)	7.4	74	(16.2)	945	(10.4)	7.8
Florida	154	(4.6)	3,852	(1.8)	4.0	272	(8.1)	6,622	(3.0)	4.1	618	(18.4)	16,739	(7.6)	3.7	890	(26.5)	23,361	(10.6)	3.8
Georgia	99	(5.2)	2,495	(2.0)	4.0	173	(9.0)	4,221	(3.3)	4.1	359	(18.7)	10,542	(8.3)	3.4	532	(27.7)	14,763	(11.7)	3.6
Hawaii	24	(5.0)	280	(1.7)	8.6	52	(10.8)	475	(2.8)	10.9	82	(17.1)	1,300	(7.7)	6.3	134	(27.9)	1,775	(10.6)	7.5
Idaho	11	(3.6)	257	(1.2)	4.3	19	(6.3)	458	(2.1)	4.1	73	(24.1)	1,476	(6.7)	4.9	92	(30.4)	1,934	(8.8)	4.8
Illinois	146	(3.2)	2,269	(1.6)	6.4	268	(5.8)	3,956	(2.8)	6.8	773	(16.9)	11,030	(7.9)	7.0	1,041	(22.7)	14,986	(10.7)	6.9
Indiana	40	(4.3)	1,221	(1.5)	3.3	82	(8.8)	2,192	(2.7)	3.7	227	(24.4)	6,015	(7.4)	3.8	309	(33.2)	8,207	(10.1)	3.8
Iowa	23	(3.2)	551	(1.5)	4.2	49	(6.9)	976	(2.6)	5.0	143	(20.2)	2,593	(6.9)	5.5	192	(27.1)	3,569	(9.5)	5.4
Kansas	30	(6.9)	557	(1.6)	5.4	37	(8.5)	951	(2.7)	3.9	82	(18.8)	2,623	(7.4)	3.1	119	(27.2)	3,574	(10.1)	3.3
Kentucky	24	(4.7)	856	(1.6)	2.8	57	(11.2)	1,553	(2.9)	3.7	105	(20.6)	4,440	(8.4)	2.4	162	(31.8)	5,993	(11.3)	2.7
Louisiana	22	(3.8)	1,226	(2.1)	1.8	43	(7.4)	2,071	(3.5)	2.1	115	(19.8)	5,655	(9.6)	2.0	158	(27.2)	7,726	(13.1)	2.0
Maine	10	(4.7)	164	(1.4)	6.1	15	(7.0)	275	(2.3)	5.5	42	(19.5)	787	(6.7)	5.3	57	(26.5)	1,062	(9.0)	5.4
Maryland	48	(2.2)	1,225	(1.7)	3.9	111	(5.2)	2,080	(3.0)	5.3	317	(14.8)	5,131	(7.3)	6.2	428	(20.0)	7,211	(10.3)	5.9
Massachusetts	84	(2.2)	921	(1.3)	9.1	167	(4.4)	1,627	(2.4)	10.3	536	(14.1)	4,569	(6.6)	11.7	703	(18.5)	6,196	(9.0)	11.3
Michigan	101	(5.1)	1,797	(1.7)	5.6	190	(9.6)	3,157	(2.9)	6.0	363	(18.3)	7,913	(7.3)	4.6	553	(27.8)	11,070	(10.3)	5.0
Minnesota	50	(3.3)	883	(1.3)	5.7	89	(5.9)	1,589	(2.4)	5.6	245	(16.2)	4,518	(6.8)	5.4	334	(22.1)	6,107	(9.2)	5.5
Mississippi	9	(3.1)	918	(2.5)	1.0	16	(5.5)	1,550	(4.2)	1.0	65	(22.3)	3,790	(10.3)	1.7	81	(27.7)	5,340	(14.6)	1.5
Missouri	42	(3.9)	1,189	(1.6)	3.5	81	(7.6)	2,113	(2.9)	3.8	224	(21.1)	5,719	(7.9)	3.9	305	(28.7)	7,832	(10.9)	3.9
Montana	¶	¶	117	(1.1)	¶	¶	¶	224	(2.0)	¶	¶	¶	840	(7.6)	¶	30	(21.9)	1,064	(9.6)	2.8
Nebraska	22	(5.5)	362	(1.5)	6.1	45	(11.3)	657	(2.7)	6.8	109	(27.3)	1,939	(7.8)	5.6	154	(38.5)	2,596	(10.5)	5.9
Nevada	24	(4.1)	533	(1.5)	4.5	50	(8.5)	983	(2.8)	5.1	137	(23.2)	2,759	(7.9)	5.0	187	(31.6)	3,742	(10.7)	5.0
New Hampshire	12	(3.5)	111	(0.9)	10.8	13	(3.8)	199	(1.7)	6.5	54	(15.9)	770	(6.5)	7.0	67	(19.8)	969	(8.2)	6.9
New Jersey	136	(3.1)	1,481	(1.5)	9.2	252	(5.8)	2,589	(2.6)	9.7	643	(14.7)	6,921	(6.9)	9.3	895	(20.5)	9,510	(9.5)	9.4
New Mexico	7	(3.4)	344	(1.5)	2.0	21	(10.3)	665	(2.9)	3.2	35	(17.2)	1,664	(7.2)	2.1	56	(27.5)	2,329	(10.1)	2.4
New York	206	(2.7)	3,212	(1.4)	6.4	412	(5.3)	5,666	(2.6)	7.3	1,117	(14.4)	14,646	(6.6)	7.6	1,529	(19.7)	20,312	(9.2)	7.5
North Carolina	75	(4.1)	2,215	(1.9)	3.4	159	(8.7)	3,629	(3.1)	4.4	308	(16.9)	9,017	(7.6)	3.4	467	(25.7)	12,646	(10.7)	3.7
North Dakota	13	(8.7)	146	(1.4)	8.9	23	(15.3)	271	(2.6)	8.5	33	(22.0)	722	(6.9)	4.6	56	(37.3)	993	(9.5)	5.6
Ohio	74	(3.7)	2,413	(1.8)	3.1	116	(5.8)	4,060	(3.0)	2.9	352	(17.7)	10,060	(7.5)	3.5	468	(23.5)	14,120	(10.5)	3.3
Oklahoma	34	(7.7)	785	(1.6)	4.3	53	(12.0)	1,404	(2.9)	3.8	129	(29.2)	4,242	(8.6)	3.0	182	(41.2)	5,646	(11.5)	3.2
Oregon	38	(4.6)	487	(1.2)	7.8	67	(8.1)	873	(2.1)	7.7	169	(20.5)	2,597	(6.2)	6.5	236	(28.6)	3,470	(8.3)	6.8
Pennsylvania	78	(3.0)	2,165	(1.6)	3.6	139	(5.3)	3,767	(2.8)	3.7	413	(15.9)	9,552	(7.1)	4.3	552	(21.2)	13,319	(9.9)	4.1
Puerto Rico	8	(8.5)	321	(1.6)	2.5	14	(14.9)	595	(2.9)	2.4	31	(33.0)	1,802	(8.9)	1.7	45	(47.9)	2,397	(11.8)	1.9

Rhode Island	7	(2.3)	146	(1.4)	4.8	18	(6.0)	238	(2.3)	7.6	58	(19.2)	732	(7.2)	7.9	76	(25.2)	970	(9.5)	7.8
South Carolina	31	(3.8)	1,144	(2.0)	2.7	56	(6.9)	1,927	(3.4)	2.9	169	(20.9)	4,612	(8.1)	3.7	225	(27.8)	6,539	(11.5)	3.4
South Dakota	13	(8.6)	154	(1.3)	8.4	17	(11.2)	264	(2.3)	6.4	33	(21.7)	829	(7.2)	4.0	50	(32.9)	1,093	(9.5)	4.6
Tennessee	34	(4.0)	1,401	(1.7)	2.4	63	(7.5)	2,411	(3.0)	2.6	177	(21.0)	6,582	(8.2)	2.7	240	(28.5)	8,993	(11.2)	2.7
Texas	290	(4.4)	6,207	(1.6)	4.7	554	(8.4)	11,190	(3.0)	5.0	1,384	(20.9)	30,444	(8.1)	4.5	1,938	(29.3)	41,634	(11.0)	4.7
Utah	35	(3.5)	562	(1.2)	6.2	77	(7.8)	1,063	(2.3)	7.2	206	(20.7)	3,496	(7.5)	5.9	283	(28.5)	4,559	(9.7)	6.2
Vermont	6	(3.8)	58	(1.1)	10.3	13	(8.2)	123	(2.3)	10.6	20	(12.6)	329	(6.1)	6.1	33	(20.8)	452	(8.4)	7.3
Virginia	94	(4.0)	1,523	(1.6)	6.2	189	(8.1)	2,688	(2.8)	7.0	390	(16.6)	6,937	(7.1)	5.6	579	(24.7)	9,625	(9.9)	6.0
Washington	43	(2.4)	939	(1.1)	4.6	90	(4.9)	1,780	(2.1)	5.1	278	(15.3)	5,392	(6.4)	5.2	368	(20.2)	7,172	(8.4)	5.1
West Virginia	6	(3.5)	334	(1.8)	1.8	13	(7.6)	578	(3.2)	2.2	45	(26.3)	1,703	(9.4)	2.6	58	(33.9)	2,281	(12.6)	2.5
Wisconsin	44	(4.6)	983	(1.6)	4.5	89	(9.3)	1,708	(2.7)	5.2	178	(18.7)	4,658	(7.4)	3.8	267	(28.0)	6,366	(10.1)	4.2
Wyoming	0	(0.0)	91	(1.4)	0.0	¶	¶	158	(2.4)	¶	¶	¶	490	(7.5)	¶	23	(28.8)	648	(9.9)	3.5
Total	2,796	(3.6)	59,827	(1.6)	4.7	5,401	(6.9)	104,354	(2.8)	5.2	13,653	(17.5)	281,104	(7.5)	4.9	19,054	(24.4)	385,458	(10.2)	4.9

ART = assisted reproductive technology; PTB = preterm birth; VPTB = very preterm birth; EPTB = early preterm birth; LPTB = late preterm birth; Prop = proportion

*In cases of missing patient's residence data (0.4%), it was assigned as the location where the ART procedure was performed.

†ART totals include infants conceived from ART procedures performed in 2018 and born in 2019 and infants conceived from ART procedures performed in 2019 and born in 2019. Total ART births exclude births to non-US residents and include only infants with gestational age data available.

§US births exclude births to non-US residents. Source: National Center for Health Statistics, Vital statistics data available. Natality public use file and CD-ROM. Hyattsville, MD, National Center for Health Statistics.

¶To protect confidentiality, cells with values of 1–4 for ART infants and cells with values of 0–9 for all infants are suppressed. Also suppressed are data that can be used to derive suppressed cell values. These values are included in the totals.

TABLE 7. Percentage of low birthweight (<2,500 g), preterm (<37 weeks), and small for gestational age infants among singleton infants born with assisted reproductive technology in 2019 and all US infants, by female patient's reporting area of residence at time of treatment — United States and Puerto Rico

Patient's reporting area of residence*	ART infants† <2500g (%)	All infants§ <2500g (%)	ART infants† <37 weeks (%)	All infants§ <37 weeks (%)	ART infants† SGA (%)	All infants§ SGA (%)
Alabama	9.4	8.7	16.6	10.5	6.1	10.9
Alaska	¶	4.9	16.2	8.1	¶	6.2
Arizona	9.6	5.9	16.7	7.9	8.0	8.6
Arkansas	8.3	7.5	11.9	10.0	7.0	9.7
California	7.8	5.6	13.7	7.4	8.1	8.7
Colorado	9.5	7.7	15.6	7.8	9.5	13.1
Connecticut	8.4	6.1	13.8	7.6	6.4	8.6
Delaware	12.6	7.6	18.8	8.9	10.9	10.3
District of Columbia	7.9	8.3	12.0	8.8	6.7	12.0
Florida	8.8	7.1	17.1	8.9	6.7	9.7
Georgia	8.2	8.1	17.4	9.6	6.4	11.1
Hawaii	17.3	7.0	19.2	9.0	12.0	10.5
Idaho	6.0	5.3	17.7	7.1	8.5	8.2
Illinois	7.9	6.7	14.9	8.8	6.4	8.9
Indiana	8.9	6.6	17.8	8.4	5.6	9.0
Iowa	6.7	5.2	17.3	7.7	3.9	6.6
Kansas	9.3	6.0	17.7	8.3	4.7	7.7
Kentucky	10.1	7.1	19.1	9.4	5.0	8.6
Louisiana	7.1	8.9	20.2	11.2	4.5	11.1
Maine	3.5	5.9	14.5	7.3	7.1	8.0
Maryland	7.7	7.0	14.7	8.5	6.8	9.3
Massachusetts	7.7	5.9	12.1	7.3	7.9	9.0
Michigan	10.4	7.0	15.8	8.3	7.9	9.8
Minnesota	6.3	5.3	12.8	7.6	5.4	7.2
Mississippi	6.9	10.2	21.4	12.4	5.2	12.2
Missouri	6.6	7.1	15.0	8.9	6.2	9.0
Montana	8.2	5.9	16.3	8.0	5.8	8.5
Nebraska	8.7	5.9	20.4	8.4	5.1	7.7
Nevada	11.5	7.1	17.5	9.0	10.9	10.7
New Hampshire	6.5	5.2	12.9	6.9	7.3	7.8
New Jersey	7.9	6.2	14.5	7.8	6.5	9.4
New Mexico	12.5	7.8	16.3	8.6	7.3	12.4
New York	7.9	6.4	13.3	7.5	8.2	10.1
North Carolina	9.6	7.7	17.4	8.9	5.9	10.3
North Dakota	9.8	4.9	17.0	7.4	¶	6.6
Ohio	7.6	6.9	15.5	8.6	6.5	9.1
Oklahoma	10.7	6.7	23.6	9.7	4.9	8.5
Oregon	7.7	5.2	17.2	6.7	4.8	7.9
Pennsylvania	7.9	6.7	14.7	8.2	6.8	9.6
Puerto Rico	19.7	8.8	26.2	10.5	20.0	13.4
Rhode Island	6.0	6.3	14.8	7.7	6.0	9.2
South Carolina	8.2	8.1	16.1	9.6	5.7	10.3
South Dakota	¶	5.2	8.2	7.5	¶	7.3
Tennessee	7.7	7.5	20.0	9.4	5.7	9.7
Texas	9.0	6.8	19.0	9.3	6.1	9.0
Utah	9.0	5.6	16.8	7.8	6.5	8.5
Vermont	10.2	5.0	12.8	6.6	5.5	8.0
Virginia	8.7	6.7	15.7	8.0	6.5	9.3
Washington	7.0	5.1	13.0	7.0	6.6	7.5
West Virginia	9.0	8.0	19.2	10.6	7.4	9.8
Wisconsin	10.6	6.0	18.4	8.3	5.9	7.5
Wyoming	17.2	8.0	16.4	7.8	15.8	13.5
Total	8.3	6.7	15.4	8.5	7.0	9.3

ART = assisted reproductive technology; SGA = small for gestational age (22-44 weeks), defined as <10th percentile of birthweight for gestational age week

*In cases of missing patient's residence data (0.4%), it was assigned as the location where the ART procedure was performed.

†ART totals include infants conceived from ART procedures performed in 2018 and born in 2019 and infants conceived from ART procedures performed in 2019 and born in 2019. Total ART births exclude births to non-US residents and include only infants with gestational age data available.

§US births exclude births to non-US residents. Source: National Center for Health Statistics, Vital statistics data available. Natality public use file and CD-ROM. Hyattsville, MD, National Center for Health Statistics.

¶To protect confidentiality, cells with values of 1–4 for ART infants and cells with values of 0–9 for all infants are suppressed. Also suppressed are data that can be used to derive suppressed cell values. These values are included in the totals.

Technical notes

Description of the data collection system

In 1995, CDC began collecting data on assisted reproductive technology (ART) procedures performed in fertility clinics in the United States as mandated by the Fertility Clinic Success Rate and Certification Act of 1992 (Public Law 102–493 [October 24, 1992]). For more details about the law, see https://www.cdc.gov/art/nass/policy.html.

ART includes all fertility treatments in which either eggs or embryos are handled outside a woman's body. In general, ART procedures involve surgically removing eggs from a woman's ovaries, combining them with sperm in the laboratory, and returning them to a female patient, gestational carrier, or donating them to another patient. They do not include treatments in which only sperm are handled (such as intrauterine insemination) or procedures in which a woman takes drugs only to stimulate egg production without the intention of having eggs surgically retrieved. ART includes but is not limited to in vitro fertilization (IVF), gamete intrafallopian transfer (GIFT), zygote intrafallopian transfer (ZIFT), tubal embryo transfer, egg and embryo cryopreservation, egg and embryo donation, and gestational surrogacy.

CDC collects ART data through the National ART Surveillance System (NASS), a web-based data collection system developed by CDC (https://www.cdc.gov/art/nass/index.html). Data collected include patient demographics, medical history, and infertility diagnoses; clinical information pertaining to the ART procedure type; and information regarding resultant pregnancies and births. The data file contains one record per ART procedure (i.e., cycle of treatment performed).

Data from 448 fertility clinics that provided and verified information about the outcomes of the ART cycles are reported here. During 2019, data from 41 clinics are not included here because they did not report their data as required. Given the estimated number of ART cycles performed in these nonreporting clinics, we estimate that NASS reported 98% of ART cycles performed in the United States

in 2019. For more information about nonreporting clinics, see

https://www.cdc.gov/art/nass/index.html.

Acknowledgments

This publication was developed and produced by the National Center for Chronic Disease Prevention and Health Promotion of the Centers for Disease Control and Prevention

National Center for Chronic Disease Prevention and Health Promotion
Karen Hacker, MD, MPH, Director

Division of Reproductive Health
Wanda D. Barfield, MD, MPH, FAAP, RADM USPHS (ret.), Director

Maternal and Infant Health Branch
Charlan Kroelinger, PhD, Chief

Suggested Citation: Sunderam, S., Zhang, Y., Jewett, A., Kissin, D. (2021). State-Specific Assisted Reproductive Technology Surveillance, United States: 2019 Data Brief. Atlanta, GA: National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention