Characteristics of births conceived through medically assisted reproduction (MAR) by parental structure in Louisiana (2016-2022)

VILDA, D., PhD,[1] MONSEUR, B., MD,[2] CLISHAM, R., MD,[3,4] GAMBALA, C., MD,[3] HARVILLE, E., PhD[1]

[1]Tulane University School of Public Health and Tropical Medicine, New Orleans, LA; [2]Stanford School of Medicine, Palo Alto, CA, USA;
[3] Tulane University School of Medicine, New Orleans, LA, USA; [4] The Fertility Institute of New Orleans, New Orleans, LA, USA

Tulane SCHOOL OF PUBLIC HEALTH AND TROPICAL MEDICINE

Building Interdisciplinary Research Careers in Women's Health

BACKGROUND

- Since the introduction of medically assisted reproduction (MAR) over four decades ago, its access and use have increased substantially. The demand and utilization of MAR is predicted to grow [1, 2], particularly among women of advanced age, single parents by choice, and sexual minority families [3].
- Research on the MAR outcomes continues to focus on cisgender heterosexual couples, while the evidence on pregnancy and birth outcomes conceived using MAR among unpartnered or single parents by choice (i.e., someone who does not have a partner(s) and decides to become a parent on their own) remains extremely scarce.
- **STUDY AIMS**: Given that MAR-treated sexual minority people and single parents by choice remain an understudied yet growing population, the aims of this study were two-fold: 1) to describe pregnancy and birth characteristics of MAR-conceived births in same-sex, different-sex, and unpartnered-parent households in Louisiana; and 2) to examine whether the risk for adverse birth outcomes was different across the three parental structures.

METHODS

- **Study design**: A cross-sectional population-based analysis of birth certificates from all live births conceived through MAR in Louisiana from 2016–2022 (N=2,484).
- **The study outcomes:** Spontaneous labor, induced labor, Cesarean delivery, breech delivery, preterm birth (PTB, birth at <37 weeks of gestation), and low birthweight (LBW, birthweight ≤2500g). All study outcomes were binary (Y/N).
- **Exposure**: Parental family structure was classified based on the sex of both parents listed on the birth certificate and included same-sex (both birth parent and other parent were female), different-sex (birth parent was female and other parent was male), and single-parent (birth parent was female and other parent's information was not included) households.
- **Analysis**: Three modified Poisson regression models with robust standard errors (clustered within each birthing person) were performed to estimate risk ratios (RR) and 95% confidence intervals (CI) associated with parental structure and adverse birth outcomes. Model 1 estimated the unadjusted (crude) associations. Model 2 included demographic and socioeconomic characteristics (age, race/ethnicity, educational attainment, insurance, and low SES). Model 3 additionally included health risk factors (parity, multiple gestation, smoking, pre-pregnancy BMI, gestational diabetes, and gestational hypertension).

RESULTS

Figure 1. Pregnancy characteristics across the three parental structures

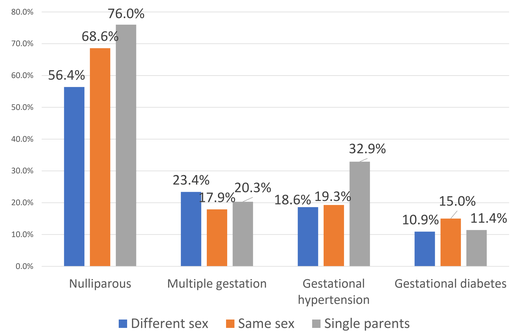
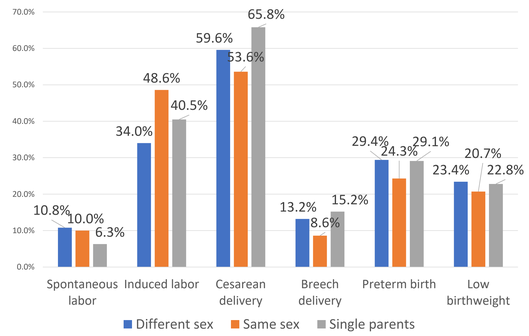


Figure 2. Birth characteristics across the three parental structures



- Among 2,484 MAR-conceived births, 140 (5.6%) were in same-sex relationships, 79 (3.2%) were in single-parent household, and 2,265 (91.2%) were in different-sex relationships.
- The prevalence of induced labor was greater among individuals in same-sex relationships (48.6% vs. 34.0% in different-sex and 42.5% in single-parent households, p<0.01). The prevalence of other pregnancy and birth outcomes varied across the groups, but these differences were not statistically significant (Figure 2).
- Birthing people in same-sex and single-parent households had a higher risk of labor induction (RR=1.43, 95% CI=1.22–1.67 and RR=1.19, 95% CI=1.01–1.42, respectively) compared to those in different-sex relationships. The risk of induced labor remained elevated among birthing people in same-sex relationships (aRR=1.32, 95% CI=1.14-1.52), even after adjusting for sociodemographic, preexisting health, and pregnancy risk factors (including chronic and gestational hypertension, gestational diabetes).

Table 1. Associations between parental structure and birth outcomes among ART-conceived pregnancies

		Model 1.	Model 2.	Model 3.
	Parental structure	RR (95% CI)	aRR (95% CI)	aRR (95% CI)
	Different-sex	Ref	Ref	Ref
	Same-sex	0.92 (0.62-1.38)	0.93 (0.60-1.45)	0.91 (0.59-1.43)
	Single parent	0.59 (0.26-1.33)	0.59 (0.25-1.38)	0.63 (0.28-1.47)
Induced labor	Different-sex	Ref	Ref	Ref
	Same-sex	1.43 (1.22-1.67)***	1.44 (1.24-1.66)***	1.32 (1.14-1.52)***
	Single parent	1.19 (1.01-1.42)*	1.23 (1.01-1.51)*	1.08 (0.84-1.39)
Cesarean delivery	Different-sex	Ref	Ref	Ref
	Same-sex	0.90 (0.80-1.01)	0.91 (0.80-1.03)	0.92 (0.83-1.02)
	Single parent	1.10 (0.94-1.30)	1.01 (0.87-1.18)	1.00 (0.87-1.14)
Breech delivery	Different-sex	Ref	Ref	Ref
	Same-sex	0.65 (0.37-1.14)	0.64 (0.38-1.09)	0.73 (0.43-1.25)
	Single parent	1.15 (0.70-1.90)	1.14 (0.68-1.92)	1.12 (0.80-1.58)
Preterm birth	Different-sex	Ref	Ref	Ref
	Same-sex	0.83 (0.63-1.09)	0.79 (0.60-1.04)	0.89 (0.73-1.08)
	Single parent	0.99 (0.66-1.48)	0.96 (0.62-1.50)	0.92 (0.63-1.35)
Low birthweight	Different-sex	Ref	Ref	Ref
	Same-sex	0.89 (0.61-1.29)	0.85 (0.58-1.24)	0.96 (0.74-1.24)
	Single parent	0.98 (0.60-1.58)	0.89 (0.57-1.39)	0.87 (0.61-1.23)

CONCLUSION

In the MAR-treated population, birthing people in same-sex relationships experienced 32% higher risk of labor induction compared to persons in different-sex and single-parent households, with other study outcomes comparable among the three parental structures.

- The prevalence of Cesarean deliveries, PTB, and LBW was the lowest among birthing people in same-sex relationships, whereas unpartnered birthing people (single parents by choice) had the highest prevalence of preexisting health risk factors compared to other two groups.
- An increased risk of labor induction observed among birthing people in same-sex relationship may suggest medical indications for deliveries with diagnoses and medical risk factors (e.g., placental abruption, fetal distress) that our data was not able to capture.
- **LIMITATIONS:** MAR utilization is generally underreported on birth certificates and varies across the states [4, 5]. In addition, we were unable to investigate the type of fertility treatment used (e.g., IVF/ICSI vs. IUI). Finally, while we used single/unmarried status, the absence of the other parent's information on the birth certificate, and the use of MAR to conceive to identify "single parents by choice", we acknowledge that some people in this category might not self-define as such and/or identify as sexual minority persons.
- **DIRECTIONS FOR FUTURE RESEARCH**: More detailed information on the diagnosis of infertility and fertility treatment type are critical in disentangling the contribution of sexual minority status, preexisting health conditions, and fertility treatment to adverse pregnancy and birth outcomes. In addition, more accurate data on individual's relationship status, diverse parenting structures and parenting intensions are needed to further investigate fertility treatment outcomes among this unique and understudied population.

References

1. Tierney K. The future of assisted reproductive technology live births in the United States. *Population Research and Policy Review.* 2022;41(5):2289-2309.
2. Raymer J, Guan Q, Norman RJ, Ledger W, Chambers GM. Projecting future utilization of medically assisted fertility treatments. *Popul Stud (Camb).* 2020;74(1):23-38.
3. Raja NS, Russell CB, Moravek MB. Assisted reproductive technology: considerations for the nonheterosexual population and single parents. *Fertility and Sterility.* 2022;118(1):47-53.
4. Berrahou IK, Leonard SA, Zhang A, Main EK, Obedin-Maliver J. Sexual and/or gender minority parental structures among California births from 2016 to 2020. *American Journal of Obstetrics & Gynecology MFM.* 2022;4(4):100653.
5. Thoma ME, Boulet S, Martin JA, Kissin D. Births resulting from assisted reproductive technology: comparing birth certificate and National ART Surveillance System Data, 2011. *National vital statistics reports: from the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System.* 2014;63(8):1-11.

Contact information

Corresponding author: Dovile Vilda, PhD, MSc (she / her)
Assistant Professor | BIRCWH Scholar
Mary Amelia Center for Women's Health Equity Research
Department of Social, Behavioral, and Population Sciences
Tulane University School of Public Health and Tropical Medicine
Email: dvilda@tulane.edu

Funding acknowledgement: This project is supported by Award Number K12HD043451 from the National Institute of Arthritis and Musculoskeletal and Skin Diseases.